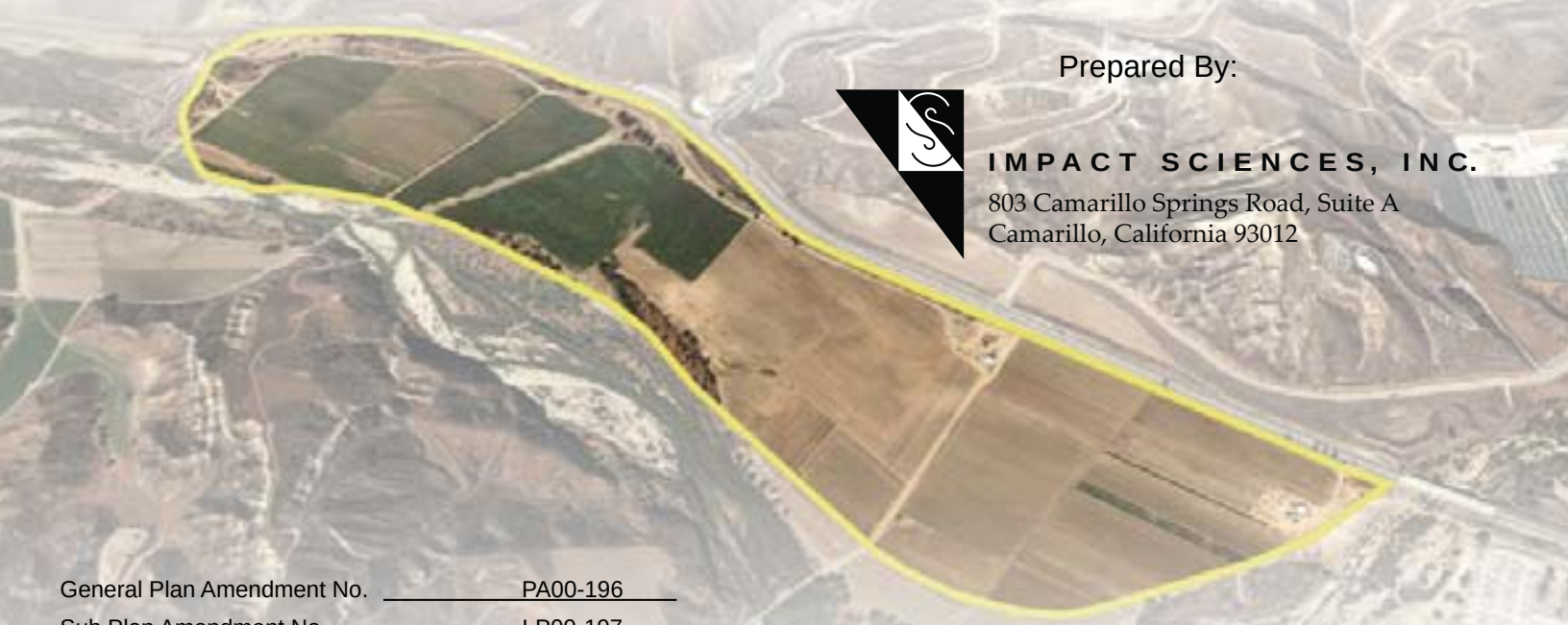
County of Los Angeles

Final Environmental Impact Report

SCH No. 2004021002

Volume V of V - Appendices

LANDMARK VILLAGE



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Sub Plan Amendment No.	LP00-197
Specific Plan Amendment No.	SP00-198
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SEA Conditional Use Permit No.	RCUP200500112
Oak Tree Permit No.	OTP00-196
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NEWHALL RANCH
Newhall Ranch Company

November 2007

FINAL
ENVIRONMENTAL IMPACT REPORT

for
LANDMARK VILLAGE

SCH No. 2004021002

Volume V of V
Appendices

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Water Resources (continued)

DWR's Progress on Incorporating Climate Change into Management of California's Water Resources

July 2006

Progress on Incorporating Climate Change into Management of California's Water Resources

July 2006
Technical Memorandum Report
California Department of Water Resources

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Progress on Incorporating Climate Change into Planning and Management of California's Water Resources

Technical Memorandum Report

July 2006

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Executive Summary

Background

On June 1, 2005, Governor Arnold Schwarzenegger issued Executive Order S-3-05 establishing greenhouse gas emissions targets for California and requiring biennial reports on potential climate change effects on several areas, including water resources. The Governor established a Climate Action Team (CAT) to guide the reporting efforts. The CAT selected four climate change scenarios that reflect two greenhouse gas emissions scenarios represented by two Global Climate Models (GCMs). The CAT requested that those four climate change scenarios be used whenever possible in the climate change reporting efforts.

This report is the Department of Water Resources response to the Executive Order. This report describes progress made incorporating climate change into existing water resources planning and management tools and methodologies.

Climate Change and California's Water Resources

California water planners are concerned about climate change and its potential effects on our water resources. Projected increases in air temperature may lead to changes in the timing, amount and form of precipitation - rain or snow, changes in runoff timing and volume, effects of sea level rise on Delta water quality, and changes in the amount of irrigation water needed due to modified evapotranspiration rates.

More than 20 million Californians rely on two massive water projects: the State Water Project (SWP) and federal Central Valley Project (CVP). These complex water storage and conveyance systems are operated by the California Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (Reclamation) for water supply, flood management, environmental protection and recreation.

DWR and Reclamation have formed a joint Climate Change Work Team to provide qualitative and quantitative information to managers on potential effects and risks of climate change to California's water resources. The mission of the team is to coordinate with other state and federal agencies on the incorporation of climate change science into California's water resources planning and management. The team will provide and regularly update information for decision-makers on potential impacts and risks of climate change, flexibility of existing facilities to cope with climate change, and available mitigation measures. This report is the first product of the Work Team.

Report Overview

This report contains eight chapters that present progress and future directions on incorporating climate change science into management of California's water resources. It focuses on assessment methodologies and preliminary study results. The technical chapters of this report,

Chapters 4-7, were peer-reviewed by experts from water resources-related agencies and research institutions. Policy implications and recommendations are beyond the scope of this report.

Uses and Limitations

The purpose of this report is to demonstrate how various analysis tools currently used by DWR could be used to address issues related to climate change. The methods and results presented in this report could be used to guide future climate change analysis and to identify areas where more information is needed.

All results presented in this report are preliminary, incorporate several assumptions, reflect a limited number of climate change scenarios, and do not address the likelihood of each scenario. Therefore, these results are not sufficient by themselves to make policy decisions.

Chapter 1: Introduction

Chapter 1 describes the purpose of this report, details the DWR-Reclamation Climate Change Work Team's mission and goals, and provides a summary of each chapter of the report. The complete text of Executive Order S-3-05 is in an appendix.

Chapter 2: Potential Impacts of Climate Change on California's Water Resources

Chapter 2 provides a statewide overview of California's water resources. Causes of climate change are summarized with an emphasis on aspects of climate change that pose a potential threat to California's water resources. It identifies measures that could be taken to adapt to or mitigate the effects of climate change. Topics covered in Chapter 2 include:

- Overview of California's water resources
- The role of water management and use in greenhouse gas emissions
- Observed and projected changes in air temperature
- Observed and projected changes in precipitation and runoff
- Observed and projected sea level rise and potential effects on groundwater and the Delta
- Potential effects of climate change on
  - Future water demands
  - Colorado River basin
  - Fish
- Sudden climate change
- Climate change and water supply planning challenges

Chapter 3: DWR Climate Change Studies

Chapter 3 presents the background and approach used for the climate change studies completed for this report. Climate change researchers have used global climate models to simulate projected changes in air temperature and precipitation. The global results were converted to represent regional changes in air temperature and precipitation in a process known as downscaling. DWR staff used the downscaled data to conduct preliminary impacts assessments for water resources. The studies use 2050 climate change projections for precipitation and runoff and 2020 land use estimates. The four climate change scenarios and the impacts assessment methodology are described in this chapter.

Chapter 4: Impacts of Climate Change on the State Water Project and Central Valley Project

Chapter 4 presents potential impacts of the selected climate change scenarios on SWP and CVP operations. Analysis includes changes in reservoir inflows, delivery reliability and annual average carryover storage due to 2050 level climate change induced shifts in precipitation and runoff patterns and 2020-level land use. The chapter discusses interaction of various operating rules and regulations such as water allocations, flood control, in-stream flow requirements, and Delta water quality requirements under climate change scenarios. Current management practices and existing system facilities were used in the analysis for this report. No changes to management practices or system facilities were made to try to mitigate the effects of climate change or sea level rise. Implications for possible changes to operations to mitigate climate change impacts are discussed, however exploring these operations changes is left for future work. The studies presented in this chapter did not incorporate potential effects of sea level rise. Future work will investigate possible changes in system operations and Delta outflow requirements that may be needed to lessen effects of sea level rise on Delta water quality.

Current management practices and existing system facilities were used in the analysis for this report. No changes were made to lessen the effects of climate change or sea level rise.

No changes were made to:

- ❑ System structures, such as added water storage, pumping, or canal capacity
- ❑ Reservoir operating rules, such as changing the space required for flood control
- ❑ Streamflow requirements
- ❑ Water quality standards
- ❑ Delta outflow requirements
- ❑ Operations to account for sea level rise

Some of the main results related to climate change impacts on the SWP and CVP include:

- ❑ In three of the four climate scenarios simulated, there were significant shortages in CVP north-of-Delta reservoirs during droughts. In future studies, operational changes are necessary to avoid these shortages. At this time, it is not clear whether the necessary changes in operations will be insignificant or substantial.

- ❑ Changes in annual average SWP south-of-Delta Table A deliveries ranged from a slight increase of about 1 percent for a wetter scenario to about a 10 percent reduction for one of the drier climate change scenarios.

- Increased winter runoff and lower Table A allocations resulted in slightly higher annual average Article 21 deliveries in the three drier climate change scenarios. The boosts in Article 21 did not offset losses to Table A though. The wetter scenario with higher Table A allocations resulted in fewer Article 21 delivery opportunities and slightly lower annual average Article 21 deliveries.

- Changes in annual average CVP south-of-Delta deliveries ranged from increases of about 2.5 percent for a wetter scenario and decreases of as much as 10 percent for drier climate change scenarios. The CVP results of the drier climate change scenarios are in question due to the north-of-Delta shortages mentioned above. These shortages will have to be addressed in future climate change studies.

- For both the SWP and CVP, carryover storage was negatively impacted in the drier climate change scenarios and somewhat increased in the wetter climate change scenario.

Sea level rise effects on water project operations to repulse a greater salt water intrusion under these conditions were not examined due to lack of existing tools for that type of analysis. Surrogates to provide an indication of the increased operation challenges from sea level rise to repulse sea water are discussed in chapter 5. Future work in this area will include the development of the necessary tools to quantify the impacts of sea level rise on saltwater intrusion and the incremental water supply impacts to repulse greater saltwater intrusion forces into the Delta. As discussed in chapter 5 these water supply impacts are expected to be significant.

Chapter 5: Impacts of Climate Change on the Sacramento-San Joaquin Delta

Chapter 5 focuses on potential impacts of climate change on Delta water quality and water levels. The reservoir operations and Delta exports for the four climate change scenarios determined in the studies for Chapter 4 were used to examine potential effects of climate change on Delta water quality. The Delta impacts reflect adjustments in reservoir operations and Delta exports due to shifting precipitation and runoff patterns. The studies in Chapter 4 include the assumption that meeting Delta water quality standards is a top priority for the SWP and CVP operations. Climate change will make meeting Delta water quality standards a larger challenge in the future. (see Table 4.12 in Chapter 4). In the interest of time, no additional changes were made to system operations in Chapter 5 to try to lessen the effects of climate change on Delta water quality as a result of sea level rise.

Sea level rise is an aspect of climate change of great interest in the Delta. Although current analysis tools are not available to determine changes in system operations required to lessen the effects of increased salt intrusion, there are tools that can estimate how much salt could enter the Delta due to sea level rise. For this report preliminary analyses were conducted to examine potential salt intrusion for a one foot rise in sea level. These results will provide information vital to the development of tools to determine changes in system operations that would be needed to maintain compliance with Delta water quality standards.

For the sea level rise scenarios, simulated water quality constituent concentrations without additional changes in system operations were compared to threshold values as a surrogate for evaluating the effects of sea level rise on water project operations to meet existing standards. Assuming these standards are not changed, this analysis shows that more water will be needed to repulse seawater to meet these standards as sea level rises. Tools are being developed to quantify the incremental impacts of sea level rise on water supplies to counteract increased salt water intrusion. Until these tools become available, the analysis below provides an indication of the water project operational challenges due to sea level rise. Chloride loadings at the urban intakes are also estimated.

Some of the main results related to climate change impacts on the Delta include:

- For the four climate change scenarios, Delta inflows typically increase during the late winter and early spring and decrease during the summer and fall. On average, Delta exports are reduced with the largest reductions occurring during the summer and fall. Inflows and exports are most sensitive to climate change during extremely wet or extremely dry periods.

- Flexibility in the system to modify reservoir operations and Delta exports for the climate change scenarios at present sea level results in minor impacts to compliance with chloride standards at Municipal and Industrial intakes.

- A one foot rise in sea level without any changes to the system operations would result in chloride concentrations below the 250 mg/l threshold 90 percent of the time at Old River at Rock Slough. In real time, operational adjustments will take place so these effects will translate into water supply impacts to the SWP and CVP. As stated above these impacts to water supply cannot be quantified at this time. Maintaining chloride concentrations below the 150 mg/l threshold was also more challenging during critical and dry years. These results indicate the need to develop a tool to quantify the additional water supplies that would need to be dedicated to repulse sea water in order to maintain Delta water quality under sea level rise conditions.

- There was complete compliance with the chloride standards at the SWP and CVP for the climate change at present sea level scenarios. Chloride concentrations remained below threshold values for the sea level rise and combined climate change and sea level rise scenarios.

- Chloride mass loadings at the municipal and industrial intakes are typically reduced for the climate change only scenarios due to lower export rates. Increased intrusion of salt water from the ocean for the sea level rise and combined climate change and sea level rise scenarios lead to increased chloride mass loadings at the municipal and industrial intakes.

- For a one foot rise in sea level, maximum daily water levels exceeded the minimum levee crest elevation on Sherman Island twice during the 16-year analysis period. Water levels did not exceed the minimum crest elevation for present sea level conditions.

Chapter 6: Climate Change Impacts on Flood Management

Chapter 6 discusses implications of climate change for managing floods. It presents historical trends that reflect potential climate change effects. Representation of historical periods by climate projection models are compared to historical data. Data requirements for analysis of climate change effects on flood frequency are also discussed.

Over the past century observed data indicate:

- Increasing maximum, mean, and minimum temperatures
- Increasing precipitation in north; decreasing precipitation in south
- Shift in annual runoff to a greater percentage in October-March vs. April-July
- Annual flood peaks increasing in mean and variance

Estimates of future climate temperatures suggest:

- Higher snow levels
- Larger direct runoff from individual storm events
- Earlier spring melt

Uncertainties in future precipitation prevents further analysis at this time

Chapter 7: Climate Change Impacts on Evapotranspiration

Chapter 7 focuses on potential increases in crop water use under climate change scenarios. California is a semiarid region, and to grow crops, water is needed for irrigation in addition to that supplied by precipitation. On a regional basis, most of the water used in agriculture is consumed by evapotranspiration (ET). There is concern that the ET might increase with climate change, which could increase the demand for developed water. This chapter provides theoretical energy budget analyses of climate change impacts on ET. Physiological processes that influence ET may explain changes in the energy budget for climate change conditions. Application of analysis tools to assess changes in estimated net irrigation requirements for crops is presented.

Some of the main issues related to climate change effects on evapotranspiration include:

- Evapotranspiration is comprised of two parts: (1) evaporation from soil, water and plant surfaces; and (2) transpiration, which occurs when water vaporizes inside the plant leaves and diffuses through the pores (i.e., stomata) to the ambient air. Both of these contributions to ET could be influenced by climate change.

- For a 3°C increase in air temperature, increases in evapotranspiration for a reference grass crop ranged from 3 percent to 6 percent. Although this is a small percentage, the volume of water, when summed over the entire state, is substantial. It is assumed that other crops will show a similar response to climate change.

- Potential higher demands for irrigation water due to increases in evapotranspiration rates could possibly be offset by improved water use efficiencies including adjusting cropping patterns and using more efficient on-farm irrigation methods.

- There is a need for canopy level experiments to validate assumptions relating canopy resistance to elevated atmospheric carbon dioxide concentrations to ensure accurate ET projection in response to climate change.

- The importance of crop life cycles and their physiological responses to expected climate change need more analysis to better project irrigation demand resulting from ET.

- The Simulation of Evapotranspiration and Applied Water (SIMETAW) model shows promise as an analytic tool to investigate potential ET of applied water responses to climate change. SIMETAW could be used in conjunction with other DWR analytic modeling tools to help managers better understand implications of climate change on agricultural water demands in California.

Chapter 8: Future Directions

Chapter 8 presents directions for further work in incorporating climate change into the management of California's water resources. Emphasis is placed on associating probability estimates with potential climate change scenarios in order to provide policymakers with both ranges of impacts and the likelihoods associated with those impacts. A better understanding of the likelihoods associated with potential climate change impacts will aid decision-makers in planning appropriate response strategies.

Future efforts will also involve addressing data and analysis gaps that were identified during these preliminary studies. For these preliminary studies, four scenarios that were readily available were selected by the Climate Action Team mainly for expediency. In collaboration with climate change scientists, criteria will be developed to assist water resource planners in determining which climate change scenarios to examine. For sea level rise studies, a tool will be developed to determine how system operations may need to be modified to maintain Delta water quality under sea level rise conditions. That tool would provide an essential component for a suite of modeling tools for climate change impacts and risk assessment.

With the accomplishments to date and planned future directions, DWR is working with other agencies and researchers to provide leadership in incorporating climate change impacts and risks into the planning and management of California's precious water resources.

Progress on Incorporating Climate Change into Management of California's Water Resources

1st Progress Report
July 2006

Chapter 1: Introduction

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1 Introduction

1.1 Background

Before the United Nations World Environment Day in San Francisco in June 2005, Governor Arnold Schwarzenegger said:

> "As of today California is going to be the leader in the fight against global warming. … I say the debate is over. We know the science. We see the threat. And we know the time for action is now."

Executive Order S-3-05 (see Section 1.7) established the following goals for reducing green house gas emissions:

- By 2010, reduce emissions to the 2000 level
- By 2020, reduce emissions to the 1990 level
- By 2050 reduce emissions to 80 percent below 1990 emissions

The Executive Order requires the secretary of the California Environmental Protection Agency to report to the Governor and legislature biannually on progress toward reaching the goals. Biennial reports are also required on potential climate change impacts and possible mitigation and adaptation plans focusing on these topics:

- Water supply
- Public health
- Agriculture
- California coastline
- Forestry

The first reports were due to the Governor and legislature in January 2006. To meet this deadline, and guide the preparation of the reports, a Climate Action Team (CAT) was formed with members from various State agencies and commissions. In addition to the overview reports being produced under the guidance of the CAT, the California Department of Water Resources (DWR) has established a complimentary report titled "Incorporating Climate Change into Management of California's Water Resources." This report describes progress on incorporating climate change science into water resources planning and management.

1.2 Climate Change and California's Water Resources

California water planners are concerned about climate change and its potential effects on our water resources. More than 20 million Californians rely on two massive water projects: the State Water Project (SWP) and federal Central Valley Project (CVP). These complex water storage and conveyance systems are operated by DWR and the Bureau of Reclamation (Reclamation) for water supply, flood management, environmental protection and recreational uses.

The ability of the SWP and the CVP to meet the water demands of its customers and the environment depends heavily on the accumulation of winter mountain snow melting into spring and summer runoff. A warming planet may reduce this natural water storage mechanism. Projected increases in air temperature may lead to changes in the timing, amount and form of precipitation – rain or snow, changes in runoff timing and volume, sea level rise effects on Delta water quality, and changes in the amount of irrigation water needed due to modified evapotranspiration rates.

1.3 DWR-Reclamation Climate Change Work Team

In the past, climate change was typically considered qualitatively in the planning process. Legislative mandates in California including Executive Order S-3-05 and the latest update to the California Water Plan (Bulletin 160) call for more quantitative assessments of climate change effects. To address these concerns, DWR and Reclamation formed a joint Climate Change Work Team to provide qualitative and quantitative information to managers on potential effects and risks of climate change to California's water resources.

The mission of the Climate Change Work Team is to coordinate with other State and federal agencies on the incorporation of climate change science into California's water resources planning and management. The team will provide and regularly update information for decision-makers on potential impacts and risks of climate change, flexibility of existing facilities to cope with climate change, and available mitigation measures.

In water resources planning, climate change studies often focus on what might happen without providing information about how likely it is to happen. A major long-term objective of the Work Team is to extend impacts analysis to include likelihoods associated with each climate change effect. In order to meet this objective, the Work Team set these goals:

- Build coalitions with experts in climate change and seek their guidance in estimating risk of climate change effects
- Support mandates on climate change
  - Governor's Executive Order S-3-05, June 1, 2005
  - California Water Plan Bulletin 160
- Assess impacts to operations of the SWP and CVP for several climate change scenarios
- Assess risk for the SWP and CVP systems based on impact studies and estimates of impact likelihood
- Evaluate risk-mitigation options

This report presents progress to date by the Work Team on incorporating climate change science into planning and management of California's water resources. This report also provides direction for continued efforts at developing probabilistic risk assessments of climate change impacts for water resources management. Figure 1.1 depicts the progress of the Work Team towards its goals. The target shape of the figure represents the focus of our efforts towards the ultimate goal, or bulls-eye, of probabilistic risk assessments. The components of Figure 1.1 that are shaded blue or white represent progress reflected in this report. The yellow and red components of Figure 1.1 represent future directions.

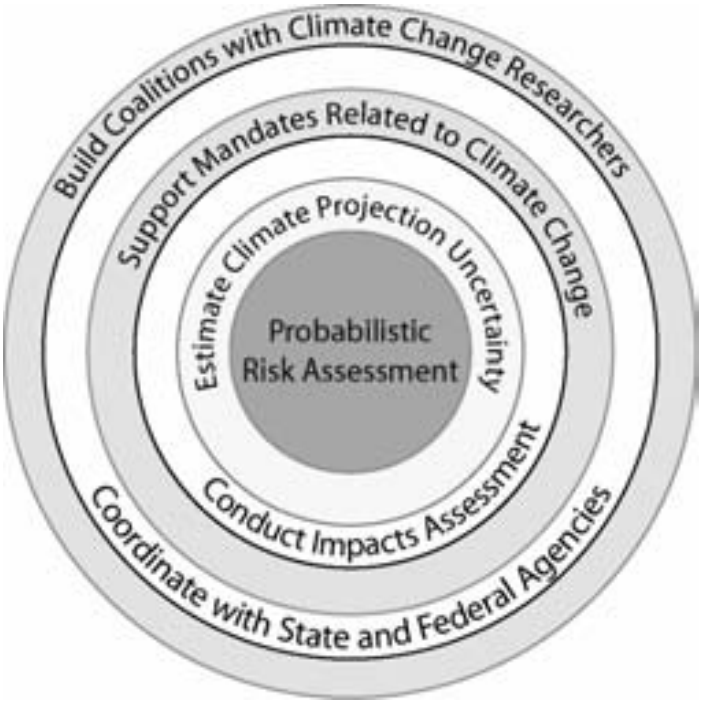

Figure 1.1: DWR-Reclamation Climate Change Work Team Goals

1.4 Report Overview

This report contains eight chapters that present progress and future directions on incorporating climate change science into management of California's water resources. It focuses on assessment methodologies and preliminary study results. The technical chapters of this report, Chapters 4-7, were peer reviewed by experts from water resources related agencies and research institutions. Policy implications and recommendations are beyond the scope of this report.

Chapter 2 provides a statewide overview of California's water resources. Causes of climate change are summarized with an emphasis on aspects of climate change that pose a potential threat to California's water resources. It then identifies measures that could be taken to adapt to or mitigate the effects of climate change.

Chapter 3 presents the background and approach used for the climate change studies completed for this report. It also describes climate change scenarios used in this report.

Chapter 4 presents potential impacts of the selected climate change scenarios on SWP and CVP operations. Analysis includes changes in reservoir inflows, delivery reliability and annual average carryover storage due to climate change induced shifts in precipitation and runoff patterns. It discusses interaction of various operating rules and regulations such as water allocations, flood control, in-stream flow requirements, and Delta water quality requirements under climate change scenarios. It also presents implications for possible changes to operations to mitigate climate change impacts. Exploring these changes is left for future work.

Chapter 5 focuses on potential impacts of climate change on Delta water quality and water levels. It presents effects of modified Delta inflows and exports on compliance with water quality standards. It also discusses implications of sea level rise including a study of levee overtopping potential.

Chapter 6 discusses implications of climate change for managing floods. It presents historical trends that reflect potential climate change effects. Representation of historical periods by climate projection models are compared to historical data. It discusses data requirements for analysis of climate change effects on flood frequency.

Chapter 7 focuses on potential increases in crop water use under climate change scenarios. It discusses potential responses of evapotranspiration to global warming. It characterizes physiological processes that influence ET and might be influenced by climate change. Also, it presents application of analysis tools to assess changes in estimated net irrigation requirements for crops.

Chapter 8 presents directions for further work in incorporating climate change into the management of California's water resources. Emphasis is placed on associating probability estimates with potential climate change scenarios in order to provide policymakers with both ranges of impacts and the likelihoods associated with those impacts.

1.5 Uses and Limitations

The purpose of this report is to demonstrate how various analysis tools currently used by DWR could be used to address issues related to climate change. The methods and results presented in this report could be used to guide future climate change analysis and to identify areas where more information is needed.

Current management practices and existing system facilities were used in the analysis for this report. No changes to management practices or system facilities were made to try to mitigate the effects of climate change or sea level rise. All results presented in this report are preliminary, incorporate several assumptions, reflect a limited number of climate change scenarios, and do not address the likelihood of each scenario. These results are not sufficient by themselves to make policy decisions.

1.6 Acknowledgements

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Chapter 7: Richard Allen-University of Idaho at Kimberley, Hugo Hidalgo-Scripps Institute of Oceanography, and Ted Hsiao-University of California at Davis

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1.7 Appendix: Executive Order S-3-05

Executive Order

EXECUTIVE DEPARTMENT

STATE OF CALIFORNIA

EXECUTIVE ORDER S-3-05
by the
Governor of the State of California

WHEREAS, California is particularly vulnerable to the impacts of climate change; and

WHEREAS, increased temperatures threaten to greatly reduce the Sierra snowpack, one of the State's primary sources of water; and

WHEREAS, increased temperatures also threaten to further exacerbate California's air quality problems and adversely impact human health by increasing heat stress and related deaths, the incidence of infectious disease, and the risk of asthma, respiratory and other health problems; and

WHEREAS, rising sea levels threaten California's 1,100 miles of valuable coastal real estate and natural habitats; and

WHEREAS, the combined effects of an increase in temperatures and diminished water supply and quality threaten to alter micro-climates within the state, affect the abundance and distribution of pests and pathogens, and result in variations in crop quality and yield; and

WHEREAS, mitigation efforts will be necessary to reduce greenhouse gas emissions and adaptation efforts will be necessary to prepare Californians for the consequences of global warming; and

WHEREAS, California has taken a leadership role in reducing greenhouse gas emissions by: implementing the California Air Resources Board motor vehicle greenhouse gas emission reduction regulations; implementing the Renewable Portfolio Standard that the Governor accelerated; and implementing the most effective building and appliance efficiency standards in the world; and

WHEREAS, California-based companies and companies with significant activities in California have taken leadership roles by reducing greenhouse gas (GHG) emissions, including carbon dioxide, methane, nitrous oxide and hydrofluorocarbons, related to their operations and developing products that will reduce GHG emissions; and

WHEREAS, companies that have reduced GHG emissions by 25 percent to 70 percent have lowered operating costs and increased profits by billions of dollars; and

WHEREAS, technologies that reduce greenhouse gas emissions are increasingly in demand in the worldwide marketplace, and California companies investing in these technologies are well-positioned to profit from this demand, thereby boosting California's economy, creating more jobs and providing increased tax revenue; and

WHEREAS, many of the technologies that reduce greenhouse gas emissions also generate operating cost savings to consumers who spend a portion of the savings across a variety of sectors of the economy; this increased spending creates jobs and an overall benefit to the statewide economy.

NOW, THEREFORE, I, ARNOLD SCHWARZENEGGER, Governor of the State of California, by virtue of the power invested in me by the Constitution and statutes of the State of California, do hereby order effective immediately:

1. That the following greenhouse gas emission reduction targets are hereby established for California: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80 percent below 1990 levels; and

2. That the Secretary of the California Environmental Protection Agency ("Secretary") shall coordinate oversight of the efforts made to meet the targets with: the Secretary of the Business, Transportation and Housing Agency, Secretary of the Department of Food and Agriculture, Secretary of the Resources Agency, Chairperson of the Air Resources Board, Chairperson of the Energy Commission, and the President of the Public Utilities Commission; and

3. That the Secretary shall report to the Governor and the State Legislature by January 2006 and biannually thereafter on progress made toward meeting the greenhouse gas emission targets established herein; and

4. That the Secretary shall also report to the Governor and the State Legislature by January 2006 and biannually thereafter on the impacts to California of global warming, including impacts to water supply, public health, agriculture, the coastline, and forestry, and shall prepare and report on mitigation and adaptation plans to combat these impacts; and

5. That as soon as hereafter possible, this Order shall be filed with the Office of the Secretary of State and that widespread publicity and notice be given to this Order.

IN WITNESS WHEREOF I have here unto set my hand and caused the Great Seal of the State of California to be affixed this the first day of June 2005.

/s/ Arnold Schwarzenegger

Governor of California

Progress on Incorporating Climate Change into Management of California's Water Resources

1st Progress Report
July 2006

Chapter 2:
Potential Impacts of Climate Change on California's Water Resources

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2 Potential Impacts of Climate Change on California's Water Resources

2.1 Introduction

The purpose of this chapter is to:

- provide a brief description of California's water resources
- summarize the anthropogenic causes of climate change
- describe the aspects of climate change that pose a potential threat to the State's water management systems

This chapter is general and statewide in scope. It describes impacts that could occur through the end of this century. Subsequent chapters are primarily focused on the effects of climate change on Central Valley water management systems based on selected downscaled climate model projections for mid-century.

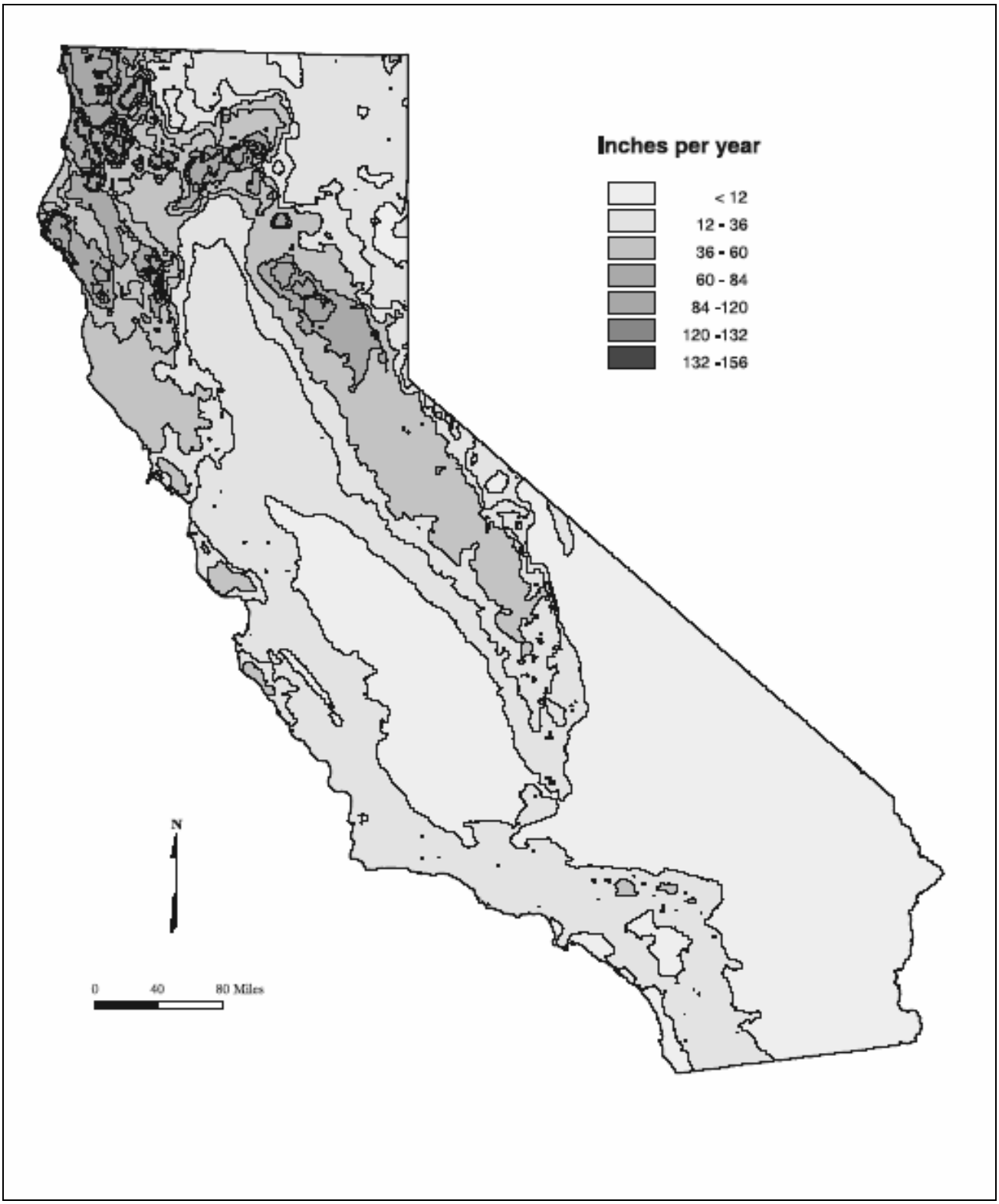
2.2 Background - California's Water Resources

2.2.1 Distribution of Precipitation

California's water resources vary significantly throughout the State as the result of varying climates and the distribution of precipitation. On average, more than 140 inches of precipitation falls annually in the mountains of northwestern California while fewer than four inches falls in parts of the desert in the southeast portion of the State. Figure 2-1 depicts the distribution of average annual precipitation in the State. Statewide average annual precipitation is about 23 inches (DWR, 2003).

Variability in the distribution of precipitation in California is due in part to hemispheric-scale atmospheric circulation patterns. Most winter storms typically move from the Pacific Ocean east across the northern part of the State. A progressively smaller percentage of storms move across the State to the south.

Most of the State's precipitation falls in the northern Coast Range, Klamath and Cascade ranges and the western slope of the Sierra Nevada due to orographic effects. The Mojave Desert, San Joaquin Valley floor and areas east of the Sierra Nevada receive much less precipitation, partly because they are in a rain shadow.



Source: DWR, 2003

Figure 2-1 Distribution of Average Annual Precipitation in California, 1961 to 1990

2.2.2 California's Water Management Systems

The majority of California's population of about 37 million people is concentrated in and near major urban centers. About half of the State's population resides in Southern California where annual precipitation and runoff is much less than in Northern California.

Much of the State's agriculture also is in areas with limited precipitation, including the San Joaquin Valley and the Imperial Valley. Agriculture is critical to the State's economy and usually consumes about 40 percent of the State's total annual developed water supply (DWR, 2005a). California uses this water to produce more than 350 crops, which in 2003 were valued at $29.4 billion. California produces more than half of the vegetables, nuts, and fruits produced in the U.S. (USDA, 2003).

An extensive network of reservoirs and aqueducts has been developed throughout much of California to provide water to major urban and agricultural areas. This network serves to store and transport runoff from where it is plentiful to where it is scarce. It also serves to store winter and early spring runoff so that it will be available when water demand is the highest in the late spring and summer. Figure 2-2 shows the location of major federal, State and local surface reservoirs and aqueducts in California.

The largest system of surface reservoirs and aqueducts in California is in the Central Valley. The historical natural average annual runoff in the Central Valley is about 33.6 million acre-feet, or about 48 percent of California's total natural runoff (DWR, 1951). About two-thirds of the runoff in the Central Valley typically originates in the Sacramento Valley.

Surface reservoirs collecting runoff in the Central Valley have a combined total capacity of about 29 million acre-feet. The two largest water projects in the Central Valley, the State Water Project (SWP) and the federal Central Valley Project (CVP), provide a combined average total of about 10 million acre-feet of water annually for urban and agricultural uses. More than 20 million Californians rely on the SWP and the CVP for at least part of their water supply. These projects irrigate an average of nearly 3.6 million acres of farmland each year (DWR, 2005a).

Other major water storage and conveyance systems in California include the All-American Canal and the Colorado River Aqueduct, both of which divert water from the Colorado River in Southern California. The All-American Canal supplies water to cities and agriculture in the Imperial and Coachella valleys. The Colorado River Aqueduct supplies water to the south coast region. In the recent past, California has diverted as much as 5.3 million acre-feet of water annually from the Colorado River. This is in excess of the State's allotment of 4.4 million acre-feet (DWR, 2005a). Additional discussion of the Colorado River and California's diversions from the river is in Section 2.8.

Figure 2-2 Major Federal, State and Local Water Storage and Conveyance Systems in California

Groundwater also plays a critical role in providing for the State's water needs. In an average year, groundwater meets about 30 percent of California's applied urban and agricultural water demands. This increases to more than 40 percent during drought years. In 1995, an estimated 13 million Californians, nearly 43 percent of the State's population, were served by groundwater (DWR, 2003).

2.2.3 Climate Change and California's Water Resources

Theories concerning climate change and global warming existed as early as the late 1800s. It wasn't until the late 1900s that understanding of the earth's atmosphere had advanced to the point where many climate scientists began to accept that the earth's climate is changing. Today, many climate scientists agree that some warming has occurred over the past century and will continue through this century.

The United Nations Intergovernmental Panel on Climate Change predicts that changes in the earth's climate will continue through the 21st century and that the rate of change may increase significantly in the future because of human activity (IPCC, 2001b). Many researchers studying California's climate believe that changes in the earth's climate have already affected California and will continue to do so in the future.

Climate change may seriously affect the State's water resources. Temperature increases could affect water demand and aquatic ecosystems. Changes in the timing and amount of precipitation and runoff could occur. Sea level rise could adversely affect the Sacramento-San Joaquin River Delta and coastal areas of the State. Some of the projected effects of climate change on California's water resources and the consequences of those effects are summarized in Table 2-1.

Climate change is identified in the 2005 update of the California Water Plan (Bulletin 160-05) as a key consideration in planning for the State's future water management (DWR, 2005a). The 2005 Water Plan update qualitatively describes the effects that climate change may have on the State's water supply. It also describes efforts that should be taken to quantitatively evaluate climate change effects for the next Water Plan update.

Table 2-1 Potential Effects of Climate Change on California's Water Resources and Expected Consequences

Potential Water Resource Impact	Expected Consequence
Reduction of the State's average annual snowpack	• Potential loss of 5 million acre-feet or more of average annual water storage in the State's snowpack • Increased challenges for reservoir management and balancing the competing concerns of flood protection and water supply
Changes in the timing, intensity, location, amount, and variability of precipitation	• Potential increased storm intensity and increased potential for flooding • Possible increased potential for droughts
Long-term changes in watershed vegetation and increased incidence of wildfires	• Changes in the intensity and timing of runoff • Possible increased incidence of flooding and increased sedimentation
Sea level rise	• Inundation of coastal marshes and estuaries • Increased salinity intrusion into the Sacramento-San Joaquin River Delta • Increased potential for Delta levee failure • Increased potential for salinity intrusion into coastal aquifers (groundwater) • Increased potential for flooding near the mouths of rivers due to backwater effects
Increased water temperatures	• Possible critical effects on listed and endangered aquatic species • Increased environmental water demand for temperature control • Possible increased problems with foreign invasive species in aquatic ecosystems • Potential adverse changes in water quality, including the reduction of dissolved oxygen levels
Changes in urban and agricultural water demand	Changes in demand patterns and evapotranspiration rates

2.3 The Role of Water Management and Use in Greenhouse Gas Emissions

2.3.1 Executive Order S-03-05

Executive Order S-3-05, signed by Governor Arnold Schwarzenegger June 1, 2005, establishes aggressive greenhouse gas emission reduction goals for California. These goals are:

- by 2010, reduce emissions to 2000 levels
- by 2020, reduce emissions to 1990 levels
- by 2050, reduce emissions to 80 percent below 1990 levels

Since water management and use are a significant part of California's energy matrix, both in terms of energy generation and consumption, they are an important consideration in meeting the emission reduction goals established by the Governor.

2.3.2 Water Supply and Treatment

In the draft "Statewide Assessment of Energy Used to Manage Water," the California Energy Commission estimated that an average of about 44 million tons of carbon dioxide is emitted into the atmosphere each year to provide water in California. Any reductions in energy consumption related to water will help the State meet its greenhouse gas reduction goals.

California's aqueduct systems are one of the larger users of electricity in the State. Other significant uses of electrical power related to water in California include:

- pumping groundwater from wells
- treating drinking water
- delivering of water to consumers through local distribution systems
- treating wastewater and wastewater reclamation.

Diesel, gasoline, and natural gas-powered pumps are used for some water supply and treatment operations. Diesel-powered pumps are most prevalent in agriculture.

End uses of water also result in the consumption of electrical energy and natural gas, such as heating of water for domestic, commercial, and industrial operations. Various industrial processes that use water also result in energy consumption.

2.3.3 Hydroelectric Power

Hydroelectric power is generated at most publicly-owned water supply reservoirs in California and at many privately-owned reservoirs. Hydroelectric power is also generated by run-of-river hydroelectric plants and by power recovery plants along aqueducts and water distribution systems. Most of California's hydroelectric power is produced in the Sierra Nevada and Cascade

Range. This is due to the relatively large amount of precipitation that falls there and the amount of elevation change available for power generation.

Hydroelectric power production varies from year to year in California with changing hydrologic conditions. Hydroelectric power produced outside of California is also imported into the State to help meet energy needs. Hydroelectric power production is a critical consideration for meeting greenhouse gas emission reduction goals set by Executive Order S-3-05. Other than the construction of hydroelectric power facilities, hydroelectric power production essentially does not result in the emission of greenhouse gasses. As discussed in Section 2.5, climate change could reduce hydroelectric power production by existing facilities, especially at reservoirs in the foothills of the Sierra Nevada. This is due to expected losses in annual snow pack and changes in the timing of annual runoff as the result of climate change.

2.3.4 Future Plans

The 2005 California Water Plan Update (DWR, 2005) estimates that water use efficiency can reduce annual urban water use by 1.1 million to 2.3 million acre-feet by 2030. It is also estimated that water use efficiency can reduce annual agricultural water use by 0.5 million to 2.0 million acre-feet by 2030. Accelerating efforts to attain those water use reductions by 2015 could result in a cumulative reduction of greenhouse gas emissions of approximately 30 million tons by 2030.

The Department of Water Resources is developing water use efficiency measures that can help California meet the greenhouse gas emission reduction goals established by the Governor. These measures are described in a Department staff report titled "Reduction of Greenhouse Gas Emissions through Water Use Efficiency Measures, October, 2005."

In the next sections of this chapter, past and potential future changes in temperature, precipitation, and sea level are described. An overview of the potential impacts of possible future changes is also presented.

2.4 Changes in Air Temperature

2.4.1 Past Changes

The Earth's climate has had numerous periods of cooling and warming in the past. Significant periods of cooling have been marked by massive accumulations of sea and land-based ice extending from the Earth's poles to as far as the mid-latitudes. Periods of cooling have also been marked by lower sea levels due to the accumulation of water as ice, and cooling and contraction of the Earth's oceans. Periods of warming caused recession of the ice toward the poles, warming and thermal expansion of the Earth's oceans, and sea level to rise. More discussion on past changes in sea level is in Section 2.6.

Figure 2-3 depicts significant periods of cooling and warming over about the past 400,000 years based on analysis of ice cores. The causes of the temperature changes are unknown, although

they may be due to changes in solar radiation, the Earth's orbit, the composition of the atmosphere, ocean circulation patterns and other factors. Average temperatures in the Northern Hemisphere appear to have been relatively stable from about 1000 to the mid-1800s based on temperature proxy records from tree rings, corals, ice cores and historical observations (IPCC, 2001a). However, there is a significant amount of uncertainty related to proxy temperature records, especially those extending far back into the past.

The United Nations Intergovernmental Panel on Climate Change stated that the Earth's climate has warmed since the pre-industrial era and that some of this change is attributable to the activities of humans (IPCCb, 2001). Global average near-surface air temperatures and ocean surface temperatures have increased 0.6 ± 0.2°C over the 20th century (IPCCa, 2001). Much of the rise occurred during 1910 to 1945 and 1976 to 2000, as depicted in Figure 2-4.

There is evidence that temperatures in the western United States and California have increased during the past century based on temperature measurements, apparent trends in reduced snowpack and earlier runoff, and other evidence such as changes in the timing of blooming plants (NWS, 2005) (Mote, 2005) (Cayan, 2001). More discussion of observed changes in temperature and related changes in snowpack and runoff in the western United States and California is contained in Section 2.5 and Chapter 6.

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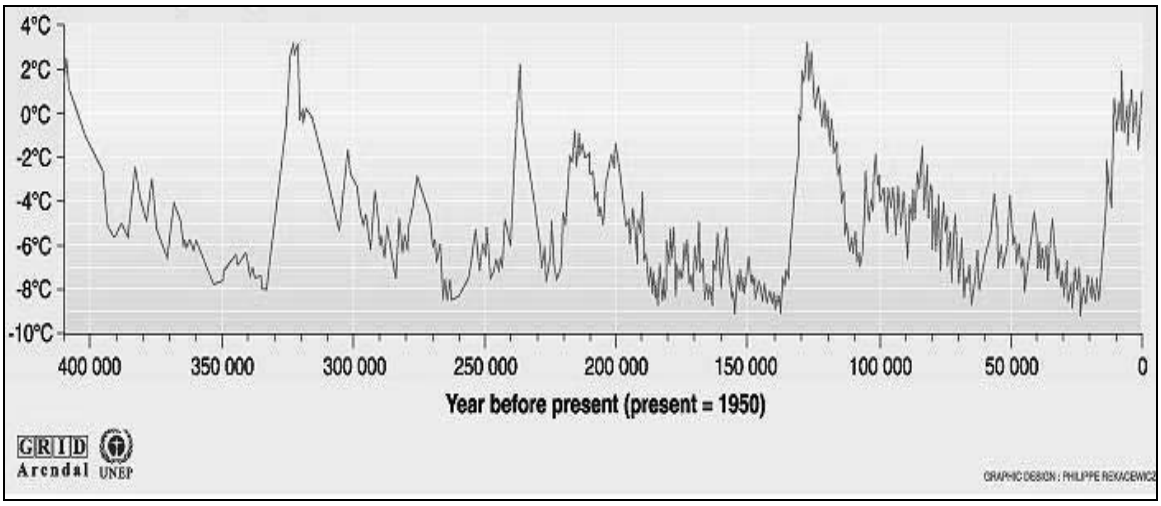

Figure 2-3 Changes in Air Temperature Over About the Past 400,000 Years

Explanation: Graph depicts changes in air temperature as evidenced by isotopic analysis of ice cores obtained at the Russian Vostok station in central east Antarctica. For additional explanation visit: http://cdiac.esd.ornl.gov/trends/temp/vostok/jouz_tem.htm.
Source: United Nation's Environment Programme Global Resource Information Database - Arendal website at http://www.grida.no/climate/vital/02.htm.

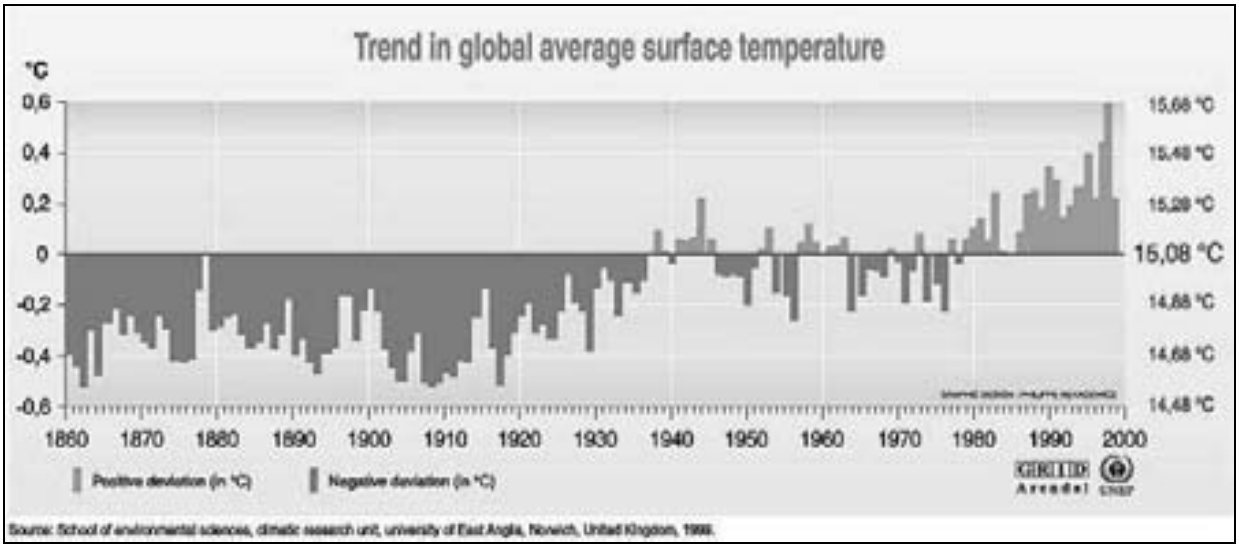

Figure 2-4 Trend in Global Average Temperature from 1860 to 2000

Explanation: The figure depicts global average combined land-surface air and sea surface temperatures from 1861 to 1998 relative to the average temperature between 1961 and 1990. The left vertical scale is in degrees Celsius.
Source: United Nation's Environment Programme Global Resource Information Database - Arendal website at: http://www.grida.no/climate/vital/17.htm.

2.4.2 Causality

Human-induced changes in the Earth's temperature have been tied to increased concentrations of greenhouse gases in the atmosphere caused by the production and burning of fossil fuels and land uses. The primary gases of concern are carbon dioxide, methane, and nitrous oxide. Table 2-2 lists changes in atmospheric concentrations of these gases from 1750 to 1998, as well as their efficacy in causing warming. Figure 2-5 depicts changes in atmospheric carbon dioxide concentration measured at Mauna Loa Hawaii from 1958 to 2005.

Table 2-2 Abundance of Well-Mixed Greenhouse Gases in 1750 (pre-industrial age) and in 1998 and Radiative Forcing Due to the Change in Abundance

Gas	Abundance (Year 1750)	Abundance (Year 1998)	Radiative Forcing (Wm^{-2})
Carbon Dioxide	278	365	1.46
Methane	700	1745	0.48
Nitrous Oxide	270	314	0.15

Source: IPCC, 2001a
Explanation: Volume mixing ratios for carbon dioxide are in parts per million and are in parts per billion for methane and nitrous oxide. Wm^{-2} = watts per square meter.

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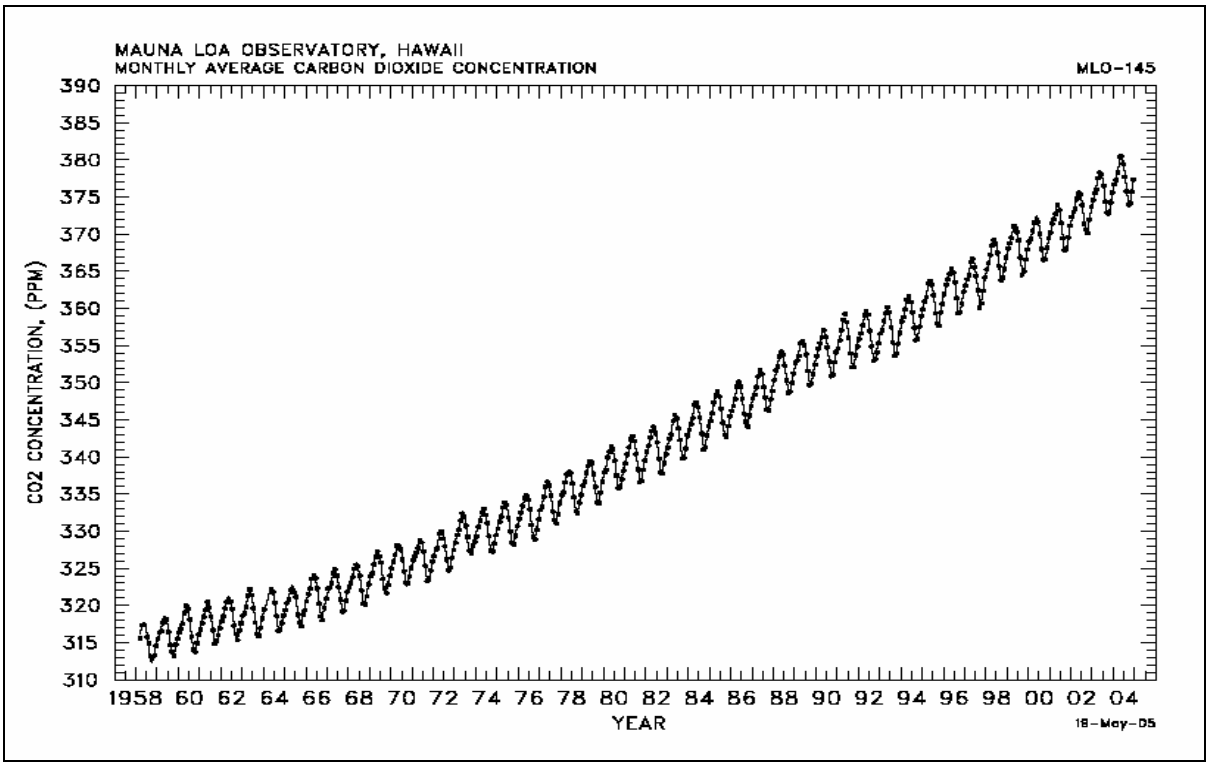


Figure 2-5 Changes in Atmospheric Carbon Dioxide Concentration Measured at Mauna Loa, Hawaii from 1958 to 2005.

Source: United States Department of Energy, Carbon Dioxide Information Analysis Center website at: http://cdiac.esd.ornl.gov/trends/co2/sio-mlo.htm .
Explanation: PPM = parts per million. Annual decreases in atmospheric carbon dioxide concentration at Mauna Loa, Hawaii occur each summer and are due to seasonal increases in plant respiration in the Northern Hemisphere.

2.4.3 Temperature Projections

The United Nations Intergovernmental Panel on Climate Change reports that global average surface temperatures are projected to rise between 1.4 to 5.8°C from 1990 to 2100, based on various climate models and greenhouse gas emission scenarios (IPCC, 2001a). Figure 2-6 is a generalized representation of the range of temperature projections reported by the IPCC in its Third Assessment Report (TAR). Information on the various projections making up the range, as well as their basis can be found in the TAR[1].

[1] Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2001a). http://www.grida.no/climate/ipcc_tar/wg1/index.htm

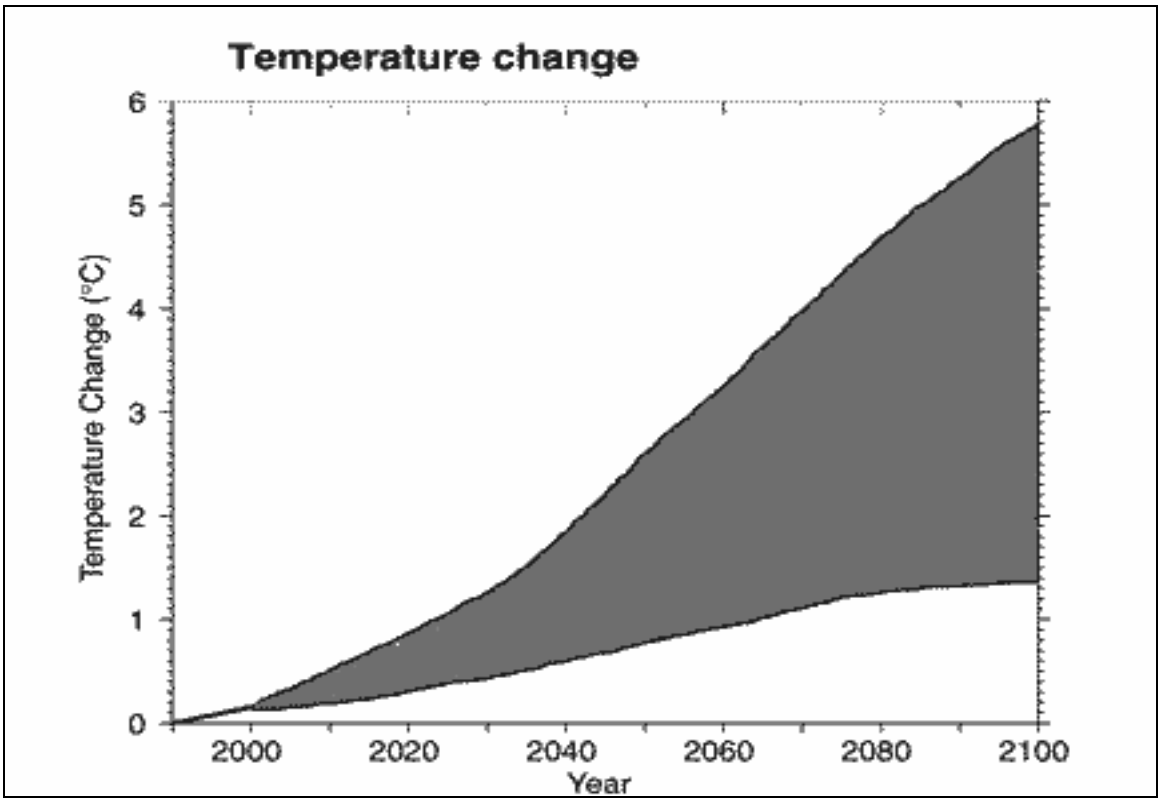


Figure 2-6 Range of Projections Reported by the Intergovernmental Panel on Climate Change for Increasing Global Average Surface Temperature Through 2100.

Source: United States Environmental Protection Agency website at: http://yosemite.epa.gov/oar/globalwarming.nsf/content/ClimateFutureClimateGlobalTemperature.html

Climate change and temperature projections can be developed on a regional basis using techniques to "downscale" from the results of global models. The level of uncertainty related to regional climate change and temperature projections is generally higher than global projections since downscaling adds more uncertainty. One relatively large group of model projections that was recently examined for California provides a range of about 2.5 to 9 degrees Celsius temperature rise for Northern California by 2100. An analysis of the distribution of the projections generally showed a central tendency at about 3 degrees Celsius of rise for 2050, and about 5 degrees Celsius for 2100 (Dettinger, 2005).

2.5 Changes in Precipitation and Runoff

Climate change appears to have already affected precipitation and runoff in California. More changes are expected in the future as additional changes in the Earth's climate occur. Some of the possible effects of climate change on precipitation as well as potential consequences of those effects are listed in Table 2-3.

While all possible changes in precipitation due to climate change are of potential concern for management of the State's water resources, this section deals mainly with potential changes in the amount, form and variability of precipitation. Existing climatologic and hydrologic data are generally suitable for evaluating historical trends for these three factors. Most research and climate change modeling efforts have focused on potential changes in the amount and form of precipitation in California. Historical information and research efforts are not as abundant or as conclusive for other past and possible future changes in precipitation in California.

2.5.1 Worldwide Precipitation Observations and Projections

Worldwide trends in precipitation over land are hard to determine. The difficulties arise from limited measurements worldwide and measurement problems, such as "undercatch" for precipitation gauges (Hulme, 1995). Where available, streamflow measurements and other information can be used as a proxy record for precipitation.

Worldwide precipitation is reported to have increased about 2 percent since 1900. While global average precipitation has been observed to increase, changes in precipitation over the past century vary in different parts of the world. Some areas have experienced increased precipitation while other areas have experienced a decline (NOAA, 2005). Figure 2-7 illustrates worldwide variation in changes in precipitation over the past century.

Precipitation and streamflow records indicate an increase in precipitation over land at a rate of about 0.5 to 1 percent per decade for the middle and high latitudes of the northern hemisphere, except for East Asia. No comparable wide-scale changes in precipitation have been observed for the Southern Hemisphere. Land surface rainfall in the subtropics has decreased an average of about 0.3 percent per decade (IPCC, 2001a).

Total atmospheric water vapor content has been noted to increase at a rate of several percent each decade in the Northern Hemisphere since about 1980 (IPCC, 2001a). Some studies suggest that regional cloudiness has increased over the past century. Satellite data show a general trend for increasing cloud cover over land and the oceans since the early 1980s. This trend appears to have reversed in the early 1990s (NOAA, 2005).

Table 2-3 Possible Effects of Climate Change on Precipitation in California and Potential Consequences

Possible Changes in Precipitation	Potential Consequences
Amount	Increased precipitation could benefit water supplies and improve environmental conditions in some areas, especially where water supply diversions have significantly affected streamflow. Increased precipitation could also increase the incidence of flooding, depending on the timing and intensity of precipitation. Decreased precipitation could have serious consequences for water supplies and the environment.
Form	Climate warming is expected to increase minimum snow elevations in California's mountains and cause more precipitation to fall in the form of rain rather than snow. This will result in reductions of annual snowpack and reduce effective water storage for maintaining spring and summer streamflow/water supply diversions. Reductions in snowpack could also negatively affect hydroelectric power generation and flood control operations.
Intensity, Duration, and Timing of Precipitation Events	Increased intensity or duration of precipitation events could increase the frequency and severity of flooding. Decreases could reduce flooding. Climate change could affect the incidence of precipitation events where rain falls on accumulations of snowpack. If the incidence or severity of such events increase, it could have serious flood control and water supply implications.
Variability	Increased variability in annual precipitation could present significant challenges for water managers in meeting water demands and providing flood control. Increased surface storage capacity, operational changes for reservoirs and additional use of groundwater storage could be required. Decreased variability could benefit water management.
Location	Shifts in the annual average distribution of precipitation in the State, due to possible changes in regional circulation patterns or other possible causes, could benefit some regions and negatively affect others. California's major water storage and conveyance systems are located and designed in accordance with the historic distribution of precipitation. Significant shifts in the distribution of precipitation could pose serious water management challenges, jeopardize the effectiveness of the State's existing water supply infrastructure and alter ecosystems.

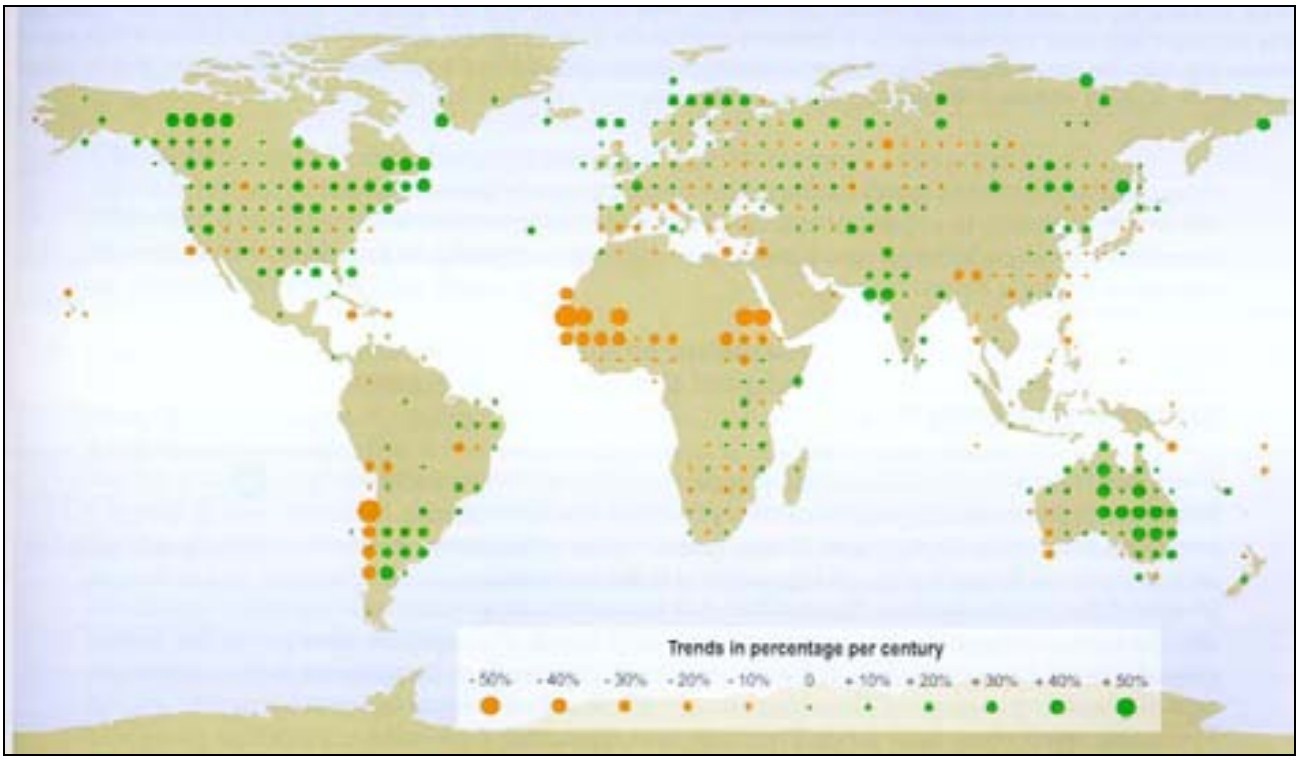


Figure 2-7 Worldwide Precipitation Trend for 1900 to 2000
Source: (IPCC, 2001b) http://www.grida.no/climate/ipcc_tar/vol4/english/fig2-6a.htm

The Intergovernmental Panel on Climate Change predicts that increasing global surface temperatures are very likely to result in changes in precipitation (IPCCb, 2001). Rising temperatures are expected to increase the activity of the world's hydrologic cycle and increase the moisture content of the atmosphere. Water vapor in the atmosphere is a greenhouse gas and will likely provide a positive feedback mechanism for climate warming.

Global average precipitation is expected to increase during the 21st century as the result of climate change based on global climate models for a wide range of greenhouse gas emission scenarios. Regional changes in precipitation will vary (IPCCa 2001). Global climate models are generally not well suited for predicting regional changes in precipitation due to their coarse discretization compared to the scale of regionally-important factors that affect precipitation.

Climate warming may have resulted in an increased occurrence of high-intensity rainfall in various areas with significant regional variation, including the United States (Groisman, 2005; Easterling, 2000). Continued warming through the 21st century may result in further increases in the occurrence of high-intensity rainfall (IPCC, 2001a; Groisman, 2005).

2.5.2 Precipitation Trends in the Western United States and California

An analysis of trends in total annual precipitation in the western United States by the National Weather Service, Climate Prediction Center provides evidence that annual precipitation has increased in much of California, the Colorado River Basin, and the West since the mid-1960s. Figure 2-8 depicts linear trends in annual precipitation in the western United States for areas referred to as "climate divisions."

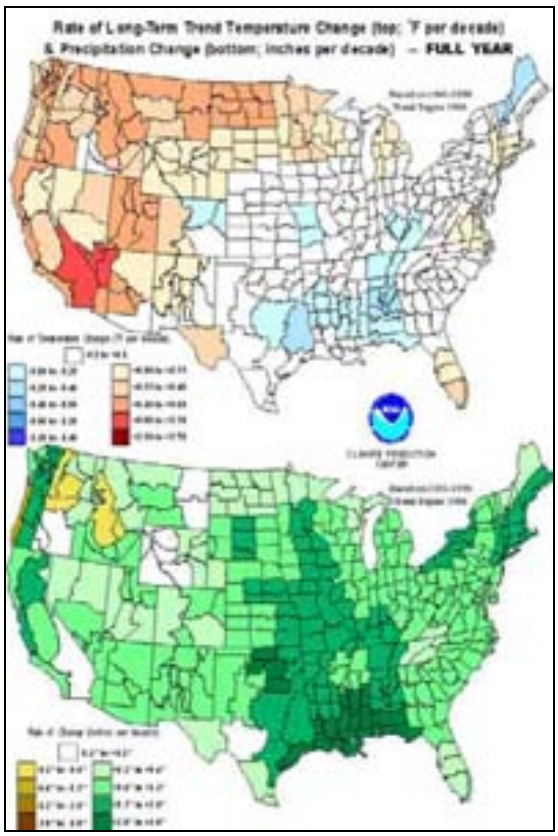


Figure 2-8 Long-Term Linear Trend Rates for Annual Precipitation in Western United States

Explanation: Rate of change is depicted for areas referred to as climate divisions. Trends are based on precipitation data from 1931-1998; however, the linear trends shown are from 1966 to 1998. For additional information concerning this figure and the determination of depicted precipitation trends visit: http://www.cpc.ncep.noaa.gov/trend_text.shtml#limits.

Adapted From: National Weather Service, Climate Prediction Website at http://www.cpc.ncep.noaa.gov/anltrend.gif

Most of the precipitation in the western U.S. falls in November through March, although monsoonal rainfall can be a locally-important factor in the Southwest from July to September. California's precipitation season is generally considered to start about mid-October and end in

April. However, most of the State's precipitation typically falls in the months just before and just after the beginning of each calendar year.

Mote and others (Mote, 2005) evaluated trends in annual November through March precipitation for the western United States and southwest Canada. Figure 2-9 depicts linear trends in November through March precipitation for two periods, 1930 to 1997 and 1950 to 1997. Precipitation trends for most of California and the Southwest are positive (increasing precipitation) during both periods.

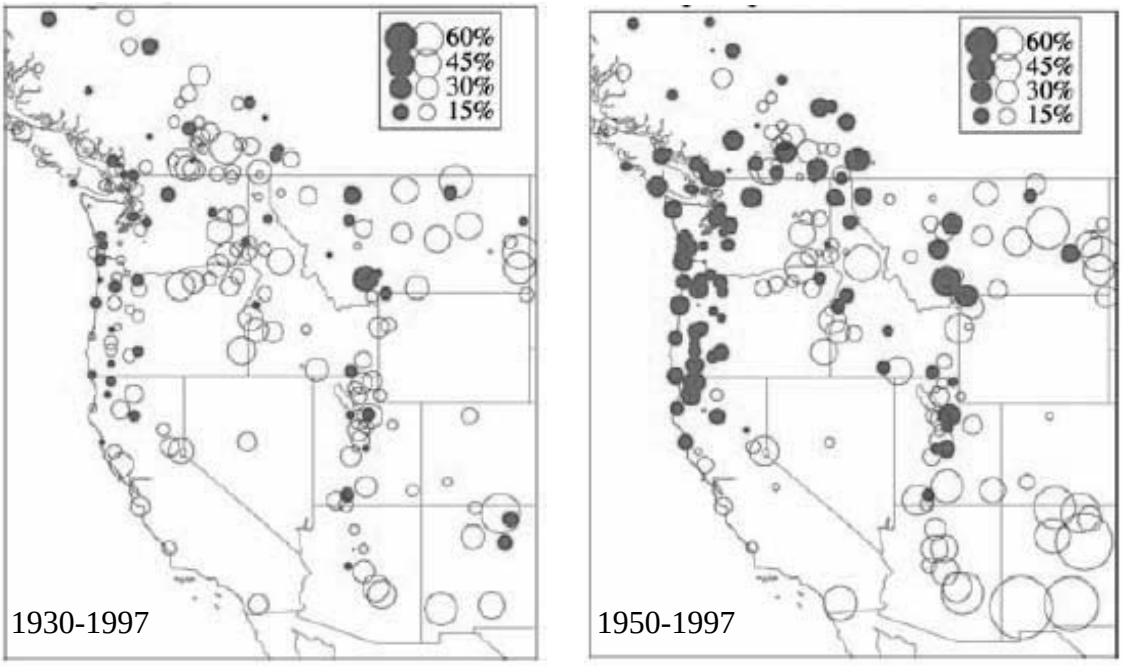


Figure 2-9 Precipitation Trends for the Western United States and Southwest Canada from 1930 to 1997 (left figure) and 1950 to 1997 (right figure)

Explanation: Depicted linear trends are for annual precipitation occurring from November through March. Decreasing precipitation trends are depicted in solid red circles. Increasing precipitation trends are depicted in open blue circles.

Source: Adapted from Mote (2005).

Former State Climatologist James Goodridge compiled an extensive collection of long-term precipitation records from throughout California. These data sets were used to evaluate whether there is a trend in precipitation in the State over the past century. Long-term runoff records in selected watersheds in the State were also examined. Figure 2-10 illustrates the variability in statewide annual average precipitation from 1890-2002. Statewide average precipitation was determined from 102 stations throughout the State. Based on a linear regression of the data, the long-term historical trend for statewide average annual precipitation appears to be relatively flat (no increase or decrease) over the entire record. However, it appears that there may be an upward trend in precipitation toward the latter portion of the record.

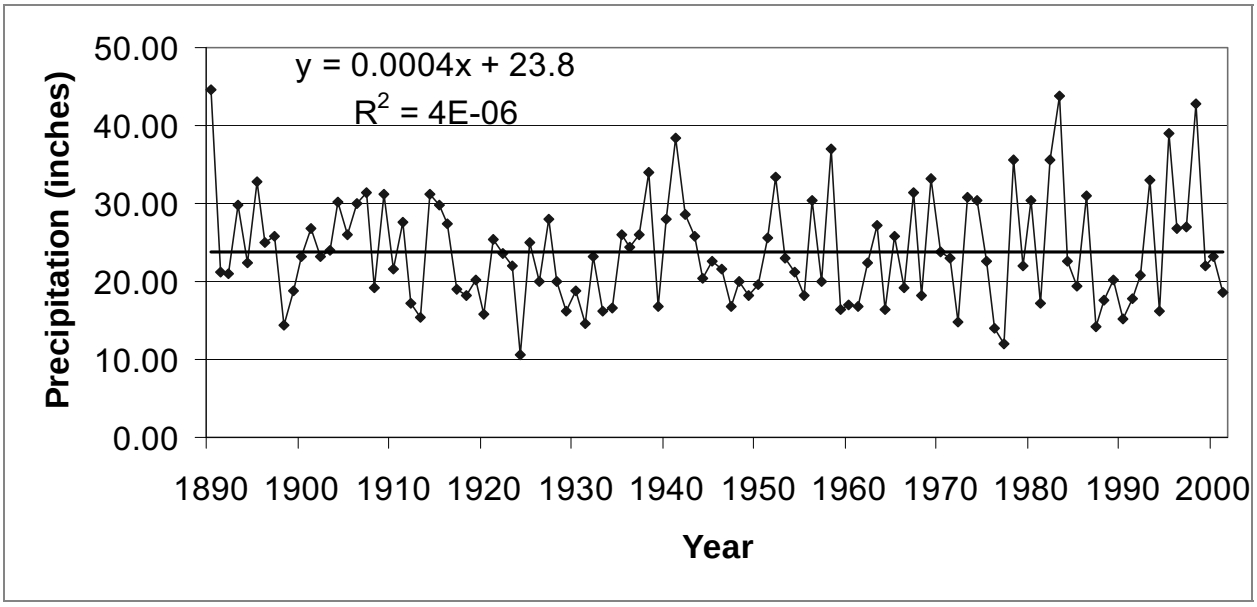


Figure 2-10 Annual Average Precipitation for California from 1890 to 2002 with Linear Trend

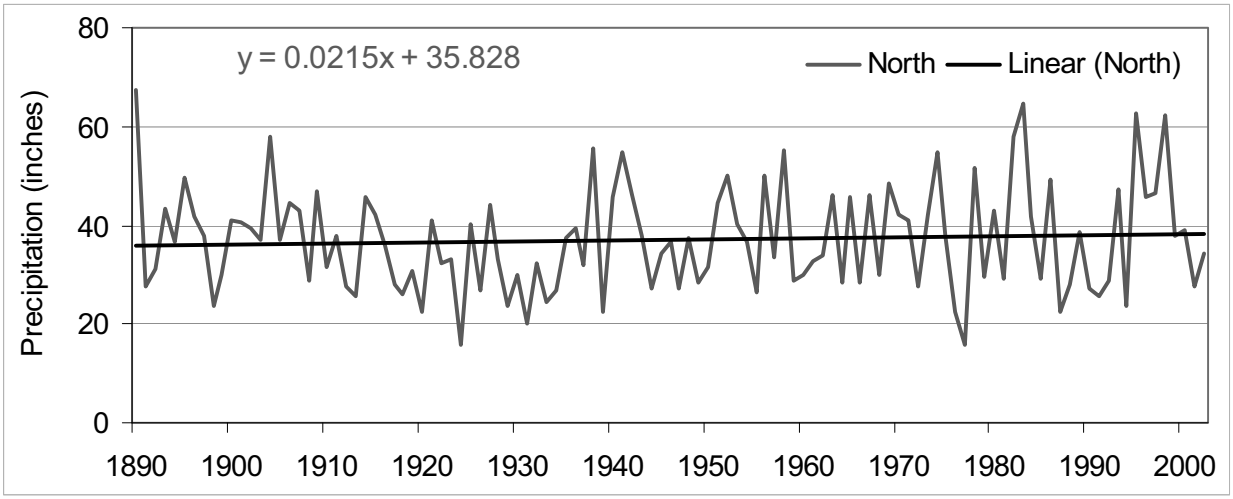
Most of the State's precipitation occurs as the result of storms from the Pacific Ocean. Hemispheric-scale circulation patterns typically cause most of these storms to move eastward across the northern part of the State. The largest amounts of precipitation fall in the mountains due to orographic effects. While a significant number of Pacific storms also cross the central and southern portions of the State, annual precipitation tends to decrease with decreasing latitude.

State precipitation records were sorted into three regions by latitude as follows:

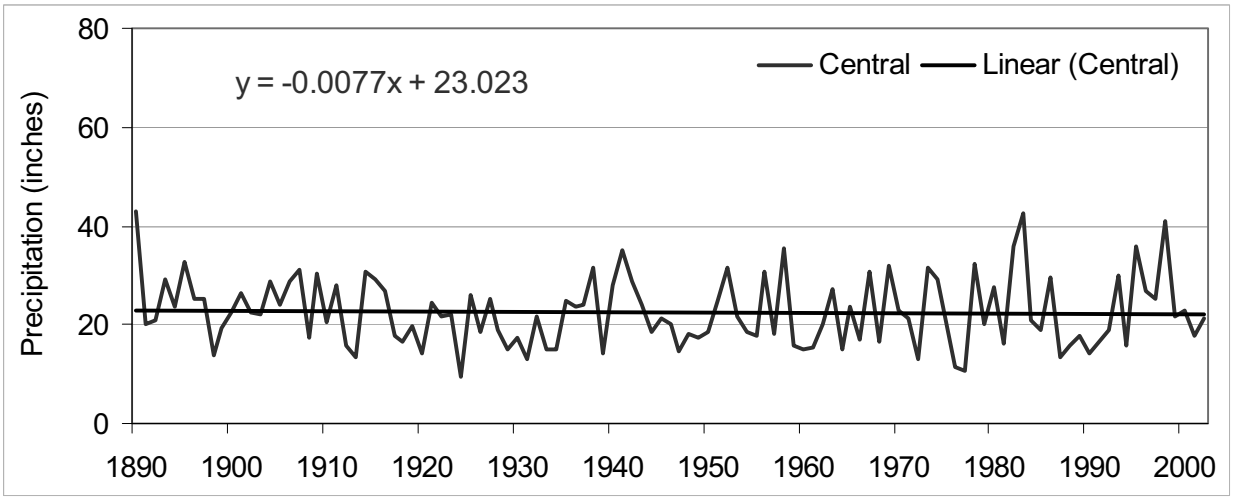
- North; from the California - Oregon border to 39 degrees latitude (latitude where California's eastern border begins to trend northwest at Lake Tahoe);
- Central; 39 to 35 degrees latitude (approximate latitude of Santa Maria); and
- South; 35 degrees latitude to the California – Mexico border.

Annual average precipitation values from 1890 to 2002 are plotted with linear trend lines for these three regions in Figure 2-11. The plots depict decreasing precipitation with decreasing latitude. Precipitation in the northern portion of the State appears to have increased slightly from 1890 to 2002. Increasing runoff trends observed for various Northern California watersheds, as discussed in Section 2.5.3 below, are consistent with the apparent increasing precipitation trend in this part of the State. Precipitation in the central and the southern portions of the State appear to have slightly decreasing trends from 1890 to 2002.

a) Northern Region: California-Oregon border to 39º latitude



b) Central Region: 39º - 35 º latitude



c) Southern Region: 35 º latitude to California-Mexico border

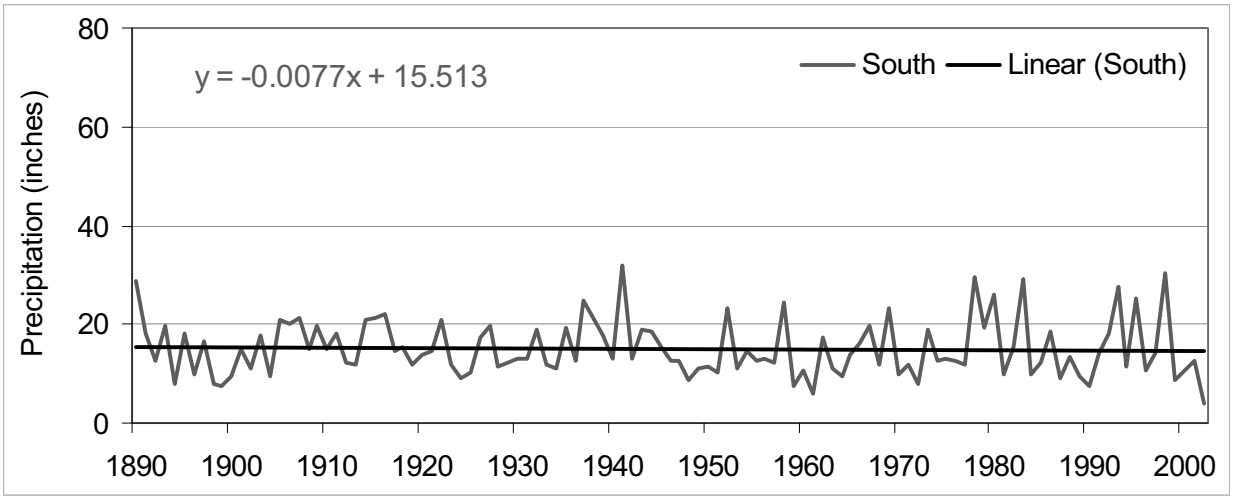


Figure 2-11 Annual Average Precipitation from 1890 to 2002 with Linear Trends by Region

Differences in California precipitation trends between those observed by the National Weather Service, Mote and others, and above analysis are likely due to differences in the:

- the period of analysis
- number and location of precipitation measurement stations used
- geographic regions selected for analysis

While increasing precipitation on a global scale is generally an expected result of climate change, significant regional differences in precipitation trends can be expected. More analysis of precipitation trends in California is probably needed for determining whether changes in California's regional annual precipitation totals have occurred as the result of climate change or other factors.

In addition to possible long-term trends in annual amounts of precipitation, increased variability of annual precipitation is also a possible outcome of climate change. Figure 2-12 depicts the coefficient of variation (standard deviation divided by the mean) based on a 10-year moving average of mean and standard deviation values for statewide annual average precipitation. There appears to be an upward trend in the variability of precipitation over the past century with end-of-period variability values about 75 percent larger than beginning-of-period values. This indicates that there tended to be more extreme wet and dry years at the end of the century than there were at the beginning of the century. This trend may continue with on-going climate change.

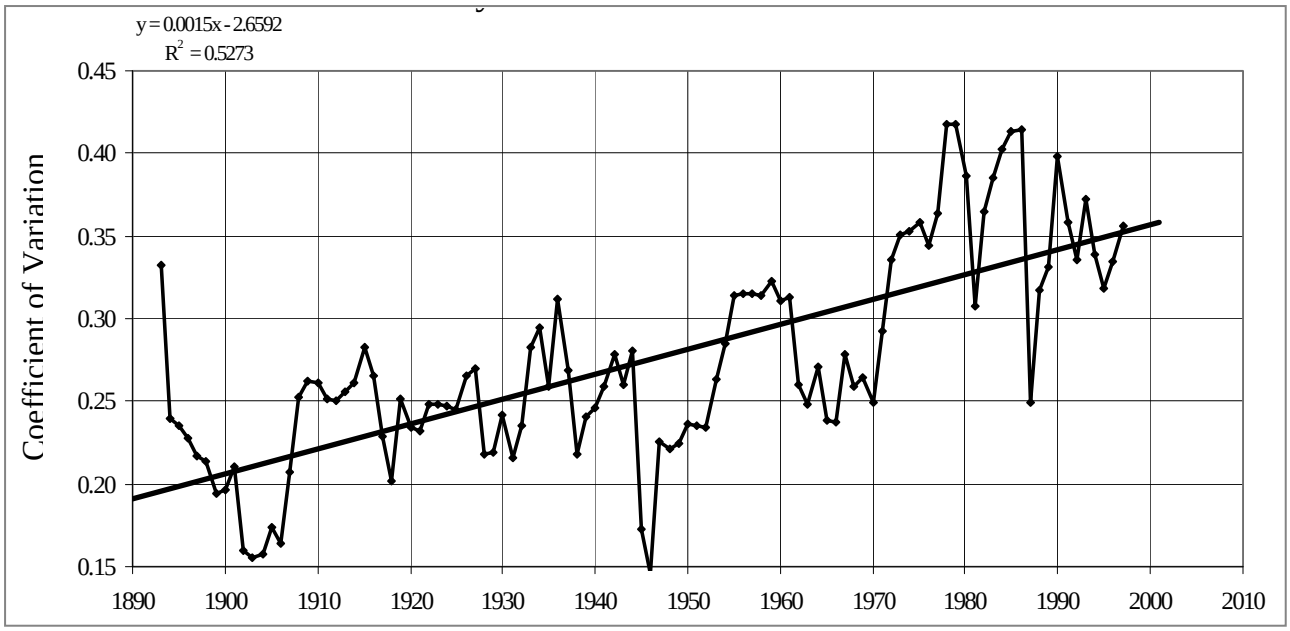


Figure 2-12 Coefficient of Variation for Annual Average Precipitation in California from 1890 to 2001 with Trend Line

2.5.3 Trends in Snowfall and Related Runoff in California

Precipitation in California's higher mountains during the late fall and winter typically falls in the form of snow. Significant accumulations of snow, referred to as snowpack, typically occur each year in the Sierra Nevada along the eastern flank of the Central Valley. A significant annual snowpack also typically occurs in the Cascade Range north and northeast of the Central Valley, and in the Klamath Mountains in the northwest corner of the State. Most of the runoff from the State's snowpack flows into the Central Valley, although snowmelt is also important for flows in rivers and streams on the east slope of the Sierra, such as the Truckee, Carson, and Owens rivers, and for the Klamath River and its tributaries.

California's annual snowpack is, on average, mostly accumulated from November though the end of March. It typically melts from April though July. Snowmelt provides significant quantities of water to streams and reservoirs for several months after the annual storm season has ended. The length and timing of each year's period of snowpack accumulation and melting can vary somewhat due to temperature and precipitation conditions.

California's snowpack is important to the State's annual water supply, because of its volume and when it typically melts. Average runoff from melting snowpack is usually about 20 percent of the State's total annual natural runoff, and probably about 35 percent of the State's total useable annual surface water supply. The State's snowpack is estimated to contribute an average of about 15 million acre-feet of runoff each year, about 14 million acre-feet of which is estimated to occur in the Central Valley. In comparison, total reservoir capacity in the Central Valley is about 24.5 million acre-feet in watersheds with significant annual accumulations of snow (DWR, 2005c).

California's reservoir managers use snowmelt to help fill reservoirs once the threat of large winter and early spring storms and related flooding risks have passed. Water stored in reservoirs is used to help meet downstream water demands when flows from snowmelt begin to recede and are typically not sufficient for satisfying downstream uses.

Some of the annual runoff collected in California's reservoirs is held from one year to the next. Water stored from one year to the next is typically referred to as "carryover storage". California's annual precipitation and snowpack can vary significantly from year to year in California. There may also be decadal-scale variation in precipitation over the Sierra (Freeman, 2002), and possibly other parts of California. Carryover storage can help meet water demand in years where precipitation and runoff is low.

Rising temperatures as the result of climate change threaten California's snowpack. An inchoative analysis of annual runoff trends in the Sacramento Valley was performed by Maurice Roos of DWR in the late 1980s (Roos, 1989). The purpose of the analysis was to determine if changes in the timing of annual runoff in the Sacramento Valley watershed had occurred as the result of possible increasing temperatures and diminished snowpack. It was concluded that, since the beginning of the 20th century, the amount of annual runoff from April though July in the upper Sacramento River watershed had a downward trend compared to each year's total runoff. This was determined to be a possible indication of a long-term reduction in the State's snowpack due to temperature rise.

An updated evaluation of runoff trends was performed for this report. Figure 2-13 presents combined unimpaired April through July runoff for four rivers in the Sacramento Valley (Sacramento, Feather, Yuba, and American rivers) as a percent of total water year runoff from 1906 to 2005. Figure 2-14a presents total April through July unimpaired runoff volume for the same period of record and for the same four rivers. Figure 2-14b presents total unimpaired water year runoff volume for the same period and rivers.

Based on the linear trends depicted in Figure 2-13 and Figure 2-14 for the four Sacramento Valley rivers:

- April through July runoff, as compared to total water year runoff, has declined about 9 percent over the past 100 years
- April through July runoff volume has decreased over the same period and total water year runoff during the same period has remained about the same

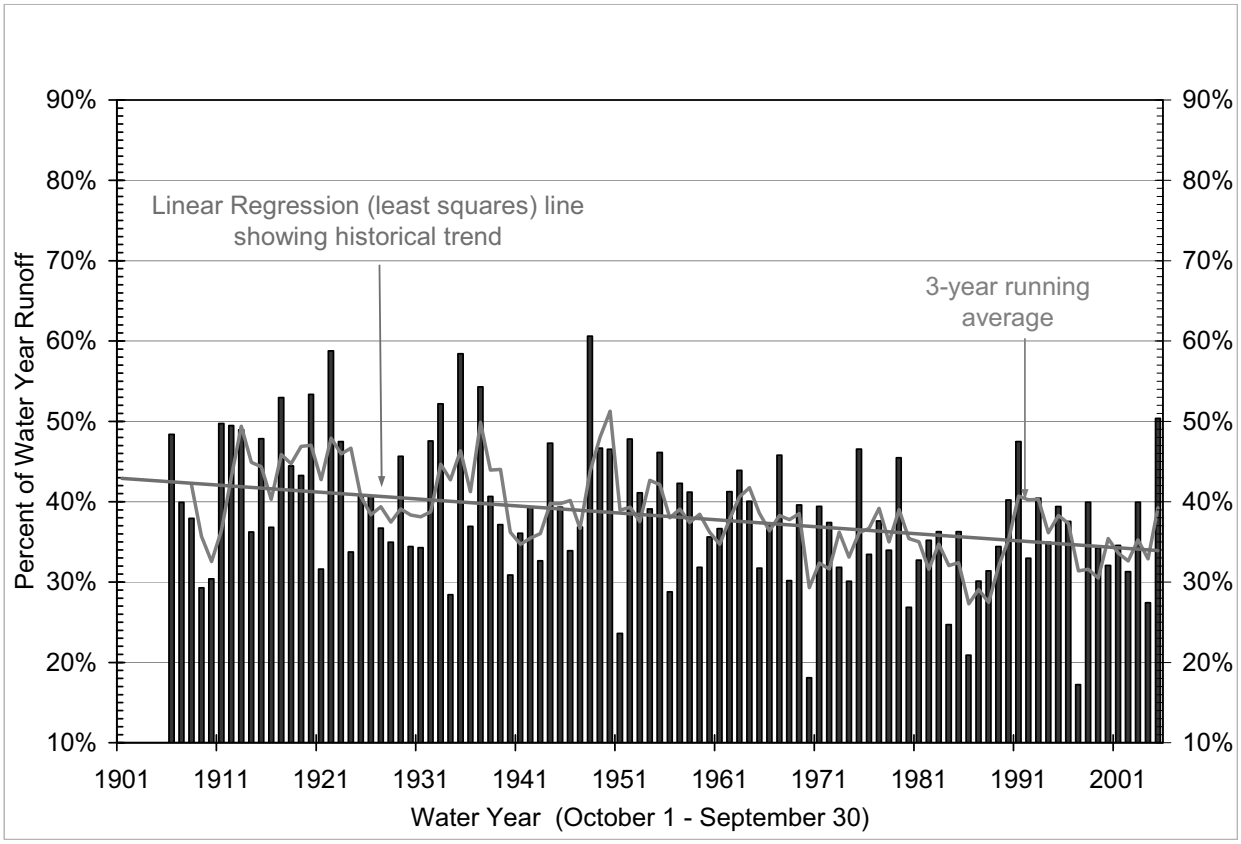
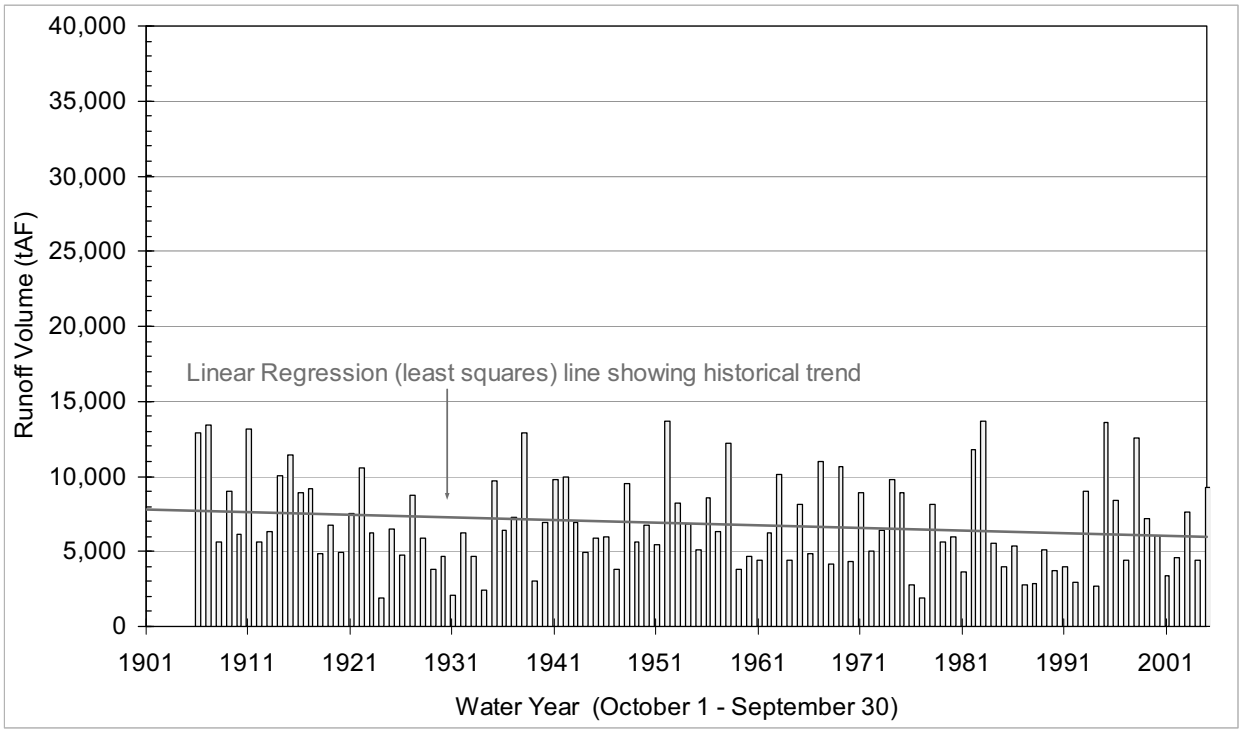


Figure 2-13 Annual April through July Unimpaired Runoff for Four Sacramento Valley Rivers Compared to Total Unimpaired Annual Runoff*

* Based on the flows of four rivers in the Sacramento Valley; Sacramento River at Bend Bridge (near Red Bluff), Feather River into Lake Oroville, Yuba River at Smartville, and American River below Lake Folsom.

a) Annual April through July Runoff Volume



b) Total Water Year Runoff Volume (October-September)

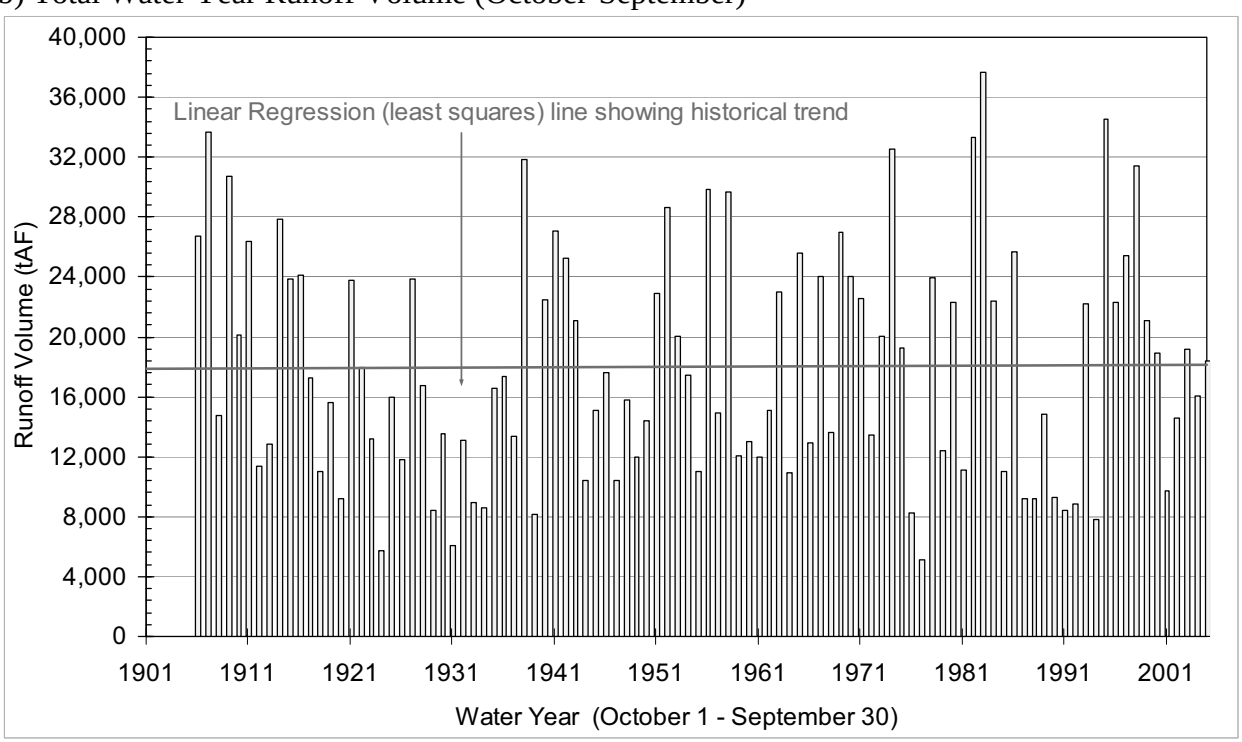


Figure 2-14 Unimpaired Runoff Volume for Four Sacramento Valley Rivers*

* Based on the flows of four rivers in the Sacramento Valley; Sacramento River at Bend Bridge (near Red Bluff), Feather River into Lake Oroville, Yuba River at Smartville, and American River below Folsom Lake. (taf) = thousand acre feet.

Figure 2-15 presents combined unimpaired runoff from April through July for four rivers in the San Joaquin River watershed (Stanislaus, Tuolumne, Merced, and San Joaquin rivers) as a percentage of total water year runoff from 1901 to 2005. Figure 2-16a presents total unimpaired April through July runoff volume for the same four rivers and for the same period of record. Figure 2-16b presents total unimpaired water year runoff volume.

The trends depicted in Figure 2-15 and Figure 2-16 for the four San Joaquin Valley rivers indicate that:

- April through July runoff, as compared to total water year runoff, has declined about 7 percent over about the past 100 years
- while total water year runoff volume decreased somewhat during the past 100 years, April through July runoff volume decreased at even a greater rate.

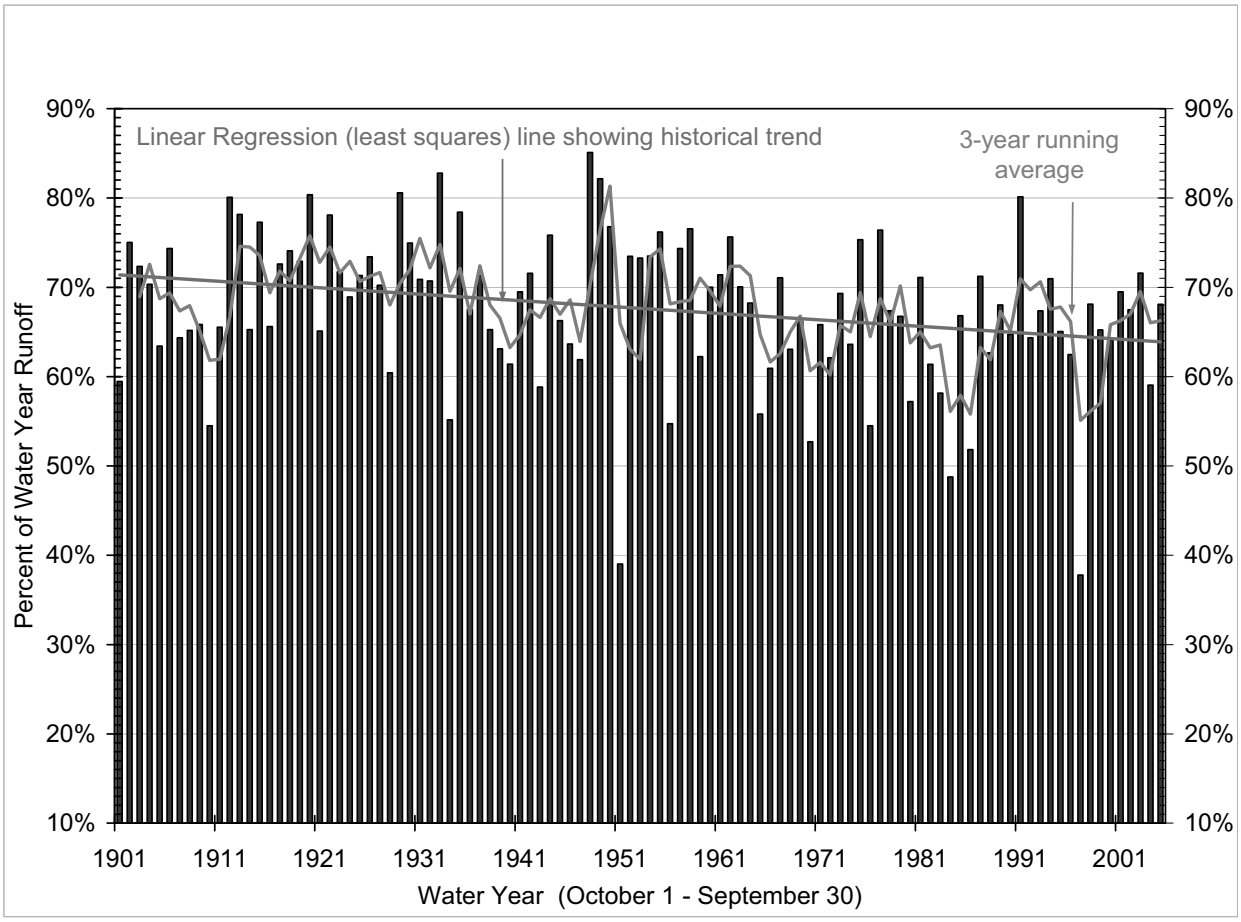
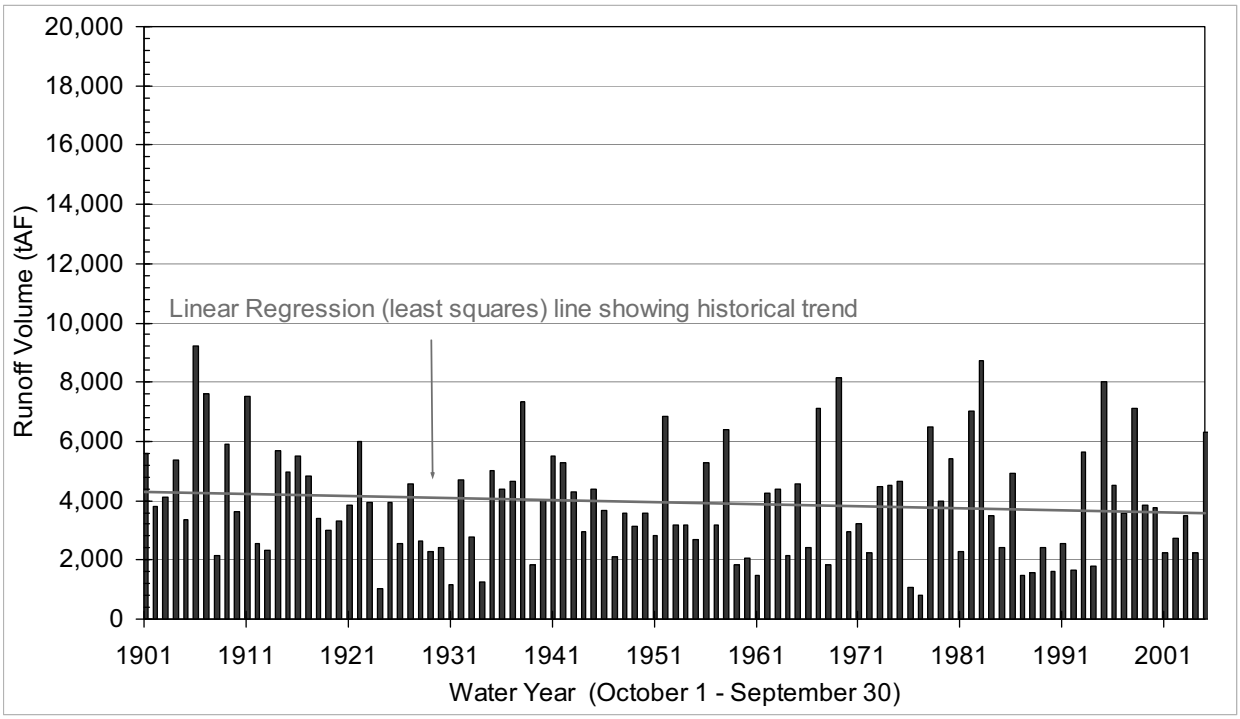


Figure 2-15 Annual April through July Unimpaired Runoff for Four San Joaquin Valley Rivers Compared to Total Unimpaired Annual Runoff*

*Based on the flows of four rivers in the San Joaquin Valley; Stanislaus River into New Melones Reservoir, Tuolumne River into Don Pedro Reservoir, Merced River into Lake McClure, and San Joaquin River into Lake Millerton.

a) Annual April through July Runoff Volume



b) Water Year Runoff Volume

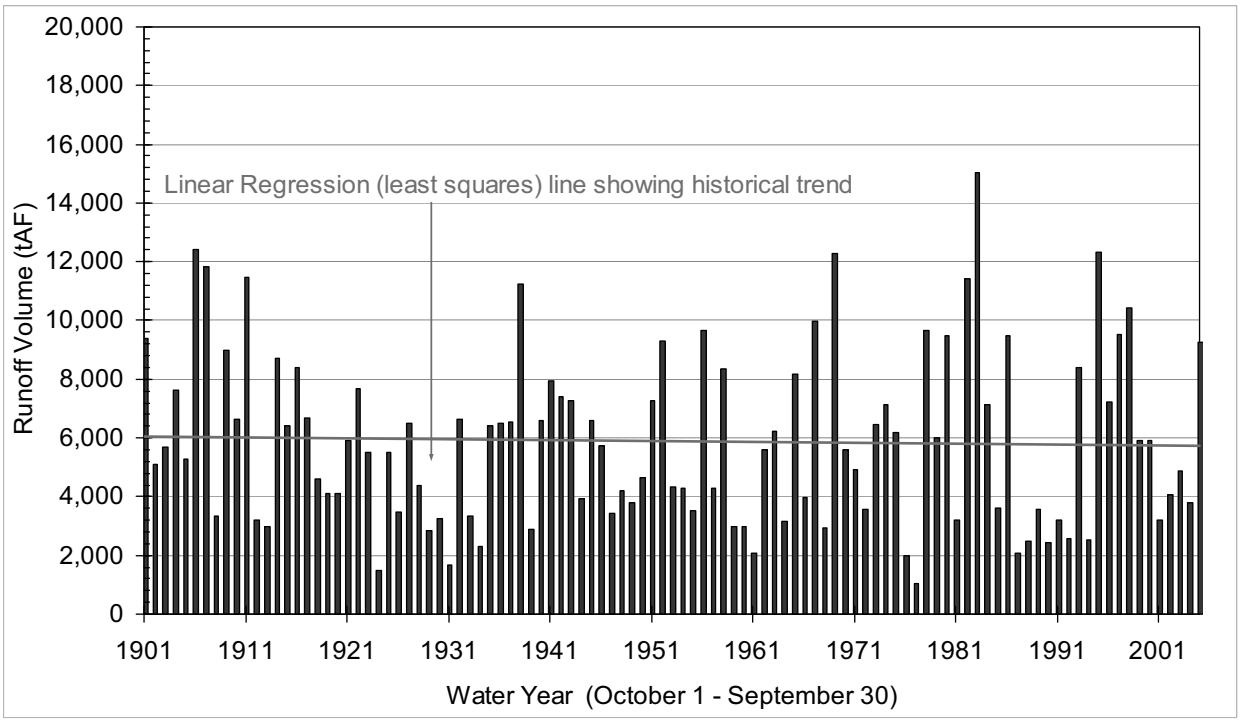


Figure 2-16 Total Unimpaired Runoff Volume for Four San Joaquin Valley Rivers*

*Based on the flows of four rivers in the San Joaquin Valley; Stanislaus River into New Melones Reservoir, Tuolumne River into Don Pedro Reservoir, Merced River into Lake McClure, and San Joaquin River into Lake Millerton. (taf) = thousand acre feet.

Some investigators have evaluated trends in Sierra runoff for different time periods over the past century. Figure 2-17 depicts two trends in April through July runoff as a percentage of total annual runoff for eight western Sierra rivers. No statistically significant downward or upward trend was determined for the period before 1945. However, the trend following 1945 is toward diminished runoff from April through July as compared to total annual runoff (Dettinger, 2005a).

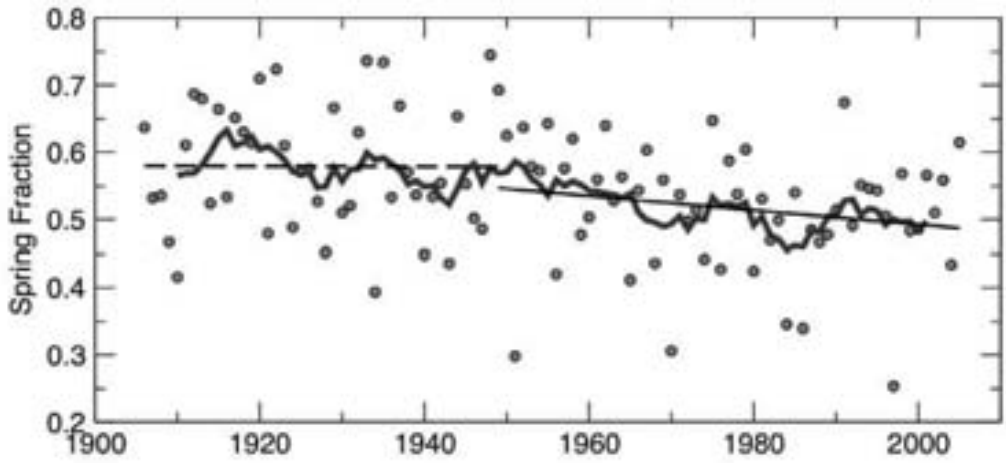


Figure 2-17 Annual April through July Unimpaired Runoff in the Central Valley Compared to Total Unimpaired Annual Runoff

Source: Dettinger, 2005a. (Updated by original author).
Explanation: Individual points depict yearly combined values for the Sacramento River at Bend Bridge (near Red Bluff), Feather River into Lake Oroville, Yuba River at Smartville, American River below Folsom Reservoir, Stanislaus River into New Melones Reservoir, Tuolumne River into Don Pedro Reservoir, Merced River into Lake McClure, and Kings River into Pine Flat Reservoir. The blue curve is the nine-year moving average of annual values. The dashed line is the linear trend prior to 1945. The solid line is the linear trend after 1945.

Updated runoff data for the Sacramento Valley and San Joaquin Valley, as discussed above, continue to support the conclusion from earlier analyses that there appears to be a long-term trend toward reduced April though July runoff compared to total annual runoff from the Sierra. It is reasonable to conclude that this trend is the likely result of climate change and warming and an attendant decline in Sierra snowpack. A portion of the trend may also be attributable to progressively earlier melting of Sierra snowpack due to warming.

The trend toward diminished April through July runoff, as compared to total annual runoff, appears to be stronger for the Sacramento Valley than for the San Joaquin Valley, as evidenced by Figure 2-13 and Figure 2-15. This may be due to elevation differences between the northern and southern Sierra. Rising temperatures could be expected to impact the northern Sierra snowpack to a greater degree than the southern Sierra snowpack because the northern Sierra is generally lower in elevation than the southern Sierra.

Table 2-4 summarizes runoff statistics and linear trends for the Sacramento and San Joaquin Valleys, selected river basins in the two valleys, and selected rivers elsewhere in the State where data could be readily obtained and where unimpaired flows could be determined or inferred. The

long-term trend in April through July runoff volumes for the Sacramento and San Joaquin valleys is downward, as are the trends for individual Sacramento Valley basins listed in the table. April through July runoff volume trends for most of the San Joaquin Valley basins listed in the table are also downward. These trends are consistent with the previously discussed conclusion that the Sierra snowpack is undergoing decline, possibly because of warming. Total water year runoff in the Sacramento Valley has an increasing trend while total water year runoff in the San Joaquin Valley appears to be decreasing on a long-term basis.

Outside of the Central Valley, the most noteworthy temporal change evident in Table 2-4 is an increasing trend in total water year runoff in the major river basins in the north coast portion of the State.

Table 2-4 Runoff Statistics and Trends for Selected River Basins in California

Basin/River System	Period of Record	Period A-J[1] Average (TAF)[3]	Period WY[2] Average (TAF)	Period A-J Linear Trend (TAF/yr)[4]	Period WY Linear Trend (TAF/yr)[4]
Central Valley River Systems					
Sacramento River System[5]	1906-2005	6,847	18,024	-17	3
San Joaquin System[6]	1901-2005	3,922	5,900	-7	-3
Sacramento Valley Basins					
Sacramento at Bend Bridge	1906-2005	2,522	8,476	-3	6
Feather	1906-2005	1,901	4,490	-6	2
Yuba	1901-2005	1,096	2,372	-3	-2
American	1901-2005	1,359	2,739	-5	-3
North San Joaquin Valley Basins					
Cosumnes	1908-2005	127	369	0	0
Mokelumne	1901-2005	487	758	-1	-1
Stanislaus	1901-2005	745	1,175	-2	-1
Tuolumne	1901-2005	1,248	1,911	-1	0
Merced	1901-2005	646	997	-1	0
San Joaquin	1901-2005	1,283	1,816	-2	-1
South San Joaquin Valley Basins					
Kings	1901-2005	1,238	1,683	-2	-1
Kaweah	1901-2005	285	432	0	0
Tule	1930-2005	63	145	0	0
Kern at Isabella	1930-2005	453	697	0	1
Kern at Bakersfield	1901-2005	473	739	0	2

Table 2-4 Runoff Statistics and Trends for Selected River Basins in California (continued)

Basin/River System	Period of Record	Period A-J[1] Average (TAF)[3]	Period WY[2] Average (TAF)	Period A-J Linear Trend (TAF/yr)[4]	Period WY Linear Trend (TAF/yr)[4]
Eastern Sierra Basins					
East Carson and West Walker	1922-2005	326	433	1	2
Truckee	1906-2005	274	452	-1	0
North Coast Basins					
Klamath	1928-2005*	1,665	4,646	1	7
Salmon	1912-2005*	521	1,288	0	2
Eel	1911-2005	914	5,493	0	12
Napa	1930-2005*	8	72	0	0
Russian	1941-2005	101	897	0	1
Central and South Coast Basins					
Arroyo Seco near Soledad	1906-2005	23	122	0	0
Arroyo Seco near Pasadena	1911-2005	2	7	0	0
Nacimiento	1916-2005	23	200	0	0
Santa Ana	1901-2005	21	60	0	0

Footnotes:
[1] A-J = April through July.
[2] WY = Water Year.
[3] TAF = Thousand acre-feet.
[4] Trend rounded to the nearest thousand acre-foot/year.
[5] Composite of runoff data for the Sacramento River at Bend Bridge, Feather River into Lake Oroville, Yuba River at Smartville, and American River below Lake Folsom.
[6] Composite of runoff data for the Stanislaus River into New Melones Reservoir, Tuolumne River into Don Pedro Reservoir, Merced River into Lake McClure, and the Kings River into Pine Flat Reservoir.

2.5.4 Projected Changes in Precipitation for California

2.5.4.1 Changes in the Amount of Precipitation

As discussed above, there are indications that total annual precipitation in some Northern California watersheds has been increasing. While the cause of this apparent change is unknown, it may be due in part to climate change since warming is expected to result in a more active hydrologic cycle.

Climate model projections for changes in total annual precipitation in California through the end of this century are mixed. Models predicting the greatest amount of warming generally predicted

moderate decreases in precipitation. Models projecting smaller increases in temperature tend to predict moderate increases in precipitation. When some of the most extreme projections are underweighted, the central tendency in the projections is toward moderately decreased precipitation (Dettinger, 2005b).

2.5.4.2 Changes in Snowpack

As discussed in Section 2.4, temperatures in California are projected to increase from about 2.5 to about 9 degrees Celsius by the end of this century as the result of climate change. One expected consequence of this is further reduction in the State's annual snowpack and earlier melting of snow.

Historically, average snowline elevations in California have ranged from about 4,500 feet in the north to above 6,000 feet in the southern Sierra. DWR staff estimates that the average snow-covered area totals about 13,200 square miles in the water supply producing basins of the Central Valley and the Trinity River above Lewiston. This is about 8 percent of the State's total land surface. The northern Sierra and Trinity mountains account for about 7,000 square miles of the 13,200 square mile total. The west slope of the southern Sierra accounts for the remainder.

Rising temperatures will cause reductions in the State's snowpack by raising snowline elevations and reducing the area where annual snowpack accumulates. A rudimentary analysis of the impact of rising temperatures on snowpack, shows that a 3 degree Celsius rise will likely cause snowlines to rise about 1,500 feet based on a moist lapse rate of 500 feet per 1 degree Celsius. This would cause a significant reduction in the amount of snow-covered area in the State and an estimated average annual loss of about 5 million acre-feet of effective water storage in snowpack.

Climate model studies support projections for continued reductions in the State's snowpack as the result of warming. Simulations under various amounts of temperature rise indicate that California's snowpack is very vulnerable to warming. One set of simulations by N. Knowles and D. R. Cayan (Knowles, 2002) provide the following projections for loss in April Sierra snowpack snow-water equivalent (in comparison to existing conditions) as a result of rising temperatures:

- 0.6 degree Celsius rise, ~5 percent loss
- 1.6 degrees Celsius rise, ~33 percent loss
- 2.1 degrees Celsius rise, ~50 percent loss

These three levels of average temperature rise were projected by Knowles and Cayan to occur by 2030, 2060 and 2090, respectively.

Losses in snow were projected to occur mainly at low to mid-altitudes. Loss of snowpack was projected to be greater in the northern Sierra and Cascades than in the southern Sierra due to the relative proportions of land at low and mid-elevations. At the highest temperature projection (increase of 2.1 degrees Celsius), the northern Sierra and Cascades were projected to lose 66

percent of their April snowpack, while the southern Sierra was projected to lose 43 percent of its snowpack.

Newer climate model studies, including those for the Intergovernmental Panel on Climate Change's 4th Assessment, due to be published in 2007, will provide a new set of temperature projections in addition to those already available. Most existing temperature projections, as well as those expected from the 4th Assessment, indicate that losses in the State's snowpack are likely to continue increasing through the end of this century.

Warming and loss of the State's snowpack will affect the operation of most major multipurpose reservoirs at low and mid-elevations in the Sierra. Operation of these reservoirs now includes maintaining empty flood-control space during winter months and then gradually allowing them to fill with snowmelt during the spring after the threat of storms and flooding has passed. Higher snow lines and more precipitation falling in the form of rain rather than snow will increase winter inflows to these reservoirs. Higher winter inflows will also likely mean that a greater portion of the total annual runoff volume will occur in the winter. Thus, more annual runoff will likely be passed through reservoirs and will not be available for hydropower production and water supply uses later in the year. Higher winter inflows may also diminish the ability of reservoir managers to store a portion of a year's runoff volume as annual carryover storage.

2.5.4.3 Other Effects

As discussed at the beginning of this section, climate change could affect the intensity, duration, and timing of precipitation events in California. It could also affect the spatial distribution and temporal variability of precipitation. Significant changes in one or more of these factors could have serious consequences for water resources management. While there may be some evidence that year-to-year variation in California's precipitation has increased over the past century, additional work is needed to determine the possible nature and extent of any changes that may already be occurring or could occur as a result of climate change.

2.6 Sea Level Rise

One of the major areas of concern related to global climate change is rising sea level. Worldwide average sea level appears to have risen about 0.3 to 0.6 of a foot over the past century based on tide gauge data (IPCC, 2001a). Rising worldwide average sea level over the past century has primarily been attributed to:

- warming of the world's oceans and the related thermal expansion of ocean waters (steric changes)
- the addition of water to the world's oceans from the melting of land-based ice, such as from Greenland and southeast Alaska (eustatic changes)

Some researchers have attributed most of the worldwide rise to steric changes, although there is some uncertainty about the relative contributions of steric and eustatic changes (Munk, 2002). Worldwide average sea level is projected to rise from between 0.3 of a foot and 2.9 feet by 2100, as discussed below (IPCC, 2001a).

California's coastline is about 1,075 miles in length, not including inland bays, estuaries and offshore islands. The State's coastal features include broad coastal plains and wide beaches in much of Southern California. Extensive stretches of mountainous and rugged coastline occur in the central and northern parts of the State, along with more limited coastal plains than those in Southern California. California's coastal topography is shown in Figure 2-18. The State's coastline also includes major inland bays and estuaries, including the San Francisco Bay and the Sacramento-San Joaquin River Delta (Delta), as shown in Figure 2-19.

Future sea level rise, while projected to be a relatively slow and gradual process, presents a somewhat alarming prospect for California, especially in the case of the more extreme projections. The effects of sea level rise will include:

- increased erosion of beaches, bluffs and other coastal features
- inundation of coastal land and marshes
- local flooding near the mouths of rivers and streams due to backwater effects (especially on coastal plains)
- increased potential for sea water intrusion into coastal aquifers
- increased sea water intrusion into estuaries, including the Sacramento-San Joaquin River Delta
- increased potential for levee failure in the Delta
- potential adverse impacts on flow control and diversion facilities in the Delta
- inundation and critical alteration of aquatic ecosystem habitat development projects in the Delta

.

Of the effects listed above, perhaps the most significant from the standpoint of the State's water resources are increased sea water intrusion and increased potential for levee failure in the Delta. Increased sea water intrusion into the Delta threatens the operations of the State Water Project and the Central Valley Project, as well as other Delta water supply diversions due to water quality degradation. Water quality degradation in the Delta also potentially threatens the Delta's fragile ecosystem, which supports threatened and endangered species. Finally, increased sea water intrusion into the Delta could threaten some groundwater supplies through the interaction of Delta waters with underlying and adjoining portions of the Central Valley groundwater basin.

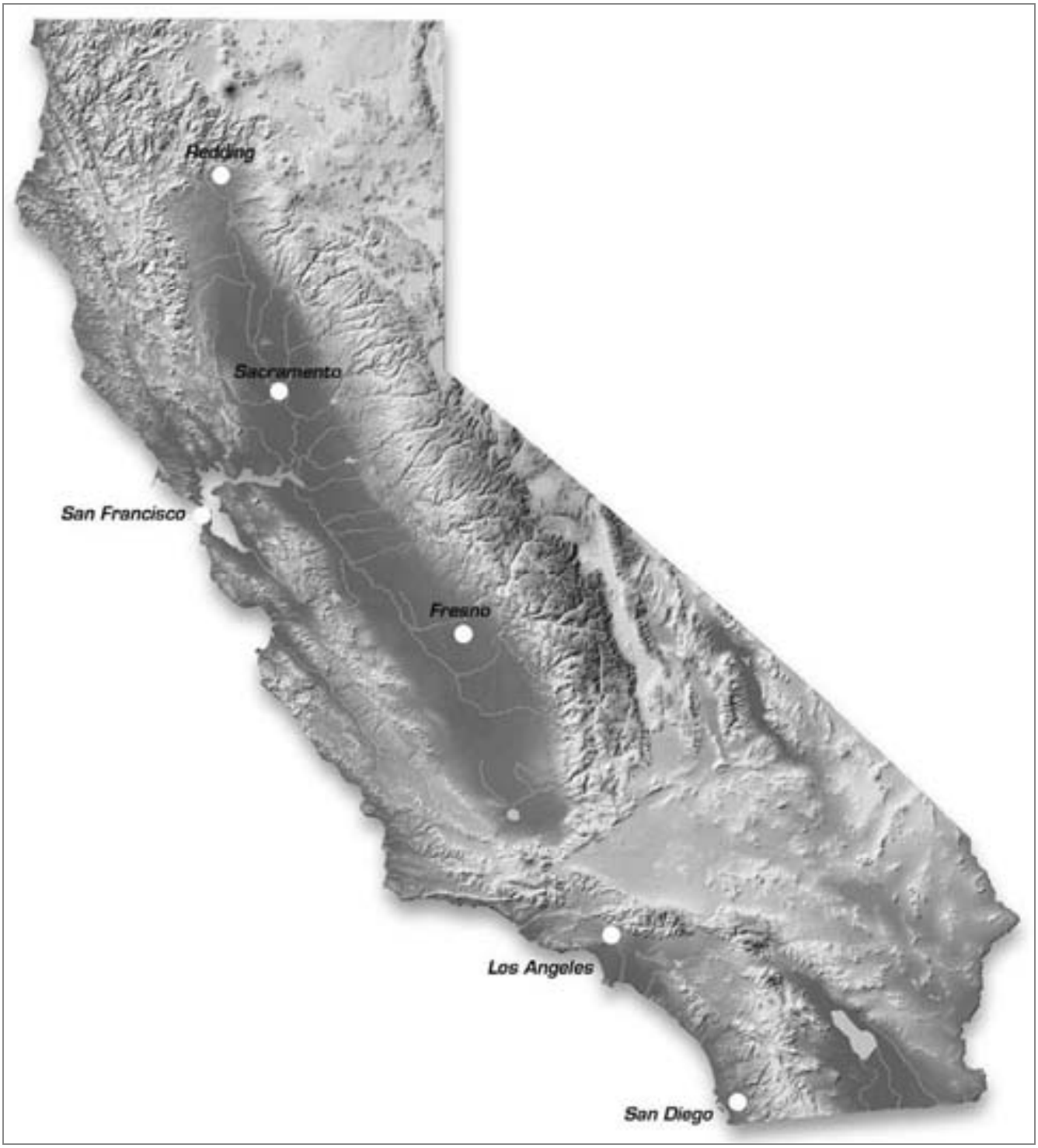


Figure 2-18 California's Topography and Coastline

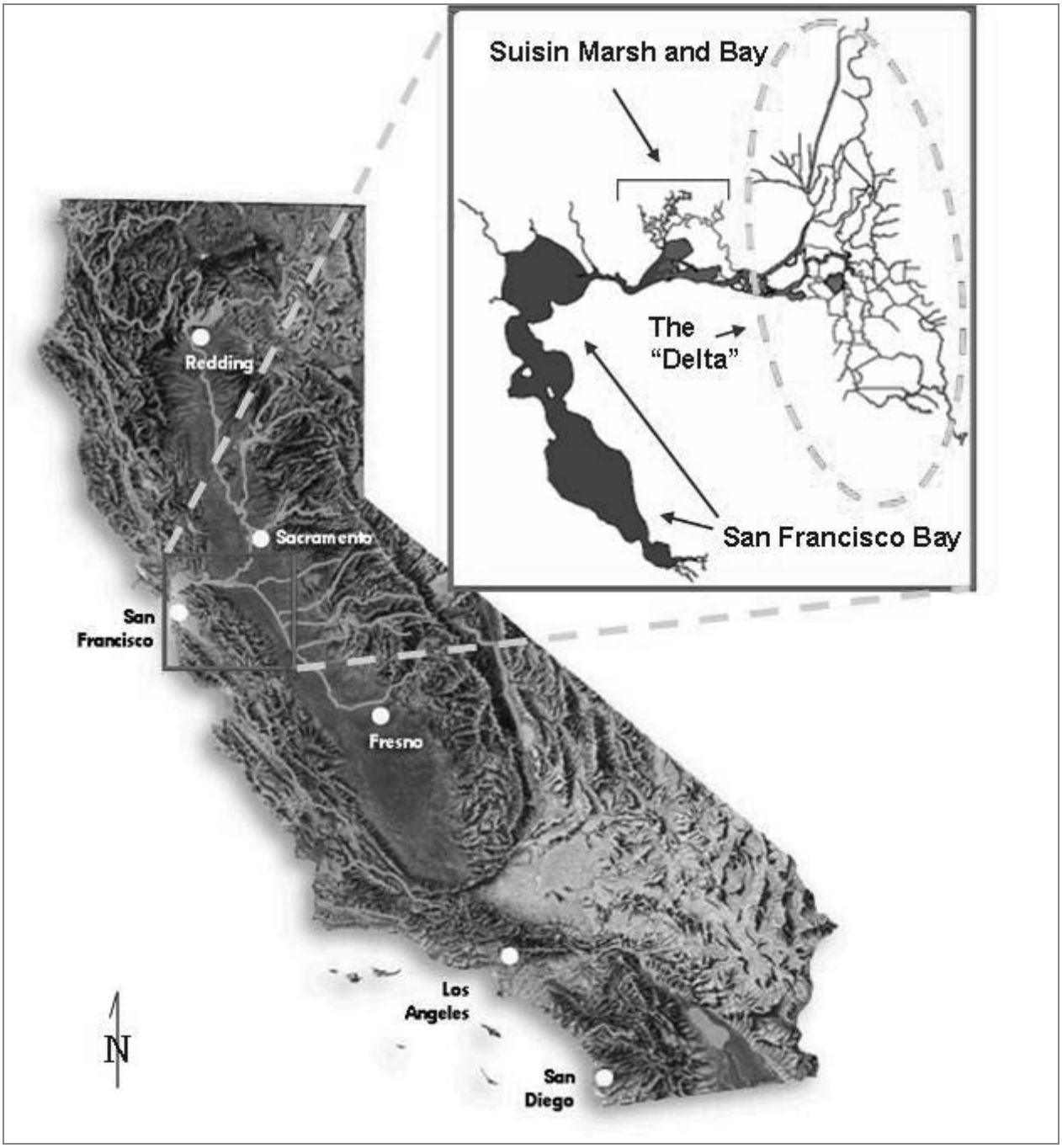


Figure 2-19 Location of the San Francisco Bay, Suisun Marsh and Sacramento-San Joaquin River Delta

2.6.1 Historical Sea Levels

2.6.1.1 Sea Level Prior to Recorded History

The Earth has been subject to many periods of cooling (glacial periods) and warming (interglacial periods). Periods of glaciation are marked by massive accumulations of land- and sea-based ice extending from the Earth's poles sometimes as far as the Earth's mid-latitudes. Interglacial periods are marked by warming and the recession of ice toward the poles. Sea level during glacial periods is lowered as a significant amount of the world's water accumulates as snow and ice through precipitation. Sea level during interglacial periods rises through the melting of massive ice sheets accumulated during glacial periods.

Geologic evidence shows that for the past million years ocean levels have repeatedly risen and fallen on a somewhat cyclical basis. Figure 2-20 depicts several glacial and interglacial periods and fluctuating ocean levels over the past 800,000 years.

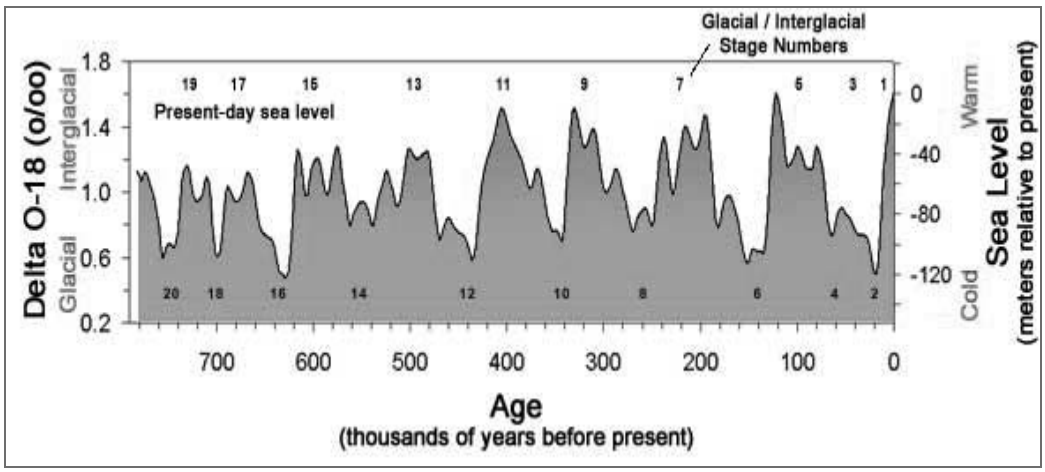


Figure 2-20 Changes in Global Sea Level over the Past 800,000 Years
Adapted from: http://coastalchange.ucsd.edu/st4_climatechange/sealevel.html
Coastal Morphology Group, Integrative Oceanography Division, Scripps Institution of Oceanography

The exact causes for the glacial periods and intervening periods of warming are unknown. Geologic evidence shows that global ocean levels have risen significantly since the most recent period of glaciation. The surface of the world's oceans during the coldest portion of the last glacial period, about 18,000 to 20,000 years ago, is estimated to have been about 400 feet lower than today's level, as shown in Figure 2-21. Most of the rise in sea level since this time was due to the large-scale melting of continental ice sheets, most of which occurred from 6,000 to 15,000 years ago. The average rate of sea level rise from about 6,000 years ago to present may have been about 0.5 mm/yr, or about 0.16 of a foot per century (IPCC, 2001a).

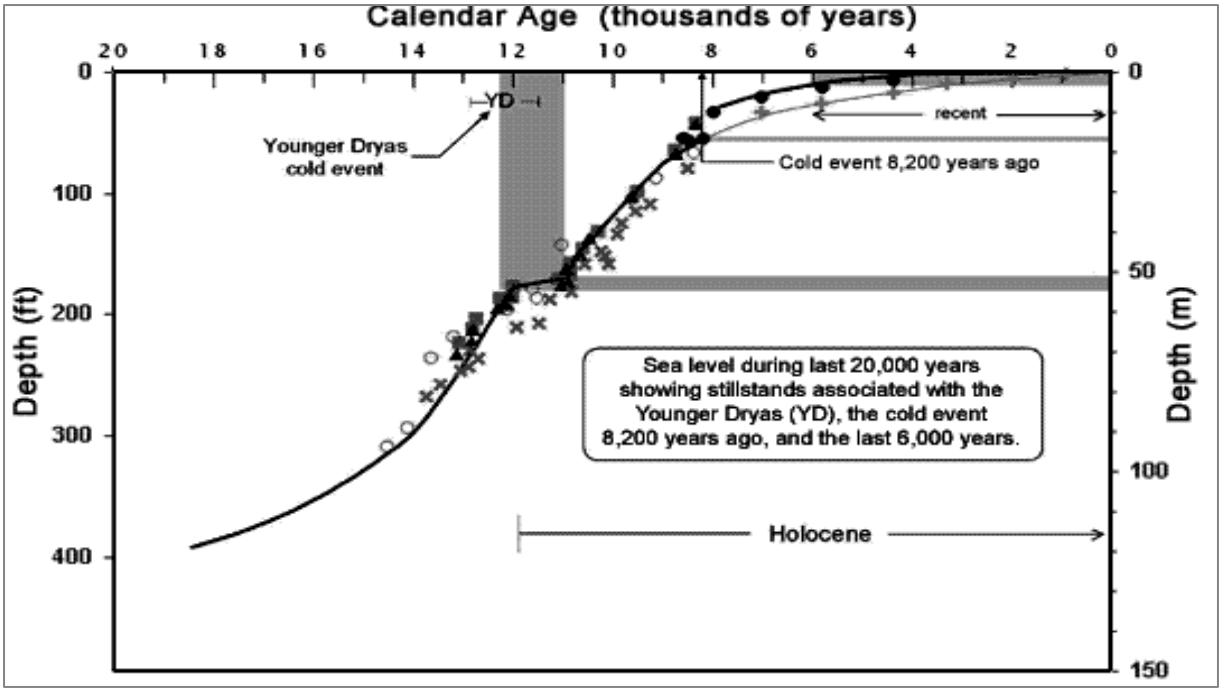


Figure 2-21 Change in Sea Level Over the Past 18,000 Years

Adapted from: Inman, et.al, 2002 http://coastalchange.ucsd.edu/st4_climatechange/sealevel.html
Explanation: The solid black and solid blue lines depict the estimated trend in sea level. The individual points of varying colors depict estimates of sea level at several locations by various researchers. A discussion about the "Younger Dryas" can be found at: http://en.wikipedia.org/wiki/Younger_Dryas#Abrupt_climate_change.

2.6.1.2 Sea Level Measurements

Direct sea level measurements began as early as the beginning of the 18th century in Europe with the use of tide gauges. Measurements for six European tide gauging stations with notably long records are depicted in Figure 2-22. All stations show a rise in relative sea level[2].

Rates of change in relative sea level measured by tide gauges along the coast of the United States over the 20th century are depicted in Figure 2-23. Since global sea level rise during the last century is believed to have been between about 0.3 and 0.6 of a foot, gauges exhibiting rates of sea level rise that significantly exceed this range could be on land masses that are subsiding. Gauges where sea level appears to rising more slowly than the worldwide average, not changing, or declining in comparison to worldwide trends may be on land masses that are rising. Table 2-5 lists areas of the U.S. coast that have been subject to recent subsidence or uplift and the causes for the changes.

Figure 2-24 depicts the locations of tide gauges along the coast of California, including eight gauges that have at least 50 years or more of record. Relative sea level trends for the eight gauges up to 2000 are shown in Figure 2-25. The trends for these gauges are summarized in Table 2-6

[2] See Section 2.6.2.3 for a discussion on "relative" sea level rise.

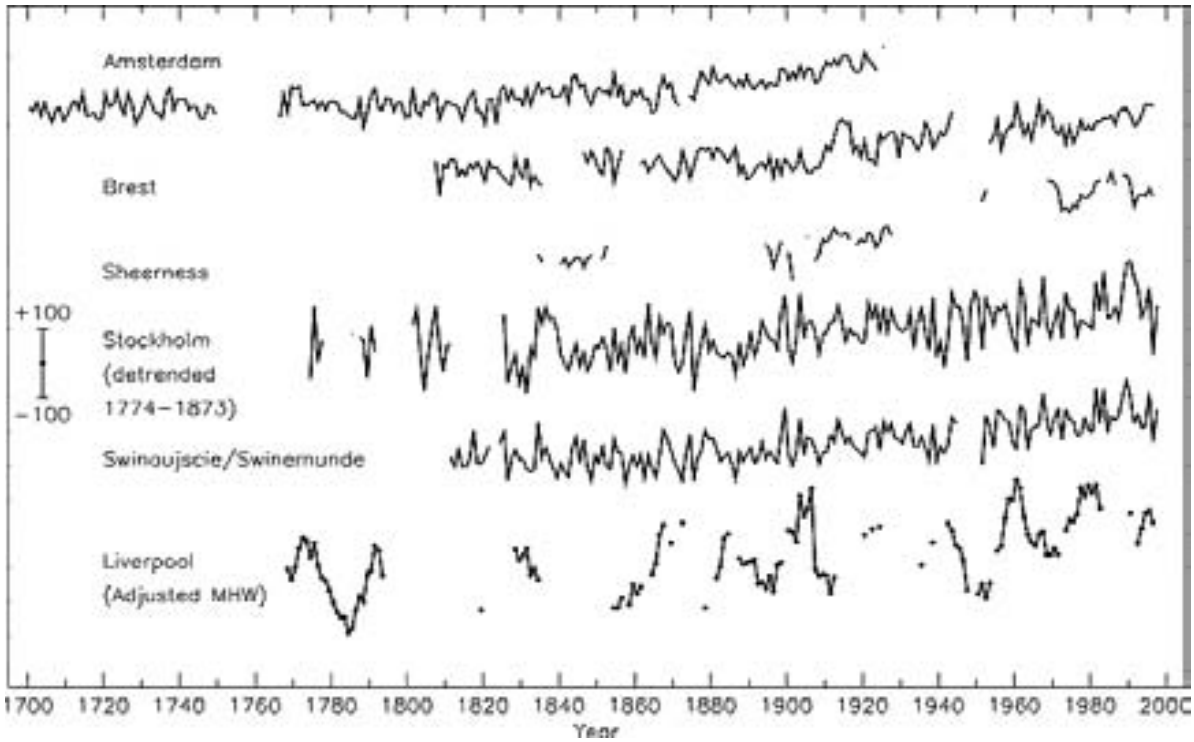


Figure 2-22 Relative Change in Sea Level Measured at Six Locations in Northern Europe Beginning at about 1700 AD

Locations: Amsterdam, Netherlands; Brest, France; Sheerness, UK; Stockholm, Sweden; Swinoujscie, Poland (formerly Swinemunde, Germany); and Liverpool, United Kingdom.
Scale: ± 100 mm.
Note: Data for Stockholm, Sweden is detrended over the period 1774 to 1873 to remove the first order contribution of postglacial rebound; Data for Liverpool, United Kingdom are "Adjusted Mean High Water" rather than Mean Sea Level and include a nodal (18.6 year) term.
Source: IPCCa, 2001
http://www.grida.no/climate/ipcc_tar/wg1/fig11-7.htm

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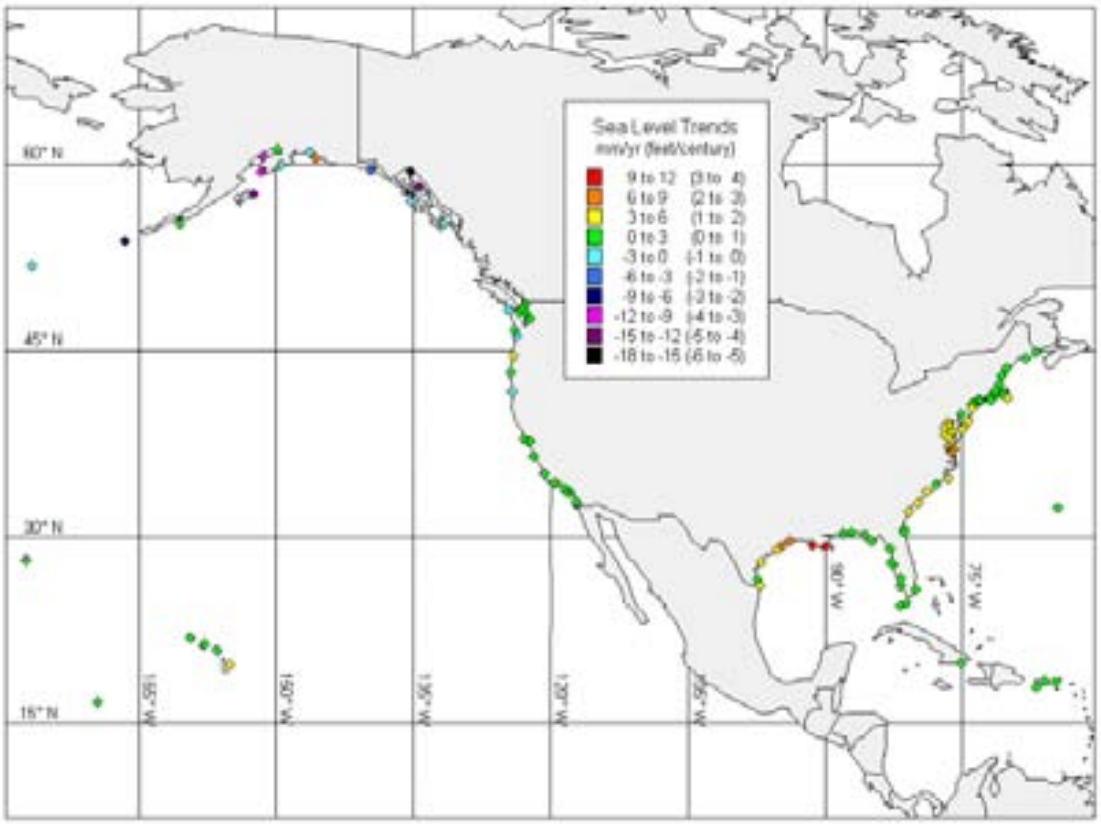

Figure 2-23 Rates of Relative Sea Level Rise Along the Coast of the United States
Source: National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational Oceanographic Products and Services' website at: http://co-ops.nos.noaa.gov/sltrends/slrmap.shtml .

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Table 2-5 Areas of the US Coast with Significant Amounts of Uplift or Subsidence

Coastline Area	Elevation Trend	Reason
Mid-Atlantic	Much of the coastline in this area is sinking slowly	Glacial rebound in the Hudson Bay region to the north
Mississippi River Delta region and the Texas coast	Sinking of the coastline--rapid sinking near the Mississippi River Delta	Lithospheric loading and sediment compaction due sediment deposition by the Mississippi River, and subsidence related to oil and gas extraction in some areas
Island of Hawaii	Sinking of the island	Lithospheric loading and local volcanic and seismic activity.
Portions of the coast of Northern California, Oregon, and Washington	Slow uplift	Tectonic effects
Portions of Alaska's coast and the Aleutian Islands	Rapid uplift	Glacial rebound and/or tectonic uplift, depending on the area

Source: Table developed from information obtained at: http://140.90.121.76/sltrends/slrmap.shtml and http://hvo.wr.usgs.gov/volcanowatch/1994/94_10_14.html

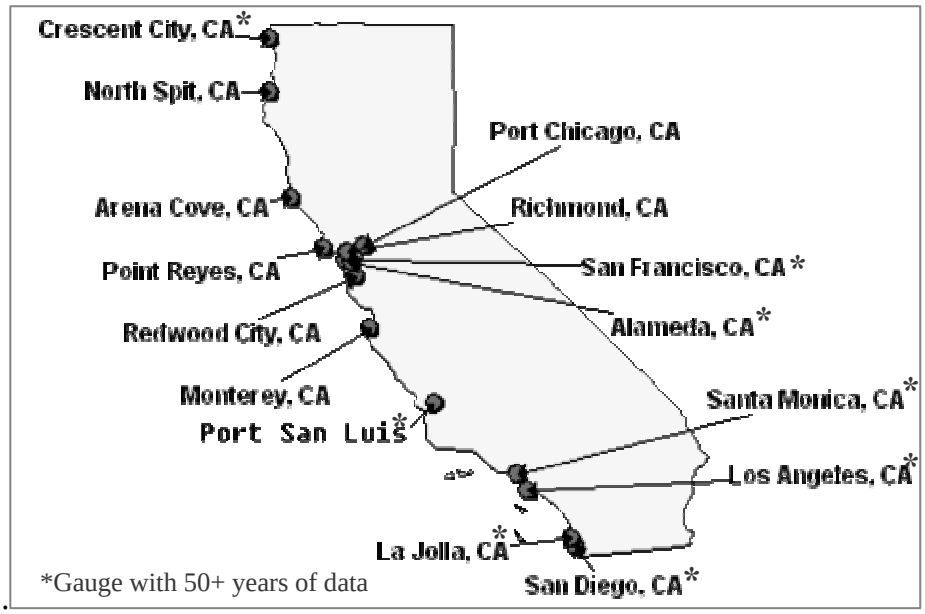
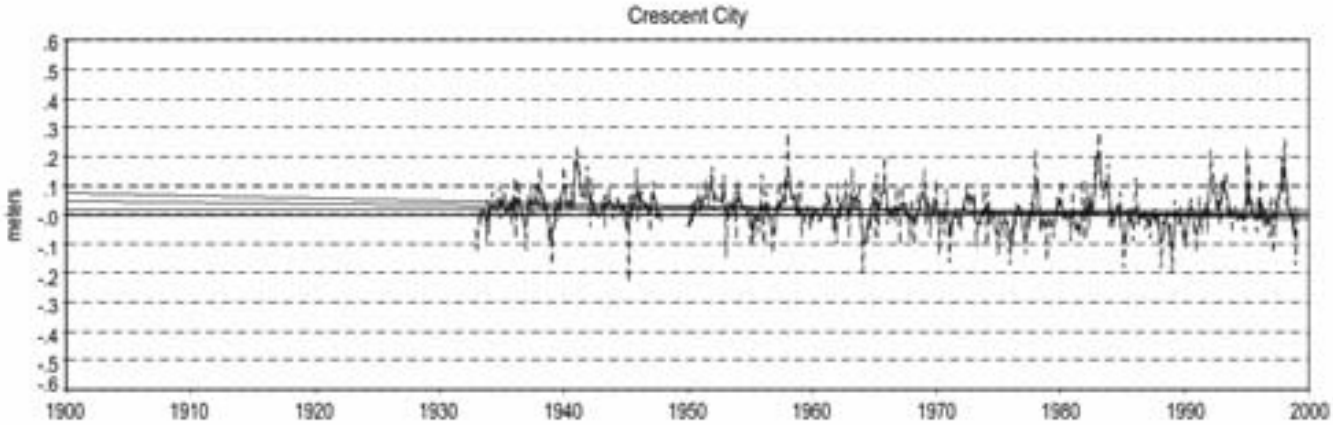
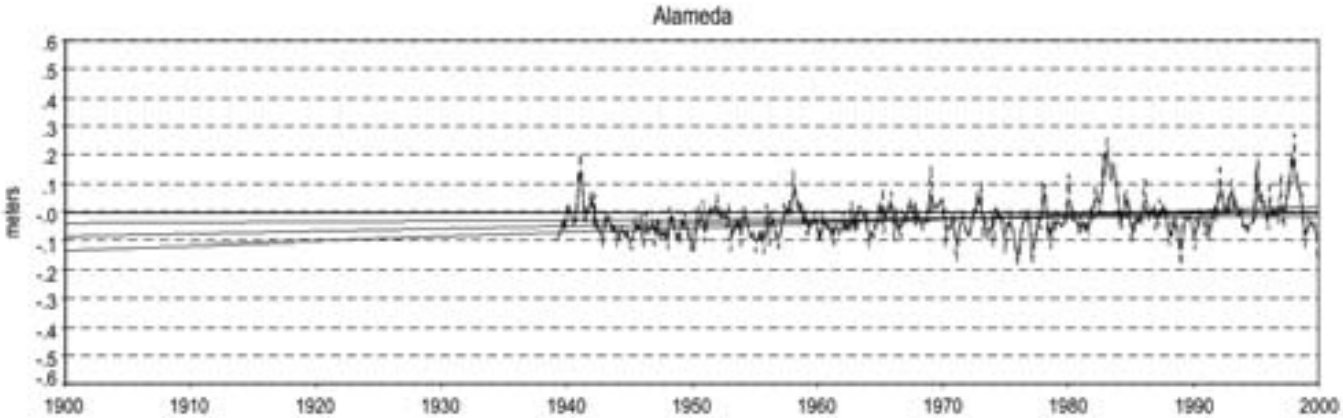


Figure 2-24 Location of Coastal Tide Gauges in California

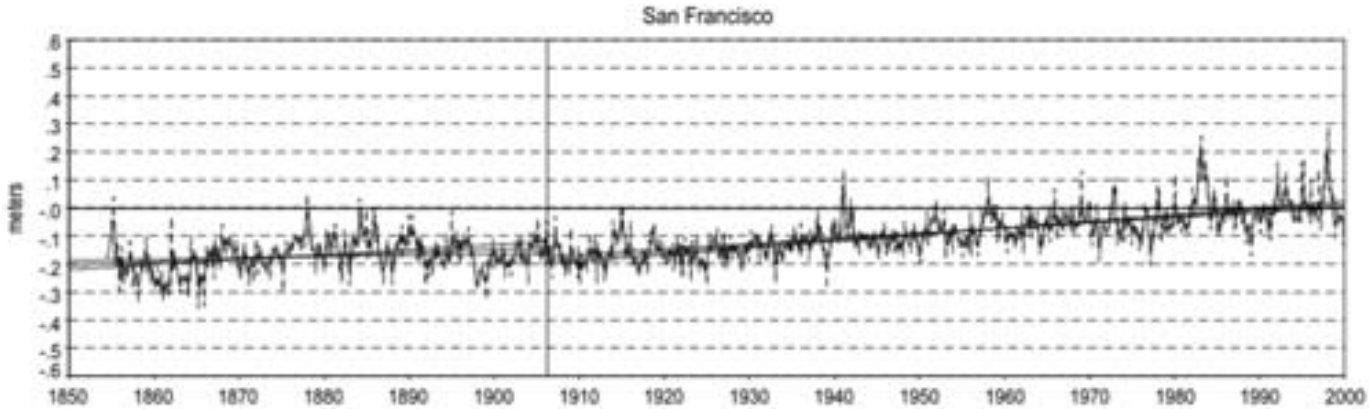
Adapted from: National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational Oceanographic Products and Services' website at: http://co-ops.nos.noaa.gov/sltrends/slrmap.shtml -- http://140.90.121.76/coastline.shtml?region=ca



Gauge No. 9419750--Crescent City. The mean sea level trend is -0.48 millimeters/year (-0.16 feet/century) with a standard error of 0.23 mm/yr based on monthly mean sea level data from 1933 to 1999.

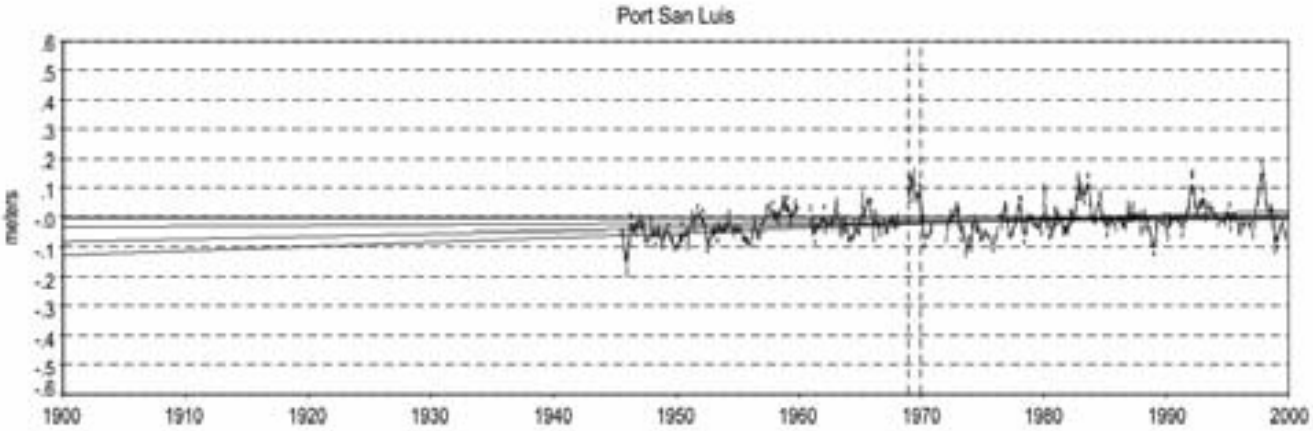


Gauge No. 9414750--Alameda. The mean sea level trend is 0.89 millimeters/year (0.29 feet/century) with a standard error of 0.32 mm/yr based on monthly mean sea level data from 1939 to 1999.

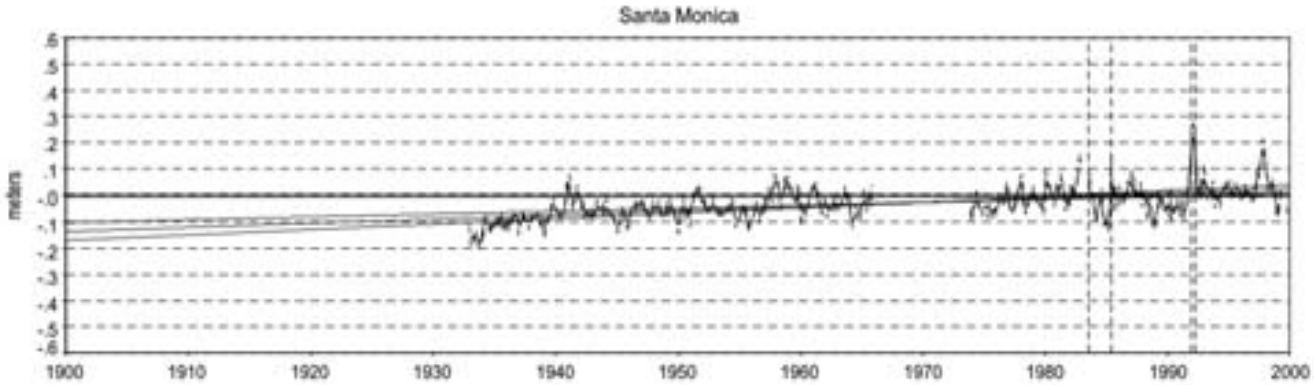


Gauge No. 9414290--San Francisco. The mean sea level trend is 2.13 millimeters/year (0.70 feet/century) with a standard error of 0.14 mm/yr based on monthly mean sea level data from 1906 to 1999.

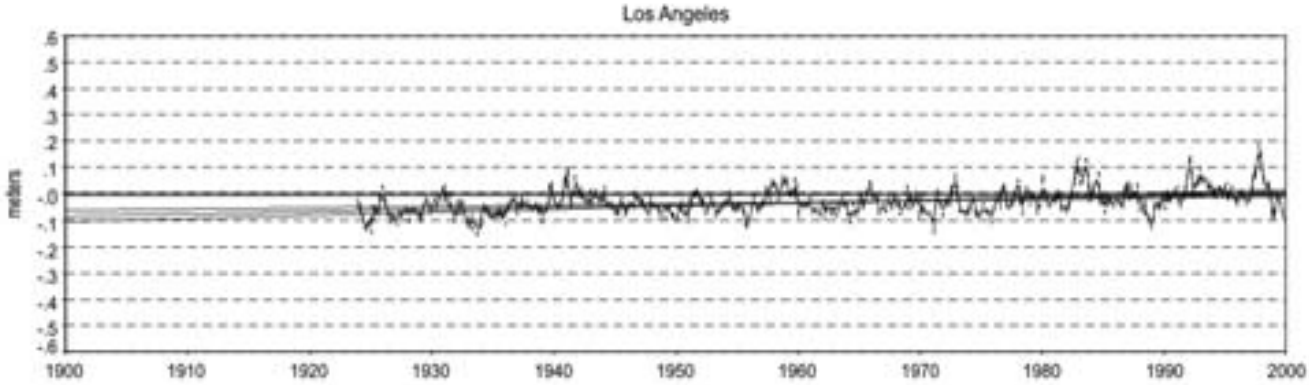
Figure 2-25 Relative Sea Level Trends for Eight Tide Gauges along California's Coast (part 1 of 3)



Gauge No. 9412110--Port San Luis**.** The mean sea level trend is 0.9 millimeters/year (0.30 feet/century) with a standard error of 0.32 mm/yr based on monthly mean sea level data from 1945 to 1999.

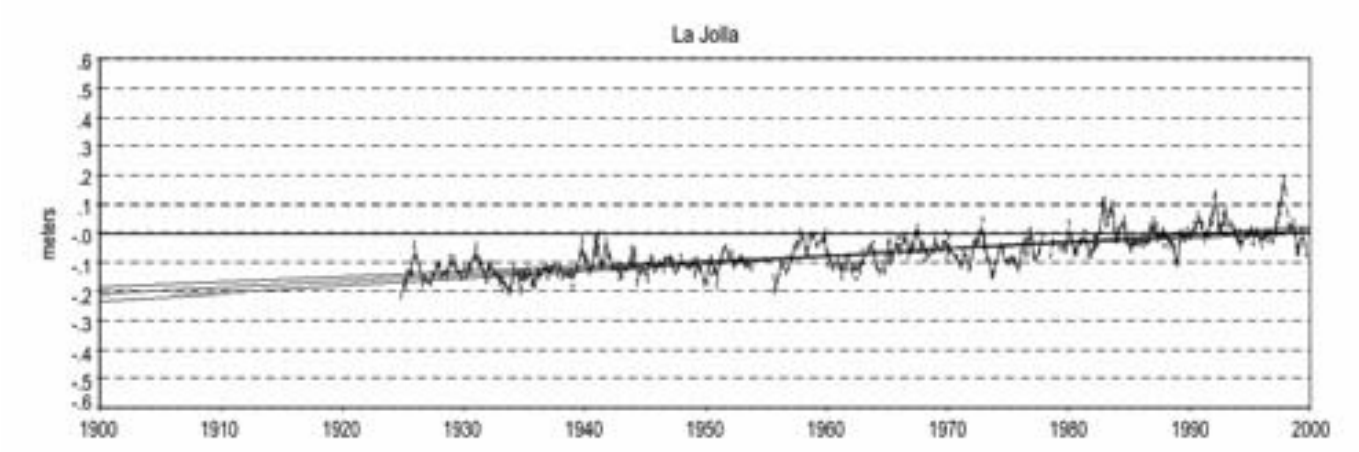


Gauge No. 9410840--Santa Monica. The mean sea level trend is 1.59 millimeters/year (0.52 feet/century) with a standard error of 0.25 mm/yr based on monthly mean sea level data from 1933 to 1999.

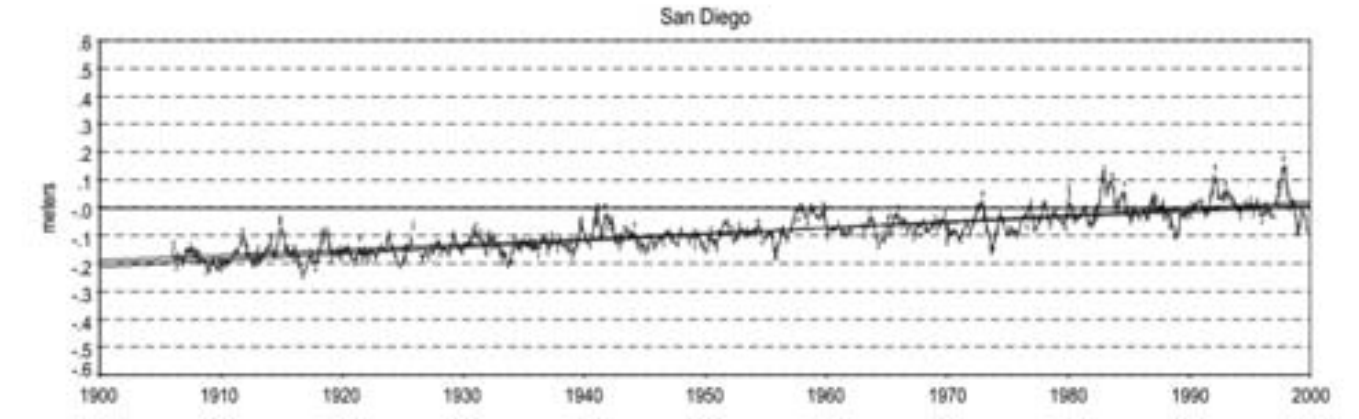


Gauge No. 9410660--Los Angeles. Mean sea level trend is 0.84 millimeters/year (0.28 feet/century) with a standard error of 0.16 mm/yr based on monthly mean sea level data from 1923 to 1999.

Figure 2-25 Relative Sea Level Trends for Eight Tide Gauges along California's Coast (part 2 of 3)



Gauge No. 9410230--La Jolla. The mean sea level trend is 2.22 millimeters/year (0.73 feet/century) with a standard error of 0.17 mm/yr based on monthly mean sea level data from 1924 to 1999.



Gauge No. 9410170--San Diego. The mean sea level trend is 2.15 millimeters/year (0.71 feet/century) with a standard error of 0.12 mm/yr based on monthly mean sea level data from 1906 to 1999.

Figure 2-25 Relative Sea Level Trends for Eight Tide Gauges along California's Coast (part 3 of 3)

Explanation: Solid blue curve is the five-month running average of monthly mean sea level with the average seasonal cycle removed. Linear trend lines illustrate 95 percent confidence interval after accounting for the average seasonal cycle. For most stations, the plotted values are relative to the 1983-2001 mean sea level datum recently established by the National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational Oceanographic Products (CO-OPS). Solid vertical lines indicate the occurrence of any major earthquakes in the vicinity of the gauge. Dashed vertical lines bracket any periods of questionable data.

Source: Graphs and explanations derived from National Oceanic and Atmospheric Administration, National Ocean Service, Center for Operational Oceanographic Products and Services' website at: http://co-ops.nos.noaa.gov/sltrends/sltrends_states.shtml?region=ca

Table 2-6 Relative Sea Level Trends for Eight Tide Gauges Along the Coast of California with 50 Years or More of Record

CO-OPS Gauge Number--Name	Sea Level Trend (feet/century)
9419750--Crescent City	-0.16
9414750—Alameda	0.29
9414290--San Francisco	0.70
9412110--Port San Luis	0.30
9410840--Santa Monica	0.52
9410660--Los Angeles	0.28
9410230--La Jolla	0.73
9410170--San Diego	0.71

Figure 2-25 and Table 2-6 show relative sea level along the coast of California is rising at all but one of the coastal gauges with 50 years or more of record. The one gauge showing a drop in relative sea level is at Crescent City. The apparent drop in sea level there is likely due to land-mass uplift given the gauge's proximity to the Mendocino Triple Tectonic Plate Junction. Information about this tectonic junction can be found at: http://pubs.usgs.gov/publications/text/Farallon.html.

The rate of relative sea level rise at the seven gauges with 50 years or more of record is fairly consistent with the worldwide sea level rise trend of 0.3 to 0.6 of a foot over the past century. Differences in the rate of rise at the various gauges may be due, at least in part, to changes in land mass elevation.

2.6.1.3 Projected Sea Level Rise

The Intergovernmental Panel on Climate Change projects worldwide average sea level to rise about 0.3 of a foot to 2.9 feet from 1990 to 2100 (IPCC, 2001a). The range in the projections reflects the results of multiple climate models for multiple greenhouse gas emission scenarios. Figure 2-26 depicts the varying sea level rise projections. A study by the U.S. Environmental Protection Agency published in 1995 assigned probability estimates for various magnitudes of sea level rise (Titus, 1995).

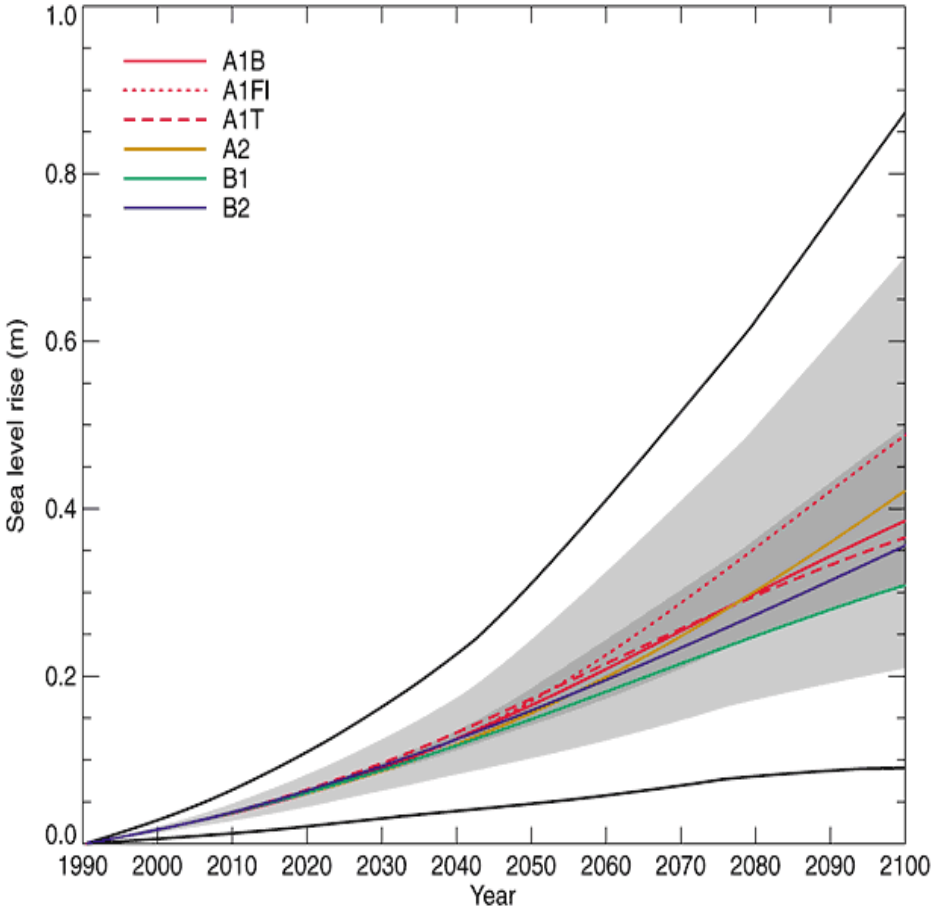


Figure 2-26 Projected Rise in Global Average Sea Level from 1900 to 2100

Source: Adapted from IPCC, 2001a (http://www.grida.no/climate/ipcc_tar/wg1/fig11-12.htm)
Explanation: Global average sea level rise from 1990 to 2100 for the SRES (Special Report on Emission Scenarios; IPCC 2000) scenarios and seven climate models. The region in dark shading shows the range of the average of models for all 35 SRES scenarios. The region in light shading shows the range of all models for all 35 scenarios. The colored lines in the key and in the graph represent the average of modeling results for six GHG emission scenarios. The region delimited by the outermost black lines shows the range of all models and scenarios including uncertainty in land-ice changes, permafrost changes and sediment deposition. This range does not allow for uncertainty relating to ice-dynamic changes in the West Antarctic ice sheet For additional explanation of this figure see IPCC, 2001a (http://www.grida.no/climate/ipcc_tar/wg1/index.htm).

As can be noted from Figure 2-26, many of the model projections for sea level rise show an acceleration in the rate of rise over that observed during the past century. This projected acceleration generally follows the projected acceleration in the rate of global average temperature rise by some climate models for some greenhouse gas emission scenarios (see section 2.4). As mentioned earlier, the rate of relative sea level rise experienced at many locations along California's coast is somewhat consistent with the worldwide average rate of rise observed over the past century. Therefore, it may be reasonable to expect that changes in worldwide average sea level through this century will also be experienced by California's coast.

As mentioned at the beginning of this section, sea level rise poses a significant threat for California. Perhaps the most noteworthy effect of sea level rise on California's water resources will be to the Sacramento-San Joaquin River Delta. Sea level rise over the next century will likely have a significant effect on the Delta's ecosystem, land uses and water supply function, even if the rate of rise over this century is about the same as that observed during the past century. Increased rates of rise, such as those projected for the highest levels of future greenhouse gas emissions and temperature rise could have profound effects on the Delta.

2.6.1.4 Short-Term Changes in Sea Level

Sea level rise at any given location is a function of changes in worldwide average sea level; however, local and regional effects superimposed on global trends can be significant. Rising or falling land elevations can affect what levels an area experiences. Land masses can rise or fall relative to the center of the Earth through tectonic movement. Changes in the elevation of a land mass can also occur due to the activities of humans, such as the extraction of petroleum or groundwater. For example, significant amounts of coastal land subsidence (up to 3 meters) have occurred on the coast of Texas near Houston and Galveston due to petroleum extraction. Groundwater extraction along the Texas coast has also caused subsidence (Gibeaut, 2000). In California, petroleum extraction in Long Beach has resulted in coastal subsidence, but in a limited area. Some coastal area subsidence has also occurred in the Santa Clara Valley south of San Francisco Bay as the result of groundwater extraction (DWR, 1998).

Changes in land elevation as the result of tectonic movement typically occur very slowly (relative to a human timescale), although local land masses have been observed to rise or sink rapidly as the result of seismic activity. As discussed earlier, coastal land masses that are subsiding (sinking) will tend to experience sea levels that appear to be rising faster than the worldwide rate of sea level rise. Coastal areas that are undergoing uplift (rising) will tend to experience sea levels that appear to be going up more slowly than the worldwide average, or will experience sea levels that appear to be declining or not changing compared to worldwide trends.

While rising worldwide average sea level and land mass elevation changes play a long-term role in sea levels experienced at a particular location, other effects can play an important role in the short term. Such effects include:

- gravitational effects of the sun and moon (astronomical tides)
- dynamic interaction of tides with coastlines
- ocean currents
- hydraulic and salinity changes caused by rivers (especially in bays and estuaries)
- barometric pressure
- interannual and decadal changes in ocean temperatures, such as the El Nino Southern Oscillation and the Pacific Decadal Oscillation[3], as well as periodic ocean temperature changes on other timescales
- waves and storm surge

[3] For more information concerning short-term changes in ocean temperature visit: (http://topex-www.jpl.nasa.gov/science/pdo.html)

Of these factors, all but the first two could be affected by climate change. Figure 2-27 and Figure 2-28 illustrate the variability of annual average relative sea level at the San Francisco and La Jolla tide gauges, respectively. These figures also show the 19-year running average of annual average sea level at each gauge for comparison. The 19-year running average was selected since all significant variations in the relative movements of the earth, moon and sun that affect astronomical tides complete their full cycle about every 18.6 years. The San Francisco tide gauge is located a short distance inside of the Golden Gate Bridge on the shore of the San Francisco Presidio. The La Jolla gauge is located at the end of the Scripps Institution of Oceanography pier in La Jolla.

Short-term changes in sea level at a particular location can be quite significant, especially when superimposed on long-term changes. The combined effect could place California's coastal resources and the Delta at an even greater risk than worldwide changes in sea level alone.

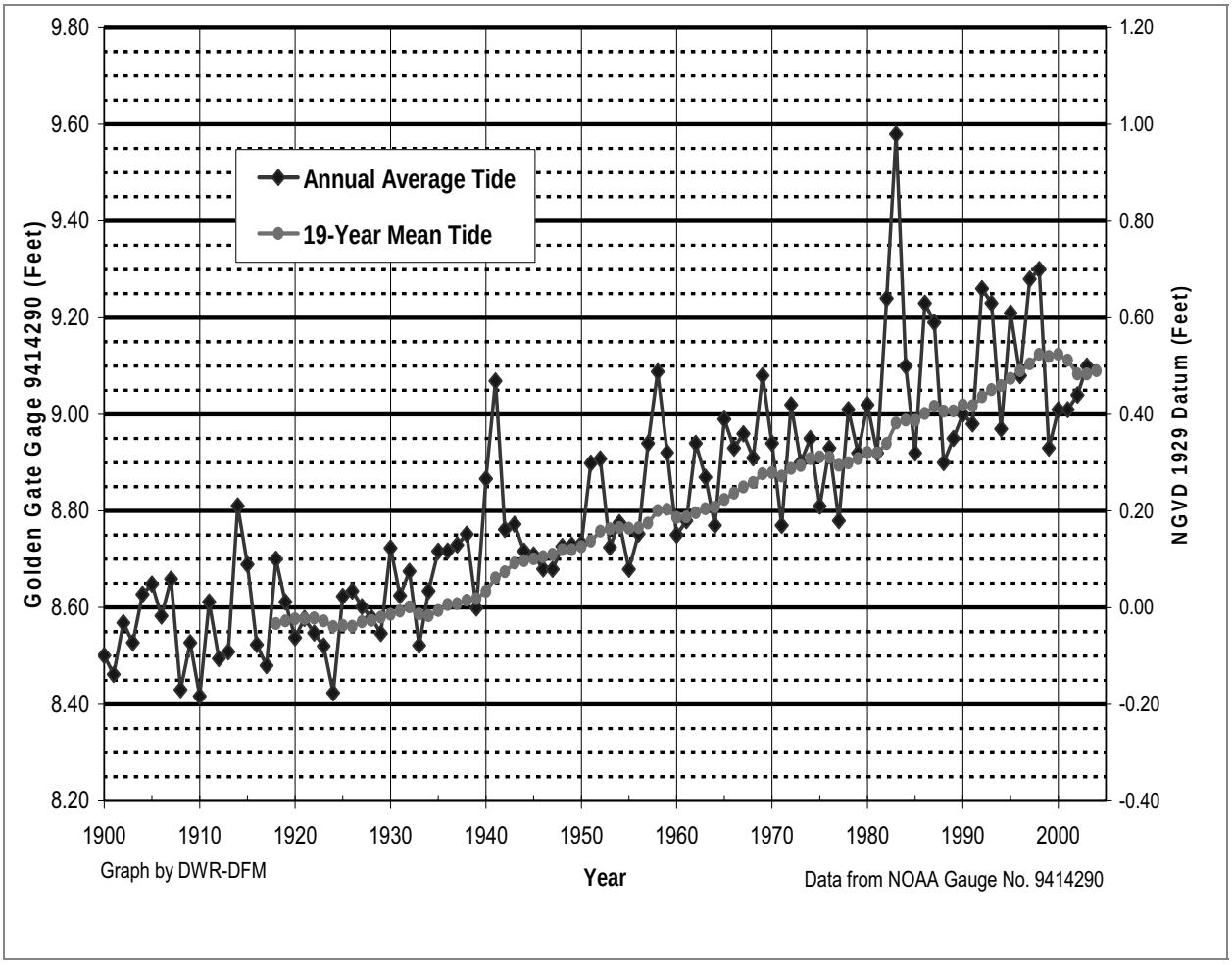


Figure 2-27 Graph of Annual Average Relative Sea Level and the 19-Year Running Average Sea Level at the San Francisco Tide Gauge

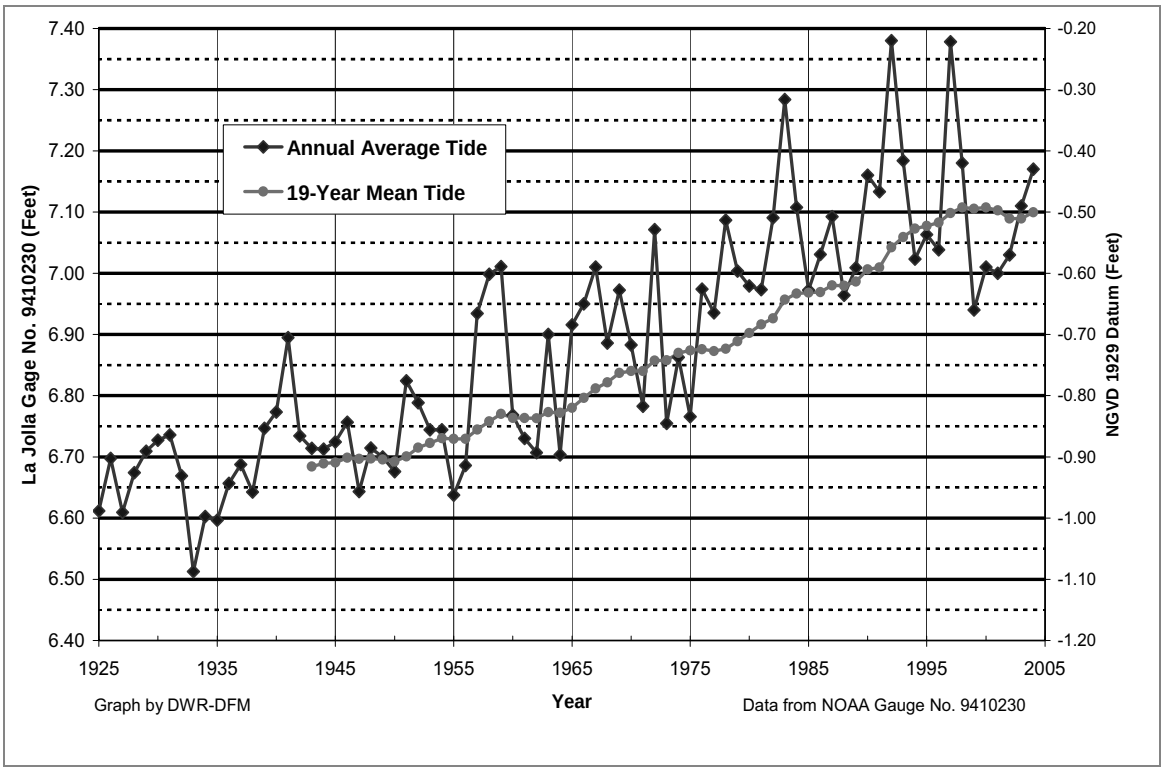


Figure 2-28 Graph of Annual Average Relative Sea Level and the 19-Year Running Average Sea Level at the La Jolla Tide Gauge

2.6.2 Consequences of Sea Level Rise

2.6.2.1 Sea Water Intrusion into Estuaries and River Systems

As mentioned previously, sea level rise during this century will cause increased sea water intrusion into California's coastal marshes and estuaries. Increased intrusion will likely disrupt marsh and estuary ecosystems, especially at the higher projections of sea level rise. Sea water intrusion into the Sacramento - San Joaquin River Delta could cause negative effects on fishes, as discussed in Section 2.9 and increase Delta salinity levels, as discussed in Chapter 5, Section 5.5. Increased salinity levels in the Delta would have a detrimental effect on Delta water supply operations if existing operations in the Delta remain the same and the Delta's configuration is not changed.

2.6.2.2 Sea Water Intrusion into Groundwater

Groundwater plays a significant role in providing California's water supply. In an average year, groundwater meets about 30 percent of California's urban and agricultural water demand. This percentage increases to more than 40 percent during drought years. In 1995, an estimated 13 million Californians, nearly 43 percent of the State's population, were served by groundwater. The demand on groundwater will likely increase as California's population grows (DWR, 2003).

Most of the State's groundwater is produced from alluvial groundwater basins. Alluvial basins are typically valleys that have been partially filled with sediment. Coarser sediment, such as sand, serves to store and transmit significant quantities of water to wells. Layers of finer sediment, such as clay, tend to restrict the movement of groundwater.

DWR has delineated 431 groundwater basins in California beneath about 40 percent of the State's surface area (DWR, 2003). The locations of these basins are illustrated in Figure 2-29.

More than 200 groundwater basins have been identified along the coast of California. Many of these basins play, or could potentially play a significant role in providing a local water supply. Many of California's larger urban areas, including the Los Angeles metropolitan area, overly coastal groundwater basins and derive a significant potion of their supply from groundwater. Regionally and nationally-significant agricultural areas that overlay coastal groundwater basins include the Salinas Valley, Santa Maria Valley and the Ventura-Oxnard Plain.

While most groundwater produced in coastal areas is derived from groundwater basins, groundwater is also produced from mountain and hillside areas underlain by rock, old marine deposits, or volcanic deposits. Such areas typically produce small quantities of groundwater compared to alluvial basins.

Figure 2-30 is a simple illustration of a cross-section of a coastal groundwater basin. The deposits of some coastal groundwater basins in California extend a significant distance beyond the coastline and contain saline ocean water. Under natural conditions, fresh water in coastal aquifers flows toward the ocean keeping saline ocean water from moving inland. However, if inland groundwater levels are lowered through pumping, ocean water may move inland.

Many groundwater basins along California's coast are very susceptible to sea water intrusion, or the intrusion of brackish water from bays and estuaries. Sea water intrusion into California's coastal aquifers was first noted in the 1930s and 1940s. Some of the earliest observations were in Los Angeles and Orange counties. Other areas where a significant amount of seawater intrusion has occurred include Ventura, Santa Cruz and Monterey counties, and some areas around San Francisco Bay and the Sacramento-San Joaquin River Delta. (DWR, 1958; DWR, 1975; DWR, 2003). Sea water intrusion in the Salinas Valley has been observed as far as 5 miles inland (DWR, 1994).

Rising sea level increases the potential for sea water intrusion into coastal groundwater aquifers and other coastal groundwater resources by increasing the pressure of ocean water exerted against water-bearing deposits extending inland from the coast. Rising sea level can also increase the potential for intrusion of sea water into coastal groundwater basins through the inundation of areas that were formerly above sea level.

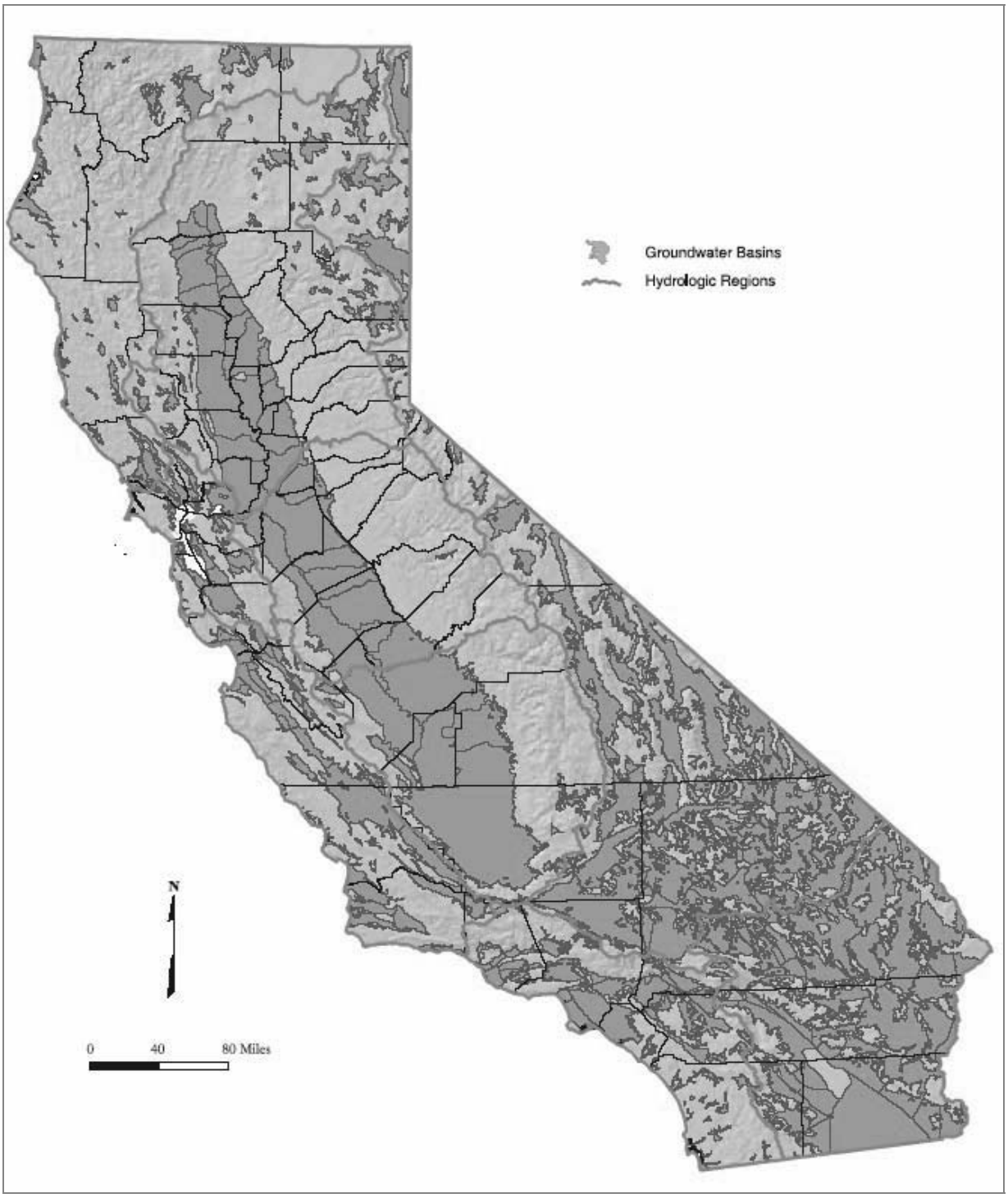


Figure 2-29 California's Groundwater Basins

Source: DWR, 2003

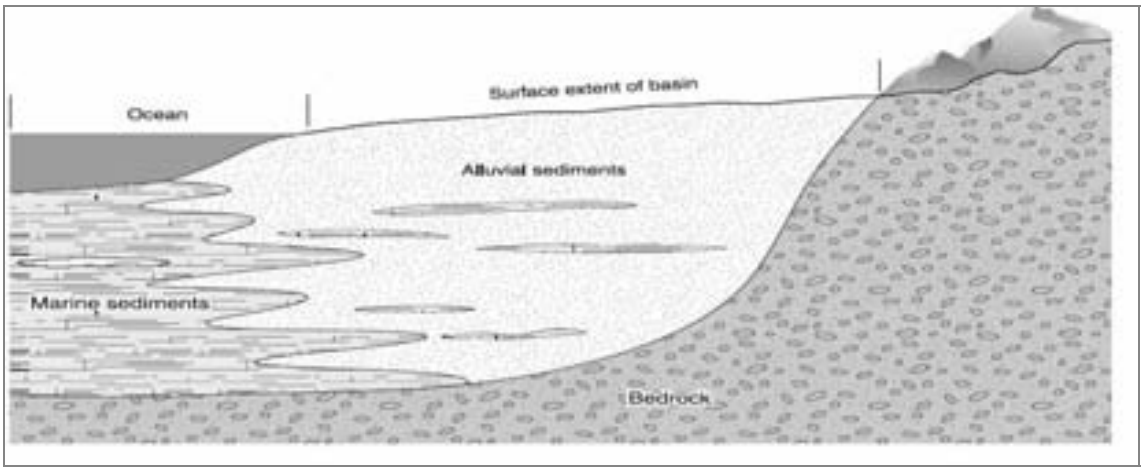


Figure 2-30 Simplified Cross-Section of a Coastal Aquifer
Source: DWR, 2003

The threat posed to coastal groundwater resources by sea level rise can be lessened by various means including controls on well construction and groundwater production, and the operation of hydraulic barrier projects. Hydraulic barrier projects typically involve the injection of treated wastewater or imported water into coastal aquifers to prevent ocean water from moving inland.

The threat to groundwater from the inundation of land by sea level rise can be lessened through shoreline engineering, such as the installation of sea walls. It is anticipated that shoreline engineering projects will be undertaken along many low-lying areas of California's coast to protect areas with high real estate values. Shoreline engineering may be difficult, impractical, or environmentally unacceptable for some of California's bays, estuaries and coastal marshes. Some of these areas might be subject to uncontrolled inundation due to sea level rise.

2.6.2.3 Flooding Risk in the Sacramento-San Joaquin River Delta

The Sacramento-San Joaquin River Delta is highly susceptible to flooding. The Delta includes 70 islands and tracts. Most have land surfaces at or below mean sea level. Land surface on some Delta Islands is as much as 25 feet below mean sea level (DWR, 2005a). The location of the Delta is depicted in Figure 2-19, and a detailed view of the Delta and its islands is shown in Figure 2-31.

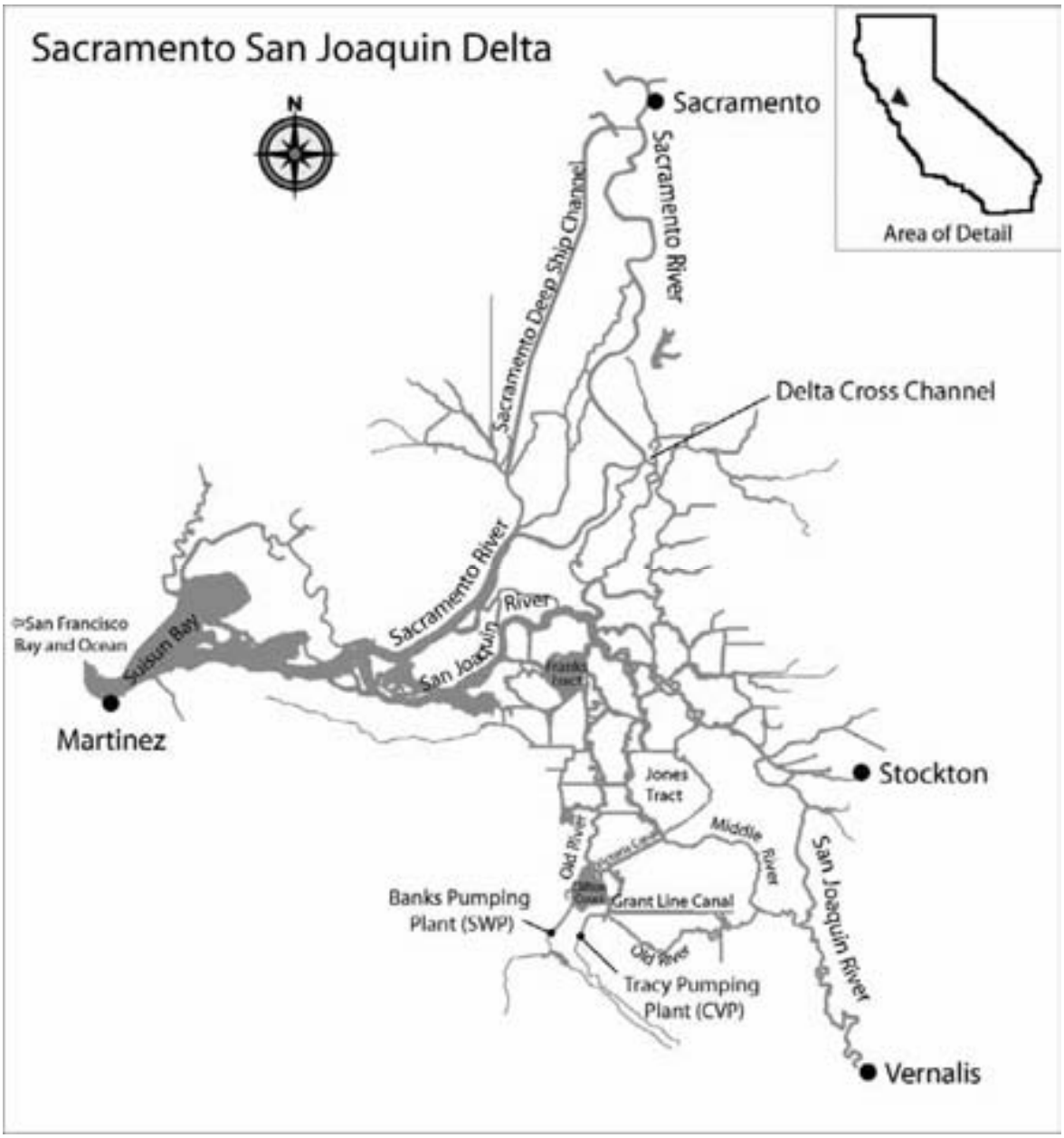


Figure 2-31 Sacramento-San Joaquin River Delta

The islands and tracts of the Delta are protected from the constant threat of inundation by about 1,100 miles of levees. Levee failure can occur due to seepage, piping, slippage, subsidence, sloughing or earthquakes, even during dry weather. Levee failure impacts include potential loss of human life, irreparable harm to the Delta's fragile ecosystem and its listed and endangered species, disruption of utilities and highways and water supply disruption. Water supply disruption can occur when levee failure and island flooding cause salinity levels in the Delta to increase to unacceptable levels due to:

- large amounts of saline ocean water to being drawn into the Delta from the San Francisco Bay, and
- increases in the volume of the Delta's tidal prism and resultant increases in the tidal exchange of saline water in the Delta.

Once a levee fails in the Delta and island flooding occurs, salinity conditions can take weeks or even months to return to normal, depending on the amount and location of levee failures and hydrologic conditions.

2.6.2.3.1 Future Increased Risk of Flooding in the Delta Due to Land Surface Subsidence and Climate Change

Flood risk in the Delta is increasing with time due to land surface subsidence and sea level rise. Land subsidence and sea level rise also increase the consequences of levee failure.

As mentioned earlier, worldwide average sea level rise is projected to be about 0.3 of a foot to 2.9 feet from 1990 to 2100 (IPCC, 2001a). Rising sea levels are likely to have a direct effect on water levels in the Delta because the bottom of essentially all Delta channels and waterways are at or below current mean seal level. Rising sea level will cause backwater effects upstream of the Delta.

Global sea level rise combined with short-term or episodic factors that increase sea level and water levels in the Delta will reduce available levee freeboard unless levees are raised. Short-term and episodic increases in water levels in the Delta include high river flows, ocean/atmosphere phenomena such as El Nino's, storm surge, barometric high tides and high astronomical tides (particularly during perigee, perihelion, and either new or full moon). Figure 2-32 illustrates the relative impact that sea level rise will have on astronomical tides in the Delta. An especially high level of risk would occur if several periodic events were to occur at the same time in the Delta.

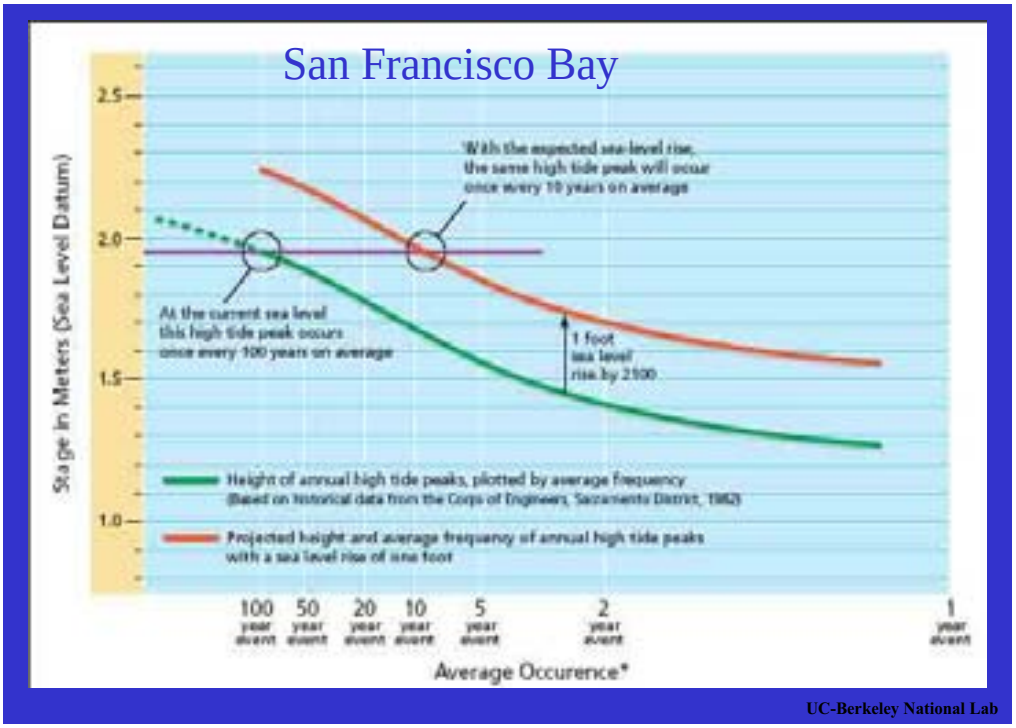


Figure 2-32 Impact of One Foot of Sea Level Rise on the Relative Effect of Astronomical Tides in the Delta

Source: Lawrence Berkeley National Lab (Miller, 1998).

Climate change may affect the magnitude and frequency of flood flows entering the Delta. In their paper on the potential impacts of climate change on California hydrology, Miller and others (2003) present peak river flow data based on climate change simulations. These data show an increased probability of higher annual peak flows for Central Valley rivers. These potential increased flows have yet to be quantified with any confidence. Higher flows will lead to higher water surface elevations in the Delta, especially in its upper reaches.

Ocean temperature anomalies, such as an El Nino, can cause a short-term rise in sea level along California's coast and thus increase water levels in the Delta. For example, the maximum water surface anomaly associated with the 1997-1998 El Nino event increased the level of the ocean along California's coast between about 0.6 to 0.8 of a foot during January 1998 (Bromirski, 2005). This level of rise was due to a combination of steric effects and poleward propagating, coastally-trapped waves. Climate change may increase the frequency or duration of El Nino events (Wara, 2005), although there is a significant amount of uncertainty about possible changes in the nature and occurrence of temperature anomalies in the Pacific as the result of climate change (Kerr, 2005).

Wind driven storm surge can also increase water surface elevations in the Delta. Stronger winds associated with some winter storms would lead to even greater changes in water surface

elevations. Such changes are a function of channel geometry and the distance of open water with respect to wind direction, referred to as "fetch."

Subsidence also must be considered as a risk to Delta levees. The surfaces of many of the Delta's islands and tracts are dominated by soils rich in peat. Peat is a complex organic material that is principally composed of degraded plant matter. Subsidence in the Delta primarily occurs when peat soils are exposed to oxygen and undergo microbial decomposition due to agricultural practices. Subsidence also occurs when peat soils are lost by wind erosion and occasional peat fires. The peat soils of the Sacramento-San Joaquin Delta have subsided at rates of up to about 2 inches per year in the past. Subsidence rates have been the highest in the central Delta islands (Mount, 2004).

Subsidence increases the threat of flooding in the Delta by increasing the differential forces that levees experience. Subsidence also increases the volume of water that can inundate an island or tract when a levee fails. Together, the continued subsidence of Delta islands and rising sea level pose a double-sided threat for Delta levees and flooding. Other factors such as possible increases in peak river flows as the result of climate change further increase the threat to Delta levees.

2.7 Future Water Demand

California's water supply future will be determined by two principal factors, the condition of the State's water resources and water demand. Climate change will likely have a significant effect on California's future water resources, as discussed elsewhere in this report. Climate change will likely also have an effect on future water demand. However, many other factors such as population, land development and economic conditions that are not directly related to climate change will also affect future demand. Table 2-7 provides a summary of some of the potential effects of climate change on future water demand. Table 2-8 lists selected factors that could affect future water demand that will not be directly affected by climate change.

Today there is much uncertainty about future water demand, especially those aspects of future demand that will be directly affected by climate change and warming. While climate change is expected to continue through at least the end of this century, the magnitude and, in some cases, the nature of future changes are uncertain. This uncertainty serves to complicate the analysis of future water demand, especially where the relationship between climate change and its potential effect on water demand is not well understood.

Of the water demand factors that could be directly affected by climate change, potential changes in evapotranspiration, agronomic practices, and environmental water demand might be the most significant for California. Of the changes in demand not directly affected by climate change, changes in demand related to population growth and technological innovation could be the most significant. The following discussion is mostly limited to these aspects of future water demand. Chapter 7 provides additional discussion on evapotranspiration and possible changes in evapotranspiration due to climate change.

Table 2-7 Summary of the Potential Effects of Climate Change on Future Water Demand

Type of Demand	Potential Effect
Crop Irrigation	Increasing temperatures will increase evapotranspiration rates and related water demand where all other factors remain unchanged. Increasing concentrations of atmospheric carbon dioxide may act to reduce increases in plant transpiration (a component of evapotranspiration) in response to increased temperatures. Other factors related to climate change, such as possible changes in humidity, cloudiness and wind could also affect evapotranspiration rates. Evaporation rates from soil and plant surfaces may rise due to temperature increase, depending on changes in other factors that affect evaporation rates. Increased evaporation rates could increase salt accumulation on plant surfaces, especially where overhead irrigation is used. Salt accumulation in surficial soils could also increase. Additional irrigation water demand may result because of possible increased salt control requirements. Some changes in crop type, planting cycles, time of planting, and crop productivity will likely occur as the result of increased temperatures. Statewide and regional irrigation water demand may increase or decrease as the result of these changes. Use of water for frost protection will likely be reduced with increasing temperatures and projected reductions in the annual number of days when frost occurs. Frost protection is typically an important consideration for orchards and vineyards.
Landscape Irrigation	Increased temperatures, as well other atmospheric/climatic factors related to climate change, will affect landscape irrigation in manner similar to that described for crop irrigation, above.
Domestic Water Uses (excluding landscape irrigation)	Domestic water use typically increases with increasing temperature. Increased water demand can occur due to the use of evaporative cooling, increased laundering of clothing, increased bathing, increased drinking water requirements for humans and pets and recreational uses of water.

Table 2-7 Summary of the Potential Effects of Climate Change on Future Water Demand (continued)

Type of Demand	Potential Effect
Commercial and Industrial Water Use (including agro-industrial facilities such as dairies, poultry farms, packing plants, etc.)	Commercial and industrial water use will likely increase as the result of warming due to such factors as increased evaporative cooling demand. Increased consumption of water by concentrated animal feeding facilities, such as dairies and poultry farms, would also likely occur.
Evaporation Losses from Natural Water Bodies and Open Water Storage and Conveyance Facilities	Evaporation losses from water bodies and open conveyances will probably increase as the result of rising temperatures especially in arid portions of the State with low humidity and limited cloud cover.
Environmental Water Requirements	Delta outflow requirements will likely increase to maintain Delta salinity conditions in response to sea level rise; if the Delta's existing configuration, operation of its water supply facilities, and its ecosystem conditions are to remain as they are now. Higher temperatures will likely result in increased environmental water demand for controlling water temperatures for sensitive aquatic species, including anadromous fish. Increased use of reservoir storage and thermal control releases from reservoirs will be required for controlling aquatic habitat temperatures.

Table 2-8 Selected Factors Affecting Future Water Demand in California that are Not Directly Related to Climate Change

Factor	Potential Effect
Population Change	Future increases in population will affect water demand, depending on the location and types of development needed to support an increased population. The conversion of agricultural lands into housing and related community development may not result in a significant increase in water use for a given area, depending on the agricultural use(s) that existed prior to land conversion, and on the type of housing and other facilities constructed. Redevelopment and densification of existing urban land may result in increased water demand in some areas. Development of raw, uncultivated land will directly increase water demand. In general, increases in California's population will tend to increase future water demand.
Changes in Agriculture	Changes in the type and amount of crops grown due to changes in agricultural markets and government crop subsidy programs may help increase or decrease agricultural water demand.
Changes in Landscaping Practices	Changes in consumer preferences and changes in land use ordinances relating to landscaping may affect future landscape water demand.
Changes in Environmental Water Use Requirements	The findings of continuing scientific research related to the condition and preservation of aquatic ecosystems in the State, including the Delta, may affect environmental water demand.
Water Law and Policy	Changes in water law and policy could affect water demand.
Technological Innovation	Lowered consumption rates could result from improvements in water use efficiency for irrigation, domestic, commercial, and industrial uses. Increased reuse of wastewater could help reduce demand on existing and future sources of water. Advances in desalinization technology may reduce demands on the State's freshwater resources, especially in areas along the south coast.

2.7.1 Evapotranspiration

The collective term *evapotranspiration* refers to the vaporization of water from soil and plant surfaces (i.e., evaporation) and vaporization that occurs in plant leaves with water diffusing through pores (stomata) to ambient air (i.e., transpiration). Transpiration is controlled by water availability from the soil, plant morphological and physiological characteristics, and atmospheric conditions which determine how much energy is available to vaporize water inside leaves. Climate and plant type are important determinants of evapotranspiration rates. Even small increases in evapotranspiration rates from crops and landscaping as the possible result of climate change could affect California's overall water demand. This is because of the relatively large amount of the State that is dedicated to irrigated agriculture and the significant amount of landscaping in urban areas.

Increased temperature and atmospheric carbon dioxide concentrations are the two most consistently projected aspects of climate change that will impact evapotranspiration rates for crops and landscaping in California. Hidalgo and others (2005) concluded that a temperature increase of 3 degrees Celsius will result in a 5 percent increase in plant transpiration, unless there is a compensating decrease in solar radiation or other component of the plant energy budget. Increasing carbon dioxide concentrations in the atmosphere may tend to reduce transpiration losses from plants. Other important factors affecting evapotranspiration include wind, dew point (humidity), cloudiness and minimum temperature.

A number of studies related to physiological, biochemical and phenological plant responses to increased atmospheric carbon dioxide concentrations have been published including those studies using data from the 18 free-air carbon dioxide enrichment research sites around the world (Long, 2004). Stomatal responses at elevated atmospheric carbon dioxide concentrations seem to decrease water vapor diffusion; however, more information is needed to better understand the effects of increasing concentrations of atmospheric carbon dioxide on transpiration.

Increased atmospheric carbon dioxide concentrations may also serve to increase vegetal production. Possible increases in production could, in turn, serve to increase total transpiration from individual plants, as well as increase the per-plant water demand for tissue production and direct evaporation from vegetal surfaces. Long and others (2004) found that carbon dioxide concentrations expected by mid-century would increase dry matter production about 20 percent and seed yield by 24 percent for some plant types, including most crops and trees.

Urbanization can affect local evapotranspiration rates through regional greenhouse gas emissions, increasing amounts of plant physiological stressors such as atmospheric ozone, and through higher temperatures associated with urban island heat effects. Slone and others (2005) reported that temperatures over urban centers can be elevated while temperatures over irrigated land tend to be lower than temperatures over undeveloped areas. A significant increase in urbanization in California is expected by the end of this century.

2.7.2 Agronomic Practices

As noted in Table 2-7, climate change and increasing temperatures can affect total crop water demand by inducing changes in crop type, planting cycles and time of planting. Few studies have assessed the possible impacts of climate change on crop patterns in California (Hayhoe, 2004).

Plant physiological responses to increasing temperature will be mixed, therefore there are likely to be varying agronomic responses to climate change. For example, fewer frost days would allow citrus production to extend to higher latitudes and elevations, including in the Central Valley. However, fewer frost days would be detrimental for tree crops having a chill requirement.

There has been a long-term shift toward planting permanent crops in many parts of California, such as trees and vines. Climate change may increase the variability in precipitation and increase the frequency of droughts. Since agricultural water supplies tend to be curtailed before urban supplies during droughts, the possible consequences of increased droughts for agriculture could become more severe because of increased planting of permanent crops. Droughts typically do not cause lasting damage where crops are planted annually.

2.7.3 Changes in Environmental Water Demand

Climate change could have a significant effect on environmental water demand in California. Two aspects of environmental water demand that will likely be impacted the most are salinity control requirements for the Sacramento-San Joaquin River Delta and temperature control demand for various rivers and the Delta.

2.7.3.1 Delta Salinity Control

The Delta is a key component of California's water supply infrastructure. A major portion of the State's agricultural and urban water supply passes through the Delta to State Water Project and Central Valley Project water diversion facilities.

Salinity levels in the Delta depend on outflow from the Delta to the San Francisco Bay and Pacific Ocean. Saline water from the San Francisco Bay is pushed out of the Delta during periods of high Delta outflow. Saline water can enter the Delta and increase salinity a significant distance inland during low outflow.

Delta outflow primarily depends on the amount of freshwater entering the Delta and the diversion of water from the Delta for the Central Valley Project, the State Water Project, and in-Delta uses which collectively reduce outflow. Most of the inflow to the Delta comes from the Sacramento, Cosumnes, Mokelumne, and San Joaquin rivers. Flows from these rivers are typically highest during the winter and spring in response to annual precipitation and snowmelt. The lowest flows typically occur in the late summer and fall.

The greatest challenge for maintaining salinity levels in the Delta typically comes in the late summer and fall when natural Delta inflow is usually the lowest. Reservoir releases during this

time help maintain river flows into the Delta in the absence of enough natural runoff. The rate of pumping from the Delta can be reduced during this period to help maintain Delta outflow and prevent salinity intrusion. Pumping operations have been severely cut back during dry years; especially when reservoir storage levels are very low due to drought.

As discussed in Section 2.5, climate change is expected to cause more precipitation in the form of rain rather than snow, reductions in water storage in annual snowpack, earlier snowmelt and sea level rise. Each of these factors could present significant reservoir management challenges, particularly for reservoirs in the Sierra foothills. These reservoirs will likely experience changes in the rate and timing of inflow. Changes in reservoir operations and reduced annual storage in snowpack could result in less water being available in the summer and fall to meet Delta outflow and salinity control requirements.

2.7.3.2 Water Temperature Control

Increased air temperatures as the result of climate change will likely increase water temperatures in the State's lakes and waterways. Increased water temperatures pose a threat to aquatic species that are sensitive to temperature, including anadromous fish. Increased water temperatures will also cause decreased dissolved oxygen concentrations in water and other water quality changes, and will likely increase production of algae and some aquatic weeds.

Intermittent temperature problems now exist for some aquatic species in some Central Valley rivers and streams, and in portions of the Delta. Intermittent temperature problems also occur in other areas of the State; including in the Klamath, Eel, and Russian river basins. High water-temperature problems typically occur during the summer and early fall.

Water resource managers often release cold water stored in reservoirs to control downstream water temperatures for aquatic life. Most of the water held in the State's reservoirs is accumulated in the winter and spring when temperatures are lower than at other times of the year. Reservoirs that are downstream of significant snowpack receive cold water from snowmelt through the spring and sometimes into the summer.

Climate change and rising temperatures will increase demand for temperature control releases from many reservoirs. However, coldwater storage in reservoirs needed to supply releases may decrease as the result of climate change due to:

- diminished snowpack and less inflow of late-season cold snowmelt, especially for lower elevation reservoirs in the Sierra Nevada
- increased heating of reservoir inflow
- increase heating of reservoir content and releases
- possible loss of reservoir storage for thermal control releases due to changes in reservoir operations in response to changes in runoff timing

Increased temperature control requirements together with a possible decreased capacity to provide temperature control releases from reservoirs as the result of climate change, could pose a double-sided threat for some aquatic species.

2.7.4 Population

California has experienced rapid population growth since the mid 1800s. This growth is due in part to California's strong economy, natural beauty and relatively mild climate.

California's population is approaching 37 million. The California Department of Finance projects the State's population to be about 44 million by 2020 and about 55 million by 2050 (DOF, 2004). California's population could be as high as 90 million by the end of the century (Landis, 2003). Figure 2-33 depicts growth in the State's population from 1850 to 2005, and projected growth to 2050.

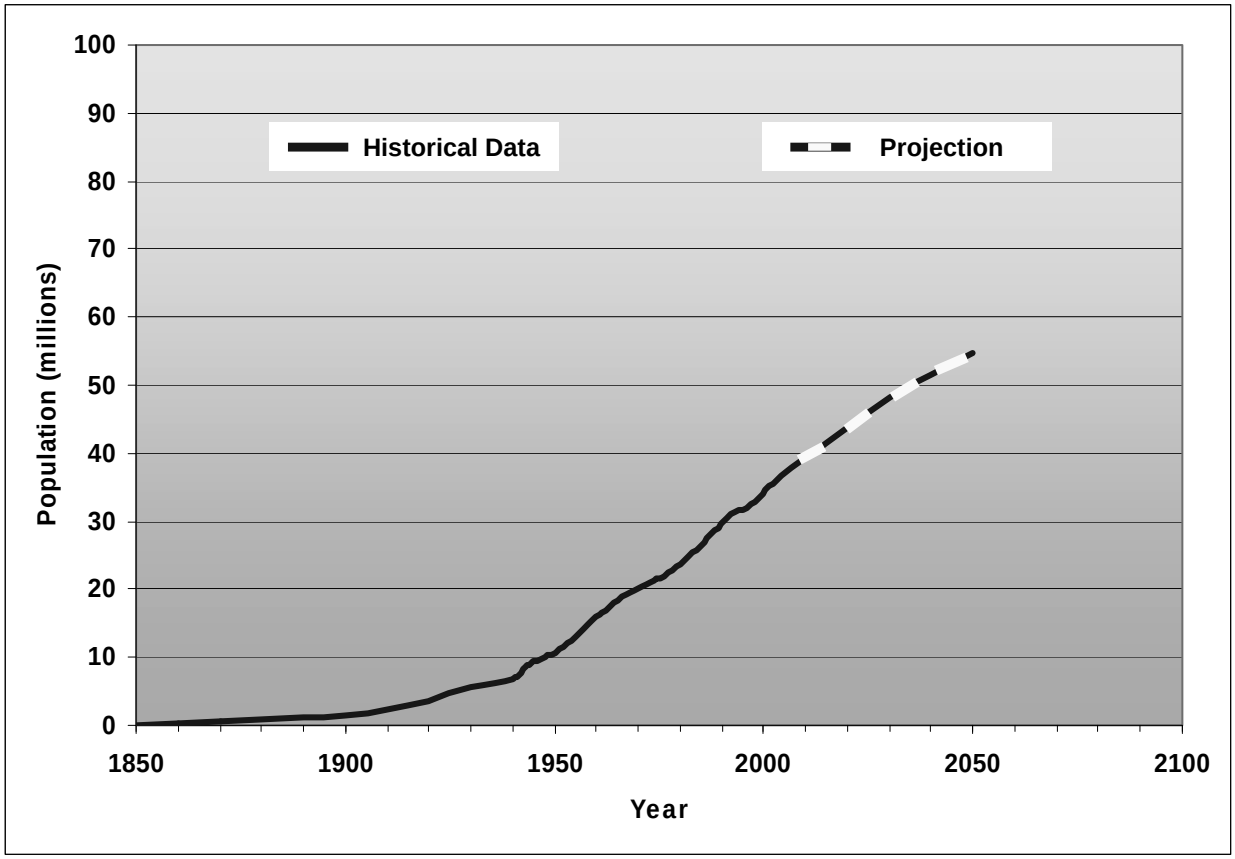


Figure 2-33 Historical and Projected Future Population Growth in California

Data source: DOF (2005)

Future increases in population will affect water demand, depending on the location and types of land development that occur to support an increased population. Much of California's future development is projected to occur on valley floor areas, including in the Central Valley along major transportation systems (Landis, 2003). While climate change is generally not expected to have a major effect on future population growth in California, it could have some effect on the where development occurs.

The conversion of agricultural lands into housing, commercial and industrial uses may not result in an increase in water use for a given area, depending on the agricultural use(s) that existed before conversion and on the specific type of development. Redevelopment and densification of existing urban land may result in increased water demand in some areas. Urbanization of undeveloped land will serve to increase water demand directly. While there is much uncertainty about California's future population growth and development, an increase in the State's population is generally expected to increase the State's total water demand, absent additional measures to conserve water.

2.7.5 Technological Innovation

Technological innovation could play a significant role in determining California's future water demand, as well as future supply. Innovation in water conservation practices could serve to reduce water demand by allowing water to be used more efficiently. Innovation in water resource management could allow California's water resource systems to be managed more efficiently and allow more water supply yield with the same or less environmental impact. Innovation in water resource management and water use would occur with or without climate change. However, given the potential impacts of climate change, there will be an increased impetus for innovation.

A key area for future technological innovation is agricultural water use efficiency. Tanaka and others (2005) have determined that by the year 2100, agricultural water use will fall by 24 percent, while loss of income from agriculture will decrease only 6 percent. This discrepancy between water use and income comes from a predicted shift to higher-value crops and more efficient use of water. A theoretical body of work suggests that horticultural breeding improvements alone can attain a maximum increase in water use efficiency of about 15 percent (Cowan, 1977).

An area of innovation that could affect future water supply conditions, at least in some parts of the State, is sea water desalinization. The unit cost of desalinization has fallen in recent years, however, desalinization remains a relatively expensive and energy-intensive means of obtaining water compared to other water sources. More improvements in desalinization technologies could reduce costs and energy requirements. Desalinization could become a more competitive source of water, especially in coastal areas of Southern California where water is often imported from long distances and at high cost partly because of energy requirements.

2.8 Colorado River Basin

This report is primarily focused on the potential effects of climate change on the Central Valley and associated water resource systems. This is because the Central Valley and its water resource systems supply most of California's water, and because much of the effort to assess the impacts of climate change on the State's water resources has been directed toward the Central Valley. Climate change will affect water resource systems that obtain water from areas outside of the Central Valley. While the timing and scope of this report preclude substantive discussion of most of these systems, it is important to mention the single largest source of water supply for California outside of the Central Valley, the Colorado River.

The Colorado River is an important source of water for Southern California. In the past, California has diverted as much as 5.3 million acre-feet annually from the Colorado River. This is in excess of the State's annual allotment of 4.4 million acre-feet. Even at the allotment of 4.4 million acre-feet per year, the River still supplies about half of Southern California's average annual net water use (DWR, 2005a).

California's diversions from the Colorado River are primarily through the All-American Canal and the Colorado River Aqueduct. The All-American Canal supplies water to cities and agriculture in the Imperial Valley, and to agriculture in the Coachella Valley. The Colorado River Aqueduct supplies water to agriculture and cities of the south coast. Figure 2-34 illustrates the location of the All-American Canal and the Colorado River Aqueduct, as well as the greater service areas for the two systems.

An overview of past, present, and future climate in the Colorado River Basin is presented in a 2005 DWR special report prepared for the Association of California Water Agencies and Colorado Water Users Association conferences (DWR, 2005b). The report discusses hydroclimatic issues for the Colorado River Basin and their implications for water users in the basin. Portions of that report are cited below.

Figure 2-34 The Colorado River Aqueduct, All American Canal and Their Service Areas

Source: California Department of Water Resources, http://www.crss.water.ca.gov/data/ca_service_area.cfm

2.8.1 Description of the Colorado River Basin and its Water Resources

The Colorado River Basin extends into seven western states and Mexico, each of which has strong interests in the river and its water. The states are Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming, as shown in Figure 2-35. While the volume of natural runoff in the basin is relatively small in comparison to its area, an average of about 15 million acre-feet of runoff is generated each year in the Colorado River Basin above Lees Ferry. Lees Ferry is labeled as "Compact Point" in Figure 2-35.

The Colorado River and its tributaries are the major source of water for many of the rapidly growing cities of the seven basin states and northern Baja California. The cities include Denver, Salt Lake City, Las Vegas, Phoenix, Tucson, Los Angeles and San Diego and other communities in south coastal California.

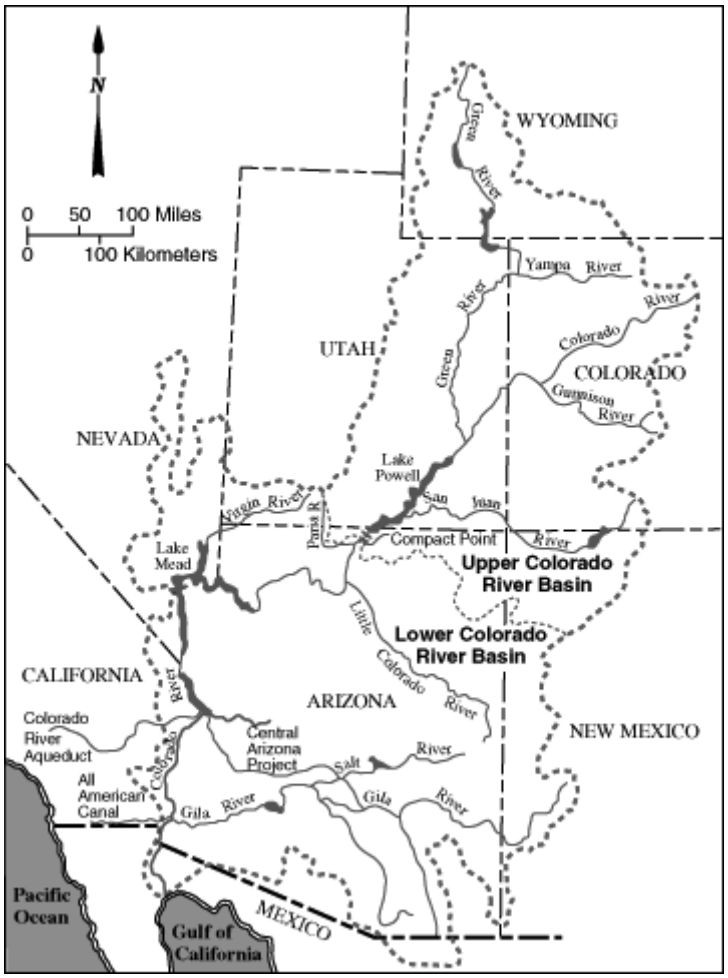


Figure 2-35 Map of the Colorado River Basin
Source: (Dettinger, 1995) http://geochange.er.usgs.gov/sw/changes/natural/codrought/

The Colorado River rises into the snow capped mountains of north central Colorado and flows southwesterly about 1,400 miles to Mexico and the Gulf of California. The River's major tributaries are the Green River, originating in the Wind River Mountains of southwest Wyoming, the Gunnison River from west central Colorado and the San Juan River from southwest Colorado.

The Colorado River basin is estimated to cover an area of about 244,000 square miles, about 8 percent of the land of the conterminous United States. About 2,000 square miles of the basin is in Mexico. The basin is typically considered to consist of two parts, an upper and lower basin, with the dividing point at the Lees Ferry gauging station in north-central Arizona, just downstream of Glen Canyon Dam and Lake Powell.

The upper Colorado River basin is nearly half the total drainage area of the entire basin or 109,300 square miles. Most of the water flowing in the Colorado River originates in the upper basin mountains, but significant tributaries also exist in the lower basin including the Little Colorado River in northeastern Arizona, the Virgin River in southwestern Utah and southeastern Nevada and the Gila River system of south central Arizona and extreme western New Mexico.

The Colorado River basin is one of the driest major watersheds in the United States. Average annual basin precipitation is 13.9 inches, with an annual average of 15.2 inches in the upper basin and 12.9 inches in the lower basin. Much of the Colorado River basin is desert receiving less than 10 inches of precipitation per year. High elevation areas receive significantly more precipitation, over 50 inches at some locations. The wetter areas of the Colorado River Basin consist of the Wind River Mountains in Wyoming, Rocky Mountains in Colorado, San Juan Mountains in southwest Colorado, the Uinta Mountains in northeast Utah and the Mogollon Rim in east central Arizona. The driest areas of the basin are in the basin's southwest corner near Yuma, Arizona. This area receives about 3 inches of annual precipitation. Figure 2-36 illustrates the distribution of average annual precipitation in the basin.

Most of the precipitation in the Colorado River basin is from winter storms originating in the Pacific Ocean. Most of the runoff from these storms comes from the high mountainous areas in the basin's upper reaches. These areas are favored by orographic precipitation and winter snowpacks. While these areas only constitute about 15 percent of the basin's entire area, they generate about 85 percent of its entire natural runoff.

Occasionally, more often in El Nino years, major winter storms from the Pacific Ocean move across Southern California and into the lower portions of the basin. These southern-track storms can provide heavy winter rainfall at low elevations in Arizona, and heavy snow in the San Juan Mountains of southwestern Colorado.

A major factor that sets the climate of the Southwest United States and southern part of the Colorado River Basin apart from the rest of the country is the North American monsoon system. Typically, during the months of July, August, and the first half of September, regional circulation patterns change and cause moisture-laden air to move into the Southwest from the Pacific Ocean, the Gulf of California, and the Gulf of Mexico. As this moist air moves into the

southwest, a combination of orographic uplift and daytime heating from the sun causes thunderstorms to develop.

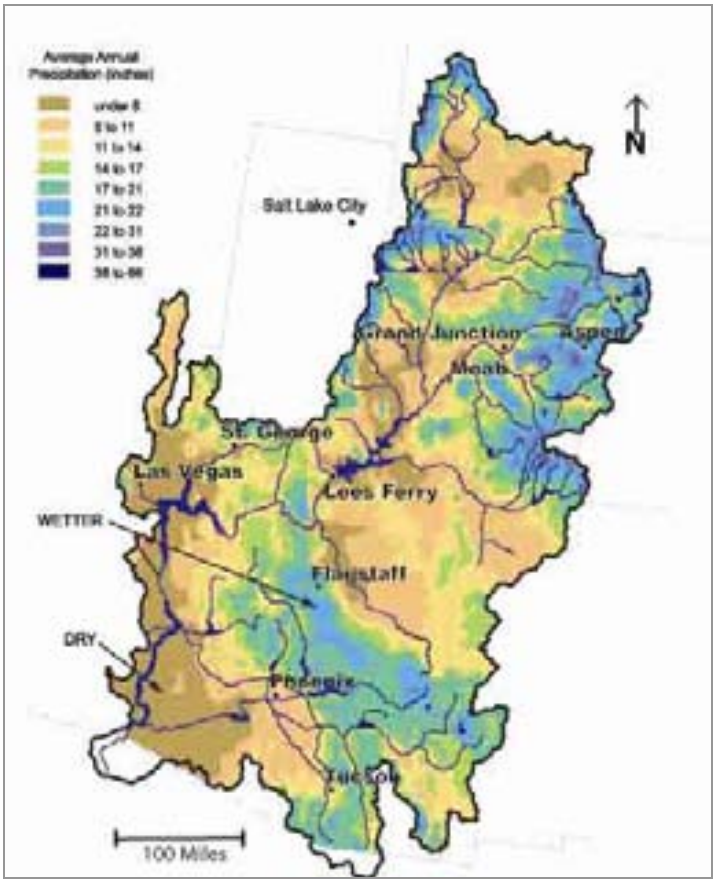


Figure 2-36 Distribution of Average Annual Precipitation in the Colorado River Basin
Adapted from The University of Arizona's Institute for the Study of Planet Earth CLIMAS
http://www.ispe.arizona.edu/climas/learn/swnutshell/sld004.htm

Summer monsoonal rainfall is an important fraction of the total annual precipitation received in southeastern Arizona, much of New Mexico, and southern Colorado. Most of the monsoonal rain is from thunderstorms and is highly localized and sometimes very intense. Although monsoonal rainfall is very important to nourishing watershed vegetation in parts of the southwest, and can cause local flooding, it does not contribute much to flows in the Colorado River or its major tributaries.

Finally, in the summer of some years, the remnants of a Pacific hurricane off the west coast of Mexico will move north over northwestern Mexico and into the Southwest United States. These tropical storms can produce regional rainfall over the desert and flash floods in some of the mountain watersheds.

Since the latter part of 1999, the upper Colorado River basin has experienced an extended severe drought. Water year 2005 saw improved hydrologic conditions in the basin. Figure 2-37 illustrates the volume of water stored in Lake Powell and Lake Mead since the construction of both reservoirs. The decline in reservoir storage after 1999 illustrates the significance of the

recent drought. While hydrologic conditions improved in Water Year 2005 and the severity of drought conditions in the basin has eased somewhat, it is premature to declare that the drought in the upper basin is over (DWR, 2005b).

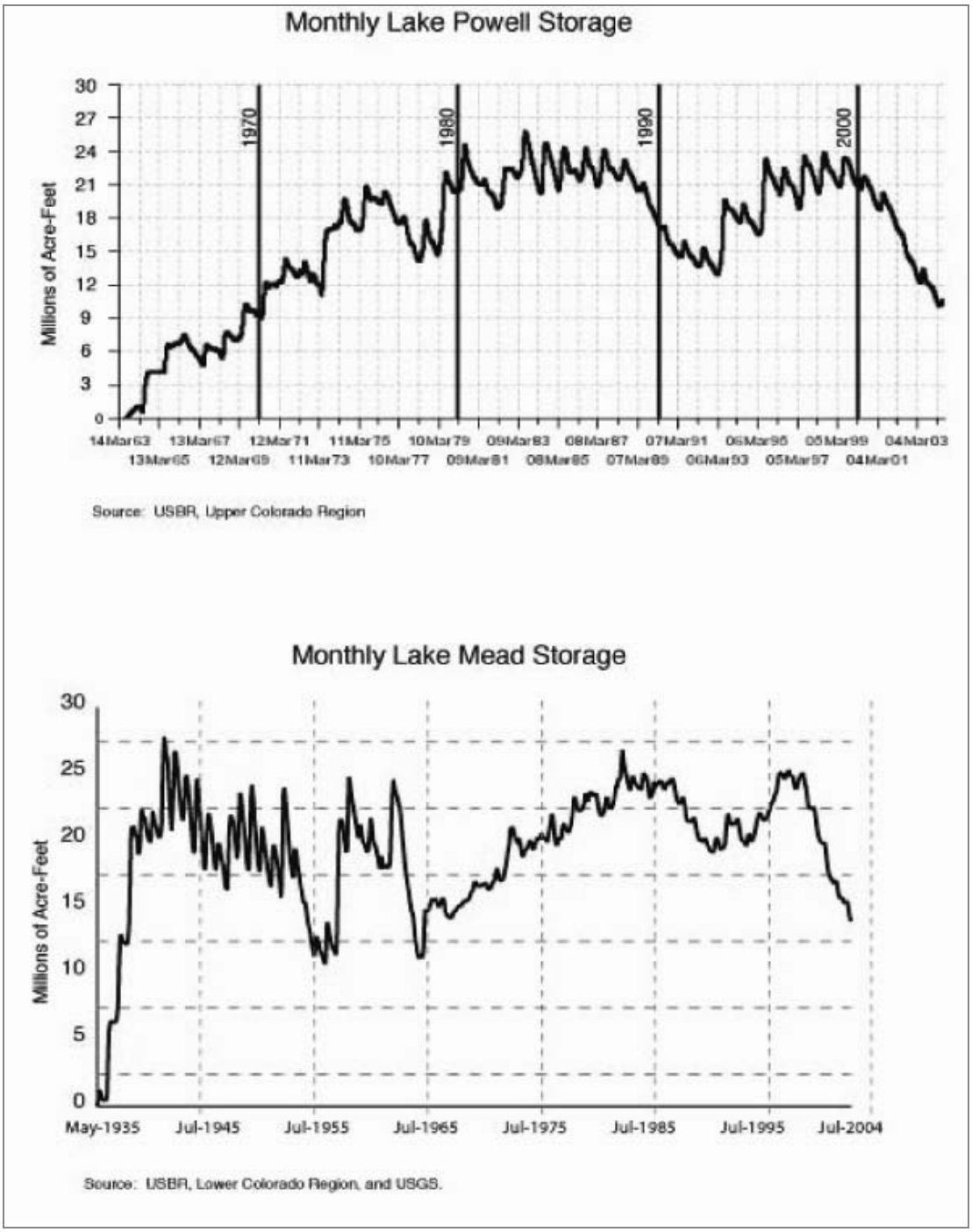


Figure 2-37 Monthly Storage Volumes in Lake Powell and Lake Mead since their Construction

2.8.2 Allocation of Water in the Colorado River Basin

The 1922 Colorado River Compact formally divided the Colorado River basin at Lees Ferry into two parts: an upper basin and lower basin, as described earlier. Each basin was apportioned 7.5 million acre-feet of Colorado River water annually for water supply purposes. A 1944 treaty between the United States and Mexico guarantees Mexico 1.5 million acre-feet annually. The burden of this guarantee is shared equally by the upper and lower basins.

The upper basin states allocated use among themselves in 1948. The allocation of water in the lower basin was decided by the U.S. Supreme Court in 1964. The court decided that the annual apportionment of 7.5 million acre-feet for the lower basin would be allocated as follows: 4.4 million acre-feet to California, 2.8 million acre-feet to Arizona, and 0.3 million acre-feet to Nevada. One of the salient points of the Supreme Court decree was that Arizona's use of Gila River water is not part of its 2.8 million acre-feet allocation. In addition, all lower basin states have the right to use tributary flows before they join the Colorado River without affecting their appropriation of Colorado River water.

2.8.3 Climate Change and the Colorado River Basin

Flows in the upper Colorado River basin are mostly a function of snowmelt. Warmer air temperatures as the projected result of climate change would tend to reduce the basin's middle elevation snowpack. Warmer air temperatures would also tend to cause earlier melting of annual accumulations of snow. Annual snowmelt could begin several weeks sooner than it does now, depending on the amount of warming that occurs.

Warming in the upper Colorado River Basin could cause an increase in winter runoff due to higher minimum snow elevations during winter storms and less precipitation falling and accumulating in the form of snow. Since reservoir storage in the Colorado River Basin is so large in comparison to average annual basin runoff (roughly four times average runoff), a change in the timing of annual runoff in the basin as the result of climate change would not be expected to significantly affect basin yield. Figure 2-38 illustrates locations of the larger reservoirs in the basin.

Recently completed climate model runs for the upcoming Intergovernmental Panel on Climate Change's 4th Assessment indicate a winter temperature increase of 1.1 to 2.0 degrees Celsius in the Colorado River basin by 2050, with continued temperature rise expected through the end of the century. Upper basin runoff from annual snowmelt would likely peak five to 25 days earlier than the average time of peak runoff for the 1951-80 historical period (Garfin, 2005).

Possible changes in amount of precipitation received by the Colorado River basin as the result of climate change could affect basin yield and thus are potentially of more concern for water supplies than predicted changes in the timing of runoff. As discussed previously, about 85 percent of upper basin runoff is contributed by its high elevation watersheds. Therefore, possible changes in high mountain watersheds and the amount runoff from them could be the most important. Although climate models provide precipitation projections, projections for a specific region, such as the Southwest, vary considerably between models and are probably not reliable (Garfin, 2005).

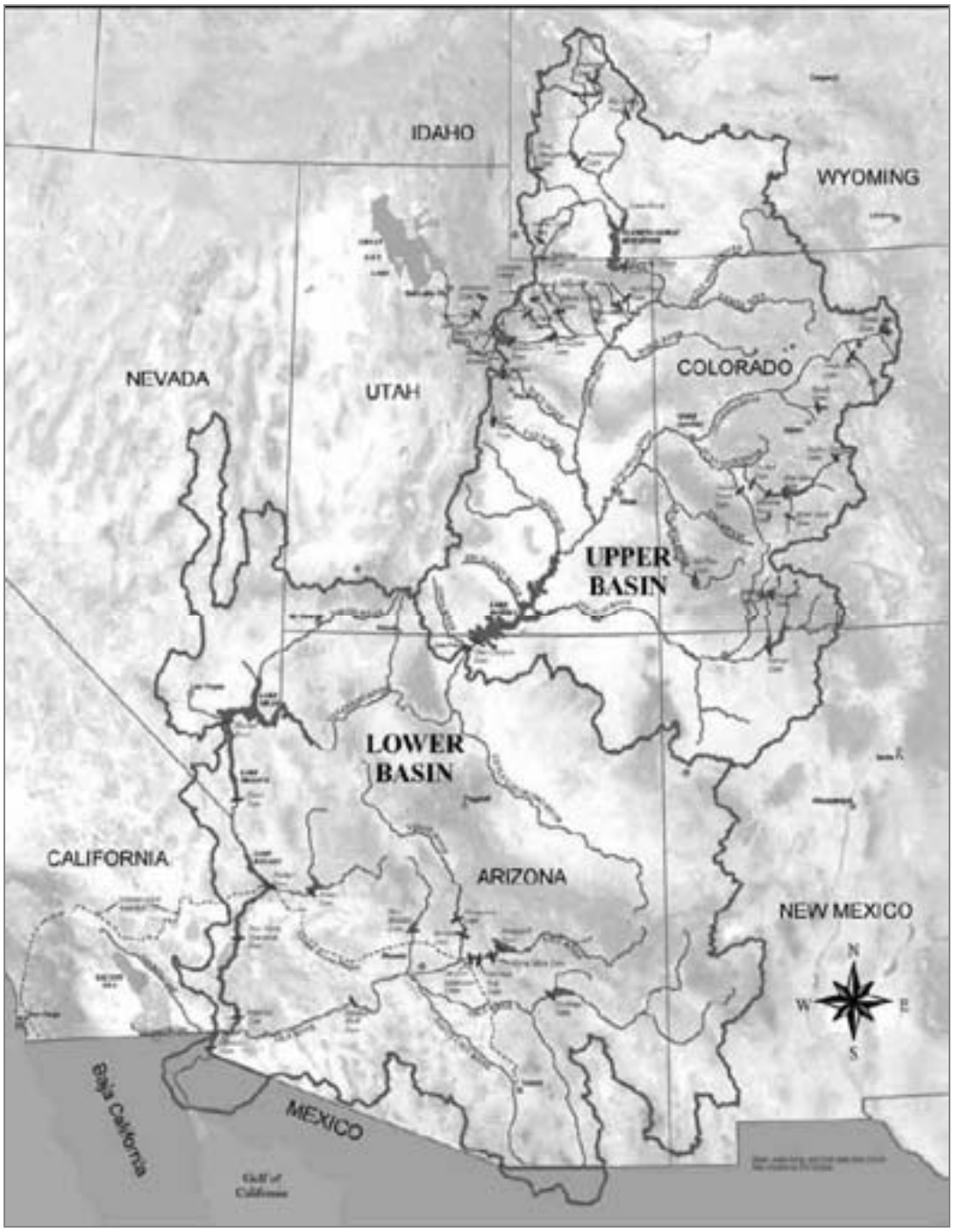


Figure 2-38 Size and Locations of Reservoirs in the Colorado River Basin

From http://www.water.utah.gov/interstate/thecoloradoriverart.pdf

Warmer temperatures from climate change could be expected to cause drying of water-producing areas of the vast Colorado River watershed somewhat sooner each year than what occurs today. One study indicates that a precipitation increase of 10 percent may be required to offset the drying effect of a 2 degree Celsius rise in temperature (Nash and Gleick, 1993).

More extreme precipitation events are generally expected to accompany increasing temperatures associated with climate change. More extreme precipitation events in the Colorado River watershed would in turn be expected to increase sediment production. Basin sediment production would also likely increase given that a higher percentage of the basin's precipitation would likely fall in the form of rain rather than snow due to increased temperatures. If more frequent wild fires were to occur because of earlier drying of watersheds, or simply because of increased summer temperatures, sediment production would be increased further. Increased sediment production would adversely affect water quality and increase the rate of reservoir capacity loss due to sedimentation.

There are likely to be changes in water demand in the Colorado River basin as the result of climate change. Changes in demand at any particular location will probably be small, however, the aggregate change for the basin could be significant since so much land is involved.

One of the key questions concerning possible changes in water demand is what effect climate change will have on evapotranspiration rates for crops and landscaping. Also of concern are possible changes in water use by water loving plants knows as phreatophytes along rivers and streams. Phreatophytes can cause a significant loss in stream flow and shallow groundwater.

As discussed in Section 2.7.1, evapotranspiration rates increase with temperature if other factors that effect evapotranspiration, such as cloudiness, humidity, and atmospheric carbon dioxide content remain the same. However, higher atmospheric carbon dioxide levels expected in the future will act to reduce water consumption by plants, as evidenced by laboratory tests.

Increasing temperatures in the Colorado River Basin will likely increase reservoir evaporation losses. Evaporative losses from open portions of conveyances such as the Central Arizona Project, Colorado River Aqueduct, and the All-American Canal would likely increase as well.

2.8.4 Summary

The Colorado River Basin provides water to Southern California. Expected changes to the Colorado River Basin associated with climate change include:

- Less precipitation falling as snow and an earlier snow melt
- Increased evaporation from reservoirs and conveyance facilities
- Increased sediment production due to more extreme events and more precipitation falling as rain than snow
- Changes in water demand

Changes in the amount of water available to California from the Colorado River Basin may change if long-term decreases in runoff occur.

2.9 Possible Effects on Fish

This section describes aspects of climate change that could affect the abundance of fish in California's inland waters. It focuses on a few key species that have major implications for water management, including rainbow trout, coho and Chinook salmon and Delta smelt. The analysis omits numerous fishes throughout the State for which the influence of climate change and its implications for water management seem less clear.

In California, the timing and amounts of water released from reservoirs and diverted from streams are limited by their effects on various native fishes, especially those that are listed as threatened or endangered under the federal and State endangered species acts. These include winter-run and spring-run Chinook salmon, coho salmon, coastal and Central Valley forms of steelhead rainbow trout, Lahontan cutthroat trout, razorback sucker and Delta smelt. California constitutes the warm, southern end of the geographic range of most of these species.

By 2100, climate change is expected to raise average air temperatures by about 1.4 to 5.8 degrees Celsius in California, raise stream water temperatures by at least as much, greatly reduce California's snowpack, shift the seasonal pattern of surface-water runoff to more in winter and less in spring and summer, and raise sea level by 0.3 of a foot to 2.9 feet (IPCCa, 2001). These physical changes are likely to influence the ecology of aquatic life in California and have several major effects -- all of them negative -- on cold-water fishes.

In many low- and middle-elevation California streams today, summer temperatures often come close to the upper tolerance limits for salmon and trout. Thus, anticipated climate change that raises air temperatures a few degrees Celsius may be enough to raise water temperatures above the tolerance of salmon and trout in many streams, favoring instead non-native fishes such as carp and sunfish.

Unsuitable summer temperatures are a problem because many of the threatened and endangered fishes spend the summer in cold-water streams, either as adults, juveniles, or both. Adults of some populations, such as spring-run Chinook, spend the summer near their upstream spawning grounds waiting for conditions suitable for spawning in fall or winter. Chinook salmon and steelhead, for example, prefer temperatures of less than 18-20 degrees Celsius in mountain streams, although they may tolerate higher temperatures for short periods (Moyle, 2002).

2.9.1 Regional Effects

The specific nature of ecological effects on fishes will differ among regions of the State. The following three regions are important for water supply and will see major effects from climate change:

- Region 1 – Basins with snowpack. River basins that drain the Sierra Nevada and Cascade Range and store water as snowpack;
- Region 2 – Basins without snowpack. River basins without significant snowpack, including all coastal streams south of the Klamath River basin; and
- Region 3 - The Sacramento-San Joaquin River Delta.

Streams on the eastern slope of the Sierra Nevada and in Southern California, as well as the Colorado River, are also important for water supply, but the effects of climate change on fishes there are less clear.

Winter-run and spring-run Chinook salmon, coho salmon, and coastal and Central Valley steelhead trout spawn in Region 1. Coho salmon and steelhead trout occupy coastal streams in the second region. Delta smelt spend their entire lives in the third region, while steelhead trout and Central Valley Chinook salmon migrate through it. All of these fishes are listed under the federal Endangered Species Act.

2.9.1.1 Region 1- Basins with Snowpack

The Sierra-Cascade basins are predicted to get less snow and more rain, more winter and less spring and summer runoff, and warmer runoff. Spring-run Chinook salmon and steelhead trout in some streams migrate upriver into the foothills and mountains early in the year, spend the summer in deep, cold pools, and spawn the following fall (salmon) or winter (steelhead). Adult survival over the summer depends upon the availability of cold water. The combination of streams being both warmer and shallower in the summer due to climate change may diminish most summer habitat for steelhead and potentially all such habitat now used by spring-run salmon.

Many salmon and rainbow trout spawn and rear below dams, or at hatcheries associated with dams. Climate change could reduce the volume of cold water in foothill reservoirs since they would receive less snowmelt and have reduced carryover storage. Thus, releases of cold water to support fish spawning and rearing below such reservoirs may decline and fish production could also decline.

2.9.1.2 Region 2 - Basins without Snowpack

Streams in basins without significant snowpack will likely be warmer in the dry season than now (as well as in the winter), matching the expected rise in air temperature. Warmer inland areas as the result of climate change may increase summer coastal fog which could provide mitigating effects for coastal areas and streams.

Juvenile coho salmon and coastal steelhead trout remain in fresh water through the summer. Climate change could make coastal streams too warm for coho salmon in the summer, especially for the more extreme projections of temperature rise. Steelhead trout could disappear from the more southerly streams in their current range (in Central and Southern California), and would probably be less abundant elsewhere.

2.9.1.3 Region 3 - Sacramento-San Joaquin River Delta

The Sacramento-San Joaquin Delta will become saltier if sea level rise predictions are correct, Delta operations remain the same and the Delta retains its present physical configuration. The predicted decline in natural runoff during the spring, summer and fall could make the Delta even

saltier, and over a larger area. River water at the upstream end of the Delta will still be fresh in summer, but is likely to be warmer than now if measures are not taken.

The Delta smelt occurs in the Sacramento-San Joaquin Estuary and nowhere else. During periods of drought, its center of abundance has been the channel of the Sacramento River in the upstream part of the Delta (Moyle, 2002). Delta smelt rarely occur in waters above 24 degrees Celsius and cannot survive long in water above 25 degrees Celsius (Swanson and others, 2000). Current peak temperatures in the lower Sacramento River at Hood and Rio Vista, for example, are already within a few degrees of these temperature thresholds (CDEC).

In short, a possible result of climate change is that Delta smelt will have little or no suitable habitat in summer. Waters in the lower Delta may be too salty and lacking in food, while fresh water in the upper Delta may be too warm. Thus, the species may become much less numerous or may even go extinct.

2.9.2 Summary

As evident from the above discussion, climate change could have a significant impact on threatened and endangered fish in California. Climate change could also have serious implications for fish that are not now identified as threatened and endangered, but might be affected to a point where they become designated as such.

2.10 Sudden Climate Change

Most global climate models predict that climate change due to human causes will be a continuous and somewhat gradual process through the end of this century. With proper foresight, planning and action, water managers will likely be able to help California adapt to many of the water supply challenges posed by climate change, even at some of the higher projections for change. However, sudden and unexpected changes in climate could leave water managers unprepared and could, in their extreme, have serious implications for California and its water supplies.

Sudden climate change could occur if progressive changes in the earth's climate cause a physical threshold or "trigger point" to be reached where one of the earth's major atmospheric or oceanic systems changes significantly, or ceases to function. One possible example of this that has received a significant amount of attention is a possible change in the global thermohaline circulation system depicted in Figure 2-39.

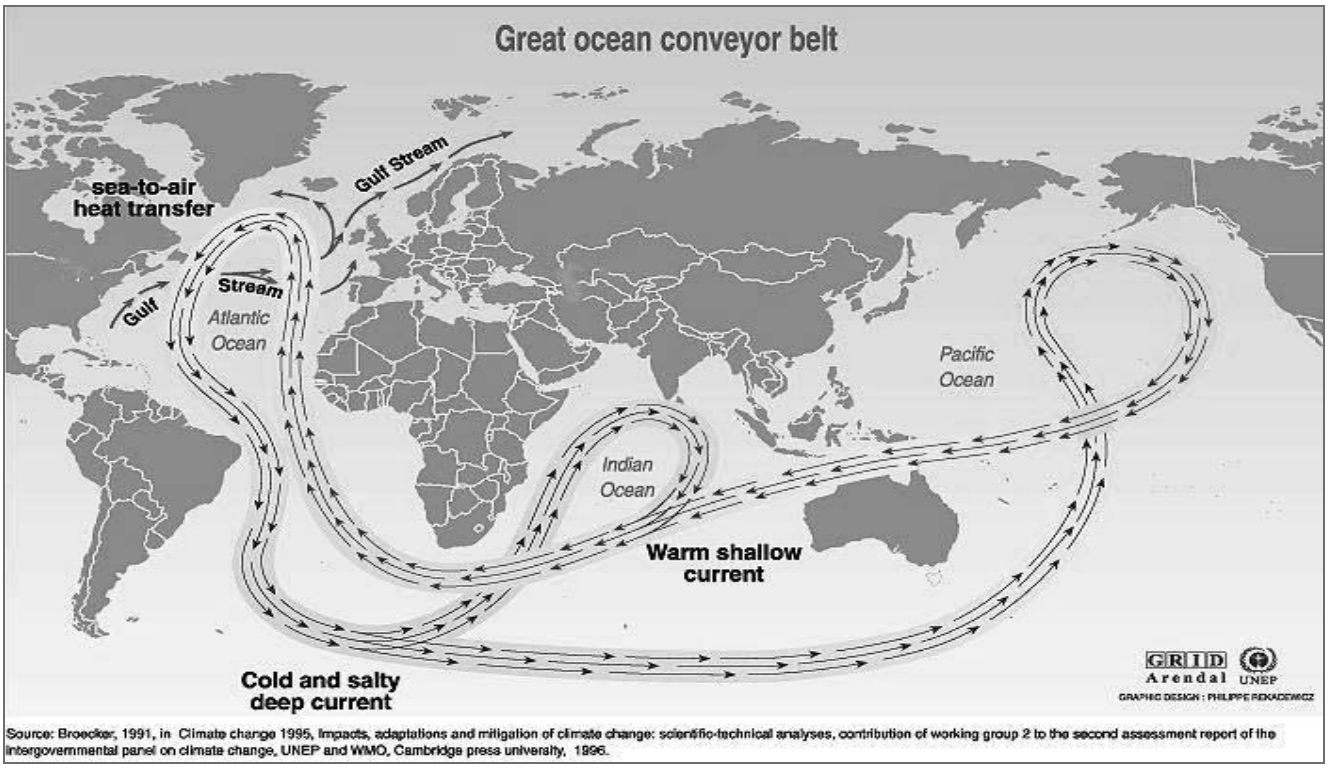


Figure 2-39 The Global Thermohaline Circulation System
Source: GRIDA, 2005.

There is evidence that circulation in the North Atlantic Ocean in relation to the global thermohaline system is slowing (Nature, 2005). While the complete shutdown of the system would likely lead to relatively rapid and significant changes in the earth's climate, such a scenario is considered by most scientists to be unlikely to occur in the next 50 years. The IPCC reports that none of the climate models it used in its evaluations project the complete shutdown of the system before 2100 (IPCC, 2001a).

Relatively sudden and often short-term changes in the climate of California and the western United States have occurred during at least the past 2000 years, as evidenced by precipitation and streamflow measurements over about the past 100 years and paleoclimatological information derived from physical evidence such as annual growth rings in trees. Of particular concern are extreme droughts, some of which appear to have occurred over large areas of the western United States and extended over several decades (MacDonald, 2005, Woodhouse, 2005). The exact cause of these events is unknown. However, there is speculation that some of the more recent droughts may have been due, at least in part, to oscillating conditions in the world's oceans.

Finally, other phenomena that could cause sudden and unexpected changes in the earth's climate include volcanic activity and the impact of meteorites or other extraterrestrial matter with the earth's surface. Large volcanic eruptions during recorded history have been observed to have caused temporary regional and sometimes global-scale cooling from one to several years (Kelly, 1996). While both volcanic eruptions and the impact of large extraterrestrial objects with the

Earth could suddenly affect the State's climate and water resources, the frequency of their occurrence together with their projected effects are extremely difficult to predict.

2.11 Summary

As discussed in previous sections, climate change could cause significant impacts on California's water resources and water demand. Changes in temperature and precipitation patterns in the State have been observed over the past century. Further changes are expected over the next century due to climate change. Changes in sea level are also expected to occur in response to the changing climate. These changes in precipitation and temperature patterns across the State may have profound impacts on ecologic and water resources systems in the State.

There is a significant amount of uncertainty about the magnitude of climate change that will occur over this century. It is unlikely that this level of uncertainty will diminish significantly in the foreseeable future (Dettinger, 2005b). There is also uncertainty about changes in hydrologic conditions, aquatic ecosystems and water demand that could occur as the result of various amounts of climate change. In the following chapters of this report, an initial attempt is made to quantify the impacts of climate change on some aspects of California's water resources.

2.12 References

Sources for illustrations are referenced below each illustration. References cited in the chapter text are listed below.

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Progress on Incorporating Climate Change into Management of California's Water Resources

1st Progress Report
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Chapter 3:
DWR Climate Change Studies

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3 DWR Climate Change Studies

3.1 Introduction

This chapter provides an overview of climate change studies being conducted by the California Department of Water Resources (DWR). DWR is doing the studies to determine potential effects of climate change on management of California's water resources in support of the governor's Executive Order S-3-05 described below. This chapter explains the background and approach for conducting these climate change studies. It also describes the specific climate change scenarios selected for study. Subsequent chapters of this report will present the results of the studies.

3.2 Background

In June 2005, Gov. Arnold Schwarzenegger issued Executive Order S-3-05 on climate change. It set future greenhouse gas emissions targets for California. It also requires reports every two years on climate change impacts to five areas including water resources. The first of those reports is due to the governor in January 2006. To comply with the Executive Order a Climate Action Team (CAT) was formed with representatives from various state agencies, including the Resources Agency. A subcommittee of the CAT selected four climate change scenarios for analysis for the initial climate change report. The California Energy Commission (CEC) is coordinating the publication of that report.

This report is supplemental and complementary to the CEC report. This report focuses only on water resources. DWR staff has conducted preliminary studies on incorporating climate change into the planning and management of California's water resources. Whenever appropriate, the four climate change scenarios selected by the CAT were used in the DWR studies. DWR has coordinated efforts with other groups conducting modeling studies of climate change impacts on water resources. The groups include the University of California, Berkeley, (CalSim-II); University of California, Davis, (CALVIN); and the Natural Heritage Institute (WEAP).

In addition to these DWR studies for the governor, the California Water Plan Update 2005 includes a qualitative discussion of the possible statewide effects of climate change (DWR, 2005). An expanded, more quantitative discussion of statewide impacts will be included in future Water Plan Updates and will use information from the studies described in this report and other studies done outside DWR.

3.3 Climate Change Scenarios

The four climate change scenarios selected by the CAT were chosen from among several available scenarios compiled for the United Nation's Intergovernmental Panel on Climate Change's (IPCC's) Fourth Assessment Report which is due out in 2007. The four climate change scenarios consist of two greenhouse gas (GHG) emissions scenarios, A2 and B1, each

represented by two different Global Climate Models (GCMs), the Geophysical Fluid Dynamic Lab model (GFDL) and the Parallel Climate Model (PCM). The four climate change scenarios are:

- GFDL A2
- PCM A2
- GFDL B1
- PCM B1

The A2 emissions scenario assumes high growth in population, regional based economic growth, and slow technological changes, which results in significantly higher greenhouse gas emissions. The B1 scenario represents low growth in population, global based economic growth and sustainable development that results in the lowest increase of greenhouse gas emissions of the IPCC scenarios. Both the GFDL and PCM models project future warming. The GFDL model indicates a greater warming trend than the PCM model.

Among the criteria used to select these climate change scenarios were ability of the models to represent El Niño events and availability of the data for analysis to meet the January 2006 governor's deadline for the report (Cayan, 2005). In addition, both models estimated historical climate trends reasonably well. The emissions scenarios and models are described further in later sections of this report.

3.3.1 Emissions Scenarios

The World Meteorological Organization and the United Nations Environment Programme formed the Intergovernmental Panel on Climate Change (IPCC) to periodically evaluate the science, impacts, and socioeconomics of climate change including adaptation and mitigation options. In order to conduct climate change studies, the IPCC has developed scenarios of future greenhouse gas emissions. The first set of IPCC emissions scenarios was released in 1990 and 1992. In 1994, those emissions scenarios were evaluated. And in 1996 a 50-member team representing 18 countries began updating the emissions scenarios. The updated emissions scenarios are documented in the 2000 IPCC Special Report on Emissions Scenarios (SRES).

The SRES emissions scenarios were developed and peer-reviewed using an open process with six major steps (IPCC, 2000):

1. Literature review of existing scenarios
2. Analysis of major scenario characteristics, driving forces, and their relationships
3. Formulation of four narrative scenario storylines to describe alternative futures
4. Quantification of each storyline using a variety of modeling approaches
5. An open review of the resulting emission scenarios and their assumptions
6. Three revisions of the scenarios and the report after the open review: the formal IPCC Expert Review and the final combined IPCC Expert and Government Review

To encompass the vast uncertainty about what may happen by the year 2100, the IPCC developed four storylines. Each story reflects different directions of major greenhouse gas emissions influences, including population, technology and economic factors. Each story evolves dynamically over time. The divergent visions for the future world are intended to represent different combinations of the main greenhouse gas sources, thus spanning the relevant ranges of greenhouse gas emissions. The four stories are referred to as A1, A2, B1 and B2, and the major characteristics of each storyline are summarized below (IPCC, 2000):

A1: The A1 story is about a future with low population growth, rapid economic growth, and rapid introduction of new and more efficient technologies. Other characteristics of the story include convergence among regions, capacity building, and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income.

A2: The A2 story is about a heterogeneous future with high population growth, regional economic growth, and fragmented technological changes. Self reliance and preservation of local identities are major themes in the A2 story.

B1: The B1 story is about a convergent future with low population growth, rapid economic growth, and sustainable technology. Economic growth moves rapidly towards a service- and information-based economy. Use of natural resources is reduced, and clean and resource-efficient technologies are introduced. The B1 storyline emphasizes global solutions to economic, social, and environmental sustainability.

B2: The B2 story envisions a future with moderate population growth, intermediate levels of economic growth, and less rapid and more diverse technological development than the A1 and B1 stories. Local solutions to economic, social, and environmental sustainability are emphasized.

Based on the four stories, the IPCC used six models and various approaches to quantify the characteristics of each story. A total of 40 scenarios were developed, each of which represents an alternative interpretation and quantification of one of the stories. All of the scenarios based on a given story are known as a scenario family. None of the scenarios include future policies that explicitly address climate change such as the United Nations Framework Convention for Climate Change or the Kyoto Protocol greenhouse gas emissions targets. However other policies included in the scenarios may affect greenhouse gas emissions. Disaster scenarios were not considered. The likelihood of each scenario was not evaluated, and thus no SRES scenario was identified as the best-guess or business-as-usual scenario.

The IPCC objectively presents the scenarios by not indicating a preference for any scenario, nor do they assign probabilities of occurrence to any of the scenarios. The IPCC intended for the scenarios to be widely used for climate change assessment: "*We recommend that the new scenarios be used not only in the IPCC's future assessments of climate change, its impacts, and adaptation and mitigation options, but also as the basis for analyses by the wider research and policy community of climate change and other environmental problems*" (IPCC, 2000).

The Climate Action Team has selected scenarios from the A2 and B1 storylines for water resources impact analysis. For these scenarios global population estimates in the year 2100 range from 7 billion people for the B1 scenario to 15 billion people for the A2 scenario (IPCC, 2001). The A2 scenario results in the highest greenhouse gas emissions, and the B1 scenario results in the lowest greenhouse gas emissions of the SRES scenarios (Figure 3.1).

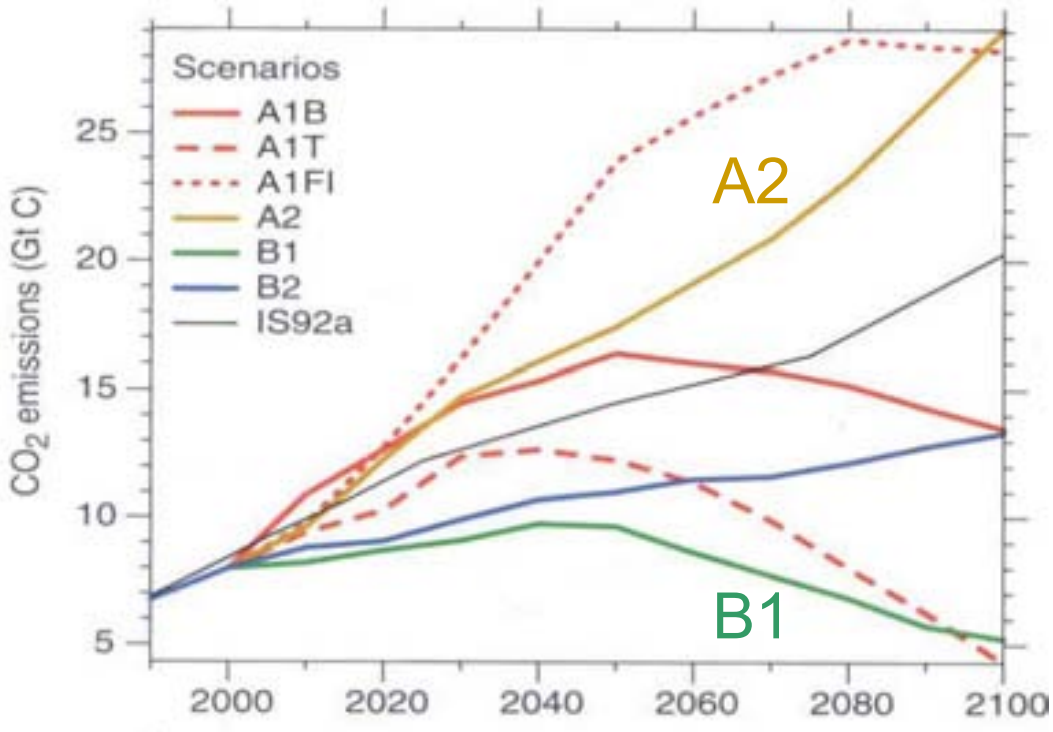

Figure 3.1 Emissions of CO_2 from Human Activities for IPCC's SRES Scenarios
Adapted from Technical Summary Figure 17 (IPCC, 2001)

3.3.2 Global Climate Models

Six Global Climate Models were used to develop IPCC's SRES emissions scenarios. The Climate Action Team (CAT) has selected the A2 and B1 emissions scenarios, each represented by two different global climate models, the Geophysical Fluid Dynamics Lab climate model (GFDL) and Parallel Climate Model (PCM). The Geophysical Fluid Dynamics Lab is part of the National Oceanic and Atmospheric Administration (NOAA). The PCM model was developed by the National Center for Atmospheric Research. The model versions, scenario name and run numbers for the four selected scenarios are given in Table 3.1. For this report, the four scenarios will be referred to by the model and scenario name.

Table 3.1 Model and Emissions Scenario Labels for Four Climate Change Scenarios

Scenario Label for this Report	GCM and SRES Scenario Description
GFDL A2	GFDL version2.1 SRESA2 run1
PCM A2	NCAR PCM version 1 SRESA2 run1
GFDL B1	GFDL version2.1 SRESB1 run1
PCM B1	NCAR PCM version 1 SRESB1 run2

The GFDL and PCM models are both state-of-the-art global climate models that represent linked oceanic, land, and atmospheric processes, including realistic representations of changes in sea surface temperatures due to the El Niño Southern Oscillation (ENSO). The climate processes in a global climate model are driven by factors known as forcings. The forcings used in these two models are summarized in Figure 3.2. Both models include forcings from greenhouse gas emissions, ozone, direct effects of sulfate aerosols, solar irradiance, and volcanic aerosols. In addition, the GFDL model includes forcings from black and organic carbon and land use or land cover. The GFDL model has a resolution of 2.0 degrees latitude by 2.5 degrees longitude, and the PCM model has a resolution of 2.8 degrees latitude by 2.8 degrees longitude. Both models were used to simulate 21st century climate change scenarios for the IPCC fourth assessment report, known as AR4, which is due out in 2007. Those simulations are archived at Lawrence Livermore National Lab's (LLNL's) Program for Climate Model Diagnosis and Intercomparison (PCMDI). The PCMDI website is http://www-pcmdi.llnl.gov/.

Model results and information for the four climate change scenarios selected by the CAT were made available for analysis on the California Climate Change Center's Web site managed by Scripps Institute for Oceanography, http://meteora.ucsd.edu/cap/cccc_model.html. Data are provided for the following variables:

- Surface latent heat flux; W/m^2
- Specific humidity at 925mb and 850mb
- Surface specific humidity; g/kg
- Total precipitation; mm/day
- Sea level pressure; mb
- Downward shortwave at the surface; W/m^2
- Upward shortwave at the surface; W/m^2
- Air temperature at 925mb, 850mb and 500mb; Kelvin
- Surface (2m) air temperature, Kelvin
- Maximum and minimum surface air temperature; Kelvin
- Zonal (east/west) wind at 925mb, 850mb and 500mb; m/s
- Surface (10m) zonal (east/west) wind; m/s
- Meridional (north/south) wind at 925mb, 850mb and 500mb; m/s
- Surface (10m) meridional (north/south) wind; m/s

Model Name/Forcing	G	O	SD	SI	BC	OC	MD	SS	LU	SO	V
GFDL v2.1	■	■	■		■	■			■	■	■
PCM	■	■	■							■	■

Shading indicates that the forcing is included on interannual or longer time scales. Forcings that only varied seasonally are not shaded.

Climate Model Forcing Factors:

G well mixed greenhouse gases
O tropospheric and stratospheric ozone
SD sulfate aerosol, direct effects
SI sulfate aerosol, indirect effects
BC black carbon aerosols
OC organic carbon aerosols
MD mineral dust
SS sea salt
LU land use/land cover
SO solar irradiance
V volcanic aerosols

Figure 3.2 Climate Model Forcings used for Climate Change Studies
Adapted from Table 5.2 (Santer et al., 2006)

A summary of the general air temperature and precipitation trends for the four climate change scenarios at the end of the 21st century is presented in Table 3.2. All four scenarios show an increase in air temperature. The PCM B1 scenario is the only scenario that shows an increase in precipitation.

For the climate change studies presented in this report, a 2050 projection level was used to reflect a water resource planning horizon. For each global climate model, projection data were available at two data points in California (Table 3.3). Average air temperature and precipitation values were computed from the global climate model results for a 30-year historical period from 1961-1990 and for a 30-year future projection period centered around 2050 (2035-2064) (Table 3.4 to Table 3.7). For comparison purposes, average historical air temperature and precipitation data for the 30 year historical period from 1961-1990 are also shown. The historical average values are based on the nearest two data stations for each site. The historical air temperature values were greater than the simulated values since the elevations of the data stations were lower than the elevations of the global climate model output locations (Table 3.3). Thus a temperature correction was applied to the historical average air temperature to adjust the value to a value that corresponds to the elevation of each global climate model output location. The historical average air temperature values for the global climate model output are within acceptable lapse rate (change of temperature with elevation) values for adjusting observed historical values (Table 3.4 and Table 3.5). The precipitation values were not adjusted for elevation since there is no straight forward correlation between precipitation and elevation.

Looking at the 2050 projections increases in air temperature range from 0.8ºC to 2.4ºC (Table 3.4 and Table 3.5). For most scenarios, warming is slightly higher in Northern California than Southern California. Projected changes in precipitation for 2050 are typically less than an inch per year. Values for both the air temperature and the precipitation projections were more

dependent on the global climate model used to represent the emissions scenario than on the emissions scenario. In other words, the projected values from a given global climate model, GFDL or PCM in this case, were closer to each other than the values for a given emissions scenario, A2 or B1 in this case. Additional global climate model results are presented in chapters 2 and 6.

Table 3.2 Air Temperature and Precipitation Trends for Climate Change Scenarios

Scenario	End of 21st Century Projection Trends
GFDL A2	Relatively strong warming Modest drying
PCM A2	Modest warming Modest drying
GFDL B1	Modest warming, Modest drying
PCM B1	Weak temperature warming Weak precipitation increase

Source: Cayan, 2005.

Table 3.3 GCM Grid Points in California

Location	Latitude degrees	Longitude degrees	Elevation m	Avg. Elevation Historical Data m
Northern California				56
GFDL	39.438	121.250	958	
PCM	40.464	120.937	1126	
Southern California				263
GFDL	35.393	118.750	850	
PCM	34.883	118.125	690	

Table 3.4 Air Temperature Projections for Northern California, °C

Northern CA	1961-1990 Average		2035-2064 Average	Difference
Historical Average	13.2		N/A	N/A
Corrected for Elevation	9.5 GFDL	8.9 PCM		
GFDL A2	9.5		11.8	2.3
GFDL B1			11.6	2.1
PCM A2	8.2		9.5	1.3
PCM B1			9.0	0.8

Table 3.5 Air Temperature Projections for Southern California, °C

Southern CA	1961-1990 Average		2035-2064 Average	Difference
Historical	16.2		N/A	N/A
Corrected for Elevation	13.6 GFDL	14.5 PCM		
GFDL A2	12.4		14.7	2.3
GFDL B1			14.5	2.1
PCM A2	14.5		15.7	1.2
PCM B1			15.4	0.9

Table 3.6 Precipitation Projections for Northern California, in/yr

Northern CA	1961-1990 Average	2035-2064 Average	Difference
Historical	27.46	N/A	N/A
GFDL A2	36.56	35.81	-0.75
GFDL B1		36.31	-0.25
PCM A2	25.03	24.41	-0.62
PCM B1		25.86	0.83

Table 3.7 Precipitation Projections for Southern California, in/yr

Southern CA	1961-1990 Average	2035-2064 Average	Difference
Historical	14.24	N/A	N/A
GFDL A2	17.92	17.70	-0.22
GFDL B1		16.15	-1.77
PCM A2	11.36	12.06	0.70
PCM B1		11.28	-0.08

3.3.3 Regional Downscaling

In order to conduct water resources impact analyses for climate change scenarios, the coarse spatial representation of the global climate model data must be refined in a process called downscaling. For the scenarios selected by the CAT, the regional climate data were produced by statistical downscaling of the global climate model output using the Variable Infiltration Capacity (VIC) model. The VIC model provides monthly output at 1/8th degree latitude/longitude resolution for the entire state of California. Daily data were computed by perturbing a historical data set based on the monthly computed climate change data from VIC. For hydrologic analysis, the VIC model output also provides stream flow, snow pack, snowmelt timing and soil moisture content (Maurer and Duffy, 2005; Maurer, 2005). Information on obtaining the downscaled data is available at the California Climate Change Center's Web site http://meteora.ucsd.edu/cap/cccc_model.html. Available climate data for a simulation period from 1950-2100 are:

- Precipitation
- Air temperature
- Wind speed
- Surface air humidity
- Soil moisture in three layers

Stream flow data for the simulation period 1950-2100 are available at the following locations:

- Smith River at Jedediah Smith State Park
- Sacramento River at Shasta Dam
- Feather River at Oroville
- North fork of the American River at North Fork Dam
- American River at Folsom Dam
- Yuba River system outflow at Marysville
- Sacramento River at the Delta
- Stanislaus River at New Melones Dam
- Tuolumne River at Don Pedro
- Merced River at Lake McClure
- King River at Pine Flat Dam

Results of the downscaled climate change data are presented in chapters 2 and 6.

3.4 Water Resources Impacts Approach

As the title of this report suggests, its main goal is to present initial methodologies and results for incorporating climate change into management of California's water resources. This report

presents preliminary studies using existing analysis tools at DWR to quantify potential water resources related effects of climate change. Whenever appropriate, studies focus on the four climate change scenarios selected by the CAT (Figure 3.3). The climate change scenario data were developed by experts in the field of climate change. The goal of DWR staff is to develop methods for incorporating that data into water resources planning and management, not to make predictions about future climate conditions. These initial studies focus on potential effects of climate change to four main California water resources areas:

- State Water Project (SWP) and Central Valley Project (CVP) operations
- Delta water quality including possible increases in sea level
- Flood management and water supply forecasting
- Changes in evapotranspiration rates and thus consumptive use of irrigation water

Each of these topics is covered in detail in separate chapters of this report.

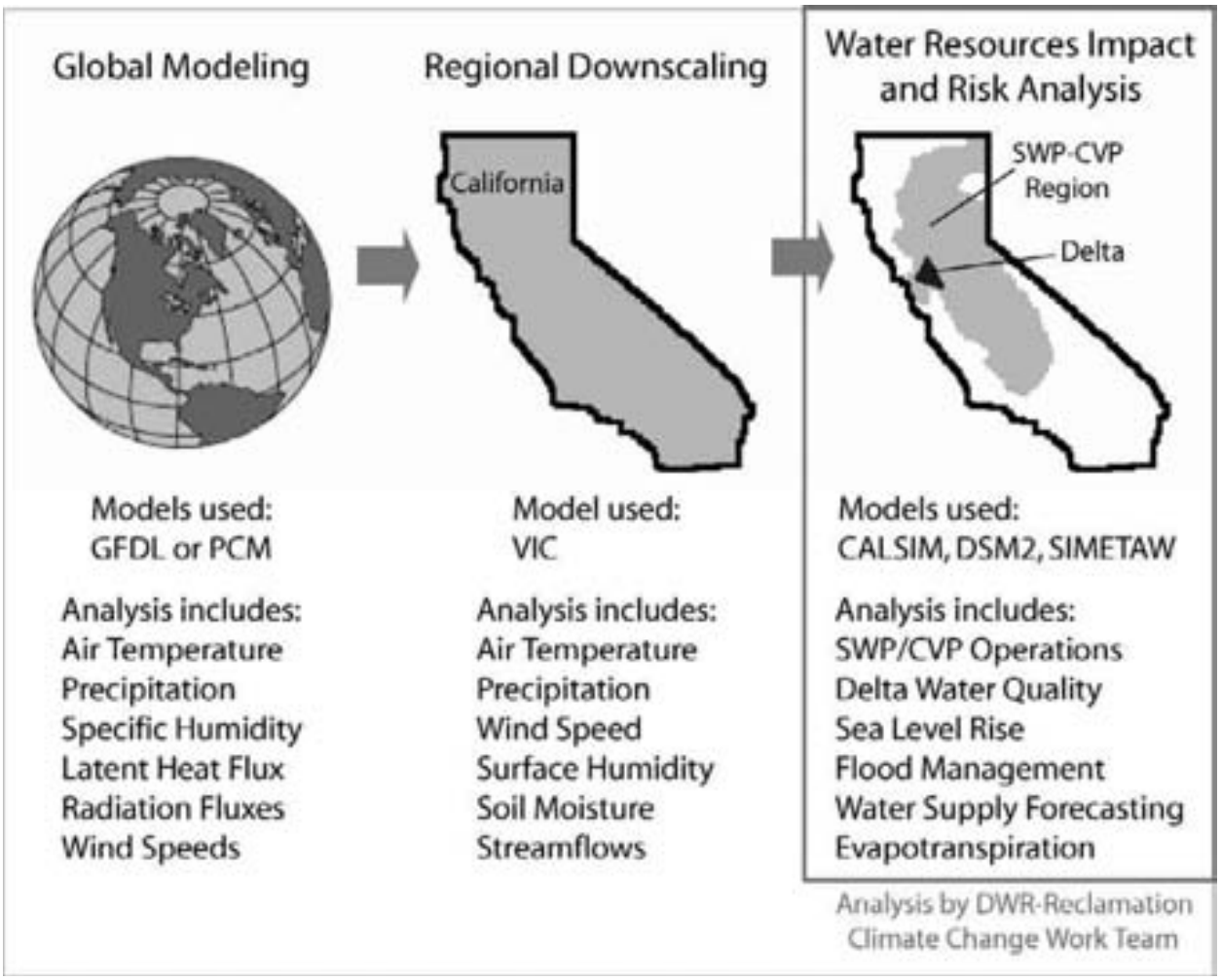

Figure 3.3 Approach for Analyzing Potential Water Resources Impacts of Climate Change

3.5 Acknowledgements

Internal review of this chapter was provided by Rich Juricich.

Analysis of historical and future air temperature and precipitation values from global climate model results were provided by Michael Anderson.

VIC data were processed and provided for download by Mary Tyree and Erik Peterson of Scripps Institution of Oceanography.

VIC data were produced by Ed Maurer at the Santa Clara University.

Information on the Global Climate Model models and emissions scenarios were provided by Dan Cayan from Scripps Institution of Oceanography and Mike Dettinger from the U.S. Geological Survey and Scripps Institution of Oceanography.

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3.7 List of Abbreviations

AR4-IPCC Fourth Assessment Report

CalSim - II-Operations model of the State Water Project and Central Valley Project

CALVIN-Economics driven optimization model of State Water Project and Central Valley Project operations

CAT-Climate Action Team

CEC-California Energy Commission

DWR-California Department of Water Resources

ENSO-El Niño Southern Oscillation

GCM-Global Climate Model

GFDL-Geophysical Fluid Dynamic Lab model

GHG-Greenhouse Gas

IPCC-Intergovernmental Panel on Climate Change

LLNL-Lawrence Livermore National Lab

NCAR-National Center for Atmospheric Research

NOAA-National Oceanic and Atmospheric Administration

PCM-Parallel Climate Model

PCMDI-Program for Climate Model Diagnosis and Intercomparison

SRES-Special Report on Emissions Scenarios [IPCC, 2000]

VIC-Variable Infiltration Capacity Model

WEAP-Water Evaluation and Planning Program

Progress on Incorporating Climate Change into Management of California's Water Resources

1st Progress Report
July 2006

Chapter 4:
Preliminary Climate Change Impacts Assessment for State Water Project and Central Valley Project Operations

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4 Preliminary Climate Change Impacts Assessment for State Water Project and Central Valley Project Operations

4.1 Introduction

Planning and design of the Central Valley Project (CVP) and State Water Project (SWP) has, for the most part, assumed an unchanging climate. Of course, it was always accepted that, in California, there would be years of plentiful precipitation followed by years of scarcity; that there would be wet, cool winters followed by hot, dry summers. Weather was expected to change. In fact, it was to overcome these changing weather patterns that the CVP and SWP were primarily built; the people of California needed flood protection during the wet periods and water during the dry. But at a climactic timescale of 30 years or more, it was assumed that the average of the weather patterns would remain about the same; the frequency and severity of future droughts would be much like that of the past; precipitation would continue to fall as winter snow, and the snow would continue to melt in the spring and early summer to fill our reservoirs. That was the assumption, and a changing climate may threaten to destabilize the infrastructure and operations dependent on that assumption.

As titled, this chapter discusses a preliminary assessment of climate change impacts on the SWP and CVP. Impacts were quantified for four scenarios predicted by two global climate models at two carbon dioxide emission rates (see Table 4.1). All four climate scenarios predict a warming trend for California. The effect on annual average precipitation is varied: Three of the scenarios predict a modestly drier climate and one predicts a weak increase in precipitation. The significant change is in the timing of runoff. Most precipitation that feeds the SWP and CVP falls in the Sierra Nevada and the southern end of the Cascades that border the eastern and northern boundaries of the Central Valley. Much of it comes as snow. A warming climate will result in a greater share of rainfall and a more rapid melt of the snowpack. As such, more runoff will occur in the winter and early spring and less during the late spring and early summer.

Table 4.1 Air Temperature and Precipitation Prediction Trends for Four Scenarios

Selected Climate Model	Emission Scenario	Description
PCM	B1	Weak temperature warming Weak precipitation increase in California
PCM	A2	Modest warming Modest drying
GFDL v2.0	B1	Modest warming, Modest drying
GFDL v2.0	A2	Relatively strong warming Modest drying

The focus of this chapter is impacts on water supply. Flood control is only discussed with respect to its operational conflicts with water supply goals. Of course, the SWP and CVP do more than provide water and flood protection to California; among other things, the projects generate and use large quantities of power; they control river temperatures to protect Chinook salmon and steelhead. Climate change effects on these operations will also be discussed.

It is important to note that this is just a starting point for analyzing climate change impacts on SWP and CVP operations. Current management practices and existing system facilities were used in the analysis for this report. No changes were made to lessen the effects of climate change or sea level rise. Only four scenarios are included, and we have not addressed the likelihood of one scenario over another. Furthermore, as will be discussed in the following sections, we have not included all of the ways in which climate change may impact water supply. Therefore, what is written here is not sufficient, by itself, to make final policy decisions. Its sole intent is to introduce readers to the methods of analysis and the potential significance of climate change impacts on CVP and SWP water supply.

4.2 Description of the CVP and SWP

The CVP, operated and maintained by the U.S. Bureau of Reclamation (Reclamation), is the largest surface water storage and delivery system in California, with a geographic scope covering 35 of the state's 58 counties. Authorized project purposes include flood control, navigation, agricultural and domestic water supply, fish and wildlife protection, and power generation. The CVP is composed of some 20 reservoirs with more than 11 million acre-feet (MAF) of storage capacity, 11 power plants, and over 500 miles of major canals and aqueducts. Within the Sacramento Basin, the CVP operates Shasta and Folsom reservoirs, among others. Water is imported from the Trinity River into the Sacramento Basin through Clear Creek Tunnel. Tracy Pumping Plant exports water from the Sacramento-San Joaquin Delta for storage in San Luis Reservoir and delivery to contractors in the San Joaquin Valley. The CVP also operates New Melones Lake on the Stanislaus River and Millerton Lake on the San Joaquin River, and it exports water from the San Joaquin Basin to the Tulare Basin through the Friant-Kern Canal. Overall, the project supplies water to 250 long-term water contractors in the Central Valley, Santa Clara Valley, and the San Francisco Bay Area. Key CVP reservoirs and their storage capacities are listed in Table 4.2.

Table 4.2 Key CVP Reservoirs

Reservoir	Capacity (TAF)
Trinity	2447
Shasta	4552
Folsom	975
San Luis (CVP share)	972
New Melones	2420
Millerton	521

The SWP is operated by DWR. It consists of 32 storage facilities, 660 miles of aqueducts and pipelines, 17 pumping plants, and eight hydroelectric powerplants. Using these facilities, the SWP provides urban and agricultural water supply, flood control, recreation, fish and wildlife enhancement, power generation, and salinity-control in the Sacramento-San Joaquin Delta. The project delivers water to over two-thirds of California's population and approximately 600,000 acres of farmland through 29 urban and agricultural water districts. These agencies have long-term water supply contracts totaling 4.2 million acre-feet per year. The principal storage facility for the SWP is Lake Oroville on the Feather River in the Sacramento Valley. Banks Pumping Plant exports water from the Sacramento-San Joaquin Delta for storage in San Luis Reservoir and delivery to water contractors in the San Francisco Bay Area, San Joaquin Valley, Central Coast, and Southern California. Key SWP reservoirs and their capacities are listed in Table 4.3.

Table 4.3 Key SWP Reservoirs

Reservoir	Capacity (TAF)
Oroville	3558
San Luis (SWP share)	1067

4.3 Modeling Methodology for Quantifying Climate Change Impacts on CVP and SWP Operations

Traditionally, planning simulation models have been used to measure the effects of hydrologic, structural, or regulatory changes on SWP and CVP operations. A base case is simulated to establish expected annual average deliveries and carryover storage if no change is made. Study scenarios are then run by incorporating the expected changes to hydrology, such as those caused by climate change, or planned changes in facilities or project regulations. The impacts of the changes can then be determined by comparing base case operational statistics with those of the study scenarios.

The DWR and Reclamation have jointly developed computer model CalSim-II that simulates much of the water resources infrastructure in the Central Valley of California and Delta region. CalSim-II models all areas that contribute flow to the Delta. The geographical coverage includes: The Sacramento River Valley; the San Joaquin River Valley; the Sacramento-San Joaquin Delta; the Upper Trinity River and the CVP and SWP service areas. CalSim-II simulates operation of the CVP-SWP system for 73 years using a monthly time step. The model assumes that facilities, land use, water supply contracts, and regulatory requirements are constant over this period, representing a fixed level of development. The historical flow record October 1922-Septrember 1994, adjusted for the influence of land-use change and upstream flow regulation, is used to represent the possible range of water supply conditions.

CalSim-II uses optimization techniques to route water through a CVP-SWP system network representation. The network includes over 300 nodes and over 900 arcs, representing 24 surface reservoirs and the interconnected flow system. A linear programming (LP)/mixed integer linear programming (MILP) solver determines an optimal set of decisions for each time period given a

set of weights and system constraints. The physical description of the system is expressed through a user interface with tables outlining the system characteristics. The priority weights and basic constraints are also entered in the system tables. The programming language used, Water Resources Engineering Simulation Language (WRESL), serves as an interface between the user and the LP/MILP solver, time-series database, and relational database. Specialized operating criteria are expressed in WRESL.

The hydrology in CalSim-II was developed jointly by DWR and Reclamation. Water diversion requirements (demands), stream accretions and depletions, rim basin inflows, irrigation efficiency, return flows, non-recoverable losses, and groundwater operation are components that make up the hydrology used in CalSim-II. Demands are preprocessed independent of CalSim-II and vary according to the specified level of development (e.g., 2001, 2020) and according to hydrologic conditions. Agricultural land-use-based demands are calculated from an assumed cropping pattern and a soil moisture budget. Urban demands are typically set to contract amount, but with reductions in wet years based on recent historical data. Both land-use-based demands and contract entitlements serve as upper bound on deliveries. Environmental demands such as minimum reservoir storage requirements, minimum in-stream flows and deliveries to national wildlife refuges, and wildlife management areas are as stipulated in current regulatory requirements and discretionary interagency agreements. Sacramento Valley and tributary rim basin hydrologies are developed using a process designed to adjust the historical sequence of monthly stream flows to represent a sequence of flows at a future level of development. Adjustments to historic water supplies are determined by imposing future level land use on historical meteorological and hydrologic conditions. San Joaquin River basin hydrology is developed using fixed annual demands and regression analysis to develop accretions and depletions. The resulting hydrology represents the water supply available from Central Valley streams to the CVP and SWP at a future level of development. Groundwater has only limited representation in CalSim-II. This resource is modeled as a series of interconnected lumped-parameter basins. Groundwater pumping, recharge from irrigation, stream-aquifer interaction and interbasin flow are calculated dynamically by the model.

CalSim-II uses DWR's Artificial Neural Network (ANN) model to simulate the flow-salinity relationships for the Delta. The ANN model correlates DSM2 model-generated salinity at key locations in the Delta with Delta inflows, Delta exports, and Delta Cross Channel operations. The ANN flow-salinity model estimates electrical conductivity at the following four locations for the purpose of modeling Delta water quality standards: Old River at Rock Slough, San Joaquin River at Jersey Point, Sacramento River at Emmaton, and Sacramento River at Collinsville. In its estimates, the ANN model considers antecedent conditions up to 148 days, and considers a "carriage-water" type of effect associated with Delta exports.

CalSim-II uses logic for determining deliveries to north-of-Delta, and south-of-Delta CVP and SWP contractors. The delivery logic uses runoff forecast information, which incorporates uncertainty and standardized rule curves (i.e. Water Supply Index versus Demand Index Curve). The rule curves relate forecasted water supplies to deliverable "demand," and then use deliverable "demand" to assign subsequent delivery levels to estimate the water available for delivery and carryover storage. Updates of delivery levels occur monthly from January 1 through May 1 for the SWP and March 1 through May 1 for the CVP as runoff forecasts become

more certain. The south-of-Delta SWP delivery is determined based on water supply parameters and operational constraints. The CVP system wide delivery and south-of-Delta delivery are determined similarly upon water supply parameters and operational constraints with specific consideration for export constraints.

4.4 Generating CalSim-II Input from Global Climate Model Output

To simulate the proposed climate change scenarios, CalSim-II climate change input was needed. At a minimum, the input had to represent climate change effects on rainfall and snowmelt runoff. Global climate models (GCMs), listed previously in Table 4.1, provided projected climate data, however, the GCM data were not suitable for direct CalSim-II input for two reasons. First, CalSim-II needed streamflow data whereas the GCMs provided precipitation data. Second, CalSim-II needed data at specific locations, such as inflows to major reservoirs, whereas the GCMs provide data at a coarse resolution of only about six grid points over all of California. In other words, the type and scale of GCM output did not fit as CalSim-II input. An intermediate hydrologic model was needed.

Fortunately, such a hydrologic simulation was available. Ed Maurer, of the University of Santa Clara, had run the GCM results of interest through a macro-scale hydrologic model called the Variable Infiltration Capacity or VIC model. VIC converted the GCM precipitation data into runoff data at a $1/8^{th}$ degree grid. Both rainfall and snowmelt runoff were represented in this model. The runoff data was further processed by SCRIPPS to produce regional scale streamflow data centered on the following locations:

1) Smith River at Jedediah Smith State Park
2) Sacramento River at Shasta Lake
3) Feather River at Lake Oroville
4) Yuba River
5) North Fork of the American River
6) American River at Folsom Lake
7) Stanislaus River at New Melones Reservoir
8) Tuolumne River at New Don Pedro Reservoir
9) Merced River at Lake McClure
10) Kings River at Pine Flat Reservoir

Thus, streamflow data was available, but the regional scale of the data was still too coarse for direct CalSim-II input.

Miller, et al (2001) proposed using perturbation ratios to transfer regional scale climate change behavior to local scale historic data. This technique was used to transfer average climate change effects observed in VIC regional runoff to historic CalSim-II reservoir inflows. First, historic and projected time references were selected – 1976 and 2050 respectively. VIC monthly streamflows were averaged around these years. To adequately represent the effects of climate change, the period of average was thirty years - a recognized climatological time-scale – centered on the reference year; 1976 average monthly streamflows were calculated using the 1961-1990 VIC data, and 2050 average monthly streamflows were calculated using the 2035-2064 VIC data. Finally, perturbation ratios were calculated by dividing the 2050 VIC average

monthly streamflows by their respective 1976 VIC average monthly streamflows. The results are listed in Table 4.4, Table 4.5, Table 4.6, and Table 4.7.

Let's consider the GFDL A2 results listed in Table 4.4. The June perturbation ratio for the Smith River region was 0.62. This shows that, on average, 2050 June streamflows in this region are projected to be 38 percent less (0.62 – 1 = -0.38) than the historic reference 1976 streamflows. For comparison, consider the June perturbation ratio in the Smith River region for scenario PCM B1 – the mildly wetter climate change scenario. Results for this scenario are listed in Table 4.7. A ratio of 0.85 is listed indicating a 15 percent reduction in average streamflow in 2050 as compared to 1976. So while PCM B1 is mildly wetter than current conditions, there is still a projected reduction in runoff in the Smith River region during the late spring.

Table 4.4 Streamflow Perturbation Ratios for Scenario GFDL A2

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Smith R at Jed Smith State Park	0.66	0.80	1.19	1.12	1.06	1.01	0.76	0.64	0.62	0.67	0.78	0.85
Stanislaus R at New Melones Dam	0.97	0.78	1.30	1.34	1.20	1.37	1.07	0.72	0.57	0.43	0.64	0.84
Kings R at Pine Flat Dam	0.81	0.83	1.35	1.33	1.36	1.35	1.24	1.00	0.61	0.38	0.52	0.72
Merced R at Lake McClure	0.81	0.56	2.04	1.30	1.10	1.38	1.26	0.83	0.48	0.25	0.39	0.69
Yuba R System Outflow	1.16	0.80	1.37	1.16	1.20	1.24	0.86	0.62	0.49	0.47	0.64	0.77
NF American R at NF Dam	1.34	0.73	1.43	1.07	1.17	1.25	0.83	0.56	0.40	0.26	0.48	0.69
Sacramento R at Shasta Dam	0.90	0.92	1.36	1.12	1.13	1.06	0.84	0.71	0.77	0.78	0.86	0.92
Feather R at Oroville	0.98	0.87	1.31	1.25	1.24	1.22	0.89	0.69	0.58	0.68	0.81	0.84
American R at Folsom Dam	1.22	0.70	1.35	1.13	0.95	1.28	0.77	0.48	0.45	0.44	0.67	0.83
Tuolumne R at New Don Pedro	0.88	0.80	1.36	1.31	1.08	1.31	1.19	0.84	0.49	0.48	0.68	0.81

Table 4.5 Streamflow Perturbation Ratios for Scenario PCM A2

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Smith R at Jed Smith State Park	0.65	0.88	0.90	0.91	1.09	1.12	0.87	0.79	0.73	0.76	0.95	1.14
Stanislaus R at New Melones Dam	0.95	1.12	0.72	1.05	1.31	1.11	1.11	0.85	0.81	0.75	0.87	0.92
Kings R at Pine Flat Dam	0.96	1.13	0.83	1.00	1.42	1.19	1.22	1.02	0.81	0.69	0.79	0.89
Merced R at Lake McClure	0.99	1.69	0.84	0.93	1.33	1.18	1.21	0.88	0.70	0.60	0.71	0.89
Yuba R System Outflow	0.69	1.10	0.82	0.95	1.25	1.14	0.95	0.74	0.67	0.67	0.91	0.91
NF American R at NF Dam	0.58	1.19	0.71	1.00	1.26	1.14	0.91	0.69	0.61	0.49	0.90	0.90
Sacramento R at Shasta Dam	0.86	1.02	0.95	0.86	1.06	1.05	0.91	0.78	0.86	0.89	0.94	0.96
Feather R at Oroville	0.81	1.00	0.93	0.90	1.24	1.13	1.00	0.79	0.73	0.85	0.93	0.93
American R at Folsom Dam	0.69	1.13	0.65	1.01	1.35	1.05	0.91	0.65	0.68	0.68	0.92	0.93
Tuolumne R at New Don Pedro	0.98	1.17	0.75	1.02	1.27	1.11	1.15	0.93	0.71	0.81	0.90	0.92

Table 4.6 Streamflow Perturbation Ratios for Scenario GFDL B1

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Smith R at Jed Smith State Park	0.56	1.20	1.16	1.18	0.98	1.26	0.85	0.74	0.69	0.74	0.92	0.99
Stanislaus R at New Melones Dam	0.82	1.36	1.13	1.47	0.84	1.03	0.99	0.72	0.55	0.48	0.67	0.85
Kings R at Pine Flat Dam	0.80	0.98	1.03	1.33	0.90	1.05	1.03	0.88	0.57	0.45	0.60	0.75
Merced R at Lake McClure	0.86	1.40	1.50	1.29	0.57	1.20	1.24	0.79	0.47	0.31	0.45	0.71
Yuba R System Outflow	0.77	2.04	1.05	1.33	0.81	1.15	0.87	0.64	0.49	0.50	0.70	0.80
NF American R at NF Dam	0.82	2.89	0.99	1.28	0.60	1.16	0.85	0.59	0.37	0.29	0.54	0.72
Sacramento R at Shasta Dam	0.77	1.26	1.11	1.32	0.96	1.17	0.90	0.78	0.80	0.84	0.91	0.95
Feather R at Oroville	0.72	1.20	1.11	1.38	1.02	1.13	0.89	0.69	0.61	0.72	0.86	0.88
American R at Folsom Dam	0.84	2.54	0.91	1.46	0.56	0.90	0.73	0.56	0.42	0.47	0.72	0.86
Tuolumne R at New Don Pedro	0.83	1.21	1.08	1.41	0.81	1.02	1.13	0.80	0.51	0.55	0.76	0.85

Table 4.7 Streamflow Perturbation Ratios for Scenario PCM B1

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Smith R at Jed Smith State Park	0.99	0.90	0.90	1.06	1.00	1.37	1.12	1.02	0.85	0.85	0.95	1.23
Stanislaus R at New Melones Dam	0.96	1.19	0.73	1.26	1.18	1.28	1.20	0.95	0.81	0.83	0.92	0.93
Kings R at Pine Flat Dam	0.94	1.13	0.78	1.16	1.15	1.13	1.12	1.06	0.81	0.85	0.86	0.91
Merced R at Lake McClure	0.95	1.45	0.64	1.20	1.21	1.32	1.19	0.96	0.73	0.80	0.86	0.90
Yuba R System Outflow	0.92	1.09	0.69	1.26	1.10	1.38	1.19	0.94	0.82	0.85	0.97	0.97
NF American R at NF Dam	0.86	1.23	0.60	1.34	1.08	1.47	1.21	0.92	0.73	0.75	0.96	0.94
Sacramento R at Shasta Dam	1.14	0.94	0.90	1.10	0.97	1.30	1.17	1.02	0.97	0.98	0.99	1.00
Feather R at Oroville	0.99	0.94	0.78	1.18	1.11	1.29	1.17	0.97	0.90	0.95	0.99	0.99
American R at Folsom Dam	0.86	1.21	0.60	1.38	1.21	1.40	1.20	0.88	0.74	0.84	0.97	0.97
Tuolumne R at New Don Pedro	0.98	1.18	0.73	1.21	1.16	1.24	1.21	1.03	0.75	0.89	0.93	0.93

The CalSim-II climate change scenario input was produced using the above listed perturbation ratios. Base CalSim-II reservoir inflows were generated from the WY1922-1994 historical record. For each climate change scenario, the historical inflows were perturbed or altered by multiplying the historical inflow timeseries with corresponding perturbation ratios obtained from the VIC streamflow analysis; perturbation ratios were matched with CalSim-II inflow timeseries data based on month and geographic proximity.

The reservoir inflows that constitute the bulk of water supply for the State Water Project (SWP) and the Central Valley Project (CVP) are limited in number. They include the Sacramento River

at Shasta, the Feather River at Oroville, the American River above Folsom, all in the Sacramento Valley, and the Stanislaus, the Tuolumne, the Merced and the San Joaquin Rivers in the San Joaquin Valley. These and others, such as the Trinity River and Yuba River, are the historical inflows that were perturbed for each climate change scenario. Focusing on Sacramento Valley impacts, average monthly Shasta, Oroville and Folsom inflows for the Base and four climate change scenarios are compared in Figure 4.1, Figure 4.2, and Figure 4.3 respectively. The period of average is WY1922-1994. As shown, the climate change perturbations generally resulted in higher flows in the winter and lower in the spring and early summer as expected.

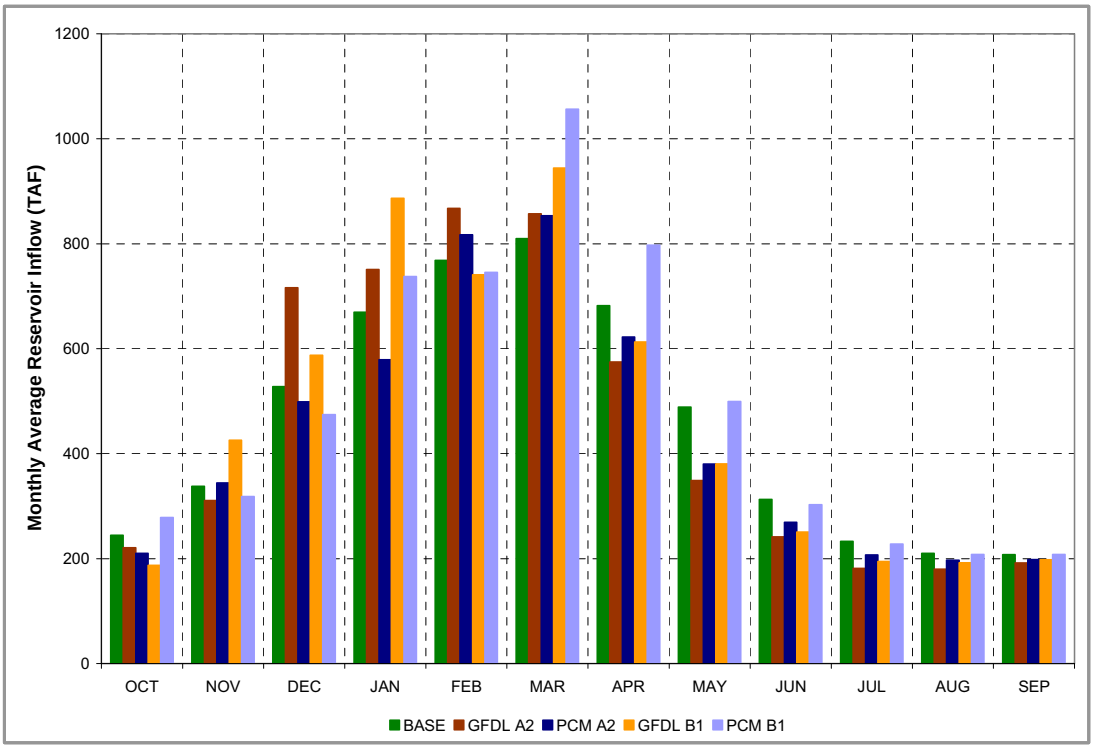

Figure 4.1 Lake Shasta Average Monthly Inflow (1922-1944)

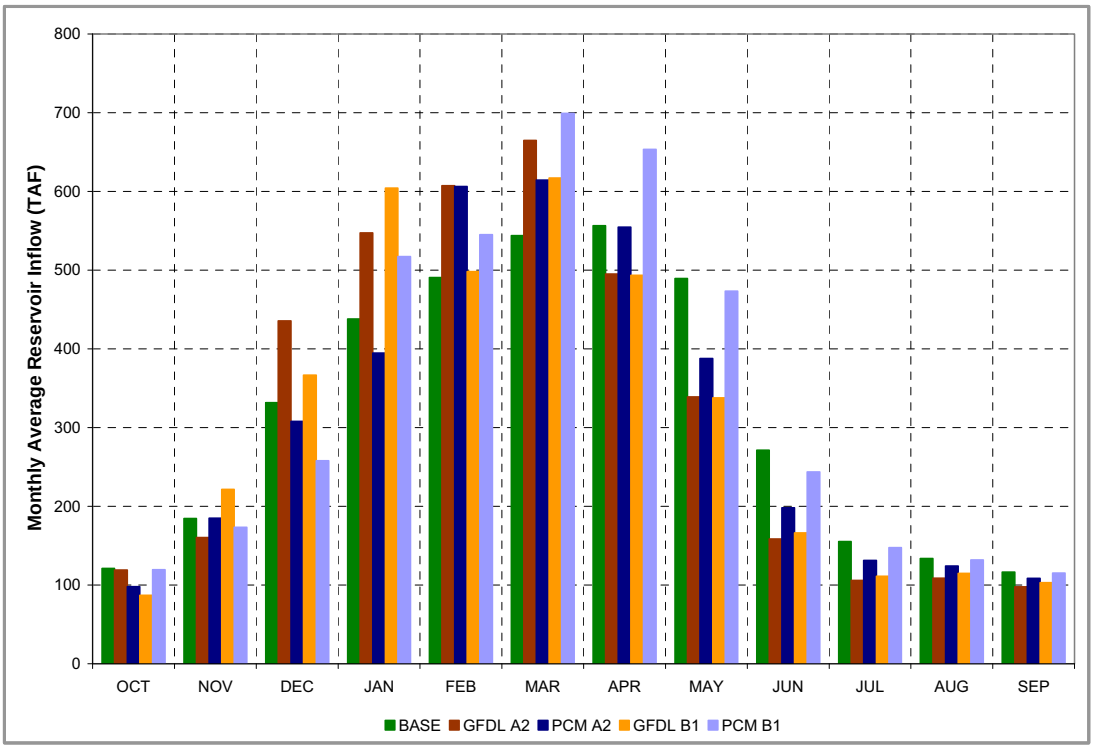

Figure 4.2 Lake Oroville Average Monthly Inflow (1922-1994)

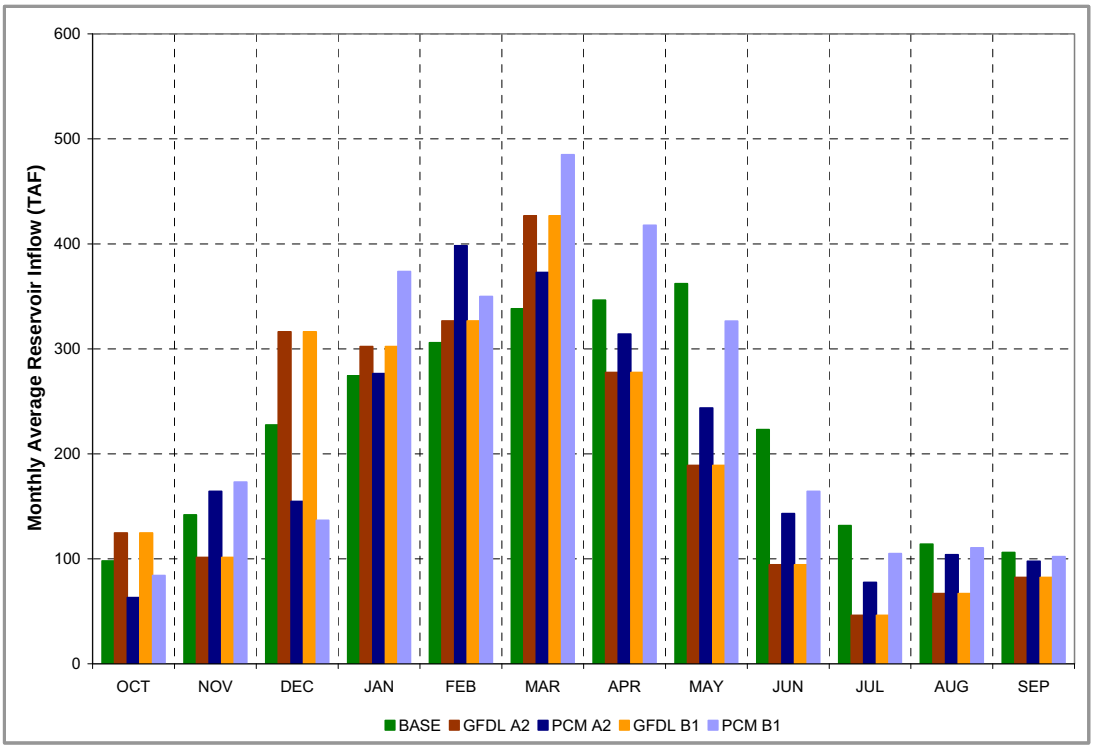

Figure 4.3 Folsom Lake Average Monthly Inflow (1922-1994)

Annual average Shasta, Oroville, and Folsom inflows are listed in Table 4.8, Table 4.9, and Table 4.10. The annual average flows for the climate change scenarios were calculated from the perturbed CalSim-II timeseries input. Inflows were averaged over the 1922 – 1994 historical period, the 1928 – 1934 and 1986 – 1992 droughts, and the 1981 – 1983 wet period.

Table 4.8 Lake Shasta Annual Average Inflow (TAF)

		BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Long-term (1922 – 1994)	Value	5492	5442	5177	5601	5854
	Change	--	-51	-315	109	362
May 1928 - Oct 1934	Value	3332	3227	3114	3321	3545
	Change	--	-106	-219	-12	213
WY 1987 - WY 1992	Value	3817	3720	3603	3859	4115
	Change	--	-97	-214	42	299
WY 1980 - WY 1983 (Wet Period)	Value	7582	7599	7223	7829	8143
	Change	--	17	-359	247	561

Table 4.9 Lake Oroville Annual Average Inflow (TAF)

		BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Long-term (1922 – 1994)	Value	3833	3840	3712	3722	4079
	Change	--	6	-122	-111	245
May 1928 - Oct 1934	Value	2174	2109	2061	2038	2282
	Change	--	-66	-113	-136	108
WY 1987 - WY 1992	Value	2002	2032	1968	1964	2163
	Change	--	30	-34	-38	161
WY 1980 - WY 1983 (Wet Period)	Value	6064	6170	5936	5995	6465
	Change	--	106	-128	-69	401

Table 4.10 Folsom Lake Annual Average Inflow (TAF)

		BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Long-term Annual Average	Value	2670	2355	2410	2368	2829
	Change	--	-315	-260	-302	159
May 1928 - Oct 1934	Value	1519	1281	1321	1277	1552
	Change	--	-238	-198	-242	33
WY 1987 - WY 1992	Value	1355	1225	1237	1239	1479
	Change	--	-130	-117	-116	125
WY 1980 - WY 1983 (Wet Period)	Value	4470	4022	4109	4057	4802
	Change	--	-449	-361	-414	332

So through a sequence of global climate models (GFDL and PCM), a regional hydrologic model (VIC), derivation of climate change runoff perturbation ratios, and, finally, applying those perturbation ratios to CalSim-II historic reservoir inflows, the CalSim-II climate change scenario input was created. The sequence of models is illustrated in Figure 4.4.

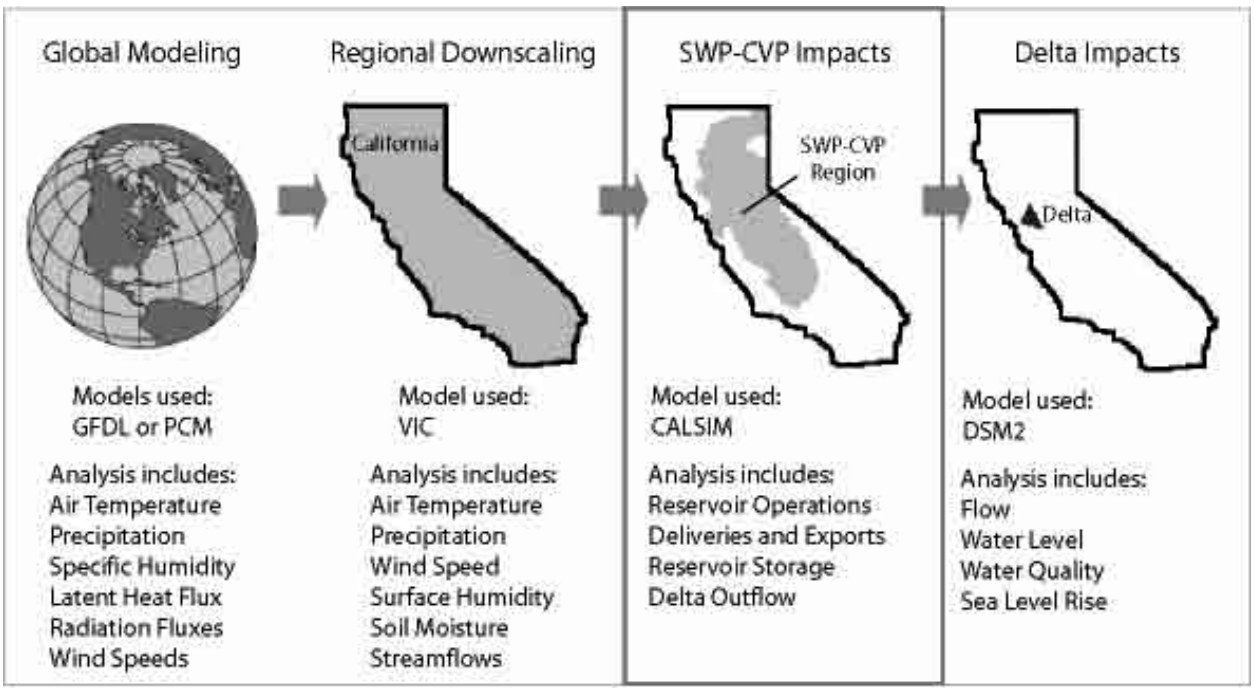

Figure 4.4 Modeling Sequence for Generating CalSim-II Climate Change Scenarios

4.5 Study Scenarios

4.5.1 Base Scenario

The base CalSim-II simulation was adapted from one of the studies presented in 2004 by the Bureau of Reclamation in support of its latest Operations Criteria and Plan (OCAP). Table 4.11 lists project and non-project demand assumptions by region. Regulatory standards and operations criteria are listed in Table 6-2 of Chapter 6 of the report *Long-Term Central Valley Project Operations Criteria and Plan* (USBR 2004). The specific study used from the OCAP analysis was Study D at a 2020 level of development. Some key regulatory and operational assumptions in this study are:

1) Delta exports, outflow and water quality are regulated according to the State Water Resources Control Board D1641 and the Water Quality Control Plan.
2) CVPIA 3406 (b)(2) is NOT included.
3) The Environmental Water Account (EWA) is NOT included.

Table 4.11 Demand Assumptions for the Base Scenario

	Base Condition
Period of Simulation	73 years (1922-1994)
HYDROLOGY **Level of Development (Land Use)**	2020 Level, DWR Bulletin 160-98
Demands **North of Delta (exc American R)** CVP SWP (FRSA) Non-Project	 Land Use based, limited by Full Contract Land Use based, limited by Full Contract Land Use based
CVP Refuges	Firm Level 2
American River Basin Water rights CVP	 2020, Sacramento Water Forum[1] 2020, Sacramento Water Forum[2]
San Joaquin River Basin Friant Unit Lower Basin Stanslaus River Basin	 Regression of historical Fixed annual demands New Melones Interim Operations Plan
South of Delta CVP CCWD SWP (w/ North Bay Aqueduct) SWP Article 21 Demand	 Full Contract 195 TAF/YR[3] 3.4-4.2 MAF/YR MWDSC up to 50 TAF/month, Dec-Mar, others up to 84 TAF/month

[1] Sacramento Water Forum 2025 Level Demands defined in the Sacramento Water Forum's EIR
[2] Same as footnote 1
[3] Delta diversions include operations of Los Vaqueros Reservoir operations

4.5.2 Climate Change Scenarios

Four climate change scenarios were simulated for this analysis: GFDL A2, PCM A2, GFDL B1, and PCM B1. GFDL and PCM are the global climate models that generated the climate scenarios. A2 and B1 indicate the different assumed rates of carbon loading in each scenario (see Table 4.1). Global climate model results were downscaled for input as CalSim-II inflow as described in Section 4.4.

The following monthly inflows were perturbed with the factors listed in Table 4.4 - Table 4.7:

1) Trinity River at Trinity Lake
2) Sacramento, McCloud, and Pit Rivers at Shasta Lake
3) Feather River at Lake Oroville
4) Yuba River upstream of the confluence with the Feather River
5) North and South Forks of the American River at Folsom Lake
6) Stanislaus River at New Melones Lake
7) Tuolumne River at New Don Pedro Reservoir
8) Merced River at Lake McClure
9) San Joaquin River at Millerton Lake

Since the monthly perturbation factors repeat themselves on an annual basis, the annual hydrology of both base and climate change scenarios maintain the same pattern of wet years and droughts. Specifically, the droughts of 1929-1934, 1976-1977, and 1987-1992 are preserved and, overall, a wet year in the base is a wet year in the climate change scenarios; there is just modestly less or more precipitation on an annual basis depending on the scenario.

The significant change in inflows between the base and climate change scenarios was in the seasonal distribution of runoff. Generally, as shown in Figure 4.1 - Figure 4.3, more runoff occurred from December through March while less came in the remainder of the year. This seasonal change in runoff was most significant in scenarios GFDL A2 and GFDL B1. It was least significant in PCM B1, and PCM A2 lies somewhere in between. A simple explanation for the change in seasonal runoff patterns is that more precipitation will fall as rain than snow in a warmer climate. More rainfall leads to more runoff in the wet months whereas less snowfall results in a smaller snowpack and less snowmelt in the dry months.

What wasn't changed between the base and climate change scenarios? There were no structural changes – no added storage, pumping, and canal capacity. No changes were made to system regulations. The CVP and SWP continued meeting minimum in-stream flow requirements. The projects continued meeting the Delta outflow and water quality standards established by the State Water Resources Control Board in Decision 1641 and the Water Quality Control Plan. Water use remained at a year 2020 level of development, and operational rules such as flood control and delivery allocations are applied consistently in base and climate change scenarios.

Current management practices and existing system facilities were used in the analysis for this report. No changes were made to lessen the effects of climate change or sea level rise.

No changes were made to:

- ❑ System structures, such as added water storage, pumping, or canal capacity
- ❑ Reservoir operating rules, such as changing the space required for flood control
- ❑ Streamflow requirements
- ❑ Water quality standards
- ❑ Delta outflow requirements
- ❑ Operations to account for sea level rise

4.5.3 Climate Change Impacts Not Considered in the Study Scenarios

There are also some key climate change impacts that were not considered in the study scenarios. With changing rates of evapotranspiration, it is expected that urban (landscaping) and agricultural demand for CVP and SWP water will change accordingly, but no changes in demand were included in the climate change scenarios. Another anticipated result of a warming climate is a rising sea level. While the climate change scenarios are held to the same

Delta salinity standards as in the base scenario, the effect of a rising sea level on the projects' ability to meet those standards was not accounted for; it is assumed in all scenarios that sea level remains unchanged. Future work will include development of a tool for modifying system operations to maintain Delta water quality standards under sea level rise conditions. Note that sea level rise scenarios discussed in Chapter 5 section 5.5 use operations based on present sea level.

Furthermore, the method of downscaling global climate model information for CalSim-II input only captures the general trends of average rainfall and seasonal shifts in runoff. There is no information included about changes in weather variability. In each of the scenarios, the frequency and length of the droughts remained the same. If climate change influences these underlying weather phenomena, then we are missing important information necessary to determine impacts to CVP and SWP operations.

4.6 Results

Results of the CalSim-II base and climate change scenarios are presented and compared in this section. Given that the primary purpose of the CVP and SWP is water supply, the key CVP and SWP operational measures presented are water shortages, contractor deliveries, and carryover storage. Then, to begin the search for operational flexibility in dealing with climate change impacts on water supply, the significance of various operational constraints was analyzed. Of course, the CVP and SWP have other important responsibilities such and fish and wildlife enhancement and power supply. Therefore, at the end of the section, climate change impacts on in-stream temperatures and power supply are also discussed.

Before reviewing the results, though, please note that the purpose of this report is to demonstrate how various analysis tools currently used by DWR could be used to address issues related to climate change. The methods and results presented in this report could be used to guide future climate change analysis and to identify areas where more information is needed. All results presented in this report are preliminary, incorporate several assumptions, reflect a limited number of climate change scenarios, and do not address the likelihood of each scenario. Therefore, these results are not sufficient by themselves to make policy decisions.

4.6.1 Shortages

To discuss CalSim-II shortages, we must first discuss water use priorities. There are many competing demands for the water that flows into the Central Valley. They include farm irrigation, urban and industrial use, ecosystem protection and restoration, and reservoir storage for hydropower production, recreation or for later use in the next inevitable drought. In CalSim-II, distribution of water is prioritized as listed in Table 4.12.

Table 4.12 CalSim-II Water Use Prioritization

First Priority	prior right water users, minimum in-stream flow requirements, WQCP requirements
Second Priority	SWP Table A contractors, CVP contractors
Third Priority	reservoir storage for the next year (carryover)
Fourth Priority	SWP Article 21 deliveries

While CVP and SWP contractor deliveries take precedence over next year's storage, a balance between the two is struck in the allocation decision. During the winter and spring, the SWP and CVP decide how much of contractor demand can be met for the year based on available storage and forecasted runoff. Part of the allocation decision is to ensure that enough water is left in storage at the end of the year in case of impending drought. Once the allocation decision is made though, deliveries to meet that allocation take priority over maintaining the storage carryover target.

Given this simple explanation of prioritization, there are two types of shortages in CalSim-II. One is an acceptable, though not desirable, result of making water allocations based on imperfect forecasts. In wetter years, the SWP and CVP sometimes allocate more south-of-Delta (SOD) deliveries than can be delivered through the pumps due to various export constraints. For the base and four climate change scenarios, this type of shortage is infrequent and, compared to total annual deliveries, insignificant. This type of shortage is also implicitly included in the delivery analysis; if it's not delivered, we don't count it.

The other type of shortage is usually unacceptable. This is when the first priority obligations – prior right contracts, minimum in-stream flow requirements, Delta requirements – are not met. The only way for this shortage to occur in CalSim-II is for one or more North-of-Delta reservoirs to be drawn down to dead storage. At this point, the model has lost control of meeting the watershed's most basic needs not to mention the lawful obligations of the CVP and SWP. Such a simulation is broken. The lower priority metrics are questionable: Could the shortage of high priority water uses be avoided at the expense of lower priority uses through some simple changes in operating rules? And the results of a broken simulation can not be confidently compared to an unbroken simulation.

Table 4.13 shows that Shasta and Folsom reservoirs were at dead storage for a significant number of months in scenarios GFDL A2, PCM A2, and GFDL B1. These months are all concentrated in the critical year of 1924 and the droughts of 1929-1934, 1976-1977, and 1987-1992. During these months, streamflow requirements were not met on the Sacramento and American rivers and the CVP was unable to contribute its Coordinated Operation Agreement defined share of in-basin use. The base scenario had one month of shortage on the American and Sacramento rivers – October 1977. Due to the severity of the 1976-1977 drought, this is frequently unavoidable in CalSim-II simulations.

Table 4.13 Months of Critical Shortages (Storage at Dead Pool)

	Shasta (months)	Oroville (months)	Folsom (months)
BASE	1	0	1
GFDL A2	31	0	28
PCM A2	29	0	22
GFDL B1	21	0	20
PCM B1	0	0	0

The length of shortages in GFDL A2, PCM A2, and GFDL B1 indicate that the delivery results presented for these scenarios in the next section are not always reliable. Too much risk was taken in the delivery allocation decisions of these three scenarios and not enough storage was carried into the drought periods as a result. In future climate change simulations, modifications to the rule that divides available water into delivery and carryover should be investigated as a means to prevent these shortages. Since CVP allocations are dependent on Shasta and Folsom storage, such modifications will likely alter the resulting delivery capability of the CVP as compared to the results presented in the next section.

4.6.2 Delivery and Storage Analysis

As shown previously in Figure 4.1, Figure 4.2, and Figure 4.3, the general effect of climate change on runoff is that more comes in the winter, when we don't need it, and less comes in spring and summer, when we do need it. One would expect that this shift in runoff will make it more difficult for the CVP and SWP to capture water and deliver it to their customers. The resulting annual average deliveries to Table A contractors listed in Table 4.14 fit these expectations for three of the four climate change scenarios. GFDL B1, with 2,861 TAF annual average deliveries, was 10.2 percent less than the Base scenario annual average of 3,186 TAF. PCM A2 and GFDL A2 also reduced Table A deliveries below the Base. On the other hand, in PCM B1, the scenario that was slightly wetter than the Base, the SWP managed to make 1.2 percent more Table A deliveries on an annual average basis – increasing deliveries from 3,186 to 3,224 TAF. The dry year samples of Table A deliveries listed in Table 4.14 show that the SWP did better in the Base scenario than in GFDL A2, PCM A2, and GFDL B1 in most instances. The exception was the single dry year of 1977 – no doubt the result of the higher Table A allocation in the Base scenario for the first year of the 1976-1977 drought. PCM B1 results in higher dry year Table A deliveries than the Base in all instances except for the 1976-1977 drought.

Table 4.14 SWP average and dry year Table A deliveries (TAF)

	Average	*Single dry year 1977*	*2-year drought 1976-1977*	*4-year drought 1931-1934*	*6-year drought 1987-1992*	*6-year drought 1929-1934*
BASE	3186	222	1620	1521	1786	1679
GFDL A2	2879	229	892	1355	1396	1554
PCM A2	2964	279	1049	1343	1651	1458
GFDL B1	2861	285	952	1386	1502	1507
PCM B1	3224	267	1413	1870	1807	1949

While Table 4.14 contrasts annual average deliveries of the Base and climate change scenarios, a more useful comparison is delivery capability. This comparison was made using delivery exceedance probability curves which show the likelihood that some quantity of water or more was delivered in a given scenario. Each curve was assembled from the 73-year annual delivery sample provided by the CalSim-II simulation. For instance, let's say that in one simulation SWP Table A contractors were delivered more than 4 million acre-feet of water in 16 of the 73-year simulation. Therefore, one point on the curve would match the 78 percent (16/73 = 78 percent) probability of exceedance with a delivery of 4 million acre-feet.

Figure 4.5 shows the exceedance probability curves for SWP Table A deliveries. GFDL A2, PCM A2, and GFDL B1, all with slightly drier climates and significant shifts in seasonal runoff, resulted in consistently lower delivery capability. It does not matter whether the deliveries are low or high. PCM B1, with the slightly wetter climate and no significant reduction in runoff in the late spring and summer, resulted in higher delivery capability for SWP Table A contractors at the lower end of the delivery spectrum and roughly equivalent capability at the higher end. This is consistent with the results shown in the dry-period analysis of Table 4.14. The 50 percent exceedance level delivery represents the median delivery of the 73-year simulation. As shown in Figure 4.5, the Base scenario delivery with a 50 percent probability of exceedance was highest at 3551 TAF. PCM B1 was close behind. GFDL A2 has the lowest delivery at 50 percent exceedance; at 3,154 TAF, it is 11.2 percent less than the base scenario.

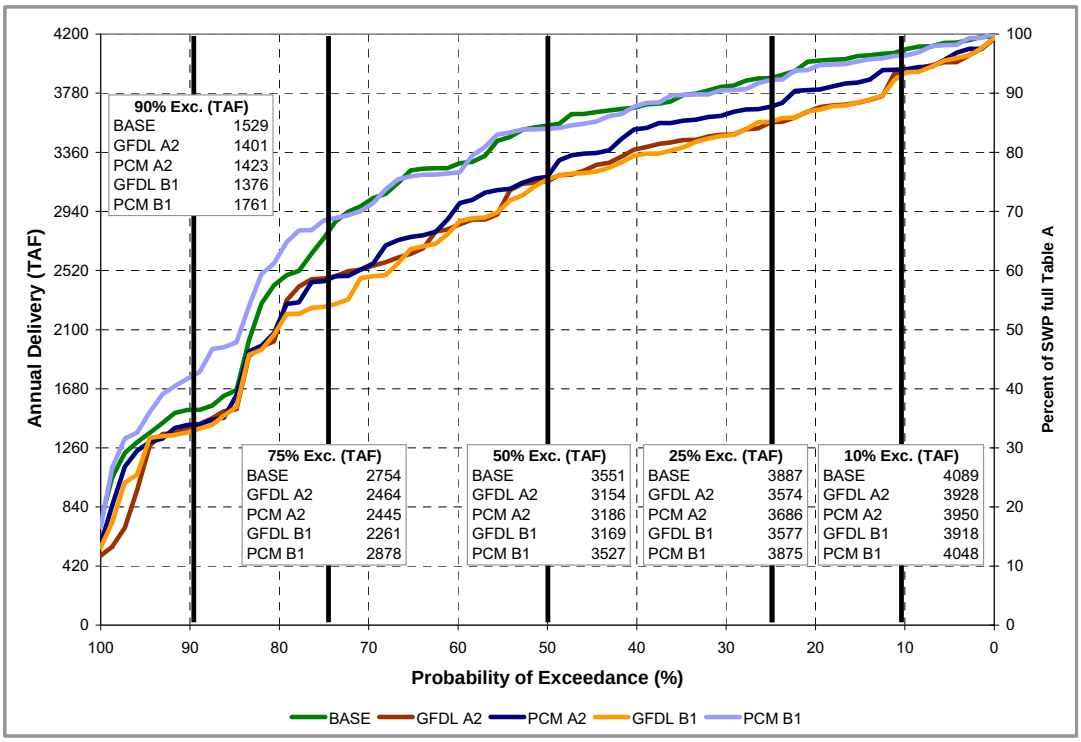

Figure 4.5 Exceedance Probability Plot of SWP Table A Deliveries

Carryover storage was analyzed in a similar fashion. SWP carryover storage is the sum of Oroville storage and SWP San Luis storage on September 30 – the end of the water year. Figure 4.6 shows the probability of exceedance plot for SWP carryover storage. Again, this is constructed from the 73-year simulation sample. As shown, the persistence of SWP carryover storage in scenarios GFDL A2, PCM A2, and GFDL B1 was consistently lower than the Base. The greatest difference was at the 10 percent exceedance level; GFDL B1, at 2,677 TAF carryover, is 28 percent less than the SWP carryover of 3,718 TAF for the Base scenario. However, during the dry years, the SWP was able to change operations and allocations sufficiently to make up for this carryover deficit and avoid unnecessary shortages. Note the convergence of the SWP carryover exceedance curves as you go from 10 percent probability to 90 percent. Base and GFDL A2 carryover were respectively 1,342 TAF and 1,202 TAF at the 90 percent exceedance level. This is a 10 percent reduction in carryover as compared to the 28 percent reduction at the 10 percent exceedance level. Overall, with the drier climate scenarios, less water was delivered to Table A contractors and more risk with SWP carryover storage was taken to do it. The SWP carryover storage in scenario PCM B1 tended to be slightly more dependable than the base for carryover under 2,250 TAF and slightly less dependable than the base for carryover greater than 2,250 TAF. This is also consistent with results shown earlier. The wetter climate of PCM B1 paid off during the drought periods when plenty of storage was available to dampen the added seasonal variability. The SWP was able to capture and deliver this water during the droughts. During the wetter periods though, the storage capacity wasn't available to capture the larger winter runoff. To maintain deliveries, carryover was then reduced.

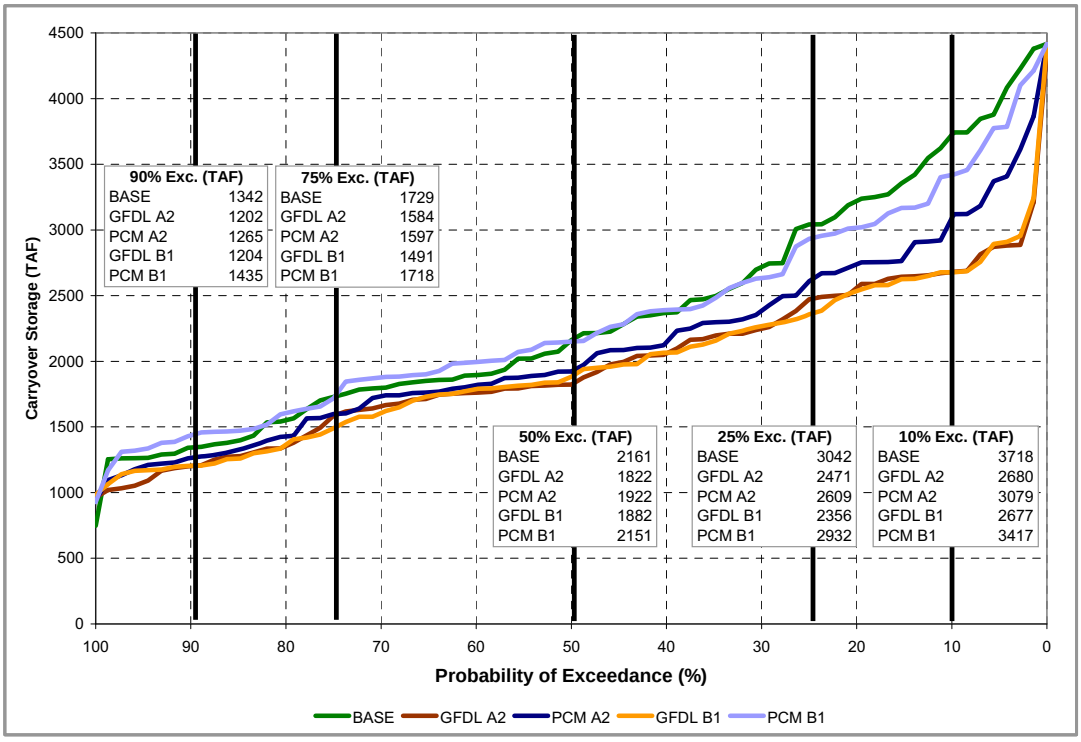

Figure 4.6 Exceedance Probability Plot of SWP Carryover Storage

SWP Article 21 deliveries were not affected by climate change in the same way as Table A deliveries. Having a lower priority than storage, as discussed in Section 4.6.1, Article 21 deliveries were only made when San Luis was full and Delta surplus and Banks pumping capacity were available. Whereas the bulk of Table A deliveries came in the summer and are dependent on the storage of winter precipitation, Article 21 deliveries were primarily made in the winter when surplus conditions existed. The larger winter runoff and lower Table A allocations resulted in higher average Article 21 deliveries for scenarios GFDL A2, PCM A2, and GFDL B1 as shown in Table 4.15. GFDL A2 annual average Article 21 deliveries were increased by 7 TAF from the Base – 99 to 106 TAF. In contrast, GFDL A2 annual average Table A deliveries were decreased 307 TAF from the Base – 3,186 to 2,879 TAF (see Table 4.14). Table 4.15 shows that PCM B1 annual average Article 21 deliveries were reduced in comparison to the Base scenario by 11 TAF. During the 1929-1934 drought, Article 21 contractors lost 69 TAF in scenario PCM B1 as compared to the Base scenario. This happened because higher Table A deliveries were made during this drought in PCM B1 than in the Base. Table 4.14 shows that PCM B1 and Base annual average Table A deliveries during the 1929-1934 drought were 1,949 TAF and 1,679 TAF respectively – a difference of 270 TAF. With higher Table A deliveries, San Luis did not fill as frequently resulting in less Article 21 delivery opportunities.

Table 4.15 SWP average and dry year Article 21 deliveries (TAF)

	Average	*Single dry year 1977*	*2-year drought 1976-1977*	*4-year drought 1931-1934*	*6-year drought 1987-1992*	*6-year drought 1929-1934*
BASE	99	0	0	157	34	111
GFDL A2	106	0	0	188	119	133
PCM A2	103	0	0	194	27	149
GFDL B1	101	0	0	170	52	132
PCM B1	88	0	0	54	39	42

Article 21 delivery capability is illustrated for the Base and climate change scenarios in Figure 4.7. As shown, in all scenarios, no Article 21 deliveries were made in more the 40 percent of the 73 years of simulation. PCM B1 had no Article 21 deliveries in 50 percent of the years. The drier climate change scenarios – GFDL A2, PCM A2, and GFDL B1 – resulted in more frequent Article 21 deliveries. Yet, at the lower probabilities of exceedance, such as 5 percent and 10 percent, the Base and PCM B1 scenarios tended to produce larger Article 21 deliveries.

As expected, the shift in seasonal runoff and slightly drier climate of scenarios GFDL A2, PCM A2 and GFDL B1 reduced annual average deliveries to CVP South-of-Delta contractors. Table 4.16 lists CVP SOD deliveries. The annual average deliveries in the Base and GFDL A2 scenarios were 2,716 and 2,435 TAF respectively – a 10.3 percent reduction. Just as with SWP Table A deliveries, scenario PCM B1 increased annual average CVP SOD deliveries as compared to the Base. The increase was 69 TAF – 2.5 percent of Base CVP SOD deliveries. With the drier climates, less was delivered to CVP SOD contractors during each of the droughts in scenarios GFDL A2, PCM A2, and GFDL B1. Drought CVP SOD deliveries were larger in PCM B1 than in the base in all instances except for 1976-1977.

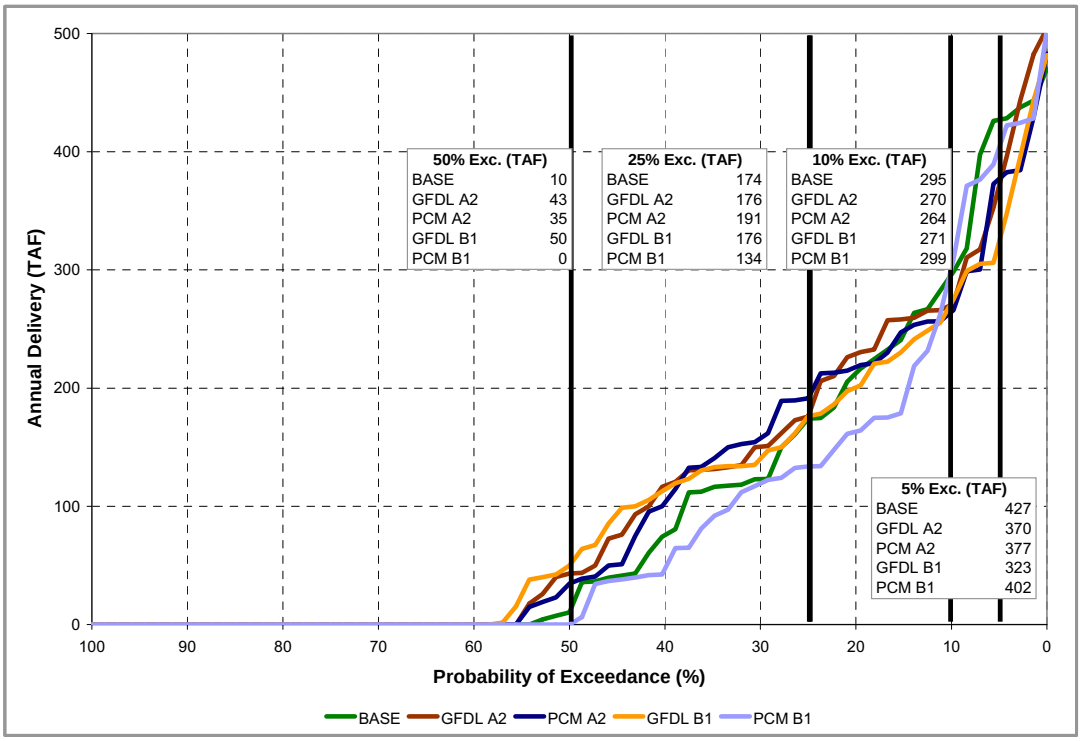

Figure 4.7 Exceedance Probability Plot of SWP Article 21 Deliveries

Table 4.16 CVP South-of-Delta contractor deliveries (TAF)

	Average	*Single dry year 1977*	*2-year drought 1976-1977*	*4-year drought 1931-1934*	*6-year drought 1987-1992*	*6-year drought 1929-1934*
BASE	2716	1358	1704	1362	1806	1538
GFDL A2	2435	1108	1434	1217	1529	1320
PCM A2	2545	1243	1583	1225	1580	1341
GFDL B1	2489	1217	1546	1240	1634	1344
PCM B1	2785	1354	1686	1541	1953	1688

Capability of CVP SOD deliveries decreased for the drier scenarios both at the high and low ends of the probability spectrum. Figure 4.8 shows that the Base median (50 percent exceedance) CVP SOD delivery was 2,963 TAF. The median delivery of scenario GFDL A2 is 2,533 TAF. This equals a 14.5 percent reduction in delivery capability at a 50 percent probability of exceedance. PCM B1 shows more capability than the base in the 60 percent-100 percent exceedance probability range. Annual deliveries of this size (1,500 TAF – 2,750 TAF) typically occurred in the drier years. As such, the higher capability of CVP SOD deliveries in PCM B1 as compared to the base conforms to the higher dry year deliveries shown in Table 4.16.

CVP carryover storage was reduced in the in the drier scenarios and increased in the wetter scenario as compared to the Base. Figure 4.9 plots exceedance probability for CVP carryover storage – defined as the sum of Trinity, Shasta, Folsom, and CVP San Luis storage on September 30, the end of the water year. For GFDL A2, PCM A2, and GFDL B1, higher risks of shortage were taken (lower carryover) and still resulted in lower SOD CVP deliveries. With PCM B1, carryover was more dependable and helped the CVP increase deliveries in the droughts.

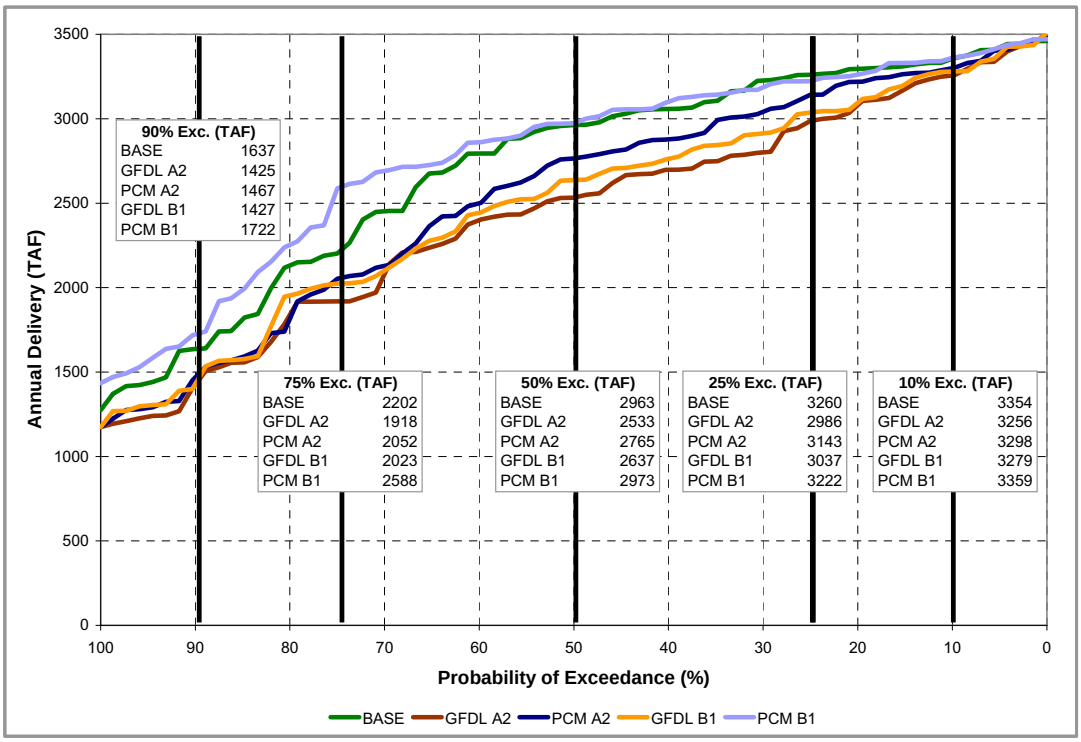

Figure 4.8 Exceedance Probability Plot of CVP South-of-Delta Deliveries

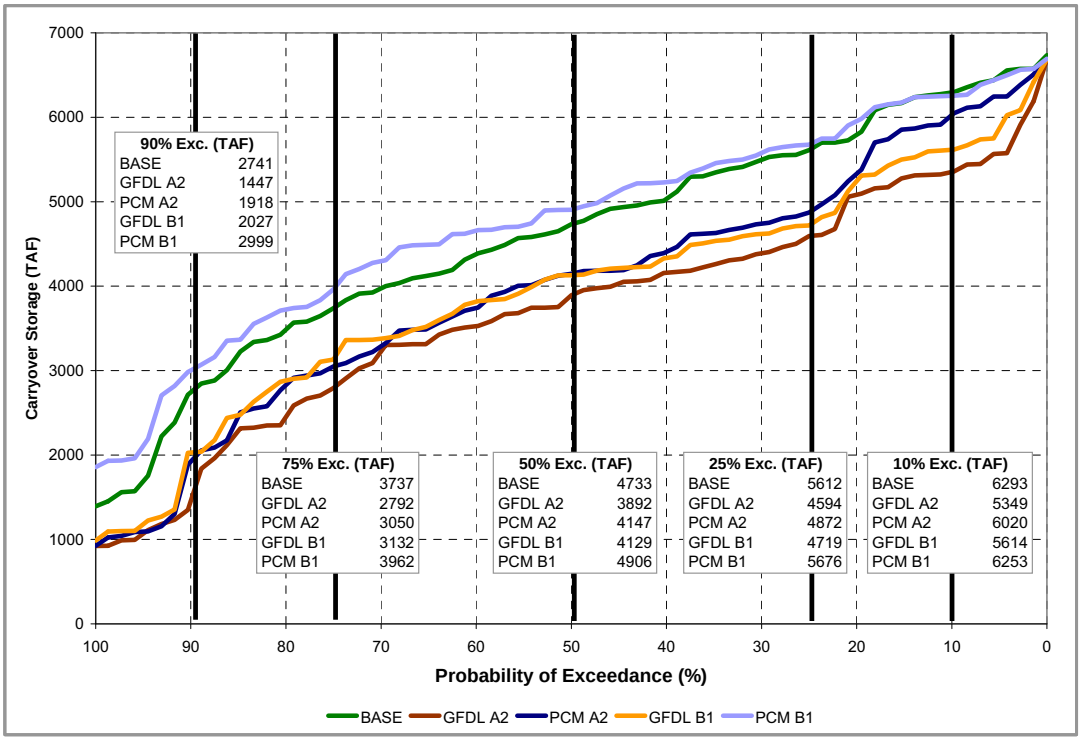

Figure 4.9 Exceedance Probability Plot of CVP Carryover Storage

Table 4.17 shows the annual average CVP north-of-Delta (NOD) deliveries were not as significantly affected by climate change as the CVP SOD deliveries. Base and GFDL A2 annual average CVP NOD deliveries were 2,251 and 2,181 TAF respectively. This equals a 3.1 percent reduction. In contrast, GFDL A2 CVP SOD deliveries were reduced 10.3 percent. There were some significant changes in CVP NOD deliveries during the dry periods. For instance, as shown in Table 4.17, Base and GFDL A2 annual average CVP NOD deliveries during the 1929-1934 drought were 1,940 TAF and 1,742 TAF respectively – a decrease of 10.2 percent. However, this decrease was less of a result of lowered allocations as it was of the critical shortages at Shasta and Folsom. When these reservoirs were drawn down to dead storage during the drought, settlement contractors and refuges were shorted their promised supply. These shortages are reflected in the annual average deliveries presented in Table 4.17.

Table 4.17 CVP North-of-Delta contractor deliveries (TAF)

	Average	*Single dry year 1977*	*2-year drought 1976-1977*	*4-year drought 1931-1934*	*6-year drought 1987-1992*	*6-year drought 1929-1934*
BASE	2251	1847	2076	1815	2061	1940
GFDL A2	2181	1803	2026	1551	1937	1742
PCM A2	2204	1798	2040	1572	1999	1759
GFDL B1	2204	1823	2048	1669	2024	1823
PCM B1	2265	1847	2073	1849	2089	1967

Why were CVP NOD deliveries not as affected by climate change as CVP SOD deliveries? The reason is that different classes of water contracts have different allocation rules. Over 80 percent of CVP NOD deliveries were for settlement contracts or refuges, and delivery allocations for these water users were independent of available storage. NOD settlement contractors and refuges receive 100 percent of contract demand in all years except Shasta critical years; in these years, 75 percent of contract demand is met. (Shasta critical years are defined as years in which Shasta natural inflow totaled less than 3.2 million acre-feet, or as years where the two year total Shasta natural inflow was less than 7.2 million acre-feet and the previous years natural inflow was less than 4 million acre-feet.) SOD exchange contracts and refuges are allocated water in the same way, but these water users represent only around 34 percent of SOD demand. In the Base scenario, nine of the 73 years were Shasta critical. From analysis of Shasta inflow, drier scenarios GFDL A2 and GFDL B1 have exactly the same distribution of Shasta critical years as the Base, drier scenario PCM A2 would add only a single Shasta critical year, and wetter scenario PCM B1 would reduce the number of Shasta critical years by three. For purposes of this study, though, it was assumed that the distribution of Shasta critical years in each climate change scenario remained unchanged from the Base. In the years this assumption was false – one in PCM A2, three in PCM B1 – only small changes in Shasta inflow would be required for the exact definition of Shasta critical to be met. Therefore, the assumption is reasonable. With no change in the number or order of Shasta critical years, water allocations for 80 percent of CVP NOD deliveries and 34 percent of CVP SOD deliveries were the same for the Base and climate scenarios. On the other hand, 66 percent of CVP SOD deliveries and only 20 percent of CVP NOD deliveries were exposed to allocation cuts due to climate change effects on available storage. Thus, total CVP SOD deliveries were more exposed to the negative effects of climate change than CVP NOD deliveries.

Figure 4.10 shows the CVP NOD delivery capability curves for all five scenarios. Capability of these deliveries in the climate change scenarios closely tracked that of the Base in the 0 percent

to 90 percent exceedance probability range. No critical shortages occurred in the years that fall in this range. Given that settlement contract and refuge deliveries were equal in all five scenarios during these years and that these types of deliveries make up more than 80 percent of the total, the fact that the capability curves for CVP NOD deliveries track so closely is expected. In the 0 percent to 90 percent exceedance probability range, GFDL A2, PCM A2, and GFDL B1 have slightly lower deliveries than the Base or PCM B1. This is due to the less than 20 percent of deliveries that are subject to allocation decisions based on available storage. The divergence of the capability curves in the 90 percent to 100 percent exceedance probability range reflects the years of shortage. GFDL A2 shorted settlement contractors and refuges the most. The Base and PCM B1 scenarios continue to track closely in the 90 percent to 100 percent range because neither experienced extreme shortages.

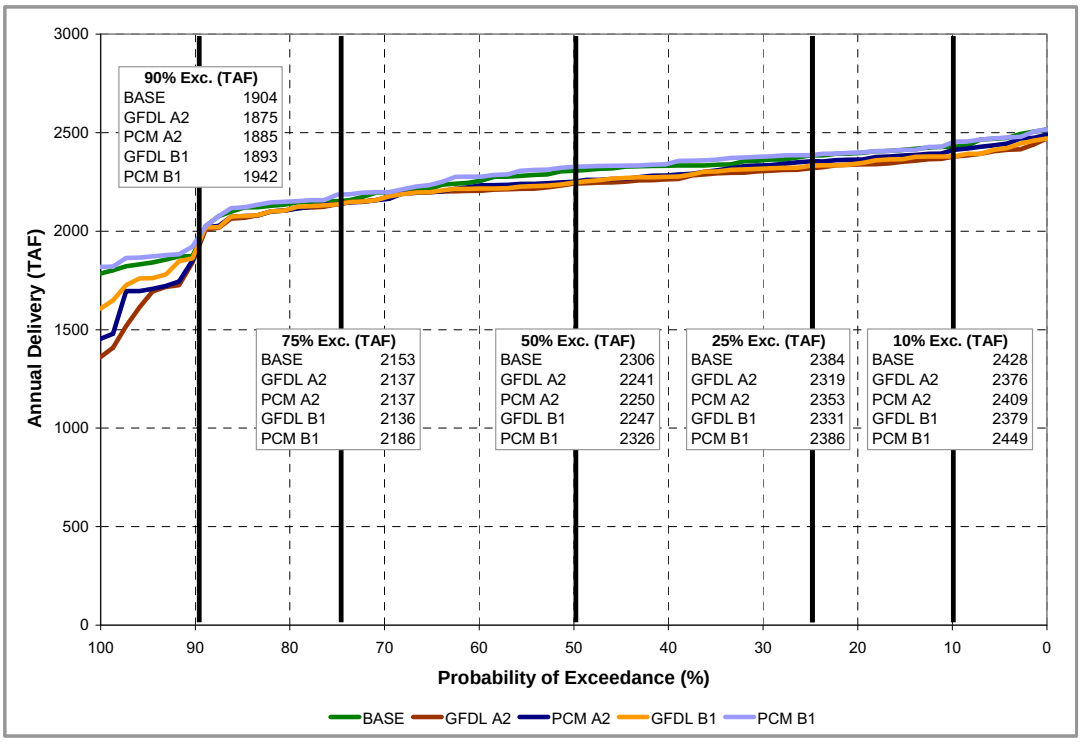

Figure 4.10 Exceedance Probability Plot of CVP North-of-Delta Deliveries

As shown in the above delivery and storage analysis, SWP Table A deliveries and CVP SOD deliveries were negatively affected by the drier climate change scenarios – GFDL A2, PCM A2, and GFDL B1. Carryover was also reduced in these scenarios. With less annual average runoff and a shift in seasonal flows, both projects were less effective capturing, storing, and delivering water. The wetter scenario, PCM B1, had an opposite effect despite the seasonal shift in runoff. During droughts, the additional water was readily captured and delivered with available storage and export capacity. Obviously, the likelihood of a wetter or drier climate will be an important consideration in climate change planning studies. In this case, PCM B1 is the outlier. Does this mean the wetter scenario is less probable than a drier scenario? That is a question that must be addressed.

4.6.3 North-of-Delta Operations Analysis

The purpose of this section is to discuss the interaction between some basic North-of-Delta operational constraints, the climate changed runoff, and impacts to water supply. The constraints of focus are flood control storage and minimum in-stream flow (MIF) requirements. Maintaining flood pool storage in reservoirs during the winter months reduces water supply capacity. Therefore, flood control operations could limit the projects' ability to capture the increased reservoir inflow due to climate change. On the other hand, MIF requirements draw water from NOD storage during extended dry periods. This can lead to a NOD-SOD storage imbalance which adds to the risk of critical NOD shortages like those that occurred in scenarios GFDL A1, PCM A1, and GFDL B1.

Figure 4.11, Figure 4.12, and Figure 4.13 show the monthly frequency that flood pool capacity limited the capture of water for long-term storage in Shasta, Oroville, and Folsom reservoirs respectively. In these frequency plots, flood control included instances that flood pool capacity is zero and the reservoirs were full -- typically in late spring and early summer. It also included late summer and early fall releases to initially free up flood pool capacity. The flood control frequency plots have nothing to do with flooding downstream; they simply show the probability that water was released from a reservoir to preserve flood pool capacity or overtopping of the reservoir in the case that the reservoir was full.

The climate change scenarios, as compared to the Base, increased inflows to Shasta, Oroville and Folsom over the December to March flood season. Shasta and Oroville reserve most of their capacity for water supply, while Folsom's primary function is flood control. It is expected that flood control frequency of Folsom will be greater than that of Shasta or Oroville. As shown in Figure 4.11, Shasta was at flood control capacity less than 40 percent of the time in December and January in all scenarios; therefore, Shasta had a better than 60 percent chance of being able to capture the additional flows in these months. In February, Shasta storage was limited by flood pool less than 45 percent of the time in the five scenarios. While in March, the presence of the flood pool becomes more significant in the GFDL B1 and PCM B1 scenarios with an approximately 50 percent control frequency. Scenarios Base, GFDL A2, and PCM A2 have a Shasta flood control frequency of around 40 percent in March.

Figure 4.12 shows that Oroville is likely to have available capacity to capture increased inflows in December, January, and February in all four climate change scenarios. Only in March does the flood control frequency of Oroville rise above 50 percent for three of the climate change scenarios; at 63 percent flood control frequency, Oroville was least effective capturing the PCM B1 increased inflows in March.

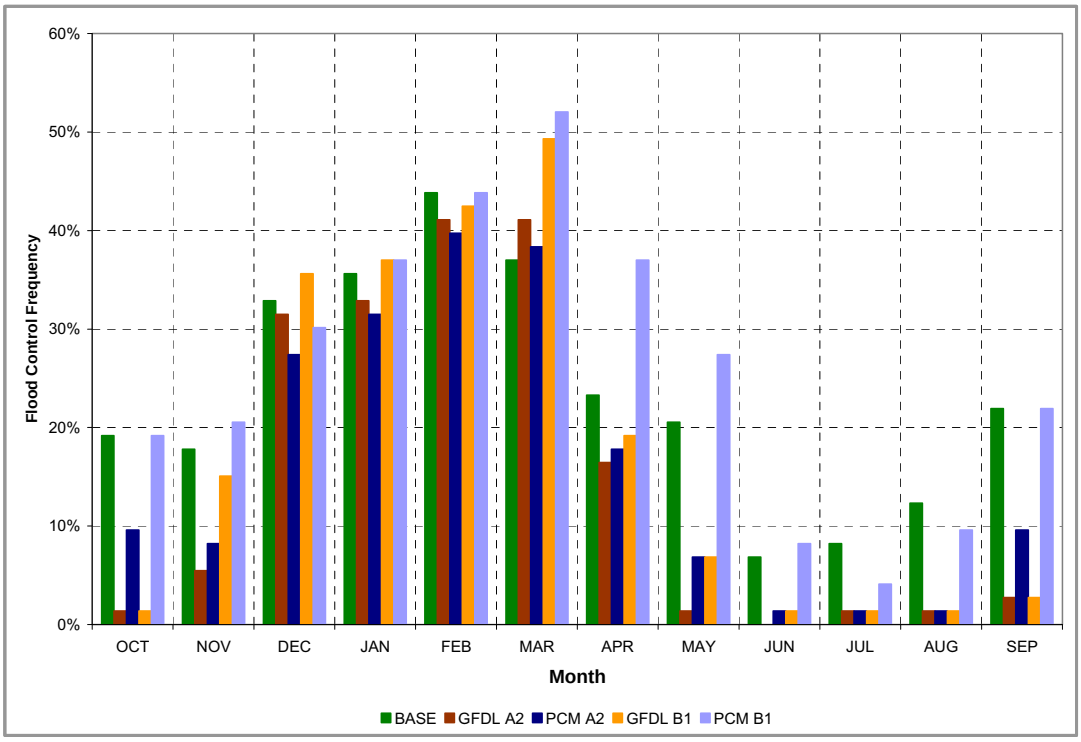

Figure 4.11 Monthly flood control frequency of Lake Shasta

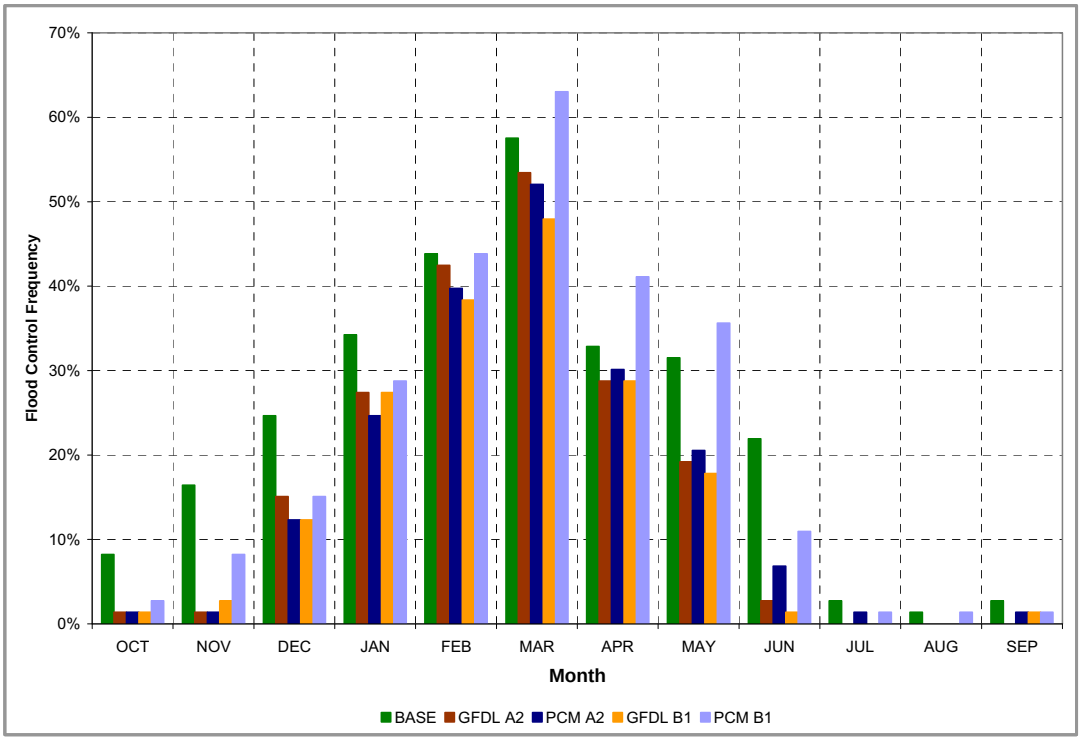

Figure 4.12 Monthly flood control frequency of Lake Oroville

Folsom was the least able of the three reservoirs to capture increased winter inflows. Figure 4.13 shows that in January, February, and March, the Folsom flood control frequency approached or surpassed 70 percent in the four climate change scenarios. PCM B1 reaches nearly 80 percent in February and March. The analysis assumes that flood pool operations will remain consistent with historical rules. However, with increased winter runoff, demands for greater flood protection may further encroach on water supply storage.

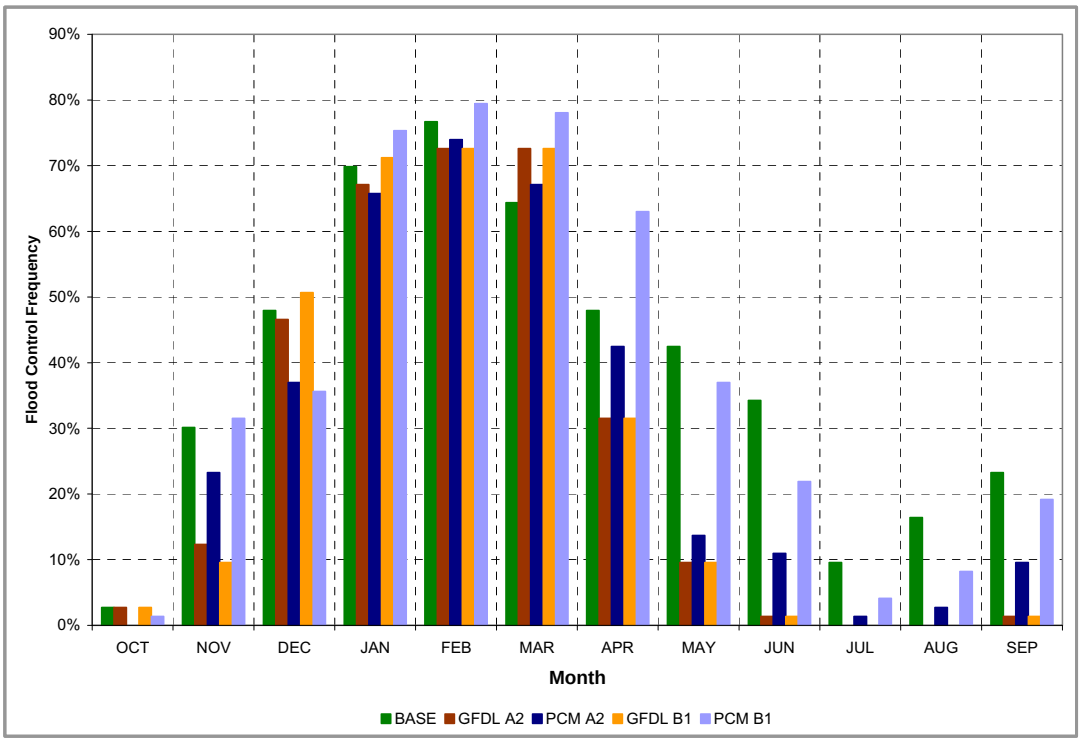

Figure 4.13 Monthly flood control frequency of Folsom Lake

While flood control operations may prevent the capture of increased winter runoff, MIF requirements downstream of the reservoirs will draw down NOD storage when reservoir inflows are low. Figure 4.14, Figure 4.15, and Figure 4.16 show the dry-period frequency that Shasta, Oroville, and Folsom releases are controlled by MIF requirements on the Sacramento, Feather, and American rivers respectively. Each river has 2 to 3 MIF requirements at different locations. When flow is reduced to one of the MIF requirements, reservoir releases on that river have reached a minimum and the MIF requirement is effectively controlling operations.

The reason the control frequency plots for MIF requirements focus on the dry periods – 1924, 1929-1934, 1976-1977, and 1987-1992 – is that those are the periods where there are critical shortages in Shasta and Folsom in the GFDL A2, PCM A2, and GFDL B1 scenarios. Figure 4.14 and Figure 4.16 show that MIF requirements are largely responsible for draining these reservoirs during the dry periods. Of course, there are downstream Delta requirements that are being met by these releases also. One can conclude that changes in SOD delivery allocations during the dry periods will not likely alleviate all of the Shasta and Folsom shortages. The water will have to be released during these years whether it's going South-of-Delta or not. The only way to prevent the shortages with changes in allocation rules is to reduce deliveries in the wet years preceding a drought in hopes of enough carryover storage to get the project through.

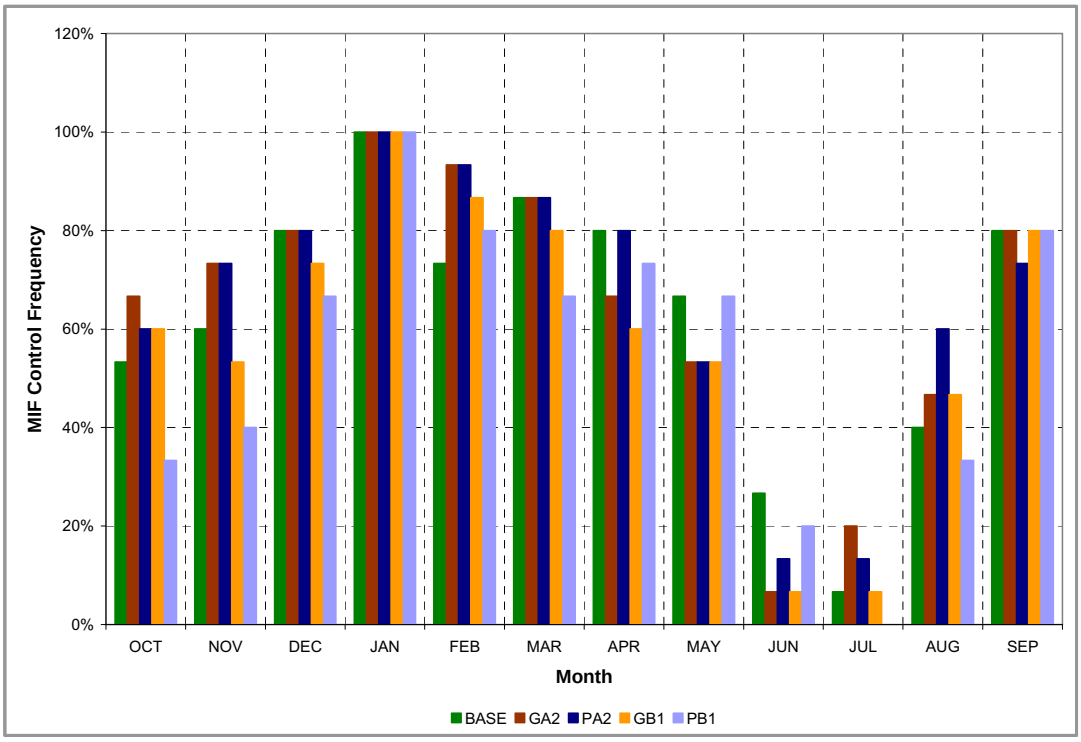

Figure 4.14 MIF requirement control frequency on the Sacramento River during dry periods (1924, 1929-1934, 1976-1977, 1987-1992)

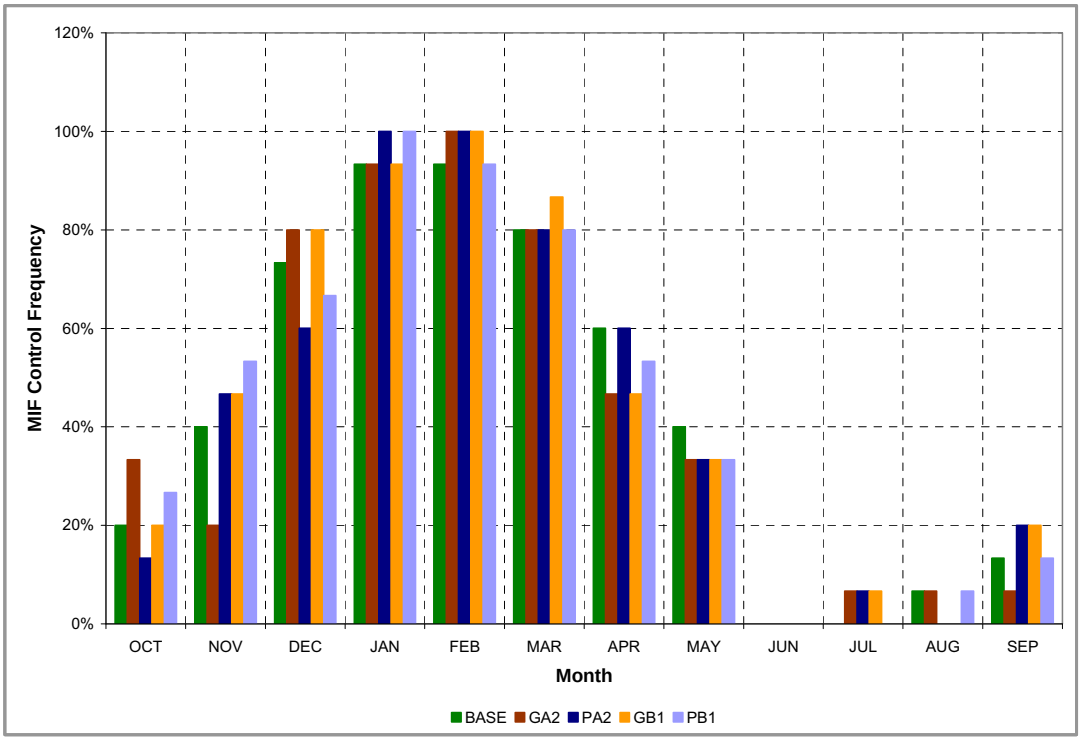

Figure 4.15 MIF requirement control frequency on the Feather River during dry periods (1924, 1929-1934, 1976-1977, 1987-1992)

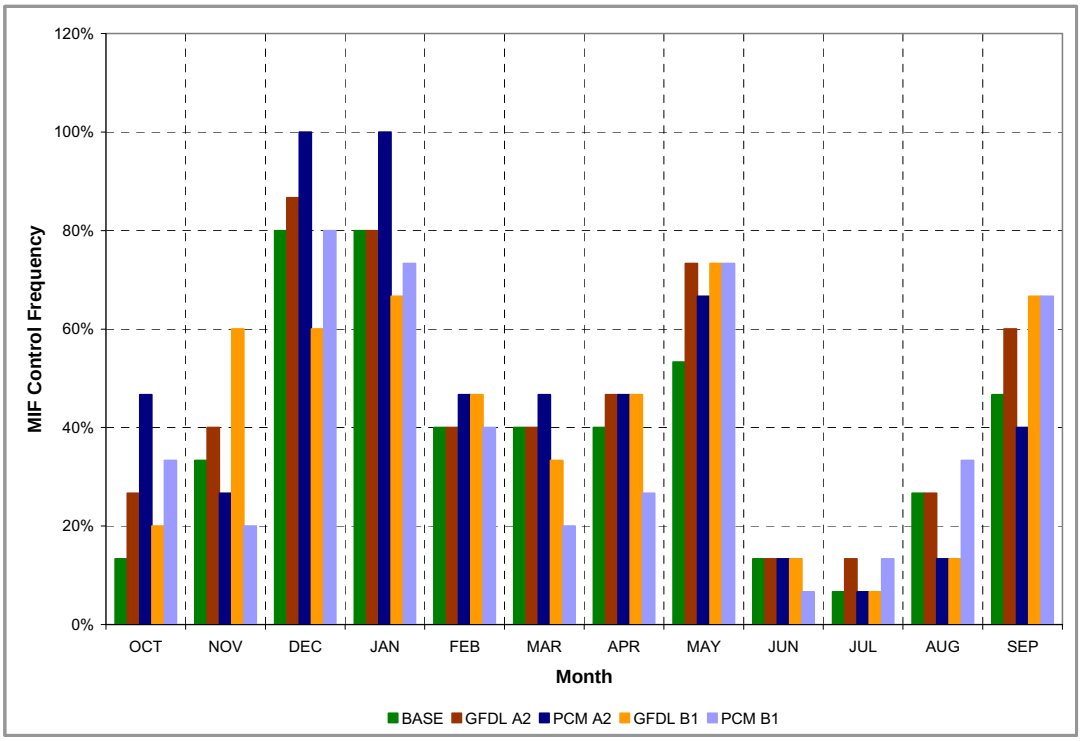

Figure 4.16 MIF requirement control frequency on the American River during dry periods (1924, 1929-1934, 1976-1977, 1987-1992)

4.6.4 Delta Operations Analysis

The CVP and SWP have three mechanisms to operate, or control, the Sacramento-San Joaquin Delta – NOD reservoir releases to the Sacramento River, the Delta Cross Channel, and Tracy and Banks exports. NOD storage releases can be increased to meet Delta outflow requirements, improve water quality, or increase exports. The Delta Cross Channel gates are opened during certain periods of the year to reduce salinity in the Delta interior with water from the Sacramento River and closed for certain periods of the year to prevent migrating fish from getting lost in the interior. Exports can be reduced to protect water quality, fish, or to maintain Delta outflow requirements or increased to capture available surplus water that would otherwise flow out to the San Francisco Bay. Delta locations of the Sacramento River inflow, Cross Channel, and the Banks and Tracy pumping plants are shown in Figure 4.17.

Operation of the Delta Cross Channel gates is largely pre-processed in CalSim-II. The only dynamic decision in the model with respect to the gates is to keep them closed when Delta inflow on the Sacramento River exceeds 25,000 cubic feet per second. While this is a frequent condition, it does not cause many differences in Delta Cross Channel gate operations when comparing the Base and climate change scenarios. There are occasions when the gates are closed in one scenario and open in another, but this is an infrequent occurrence.

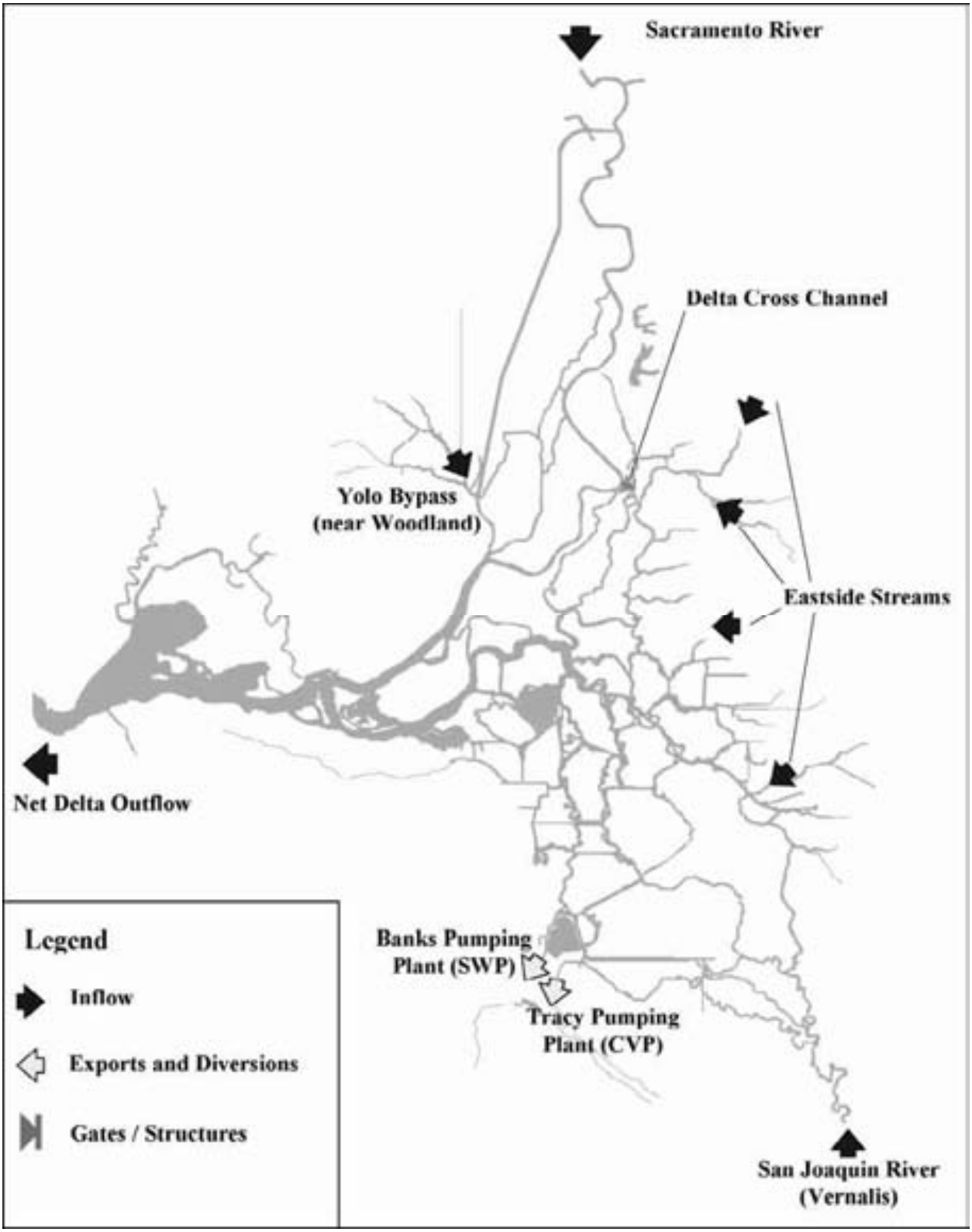

Figure 4.17 Map of the Sacramento – San Joaquin Delta

Annual average changes in Delta inflow are listed in Table 4.18. Total Delta inflow includes the Sacramento River, Yolo Bypass, Eastside streams, San Joaquin River (SJR), and Marsh Creek. Inflow from the Eastside streams and Marsh Creek do not change from the Base to the climate change scenarios. Changes in inflow are centered on the San Joaquin River, Sacramento River, and Yolo Bypass.

Table 4.18 Annual Average Delta Inflow (WY1922-1994)

Study	San Joaquin River			Sacramento River and Yolo Bypass			Total Delta Inflow		
	Annual Average Inflow (TAF)	Change from Base (TAF)	Change from Base (%)	Annual Average Inflow (TAF)	Change from Base (TAF)	Change from Base (%)	Annual Average Inflow (TAF)	Change from Base (TAF)	Change from Base (%)
BASE	2,622	0	0%	17,430	0	0%	20,850	0	0%
GFDL A2	2,508	-114	-4%	16,956	-474	-3%	20,258	-591	-3%
PCM A2	2,542	-81	-3%	16,601	-829	-5%	19,939	-911	-4%
GFDL B1	2,260	-362	-14%	17,018	-412	-2%	20,071	-778	-4%
PCM B1	2,691	69	3%	18,301	870	5%	21,789	939	5%

So far, there has been no discussion of effects in the San Joaquin basin due to the altered reservoir inflows under the climate change scenarios. That will have to wait for another report. However, with respect to Delta operations, it's important to look at the changes in Delta inflow on the San Joaquin River. In the dry months, where SJR Delta inflow is reduced, either exports must be reduced or more NOD storage releases must be made to support Banks and Tracy pumping. Furthermore, Banks permitted pumping capacity is dependent on SJR Delta inflow at Vernalis from December 15 to March 15. During this period, Banks permitted capacity is 6,680 cfs when SJR inflow is at or below 1,000 cfs. One-third of SJR inflow is added to permitted capacity if SJR inflow exceeds 1,000 cfs. Given Banks physical capacity is approximately 8,500 cfs, this permitted capacity condition is significant when SJR monthly inflows are within the range of 60 to 330 TAF per month. Figure 4.18 shows the monthly SJR Delta inflows as averaged over WY1922-1994. From December to March, monthly average inflow falls within this range.

Figure 4.19 shows combined monthly Sacramento River and Yolo Bypass Delta inflows as averaged over WY1922-1994. Average inflows of the climate change scenarios tend to be higher than the base scenario December through March. This is due to increased NOD reservoir inflow in these months when flood control operations were in effect and storage capacity was not available. During the summer and early fall months, Sacramento inflows for scenarios GFDL A2, PCM A2, and GFDL B1 are lower than in the Base. One explanation is that in the Base scenario larger NOD reservoir releases must be made to support the higher exports and SOD deliveries.

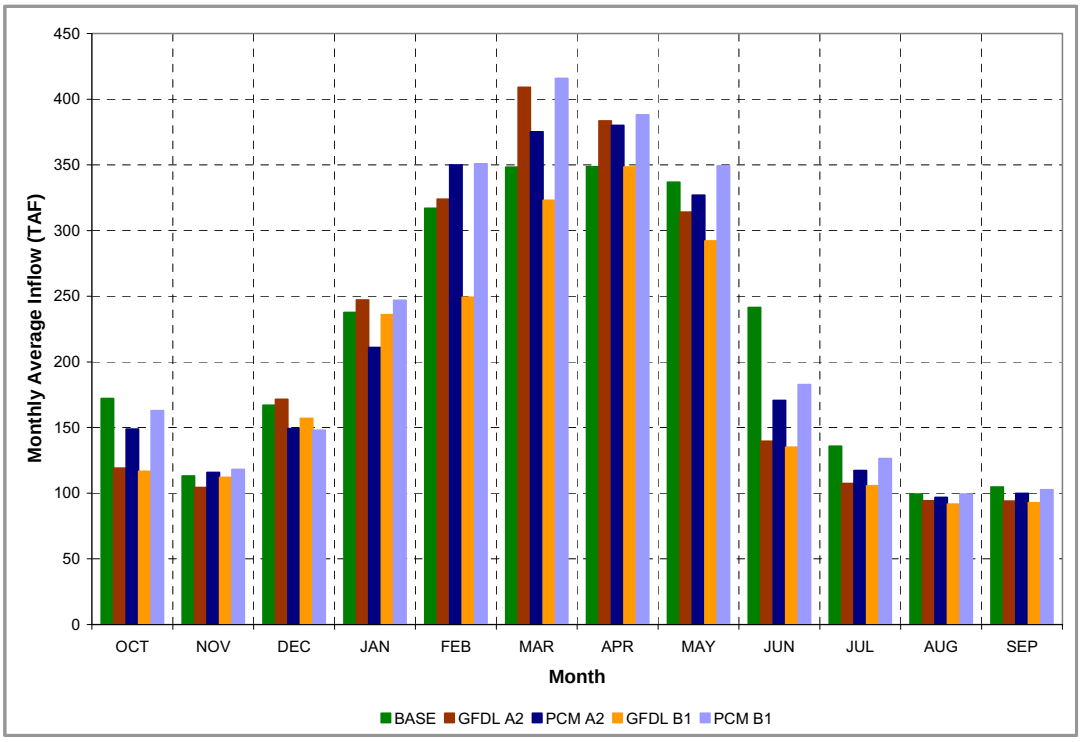

Figure 4.18 Monthly average San Joaquin River Delta inflow at Vernalis (WY1922-1994)

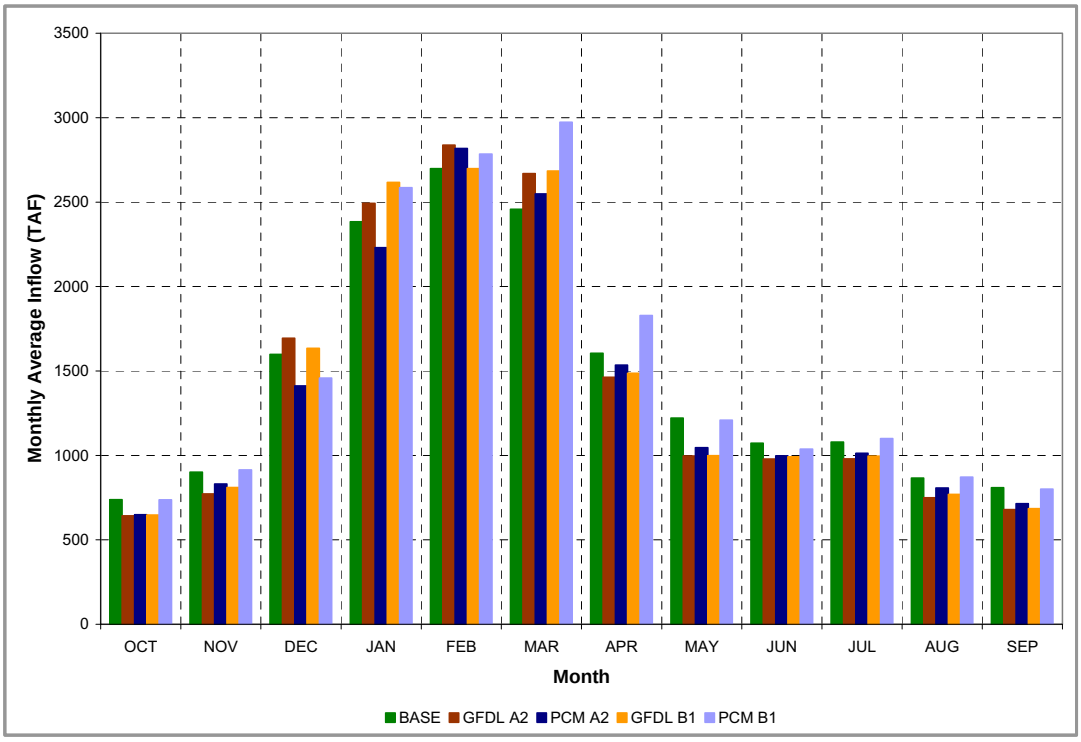

Figure 4.19 Monthly average Sacramento River--Yolo Bypass Delta inflow (WY1922-1994)

Changes in required, surplus, and total Delta outflow, as compared to the Base are listed in Table 4.19. Required Delta outflow is defined in Table 3 of the Water Quality Control Plan (WQCP). It also includes outflow necessary to maintain water quality standards as set in the WQCP. As shown, there are no significant changes in required Delta outflow on an annual average basis. Surplus Delta outflow is where the changes are concentrated. This outflow typically comes in the winter and spring due to rain and snowmelt runoff. In PCM A2, Surplus Delta outflow decreases by 7 percent as compared to the base scenario, while in PCM B1, it increases by 11 percent on average.

Table 4.19 Annual Average Delta Outflow (WY1922 – 1994)

Study	Required Delta Outflow			Surplus Delta Outflow			Total Delta Outflow		
	Annual Average Outflow (TAF)	Change from Base (TAF)	Change from Base (%)	Annual Average Outflow (TAF)	Change from Base (TAF)	Change from Base (%)	Annual Average Outflow (TAF)	Change from Base (TAF)	Change from Base (%)
BASE	5,621	0	0%	8,187	0	0%	13,808	0	0%
GFDL A2	5,627	5	0%	8,170	-18	0%	13,796	-12	0%
PCM A2	5,633	12	0%	7,652	-535	-7%	13,285	-524	-4%
GFDL B1	5,622	1	0%	7,923	-264	-3%	13,546	-263	-2%
PCM B1	5,590	-32	-1%	9,060	872	11%	14,649	841	6%

Figure 4.20 shows monthly Delta outflow as averaged over WY1922-1994. Notice that outflows for the base and climate change scenarios are roughly equivalent on average July-November. As set in Table 3 of the WQCP, required Delta outflow in these months will not change from scenario to scenario. Little surplus would be expected in these months also. The slight increases in base outflows during these months were attributed to maintaining water quality standards with higher exports. This, at times, required higher Delta outflows. In the winter, Delta outflows of the climate change scenarios tended to be higher than those of the base. Given higher Delta inflows during this period and limited pumping capacity, this pattern was expected.

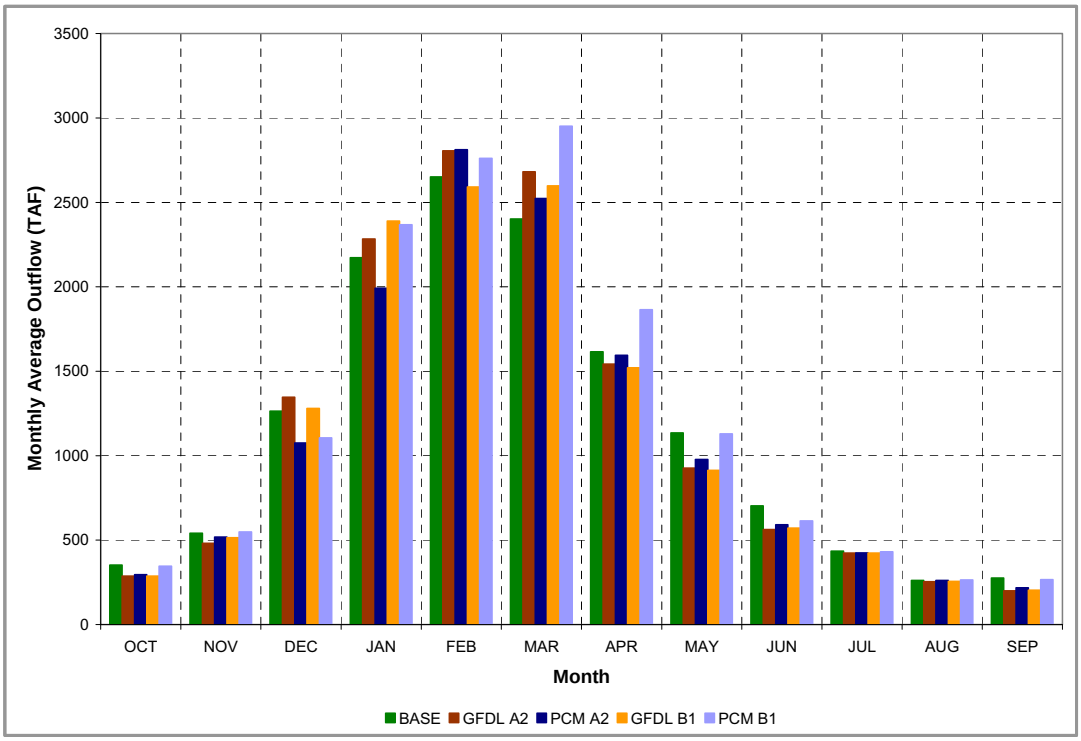

Figure 4.20 Monthly average Delta outflow (WY1922-1994)

Previously, it was shown that the combined SWP and CVP SOD deliveries in the drier climate change scenarios were consistently less than the base scenario. It was expected that SOD exports would decrease also. Table 4.20 lists annual average exports and calculates changes with respect to the base. Total exports in GFDL A2, PCM A2, and GFDL B1 decrease by 10 percent, 6 percent, and 9 percent respectively. Overall, SOD deliveries were increased for the SWP and CVP in scenario PCM B1. A corresponding 2 percent increase in total exports is shown in Table 4.20.

Table 4.20 Annual Average Delta Exports

Study	Tracy Exports			Banks Exports			Total Exports		
	Annual Average Exports (TAF)	Change from Base (TAF)	Change from Base (%)	Annual Average Exports (TAF)	Change from Base (TAF)	Change from Base (%)	Annual Average Exports (TAF)	Change from Base (TAF)	Change from Base (%)
BASE	2554	0	0%	3351	0	0%	5905	0	0%
GFDL A2	2286	-269	-11%	3046	-305	-9%	5332	-573	-10%
PCM A2	2391	-164	-6%	3131	-220	-7%	5522	-383	-6%
GFDL B1	2369	-186	-7%	3027	-324	-10%	5395	-510	-9%
PCM B1	2620	66	3%	3383	33	1%	6004	98	2%

Figure 4.21 shows monthly total Delta exports as averaged over WY1922-1994. During the winter, average exports were not significantly changed from the base to the climate change scenarios. Even with the added Delta inflow of the climate change scenarios during the wet months, exports at Tracy and Banks were unable to capture most of it because of a combination of permitted pumping capacity, physical pumping capacity, SOD conveyance constraints, and the export to inflow ratio of the WQCP. Base and PCM B1 exports were significantly higher in the summer and fall months as compared to the drier climate change scenarios. The higher exports were to support the higher delivery allocations in the Base and PCM B1 scenarios.

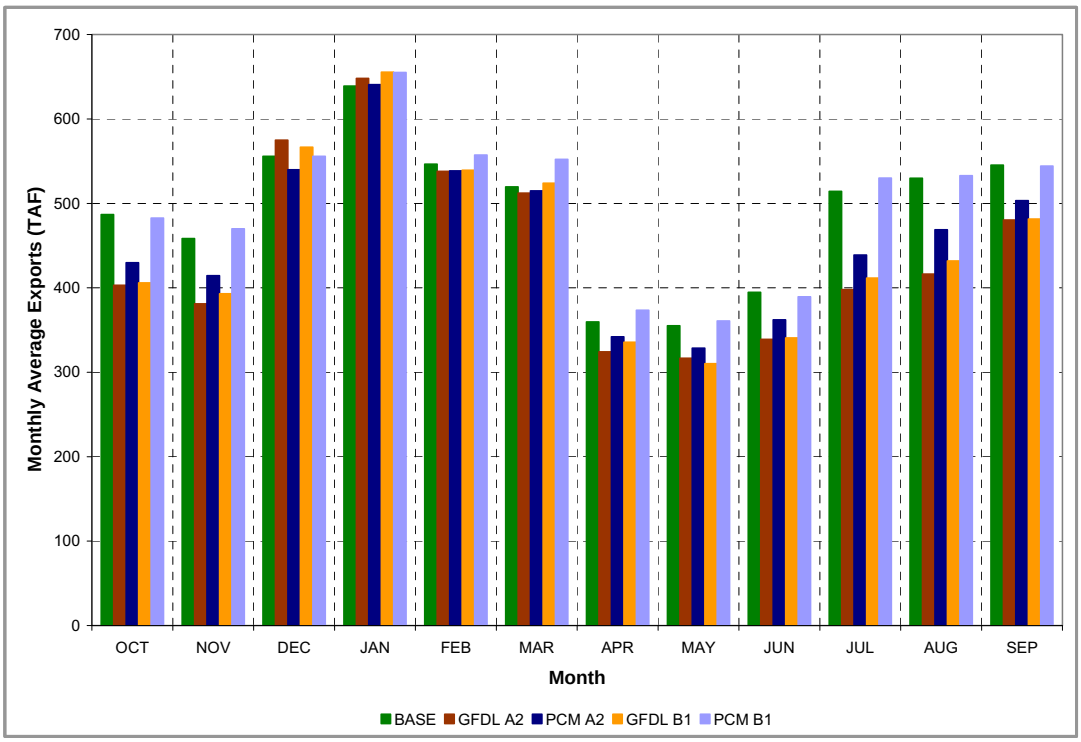

Figure 4.21 Monthly average total Delta exports (WY1922-1994)

There are a number of system constraints, physical and regulatory, that inhibit SWP and CVP Delta exports to SOD contractors. They include:

1) Permitted and physical pumping capacity
2) SOD conveyance capacity including storage capacity, channel and pumping capacity, and contractor demand
3) April-May SJR pulse flow limits on exports (April 15-May15)
4) WQCP water quality standard limits on exports as calculated using ANN
5) WQCP export-inflow ratio

The frequency that these export constraints control exports was quantified for the Base and climate change scenarios. For Banks, the frequency that permitted or physical pumping capacity was reached on a monthly basis is shown in Figure 4.22. This constraint is most significant in

January when surplus Delta outflow was likely. Figure 4.23 shows that SOD conveyance constraints are most likely to constrain exports in March. The April-May pulse flow export limits were applied from April 15 to May 15. Since the simulation time-step is one month, the simulated constraint was actually a day-weighted average of the pulse flow constraint and permitted capacity. As shown in Figure 4.24, the simulated April-May export constraint controlled Banks pumping about 90 percent of the time in these two months in all scenarios. Figure 4.25 shows the frequency that exports are constrained in each simulation by the various WQCP water quality standards; while frequency of water quality constraints varies significantly from month to month and scenario to scenario, November is the month where water quality was most likely to control Banks exports in all five simulations. The frequency that the export-inflow ratio controls Banks is shown in Figure 4.26

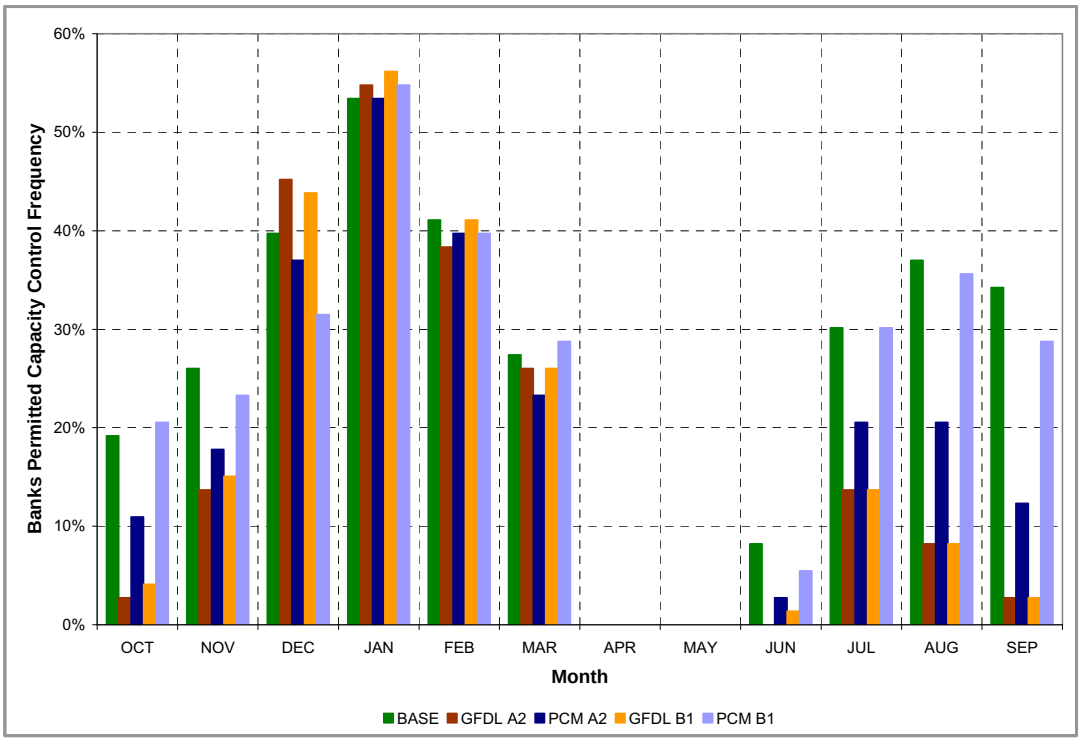

Figure 4.22 Operational control frequency of Banks permitted capacity

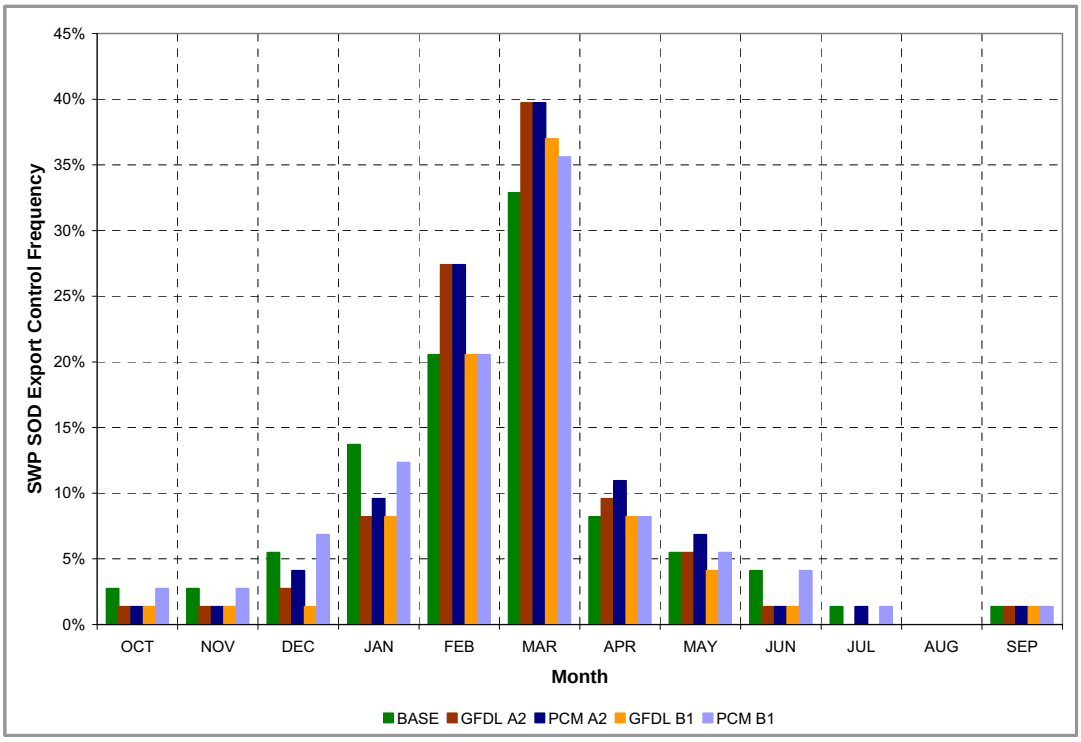

Figure 4.23 Operational control frequency of SWP SOD conveyance capacity on Banks exports

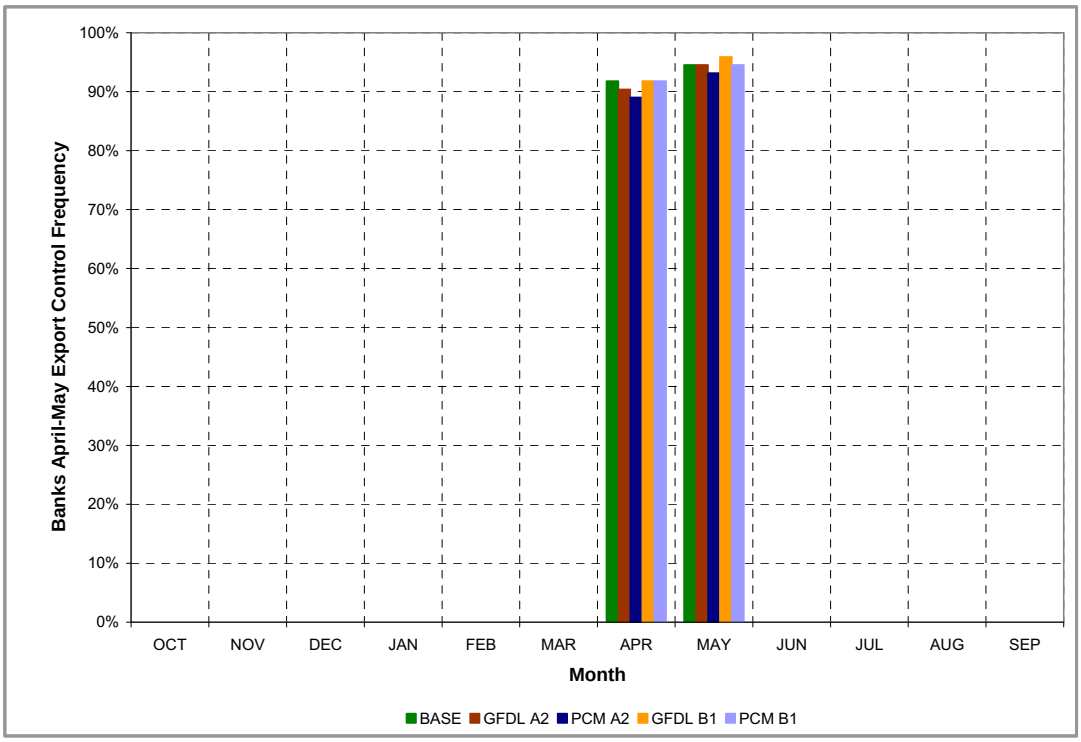

Figure 4.24 Operational control frequency of the April-May San Joaquin River pulse flow export constraints on Banks pumping

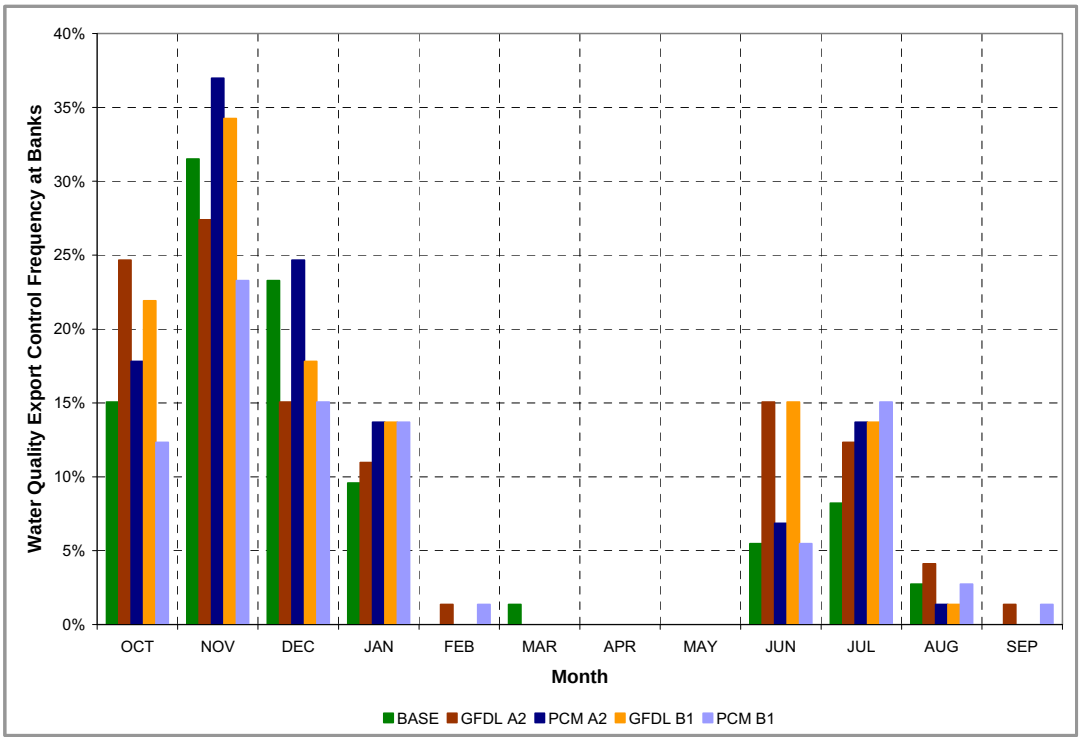

Figure 4.25 Operational control frequency of Delta water quality standards on Banks pumping

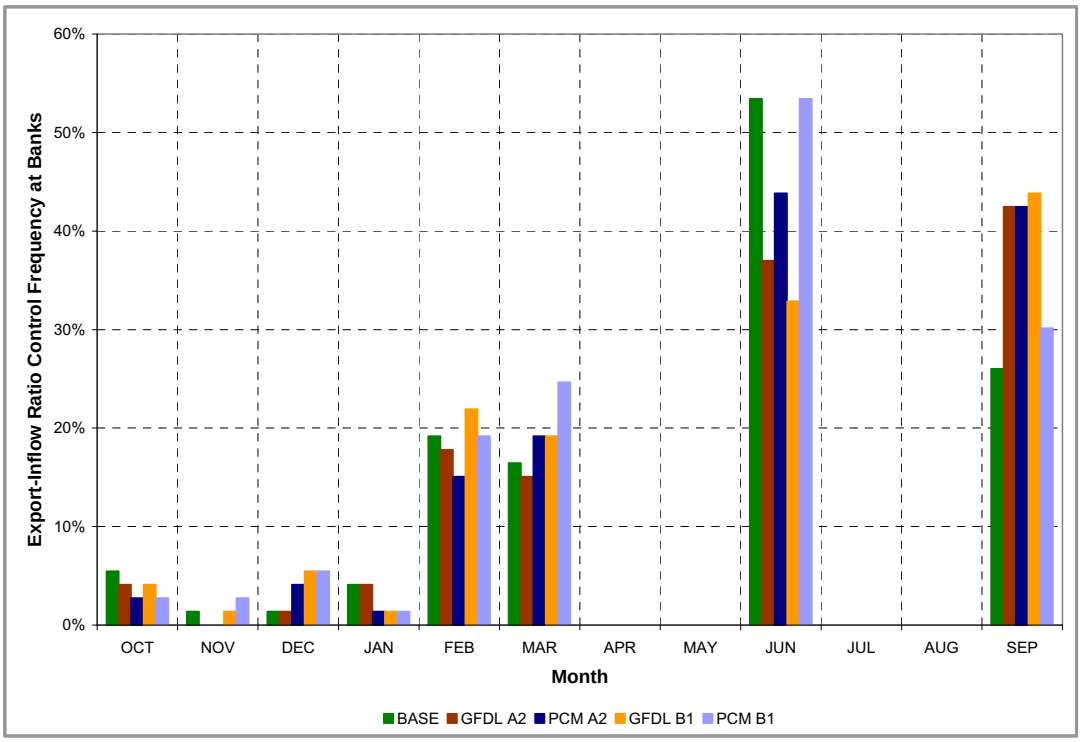

Figure 4.26 Operational control frequency of Banks pumping by the export-inflow ratio

With increased Delta inflow from December to March in the climate change scenarios, it would be useful, from a water supply standpoint, to capture some of the surplus Delta outflow. From the operational control frequency information contained in Figure 4.22 to Figure 4.26, the key constraint in this period was Banks permitted and physical capacity. In March, SWP SOD conveyance often becomes the constraining parameter. This suggests that changes in Banks permitted capacity and SWP SOD conveyance capacity – surface storage, canals, pumps, groundwater banking – should be tested for its potential to compensate for climate change impacts on SOD water supply.

Figure 4.27 shows the frequency that Banks exports are not constrained by physical or permitted capacity, SOD conveyance capacity, April-May export restrictions, water quality, or the export-inflow ratio. In this case, a decision was made to preserve Oroville storage at the expense of San Luis storage. As expected, the least flexibility in Banks pumping is in December-March when it is most needed to capture the additional Delta inflow in the climate change scenarios. Due to decreased exports, there is some unused summer Banks capacity in the drier climate change scenarios as compared to the Base. Would it be helpful to increase San Luis carryover at the expense of Oroville? It is possible that greater available capacity in Oroville would help to capture the increased winter runoff, but no conclusions could be made without further tests. Special Feather River fish criteria from October 15 to November 30 limit Oroville releases for Delta export. So even though there is a high frequency of no export controls in these months, it is likely that Oroville releases could not be made to take advantage. The CVP could take advantage of available Banks capacity for delivery to Cross Valley Canal in the summer and fall. However, given the critical shortages on Shasta and Folsom in the drier climate change scenarios, it is not clear that the CVP would want to release additional water from these reservoirs.

Tracy Pumping Plant has a physical capacity of 4,600 cfs with exports further limited to a range of 4,200 cfs – 4,600 cfs by a constriction on the upper Delta-Mendota canal. Figure 4.28 shows the frequency that the combined physical pumping capacity and upper DMC constraint limit Tracy exports. Sometimes, typically in the winter, there is no place SOD for the CVP to put the water. Figure 4.29 shows the frequency that this occurs. As shown in Figure 4.30, the April-May export constraint regularly limits Tracy exports in these months – just as it did with Banks. However, the April-May constraint does not control Tracy as frequently as Banks because of CVP SOD conveyance limits. Figure 4.31 shows the regularity that the WQCP water quality standards limit Tracy pumping, and Figure 4.32 shows the same information for the export-inflow ratio.

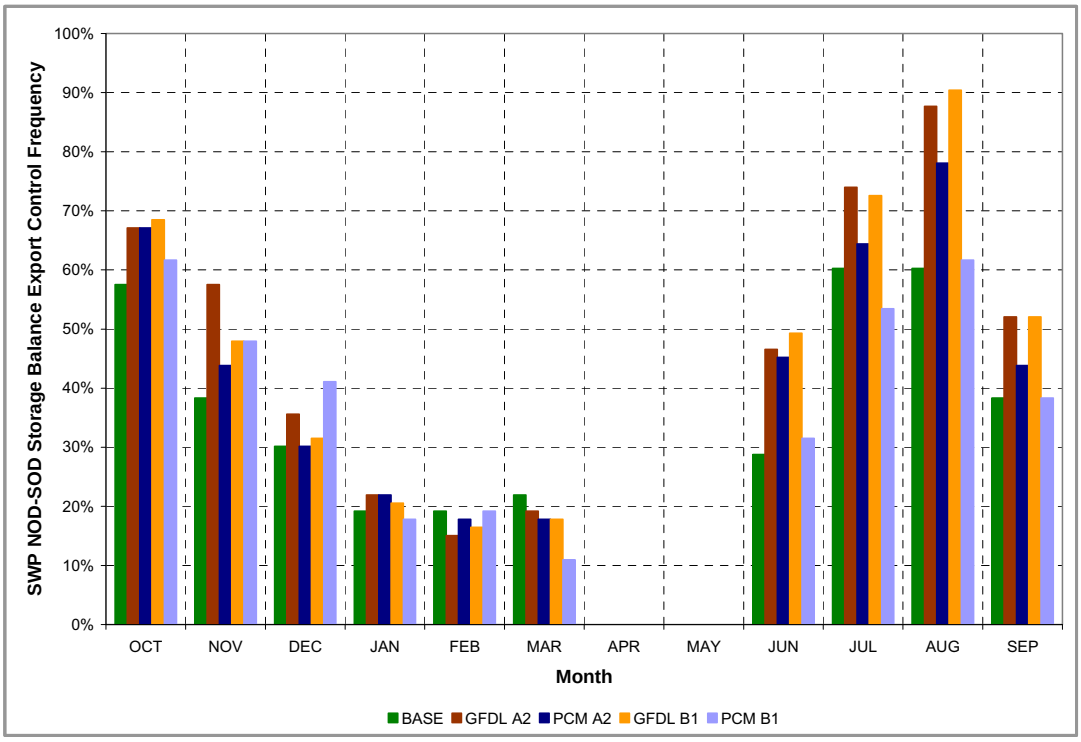

Figure 4.27 Frequency of the decision to favor SWP NOD storage over SWP SOD storage by limiting Oroville releases and Banks pumping

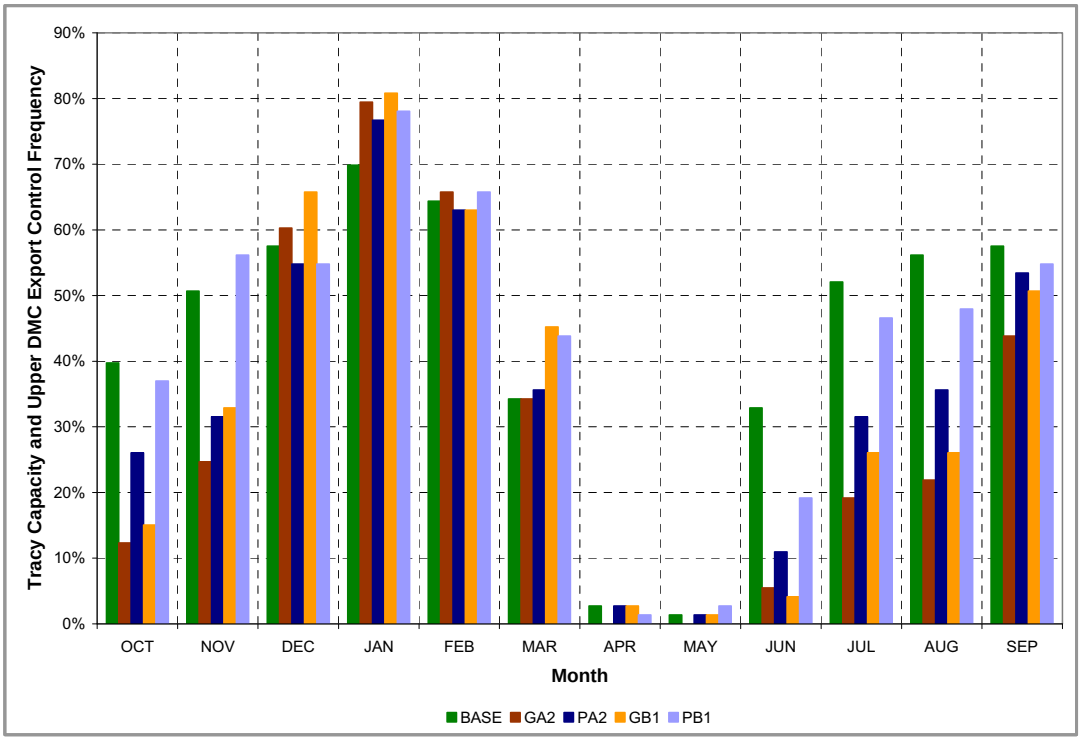

Figure 4.28 Operational control frequency of Tracy pumping capacity and upper Delta-Mendota Canal conveyance capacity

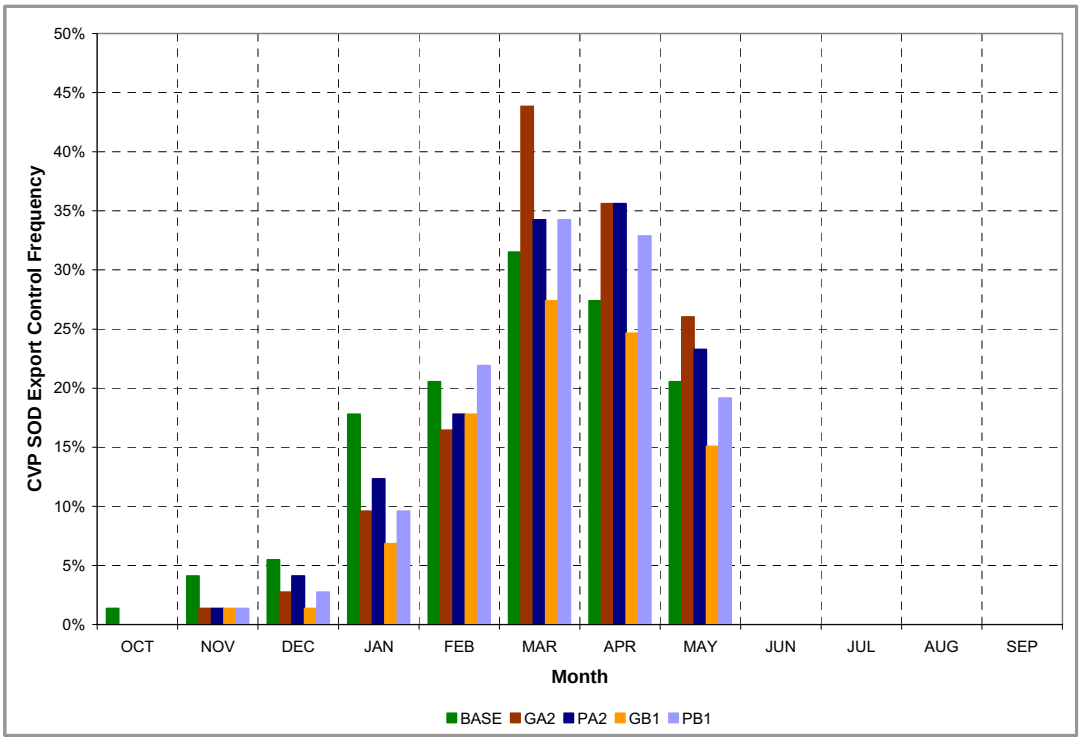

Figure 4.29 Operational control frequency of CVP SOD conveyance capacity on Tracy exports

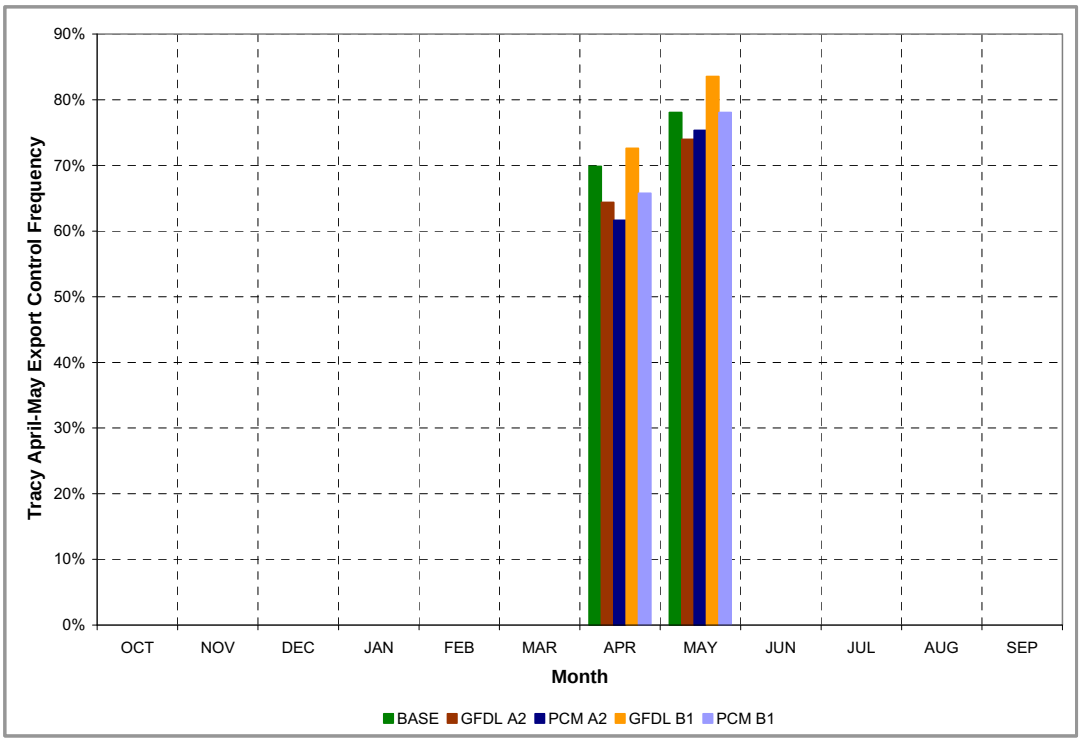

Figure 4.30 Operational control frequency of the April-May San Joaquin River pulse flow export constraints on Tracy pumping

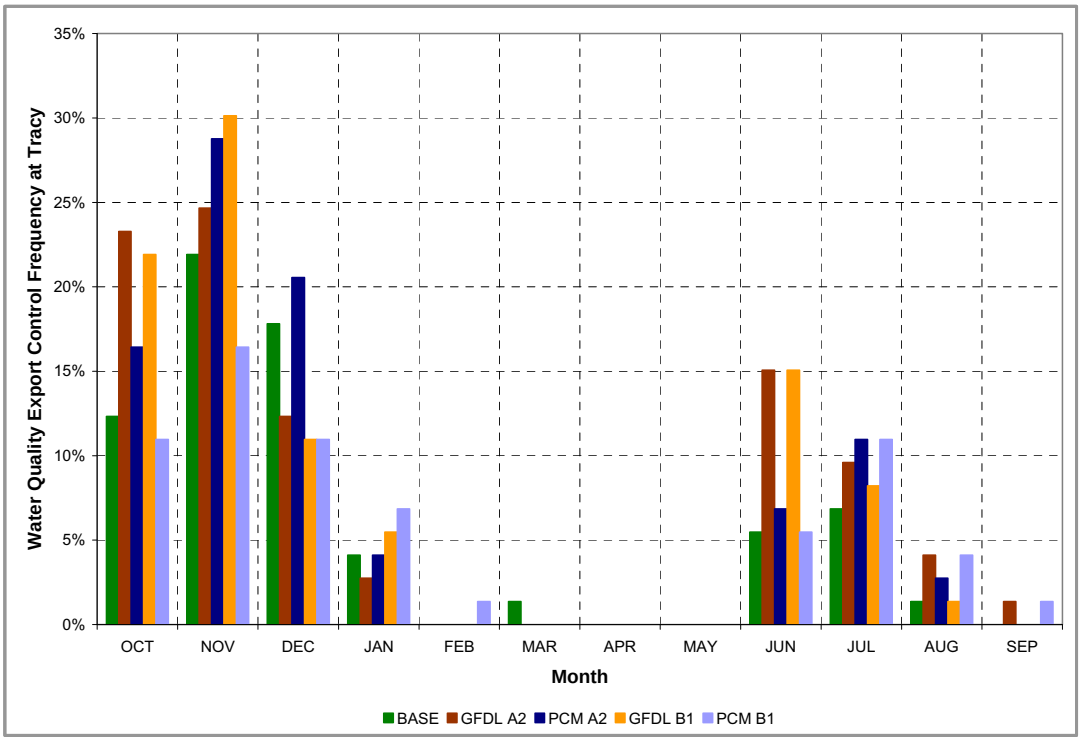

Figure 4.31 Operational control frequency of water quality standards of Tracy pumping

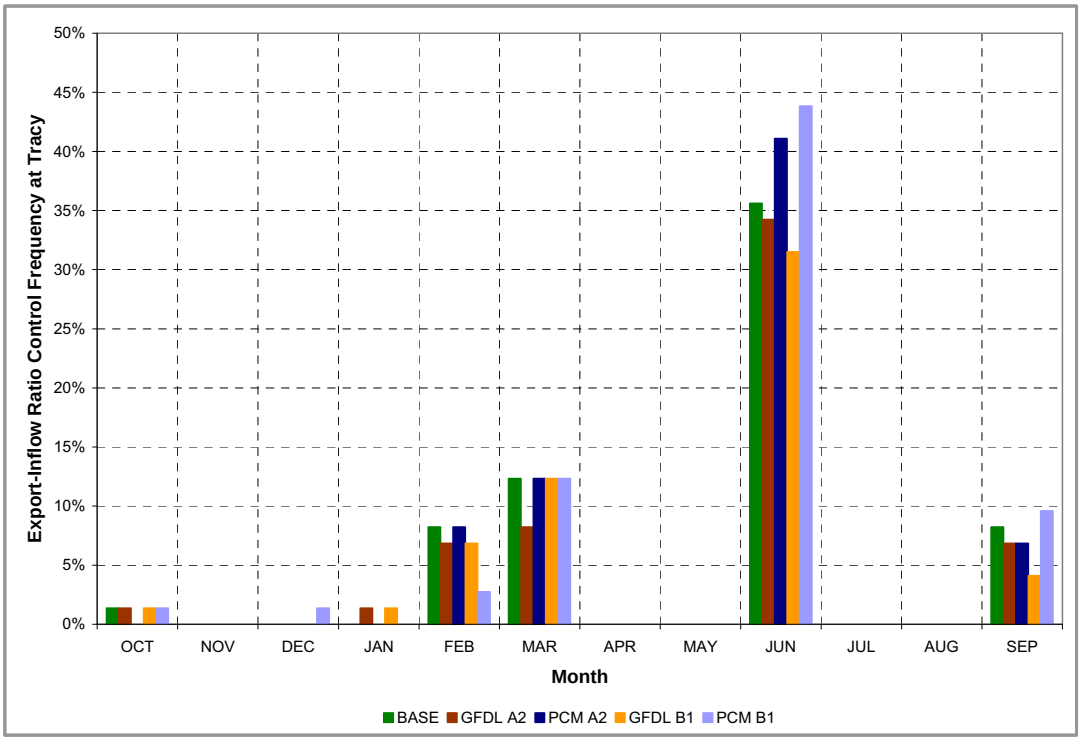

Figure 4.32 Operational control frequency of the export-inflow ratio of Tracy pumping

In the key months of December through March, Tracy exports were most frequently limited by pumping capacity or the upper Delta-Mendota Canal constriction as shown in Figure 4.27. It has been proposed to install an intertie between the Delta-Mendota Canal (DMC) and the California Aqueduct. This would relieve the upper DMC constraint and would be worth more study in the context of climate change.

Figure 4.33 shows the frequency that Tracy Pumping Plant has remaining export capacity -- none of the above mentioned constraints are controlling Tracy exports. Just as with Banks, Tracy is less likely to have available export capacity in the December – March period when it is most needed. In the drier climate change scenarios, there is some flexibility for higher Tracy exports in the summer and fall. However, given the shortages in Shasta and Folsom in these drier scenarios, it is doubtful that higher releases from these reservoirs to support higher exports would be beneficial.

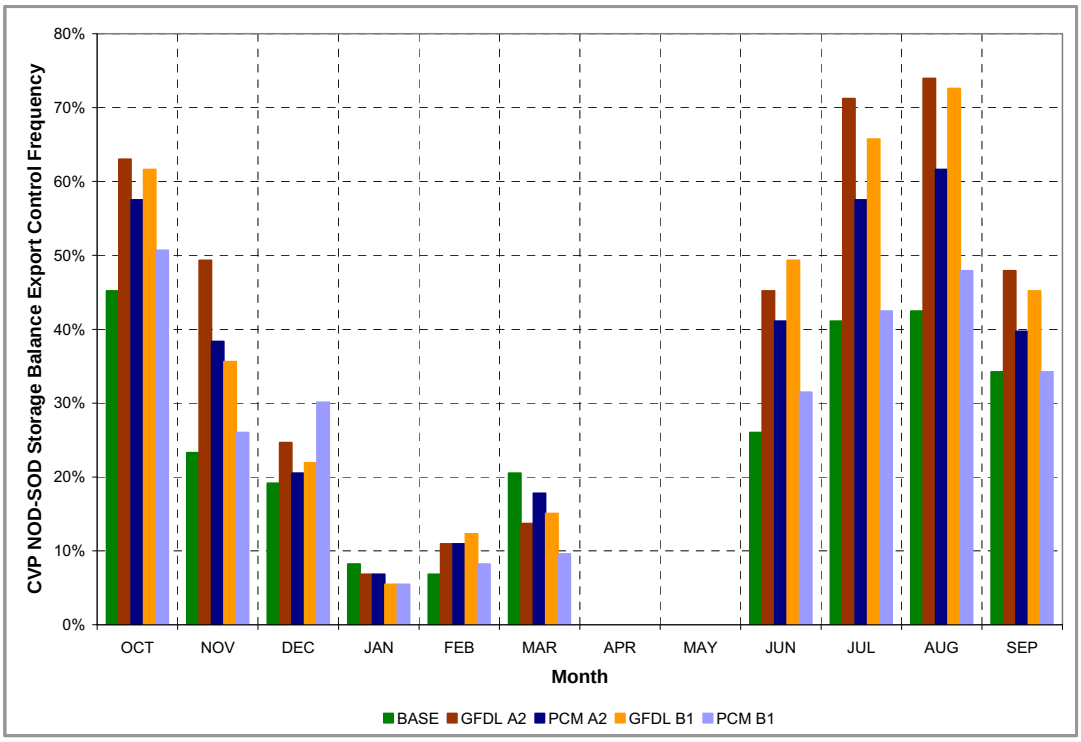

Figure 4.33 Frequency of the decision to favor CVP NOD storage over CVP SOD storage by limiting Shasta and Folsom releases and Tracy pumping

4.6.5 Power Supply

Climate change impacts to CVP and SWP power supply were calculated using Bureau of Reclamation and DWR spreadsheet models. These models estimate monthly power generation using reservoir storage and release data from CalSim-II, and they estimate monthly power loads based on CalSim-II pumping rates. The CVP and SWP facilities included in the power supply analysis are listed in Table 4.21.

Estimates of the average annual SWP power generation and load for each study are compared to the base study in Table 4.22. The summary includes the long-term period of 1922-1993 as well as two six-year droughts. The negative values for net generation indicate that the SWP consumes more power than is generated. For the period 1922-1993, the GFDL A2, PCM A2 and GFDL B1 studies show a decrease in net generation ranging from 7 percent to 11 percent while the PCM B1 study has a smaller decrease of 1 percent. The SWP net power generation effects for the drought of 1929-1934 ranges from a decrease of 11 percent for the PCM A2 study to an increase of 14 percent for the PCM B1 study. For 1987-1992, the GFDL A2, PCM A2 and GFDL B1 studies have a decrease in net generation ranging from 8 percent to 21 percent while the PCM B1 study is only 1 percent less than the base study.

Estimates of the average annual CVP power generation and load for each study are compared to the base study in Table 4.23 for the long-term period of 1922-1994 and the two six-year droughts. For 1922-1994, the GFDL A2, PCM A2 and GFDL B1 studies show a decrease in net generation ranging from 6 percent to 10 percent while the PCM B1 study increases net generation by 6 percent. The CVP net power generation effects for the drought of 1929-1934 ranges from a decrease of 15 percent for the GFDL A2 study to an increase of 7 percent for the PCM B1 study. For 1987-1992, the GFDL A2, PCM A2 and GFDL B1 studies have a decrease in net generation ranging from 3 percent to 12 percent while the PCM B1 study is 8 percent greater than the base study.

Table 4.21 Generation and Load Facilities Included in Power Supply Analysis

SWP Facilities		CVP Facilities	
Generation	Load	Generation	Load
Oroville	Banks	Trinity	Tracy
Thermalito	South Bay	Carr	Banks
Gianelli	Del Valle	Spring Creek	Contra Costa
Alamo	Gianelli	Shasta	O'Neill
Mojave	Dos Amigos	Keswick	San Luis
Devil Canyon	Las Perillas	Folsom	San Felipe
Warne	Badger	Nimbus	Dos Amigos
Castaic	Buena Vista	New Melones	Folsom
	Teerink	San Luis	Corning
	Chrisman	O'Neill	Red Bluff
	Edmonston		San Luis Relift
	Oso		DMC Relift
	Pearblossom		Tehama-Colusa Relift
			Miscellaneous

Table 4.22 Annual Average SWP Power Generation and Load

Calendar year period	Study	Powerplant generation (GWh)	Pumping plant load (GWh)	Net generation (GWh)	Percent change from base
1922-1993	Base	4,840	9,577	-4,737	0%
	GFDL A2	4,552	8,764	-4,212	-11%
	PCM A2	4,576	8,988	-4,412	-7%
	GFDL B1	4,479	8,703	-4,224	-11%
	PCM B1	4,989	9,686	-4,696	-1%
1929-1934	Base	2,666	5,289	-2,623	0%
	GFDL A2	2,577	5,039	-2,462	-6%
	PCM A2	2,453	4,788	-2,335	-11%
	GFDL B1	2,486	4,888	-2,402	-8%
	PCM B1	2,954	5,934	-2,980	14%
1987-1992	Base	2,610	5,386	-2,776	0%
	GFDL A2	2,365	4,561	-2,196	-21%
	PCM A2	2,489	5,057	-2,568	-8%
	GFDL B1	2,368	4,698	-2,330	-16%
	PCM B1	2,721	5,465	-2,745	-1%

Table 4.23 Annual Average CVP Power Generation and Load

Water year period	Study	Powerplant generation (GWh)	Pumping plant load (GWh)	Net generation (GWh)	Percent change from base
1922-1994	Base	4,733	1,313	3,420	0%
	GFDL A2	4,265	1,191	3,074	-10%
	PCM A2	4,310	1,239	3,071	-10%
	GFDL B1	4,440	1,227	3,213	-6%
	PCM B1	4,969	1,355	3,614	6%
1929-1934	Base	2,864	790	2,074	0%
	GFDL A2	2,487	719	1,768	-15%
	PCM A2	2,543	723	1,820	-12%
	GFDL B1	2,641	720	1,922	-7%
	PCM B1	3,077	856	2,221	7%
1987-1992	Base	3,248	840	2,408	0%
	GFDL A2	2,858	736	2,122	-12%
	PCM A2	2,949	743	2,205	-8%
	GFDL B1	3,116	783	2,334	-3%
	PCM B1	3,513	912	2,600	8%

A comparison of monthly average SWP power generation and load and CVP power generation and load are presented in Figure 4.34, Figure 4.35, Figure 4.36 and Figure 4.37, respectively. For the drier scenarios, SWP power generation decreases in all months compared to the Base with the exception of scenario GFDL A2 which has a slight increase in March. The largest decrease occurs in May. For the wetter scenario, PCM B1, SWP power generation increases in February through September and decreases in October through January. The largest increase in SWP power generation occurs in March.

SWP power load decreases in all months for the drier scenarios because of reduced water deliveries. With the wetter scenario, SWP power load increases in all months except January and February.

For the drier scenarios, CVP power generation decreases in all months compared to the Base with the exceptions of scenario GFDL A2 which has a slight increase in March and scenario GFDL B1 which has slight increases in January and March. The largest decreases in CVP power generation occur in September and October when storage impacts are greatest. For the wetter scenario, PCM B1, CVP power generation increases in all months except June and December which have slight decreases. The largest increase in CVP power generation occurs in March.

For the drier scenarios, CVP power load increases slightly in January through March due to higher exports and decreases in other months due to reduced deliveries. With the wetter scenario, there are slight increases in CVP power load in all months except October.

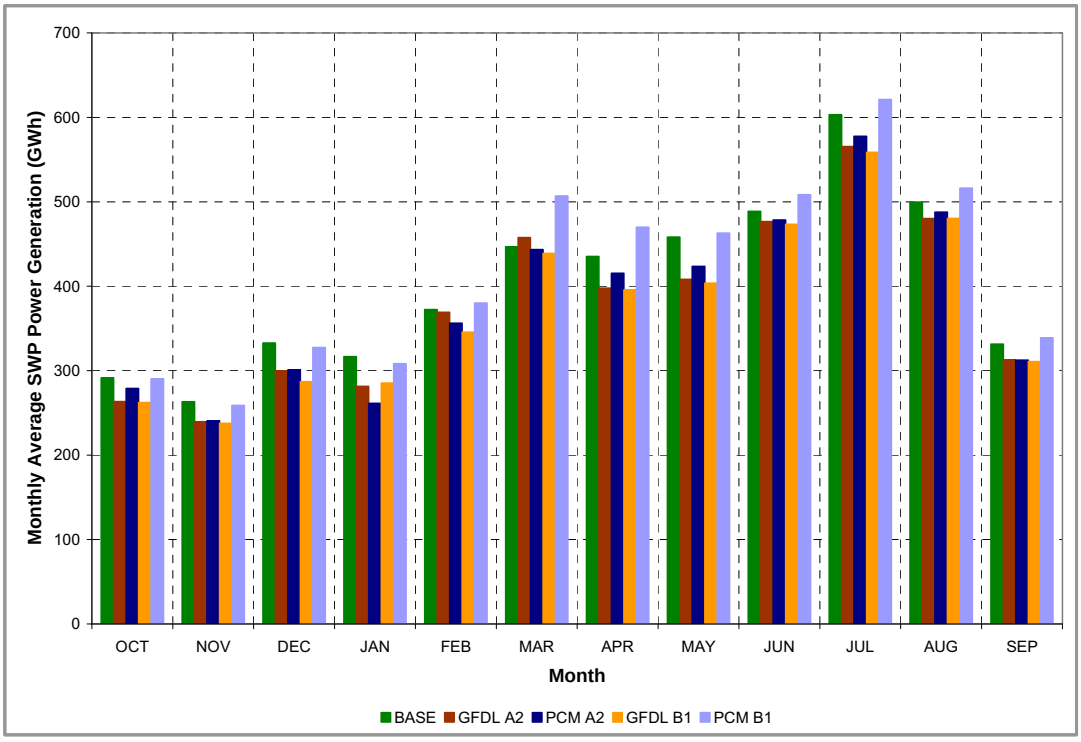

Figure 4.34 Monthly Average SWP Power Generation

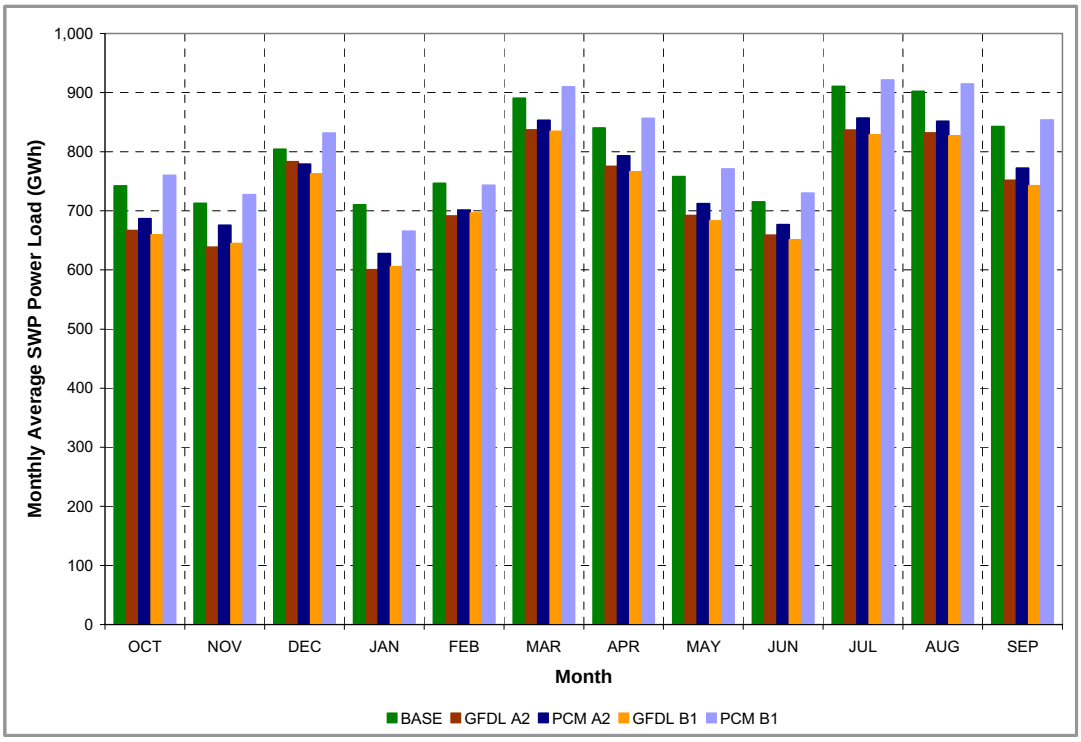

Figure 4.35 Monthly Average SWP Power Load

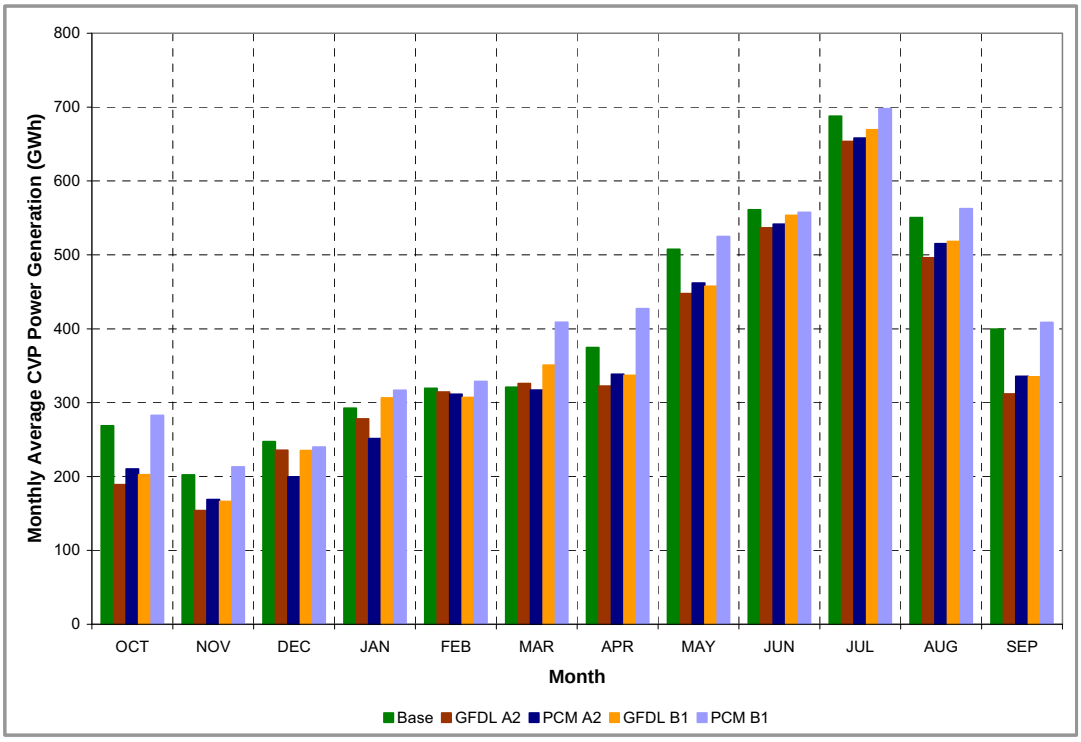

Figure 4.36 Monthly Average CVP Power Generation

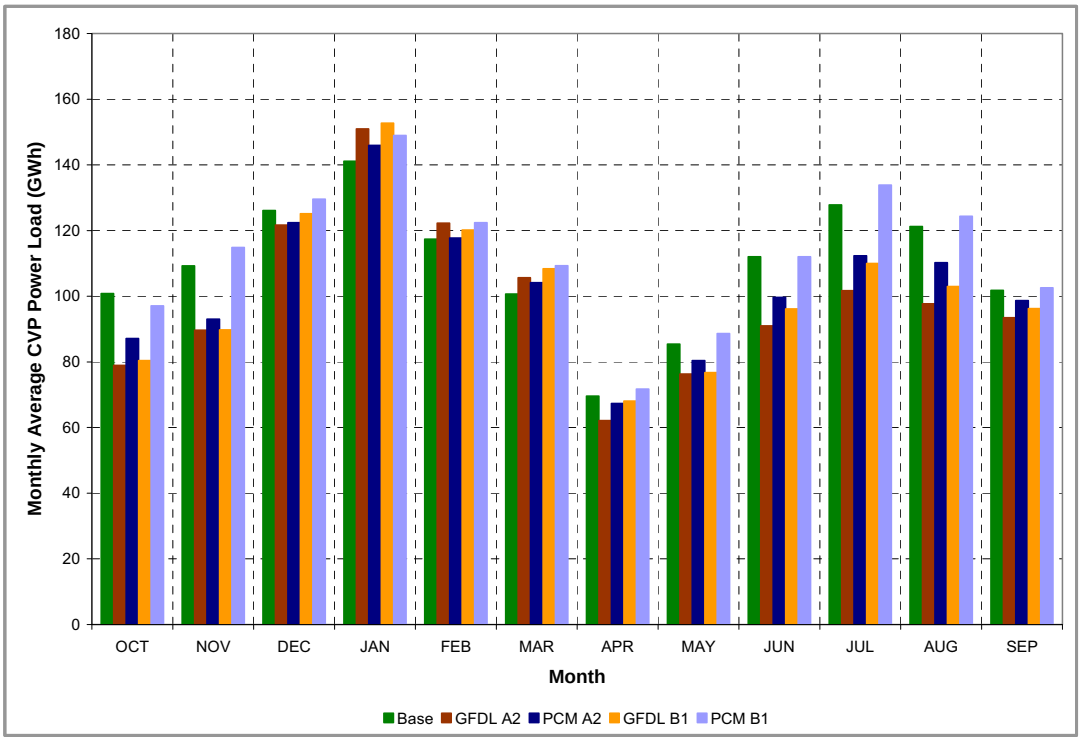

Figure 4.37 Monthly Average CVP Power Load

4.6.6 In-Stream Temperature Analysis

Water temperature has been recognized as key to the habitat needs of steelhead and Chinook salmon in the rivers of the Central Valley. River temperatures that are too high can kill salmon and steelhead by impairing metabolic function, or indirectly by increasing the probability of disease, predation, or other secondary mortality factors. Temperature tolerances also vary by life stage.

The water temperature of the river is a result of several factors: the temperature of water released from the major dams (Shasta, Oroville and Folsom) in the Sacramento Valley (a function of temperature stratification within each reservoir); the depths from which dam releases are made; the seasonal management of the deep cold-water pool reserves; ambient seasonal air temperatures and other climatic conditions; tributary accretions and water temperatures; and residence time in the re-regulating reservoirs downstream of each major dam, and in the river itself. To assist with downstream temperature control, temperature control devices (TCD) were installed at Shasta, Oroville, and Folsom dams. The TCDs can selectively withdraw water from different reservoir levels. The TCDs are generally operated to conserve cold water for the summer and fall months, when river temperatures become critical for fisheries. Therefore, the TCD is operated to make upper-level releases in the winter and spring, mid-level releases in the late spring and summer, and low-level release in the late summer and fall.

To assist in the water temperature impact evaluations of the various climate change scenarios, the Bureau of Reclamation temperature model was used to estimate temperatures in the Trinity,

Sacramento, Feather, American, and Stanislaus river systems. The reservoir component of the temperature model simulates TCD operation. The joint DWR/Bureau of Reclamation simulation model, CALSIM-II, provided monthly CVP/SWP operations input to the temperature model for a 72-year hydrologic period from1922 to 1993.

The climate change scenario impacts on the distribution and volume of reservoir inflow, and its resulting effect on seasonal reservoir storage, influence the cold-water pool volume. Three of the four climate change scenarios indicate an average reduction in reservoir storage, and therefore a corresponding reduction in cold-water pool volume. In addition, all four climate change scenarios show an expected increase in air temperature. This increase is reflected in increased river temperature. A summary of river temperatures at several key locations along the Sacramento River is shown in Table 4.24. Increased air temperature in the winter and early spring is especially important since inflow and air temperature during this period drive accumulation of the cold-water pool.

Table 4.24 Average Water Temperatures along the Sacramento River

	Study 1: Base		Study 2: GFDL A2		Study 3: PCM A2		Study 4: GFDL B1		Study 5: PCM B1	
	Average	1928-1934	Average	1928-1934	Average	1928-1934	Average	1928-1934	Average	1928-1934
American River	59.8	60.5	62.9	63.7	61.4	62.2	62.6	63.4	60.7	61.5
Balls Ferry	52.3	53.9	54.6	56.5	53.8	55.7	54.4	56.1	52.9	54.2
Bend Bridge	53.3	54.7	55.4	57.1	54.6	56.4	55.2	56.7	53.8	55.0
Butte City	57.1	58.3	59.5	61.0	58.5	59.9	59.2	60.6	57.8	58.9
Colusa Basin Drain	59.4	60.4	62.2	63.3	61.0	62.0	61.9	63.0	60.3	61.3
Feather River	59.8	60.6	62.7	63.7	61.3	62.2	62.4	63.3	60.6	61.5
Freeport	59.9	60.7	63.0	63.8	61.5	62.3	62.7	63.6	60.9	61.6
Jellys Ferry	53.1	54.5	55.2	56.9	54.4	56.2	55.0	56.5	53.6	54.7
Keswick	50.6	52.2	53.0	54.8	52.1	54.0	52.8	54.5	51.2	52.5
Keswick Above Spring Creek	50.8	52.3	53.2	55.1	52.3	54.3	53.1	54.8	51.4	52.6
Red Bluff	53.8	55.3	56.0	57.7	55.2	56.9	55.8	57.3	54.4	55.6
Shasta	49.8	51.4	52.1	54.0	51.3	53.2	52.0	53.7	50.5	51.6
Vina	54.8	56.1	57.0	58.6	56.2	57.7	56.8	58.2	55.4	56.5
Wilkins Slough	58.4	59.6	61.1	62.4	60.0	61.2	60.8	62.0	59.2	60.3

4.7 Conclusion

The purpose of this report was to provide a preliminary assessment of climate change impacts on CVP and SWP operations. Results of four climate change scenarios from global climate models GFDL and PCM were downscaled to regional hydrologic data using VIC. The regional streamflows were used to determine average monthly changes in reservoir inflows at a 2050 climate (2035 to 2064) as compared to a historical 1976 climate (1961 to 1990). The resulting perturbation factors were superimposed on historical reservoir inflows to create input for the four climate change simulations of CVP and SWP operations. The perturbed reservoir inflows were input into CalSim-II – the current planning simulation model for the CVP and SWP. Simulation results of the four climate change scenarios were compared to a historic climate simulation scenario in order to determine changes in water deliveries and carryover storage.

4.7.1 Study Limitations

There were some limitations in our analysis. First, the only representation of climate change in the CalSim-II simulations was the perturbed reservoir inflows. No consideration was given in these scenarios to heightened water demand due to changes in evapotranspiration or rainfall; nor was consideration given to increased Delta salinity due to a rising sea level. Both could significantly impact delivery capability.

Also, the method of downscaling global climate model information for CalSim-II input only captures the general trends of average rainfall and seasonal shifts in runoff. There is no information included about changes in weather variability. In each of the scenarios, the frequency and length of the droughts remained the same. If climate change influences these underlying weather phenomena, then we are missing important information necessary to determine impacts to CVP and SWP operations.

Another analytical limitation of our simulated results was the critical shortages of water in Shasta and Folsom during the droughts in scenarios GFDL A2, PCM A2, and GFDL B1. When these reservoirs were at dead storage, the simulated CVP operation was allowed to break rules and contracts that the Base and PCM B1 scenarios otherwise weren't. The result is that CVP deliveries reported for scenarios GFDL A2, PCM A2, and GFDL B1 are likely inaccurate. Alterations to CVP allocation rules governing the balance between deliveries and carryover may be necessary to prevent these shortages.

Given these and other analytical limitations, the results presented in this report are strictly preliminary. They are intended to be used to guide future climate change analysis and to identify areas where more information is needed. The results are not sufficient by themselves to make policy decisions.

4.7.2 Results

While there were limitations to our analysis, the results were nevertheless significant. General shifts in seasonal and annual average runoff, as predicted by the climate change scenarios, resulted in considerable impacts to SWP and CVP delivery capabilities, especially in the drier scenarios. Annual average SWP Table A deliveries were reduced by 10.2 percent in GFDL B1, while GFDL A2, the driest scenario, reduced annual average CVP SOD deliveries by 10.3 percent. SWP Article 21 deliveries tended to be slightly higher in the dry scenarios as compared to the Base because San Luis storage was less aggressively used for Table A and more Delta surplus was available in the winter; as such, San Luis was more likely to fill and the conditions for Article 21 deliveries -- full San Luis, Delta surplus, available Banks capacity -- were more likely to be met. However, the increased Article 21 deliveries did not offset reductions to Table A deliveries. PCM B1, the wetter climate change scenario, generated slightly higher SWP Table A and CVP SOD deliveries and slightly lower Article 21 deliveries; the difference between PCM B1 and the Base was most significant in the dry periods when storage capacity was available to make use of the extra water.

In response to climate change, California will need to search for physical, regulatory, and operational flexibilities in the SWP and CVP systems to maintain project delivery capabilities. With more runoff in the winter, there is likely to be a heightened conflict between the water

supply and flood control uses of North-of-Delta reservoirs. Better storm forecasting technology, allowing for earlier flood releases, or increased storage capacity could reduce the conflict. With higher Delta inflows in the winter months, greater winter SOD exports are desirable. For Banks Pumping Plant, permitted capacity and SOD conveyance including storage, pump, and channel capacity often limited exports from December to March. Therefore, future studies on changes in Banks permitted capacity should consider including climate change scenarios for estimating potential water supply benefits. Tracy exports were often limited by the upper Delta-Mendota Canal constriction. As such, it would be useful to simulate the proposed DMC-California Aqueduct intertie in the context of a climate change scenario.

CalSim-II results were processed to produce net impacts to SWP and CVP power generation. The SWP, using more power than it generates, increased its net load on an annual average basis by 11 percent in both GFDL simulations. The CVP, a net power generator, lost 10 percent of its power production on an annual average basis in both GFDL scenarios. Power generation on average increased for the CVP in scenario PCM B1. Of course, annual average changes in power generation are not as telling as seasonal changes. For the drier climate scenarios, lower storage resulted in reduced SWP and CVP power generation during the key summer months. Summer power generation was slightly higher for PCM B1.

Base and climate change scenario results were input into the Bureau of Reclamation temperature model for in-stream temperature analysis. High temperatures can be hazardous to salmon and steelhead. Therefore, downstream temperature controls are part of CVP and SWP operations of Shasta, Oroville, and Folsom. According to Table 4.24, the climate change scenarios resulted in warming of river temperatures at several key locations on an annual average basis. The timing of impacts will have to be explored in future studies.

As stated in the introduction, this is just the starting point for analyzing climate change impacts on SWP and CVP operations. There is still much work to be done to fully consider climate change effects in project planning studies. Furthermore, future studies should consider measures to relieve the negative effects of climate change. Analysis of the interaction of hydrologic changes and system constraints can suggest where more flexibility would be most useful. Eventually, the accumulated data and analysis can be used by our scientists, engineers, and political leaders to make sound policy decisions concerning the SWP, CVP, and climate change.

4.8 Acknowledgements

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4.9 References

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Progress on Incorporating Climate Change into Management of California's Water Resources

1st Progress Report
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Chapter 5:
Preliminary Climate Change Impacts Assessment for the Sacramento-San Joaquin Delta

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5 Preliminary Climate Change Impacts Assessment for the Sacramento-San Joaquin Delta

5.1 Introduction

The Sacramento-San Joaquin Delta is a dynamic network of natural and man-made channels. Freshwater from the southward flowing Sacramento River and from the northward flowing San Joaquin River converge with salty tidal flows from San Francisco Bay (Figure 5.1). Historically the Delta was a vast marsh. After the Gold Rush, farmers began building levees in the Delta to reclaim farmland. After years of farming, many of the Delta islands have subsided and are currently below sea level. Today the Delta consists of 57 leveed islands and more than 700 miles of sloughs and channels. This complex ecosystem is home to more than 500 species, including 20 endangered species such as the Delta smelt and salt harvest Suisun Marsh mouse. The Delta is also part of the migration path of young salmon heading out to the ocean and for adult salmon returning to spawn in their natal streams.

The Sacramento-San Joaquin Delta can be considered the hub of California's water supply system. About two-thirds of Californians and millions of acres of farmland rely on water from the Delta. Pumping plants in the south Delta are integral components for water distribution to central and southern California from the State Water Project (SWP) and the federal Central Valley Project (CVP). The Delta also provides local water supply for municipal and industrial and agricultural uses. The Delta supports more than $500 million in annual crop production (DWR, 2006).

The Sacramento River provides most of the freshwater inflow into the Delta (Figure 5.2). From 1980-1991, on average nearly 25 percent of the freshwater inflows to the Delta were used for municipal, industrial and agricultural water supplies, while the remaining 75 percent flowed to San Francisco Bay as Delta outflow. The actual distribution of Delta inflows varies from year to year depending on factors such as the amount and timing of precipitation and operations of upstream reservoirs.

Climate change could affect the Delta water balance shown in Figure 5.2. Warmer air temperatures are expected to shift the timing and form -- rain or snow -- of winter precipitation (see Chapter 2 and Chapter 6). Less snowpack would lead to less spring runoff. These shifting precipitation and runoff patterns would affect reservoir operations and Delta exports (see Chapter 4). Since the major inflows into the Delta are controlled by reservoir releases, Delta inflow patterns would be affected as well. More changes to reservoir releases and Delta exports might be required for compliance with Delta water quality standards. Changes in crop evapotranspiration rates could affect the amount of water needed for agricultural uses (see Chapter 7).

Future projected sea level rise would also affect the Delta. Higher water levels could threaten Delta island levees. Increased saltwater intrusion from the ocean could require increased freshwater releases from upstream reservoirs to maintain compliance with Delta water quality standards.

This chapter presents an initial demonstration of modeling tools use to quantify potential impacts of climate change on Delta water quality and water levels. The results demonstrate advancements on incorporating climate change into existing modeling methodologies, however the results produced are not sufficient by themselves for making management decisions. All results are preliminary and are for illustration purposes only. Sections 5.3 and 5.4 present potential effects of shifting precipitation and runoff patterns on Delta inflows and diversions for present sea level conditions. Section 5.5 addresses potential effects of sea level rise alone and in conjunction with shifting precipitation and runoff patterns.

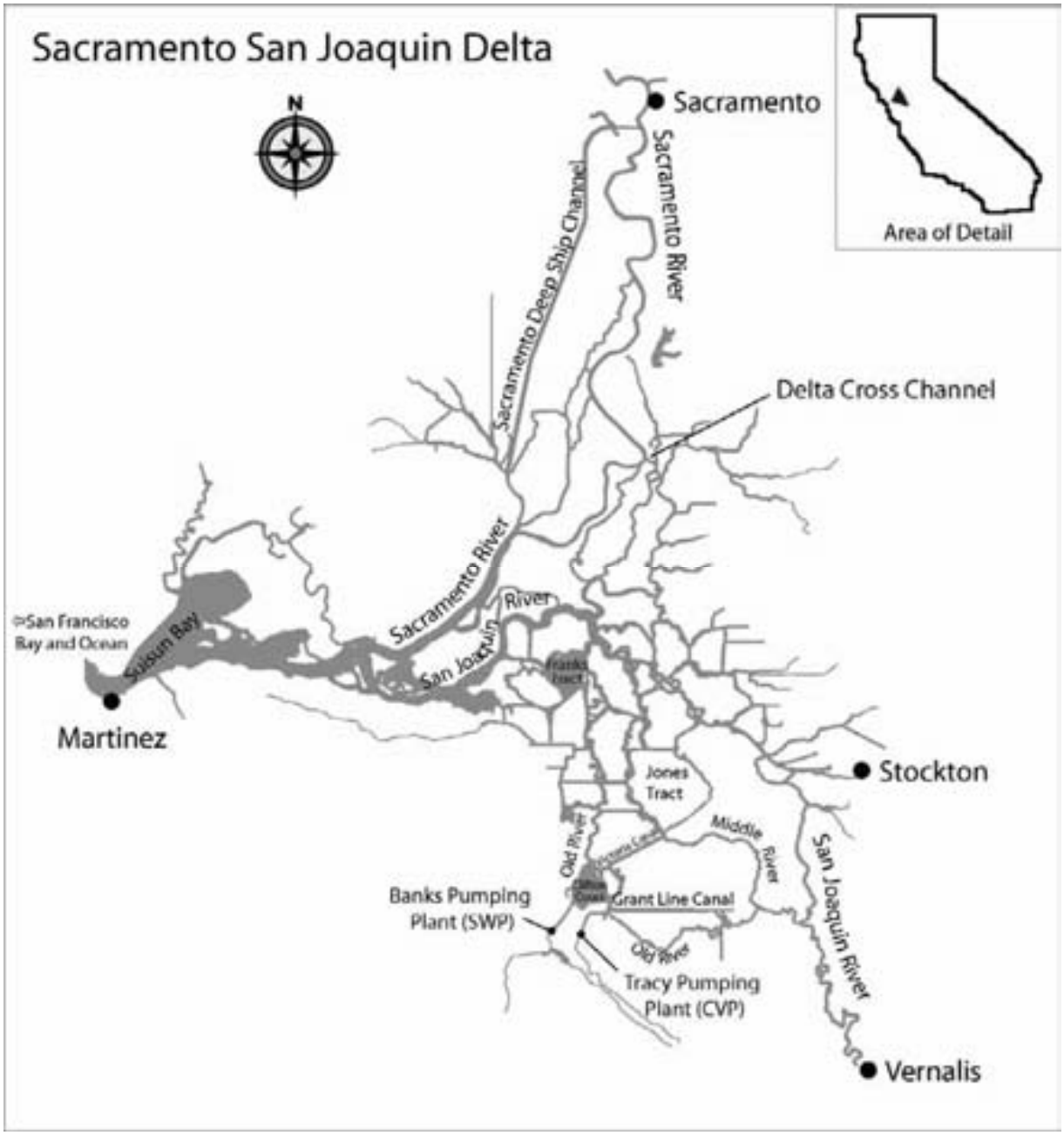


Figure 5.1: The Sacramento-San Joaquin Delta

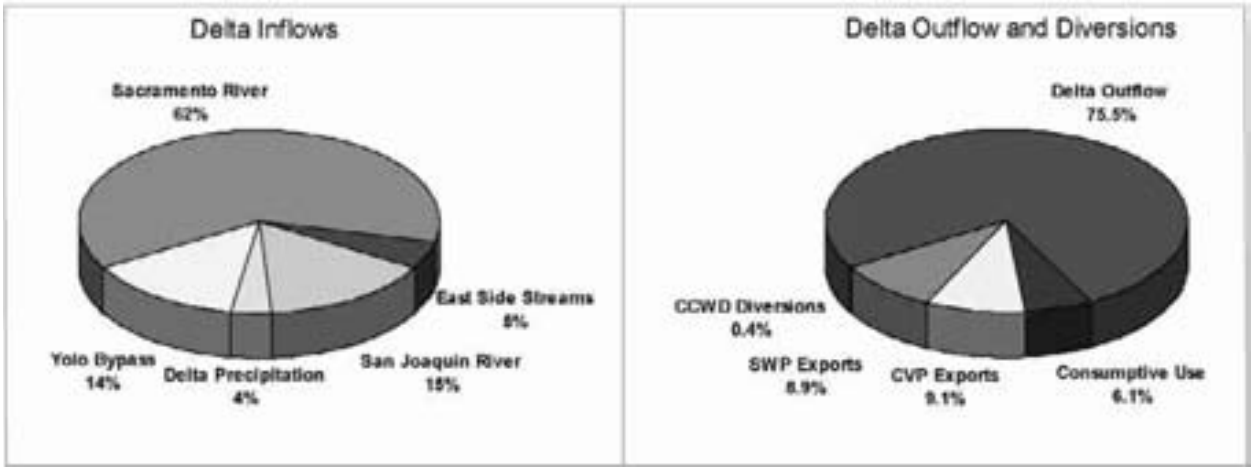


Figure 5.2: Average Annual Delta Inflows, Outflow and Diversions from 1980-1991
Adapted from Delta Atlas (DWR, 1995a)

5.2 Approach

A series of numerical models are being used for preliminary quantification of potential impacts of climate change on Delta flows, water levels and water quality (Figure 5.3). First, climate change scenarios are modeled using a Global Climate Model (GCM) to produce estimates of future air temperature and precipitation changes. These global scale changes are then reduced to a regional scale by a process called downscaling (see Chapter 3). The regional downscaling converts future projections of air temperature and precipitation into estimates of future streamflows. For these studies, the future streamflows are entered into a model, CalSim-II, which then simulates the operations of the SWP and CVP (see Chapter 4 and http://modeling.water.ca.gov/hydro/model/index.html). Using current management practices and existing system facilities, CalSim-II provides estimates of reservoir releases and Delta exports for each climate change scenario. The resulting Delta inflows and exports are then used to drive a model of the flows, water levels and water quality in the Delta, the Delta Simulation Model 2 (DSM2) (http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/models/dsm2/dsm2.cfm). Results of the Delta model are then analyzed for the potential effects on water quality at several key locations. DSM2 is also used to estimate impacts of sea level rise.

All results presented in this report are preliminary. These studies are a starting point for analyzing climate change impacts on Delta hydrodynamics and water quality. Current management practices and existing system facilities were used in the analysis for this report. No changes were made to lessen the effects of climate change or sea level rise. Only four climate change scenarios and one sea level rise scenario were examined, and the likelihood of each scenario was not addressed. Several assumptions were also included in the analyses (see Section 5.2.3). The results presented here are not sufficient by themselves for making final policy decisions. These results are intended to illustrate the application of CalSim-II and DSM2 for climate change impacts assessment. Future efforts will involve improvements of the models and the study assumptions, and will address the likelihood of various climate change scenarios.

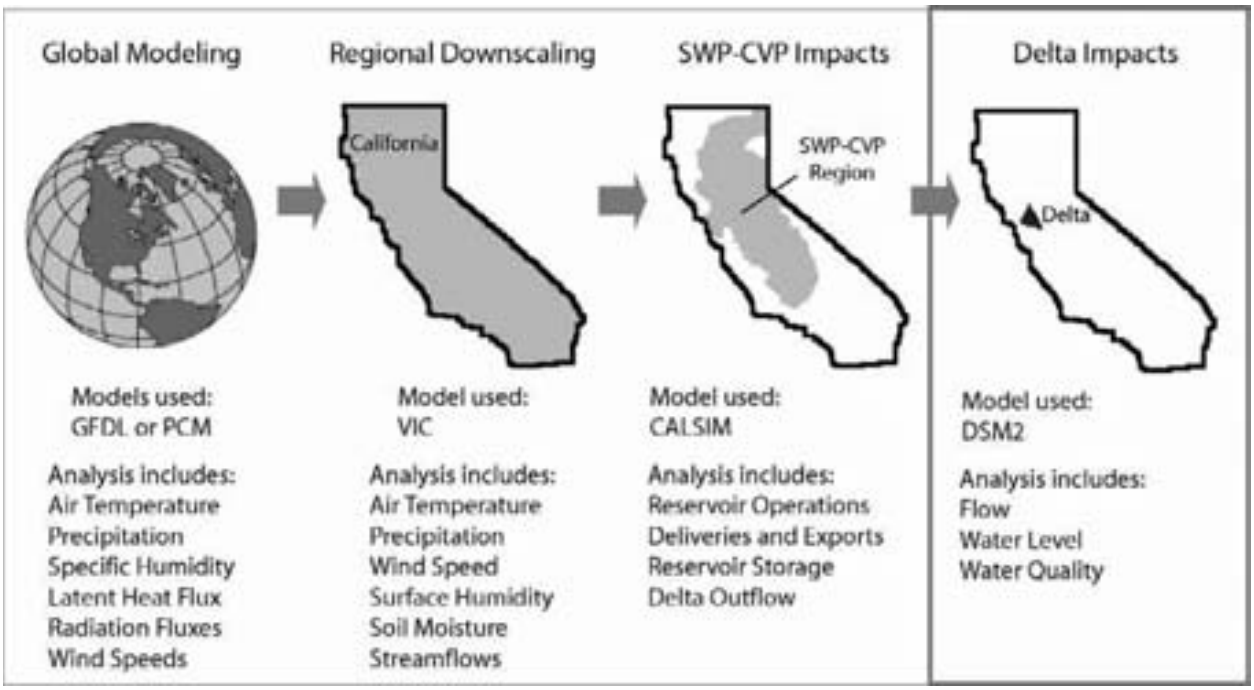


Figure 5.3: Delta Impacts Analysis Approach

5.2.1 Base Case

The base case for these studies is a 2020 level of development scenario using operations based on the "Long-Term Central Valley Project Operations Criteria and Plan" (USBR, 2004). Assumptions for the base case and climate change scenarios are presented later in Section 5.2.3.

5.2.2 Climate Change Scenarios

The studies presented in this report focus on the four climate change scenarios selected by the Climate Action Team appointed in response to the governor's Executive Order S-3-05 on climate change. The four climate change scenarios consist of two greenhouse gas (GHG) emissions scenarios developed by the Intergovernmental Panel on Climate Change (IPCC), known as A2 and B1, each represented by two different GCMs, the Geophysical Fluid Dynamic Lab model (GFDL) and the Parallel Climate Model (PCM) (see Chapter 3).

The A2 emissions scenario assumes high population growth, regional based economic growth, and slow technological changes that result in significantly higher GHG emissions. The B1 scenario represents low population growth, global based economic growth and sustainable development that result in the lowest increase of GHG emissions of the IPCC scenarios. Both the GFDL and PCM models project future warming, with GFDL indicating a greater warming trend than PCM. The PCM B1 scenario is the only scenario that shows a slight increase in precipitation. Precipitation is reduced in the other three scenarios.

Although the GCM models represent climate change through the end of the 21st century, the planning horizon for water resources is typically about 30 years. So the studies presented here focus on the climate change projections at about mid-century (Table 5.1). Thirty years of projected streamflows centered around the year 2050 (2035-2064) were used to develop the climate change influenced runoff patterns simulated in the SWP and CVP operations model, CalSim-II (see Chapter 4). However, land use projections were not available for 2050, so the climate change scenarios use land-use estimates for 2020. Thus when the climate change scenarios are described as being at the 2050 projection level, this refers to the runoff estimates only.

Table 5.1: Air Temperature and Precipitation Projections for 2050

Scenario	Average Change in Air Temperature °C		Average Change in Precipitation, in/yr	
	Northern CA	Southern CA	Northern CA	Southern CA
2050 GFDL A2	2.3	2.3	-0.75	-0.22
2050 PCM A2	2.1	2.1	-0.25	-1.77
2050 GFDL B1	1.3	1.2	-0.62	0.70
2050 PCM B1	0.8	0.9	0.83	-0.08

5.2.3 Assumptions

Major assumptions made in these studies are summarized below:

Runoff Estimations for Climate Change Scenarios (see Chapter 4 section 4.4)

- ❑ Runoff estimates reflect 2050 projections.
- ❑ Climate change scenarios maintain historical hydrologic variability.

CalSim-II Simulations of SWP and CVP Operations (see Chapter 4 section 4.5)

- ❑ Simulations were run for a 73-year analysis period based on wy1922-1994.
- ❑ Operating rules were not modified for climate change scenarios.
- ❑ For climate change scenarios, reservoir inflows reflect 2050 projections.
- ❑ For all scenarios, land use and water demands represent a constant 2020 level of development. The level of development does not change as the simulation progresses through time.

Current management practices and existing system facilities were used in the analysis for this report. No changes were made to lessen the effects of climate change or sea level rise.

No changes were made to:

- ❑ System structures, such as added water storage, pumping, or canal capacity
- ❑ Reservoir operating rules, such as changing the space required for flood control
- ❑ Streamflow requirements
- ❑ Water quality standards
- ❑ Delta outflow requirements
- ❑ Operations to account for sea level rise

- Delta exports, outflow and water quality are regulated according to the State Water Resources Control Board Decision 1641 (D1641) and the Water Quality Control Plan.
- Meeting Delta water quality standards is the top priority when changing SWP and CVP operations. Climate change will make this a larger challenge in the future. (see Table 4.12 in Chapter 4).

CalSim-II Simulations of SWP and CVP Operations (continued)

- Regulations from the Central Valley Project Improvement Act (CVPIA) 3406 (b)(2) are not included.
- The Environmental Water Account (EWA) is not included.
- San Joaquin River hydrology, operations and water quality do not reflect recent improvements subjected to the 2005 California Water and Environmental Modeling Forum (CWEMF)/CALFED peer review.
- New Melones Reservoir operations are governed by the Interim Plan of Operations.
- Operations were not modified to reflect sea level rise conditions

Delta Simulations

- Simulations were run for a 16-year analysis period based on wy1976-1991.
- Delta inflows and exports provided by CalSim-II output were not further modified to try to mitigate for Delta water quality effects of climate change or sea level rise.
- Contra Costa Water District (CCWD) diversions from Old River at Rock Slough and Old River at Highway 4 were combined and diverted from Rock Slough since CalSim-II did not simulate the two diversions separately.
- Operations of south Delta temporary fish and agricultural barriers were not simulated.[1]
- Pulse flows in April and May for the Vernalis Adaptive Management Plan (VAMP) were not simulated.
- Delta Island Consumptive Use for the 2020 level of development was used for all scenarios.
- Delta island return flow water quality varies monthly in a given year, but does not vary from year to year.
- For one-foot sea level rise scenarios, sea level rise was assumed to affect tidal elevation only. Tidal period and amplitude were assumed to be unchanged.
- Martinez EC is either the same or is increased for sea level rise scenarios (see section 5.5.1.1)
- Vernalis EC is the same for present sea level and one-foot sea level rise scenarios.

[1] Barrier operations can significantly influence Delta water quality and circulation patterns. The intent of the preliminary studies was to focus on the effects of climate change without having to separate which impacts were due to climate change and which were due to barrier operations.

5.2.4 Delta Simulations

The base case and four climate change scenarios were evaluated using DSM2 to quantify effects on Delta water quality and water levels. Each scenario was simulated at present sea level and for a one-foot sea level rise. DSM2 is a one dimensional model of flow, water levels and conservative and non-conservative constituent transport. The boundaries of the Delta representation in DSM2 are the I Street Bridge in Sacramento on the Sacramento River, Vernalis on the San Joaquin River, and Martinez downstream of the confluence of the two rivers as they flow into San Francisco Bay (Figure 5.1). Tidal water level fluctuations, river inflows, Delta exports, and irrigation withdrawals and return flows are all represented in DSM2. To represent the effects of the tidal cycle, DSM2 uses a 15-minute computational time step.

For DSM2 planning studies, a 16-year study period based on water years (wy) 1976-1991 (Oct. 1, 1975 to Sept. 30, 1991) is used. The study period reflects the variability in California's hydrology and includes the wettest (wy1983) and driest (wy1977) periods on record.

Reservoir inflows for the study period were modified to reflect climate change by multiplying the base-case runoff by monthly adjustment factors for each climate change scenario (see Chapter 4). Thus these studies reflect potential changes in magnitude and timing of runoff, but they do not represent potential changes in hydrologic variability since the base case represents historical hydrologic variability. System operations were then simulated using CalSim-II. Monthly average results from the CalSim-II simulations provided the following major Delta inflows, exports and diversions (Figure 5.4):

Delta Inflows

- Sacramento River at I Street Bridge in Sacramento
- San Joaquin River at Vernalis
- Eastside Streams (combined Mokelumne and Cosumnes river flows)
- Calaveras River
- Yolo Bypass

Delta Exports and Diversions

- SWP at Banks Pumping Plant
- CVP at Tracy Pumping Plant
- Contra Costa Water District (combined diversions Old River at Rock Slough and at Hwy. 4)
- North Bay Aqueduct
- Vallejo

The Delta inflows, exports and diversions provided from CalSim-II already incorporate mitigation for climate change through system operations using present operating rules. Tidal fluctuations in water level at Martinez are represented in DSM2 on a 15-minute time step by an adjusted astronomical tide that is based on historical data and reflects the spring-neap tidal cycle (Ateljevich, 2001a). Delta Island Consumptive Use (DICU) is represented at more than 250 locations (DWR, 1995b). Delta Cross Channel operations are provided by CalSim-II and did not change for any of the scenarios.

For this study, water quality analysis focused on salinity. DSM2 simulates electrical conductivity (EC) directly. Other salinity constituents such as chlorides can be estimated from the EC concentrations using statistical regression equations. For the DSM2 simulations, EC values must be specified for all Delta inflows. For the Sacramento River, eastside streams, Calaveras River and Yolo Bypass, constant EC values for each location are used in all of the scenarios (Table 5.2). San Joaquin River EC at Vernalis is provided for each scenario from output from the CalSim-II simulations. EC at Martinez is estimated for each scenario using a regression relationship that correlates the astronomical tide and Delta outflow to salinity (Ateljevich, 2001b). Delta Island return flow quality estimates were made based on available field data (DWR, 1995c). The quality of the return flows varies monthly, but does not vary from year to year. The same return flow quality values were used for all scenarios.

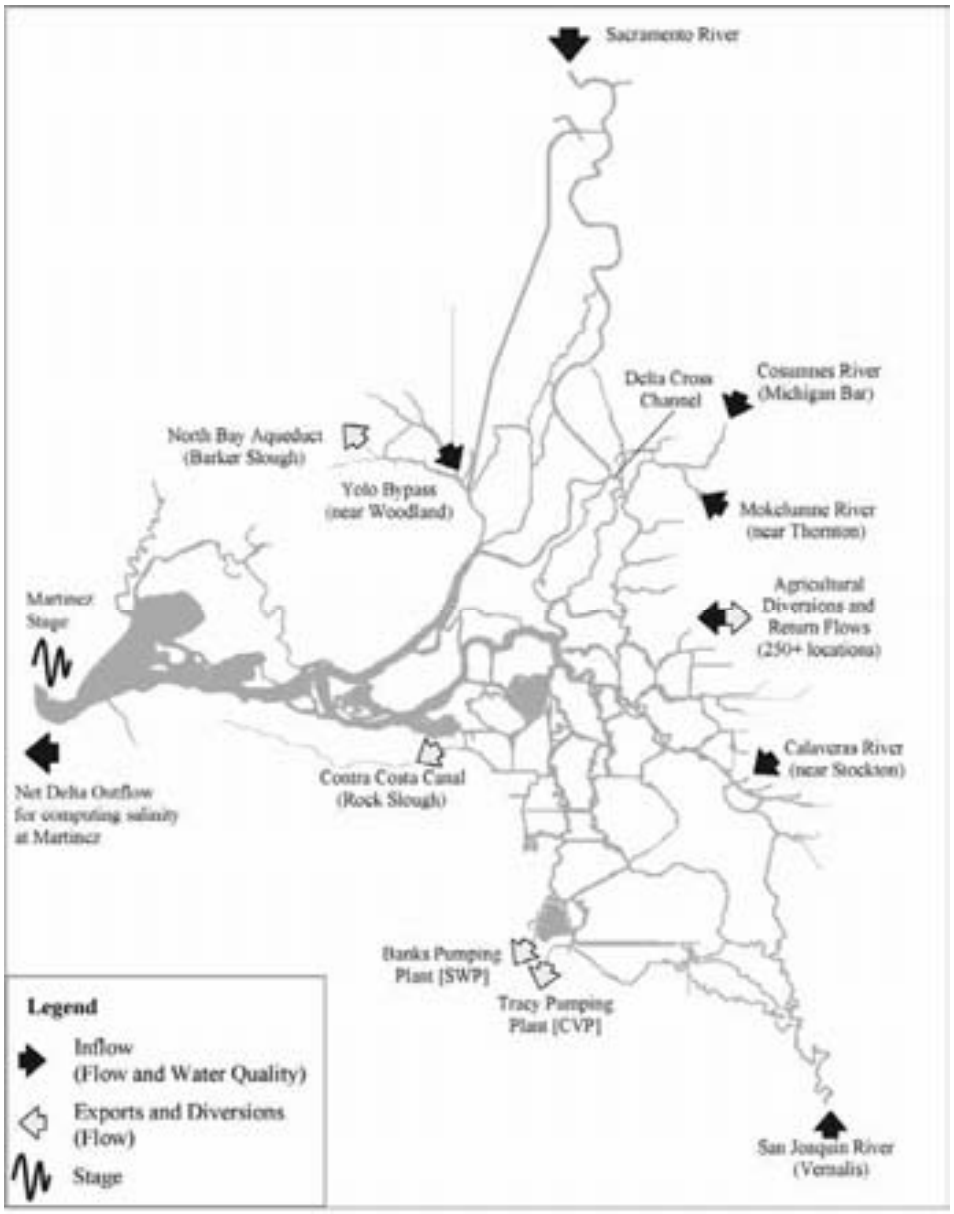


Figure 5.4: Inflows, Exports, Diversions and EC Inputs for DSM2 Simulations

Table 5.2: Constant EC Concentrations for DSM2 Simulations

Location	EC, uS/cm
Sacramento River	175
Eastside Streams	150
Calaveras River	150
Yolo Bypass	175

For sea level rise scenarios (see section 5.5), the tidal elevations at Martinez were raised uniformly by one-foot. This assumes that sea level rise does not affect the period of the tidal cycle. Estimates of additional salt transported from the ocean to Martinez under a one-foot sea level rise were not available. Due to time constraints, a preliminary approach for estimating salinity increases at Martinez for a one-foot sea level rise is applied only to the base case. In order to examine potential combined effects of sea level rise and climate change, scenarios that combined changes in Delta inflows and exports due to climate change with a one-foot sea level rise assumed that the salinity at Martinez for the one-foot sea level rise was the same as the Martinez EC for the present sea level version of that scenario. For example, the specified EC at Martinez was the same for the 2050 GFDL A2 present sea level and one-foot sea level rise scenarios. Since the salinity at Martinez would likely increase with rising sea levels, this assumption provides a lower bound for potential sea level rise effects on water quality for a one-foot rise in sea level. For these studies, system operations were not changed to try to lessen the increased salt intrusion for the sea level rise scenarios.

5.3 Climate Change Impacts on Delta Inflows and Exports for Present Sea Level Conditions

Output from CalSim-II provided Delta inflows and exports for DSM2 simulations of present sea level conditions for the base case and four climate change scenarios (Figure 5.5 to Figure 5.8). Tabular values of selected Delta inflows and exports are provided in the appendix in Section 5.11. Table 5.3 to Table 5.6 show monthly average changes in Delta inflows and exports for the climate change scenarios relative to the base case, and yearly changes are shown in Table 5.7 and Table 5.8. These results are preliminary representations of climate change impacts, and they reflect the assumptions listed in Section 5.2.3. See Chapter 4 for further information on climate change impacts to system operations.

Delta inflows tend to increase during the late winter and early spring and decrease during the summer and fall. The largest reductions in exports tend to occur in summer and fall. Inflows and exports are most sensitive to climate change during extremely wet or extremely dry periods. For example, the largest reduction in the magnitude of Delta inflows occurs during the summer of 1983 when base runoff was very high. For the climate change scenarios, the reduction in inflow for each month is determined by a monthly scaling factor as described in Chapter 4. For example, in the GFDL A2 scenario the June runoff into Shasta and Oroville is reduced by about 30 percent. Since the base runoff for 1983 was very high, the 30 percent reduction in the runoff resulted in the largest Delta inflow reduction. Contra Costa Water District (CCWD) diversions

were the same for all scenarios since they receive a high priority when CalSim-II allocates water. See Chapter 4 for more details on effects of climate change on SWP and CVP operations.

Table 5.3: Average Monthly Change in Sacramento River Inflow to the Delta, cfs

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
GFDL A2	-1,600	-2,156	-1,518	930	265	2,441	-1,040	-2,667	-1,647	-1,571	-1,600	-2,156
PCM A2	-294	-1,056	-1,515	-910	-57	811	-1,010	-2,168	-841	-1,104	-294	-1,056
GFDL B1	-1,175	-1,719	-1,611	1,547	-369	2,456	-728	-2,605	-1,540	-1,205	-1,175	-1,719
PCM B1	254	-163	-178	1,639	386	5,265	1,814	17	-289	272	254	-163

Table 5.4: Average Monthly Change in San Joaquin River Inflow to the Delta, cfs

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
GFDL A2	-1,324	-436	634	479	713	1,921	901	-393	-2,812	-1,173	-115	-426
PCM A2	-410	296	-592	-404	1,447	980	813	-110	-1,847	-705	-67	-196
GFDL B1	-1,362	208	82	364	-1,773	-175	288	-870	-2,866	-1,159	-136	-422
PCM B1	-198	287	-617	361	1,257	1,600	823	255	-1,628	-420	-26	-113

Table 5.5: Average Monthly Change in SWP Exports, cfs

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
GFDL A2	-756	-646	-91	-107	-73	-146	-516	-106	-158	-407	-445	-865
PCM A2	-630	-12	-338	-292	-57	-167	-284	-69	-142	-351	-10	-626
GFDL B1	-756	-489	107	-160	-131	-152	-417	-454	-382	-382	-433	-999
PCM B1	-169	3	-213	-28	-106	198	-117	75	-75	8	91	-75

Table 5.6: Average Monthly Change in CVP Exports, cfs

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
GFDL A2	-474	-36	-266	126	-444	149	-303	-235	-690	-1,143	-867	-305
PCM A2	-306	-94	-255	159	-490	169	-243	-125	-263	-582	-350	-99
GFDL B1	-473	-46	-164	143	-365	219	-215	-178	-447	-754	-554	-81
PCM B1	-16	245	-269	125	-71	130	-48	63	55	122	-4	-37

Table 5.7: Annual Change in Delta Inflows

Water Year	Year Type*	Base Flows TAF		Change in Sacramento River Flows, TAF				Change in San Joaquin River Flows, TAF			
		SAC River	SJR River	GFDL A2	PCM A2	GFDL B1	PCM B1	GFDL A2	PCM A2	GFDL B1	PCM B1
1976	C	9,322	1,345	-1,011	-611	-933	-198	-148	-88	-154	-41
1977	C	6,222	1,086	-511	-157	-145	99	-37	-19	-59	-8
1978	AN	20,144	4,094	826	-148	792	2,021	-260	-148	-787	-94
1979	BN	13,383	2,974	-1,457	-892	-1,562	492	-443	-144	-614	260
1980	AN	20,158	4,794	-622	-175	-430	1,092	101	0	-1,096	367
1981	D	11,976	1,840	-922	-866	-693	251	-343	-38	-360	45
1982	W	31,303	6,056	-585	-373	-573	735	131	61	-796	438
1983	W	35,501	13,934	-5,199	-3,185	-4,618	-130	-1,874	-838	-2,971	-148
1984	W	23,068	5,767	201	56	315	1,196	32	183	-229	340
1985	D	12,050	1,556	-588	-183	-286	78	-204	-56	-216	-10
1986	W	18,784	4,732	-871	-776	-821	208	568	493	-874	589
1987	D	9,765	1,333	-1,008	-828	-988	353	-115	-93	-119	-44
1988	C	8,694	932	-158	-192	-71	314	-25	-19	-26	-3
1989	D	12,086	973	756	-426	838	2,093	-29	-10	-36	4
1990	C	8,128	893	-243	-289	-215	-122	-15	-9	-26	14
1991	C	7,611	965	-535	-145	-136	333	-21	-12	-26	8

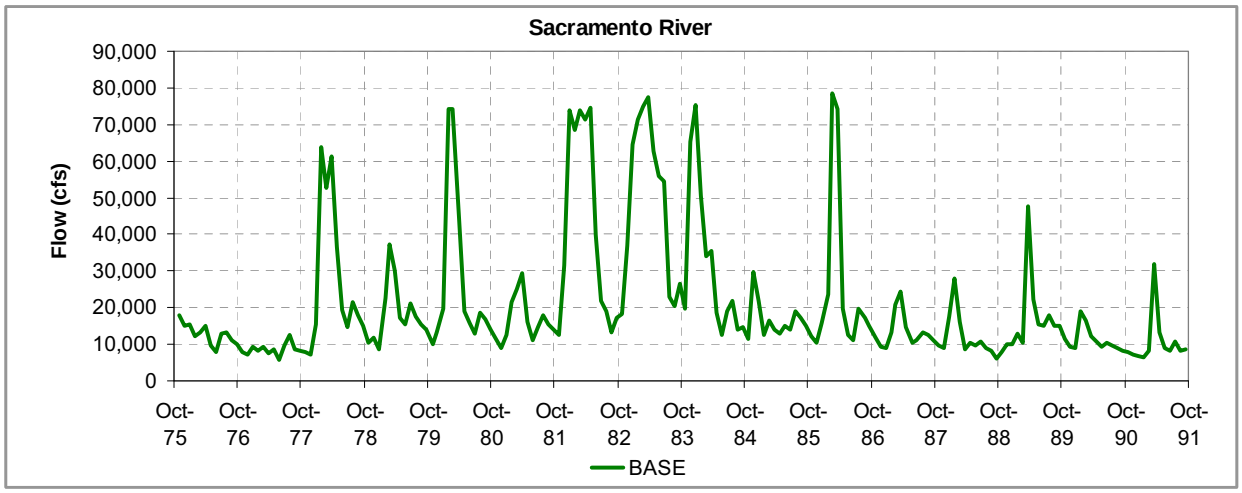
*Sac 40-30-30 water year types: W=Wet, AN=Above Normal, BN=Below Normal, D=Dry, C=Critical

Table 5.8: Annual Change in Delta Exports

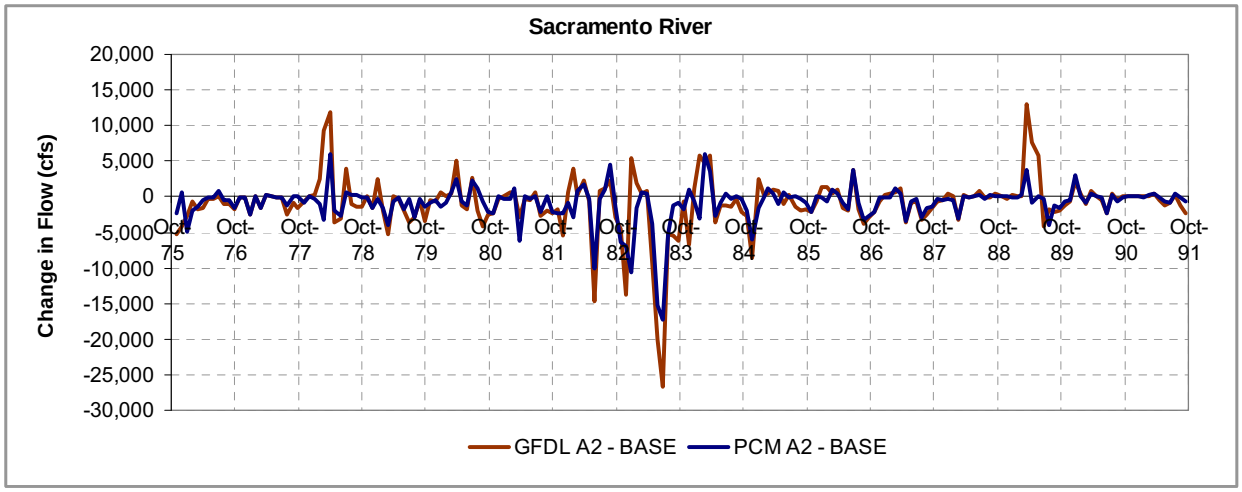
Water Year	Year Type*	Base Exports TAF		Change in SWP Exports TAF				Change in CVP Exports, TAF			
		SWP	CVP	GFDL A2	PCM A2	GFDL B1	PCM B1	GFDL A2	PCM A2	GFDL B1	PCM B1
1976	C	2,967	2,158	-635	-385	-588	-229	-23	45	22	-34
1977	C	995	1,391	-3	-83	-59	75	-462	-97	-153	38
1978	AN	3,608	2,736	-217	-115	-438	-102	-143	-29	-171	19
1979	BN	3,703	2,895	-446	-101	-589	118	-447	-223	-374	62
1980	AN	4,105	2,965	-478	-263	-457	1	-992	-572	-786	-152
1981	D	3,326	2,748	-674	-558	-716	-167	-195	-71	-128	8
1982	W	4,706	3,229	191	244	179	281	-393	-153	-286	-172
1983	W	3,676	2,827	34	0	29	0	176	15	168	14
1984	W	3,417	2,501	-288	-86	-305	-3	-309	-102	-174	-25
1985	D	3,516	2,869	-239	-189	-278	76	-415	-11	-169	-42
1986	W	4,201	2,799	-583	-432	-664	56	-520	-420	-471	-227
1987	D	2,570	1,904	-903	-770	-972	-284	-377	-239	-277	395
1988	C	1,541	1,729	32	-12	20	72	-191	-117	-100	265
1989	D	2,723	2,248	-382	-194	-344	-71	-299	-289	-162	99
1990	C	1,605	1,563	-303	-277	-314	-161	-24	-90	-25	-77
1991	C	1,110	1,495	162	63	-17	161	-574	-143	-149	103

*Sac 40-30-30 water year types: W=Wet, AN=Above Normal, BN=Below Normal, D=Dry, C=Critical

a) Base Case Delta Inflows



b) Change in Inflow for Climate Change A2 Scenarios



c) Change in Inflow for Climate Change B1 Scenarios

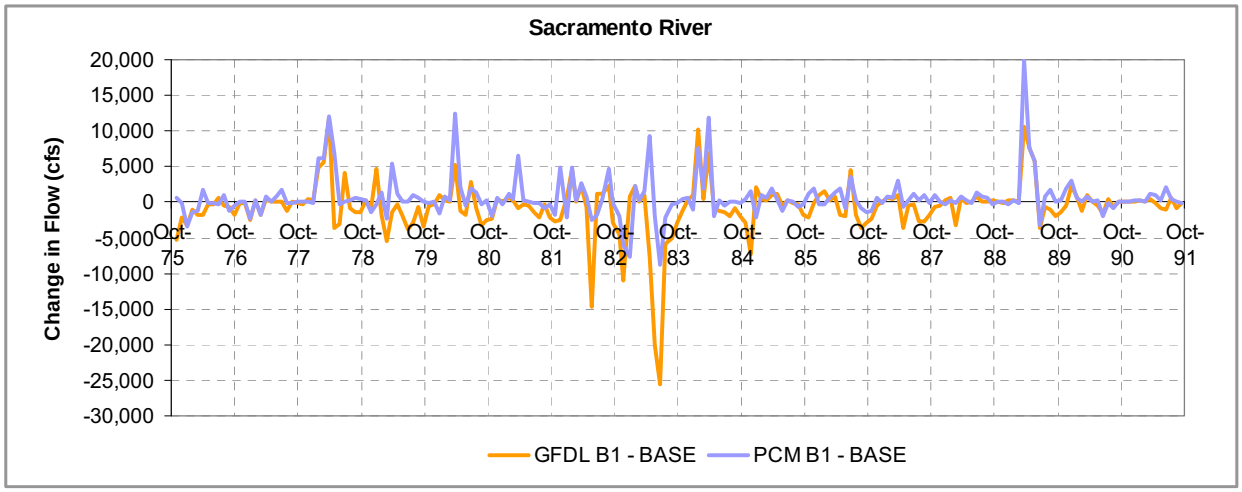
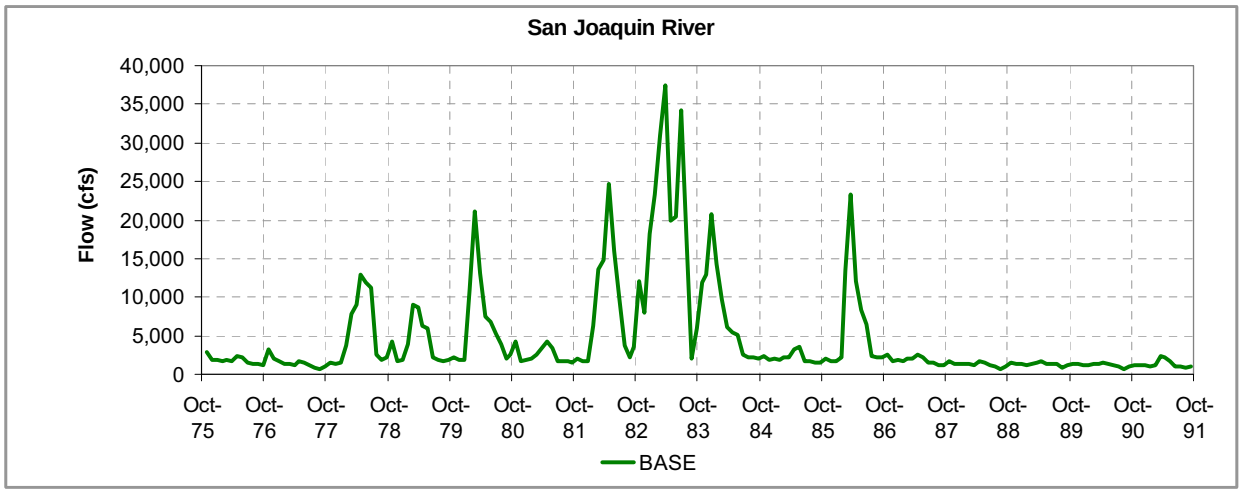
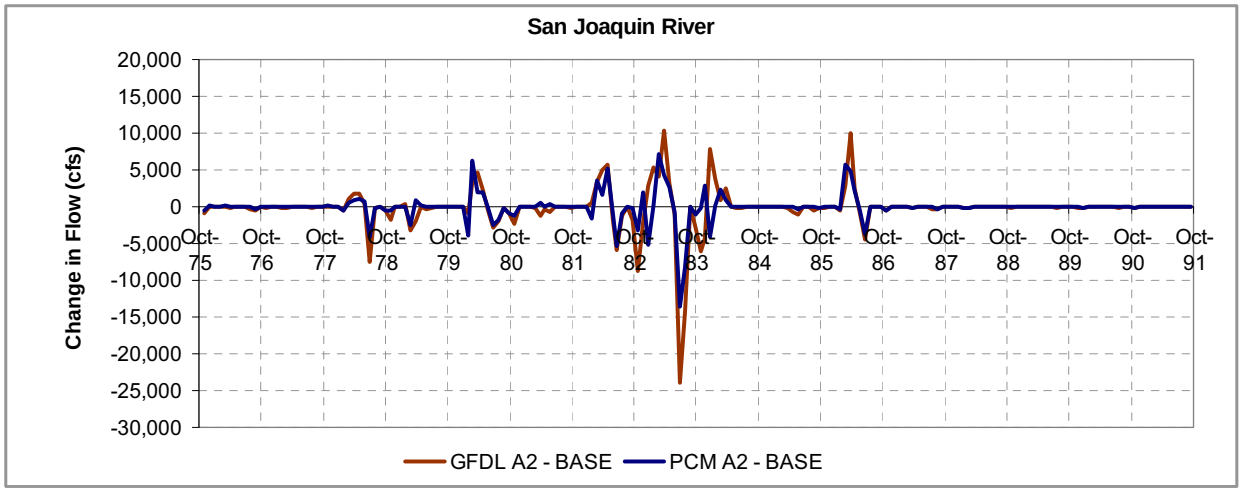


Figure 5.5: Delta Inflows from the Sacramento River

a) Base Case Delta Inflows



b) Change in Inflow for Climate Change A2 Scenarios



c) Change in Inflow for Climate Change B1 Scenarios

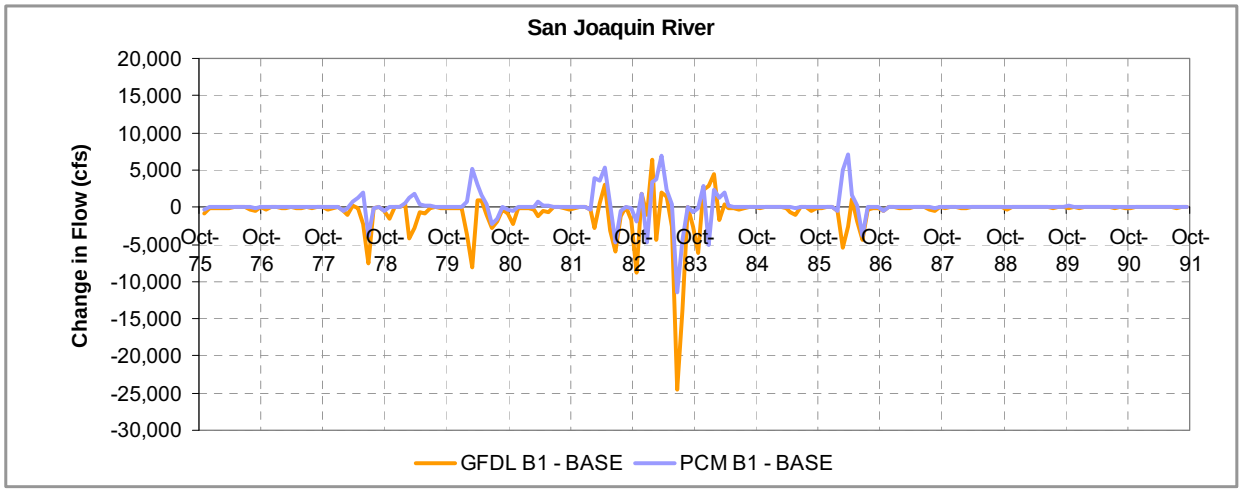
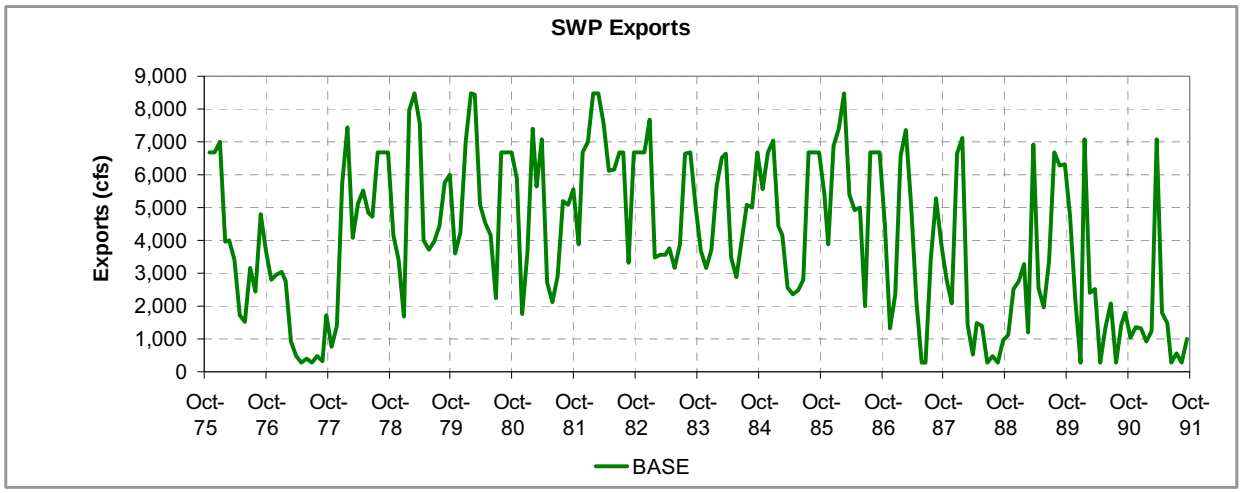
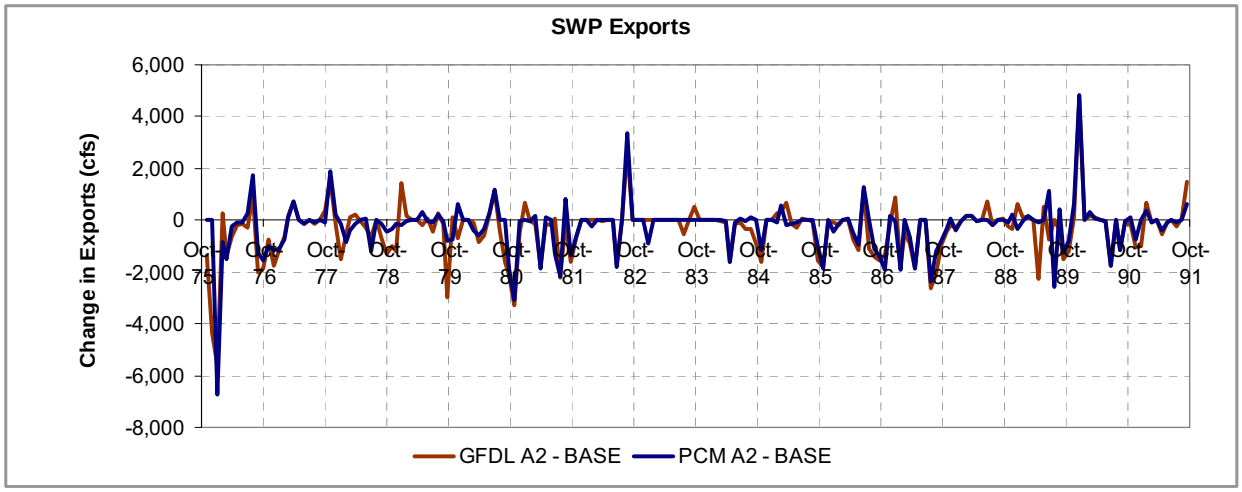


Figure 5.6: Delta Inflows from the San Joaquin River

a) Base Case Delta Exports



b) Change in Exports for Climate Change A2 Scenarios



c) Change in Exports for Climate Change B1 Scenarios

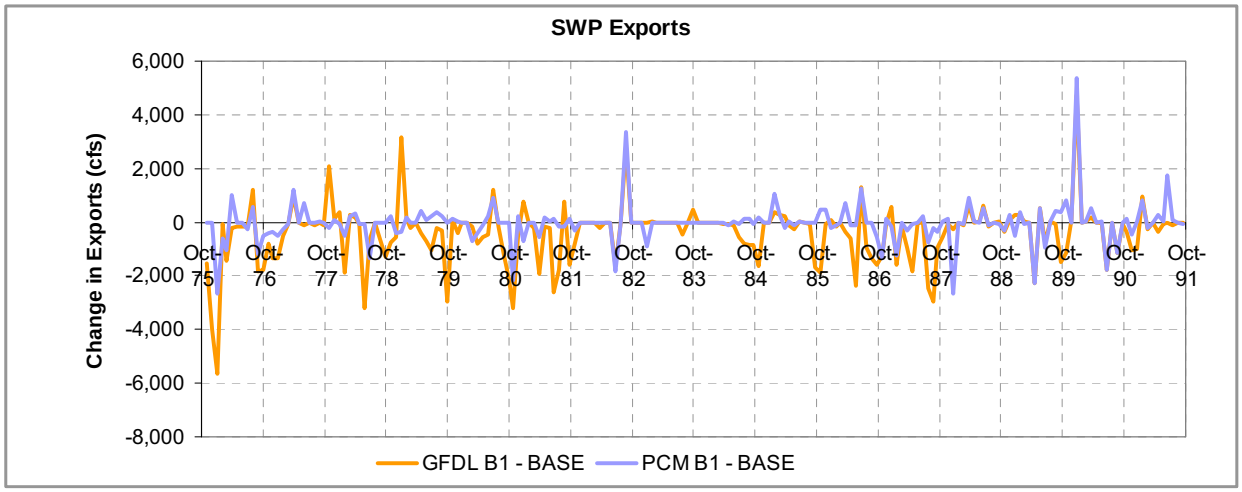
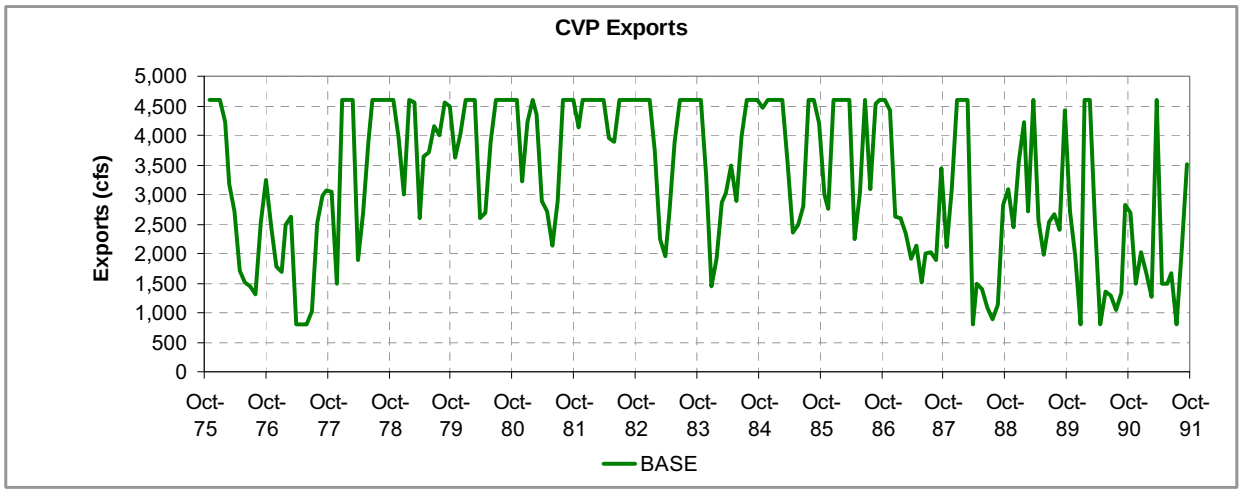
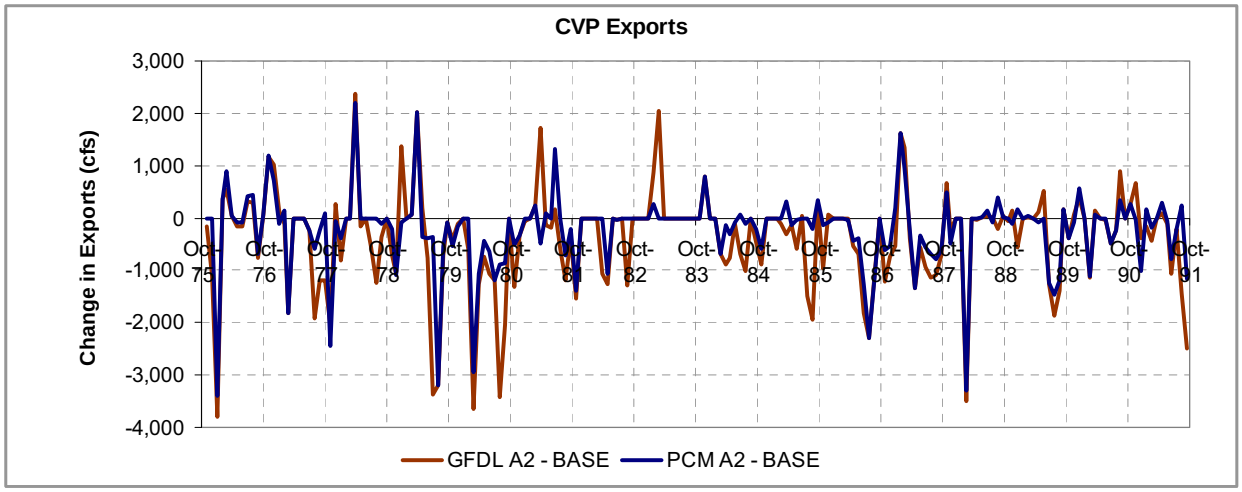


Figure 5.7: Delta Exports from the State Water Project

a) Base Case Delta Exports



b) Change in Exports for Climate Change A2 Scenarios



c) Change in Exports for Climate Change B1 Scenarios

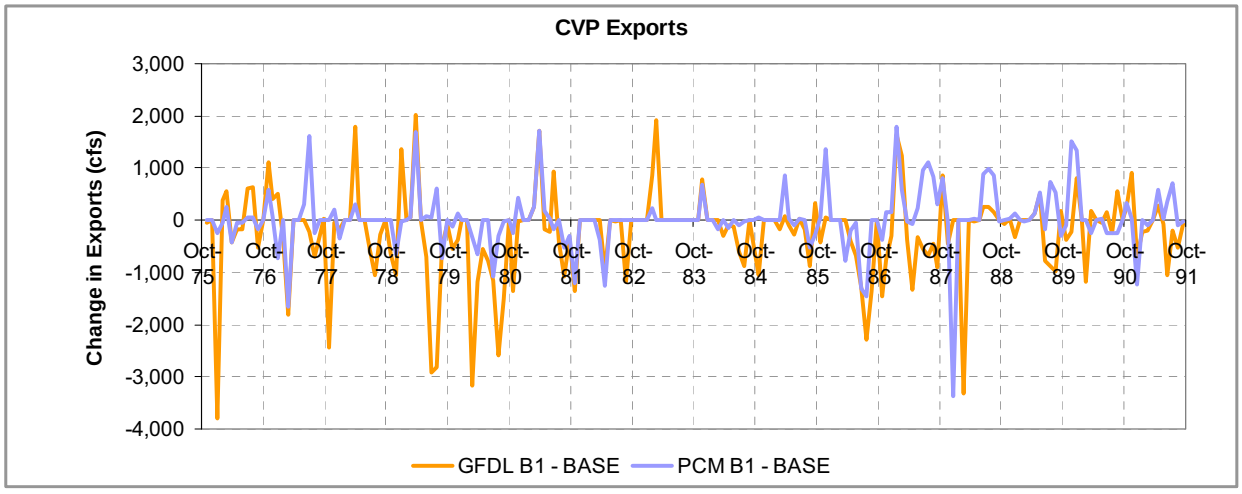


Figure 5.8: Delta Exports from the Central Valley Project

5.4 Climate Change Impacts on Water Quality for Present Sea Level Conditions

Initial analysis of potential impacts of climate change on Delta water quality for present sea level conditions focuses on compliance with selected Delta water quality standards from the Water Quality Control Plan and the State Water Resources Control Board Decision 1641 (D1641) (SWRCB, 1995). Analysis of other water quality parameters of concern, such as disinfection by-product formation potential is beyond the scope of this report. Initial analysis focused on specified limits for chloride concentrations (Table 5.9) at four municipal and industrial intake locations (Figure 5.9). Chloride mass loadings at each intake were also examined. All results are preliminary and incorporate several assumptions (see Section 5.2.3). These preliminary results are intended to illustrate the use of CalSim-II and DSM2 for climate change impacts assessment. The results are not sufficient by themselves for making policy decisions.

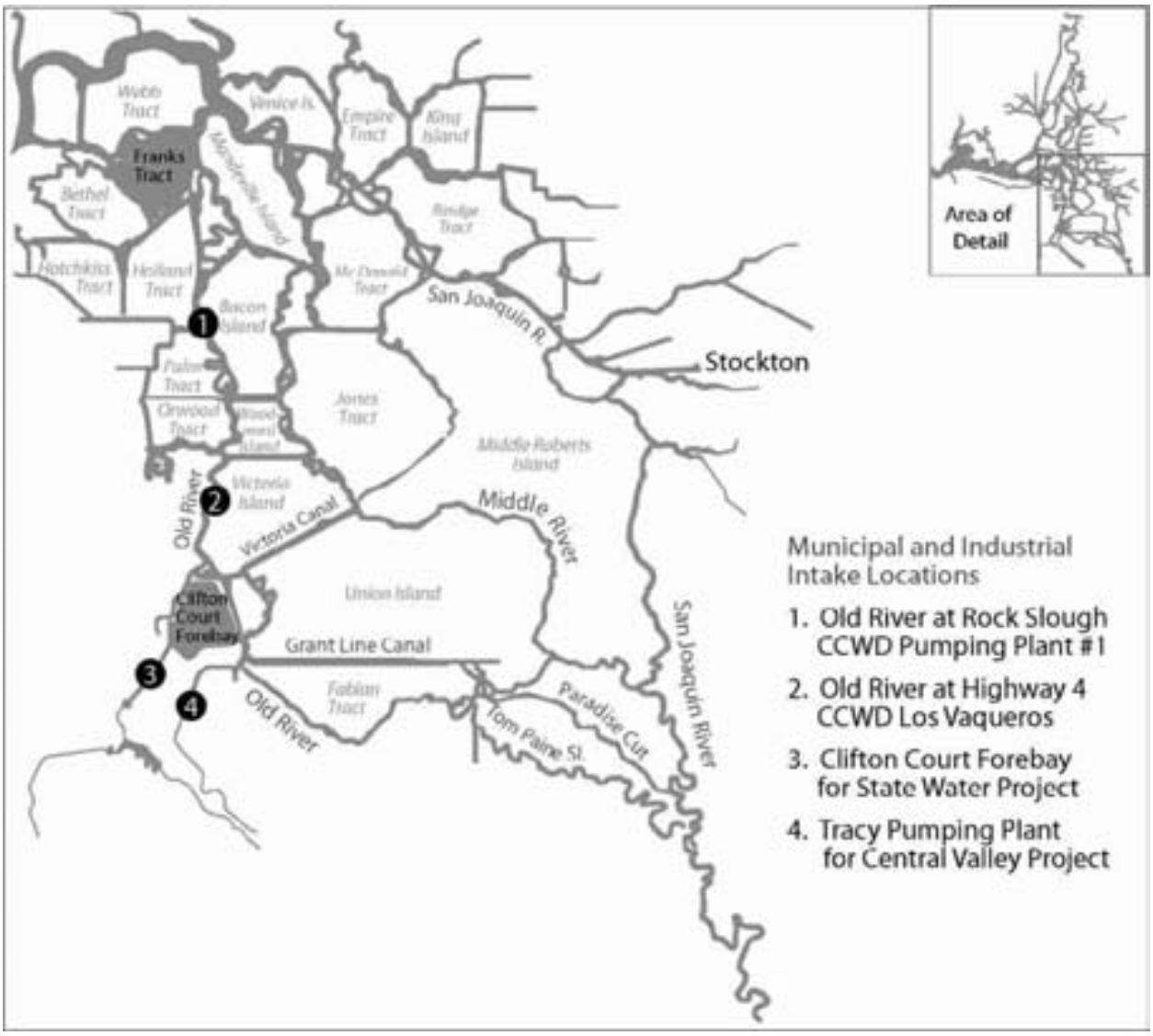


Figure 5.9: Delta Water Quality Impact Analysis Locations

Table 5.9: Delta Water Quality Standards

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Municipal and Industrial Compliance Locations	Daily average Cl < 250 mg/l											
Contra Costa Pumping Plant #1	Cl<150 mg/l for a required # of days based on year type											

5.4.1 Municipal and Industrial Water Quality for Present Sea Level Conditions

For this study, two municipal and industrial chloride standards from D1641 (SWRCB, 1995) were examined. The first standard specifies that maximum allowable daily average chloride concentrations can not exceed 250mg/l (Table 5.9). The second standard states that daily average chloride concentrations must be less than 150 mg/l for a specified number of days per calendar year based on the water year type (Table 5.10). This second chloride standard also requires that chloride concentration must be less than 150 mg/l for two consecutive weeks before those days can be counted towards meeting the standard.

Table 5.10: D1641 150 mg/l Chloride Standard

Water Year Type	Minimum Number of Days with Chloride Concentration ≤ 150 mg/l
Wet	240 (60% of the time)
Above Normal	190 (52% of the time)
Below Normal	175 (48% of the time)
Dry	165 (45% of the time)
Critical	155 (42% of the time)

*Chloride concentrations must be below 150 mg/l for at least two weeks before those days can be counted towards meeting the standard.

CalSim-II and DSM2 results were analyzed to determine compliance with the chloride standards at four municipal and industrial intakes (Figure 5.9) for the base and climate change scenarios:

- CCWD at Old River diversion at Rock Slough (for Contra Costa Canal)
- CCWD at Old River diversion at Highway 4 (for Los Vaqueros)
- SWP at Clifton Court Forebay
- CVP at Tracy

For these studies in both CalSim-II and DSM2, Contra Costa Water District's diversions were all withdrawn from Old River at Rock Slough[2]. This assumption could have local impacts on hydrodynamics and water quality. Although CCWD diversions were not simulated at Old River at Highway 4, water quality results are presented for that location since it is a potential diversion point.

In CalSim-II, the Artificial Neural Network (ANN) that represents Delta water quality provides chloride concentrations at a few Delta locations. The DSM2 simulations for this study determined EC concentrations throughout the Delta. These EC values can be converted to chloride concentrations using regression relationships based on field data (e.g. Suits, 2001 or Freeport, 2003[3]). For the analysis presented in this chapter, the simulated EC concentrations were converted to chlorides using the following equations from Suits (2001):

Contra Costa Water District Old River Diversion at Rock Slough

$$Cl = \frac{EC - 89.6}{3.73} \qquad \text{Eqn 5.1}$$

Old River at Highway 4, SWP at Clifton Court and CVP at Tracy

$$Cl = \frac{EC - 160.6}{3.66} \qquad \text{Eqn 5.2}$$

where,

Cl = chloride concentration in mg/l

EC = electrical conductivity in uS/cm

5.4.1.1 250 mg/l Chloride Standard

Monthly Average Results

One of the municipal and industrial beneficial use standards in D1641 specifies a maximum daily chloride concentration of 250 mg/l (Table 5.9). CalSim-II simulations attempt to meet this standard at Old River at Rock Slough. Monthly time step CalSim-II simulations represent this standard by setting a monthly average chloride target at Old River at Rock Slough of 225 mg/l. In CalSim-II the monthly average chloride concentrations at Rock Slough are determined by an ANN. CalSim-II tries to operate the system to meet the maximum allowable chloride standard at all time, but that isn't always possible (Table 5.11). For the base case, the 225mg/l chloride

[2] CalSimII calculates CCWD's combined Old River at Rock Slough (Contra Costa Canal) and Old River at Highway 4 (Los Vaqueros) diversions. For DSM2 studies, these combined diversions are taken from Old River at Rock Slough. In order to represent the two diversions separately, it would be necessary to develop a series of rules to emulate the CCWD operation of those diversions.

[3] Examining long term average chloride concentrations at Old River at Rock Slough using two sets of regression relationships, chloride concentrations from the Suits (2001) regression equation were an average of about 15mg/l higher than chloride concentrations determined from the Freeport (2003) regression equations.

target was met about 92 percent of the time for the DSM2 analysis period of wy1976-wy1991. Times when the target maximum chloride concentration was not met occurred in November to January. For the four climate change scenarios, the percent time for meeting the maximum chloride concentration target was met differed from the base case by less than 2 percent.

Table 5.11: Percent of Time Monthly Average Chloride Concentration <225mg/l

	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
CalSim-II results	92.2	91.1	92.2	90.1	93.8
DSM2 results	92.7	95.3	94.8	95.8	93.8

Monthly system operations from CalSim-II are used to run the more detailed Delta model, DSM2. DSM2 runs on a 15-minute time step and includes physically-based descriptions of flow and water quality constituent transport. DSM2 represents the spring-neap tidal cycle and diversions to and return flows from Delta islands. Thus, chloride concentrations simulated by the physically-based model DSM2 can differ from those estimated by the correlation-based ANN in CalSim-II. For studies in this report, average differences in monthly average chloride concentration at Old River at Rock Slough were about 5mg/l lower for the DSM2 simulations than for the ANN results. For comparison purposes, the percent time that the monthly average chloride concentrations at Rock Slough were less than the 225 mg/l target for both CalSim-II and DSM2 results are shown in Table 5.11. Since the DSM2 simulations tend to have slightly lower chloride concentrations that those estimated by the ANN, the monthly average DSM2 simulation results are less than 225 mg/l a bit more frequently than the CalSim-II results.

Daily Average Results

Daily average EC results from DSM2 for the 16-year simulation period were converted to daily average chloride concentrations using equations 5.1 and 5.2. Exceedance plots for daily average chloride concentrations at Rock Slough are shown in Figure 5.10. Percentiles and average chloride concentrations are shown in Table 5.12. Exceedance plots and percentile tables for other municipal and industrial intake locations are presented in the appendix in section 5.12. The distribution of chloride concentrations is similar for the base case and climate change scenarios at all four municipal and industrial intake locations.

Daily average chloride concentrations based on DSM2 simulation results can be used to examine compliance with the 250 mg/l maximum allowable daily average chloride concentration standard (Table 5.9). Compliance with the maximum daily average chloride concentration standard is given in Table 5.13. Increases in chloride standard compliance for the climate change scenarios relative to the base case are shown in Table 5.14. At Old River at Rock Slough, compliance with the 250 mg/l standard is at least 97 percent for all scenarios. Compliance was reduced in September through February of dry years when freshwater inflows to the Delta are low, which leads to higher salt intrusion from the ocean. Increased winter runoff for the climate change scenarios lead to slight improvements in compliance with the chloride standard at Old River at Rock Slough. There was complete compliance with the 250 mg/l standard for SWP and CVP intakes for all of the scenarios.

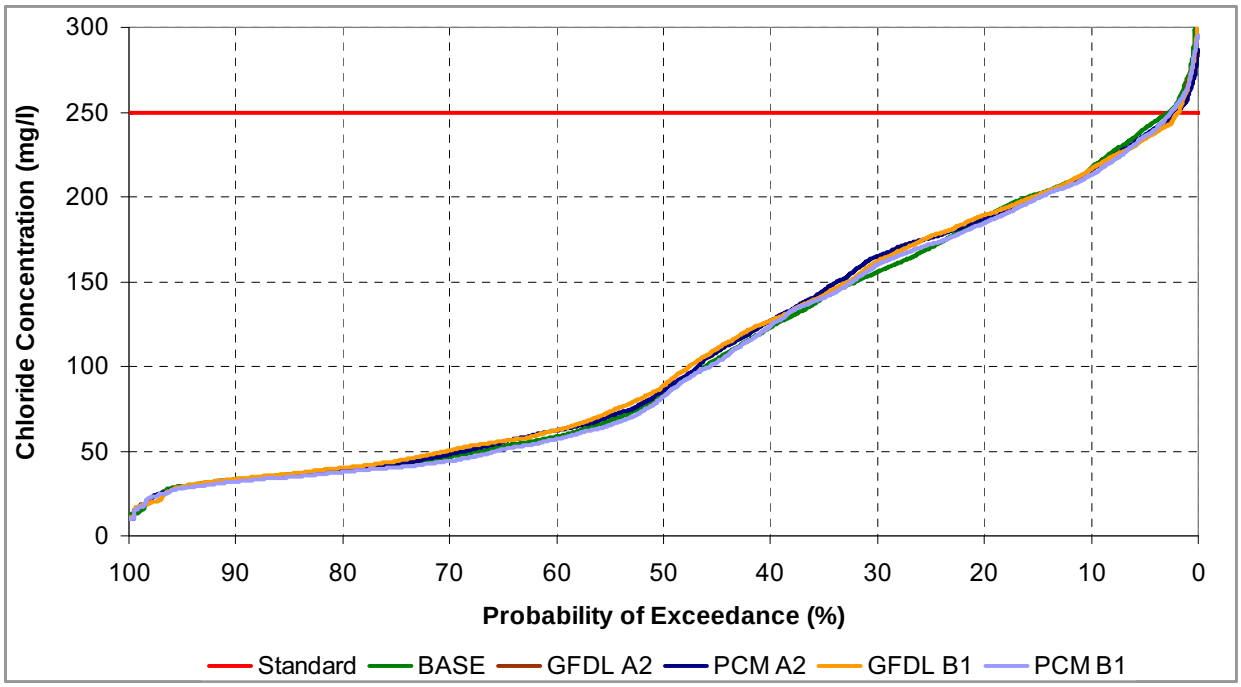


Figure 5.10: Probability of Exceedance for Chlorides at Old River at Rock Slough

Table 5.12: Chloride Concentration Percentiles for Old River at Rock Slough (mg/l)

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	30	33	42	83	170	217	240	109
GFDL A2	27	33	43	89	175	217	234	110
PCM A2	29	33	43	86	176	216	236	110
GFDL B1	29	34	44	89	177	216	234	111
PCM B1	28	32	40	82	172	213	236	107

Examining the daily average chloride concentrations from DSM2 resulted in higher compliance values for the 250 mg/l maximum chloride concentration standard at Old River at Rock Slough (Table 5.13) than the estimated compliance from examining the monthly average results from CalSim-II relative to the target monthly average chloride concentration of 225mg/l (Table 5.11). For these studies, the 225 mg/l target monthly average chloride concentration in CalSim-II provides a conservative estimate of compliance with of the daily average 250 mg/l maximum chloride concentration standard.

Although the Contra Costa Water District intake at Old River at Highway 4 is not a D1641 compliance location, chloride concentrations were also examined at that location. At Old River at Highway 4, daily average chloride concentrations were less than 250 mg/l 99.9 percent of the time for the base case and 100 percent of the time for the four climate change scenarios. There was complete compliance with the 250 mg/l chloride standard at the SWP and CVP intakes for all scenarios. These results demonstrate that existing flexibility in the system was able to accommodate changing reservoir inflows due to climate change with only minor impacts to compliance with the 250 mg/l chloride standard.

Table 5.13: Municipal and Industrial Intake Chloride Standard Compliance

Scenario/ Location	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
CCWD-Old River at Rock Sl.	97.2%	98.0%	98.0%	98.2%	97.4%
CCWD-Old River at Hwy 4*	99.9%	100%	100%	100%	100%
SWP-Clifton Court	100%	100%	100%	100%	100%
CVP-Tracy	100%	100%	100%	100%	100%

* Contra Costa Water District's intake at Old River at Highway 4 is not a compliance location for D1641. It is shown for comparison purposes.

Table 5.14: Change in Municipal and Industrial Intake Chloride Standard Compliance

Scenario/ Location	GFDL A2	PCM A2	GFDL B1	PCM B1
CCWD-Old River at Rock Sl.	0.8%	0.8%	0.9%	0.2%
CCWD-Old River at Hwy 4*	0.1%	0.1%	0.1%	0.1%
SWP-Clifton Court	0.0%	0.0%	0.0%	0.0%
CVP-Tracy	0.0%	0.0%	0.0%	0.0%

* Contra Costa Water District's intake at Old River at Highway 4 is not a compliance location for D1641. It is shown for comparison purposes.

5.4.1.2 150 mg/l Chloride Standard

At Old River at Rock Slough, another water quality standard states that the daily average chloride concentration should be below 150 mg/l for a specified number of days per calendar year depending on the water year type (Table 5.9 and Table 5.10). This standard also states that chloride concentrations must be below 150mg/l for at least two weeks before those days can be counted towards meeting the standard. Daily average chloride concentrations were computed from DSM2 EC results using equation 5.1. There was complete compliance with this standard for the base case or the two A2 scenarios (Table 5.15). For the two B1 scenarios, compliance

with the standard was reduced during a dry year. The values in Table 5.15 reflect the requirement that chloride concentrations be less than 150 mg/l for at least two weeks before those days can be counted toward the standard. For these studies, the compliance pattern does not change for any of the scenarios if all days with chloride concentrations less than 150 mg/l are considered. For the two cases that had non-compliance, the number of days with chloride concentrations less than 150 mg/l with and without the 2 consecutive week requirement is shown in Table 5.16. In most cases, existing system flexibility was able to adjust to climate change while maintaining compliance with the 150 mg/l chloride standard.

Table 5.15: Old River at Rock Slough 150mg/l Chloride Standard Compliance
Number of days that chloride concentrations were below 150 mg/l for at least 2 weeks

Year	Yr. Type*	Standard: Min Days Cl≤150 mg/l	Base	GFDL A2	PCM A2	GFDL B1	PCM B1
1976	C	155	177	168	169	167	178
1977	C	155	161	190	169	170	158
1978	AN	190	247	255	250	259	250
1979	BN	175	259	264	239	264	247
1980	AN	190	269	265	262	264	262
1981	D	165	260	275	261	257	261
1982	W	240	365	365	365	365	365
1983	W	240	365	365	365	365	365
1984	W	240	295	306	306	307	296
1985	D	165	216	211	199	215	223
1986	W	240	287	252	259	252	258
1987	D	165	176	196	187	197	217
1988	C	155	230	236	229	234	245
1989	D	165	184	169	170	**153**	**139**
1990	C	155	222	195	195	196	210

*Sac 40-30-30 water year types: W=Wet, AN=Above Normal, BN=Below Normal, D=Dry, C=Critical
Gray shading and bold text indicate non-compliance with the standard.

Table 5.16: Effect of 2 Week Requirement on 150mg/l Chloride Standard Compliance for Two Climate Change Scenarios at Old River at Rock Slough

	Year	Yr. Type*	Standard: Min Days Cl≤150 mg/l	Number of Days Cl≤150 mg/l	
				GFDL B1	PCM B1
# Days with Cl≤150 mg/l for at least 2 weeks	1989	D	165	**153**	**139**
Total # Days with Cl≤150 mg/l	1989	D	165	**156**	**155**

*Sac 40-30-30 water year types: W=Wet, AN=Above Normal, BN=Below Normal, D=Dry, C=Critical
Gray shading and bold text indicate non-compliance with the standard.
Results are only shown for scenarios that did not comply with the standard (see Table 5.15)

5.4.1.3 Chloride Mass Loading Rates

Chloride mass loadings at municipal and industrial intakes were estimated using equation 5.3. The mass loading estimates for CCWD are based on the combined diversion rate for CCWD's Old River diversions at Rock Slough and Highway 4 and the chloride concentrations at Rock Slough (see footnote 2 on page 5-1 for explanation of combined diversions).

$$Cl\ MassLoading\ (metric\ tons/day) = Cl\ (mg/l) * Exports\ (cfs) * \underbrace{2.832x10^{-8}}_{\frac{mg}{l}\ to\ \frac{metric\ tons}{ft3}} * \underbrace{86{,}400}_{\frac{ft^3}{\sec}\ to\ \frac{ft^3}{day}} \qquad \text{Eqn 5.3}$$

Since the export rates at Old River at Rock Slough are the same for all of the scenarios (Table 5.39), the chloride mass loadings are similar for all of the scenarios (Table 5.17). Export rates for the SWP and CVP vary for each scenario (Table 5.37 and Table 5.38). Mass loadings for the SWP and CVP are an order of magnitude higher than those at Rock Slough because the export rates at those locations are also an order of magnitude higher (Table 5.37 and Table 5.38). For the SWP, average chloride mass loadings decrease by 4 percent-9 percent for the climate change scenarios relative to the base case (Table 5.18). For the CVP, the B1 scenarios show little change relative to the base case, while the A2 scenarios have about 5 percent lower chloride mass loadings than the base case (Table 5.19). Reduced chloride mass loadings for the climate change scenarios are due to reduced export rates for those scenarios.

Table 5.17: Chloride Mass Loading Percentiles (metric tons/day) for Old River at Rock Slough

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	0*	9	19	45	80	115	146	54
GFDL A2	0	7	20	47	77	119	141	54
PCM A2	0	9	20	47	77	113	145	54
GFDL B1	0	8	20	47	78	119	140	55
PCM B1	0	9	19	45	77	115	148	54

*Zero values reflect times when no diversions were made.

Table 5.18: Chloride Mass Loading Percentiles (metric tons/day) for State Water Project

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	48	80	264	460	1086	1763	2068	711
GFDL A2	48	73	247	480	923	1387	1713	646
PCM A2	48	69	255	451	957	1560	1945	667
GFDL B1	47	71	230	477	951	1495	1883	670
PCM B1	47	75	265	459	1009	1660	1954	685

Table 5.19: Chloride Mass Loading Percentiles (metric tons/day) for Central Valley Project

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	59	146	317	575	1037	1325	1540	686
GFDL A2	56	145	271	534	1001	1260	1444	648
PCM A2	53	142	314	532	1074	1305	1413	663
GFDL B1	65	164	340	560	1050	1282	1475	686
PCM B1	51	118	337	582	1056	1267	1491	688

5.5 Sea Level Rise

Historical records show that in the 20th century sea levels rose globally with an average increase ranging from 3.9 in to 7.9 in (IPCC, 2001). Over the past 100 years, sea level at Golden Gate has risen more than 8 inches (Figure 5.11) (Roos, 2004). Sea levels are expected to continue to rise under global warming due to thermal expansion of the ocean and melting of glaciers and polar ice caps. Simulations of future climate change for all of the Intergovernmental Panel on Climate Change's (IPCC's) emissions scenarios show increases in global sea levels ranging from 0.3 feet to 2.9 feet (IPCC, 2001).

For California's water supply, the largest effect of sea level rise (SLR) would likely be in the Sacramento-San Joaquin Delta (DWR, 2005). Rising sea levels would increase pressure on the levees that protect the Delta islands, many of which are below sea level. A one-foot increase in sea level is projected to increase the frequency of a 100-year peak tide to a 10-year event (DWR, 2005). Increased intrusion of salt water from the ocean into the Delta could degrade the quality of the freshwater that is pumped out of the Delta for municipal, industrial and agricultural purposes. This could lead to increased releases of water from upstream reservoirs or reduced pumping from the Delta to maintain compliance with Delta water quality standards. Salt water intrusion could also degrade groundwater aquifers. Additional information on sea level rise can be found in Chapter 2 in section 2.6.

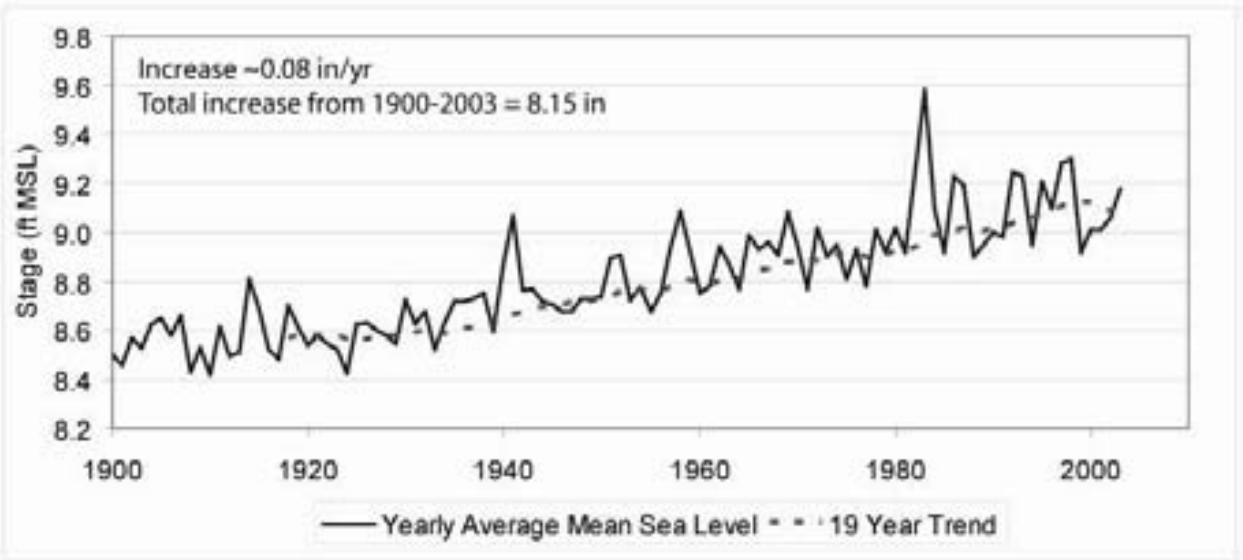


Figure 5.11 Historical Annual Mean Sea Level at Golden Gate, 1900-2003

5.5.1 Analysis Approach

In order to do a complete analysis of potential sea level rise impacts on the Delta, both increased salt intrusion and changes in system operations such as reservoir releases and Delta exports would need to be examined. Currently an analysis tool is not available to determine changes in system operations required to lessen the effects of increased salt intrusion due to sea level rise. However, existing tools can be used to quantify potential salt intrusion into the Delta for sea level rise with present system operations. The results of such studies improve understanding of the salinity transport in the Delta and provide an important starting point for the development of tools and analysis techniques for determining changes in system operations to maintain compliance with Delta water quality standards for sea level rise conditions. In this report water quality concentrations for a one-foot sea level rise without changes in system operations are compared to water quality standards. This information is presented as a surrogate for evaluating the effects of sea level rise on water project operations to meet existing standards.

This report provides preliminary assessments of potential impacts of sea level rise on Delta water quality and on levee overtopping potential assuming present system operations. Additional information on possible effects of sea level rise on the Delta, such as increasing the risk of levee failures, is presented in Chapter 2 in section 2.6. These studies are a first step in developing a more complete sea level rise analysis approach. All results are preliminary and are intended to illustrate the use of DSM2 for sea level rise analysis.

Preliminary modeling studies were conducted to assess potential effects of a one-foot rise in sea level on the Delta. DSM2 simulations were run for

- Present sea level with base case system operations (see section 5.4)
- Present sea level with system operations modified for climate change (see sections 5.4)
- One-foot sea level rise with base case system operations (see sections 5.5.2 and 5.5.4)
- One-foot sea level rise with system operations modified for climate change (see sections 5.5.3 and 5.5.4)

For all of the sea level rise scenarios, the tidal stage (water level) was increased uniformly by one-foot at the DSM2 downstream boundary at Martinez. This assumes that sea level rise does not change the tidal period or amplitude. Representation of Martinez EC for the sea level rise simulations is described in section 5.5.1.1. All other Delta inflows, exports and water quality boundary conditions were identical to the present sea level simulations (see sections 5.3 and 5.11). No operational changes were made to lessen potential effects of sea level rise.

Water quality analysis for the sea level rise scenarios focused on the comparisons of simulated constituent concentrations compared to standard thresholds for the municipal and industrial intakes (Table 5.9). These results are a demonstration of a preliminary application of DSM2 to access water quality changes for a one foot rise in sea level. The results do not reflect operations changes to try to reduce the effects of salt water intrusion from sea level rise, and therefore the results by themselves are not sufficient for making management decisions.

5.5.1.1 Martinez Salinity for Sea Level Rise Scenarios

One area of uncertainty in modeling sea level rise conditions with DSM2 is the representation of salt water intrusion at Martinez, the downstream boundary for DSM2. For this report, two assumptions were used for estimating salinity at Martinez for a one-foot sea level rise (Anderson and Miller, 2005):

- Assume Martinez EC is the same as in the present sea level scenarios
- Increase Martinez EC based on a regression relationship (equation 5.4)

Comparing results for DSM2 studies using each of these assumptions for Martinez EC provides a range of potential effects of a one-foot rise in sea level.

Assume Martinez EC Does Not Change

The first method used to estimate Martinez EC for a one-foot rise in sea level was to assume that the EC is the same as in the present sea level scenario. This provides a lower-bound estimate of salt water intrusion into the Delta for a one-foot increase in sea level.

Assume Martinez EC Increases

The second method used to estimate Martinez EC for a one-foot rise in sea level was to use a preliminary regression relationship based on the Martinez EC for present sea level conditions (Anderson and Miller, 2005):

$$MartinezEC_{1\,ft\,SLR} = 1.0022 * MartinezEC_{Present\,Sea\,Level} + 840.87 \qquad \text{Eqn. 5-4}$$

This regression relationship was based on results from a preliminary one year (calendar year 1992) multi-dimensional modeling study using models from Resource Management Associates (RMA). Since the effects of sea level rise on EC at the DSM2 downstream boundary at Martinez had not been quantified, a multi-dimensional modeling study was done to represent flows and salt water intrusion from Golden Gate into the Delta for a one-foot sea level rise (Figure 5.12). Results from the RMA modeling studies at Martinez for base and one-foot sea level rise conditions were used to develop the regression relationship shown in equation 5-4 (Figure 5.13). This regression relationship can be used to estimate Martinez EC for a one-foot sea level rise for DSM2 simulations.

Equation 5-4 is only applicable for a one-foot rise in sea level. Since this relationship is linear with a coefficient of nearly 1 (1.0022), equation 5-4 indicates that a one-foot rise in sea level at Golden Gate corresponds to an approximate increase in EC at Martinez of 840 uS/cm. Therefore use of this regression equation to estimate the Martinez EC for a one-foot rise in sea level will provide a higher estimate of salt water intrusion than using the assumption that the Martinez EC does not change. An increase in EC of 840 uS/cm is relatively small during time periods when Martinez EC is high (20,000-35,000 uS/cm) and freshwater inflows are low and salt water intrusion is of most concern, typically during the summer and early fall.

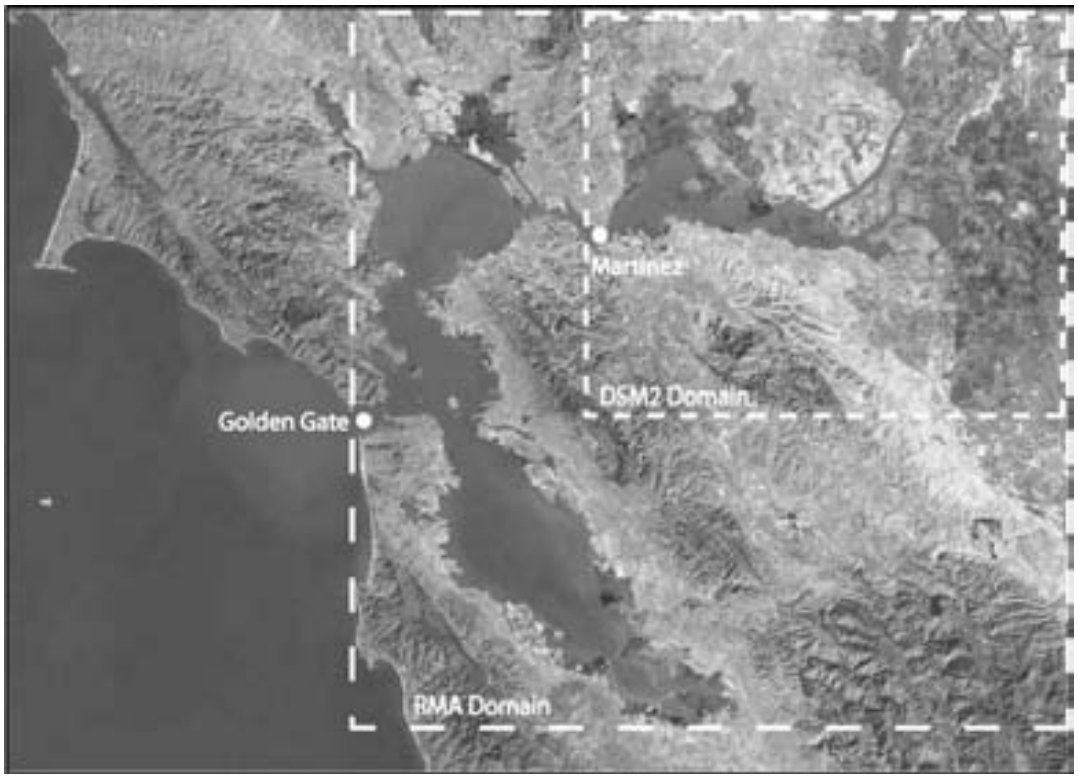


Figure 5.12 Modeling Domains for RMA and DSM2
Satellite image from USGS. (Anderson and Miller, 2005)

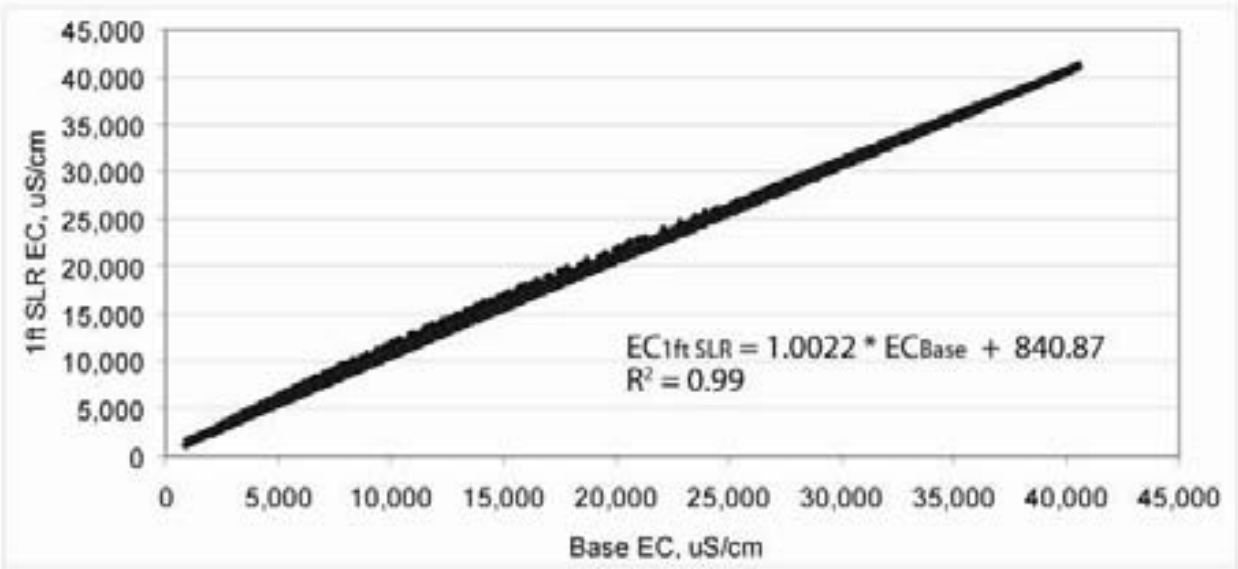


Figure 5.13: Regression Relationship for EC at Martinez for a One-Foot Sea Level Rise.
(Anderson and Miller, 2005)

The RMA modeling study from which the regression relationship in equation 5-4 was developed was a preliminary study that included the following assumptions:

- Historical tidal stage at Golden Gate was increased uniformly by one-foot,
- Ocean salinity is not affected by sea level rise [the same EC boundary condition of a constant ocean salinity was applied for both the base and 1ft SLR scenarios],
- Historical Delta inflows and exports were not modified to mitigate for salt water intrusion due to sea level rise [historical Delta inflows and exports were used for both the base and 1ft SLR scenarios],
- Agricultural return flows do not significantly affect EC at Martinez [Delta island diversions and return flows were not simulated],
- Temporary agricultural and fish barriers in the South Delta were not simulated, and
- Historical Delta inflows and exports for 1992 provide adequate ranges of flows and EC to develop an EC relationship at Martinez for one-foot sea level rise conditions that can be applied for any time period.

5.5.2 Sea Level Rise Effects on Delta Water Quality

Potential effects of a one-foot rise in sea level on Delta water quality were examined for DSM2 results using two different assumptions regarding Martinez EC (see section 5.5.1.1)

- Assume Martinez EC is the same as in the present sea level scenarios
- Assume that Martinez EC increases for a one-foot sea level rise

These results are a preliminary demonstration of the use of DSM2 to estimate a range of impacts given uncertainties in quantifying how much salt would be transported into the Delta under sea level rise with no modifications to system operations to try to reduce the salt water intrusion. Several assumptions that are involved in these studies are described in sections 5.2.3 and 5.5.1.1. Since available methodologies didn't allow consideration of changes to system operations for sea level rise scenarios, simulated constituent concentrations are compared with threshold values for selected water quality standards as a surrogate for evaluating the effects of sea level rise on water project operations to meet existing standards.

Daily average EC results from DSM2 for the 16-year simulation period were converted to daily average chloride concentrations using equations 5.1 and 5.2. Exceedance plots for daily average chloride concentrations at Rock Slough are shown in Figure 5.14. Percentiles and average chloride concentrations are shown in Table 5.20. Exceedance plots and percentile tables for other municipal and industrial intake locations are presented in the appendix in section 5.13. The sea level rise scenarios show an average increase in chloride concentrations of 15-20mg/l compared to the base case. Differences between the two sea level rise scenarios are typically 5-10mg/l. This indicates that raising the water levels at Martinez has more of an impact on chloride concentrations at Old River at Rock Slough than raising the Martinez salt concentrations. For

the SWP and CVP, the average increase in chloride concentrations was about 10 mg/l (see section 5.13). Differences between the two sea level rise scenarios were less than 2mg/l.

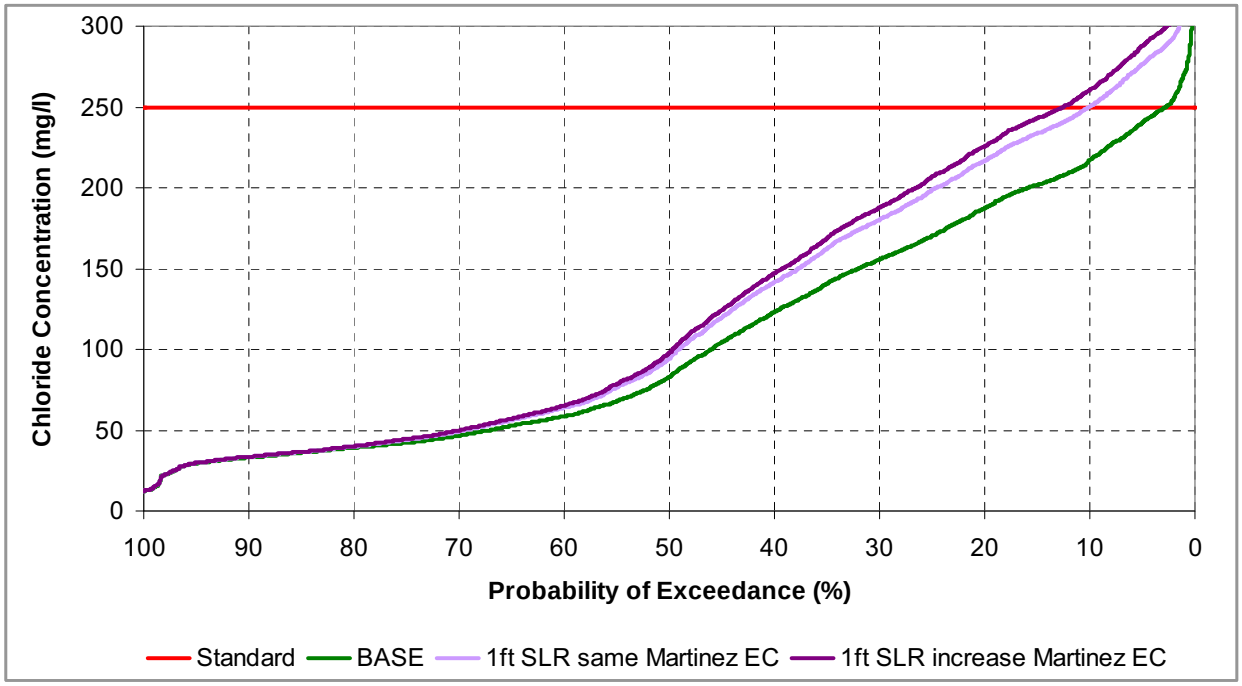


Figure 5.14: Probability of Exceedance for Chlorides at Old R. at Rock Sl. for a One-Foot Sea Level Rise and no Changes in System Operations

Table 5.20: Chloride Concentration Percentiles (mg/l) for Old R. at Rock Sl. for a One-Foot Sea Level Rise and no Changes in System Operations

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	30	33	42	83	170	217	240	109
1ft SLR same Martinez EC	30	33	44	94	199	250	276	123
1ft SLR increase Martinez EC	30	34	45	98	207	261	288	128

5.5.2.1 250 mg/l Chloride Threshold for Sea Level Rise Scenarios

Daily average chloride concentrations based on DSM2 simulation results for the two sea level rise scenarios without any changes in system operations were compared with the 250 mg/l maximum allowable daily average chloride concentration threshold (Table 5.9). The frequency that chloride concentrations were below the 250 mg/l threshold is presented in Table 5.21. Changes in the frequency that concentrations were below the threshold for sea level rise relative to the base case are shown in Table 5.22. For the base case, chloride concentrations are below the 250 mg/l chloride threshold at Old River at Rock Slough about 97 percent of the time. For the two sea level rise scenarios, chloride concentrations are below the threshold value at Old River at Rock Slough 88 percent to 90 percent of the time. For the scenario that assumes an

increase in EC at Martinez the threshold value is exceeded about 2.5 percent more often than for the scenario that assumes that the EC at Martinez does not change. Chloride concentrations rarely exceeded 250mg/l at Old River at Highway 4 for both the base and the sea level rise scenarios. The 250 mg/l threshold was never exceeded at both the SWP and CVP for the base case and sea level rise scenarios.

Table 5.21: Frequency that Chloride Concentrations were below the 250 mg/l Threshold for a One-Foot Sea Level Rise and no Changes in System Operations

Scenario/ Location	BASE	1ft Sea Level Rise same Martinez EC	1ft Sea Level Rise increase Martinez EC
CCWD-Old River at Rock Sl.	97.2%	89.9%	87.5%
CCWD-Old River at Hwy 4	99.9%	99.7%	99.4%
SWP-Clifton Court	100%	100%	100%
CVP-Tracy	100%	100%	100%

Table 5.22: Change in Frequency that Chloride Concentrations were below the 250mg/l Threshold for a One-Foot Sea Level Rise and no Changes in System Operations Compared to the Base Case

Scenario/ Location	1ft Sea Level Rise same Martinez EC	1ft Sea Level Rise increase Martinez EC
CCWD-Old River at Rock Sl.	-7.3%	-9.8%
CCWD-Old River at Hwy 4	-0.2%	-0.5%
SWP-Clifton Court	0%	0%
CVP-Tracy	0%	0%

5.5.2.2 150 mg/l Chloride Threshold for Sea Level Rise Scenarios

For the two sea level rise scenarios with no changes in system operations, daily average chloride concentrations were computed from DSM2 EC results using equation 5.1, and the results were compared to the 150 mg/l threshold (Table 5.9 and Table 5.10). There was complete compliance with the 150 mg/l standard in the base case (Table 5.23). For the sea level rise scenario that assumed no change in Martinez EC, the 150 mg/l threshold was exceeded in the critically dry years of 1976 and 1977. For the sea level rise scenario that assumed an increase in Martinez EC, the 150 mg/l threshold was exceeded in 1976, 1977, and 1989, a dry year. In most cases, existing operations lead to chloride concentrations below the 150 mg/l threshold, even under sea level rise conditions.

Table 5.23: Comparison of Chloride Concentrations to the 150 mg/l Threshold at Old River at Rock Sl. for a One-Foot Sea Level Rise and no Changes in System Operations Number of days with chloride concentrations below 150 mg/l

Year	Yr. Type*	Min Days Cl≤150 mg/l	Base	1ft SLR same Martinez EC	1ft SLR increase Martinez EC
1976	C	155	177	**126**	**118**
1977	C	155	161	**102**	**94**
1978	AN	190	247	240	237
1979	BN	175	259	226	223
1980	AN	190	269	263	261
1981	D	165	260	232	217
1982	W	240	365	365	365
1983	W	240	365	365	365
1984	W	240	295	289	288
1985	D	165	216	198	197
1986	W	240	287	265	257
1987	D	165	176	168	165
1988	C	155	230	209	206
1989	D	165	184	166	**162**
1990	C	155	222	181	176

*Sac 40-30-30 water year types: W=Wet, AN=Above Normal, BN=Below Normal, D=Dry, C=Critical
Gray shading and bold text indicate values that exceeded the threshold.

5.5.2.3 Chloride Mass Loading for Sea Level Rise Scenarios

Chloride mass loadings at municipal and industrial intakes were estimated based on chloride concentrations and export rates (equation 5.3). The mass loading estimates for CCWD are based on the combined diversion rate for CCWD's Old River diversions at Rock Slough and Highway 4 and the chloride concentrations at Rock Slough (see footnote 2 on page 5-1 for explanation of combined diversions). Since operations were not changed to try to lessen the effects of sea level rise, the export rates for each intake were the same for the base and sea level rise scenarios. Thus differences in mass loading rates are due only to differences in chloride concentrations.

For all intake locations, sea level rise increased the average chloride mass loadings by 13 percent-17 percent for Old River at Rock Slough, by 11 percent-14 percent for the SWP and by 7 percent-9 percent for the CVP. These ranges reflect the two sea level rise assumptions of no change in Martinez EC and increasing Martinez EC. The sea level rise scenarios increased the chloride mass loadings, and the climate change scenarios decreased them (see section 5.4.1.3). The combined affects of sea level rise and climate change are presented in section (5.5.3.3).

Table 5.24: Chloride Mass Loading Percentiles (metric tons/day) for Old River at Rock Slough for a One-Foot Sea Level Rise with no Changes in System Operations

	5%	10%	25%	50%	75%	90%	95%	Avg
Base	0	9	19	45	80	115	146	54
1ft SLR same Martinez EC	0	9	20	50	92	132	165	61
1 ft SLR increase Martinez EC	0	9	20	51	96	138	172	63

Table 5.25: Chloride Mass Loading Percentiles (metric tons/day) for State Water Project for a One-Foot Sea Level Rise and no Changes in System Operations

	5%	10%	25%	50%	75%	90%	95%	Avg
Base	48	80	264	460	1086	1763	2068	711
1ft SLR same Martinez EC	49	84	267	514	1202	1925	2299	786
1 ft SLR increase Martinez EC	50	86	270	527	1238	2014	2394	812

Table 5.26: Chloride Mass Loading Percentiles (metric tons/day) for Central Valley Project for a One-Foot Sea Level Rise and no Changes in System Operations

	5%	10%	25%	50%	75%	90%	95%	Avg
Base	59	146	317	575	1037	1325	1540	686
1ft SLR same Martinez EC	58	147	328	611	1140	1433	1648	734
1 ft SLR increase Martinez EC	58	147	331	618	1163	1461	1696	749

5.5.3 Combined Climate Change and Sea Level Rise Effects on Delta Water Quality

Potential effects of a one-foot rise in sea level coupled with shifting precipitation and runoff patterns from climate change were examined. The results are preliminary and reflect several assumptions (see section 5.2.3) including:

- Martinez EC is the same as in the present sea level scenarios. Due to time constraints for this report, combined sea level rise and climate change scenarios were not run for the increased Martinez EC sea level rise scenario.
- System operations were only modified to reflect the changing precipitation and runoff patterns due to climate change. System operations were not modified to account for sea level rise.

For the combined sea level rise and climate change scenarios, daily average EC results from DSM2 for the 16-year simulation period were converted to daily average chloride concentrations using equations 5.1 and 5.2. Exceedance plots for daily average chloride concentrations at Rock Slough for the combined climate change and one-foot sea level rise scenarios with no changes to system operations for sea level rise are shown in Figure 5.15. Percentiles and average chloride concentrations are shown in Table 5.27. Exceedance plots and percentile tables for other municipal and industrial intake locations are presented in the appendix in section 5.14. For the combined climate change and sea level rise scenarios, average increases in chloride concentrations range from13-17mg/l compared to the base case. For the SWP and CVP, the average increase in chloride concentrations for the combined climate change and sea level rise scenarios was about 10 mg/l (see section 5.14).For all of these intakes, the increases in chloride concentrations are similar to increases due to sea level rise alone.

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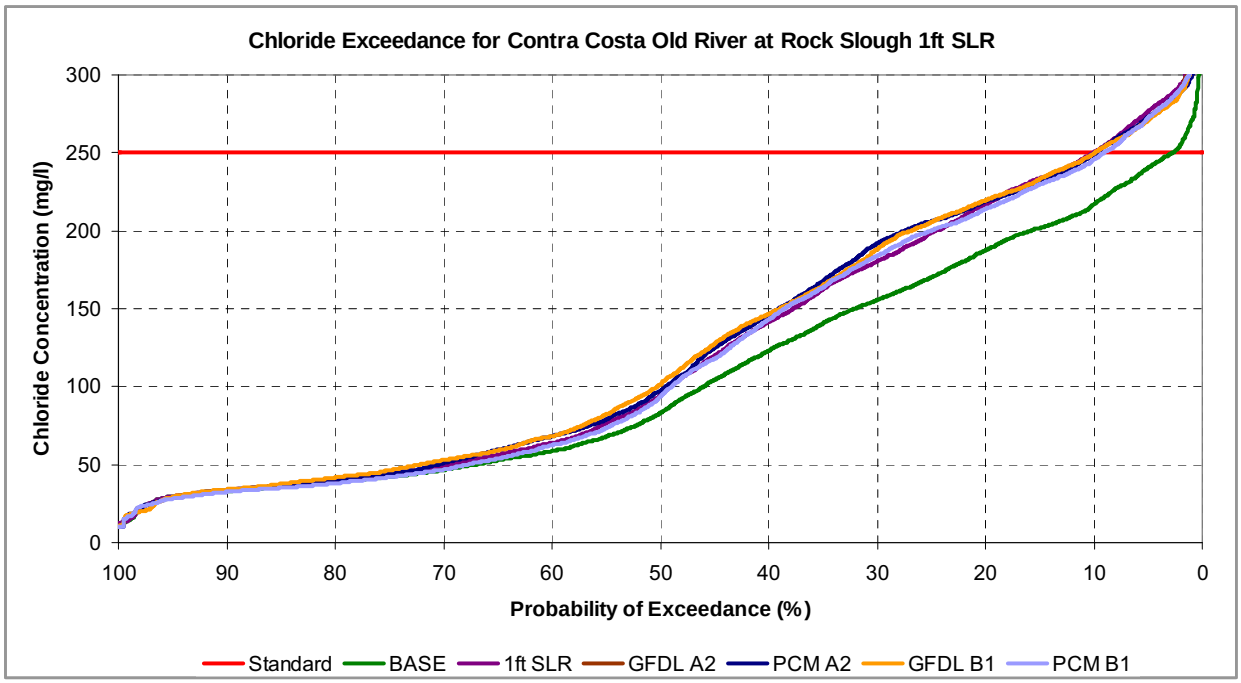

Figure 5.15: Probability of Exceedance for Chlorides at Old River at Rock Slough for Climate Change and a One-Foot Sea Level Rise with no Changes in Operations for SLR

Table 5.27: Chloride Concentration Percentiles (mg/l) for Old R. at Rock Sl. for Climate Change and a One-Foot Sea Level Rise with no Changes in Operations for SLR

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	30	33	42	83	170	217	240	109
1ft SLR same Mtz EC	30	33	44	94	199	250	276	123
GFDL A2 1ft SLR	27	33	45	102	205	251	272	125
PCM A2 1ft SLR	29	34	44	97	206	249	273	125
GFDL B1 1ft SLR	29	34	46	102	205	250	271	126
PCM B1 1ft SLR	28	33	42	94	200	245	272	122

*All sea level rise scenarios in this table assume that Martinez EC is the same as in the present sea level scenarios.

5.5.3.1 250 mg/l Chloride Threshold for Combined Sea Level Rise and Climate Change Scenarios

For the combined climate change and sea level rise scenarios with no additional changes to system operations for sea level rise, daily average chloride concentrations based on DSM2 simulation results were compared to the 250 mg/l daily average chloride concentration threshold

(Table 5.9). The frequency that chloride concentrations were below the 250 mg/l threshold is given in Table 5.28. Changes in the frequency that chloride concentrations were below the threshold relative to the base case are shown in Table 5.29. For the base case, the 250 mg/l chloride standard is met at Old River at Rock Slough about 97 percent of the time. For the combined climate change and one-foot sea level rise scenarios with no changes in system operations for sea level rise, chloride concentrations at Old River at Rock Slough were less than the threshold value about 90 percent of the time. This result is similar to the sea level rise only scenario (Table 5.21). Chloride concentrations rarely exceeded 250mg/l threshold at Old River at Highway 4 for all scenarios. Chloride concentrations never exceeded the 250 mg/l threshold at both the SWP and CVP for the base and combined climate change and sea level rise scenarios.

Table 5.28: Frequency that Chloride Concentrations were below the 250 mg/l Threshold for Climate Change and a 1-ft Sea Level Rise with no Changes to Operations for SLR

Scenario/ Location	BASE	1ft SLR	GFDL A2 1ft SLR	PCM A2 1ft SLR	GFDL B1 1ft SLR	PCM B1 1ft SLR
Contra Costa-Old R. at Rock Sl.	97.2%	89.9%	89.6%	90.3%	90.1%	90.9%
Contra Costa-Old R at Hwy 4	99.9%	99.7%	100.0%	100.0%	99.8%	99.8%
SWP-Clifton Court	100%	100%	100%	100%	100%	100%
CVP-Tracy	100%	100%	100%	100%	100%	100%

*Note that all sea level rise scenarios shown in this table assume that Martinez EC is the same as in the present sea level scenarios.

Table 5.29: Change in Frequency that Chloride Concentrations were below the 250mg/l Threshold for Climate Change and a 1ft Sea Level Rise with no Changes to Operations for Sea Level Rise Compared to the Base Case

Scenario/ Location	1ft SLR	GFDL A2	PCM A2	GFDL B1	PCM B1
Contra Costa-Old River at Rock Sl.	-7.3%	-7.7%	-6.9%	-7.2%	-6.3%
Contra Costa-Old River at Hwy 4	-0.2%	0.1%	0.1%	-0.1%	-0.1%
SWP-Clifton Court	0%	0%	0%	0%	0%
CVP-Tracy	0%	0%	0%	0%	0%

*Note that all sea level rise scenarios shown in this table assume that Martinez EC is the same as in the present sea level scenarios.

5.5.3.2 150 mg/l Chloride Threshold for Combined Sea Level Rise and Climate Change Scenarios

For the combined climate change and sea level rise scenarios with no additional changes in system operations for sea level rise, daily average chloride concentrations were computed from DSM2 EC results using equation 5.1, and the results were compared to the 150 mg/l chloride threshold (Table 5.9 and Table 5.10). The 150 mg/l threshold was never exceeded in the base case (Table 5.30). For the combined climate change and one-foot sea level rise scenarios with no changes in system operations for sea level rise, the threshold value was exceeded in the critically dry years of 1976 and 1977, and for some of the scenarios in 1989. In most cases, existing operations maintained compliance with the 150 mg/l chloride standard, even under combined climate change and sea level rise conditions.

Table 5.30: Comparison of Chloride Concentrations to the 150 mg/l Threshold at Old R. at Rock Sl. for Climate Change and a One-Foot Sea Level Rise with no Changes in Operations for SLR Number of Days that Chloride Concentrations were Below 150 mg/l

Year	Yr. Type*	Min Days Cl≤150 mg/l	Base	1ft SLR	GFDL A2 1ft SLR	PCM A2 1ft SLR	GFDL B1 1ft SLR	PCM B1 1ft SLR
1976	C	155	177	**126**	**112**	**113**	**112**	**129**
1977	C	155	161	**102**	**107**	**105**	**113**	**107**
1978	AN	190	247	240	248	245	238	245
1979	BN	175	259	226	231	233	230	240
1980	AN	190	269	263	258	256	255	255
1981	D	165	260	232	240	229	239	241
1982	W	240	365	365	343	365	341	365
1983	W	240	365	365	365	365	365	365
1984	W	240	295	289	299	301	301	291
1985	D	165	216	198	201	198	198	195
1986	W	240	287	265	242	250	242	246
1987	D	165	176	168	180	172	178	181
1988	C	155	230	209	211	207	209	224
1989	D	165	184	166	**152**	165	**142**	**137**
1990	C	155	222	181	182	162	183	162

*Sac 40-30-30 water year types: W=Wet, AN=Above Normal, BN=Below Normal, D=Dry, C=Critical
Gray shading and bold text indicate values that exceed the threshold.
All sea level rise scenarios assume that Martinez EC is the same as in the present sea level scenarios.

5.5.3.3 Chloride Mass Loading for Combined Sea Level Rise and Climate Change Scenarios

Chloride mass loadings at municipal and industrial intakes were estimated based on chloride concentrations and export rates (equation 5.3). The mass loading estimates for CCWD are based on the combined diversion rate for CCWD's Old River diversions at Rock Slough and Highway 4 and the chloride concentrations at Rock Slough (see footnote 2 on page 5-1 for explanation of combined diversions). Diversion rates for CCWD were identical for all scenarios. SWP and CVP operations were changed to reflect shifts in precipitation and runoff due to climate change, but they were not changed to try to lessen the effects of sea level rise.

For all intake locations, sea level rise increased the average chloride mass loadings by about 15 percent for Old River at Rock Slough, by 5 percent for the SWP and by 3 percent-7 percent for the CVP. For Old River at Rock Slough and for the Central Valley Project B1 scenarios, the mass loadings are similar to the sea level rise only scenario. For the SWP and for the CVP A2 scenarios, reduced exports for the climate change scenarios lead to lower mass loadings than in the sea level rise only scenario. This demonstrates that shifts in system operations due to changes in runoff patterns can lessen the effects of sea level rise at the intakes that are further away from the ocean.

Table 5.31: Chloride Mass Loading Percentiles (metric tons/day) for Old River at Rock Sl. for Climate Change and a One-Foot Sea Level Rise with no Changes in Operations for SLR

	5%	10%	25%	50%	75%	90%	95%	Avg
Base	0	9	19	45	80	115	146	54
1ft SLR same Martinez EC	0	9	20	50	92	132	165	61
GFDL A2 1ft SLR same Mtz EC	0	7	21	53	92	137	163	62
PCM A2 1ft SLR same Mtz EC	0	9	22	53	90	129	163	62
GFDL B1 1ft SLR same Mtz EC	0	8	22	54	90	136	157	63
PCM B1 1ft SLR same Mtz EC	0	9	20	48	91	131	167	61

Note: Export rates were identical for all scenarios.

Table 5.32: Chloride Mass Loading Percentiles (metric tons/day) for the State Water Project for Climate Change and a One-Foot Sea Level Rise with no Changes in Operations for SLR

	5%	10%	25%	50%	75%	90%	95%	Avg
Base	48	80	264	460	1086	1763	2068	711
1ft SLR same Martinez EC	49	84	267	514	1202	1925	2299	786
GFDL A2 same Mtz EC	51	74	245	530	1026	1536	1959	718
PCM A2 same Mtz EC	51	70	251	498	1075	1802	2188	740
GFDL B1 same Mtz EC	49	73	254	516	1091	1749	2118	744
PCM B1 same Mtz EC	48	76	262	521	1152	1922	2226	758

Note: Export rates were modified for climate change, but not for sea level rise.

Table 5.33: Chloride Mass Loading Percentiles (metric tons/day) for the Central Valley Project for Climate Change and a One-Foot Sea Level Rise with no Changes in Operations for SLR

	5%	10%	25%	50%	75%	90%	95%	Avg
Base	59	146	317	575	1037	1325	1540	686
1ft SLR same Martinez EC	58	147	328	611	1140	1433	1648	734
GFDL A2 same Mtz EC	55	143	275	563	1099	1360	1576	695
PCM A2 same Mtz EC	53	141	320	569	1168	1408	1549	710
GFDL B1 same Mtz EC	65	175	346	586	1141	1394	1625	735
PCM B1 same Mtz EC	51	121	350	613	1160	1401	1635	736

Note: Export rates were modified for climate change, but not for sea level rise.

5.5.4 Sea Level Rise Effects on Potential to Overtop Delta Levees

This study examined potential effects of a one-foot increase in sea level on the potential to overtop levees on three islands in the western Delta, Sherman Island, Twitchell Island, and Jersey Island. These are the Delta islands closest to the ocean, and so they are most vulnerable to potential overtopping due to sea level rise. The lowest crest elevations on levees on those islands are shown in Figure 5.16. Simulated water levels for present sea level and one-foot sea level rise scenarios were compared to these low-crest elevations to determine potential overtopping (Table 5.34). For the purpose of this analysis, potential overtopping was defined as any time the daily maximum water level in the channel exceeded the minimum crest elevation on the levee. Actual levee overtopping and effects of wind-induced waves were not simulated. Results are preliminary and are presented for illustrative purposes only.

Results for the present sea level scenarios indicated that water levels were never high enough to potentially overtop the study levees, even when Delta inflows were modified by climate change. For all of the one-foot sea level rise scenarios, there were two potential levee overtoppings during the 16-year simulation when simulated water levels exceeded the minimum levee crest elevations. For both the base and climate change sea level rise scenarios, the potential overtoppings occurred at the same time and affected all five study locations. Actual overtopping events and their effects on water levels and water quality were not simulated.

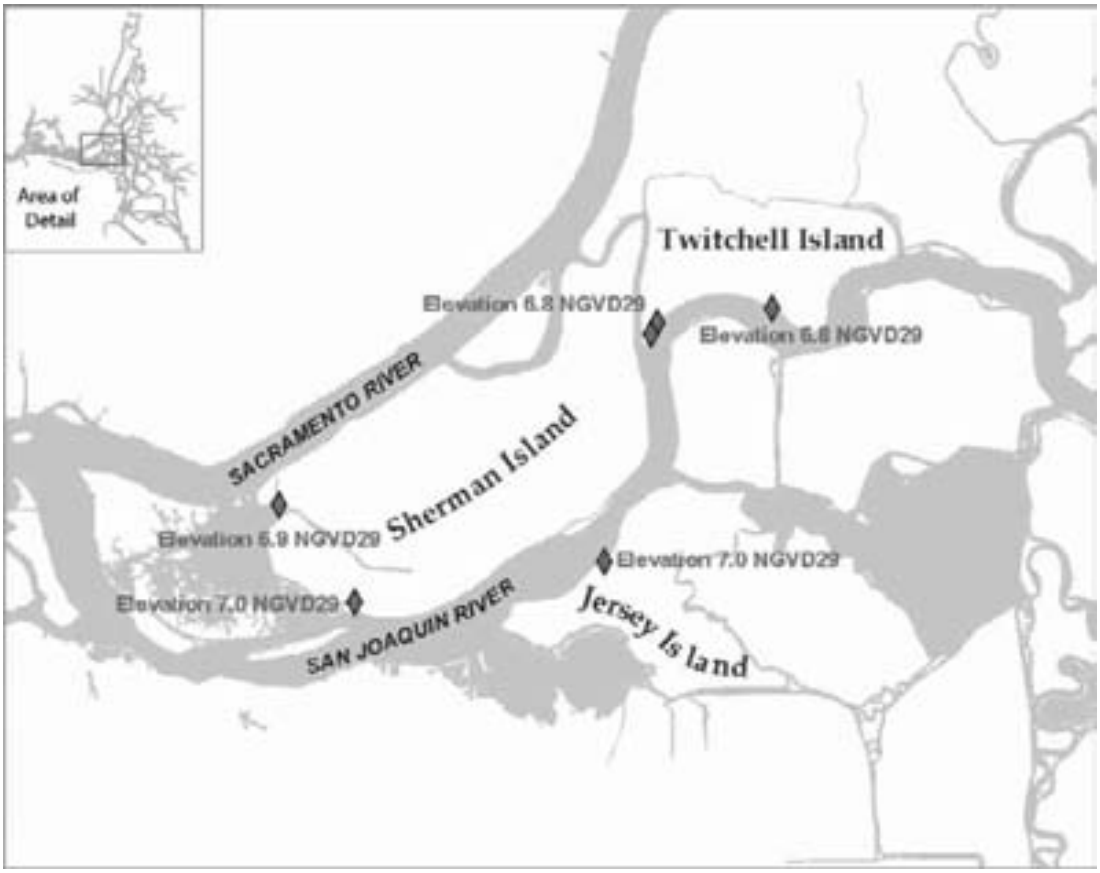

Figure 5.16: Locations of Lowest Levee Elevation on Three Delta Islands

Table 5.34: Summary of Levee Overtopping Events for Sea Level Rise Scenarios

Location	Min Crest Elevation, ft	Number of Potential Overtopping Events in 16 yrs			
		Base	4 Climate Change Scenarios	1 ft SLR	4 Climate Change Scenarios 1ft SLR
NW Sherman Island	6.9	0	0	2	2
SW Sherman Island	7.0	0	0	2	2
SW Twitchell Island	6.8	0	0	2	2
SE Twitchell Island	6.8	0	0	2	2
W Jersey Island	7.0	0	0	2	2

These results indicate that for the scenarios examined, sea level rise is more likely to increase the potential to overtop the study levees than changes in Delta inflows due to climate change. However, this analysis does not provide insight into potential changes in frequency of extreme events due to climate change. Since these climate change studies use perturbation ratios to modify historically-based reservoir inflows (see Chapter 4), the climate change scenarios preserve the historical hydrologic variability and do not reflect any potential changes in the

frequency of extreme events. Thus for the combined sea level rise and climate change scenarios, the potential levee overtoppings occurred at the same time during periods as the sea level rise only scenario. All of the potential overtoppings corresponded to periods with historically high water levels. Levees in other parts of the Delta may be more vulnerable to overtopping due to shifts in reservoir release patterns. Future studies could examine potential effects of sea level rise on levees throughout the Delta.

5.6 Summary

5.6.1 Climate Change for Present Sea Level

The DSM2 model was used for preliminary assessment of potential climate change effects on the Delta for four scenarios. The four scenarios correspond to two greenhouse gas emissions scenarios represented by two global climate models. All four climate change scenarios represent warmer future conditions, and three scenarios reflect drier conditions. The fourth climate change scenario projects slightly wetter conditions.

Projected runoff for the climate change scenarios was used to drive an SWP and CVP operations model that provided Delta inflows and exports (see Chapter 4). These studies include the assumption that meeting Delta water quality standards is a top priority for the SWP and CVP operations. Thus the impacts assessment for the Delta already included some mitigation for climate change through modified system operations for maintaining Delta water quality standards. So Delta water quality effects for the four climate change scenarios were relatively minor. There were no significant changes in compliance with 250 mg/l chloride standard at the municipal and industrial intakes, and there was complete compliance with that standard at the SWP and CVP intakes for all of the scenarios. The only reduction in compliance with the 150mg/l chloride standard occurred for the two B1 climate change scenarios. Chloride mass loadings at the SWP for all climate change scenarios and CVP for the A2 scenarios were reduced for the climate change scenarios due to lower export rates. Overall, existing system flexibility was able to provide Delta water quality compliance for most of the climate change conditions examined.

For the water quality analysis, the choice of global climate model had more influence on the results than the choice of greenhouse gas emissions scenario. One way to address the uncertainties associated with climate models and emissions scenarios is to conduct analysis using multiple climate models representing multiple emissions scenarios.

5.6.2 Sea Level Rise

An analysis tool is not currently available to determine changes in system operations to maintain Delta water quality under sea level rise conditions. As a first step towards developing such a tool, preliminary studies were conducted for a one-foot sea level rise with present system operations. Simulated water quality constituent concentrations for sea level rise conditions with no changes in system operations were compared to threshold values as a surrogate for evaluating the effects of sea level rise on water project operations to meet existing standards.

Preliminary sea level rise studies examined changes in chloride concentrations at municipal and industrial intakes for a one-foot increase in sea level. Due to the uncertainties in how much salt would be transported into the Delta for sea level rise conditions, two scenarios were examined to provide a range of potential impacts. One scenario assumed that the EC at the DSM2 downstream boundary at Martinez did not change relative to present sea level conditions, and the second scenario assumed that Martinez EC increased based on results of a multi-dimensional modeling study.

Without adjusting system operations to try to lessen the effects of sea level rise, chloride concentrations at Old River at Rock Slough were below the 250 mg/l threshold about 90 percent of the time. In real time, operational adjustments will take place so these effects will translate into water supply impacts to the SWP and CVP. As stated above these impacts to water supply cannot be quantified at this time. Increased salt intrusion for the sea level rise scenarios lead to chloride concentrations that exceeded the 150 mg/l standard during some critical and dry years. Chloride mass loadings at all of the urban intakes increased due to higher chloride concentrations. Impacts were similar for the two salt intrusion assumptions.

5.6.3 Combined Climate Change and Sea Level Rise

Preliminary impacts assessments were also conducted for combined climate change and one-foot sea level rise scenarios. System operations were changed to reflect shifts in runoff patterns for climate change, but they were not changed to try to lessen the impacts of sea level rise. Comparisons of chloride concentrations with threshold values at municipal and industrial intakes and potential for overtopping Delta levees were examined. Comparisons of chloride concentrations with threshold values were similar to those for the sea level rise only scenarios. Chloride mass loadings for Old River at Rock Slough were similar for all of the combined climate change and sea level rise scenarios since the export rates were the same. For the SWP and CVP, chloride mass loadings for the combined climate change and sea level rise scenarios were lower than for the sea level rise only scenarios due to reduced export rates.

For the potential levee overtopping analysis, no potential overtoppings occurred for the present sea level conditions. A one-foot rise in sea level resulted in two potential overtoppings during the 16-year analysis. The overtopping potential was not changed when combined sea level rise and climate change conditions were examined. Effects of wind were not considered.

5.7 Future Directions

Future directions for Delta climate change studies may include extending existing analyses, improving analysis tools, investigating mitigation measures, and characterizing uncertainty.

A key area of interest is examining effects of sea level rise alone or combined with climate change on system operations. For the analysis approach presented in this report, an Artificial Neural Network (ANN) could be developed to represent sea level rise effects on Delta water quality. By incorporating a sea level rise ANN into the operations model CalSim-II, changes in system operations to reduce salt water intrusion into the Delta could be determined for sea level rise alone or combined with other climate change factors such as shifting runoff patterns. For

more detailed studies of sea level rise effects on the Delta using DSM2, an improved characterization of potential salt intrusion into the Delta could be developed.

Additional topics related to sea level rise that could be examined included extending the potential levee overtopping analysis to other areas of the Delta. Existing simulation results could be used to estimate sea level rise effects on the stability of Delta levees. Potential effects for a range of increases in sea level could be examined.

Flexibility of the existing system to mitigate for climate change could be explored. Possible mitigation measures could include modifying reservoir releases, Delta exports, Delta Cross Channel operations, and temporary barrier operations. If present system flexibility isn't sufficient for mitigation, additional measures could be investigated such as modifying operating rules or considering new system components such as the proposed South Delta operable gates.

The main focus of future efforts will be to characterize uncertainty related to the climate change projections. For managers to make decisions, information is needed on both the magnitude of potential effects and the likelihood of those effects.

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5.10 Abbreviations

ANN-Artificial Neural Network

CalSim-II -SWP and CVP operations model

CCWD-Contra Costa Water District

CVP- Central Valley Project

CVPIA-Central Valley Project Improvement Act

CWEMF-California Water and Environmental Modeling Forum

D1641-State Water Resources Control Board Decision 1641 on Delta water quality standards

DICU-Delta Island Consumptive Use

DSM2-Delta Simulation Model 2

DWR-California Department of Water Resources

EC-Electrical conductivity, a measure of salinity

EWA-Environmental Water Account

GCM-Global Climate Model

GFDL-Geophysical Fluid Dynamic Lab model

GHG-Greenhouse Gas

HWY-Highway

IPCC-Intergovernmental Panel on Climate Change

PCM-Parallel Climate Model

SAC-Sacramento River

SJR-San Joaquin River

SLR-Sea Level Rise

SWP-State Water Project

VIC-Variable Infiltration Capacity Model

WY-Water Year (October 1 to September 30)

5.11 Appendix A: DSM2 Inputs

This appendix provides tables of selected DSM2 input values.

Delta Inflows

- Sacramento River at I Street Bridge in Sacramento (Table 5.35)
- San Joaquin River at Vernalis (Table 5.36)

Delta Exports and Diversions

- State Water Project at Banks Pumping Plant (Table 5.37)
- Central Valley Project at Tracy Pumping Plant (Table 5.38)
- Contra Costa Water District (combined Old River diversions from Rock Slough and Highway 4) (Table 5.39)

Table 5.35: DSM2 Input from CalSim-II: Sacramento River Flows (cfs) at Sacramento

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-75	17,863	12,673	15,573	12,573	18,478
Nov-75	15,078	10,890	15,630	12,904	15,027
Dec-75	15,560	12,797	10,636	12,305	12,111
Jan-76	12,235	11,534	10,353	11,179	10,769
Feb-76	13,354	11,566	11,863	11,525	12,199
Mar-76	15,068	13,413	14,648	13,372	16,710
Apr-76	9,702	9,426	9,545	9,416	9,575
May-76	8,046	7,712	7,866	7,698	7,962
Jun-76	12,821	12,959	13,584	13,365	12,460
Jul-76	13,228	12,146	12,819	12,773	14,190
Aug-76	10,993	9,908	10,486	10,253	9,844
Sep-76	10,147	8,321	8,635	8,385	9,643
Oct-76	7,811	7,763	7,771	7,765	7,796
Nov-76	7,248	7,212	7,217	7,214	7,237
Dec-76	9,348	6,752	6,757	6,753	6,959
Jan-77	8,192	8,340	8,205	8,391	8,523
Feb-77	9,469	7,897	7,842	7,662	7,767
Mar-77	7,440	7,684	7,668	7,931	8,175
Apr-77	8,567	8,571	8,571	8,647	8,568
May-77	5,704	5,676	5,676	5,727	6,472
Jun-77	9,537	9,491	9,488	9,584	11,312
Jul-77	12,700	10,150	11,568	11,522	12,680
Aug-77	8,588	7,802	8,600	8,577	8,462
Sep-77	8,245	6,735	8,250	8,155	8,249
Oct-77	7,735	7,075	6,849	7,453	7,737
Nov-77	7,130	7,243	7,144	7,545	7,131
Dec-77	15,471	15,716	15,260	15,648	15,269
Jan-78	63,890	66,446	62,893	68,715	70,086
Feb-78	52,536	61,753	49,313	58,126	58,664
Mar-78	61,373	73,262	67,423	73,271	73,503
Apr-78	36,433	32,776	34,568	32,730	43,377
May-78	19,397	16,344	16,791	16,361	19,043
Jun-78	14,823	18,805	15,368	18,962	14,920
Jul-78	21,490	20,468	21,705	20,659	21,695
Aug-78	17,756	16,396	18,032	16,428	18,322
Sep-78	14,949	13,515	14,838	13,525	15,417
Oct-78	10,305	10,412	10,261	10,496	10,554
Nov-78	11,755	10,079	10,253	10,900	10,332
Dec-78	8,667	11,206	8,289	13,404	8,383
Jan-79	22,527	20,491	20,858	20,771	23,862
Feb-79	37,221	31,858	33,244	31,778	34,859
Mar-79	30,147	30,228	29,440	28,700	35,538
Apr-79	17,240	16,918	17,122	16,936	18,364
May-79	15,250	13,358	13,481	13,342	15,409
Jun-79	21,138	17,435	20,789	17,316	21,275
Jul-79	17,481	14,629	14,538	14,535	18,448
Aug-79	15,445	14,908	15,200	14,721	16,023
Sep-79	14,046	10,527	12,708	10,577	14,030

Table 5.35: DSM2 Input from CalSim-II: Sacramento River Flows (cfs) at Sacramento (cont.)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-79	10,199	9,803	9,370	9,755	10,054
Nov-79	13,383	12,681	12,956	13,059	13,480
Dec-79	19,685	20,398	18,276	20,596	18,114
Jan-80	74,269	74,316	73,465	74,559	75,159
Feb-80	74,367	74,720	75,069	74,488	74,648
Mar-80	44,213	49,229	46,649	49,392	56,602
Apr-80	18,884	17,753	18,154	17,725	20,898
May-80	15,671	13,984	14,392	13,918	15,258
Jun-80	12,820	15,485	15,166	15,686	14,695
Jul-80	18,699	16,812	19,812	17,870	20,024
Aug-80	17,014	12,895	16,269	13,809	16,721
Sep-80	14,012	11,504	11,831	11,526	14,227
Oct-80	11,568	9,276	9,283	9,277	9,655
Nov-80	8,853	8,603	8,892	9,311	9,412
Dec-80	12,513	12,582	12,248	12,624	12,215
Jan-81	21,469	22,017	21,090	22,187	22,650
Feb-81	25,217	25,758	26,399	25,526	25,751
Mar-81	29,580	26,680	23,329	28,722	36,183
Apr-81	16,214	15,974	16,247	15,917	16,484
May-81	10,949	10,411	10,592	10,410	10,949
Jun-81	14,721	15,407	14,771	13,366	14,573
Jul-81	17,771	15,035	15,594	15,589	17,623
Aug-81	15,247	13,362	15,291	15,001	14,382
Sep-81	13,857	11,589	11,746	11,625	13,609
Oct-81	12,566	10,777	10,230	9,964	10,767
Nov-81	31,571	26,160	29,202	29,009	36,384
Dec-81	73,957	74,668	73,141	74,593	71,835
Jan-82	68,660	72,623	65,754	73,359	73,558
Feb-82	73,878	74,226	74,623	74,011	74,190
Mar-82	71,357	73,606	73,039	73,639	74,034
Apr-82	74,475	73,798	74,184	73,832	75,220
May-82	39,827	25,178	29,784	25,134	37,372
Jun-82	21,942	22,822	21,678	23,054	20,123
Jul-82	18,866	20,072	19,778	20,071	19,391
Aug-82	13,160	15,367	17,654	15,486	17,839
Sep-82	17,174	14,366	15,851	14,366	17,032
Oct-82	18,126	13,611	11,672	13,582	16,192
Nov-82	37,037	23,328	30,128	26,130	31,073
Dec-82	64,483	69,855	53,805	65,208	56,758
Jan-83	71,244	73,187	69,680	73,465	73,568
Feb-83	75,088	75,443	75,780	75,178	75,365
Mar-83	77,464	78,354	77,903	78,435	79,055
Apr-83	62,634	53,326	58,813	54,985	71,943
May-83	56,061	36,111	40,874	36,041	54,021
Jun-83	54,463	27,774	37,161	28,819	45,678
Jul-83	23,061	17,810	17,761	17,220	20,917
Aug-83	20,551	15,086	19,287	15,496	20,220
Sep-83	26,629	20,383	25,821	23,725	26,584

Table 5.35: DSM2 Input from CalSim-II: Sacramento River Flows (cfs) at Sacramento (cont.)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-83	19,560	18,926	17,794	18,379	20,092
Nov-83	65,368	58,660	66,296	65,578	66,043
Dec-83	75,185	76,378	74,491	76,092	74,203
Jan-84	50,683	56,494	47,666	60,827	58,266
Feb-84	34,027	38,624	39,952	34,452	36,023
Mar-84	35,425	41,224	38,921	42,305	47,338
Apr-84	18,696	15,098	16,030	17,764	16,792
May-84	12,643	11,476	11,870	11,464	12,820
Jun-84	19,109	17,812	19,570	17,638	18,568
Jul-84	21,758	20,377	21,425	19,743	21,795
Aug-84	14,080	13,763	14,187	13,266	14,183
Sep-84	14,779	12,694	14,475	12,857	14,665
Oct-84	11,554	8,854	9,588	8,693	11,936
Nov-84	29,685	21,119	23,591	22,448	31,207
Dec-84	21,806	24,234	20,176	23,951	19,602
Jan-85	12,452	12,730	12,348	12,856	13,483
Feb-85	16,394	16,905	17,631	16,676	16,981
Mar-85	14,160	15,214	14,520	15,131	16,039
Apr-85	12,790	13,613	11,785	13,992	13,247
May-85	14,989	14,016	15,616	14,531	13,849
Jun-85	14,037	14,331	14,008	14,228	14,252
Jul-85	19,094	17,618	19,092	18,904	19,097
Aug-85	17,293	15,333	16,993	16,981	16,591
Sep-85	14,941	13,139	14,170	13,117	14,585
Oct-85	12,015	9,803	9,836	9,866	13,121
Nov-85	10,466	9,763	10,561	10,429	12,359
Dec-85	15,952	17,338	15,763	16,933	15,634
Jan-86	23,798	25,091	23,209	25,287	23,469
Feb-86	78,551	79,043	79,619	78,795	79,214
Mar-86	74,396	75,360	74,894	75,150	75,843
Apr-86	19,689	18,055	18,799	17,987	21,630
May-86	12,499	10,540	10,741	10,535	11,724
Jun-86	11,145	14,936	14,934	15,649	14,786
Jul-86	19,681	17,973	18,771	17,934	20,008
Aug-86	17,254	13,466	14,070	13,628	16,407
Sep-86	15,048	12,126	12,302	12,172	13,601
Oct-86	11,832	9,715	9,758	9,594	10,523
Nov-86	9,365	8,659	9,277	8,836	9,973
Dec-86	8,963	9,138	8,880	9,095	8,821
Jan-87	13,430	13,782	13,318	14,007	14,193
Feb-87	20,787	21,380	21,964	21,151	21,399
Mar-87	24,272	25,424	24,766	25,359	27,271
Apr-87	14,647	11,084	11,220	11,123	13,941
May-87	10,242	9,405	9,625	9,715	10,549
Jun-87	11,241	10,612	11,017	10,924	12,352
Jul-87	13,153	9,857	10,225	10,409	13,477
Aug-87	12,465	9,952	10,892	9,818	13,397
Sep-87	11,011	9,363	9,597	9,153	10,943

Table 5.35: DSM2 Input from CalSim-II: Sacramento River Flows (cfs) at Sacramento (cont.)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-87	9,814	9,200	9,460	9,197	10,879
Nov-87	8,896	8,497	8,500	8,494	8,944
Dec-87	17,578	17,945	17,358	17,846	17,277
Jan-88	28,123	28,131	27,735	28,818	28,374
Feb-88	16,008	12,799	13,010	12,698	15,957
Mar-88	8,685	8,883	8,847	9,280	9,580
Apr-88	10,475	10,273	10,314	10,294	10,800
May-88	9,754	9,819	9,810	9,811	9,667
Jun-88	10,922	11,737	11,101	11,803	12,339
Jul-88	9,130	8,938	8,823	9,194	9,980
Aug-88	8,130	7,991	8,366	8,236	8,709
Sep-88	6,195	6,589	6,279	6,407	5,882
Oct-88	7,771	7,785	7,777	7,785	7,778
Nov-88	9,993	9,718	10,072	9,933	10,092
Dec-88	9,968	10,284	9,822	10,199	9,732
Jan-89	12,814	12,943	12,666	13,035	13,125
Feb-89	10,328	10,454	10,556	10,346	10,260
Mar-89	47,840	60,757	51,571	58,410	67,796
Apr-89	22,084	29,703	21,145	29,705	29,670
May-89	15,373	21,237	15,441	21,241	21,200
Jun-89	15,170	11,053	14,845	11,523	11,856
Jul-89	18,046	16,272	14,002	17,339	18,780
Aug-89	15,192	13,066	14,029	14,109	16,907
Sep-89	15,211	13,196	13,563	13,237	15,276
Oct-89	11,409	10,180	10,663	9,987	11,725
Nov-89	9,196	8,561	8,707	8,656	11,200
Dec-89	8,934	11,069	11,981	11,185	11,917
Jan-90	18,954	19,488	18,981	19,807	19,642
Feb-90	16,333	15,351	15,533	15,152	16,342
Mar-90	12,359	13,148	12,784	13,440	13,128
Apr-90	10,745	10,735	10,744	10,734	10,737
May-90	9,169	8,763	9,022	8,760	9,371
Jun-90	10,434	8,178	8,183	8,809	8,425
Jul-90	9,577	10,091	9,776	10,097	9,454
Aug-90	8,949	8,485	8,255	8,268	8,017
Sep-90	8,293	8,275	8,246	8,290	8,296
Oct-90	7,745	7,737	7,745	7,736	7,746
Nov-90	7,223	7,216	7,223	7,216	7,223
Dec-90	6,721	6,715	6,721	6,715	7,010
Jan-91	6,576	6,577	6,539	6,808	6,820
Feb-91	8,350	8,366	8,605	8,439	8,472
Mar-91	31,783	32,148	32,136	32,314	33,002
Apr-91	13,266	12,800	13,143	13,105	14,314
May-91	8,786	7,652	8,089	7,999	8,964
Jun-91	8,093	7,229	7,304	7,044	10,171
Jul-91	10,700	11,045	11,079	11,296	11,223
Aug-91	8,100	6,830	7,907	7,336	8,264
Sep-91	8,471	6,190	7,793	8,392	8,355

Table 5.36: DSM2 Input from CalSim-II: San Joaquin River Flows (cfs) at Vernalis

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-75	2,946	2,063	2,421	2,019	2,652
Nov-75	1,805	1,753	1,918	1,732	1,856
Dec-75	1,910	1,858	1,885	1,837	1,904
Jan-76	1,721	1,669	1,693	1,648	1,715
Feb-76	1,933	1,879	2,039	1,858	2,021
Mar-76	1,775	1,662	1,690	1,661	1,734
Apr-76	2,450	2,442	2,447	2,445	2,450
May-76	2,262	2,249	2,256	2,254	2,261
Jun-76	1,486	1,449	1,470	1,463	1,483
Jul-76	1,427	1,152	1,407	1,108	1,423
Aug-76	1,347	857	911	858	1,139
Sep-76	1,178	1,160	1,171	1,162	1,179
Oct-76	3,209	3,101	3,131	2,915	3,171
Nov-76	2,100	2,050	2,078	2,050	2,090
Dec-76	1,693	1,642	1,670	1,643	1,682
Jan-77	1,306	1,189	1,220	1,191	1,264
Feb-77	1,383	1,260	1,294	1,265	1,340
Mar-77	1,275	1,268	1,272	1,256	1,275
Apr-77	1,702	1,698	1,700	1,624	1,702
May-77	1,581	1,574	1,577	1,480	1,581
Jun-77	1,236	1,216	1,223	1,209	1,236
Jul-77	798	684	788	685	788
Aug-77	680	646	673	647	680
Sep-77	982	956	975	958	981
Oct-77	1,454	1,442	1,626	1,200	1,454
Nov-77	1,351	1,270	1,350	1,262	1,351
Dec-77	1,524	1,518	1,522	1,535	1,524
Jan-78	3,727	3,247	3,248	3,248	3,251
Feb-78	7,843	8,901	8,385	6,816	7,735
Mar-78	9,089	10,909	10,055	9,268	9,773
Apr-78	12,921	14,729	13,976	12,726	14,273
May-78	11,897	12,235	12,588	9,647	13,952
Jun-78	11,295	3,840	7,262	3,687	7,372
Jul-78	2,470	2,263	2,263	2,263	2,263
Aug-78	1,908	1,908	1,908	1,908	1,908
Sep-78	2,194	1,614	1,614	1,614	1,725
Oct-78	4,206	2,408	3,694	2,621	4,202
Nov-78	1,648	1,606	1,681	1,604	1,650
Dec-78	1,829	1,787	1,823	1,898	1,831
Jan-79	3,851	4,284	3,770	4,278	4,363
Feb-79	9,064	5,809	6,625	4,816	10,257
Mar-79	8,638	6,609	9,480	5,839	10,407
Apr-79	6,349	6,369	6,482	5,729	6,790
May-79	5,904	5,597	5,868	5,008	6,114
Jun-79	2,190	2,093	2,116	2,094	2,334
Jul-79	1,849	1,803	1,818	1,805	1,849
Aug-79	1,764	1,694	1,705	1,695	1,764
Sep-79	1,870	1,820	1,837	1,797	1,883

Table 5.36: DSM2 Input from CalSim-II: San Joaquin River Flows (cfs) at Vernalis (cont.)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-79	2,255	2,200	2,236	2,081	2,281
Nov-79	1,808	1,732	1,788	1,618	1,821
Dec-79	1,945	1,866	1,923	1,752	1,958
Jan-80	11,058	10,135	7,211	7,463	11,747
Feb-80	21,061	24,227	27,335	12,986	26,166
Mar-80	13,100	17,772	15,092	14,019	16,080
Apr-80	7,544	9,844	9,434	8,528	9,136
May-80	6,767	6,218	6,527	5,690	7,183
Jun-80	5,214	2,445	2,766	2,405	2,891
Jul-80	3,864	1,952	2,135	1,920	2,262
Aug-80	2,014	1,788	1,916	1,766	2,006
Sep-80	2,611	1,708	1,770	1,689	2,211
Oct-80	4,278	1,988	2,940	1,979	3,763
Nov-80	1,742	1,688	1,718	1,634	1,740
Dec-80	1,885	1,829	1,859	1,776	1,883
Jan-81	2,106	2,023	2,057	2,019	2,085
Feb-81	2,547	2,280	2,523	2,280	2,604
Mar-81	3,483	2,240	3,957	2,220	4,303
Apr-81	4,327	3,907	4,340	3,906	4,588
May-81	3,461	2,767	3,806	2,710	3,750
Jun-81	1,710	1,671	1,702	1,676	1,683
Jul-81	1,678	1,631	1,668	1,637	1,645
Aug-81	1,625	1,589	1,617	1,486	1,600
Sep-81	1,567	1,311	1,561	1,310	1,549
Oct-81	2,104	2,042	2,100	2,027	2,100
Nov-81	1,708	1,661	1,689	1,657	1,703
Dec-81	1,760	1,711	1,741	1,707	1,754
Jan-82	6,242	6,697	4,673	5,878	5,941
Feb-82	13,580	16,895	17,143	10,856	17,456
Mar-82	14,865	19,929	16,487	15,515	18,363
Apr-82	24,622	30,388	29,743	27,701	29,908
May-82	16,058	14,288	15,150	12,939	16,504
Jun-82	9,692	3,738	4,247	3,738	5,012
Jul-82	3,715	2,511	2,804	2,511	3,191
Aug-82	2,199	2,199	2,199	2,199	2,199
Sep-82	3,563	1,837	3,331	1,837	3,382
Oct-82	12,098	3,340	8,876	3,369	10,131
Nov-82	7,981	5,876	9,890	9,739	9,744
Dec-82	18,184	21,017	13,073	17,211	13,383
Jan-83	23,332	28,727	23,427	29,754	26,805
Feb-83	31,051	35,096	38,220	26,681	34,742
Mar-83	37,383	47,697	41,589	39,407	44,295
Apr-83	19,986	23,136	22,652	21,521	22,363
May-83	20,416	19,270	19,789	17,881	20,879
Jun-83	34,195	10,326	20,598	9,633	22,664
Jul-83	17,655	3,333	9,375	3,997	13,234
Aug-83	2,082	2,082	2,082	2,082	2,082
Sep-83	5,958	3,069	4,827	3,339	5,236

Table 5.36: DSM2 Input from CalSim-II: San Joaquin River Flows (cfs) at Vernalis (cont.)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-83	11,980	5,880	11,773	5,759	11,820
Nov-83	12,960	8,708	15,882	15,330	15,748
Dec-83	20,682	28,501	16,607	23,593	15,626
Jan-84	14,354	18,070	14,455	18,775	16,712
Feb-84	9,683	10,593	12,064	7,987	10,999
Mar-84	6,092	8,591	6,980	6,525	8,034
Apr-84	5,530	5,551	5,552	5,433	5,680
May-84	5,064	4,948	5,015	4,908	5,065
Jun-84	2,627	2,428	2,540	2,356	2,629
Jul-84	2,243	2,184	2,235	2,188	2,243
Aug-84	2,137	2,099	2,135	2,101	2,139
Sep-84	1,969	1,938	1,959	1,932	1,969
Oct-84	2,343	2,301	2,327	2,288	2,343
Nov-84	1,922	1,900	1,914	1,894	1,922
Dec-84	1,971	1,948	1,963	1,942	1,971
Jan-85	1,791	1,764	1,782	1,758	1,791
Feb-85	2,211	2,174	2,201	2,169	2,211
Mar-85	2,191	2,098	2,172	2,081	2,188
Apr-85	3,241	2,573	3,241	2,574	3,241
May-85	3,491	2,376	3,086	2,383	3,419
Jun-85	1,744	1,731	1,745	1,752	1,746
Jul-85	1,651	1,635	1,652	1,660	1,653
Aug-85	1,580	1,133	1,581	1,018	1,582
Sep-85	1,577	1,346	1,339	1,352	1,527
Oct-85	2,119	2,012	2,086	2,001	2,114
Nov-85	1,698	1,740	1,674	1,738	1,695
Dec-85	1,776	1,818	1,753	1,817	1,774
Jan-86	2,182	1,674	1,751	1,662	1,765
Feb-86	13,469	16,280	19,260	7,964	18,396
Mar-86	23,294	33,269	28,189	20,725	30,362
Apr-86	12,075	14,596	14,225	13,234	13,765
May-86	8,356	7,526	7,894	6,515	8,604
Jun-86	6,517	2,130	2,801	2,130	2,752
Jul-86	2,389	2,370	2,378	2,129	2,387
Aug-86	2,169	2,154	2,161	2,070	2,168
Sep-86	2,169	2,153	2,160	2,062	2,167
Oct-86	2,566	2,105	2,112	2,104	2,127
Nov-86	1,748	1,742	1,745	1,696	1,748
Dec-86	1,794	1,787	1,790	1,741	1,794
Jan-87	1,675	1,663	1,669	1,618	1,674
Feb-87	2,041	2,019	2,029	1,974	2,039
Mar-87	1,961	1,855	1,870	1,855	1,934
Apr-87	2,475	2,464	2,467	2,467	2,483
May-87	2,287	2,268	2,274	2,273	2,299
Jun-87	1,531	1,476	1,491	1,491	1,566
Jul-87	1,514	1,205	1,466	1,196	1,555
Aug-87	1,252	825	833	826	1,064
Sep-87	1,197	1,171	1,182	1,173	1,208

Table 5.36: DSM2 Input from CalSim-II: San Joaquin River Flows (cfs) at Vernalis (cont.)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-87	1,676	1,588	1,593	1,590	1,658
Nov-87	1,330	1,279	1,301	1,282	1,327
Dec-87	1,288	1,236	1,258	1,238	1,286
Jan-88	1,280	1,169	1,185	1,173	1,261
Feb-88	1,326	1,206	1,224	1,212	1,313
Mar-88	1,254	1,250	1,250	1,250	1,252
Apr-88	1,719	1,713	1,714	1,713	1,716
May-88	1,586	1,578	1,578	1,577	1,582
Jun-88	1,262	1,239	1,240	1,238	1,251
Jul-88	969	993	1,020	979	1,003
Aug-88	688	670	677	666	685
Sep-88	1,033	1,014	1,022	1,010	1,029
Oct-88	1,554	1,345	1,522	1,309	1,552
Nov-88	1,279	1,201	1,273	1,227	1,278
Dec-88	1,391	1,358	1,384	1,358	1,389
Jan-89	1,183	1,175	1,178	1,176	1,180
Feb-89	1,360	1,349	1,351	1,349	1,355
Mar-89	1,596	1,592	1,595	1,590	1,596
Apr-89	1,727	1,695	1,714	1,696	1,737
May-89	1,439	1,403	1,418	1,407	1,453
Jun-89	1,292	1,255	1,256	1,277	1,322
Jul-89	1,292	1,200	1,286	1,116	1,281
Aug-89	803	789	793	784	811
Sep-89	1,164	1,150	1,154	1,149	1,173
Oct-89	1,370	1,321	1,322	1,308	1,579
Nov-89	1,324	1,225	1,236	1,314	1,328
Dec-89	1,254	1,154	1,161	1,157	1,258
Jan-90	1,194	1,183	1,186	1,188	1,201
Feb-90	1,380	1,363	1,365	1,372	1,392
Mar-90	1,315	1,314	1,314	1,313	1,315
Apr-90	1,570	1,566	1,568	1,564	1,571
May-90	1,307	1,304	1,305	1,301	1,308
Jun-90	1,164	1,162	1,163	1,161	1,164
Jul-90	1,062	935	1,013	907	1,065
Aug-90	728	721	724	716	730
Sep-90	1,085	1,080	1,082	1,007	1,086
Oct-90	1,212	1,051	1,052	1,016	1,257
Nov-90	1,173	1,173	1,173	1,133	1,173
Dec-90	1,130	1,130	1,130	1,130	1,130
Jan-91	1,006	1,004	1,033	1,003	1,033
Feb-91	1,128	1,133	1,149	1,106	1,149
Mar-91	2,387	2,383	2,385	2,383	2,387
Apr-91	2,245	2,230	2,237	2,228	2,246
May-91	1,690	1,672	1,681	1,670	1,692
Jun-91	1,106	1,074	1,092	1,088	1,118
Jul-91	1,073	1,035	1,056	1,006	1,087
Aug-91	777	757	767	755	780
Sep-91	1,026	1,008	1,017	1,008	1,029

Table 5.37: DSM2 Input from CalSim-II: State Water Project Exports (cfs)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-75	6,680	5,334	6,680	5,136	6,680
Nov-75	6,680	2,328	6,680	2,673	6,680
Dec-75	7,013	1,380	300	1,343	4,367
Jan-76	3,972	4,234	3,115	3,903	3,365
Feb-76	3,987	2,609	2,467	2,564	2,921
Mar-76	3,416	2,757	3,199	3,197	4,403
Apr-76	1,721	1,557	1,638	1,551	1,677
May-76	1,517	1,357	1,436	1,352	1,479
Jun-76	3,152	2,884	3,430	2,989	2,909
Jul-76	2,424	3,386	4,162	3,629	2,996
Aug-76	4,808	2,775	3,553	2,984	3,632
Sep-76	3,672	1,828	2,119	1,906	3,174
Oct-76	2,792	2,063	1,780	1,987	2,391
Nov-76	2,945	1,177	1,780	1,582	2,558
Dec-76	3,049	1,888	1,925	1,715	2,558
Jan-77	2,764	2,096	2,013	2,232	2,493
Feb-77	919	1,077	1,034	855	858
Mar-77	497	1,219	1,200	1,455	1,706
Apr-77	300	300	300	300	300
May-77	413	300	300	300	1,105
Jun-77	300	300	300	300	300
Jul-77	461	300	352	329	461
Aug-77	306	300	300	300	342
Sep-77	1,703	2,079	1,609	1,564	1,701
Oct-77	763	2,347	2,634	2,869	542
Nov-77	1,386	1,245	1,623	1,527	1,477
Dec-77	5,717	4,210	5,565	6,102	5,635
Jan-78	7,455	6,934	6,589	5,577	6,930
Feb-78	4,092	4,233	3,679	4,380	4,316
Mar-78	5,115	5,337	4,977	5,280	5,440
Apr-78	5,516	5,490	5,546	5,464	5,452
May-78	4,844	4,532	4,899	1,620	4,758
Jun-78	4,713	4,046	3,490	4,047	3,374
Jul-78	6,680	6,680	6,680	6,680	6,680
Aug-78	6,680	5,991	6,526	6,001	6,680
Sep-78	6,680	5,362	6,227	5,368	6,680
Oct-78	4,174	3,199	3,828	3,427	4,421
Nov-78	3,417	2,198	3,262	2,847	2,991
Dec-78	1,695	3,108	1,504	4,863	1,312
Jan-79	7,964	8,108	7,937	8,106	8,134
Feb-79	8,500	8,500	8,500	8,285	8,500
Mar-79	7,561	7,561	7,561	7,561	7,561
Apr-79	4,020	3,844	4,317	3,626	4,429
May-79	3,718	3,780	3,657	3,018	3,795
Jun-79	3,948	3,494	3,868	2,918	4,188
Jul-79	4,454	4,744	4,676	4,245	4,830
Aug-79	5,754	5,608	5,731	5,436	5,970
Sep-79	6,005	3,021	5,188	3,030	6,006

Table 5.37: DSM2 Input from CalSim-II: State Water Project Exports (cfs) (cont.)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-79	3,597	3,693	2,835	3,676	3,743
Nov-79	4,239	3,534	4,844	3,851	4,279
Dec-79	7,019	7,008	7,015	7,000	7,021
Jan-80	8,500	8,500	8,500	8,500	8,500
Feb-80	8,437	8,347	8,069	8,267	7,726
Mar-80	5,072	4,241	4,471	4,264	4,656
Apr-80	4,535	3,940	4,204	3,967	4,403
May-80	4,163	4,375	4,417	3,682	4,365
Jun-80	2,250	3,405	3,407	3,433	3,181
Jul-80	6,680	6,296	6,680	6,494	6,680
Aug-80	6,680	5,053	6,680	5,478	6,680
Sep-80	6,680	4,577	4,834	4,578	6,680
Oct-80	5,889	2,631	2,791	2,665	3,713
Nov-80	1,759	1,288	1,704	1,299	1,989
Dec-80	3,629	4,282	3,639	4,403	2,941
Jan-81	7,382	7,354	7,366	7,353	7,375
Feb-81	5,654	5,499	5,808	5,418	5,610
Mar-81	7,074	5,293	5,231	5,134	6,529
Apr-81	2,707	2,564	2,801	2,544	2,890
May-81	2,127	1,935	2,126	1,915	2,152
Jun-81	2,909	2,957	1,605	300	3,015
Jul-81	5,219	3,016	3,038	3,425	5,038
Aug-81	5,079	4,970	5,913	5,837	4,900
Sep-81	5,546	3,940	4,198	3,978	5,665
Oct-81	3,896	3,225	3,244	3,092	3,602
Nov-81	6,680	6,680	6,680	6,680	6,680
Dec-81	7,002	6,993	6,998	6,992	7,001
Jan-82	8,500	8,500	8,238	8,500	8,500
Feb-82	8,500	8,500	8,500	8,500	8,500
Mar-82	7,561	7,535	7,561	7,352	7,561
Apr-82	6,125	6,125	6,125	6,125	6,125
May-82	6,177	6,177	6,177	6,177	6,177
Jun-82	6,680	4,984	4,873	5,025	4,869
Jul-82	6,680	6,680	6,680	6,680	6,680
Aug-82	3,304	6,077	6,680	6,115	6,680
Sep-82	6,680	6,680	6,680	6,680	6,680
Oct-82	6,680	6,680	6,680	6,680	6,680
Nov-82	6,680	6,680	6,680	6,680	6,680
Dec-82	7,678	7,678	6,761	7,678	6,755
Jan-83	3,472	3,477	3,476	3,477	3,474
Feb-83	3,548	3,548	3,548	3,548	3,548
Mar-83	3,555	3,555	3,555	3,555	3,555
Apr-83	3,749	3,749	3,749	3,749	3,749
May-83	3,171	3,171	3,171	3,171	3,171
Jun-83	3,877	3,877	3,877	3,877	3,877
Jul-83	6,638	6,119	6,638	6,194	6,638
Aug-83	6,680	6,680	6,680	6,680	6,680
Sep-83	5,039	5,573	5,039	5,496	5,039

Table 5.37: DSM2 Input from CalSim-II: State Water Project Exports (cfs) (cont.)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-83	3,682	3,682	3,682	3,682	3,682
Nov-83	3,144	3,144	3,144	3,144	3,144
Dec-83	3,723	3,723	3,723	3,723	3,723
Jan-84	5,640	5,640	5,640	5,640	5,640
Feb-84	6,531	6,509	6,531	6,506	6,531
Mar-84	6,635	6,564	6,619	6,564	6,635
Apr-84	3,499	1,880	1,914	3,413	3,356
May-84	2,899	2,781	2,825	2,776	2,916
Jun-84	3,974	3,875	4,039	3,425	3,880
Jul-84	5,093	4,771	5,062	4,269	5,198
Aug-84	4,981	4,630	5,090	4,132	5,086
Sep-84	6,680	5,772	6,680	5,850	6,606
Oct-84	5,541	3,916	4,371	3,928	5,726
Nov-84	6,680	6,680	6,680	6,680	6,680
Dec-84	7,040	7,036	7,039	7,035	7,040
Jan-85	4,443	4,703	4,340	4,822	5,478
Feb-85	4,167	4,490	4,719	4,438	4,432
Mar-85	2,560	3,215	2,356	2,791	2,362
Apr-85	2,356	2,230	2,221	2,249	2,393
May-85	2,497	2,183	2,424	2,219	2,387
Jun-85	2,795	2,843	2,790	2,829	2,833
Jul-85	6,680	6,680	6,680	6,680	6,680
Aug-85	6,680	6,647	6,680	6,601	6,680
Sep-85	6,680	5,123	5,685	5,003	6,680
Oct-85	5,411	3,610	3,525	3,524	5,886
Nov-85	3,894	3,880	3,899	3,804	4,363
Dec-85	6,900	6,825	6,480	6,995	6,687
Jan-86	7,407	7,238	7,264	7,234	7,268
Feb-86	8,500	8,500	8,500	8,500	8,500
Mar-86	5,388	5,384	5,460	5,002	6,084
Apr-86	4,901	4,149	4,423	4,276	4,806
May-86	4,988	3,857	4,063	2,623	4,857
Jun-86	2,020	3,206	3,323	3,329	3,288
Jul-86	6,680	5,564	6,680	5,711	6,680
Aug-86	6,680	5,297	5,562	5,319	6,680
Sep-86	6,680	5,134	5,253	5,098	6,102
Oct-86	4,471	3,129	2,563	3,236	3,110
Nov-86	1,302	1,147	1,445	1,251	1,445
Dec-86	2,356	3,245	2,325	2,916	2,166
Jan-87	6,572	4,826	4,640	4,970	5,308
Feb-87	7,360	6,872	7,356	7,210	7,360
Mar-87	5,086	4,197	4,435	4,156	4,764
Apr-87	2,141	300	300	300	2,064
May-87	300	300	300	300	300
Jun-87	300	300	300	300	526
Jul-87	3,445	810	1,071	985	2,692
Aug-87	5,279	3,225	4,076	2,304	5,073
Sep-87	3,863	2,927	3,056	2,910	3,498

Table 5.37: DSM2 Input from CalSim-II: State Water Project Exports (cfs) (cont.)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-87	2,809	2,360	2,481	2,263	2,860
Nov-87	2,071	1,875	2,146	1,985	2,175
Dec-87	6,629	6,341	6,220	6,375	3,961
Jan-88	7,107	7,070	7,075	7,071	7,100
Feb-88	1,428	1,588	1,612	1,322	1,368
Mar-88	511	702	664	1,102	1,424
Apr-88	1,482	1,448	1,464	1,450	1,507
May-88	1,407	1,412	1,411	1,411	1,399
Jun-88	300	1,043	300	892	803
Jul-88	482	300	300	300	382
Aug-88	300	300	300	300	300
Sep-88	942	1,005	950	966	876
Oct-88	1,138	910	1,049	772	820
Nov-88	2,515	2,167	2,742	2,573	2,810
Dec-88	2,780	3,420	2,456	3,057	2,273
Jan-89	3,282	3,395	3,246	3,554	3,660
Feb-89	1,212	1,308	1,377	1,222	1,156
Mar-89	6,937	6,937	6,937	6,936	6,937
Apr-89	2,551	300	2,468	300	300
May-89	1,975	2,489	1,974	2,488	2,504
Jun-89	3,345	2,589	4,465	2,569	2,370
Jul-89	6,670	6,680	4,086	6,680	6,680
Aug-89	6,275	5,862	6,680	6,191	6,680
Sep-89	6,328	4,834	5,076	4,860	6,680
Oct-89	4,778	3,580	3,983	3,617	5,591
Nov-89	2,198	2,299	2,836	2,259	2,158
Dec-89	300	4,944	5,144	5,049	5,641
Jan-90	7,078	7,074	7,075	7,076	7,080
Feb-90	2,385	2,546	2,686	2,391	2,410
Mar-90	2,530	2,667	2,604	2,718	3,041
Apr-90	300	300	300	300	300
May-90	1,358	1,320	1,344	1,318	1,377
Jun-90	2,074	300	300	300	300
Jul-90	300	300	300	300	300
Aug-90	1,430	300	300	300	300
Sep-90	1,794	1,777	1,744	1,719	1,793
Oct-90	1,023	862	1,117	671	1,169
Nov-90	1,361	300	609	300	888
Dec-90	1,306	300	1,324	300	1,351
Jan-91	921	1,591	1,277	1,888	1,710
Feb-91	1,254	1,178	1,173	976	1,048
Mar-91	7,065	7,064	7,065	7,064	7,065
Apr-91	1,801	1,270	1,389	1,419	2,084
May-91	1,478	1,370	1,412	1,400	1,495
Jun-91	300	300	300	300	2,022
Jul-91	555	300	446	423	655
Aug-91	300	382	300	300	300
Sep-91	983	2,475	1,609	967	890

Table 5.38: DSM2 Input from CalSim-II: Central Valley Project Exports (cfs)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-75	4,600	4,449	4,600	4,554	4,600
Nov-75	4,600	3,497	4,600	4,600	4,600
Dec-75	4,600	800	1,200	800	4,342
Jan-76	4,229	4,600	4,600	4,600	4,183
Feb-76	3,174	3,723	4,071	3,740	3,417
Mar-76	2,717	2,757	2,758	2,303	2,291
Apr-76	1,721	1,557	1,638	1,551	1,677
May-76	1,517	1,357	1,436	1,352	1,479
Jun-76	1,436	1,753	1,853	2,031	1,480
Jul-76	1,315	1,602	1,752	1,940	1,357
Aug-76	2,518	1,756	1,830	2,001	2,345
Sep-76	3,242	3,271	3,302	3,257	3,247
Oct-76	2,448	3,625	3,637	3,565	3,024
Nov-76	1,767	2,780	2,481	2,172	1,842
Dec-76	1,689	1,841	1,590	2,197	950
Jan-77	2,489	2,387	2,623	2,134	2,504
Feb-77	2,616	800	800	800	955
Mar-77	800	800	800	800	800
Apr-77	800	800	800	800	800
May-77	800	800	800	800	1,105
Jun-77	1,026	800	800	800	2,643
Jul-77	2,509	600	1,927	1,813	2,272
Aug-77	2,979	1,789	2,732	2,679	2,979
Sep-77	3,078	1,889	3,169	3,101	3,083
Oct-77	3,050	1,013	600	600	3,051
Nov-77	1,489	1,758	1,420	1,444	1,691
Dec-77	4,600	3,795	4,209	4,427	4,257
Jan-78	4,600	4,600	4,600	4,600	4,600
Feb-78	4,600	4,600	4,600	4,600	4,600
Mar-78	1,894	4,262	4,091	3,681	2,206
Apr-78	2,692	2,538	2,692	2,692	2,692
May-78	3,896	3,896	3,896	3,896	3,896
Jun-78	4,600	4,046	4,600	4,047	4,600
Jul-78	4,600	3,354	4,600	3,546	4,600
Aug-78	4,600	4,232	4,488	4,323	4,600
Sep-78	4,600	4,600	4,600	4,600	4,600
Oct-78	4,600	3,885	4,390	3,954	4,600
Nov-78	3,964	2,907	2,872	2,906	3,325
Dec-78	3,010	4,377	2,914	4,377	2,993
Jan-79	4,600	4,600	4,600	4,600	4,600
Feb-79	4,548	4,600	4,600	4,600	4,600
Mar-79	2,589	4,600	4,600	4,600	4,281
Apr-79	3,646	3,844	3,284	3,626	3,647
May-79	3,718	2,948	3,334	3,018	3,795
Jun-79	4,161	800	3,811	1,247	4,211
Jul-79	3,999	800	800	1,191	4,596
Aug-79	4,549	3,838	4,008	4,048	3,822
Sep-79	4,478	4,389	4,401	4,397	4,478

Table 5.38: DSM2 Input from CalSim-II: Central Valley Project Exports (cfs)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-79	3,620	3,220	3,071	3,074	3,495
Nov-79	4,013	3,913	3,844	3,644	4,146
Dec-79	4,600	4,600	4,600	4,600	4,600
Jan-80	4,600	4,015	4,600	4,600	4,600
Feb-80	4,600	943	1,655	1,419	4,273
Mar-80	2,591	1,335	1,537	1,401	1,944
Apr-80	2,699	1,951	2,252	2,155	2,699
May-80	3,884	2,819	3,239	3,102	3,884
Jun-80	4,600	3,405	3,407	3,433	3,512
Jul-80	4,600	1,186	3,720	2,010	4,310
Aug-80	4,600	2,563	3,727	3,105	4,578
Sep-80	4,600	4,600	4,600	4,600	4,600
Oct-80	4,600	3,289	4,083	3,246	4,351
Nov-80	3,231	2,900	2,895	3,212	3,659
Dec-80	4,227	4,159	4,223	4,222	4,227
Jan-81	4,600	4,600	4,600	4,600	4,600
Feb-81	4,349	4,600	4,600	4,600	4,600
Mar-81	2,892	4,600	2,394	4,600	4,600
Apr-81	2,707	2,564	2,801	2,544	2,890
May-81	2,127	1,935	2,126	1,915	2,152
Jun-81	2,897	3,073	4,214	3,833	2,729
Jul-81	4,600	4,023	4,600	4,175	4,600
Aug-81	4,600	3,407	3,893	3,521	4,080
Sep-81	4,600	4,228	4,400	4,247	4,309
Oct-81	4,129	2,581	2,729	2,771	2,912
Nov-81	4,600	4,600	4,600	4,600	4,600
Dec-81	4,600	4,600	4,600	4,600	4,600
Jan-82	4,600	4,600	4,600	4,600	4,600
Feb-82	4,600	4,600	4,600	4,600	4,600
Mar-82	4,600	3,542	4,600	4,600	4,229
Apr-82	3,954	2,690	2,897	2,973	2,690
May-82	3,895	3,895	3,895	3,895	3,895
Jun-82	4,600	4,571	4,571	4,571	4,600
Jul-82	4,600	4,600	4,600	4,600	4,600
Aug-82	4,600	3,302	4,578	3,416	4,600
Sep-82	4,600	4,600	4,600	4,600	4,600
Oct-82	4,600	4,600	4,600	4,600	4,600
Nov-82	4,600	4,600	4,600	4,600	4,600
Dec-82	4,600	4,600	4,600	4,600	4,600
Jan-83	3,741	4,600	3,995	4,600	3,970
Feb-83	2,251	4,298	2,251	4,173	2,251
Mar-83	1,955	1,955	1,955	1,955	1,955
Apr-83	2,687	2,687	2,687	2,687	2,687
May-83	3,892	3,892	3,892	3,892	3,892
Jun-83	4,600	4,600	4,600	4,600	4,600
Jul-83	4,600	4,600	4,600	4,600	4,600
Aug-83	4,600	4,600	4,600	4,600	4,600
Sep-83	4,600	4,600	4,600	4,600	4,600

Table 5.38: DSM2 Input from CalSim-II: Central Valley Project Exports (cfs)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-83	4,600	4,600	4,600	4,600	4,600
Nov-83	3,310	4,093	4,093	4,093	4,006
Dec-83	1,445	1,445	1,445	1,445	1,445
Jan-84	1,919	1,919	1,919	1,919	1,919
Feb-84	2,869	2,173	2,173	2,872	2,692
Mar-84	3,032	2,154	2,898	2,741	3,026
Apr-84	3,499	2,743	3,188	3,413	3,356
May-84	2,899	2,781	2,825	2,776	2,916
Jun-84	3,974	3,274	4,039	3,381	3,880
Jul-84	4,600	3,591	4,483	3,717	4,590
Aug-84	4,600	4,600	4,600	4,600	4,600
Sep-84	4,600	4,128	4,394	4,151	4,600
Oct-84	4,468	3,589	3,888	3,403	4,533
Nov-84	4,600	4,600	4,600	4,600	4,600
Dec-84	4,600	4,600	4,600	4,600	4,600
Jan-85	4,600	4,600	4,600	4,600	4,600
Feb-85	4,600	4,490	4,600	4,438	4,600
Mar-85	3,523	3,204	3,846	3,593	4,378
Apr-85	2,356	2,230	2,221	2,249	2,393
May-85	2,497	1,912	2,469	2,219	2,387
Jun-85	2,795	2,843	2,790	2,829	2,833
Jul-85	4,600	3,103	4,600	4,416	4,600
Aug-85	4,600	2,669	4,386	3,712	4,073
Sep-85	4,191	4,423	4,529	4,532	3,927
Oct-85	3,006	2,036	2,867	2,588	3,049
Nov-85	2,765	2,842	2,671	2,820	4,129
Dec-85	4,600	4,600	4,600	4,600	4,600
Jan-86	4,600	4,600	4,600	4,600	4,600
Feb-86	4,600	4,600	4,600	4,600	4,600
Mar-86	4,600	4,600	4,573	4,600	3,828
Apr-86	2,254	1,725	1,808	1,865	2,049
May-86	3,016	2,318	2,627	2,340	2,962
Jun-86	4,600	2,785	3,323	3,329	3,288
Jul-86	3,097	800	800	800	1,651
Aug-86	4,525	3,383	3,345	3,161	4,522
Sep-86	4,600	4,600	4,600	4,600	4,600
Oct-86	4,600	3,377	3,988	3,145	4,217
Nov-86	4,424	3,683	3,896	3,681	4,569
Dec-86	2,622	2,084	2,822	2,316	2,789
Jan-87	2,590	4,221	4,223	4,221	4,393
Feb-87	2,336	3,676	3,287	3,570	2,926
Mar-87	1,901	1,526	1,677	1,533	1,885
Apr-87	2,141	800	800	800	2,064
May-87	1,507	956	1,182	1,194	1,730
Jun-87	2,001	1,072	1,438	1,458	2,949
Jul-87	2,015	879	1,315	1,339	3,138
Aug-87	1,895	800	1,117	1,436	2,740
Sep-87	3,440	2,715	2,830	2,526	3,751

Table 5.38: DSM2 Input from CalSim-II: Central Valley Project Exports (cfs)

Date	BASE	GFDL A2	PCM A2	GFDL B1	PCM B1
Oct-87	2,102	2,778	2,603	2,960	2,904
Nov-87	3,080	2,841	2,593	2,634	3,024
Dec-87	4,600	4,600	4,600	4,600	1,241
Jan-88	4,600	4,600	4,600	4,600	4,600
Feb-88	4,600	1,106	1,314	1,279	4,600
Mar-88	800	800	800	800	800
Apr-88	1,482	1,448	1,464	1,450	1,507
May-88	1,407	1,412	1,411	1,411	1,399
Jun-88	1,093	1,132	1,245	1,348	1,990
Jul-88	878	883	800	1,125	1,857
Aug-88	1,125	916	1,511	1,280	1,995
Sep-88	2,814	2,849	2,820	2,830	2,785
Oct-88	3,097	3,034	3,089	3,022	3,099
Nov-88	2,434	2,577	2,321	2,463	2,470
Dec-88	3,557	2,995	3,723	3,226	3,696
Jan-89	4,213	4,211	4,211	4,211	4,212
Feb-89	2,720	2,746	2,769	2,721	2,704
Mar-89	4,600	4,600	4,600	4,600	4,600
Apr-89	2,551	2,670	2,468	2,668	2,684
May-89	1,975	2,489	1,974	2,488	2,504
Jun-89	2,544	1,273	1,298	1,778	2,370
Jul-89	2,658	800	1,201	1,781	3,380
Aug-89	2,390	1,009	1,198	1,418	2,914
Sep-89	4,426	4,600	4,600	4,600	4,121
Oct-89	2,719	2,325	2,333	2,337	2,625
Nov-89	1,959	2,019	1,872	1,728	3,475
Dec-89	800	1,189	1,367	1,610	2,128
Jan-90	4,600	4,600	4,600	4,600	4,600
Feb-90	4,600	3,451	3,488	3,413	4,600
Mar-90	2,530	2,667	2,604	2,718	2,287
Apr-90	800	800	800	800	800
May-90	1,358	1,320	1,344	1,318	1,377
Jun-90	1,278	800	800	1,430	1,042
Jul-90	1,039	800	800	800	800
Aug-90	1,339	2,223	1,675	1,887	1,099
Sep-90	2,821	2,821	2,821	2,821	2,826
Oct-90	2,697	2,952	2,955	2,941	3,022
Nov-90	1,485	2,140	1,459	2,397	1,510
Dec-90	2,019	1,631	998	1,327	800
Jan-91	1,668	1,515	1,821	1,449	1,669
Feb-91	1,262	822	1,082	1,056	1,167
Mar-91	4,600	4,600	4,600	4,600	4,600
Apr-91	1,491	1,576	1,793	1,760	2,084
May-91	1,478	1,370	1,412	1,400	1,495
Jun-91	1,656	600	861	600	2,022
Jul-91	800	600	600	600	1,508
Aug-91	2,034	600	2,270	1,498	1,946
Sep-91	3,520	1,017	2,362	3,450	3,498

Table 5.39: DSM2 Input from CalSim-II: Contra Costa Water District Diversions (cfs)

Water Yr	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1976	220	187	148	120	99	197	0	145	249	164	168	279
1977	241	66	49	115	162	197	180	241	249	324	273	279
1978	241	193	177	143	162	99	111	220	281	511	538	464
1979	413	183	172	120	103	200	0	220	474	329	356	264
1980	236	183	146	120	61	99	0	220	418	327	355	264
1981	236	188	146	120	103	99	0	220	430	332	356	264
1982	236	185	145	120	103	34	0	220	479	327	355	264
1983	233	185	145	120	103	99	0	220	410	329	356	279
1984	223	143	181	122	101	99	0	220	435	329	356	281
1985	224	183	145	120	103	99	0	220	434	330	356	264
1986	237	150	145	120	56	150	0	220	420	327	355	264
1987	234	183	145	120	103	99	0	220	437	329	338	264
1988	96	71	99	120	99	99	0	220	281	153	231	103
1989	213	183	145	120	103	99	111	220	481	511	538	264
1990	213	183	145	120	103	197	0	241	249	250	233	166
1991	184	193	177	143	162	197	180	241	249	324	273	279

Note: Values represent combined Old River at Rock Slough and Old River at Highway 4 diversions. CCWD diversions were identical for the base case and all climate change scenarios.

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5.12 Appendix B: Additional Chloride Exceedance Plots and Percentile Tables for Present Sea Level Scenarios

This appendix provides chloride exceedance plots and percentile tables computed from daily average DSM2 results at selected municipal and industrial intake locations.

- ❑ CCWD at Old River diversion at Highway 4 (Figure 5.17 and Table 5.40)
- ❑ SWP at Clifton Court Forebay (Figure 5.18 and Table 5.41)
- ❑ CVP at Tracy (Figure 5.19 and Table 5.42)

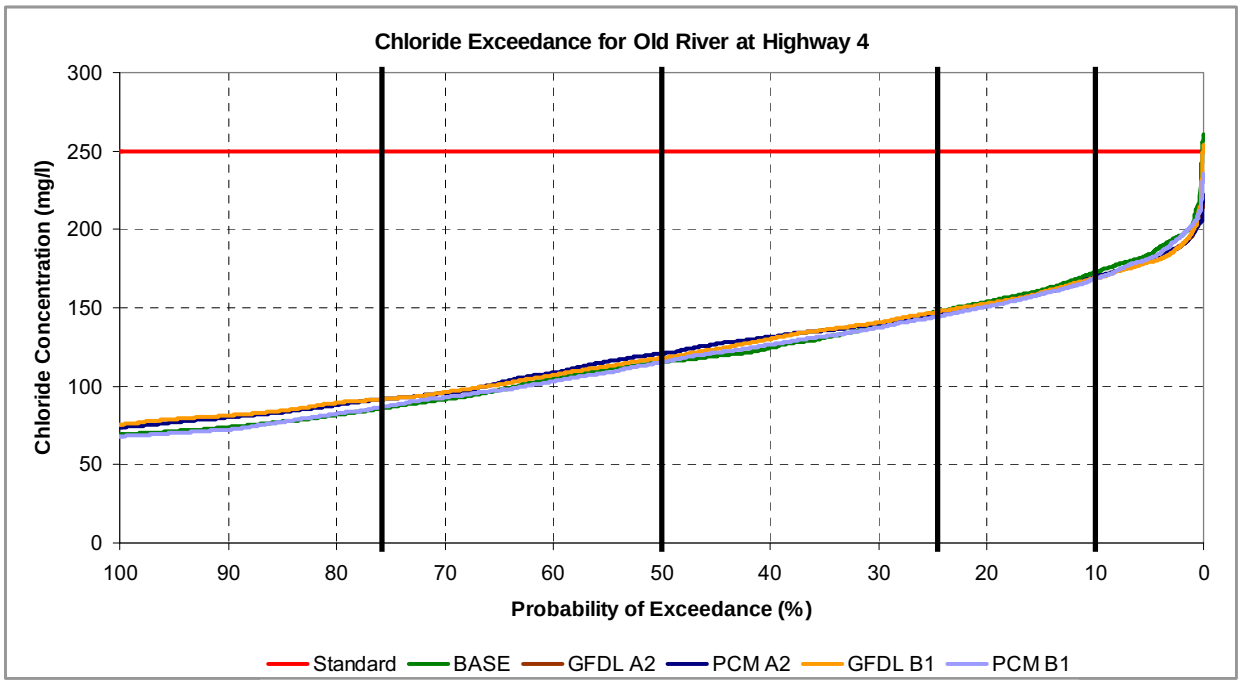

Figure 5.17: Probability of Exceedance for Chlorides at Old River at Highway 4

Table 5.40: Chloride Concentration Percentiles (mg/l) for Old River at Highway 4

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	11	21	33	69	133	170	183	85
GFDL A2	10	21	33	76	136	166	179	86
PCM A2	10	20	32	74	137	167	180	86
GFDL B1	14	22	35	75	137	167	179	87
PCM B1	10	20	31	68	133	166	181	83

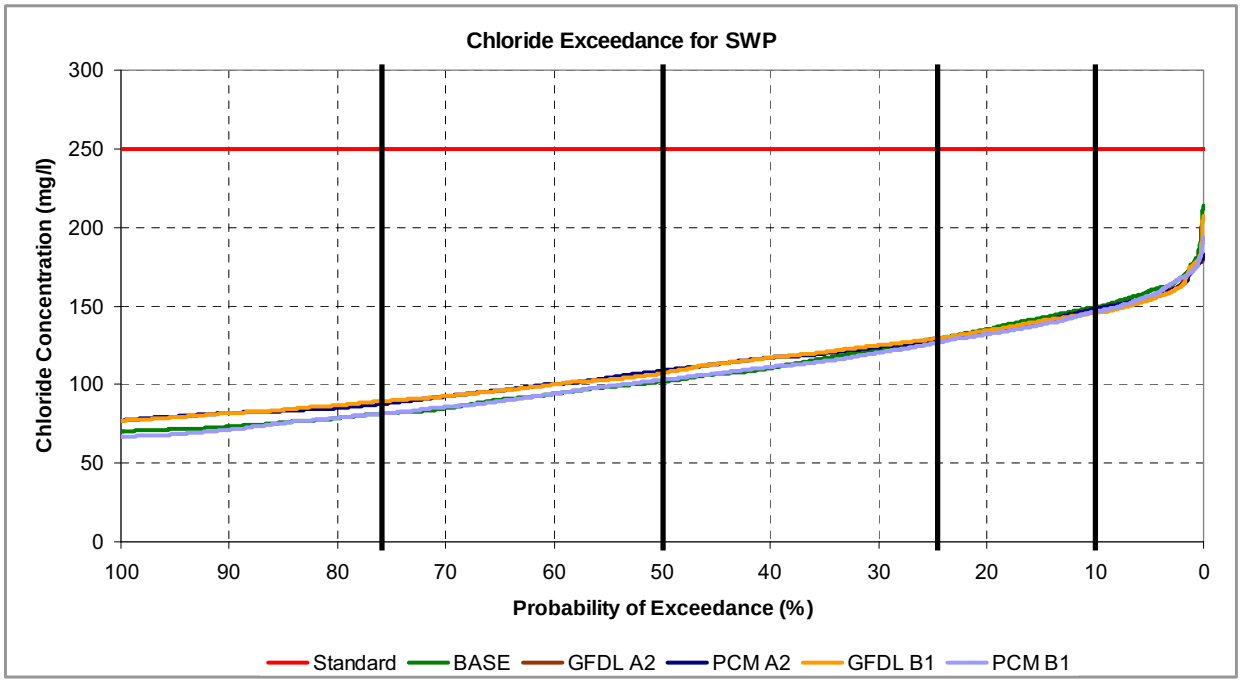

Figure 5.18: Probability of Exceedance for Chlorides at the State Water Project

Table 5.41: Chloride Concentration Percentiles (mg/l) for the State Water Project

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	10	22	34	70	119	148	158	78
GFDL A2	10	21	37	77	121	146	154	80
PCM A2	10	20	35	77	121	146	154	80
GFDL B1	10	25	39	77	122	145	153	81
PCM B1	10	19	33	67	116	145	156	76

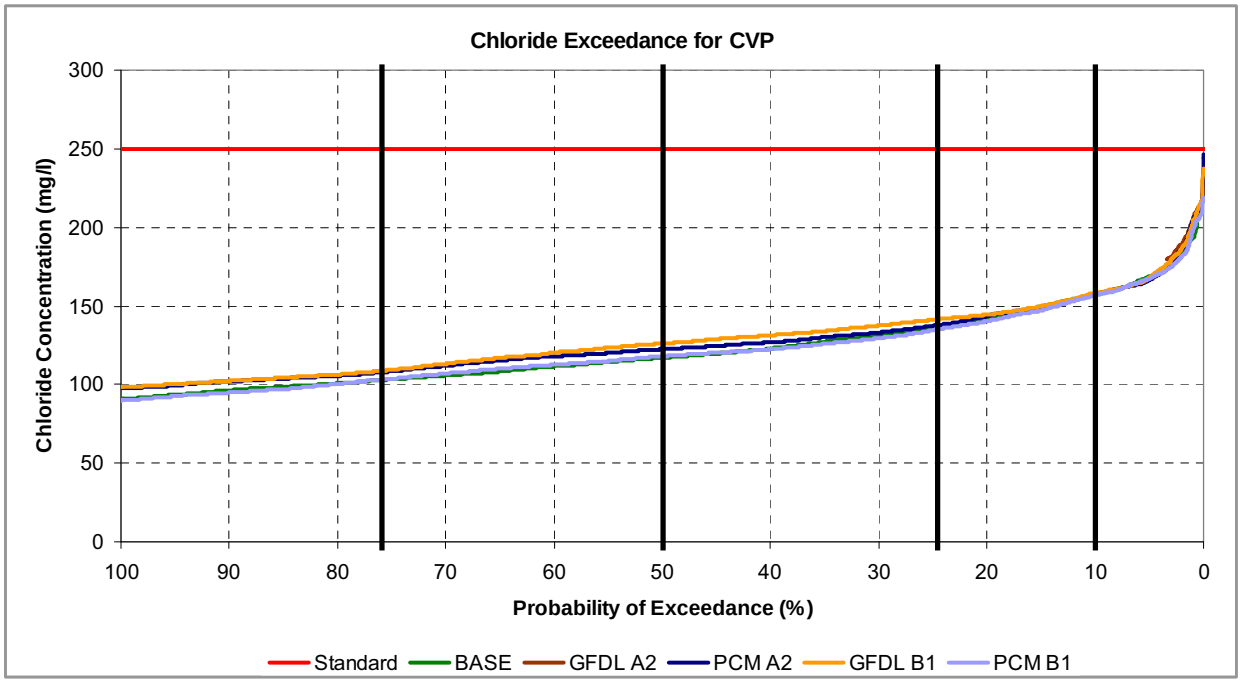

Figure 5.19: Probability of Exceedance for Chlorides at the Central Valley Project

Table 5.42: Chloride Concentration Percentiles (mg/l) for the Central Valley Project

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	10	16	53	91	129	155	168	91
GFDL A2	10	18	60	100	134	156	169	96
PCM A2	10	15	56	97	131	156	166	94
GFDL B1	11	26	60	99	135	156	167	97
PCM B1	10	15	54	90	127	155	167	90

5.13 Appendix D: Additional Chloride Exceedance Plots and Percentile Tables for One-Foot Sea Level Scenarios

This appendix provides chloride exceedance plots and percentile tables computed from daily average DSM2 results for one-foot sea level rise scenarios at selected municipal and industrial intake locations. No operations changes were made to try to reduce the effects of sea level rise.

- CCWD at Old River diversion at Highway 4 (Figure 5.20 and Table 5.43)
- SWP at Clifton Court Forebay (Figure 5.21 and Table 5.44)
- CVP at Tracy (Figure 5.22 and Table 5.45)

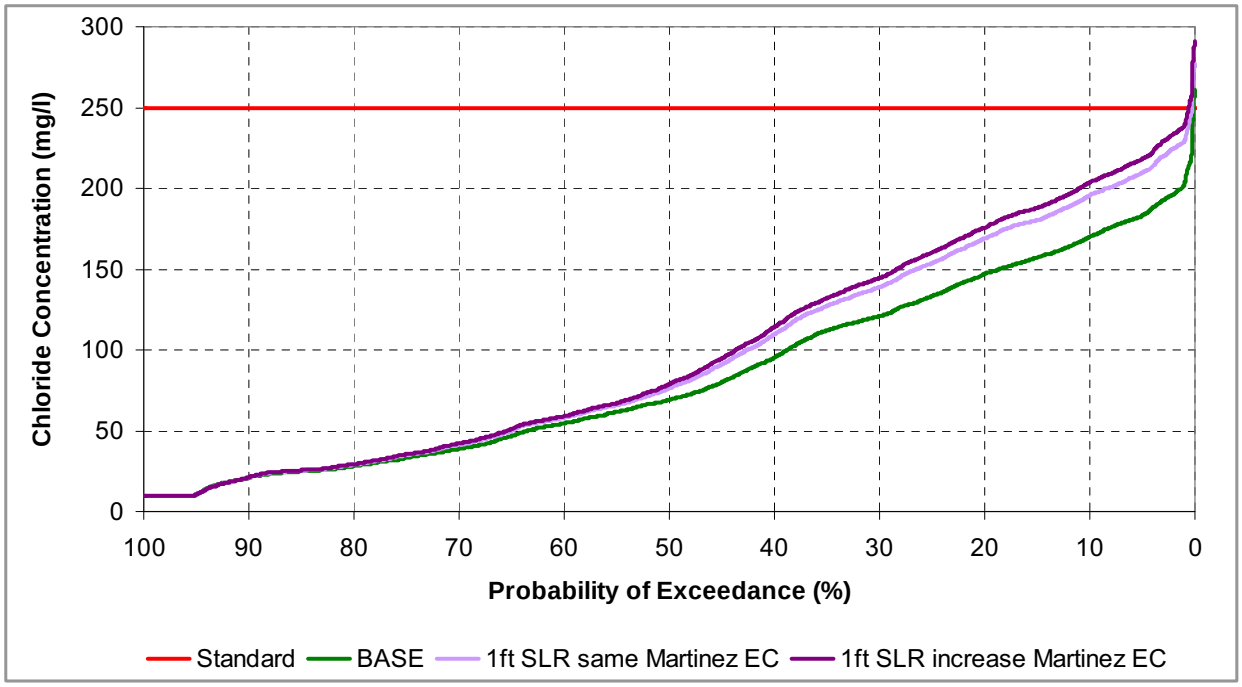

Figure 5.20: Probability of Exceedance for Chlorides at Old R. at Hwy 4 for a One-Foot Sea Level Rise and no Changes in System Operations

Table 5.43: Chloride Concentration Percentiles (mg/l) for Old R. at Hwy 4 for a One-Foot Sea Level Rise and no Changes in System Operations

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	11	21	33	69	133	170	183	85
1ft SLR same Martinez EC	11	21	35	76	154	196	210	96
1ft SLR increase Martinez EC	11	21	35	79	160	204	218	99

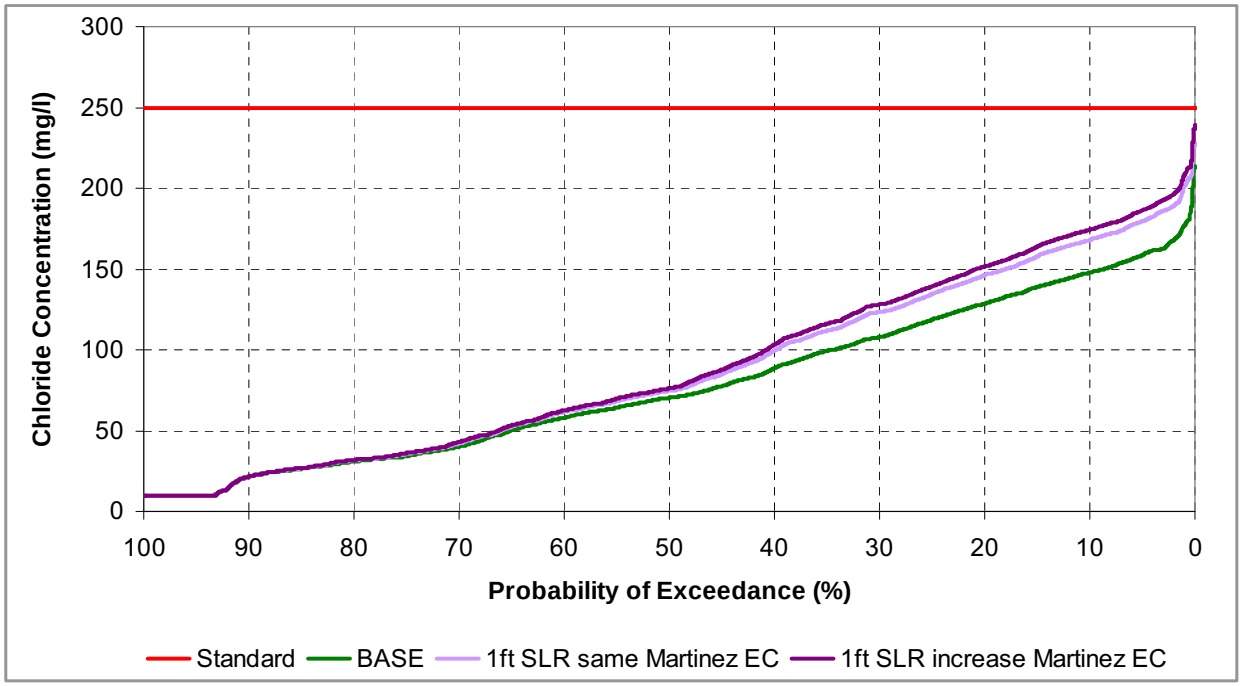

Figure 5.21: Probability of Exceedance for Chlorides at the State Water Project for a One-Foot Sea Level Rise and no Changes in System Operations

Table 5.44: Chloride Concentration Percentiles (mg/l) for the State Water Project for a One-Foot Sea Level Rise and no Changes in System Operations

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	10	22	34	70	119	148	158	78
1ft SLR same Martinez EC	10	21	36	75	135	168	180	87
1ft SLR increase Martinez EC	10	22	36	76	139	174	186	89

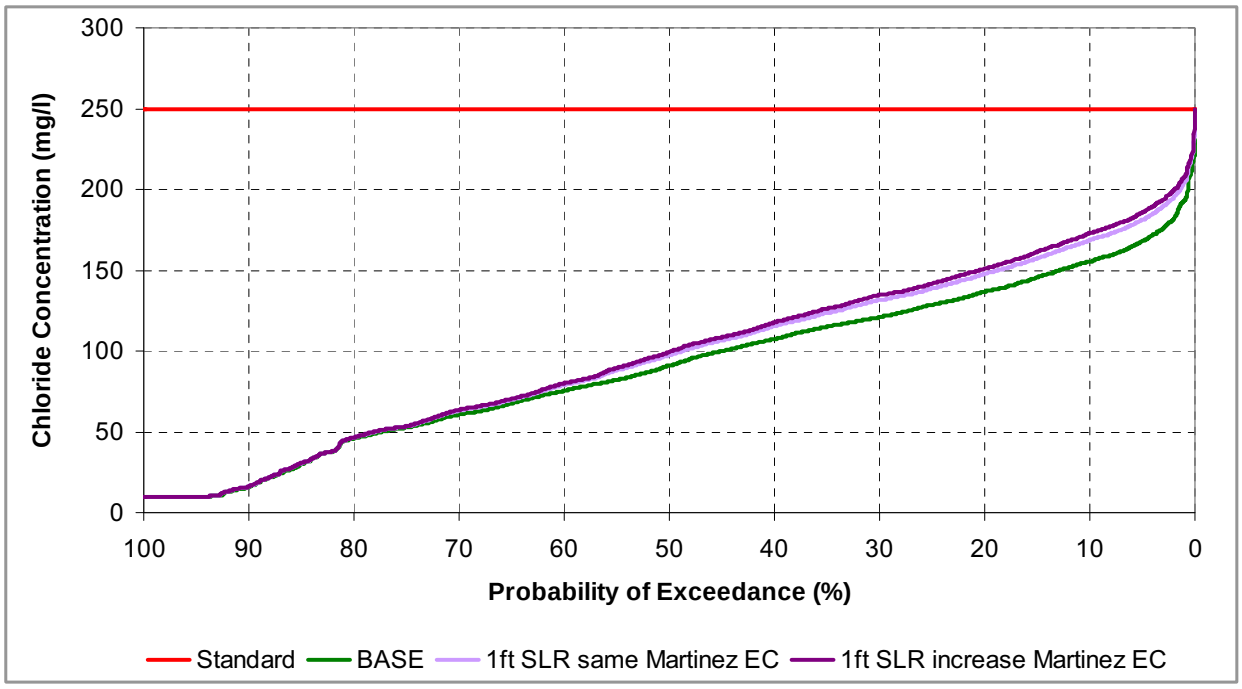

Figure 5.22: Probability of Exceedance for Chlorides at the Central Valley Project for a One-Foot Sea Level Rise and no Changes in System Operations

Table 5.45: Chloride Concentration Percentiles (mg/l) for the Central Valley Project for a One-Foot Sea Level Rise and no Changes in System Operations

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	10	16	53	91	129	155	168	91
1ft SLR same Martinez EC	10	16	53	97	139	169	181	97
1ft SLR increase Martinez EC	10	16	53	99	142	173	186	98

5.14 Appendix E: Additional Chloride Exceedance Plots and Percentile Tables for Combined Climate Change and One-Foot Sea Level Scenarios

This appendix provides chloride exceedance plots and percentile tables computed from daily average DSM2 results for combined climate change and one-foot sea level rise scenarios at selected municipal and industrial intake locations. No changes in operations were made to account for sea level rise (SLR).

- ❑ CCWD at Old River diversion at Highway 4 (Figure 5.23 and Table 5.46)
- ❑ SWP at Clifton Court Forebay (Figure 5.24 and Table 5.47)
- ❑ CVP at Tracy (Figure 5.25 and Table 5.48)

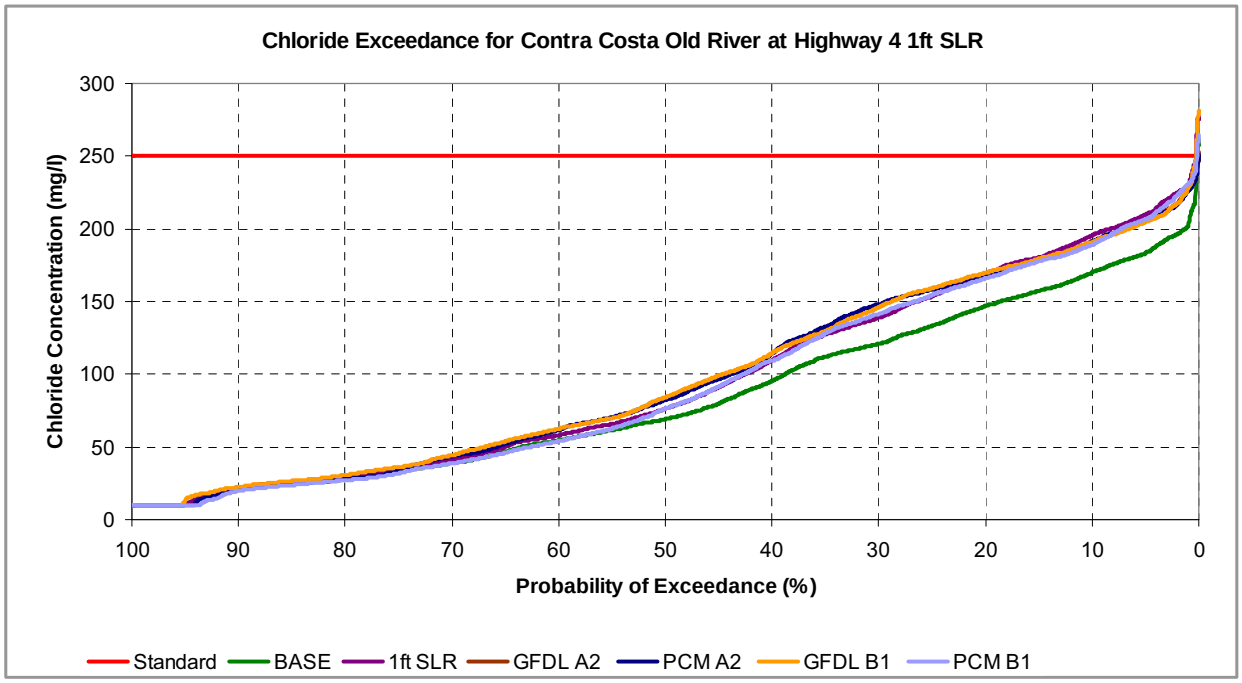

Figure 5.23: Probability of Exceedance for Chlorides at Old River at Highway 4 for Climate Change and a One-Foot Sea Level Rise and no Changes in Operations for SLR

Table 5.46: Chloride Concentration Percentiles (mg/l) for Old R. at Highway 4 for Climate Change and a One-Foot Sea Level Rise and no Changes in Operations for SLR

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	11	21	33	69	133	170	183	85
1ft SLR same Mtz EC	11	21	35	76	154	196	210	96
GFDL A2 1ft SLR	10	21	35	85	158	191	205	97
PCM A2 1ft SLR	10	21	35	82	158	191	206	97
GFDL B1 1ft SLR	13	22	36	84	159	191	205	98
PCM B1 1ft SLR	10	20	32	76	154	189	207	94

*All sea level rise scenarios in this table assume that Martinez EC is the same as in the present sea level scenarios.

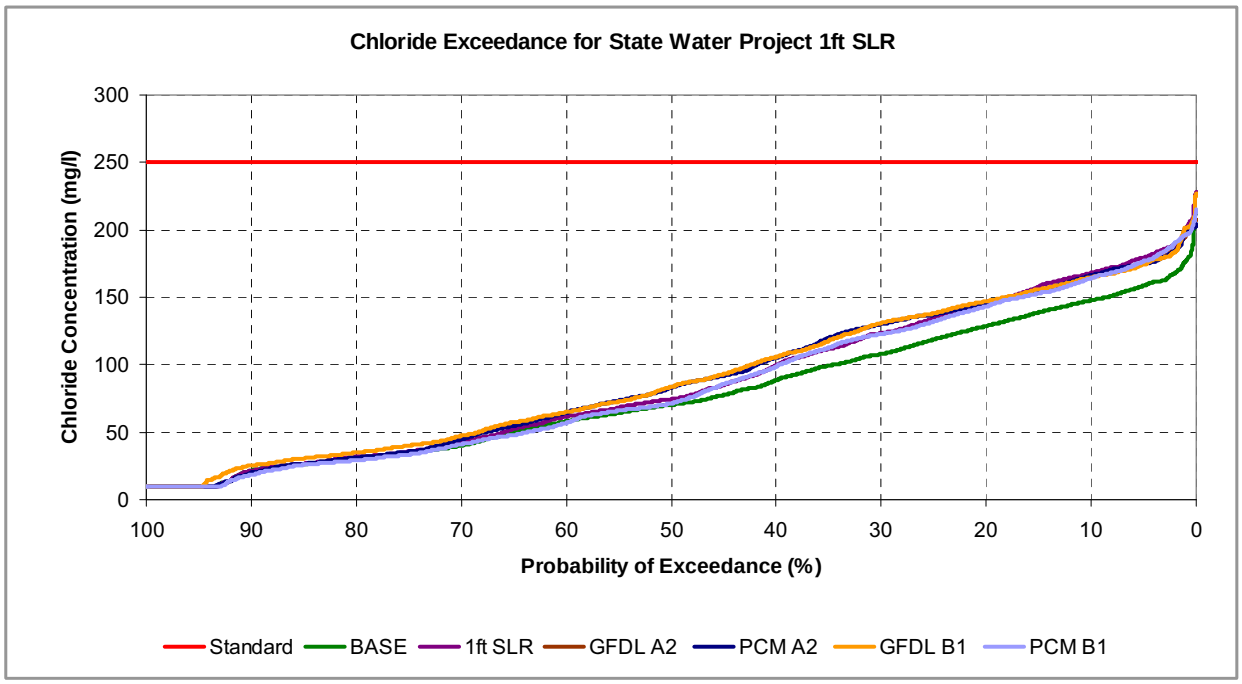

Figure 5.24: Probability of Exceedance for Chlorides at the State Water Project for Climate Change and a One-Foot Sea Level Rise and no Changes in Operations for SLR

Table 5.47: Chloride Concentration Percentiles (mg/l) for the State Water Project for Climate Change and a One-Foot Sea Level Rise and no Changes in Operations for SLR

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	10	22	34	70	119	148	158	78
1ft SLR same Mtz EC	10	21	36	75	135	168	180	87
GFDL A2 1ft SLR	10	22	38	83	138	166	175	89
PCM A2 1ft SLR	10	20	35	83	137	166	175	89
GFDL B1 1ft SLR	10	25	40	84	138	165	174	90
PCM B1 1ft SLR	10	18	33	71	132	164	177	85

*All sea level rise scenarios in this table assume that Martinez EC is the same as in the present sea level scenarios.

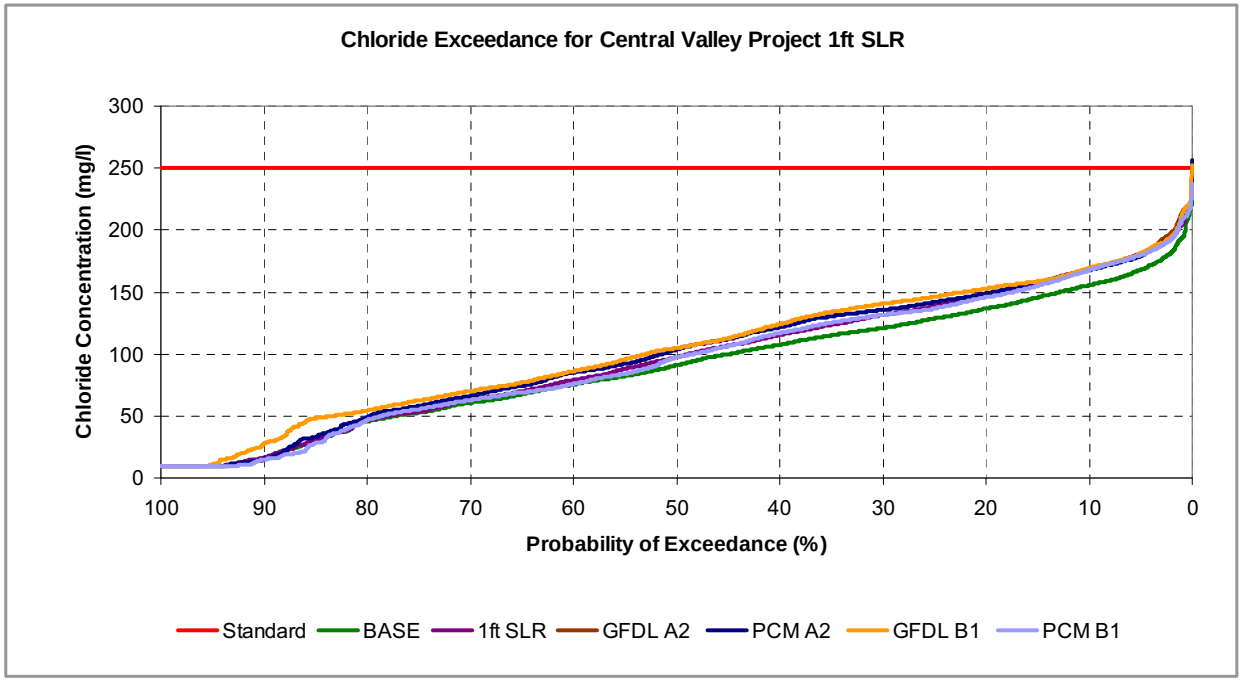

Figure 5.25: Probability of Exceedance for Chlorides at the Central Valley Project for Climate Change and a One-Foot Sea Level Rise and no Changes in Operations for SLR

Table 5.48: Chloride Concentration Percentiles (mg/l) for the Central Valley Project for Climate Change and a One-Foot Sea Level Rise and no Changes in Operations for SLR

	5%	10%	25%	50%	75%	90%	95%	Avg
BASE	10	16	53	91	129	155	168	91
1ft SLR same Mtz EC	10	16	53	97	139	169	181	97
GFDL A2 1ft SLR	10	18	63	105	145	170	182	103
PCM A2 1ft SLR	10	15	58	104	142	168	179	100
GFDL B1 1ft SLR	11	28	63	105	146	169	181	103
PCM B1 1ft SLR	10	15	55	97	137	167	180	96

*All sea level rise scenarios in this table assume that Martinez EC is the same as in the present sea level scenarios.

Progress on Incorporating Climate Change into Management of California's Water Resources

1st Progress Report
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Chapter 6:
Climate Change Impacts on Flood Management

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6 Climate Change Impacts on Flood Management

6.1 Introduction

Changing climate can have a significant impact on the timing and magnitude of precipitation and runoff in California. Climate is the time-averaged state of temperature, winds, precipitation and runoff. Flooding, however, results from individual weather events which can be considered random phenomena on the time scale of climate (e.g. 30 to 50 years). From year to year, there is a large amount of variability in winter rainfall and associated runoff patterns. This large variability creates uncertainty when evaluating changes in weather events due to climate change.

One way to address this uncertainty is to look at long-term precipitation, temperature, and runoff records in California and identify any trends that may have occurred over the past century. Future change can then be inferred from trends identified in the past record. However, a straight extrapolation of historical trends into the future may not be accurate.

Climate modeling tries to simulate these nonlinear components and their evolution with changing greenhouse gas levels in the atmosphere. Results from these global-scale simulations have been downscaled to provide information on potential changes over California. However, the model results provided relate to climate properties, not weather properties. Because of this, the results cannot be used directly to evaluate changes in specific rainfall and runoff patterns leading to floods or to changes in frequency of floods or droughts.

The climate model simulation data can be used to compare simulated future trends in precipitation, temperature, and runoff to historical trends. The model-derived trends also can be used to guide extrapolation of historical trends. Based on these efforts and using some assumptions, changes in runoff to a given rainfall pattern can be estimated using watershed models.

Such analyses are just the start of work that needs to be completed to evaluate climate change impacts on precipitation and the associated water supply or flood runoff in California. This chapter presents the initial work that has been done and outlines future work and data needed to complete such work. The topics covered in this chapter are illustrated in Figure 6-1. This chapter starts with a literature review of work on climate change and runoff in California. The chapter then examines the historical record for existing trends and investigates the information that can be obtained from the climate change scenarios selected for study by the state's Climate Action Team. After discussing the elements of the climate change scenario data that are not suitable for flood analysis, the chapter concludes with a description of climate change scenario data that would be suitable for analyzing climate change impacts on flood frequency and outlines future work directions. It is important to note that the work presented here is an analysis of past and potential future changes to California hydrology. It is not a recommendation for making changes to existing flood risk, flood frequency, or water supply practices and analyses.

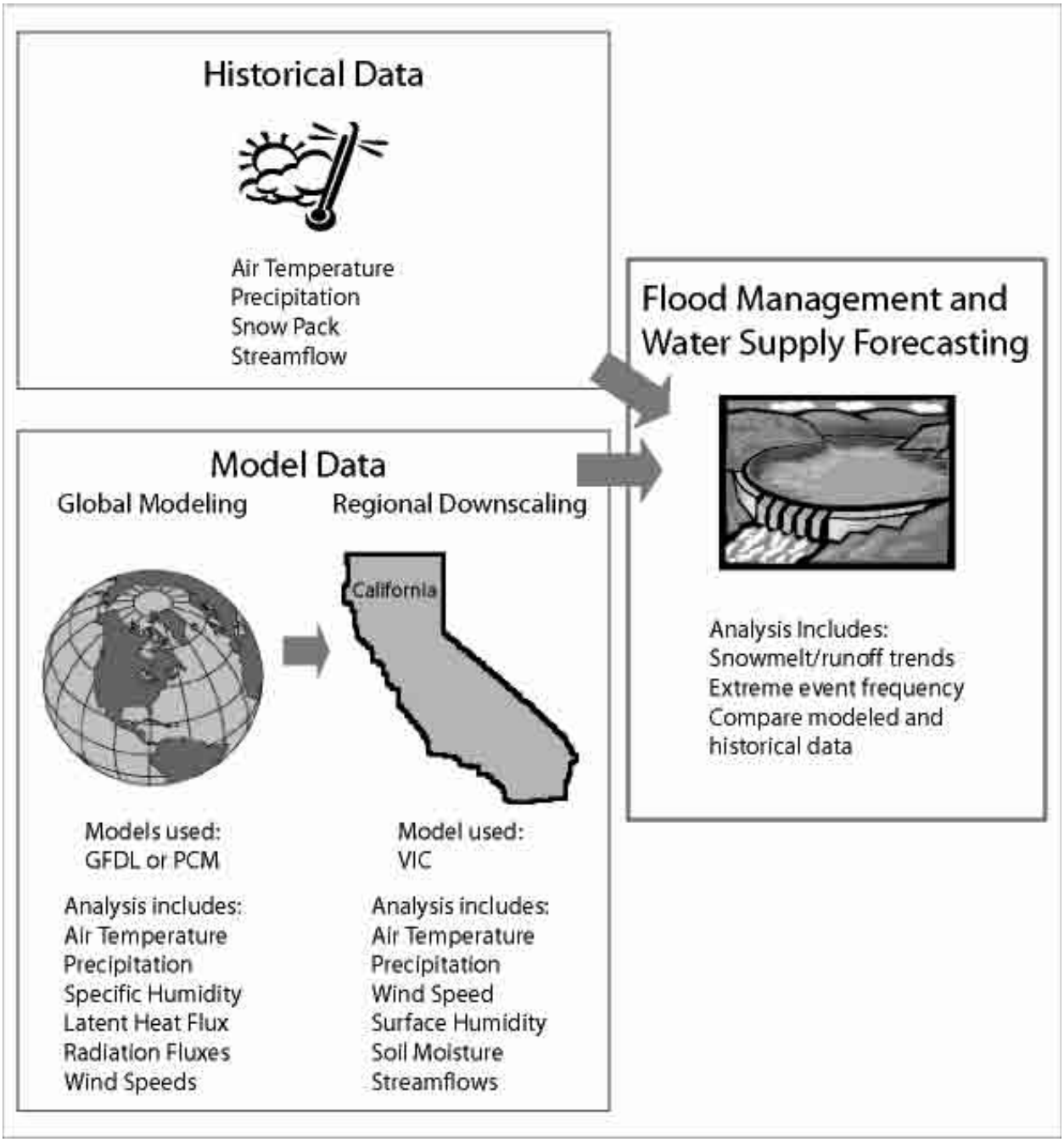


Figure 6-1 Relation of climate change scenario simulations to flood analysis

6.2 Literature Review of Flood Analysis and Climate Change

In 1988, the United Nations Environmental Programme and the World Meteorological Organization established the Intergovernmental Panel on Climate Change (IPCC). It released the First Assessment Report in 1990, the Second Assessment Report in 1995, and the Third Assessment Report in 2001 (IPCC FAR 1990, SAR 1995, TAR 2001). Beginning in 2000, the U.S. Global Climate Change Research Program (USGCRP) has released a series of regional and

sectorial assessment reports. The IPCC TAR and USGCRP Report of the Water Sector (USGCRP Water 2001) provide up-to-date summaries of the potential consequences of global warming.

The IPCC reports that climate model projections with a transient 1 percent annual increase in greenhouse gas emissions show an increase in the global mean near-surface air temperature of 1.4 to 5.8 ^{o}C, with a 95 percent probability interval of 1.7 to 4.9 ^{o}C by 2100 (Wigley and Roper 2001). Both reports indicate that likely changes during the 21st century include: higher maximum and minimum temperatures with a decreasing diurnal range over U.S. land areas, more intense precipitation events, increased summer continental drying, and increased risk of drought. Climate model projections of precipitation amounts remains uncertain, however, the rain to snow ratio, at least in the Sierra Nevada appears to be increasing under the climate change scenarios discussed in the USGCRP Water Sector Report (USGCRP Water 2001).

Further research has been done to investigate the potential impacts of climate change on California hydrology using climate model projections and land surface-hydrology models. Table 6-1 lists the references grouped by the type of study conducted. As can be seen from Table 6-1, there are three main types of studies that have been conducted: regression studies, computer model simulation of watersheds using GCM data directly, and computer model simulation of watersheds using climate change data that has been downscaled. Downscaling means inferring finer detail data from the GCM results. This process is based on statistical properties of a region or through the use of a finer-grid scale dynamic model of the atmosphere and land surface.

Table 6-1Climate Change Studies and Runoff in California

STUDY TYPE	REFERENCES
Regression	Revelle and Waggoner (1983) Stewart et al. (2004)
GCM	Gleick (1987) Lettenmaier and Gan (1990) Dettinger et al. (2004)
GCM with Downscaling	Miller et al. (1999) Knowles and Cayan (2001) Wilby and Dettinger (2000) Miller (2003) Wood et al. (2004) Van Rheenen et al. (2004) Christensen et al. (2004) Kim (2005) Maurer and Duffy (2005)
Other	Jeton et al. (1996) Bardini et al. (2001) Knowles and Cayan (2004)

Also noted in Table 6-1 are studies that do not fit into the above three categories. These studies include watershed studies with set incremental changes to temperature and precipitation (Jeton et al., 1996), an analysis of the changes to the Sacramento and San Joaquin River Delta associated with runoff changes in the upper watersheds (Knowles and Cayan, 2004), and an assessment of climate change data and known impacts to date combined with an assessment of mitigation measures for DWR (Bardini et al., 2001).

The consensus of the above-cited studies is that climate change will impact the timing and magnitude of runoff and flooding patterns in California. Expected impacts include more precipitation falling as rain rather than snow and an earlier melt to the winter snowpack. The uncertainty lies in the magnitude of these changes and any changes associated with the frequency and magnitude of future floods and droughts. The following sections investigate historical changes to precipitation, temperature, and runoff as well as potential changes identified by the latest climate change simulations and their associated consequences.

6.3 Historical Precipitation, Temperature, and Runoff Trends

Former state climatologist James Goodridge compiled an extensive collection of long-term precipitation and temperature data across the state. These data sets have been used to identify precipitation and temperature trends that have occurred in the last 100 years. Long-term runoff records in selected watersheds were also examined for trends. Results are presented below. In order to determine if the identified trends were statistically significant, a t-test with an alpha value of 0.05 was used.

6.3.1 Precipitation

Figure 6-2 shows the statewide average of annual precipitation from 102 stations across California from 1890 to 2002. The average annual precipitation for California of 23.8 inches has not changed significantly over the past century. In an effort to determine if there has been a change in precipitation distribution over the state, the precipitation records were sorted by latitude placed into three categories: south, central, and north. The division between south and central is 35 degrees north latitude and the division between central and north is 39 degrees north latitude.

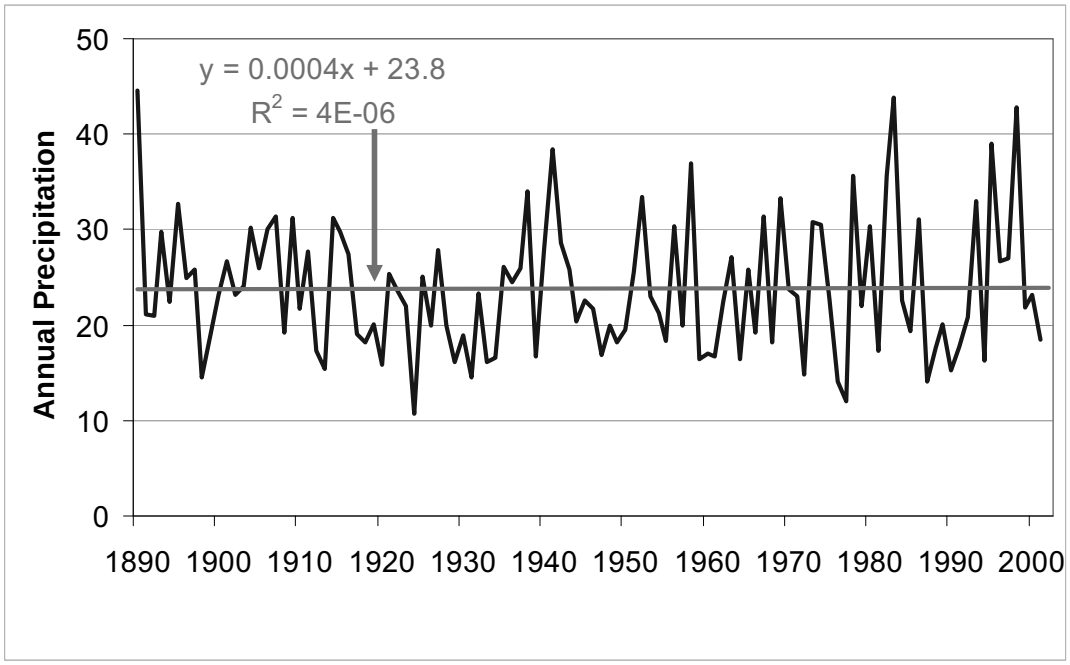


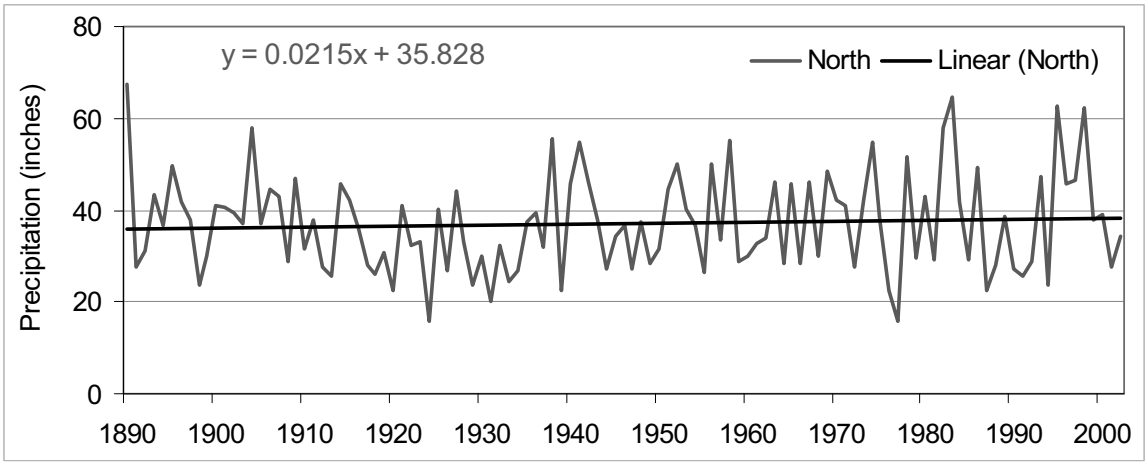
Figure 6-2 Average annual precipitation for California 1890-2002 with trend line.

Average annual precipitation is plotted with trend lines in Figure 6-3 for the south, central, and north regions for 1890-2002. The south and central regions both show a minor decreasing trend in precipitation while the north part of the state shows a minor increase. The trends do not yield a significant change in the average precipitation over the course of the century. But if focus is shifted to the last 30 years, an increasing trend can be found for all three regions as is shown in Figure 6-4. This may be an artifact of the big El Nino seasons of 1983 and 1998. Using the t-test, only the trends for central and northern California were determined to be statistically significant.

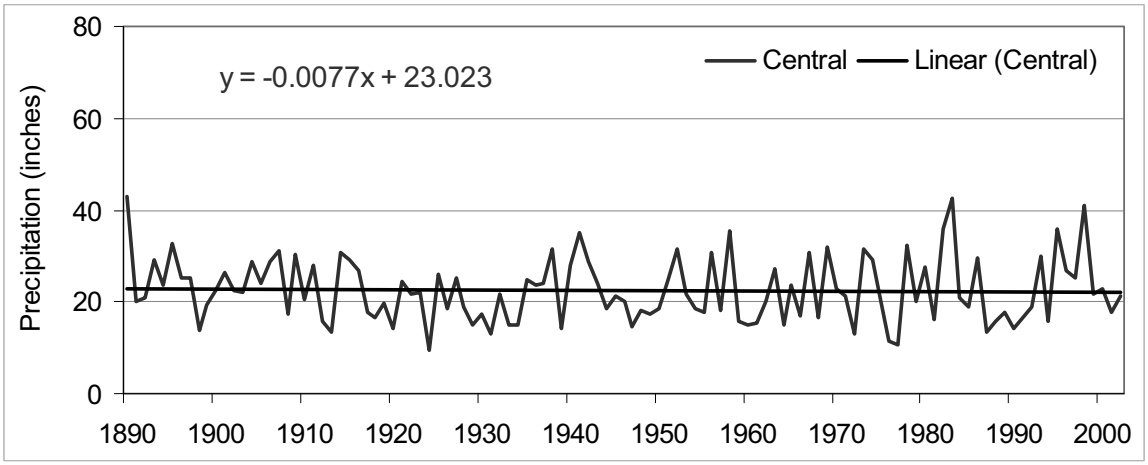
Figure 6-4 depicts annual precipitation for the three regions and a fit linear trend for the past 30 years. This increasing trend over the past 30 years is consistent with the research presented in Chapter 2 which points to increasing precipitation over the state. But it does contradict data presented in Bardini and others (2001). Their data pointed to potential decreasing precipitation. The differences can likely be related to the difference in the period selected to identify the trend. Extremes at the beginning or end of the time series can significantly impact the magnitude of the identified trend.

While the average precipitation has little or no trend over the past century, the variability has a distinct and statistically significant increase, which can be seen in Figure 6-5. Figure 6-5 depicts the coefficient of variation (standard deviation divided by the mean) based on a 10-year moving average of mean and standard deviation values of the annual precipitation time series. There is a distinct upward trend in the variability over the past century with end of period values about 75 percent larger than beginning- of-period values. This increase in variability is much larger than any of the linear trends identified in the average values of the data. There is some evidence from scattered precipitation measurements from 1850 to 1900 that the 19th century was more variable than the 20th.

a) Northern Region: California-Oregon border to 39º latitude



b) Central Region: 35 º - 39º latitude



c) Southern Region: 35 º latitude to California-Mexico border

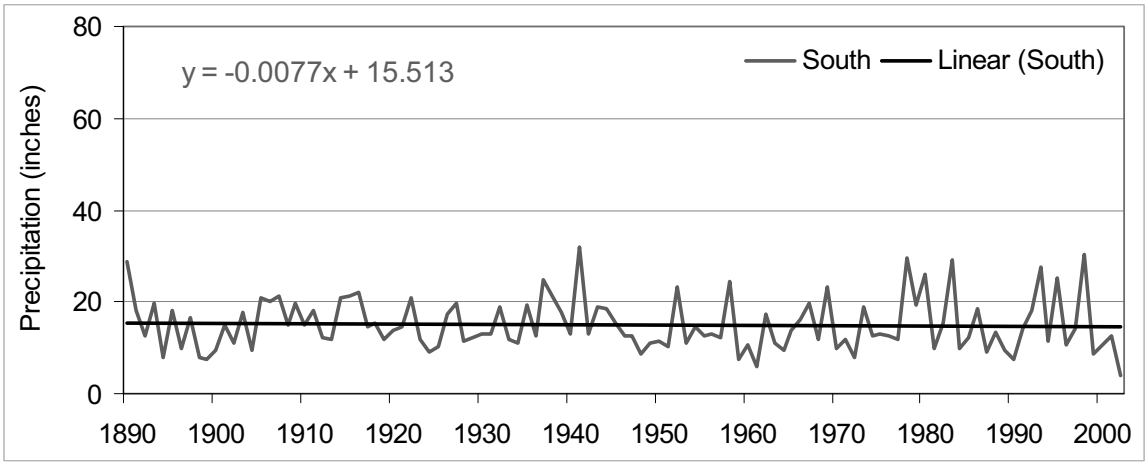


Figure 6-3 Annual average precipitation with trends by region

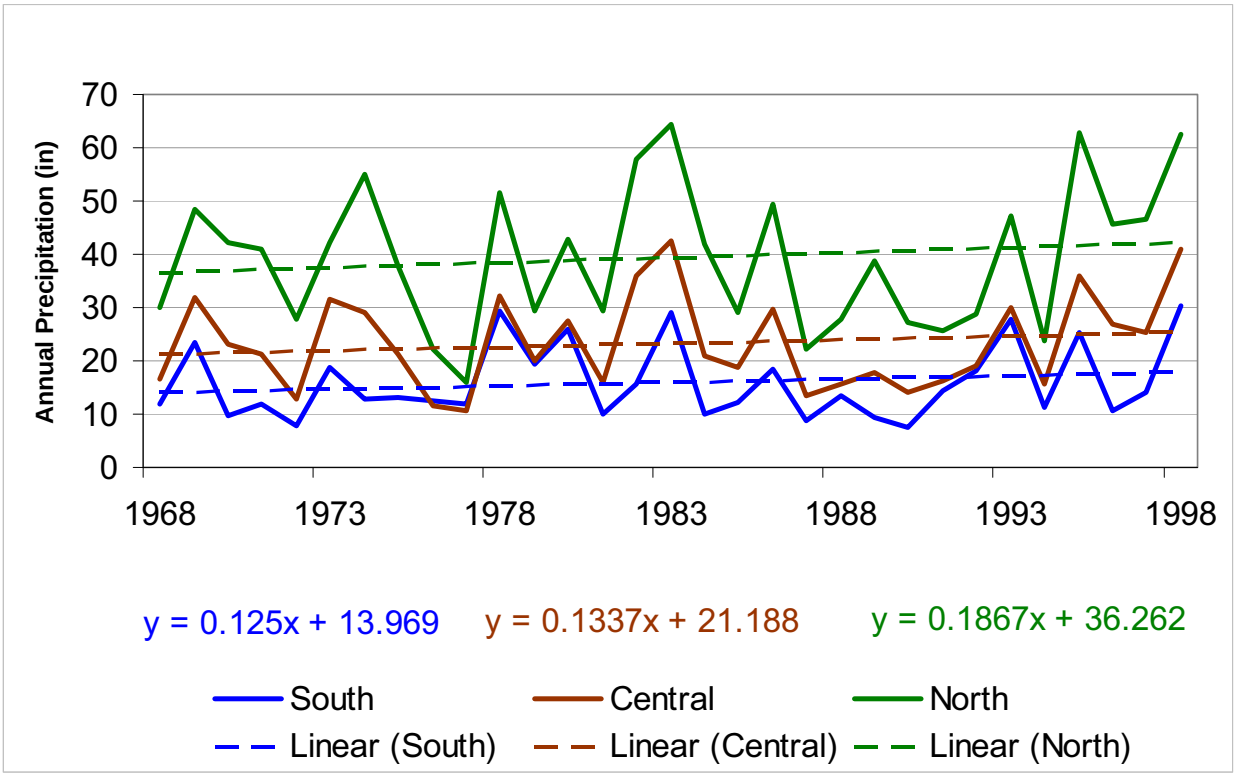


Figure 6-4 Linear trends of annual precipitation for the past 30 years

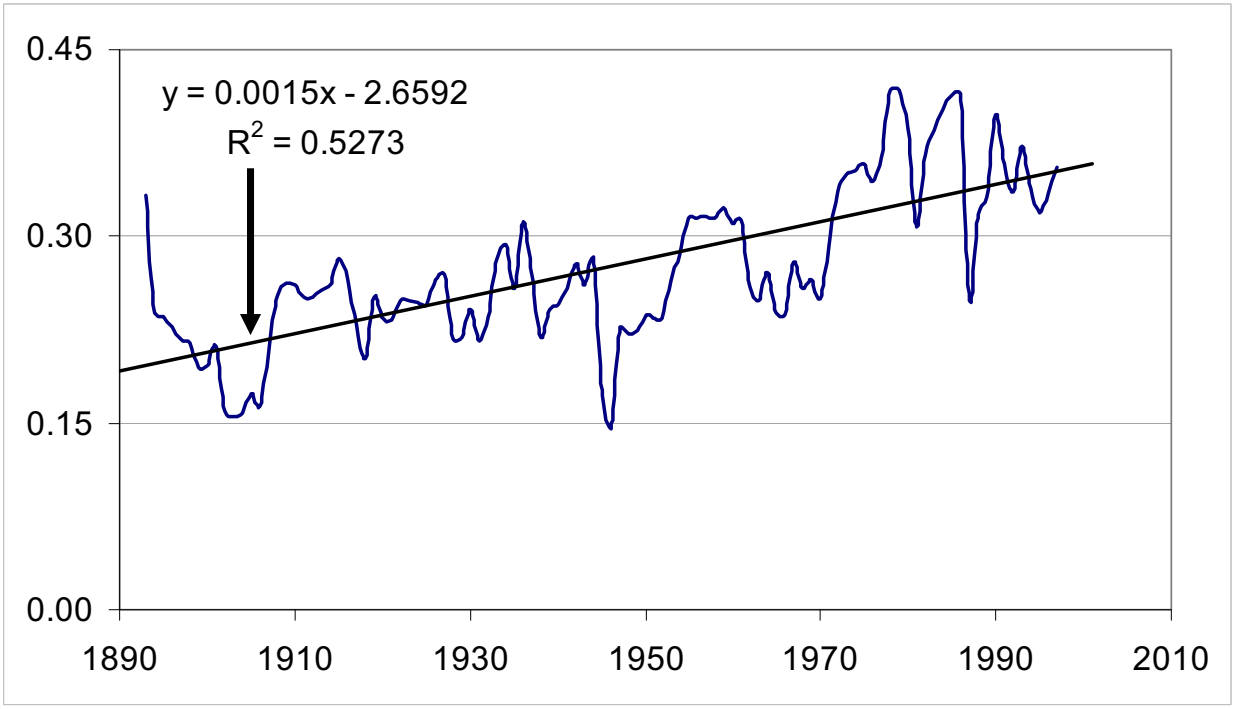


Figure 6-5 Coefficient of variation for statewide average precipitation with trend line

6.3.2 Temperature

In California, increases in atmospheric temperature have already been observed over the past 100 years. Using 226 temperature stations with data record lengths on the order of 100 years, the following trends were identified. The annual maximum, average, and minimum temperatures for California are shown in Figure 6-6. All three time series show a statistically significant increasing trend of about 2 degrees Fahrenheit per century. The minimum temperatures show the largest trend while the maximum temperatures show the smallest.

In terms of variability, Figure 6-7 depicts the trends in the variability of annual maximum, average, and minimum temperatures averaged over the state. For the maximum and average temperatures, there is not a statistically significant trend. For the minimum temperatures, there is a statistically significant decreasing trend in the variability. This, along with the identified trend in state average minimum temperatures indicate that the lower bound of temperature in the state is moving upward and that this upward trend is damping out the variability of the minimum temperature. As a consequence, on average, there may be fewer cold extreme temperature days in the future as a result of global warming. This result is coincident with other studies (see for example Easterling et al, 2000.)

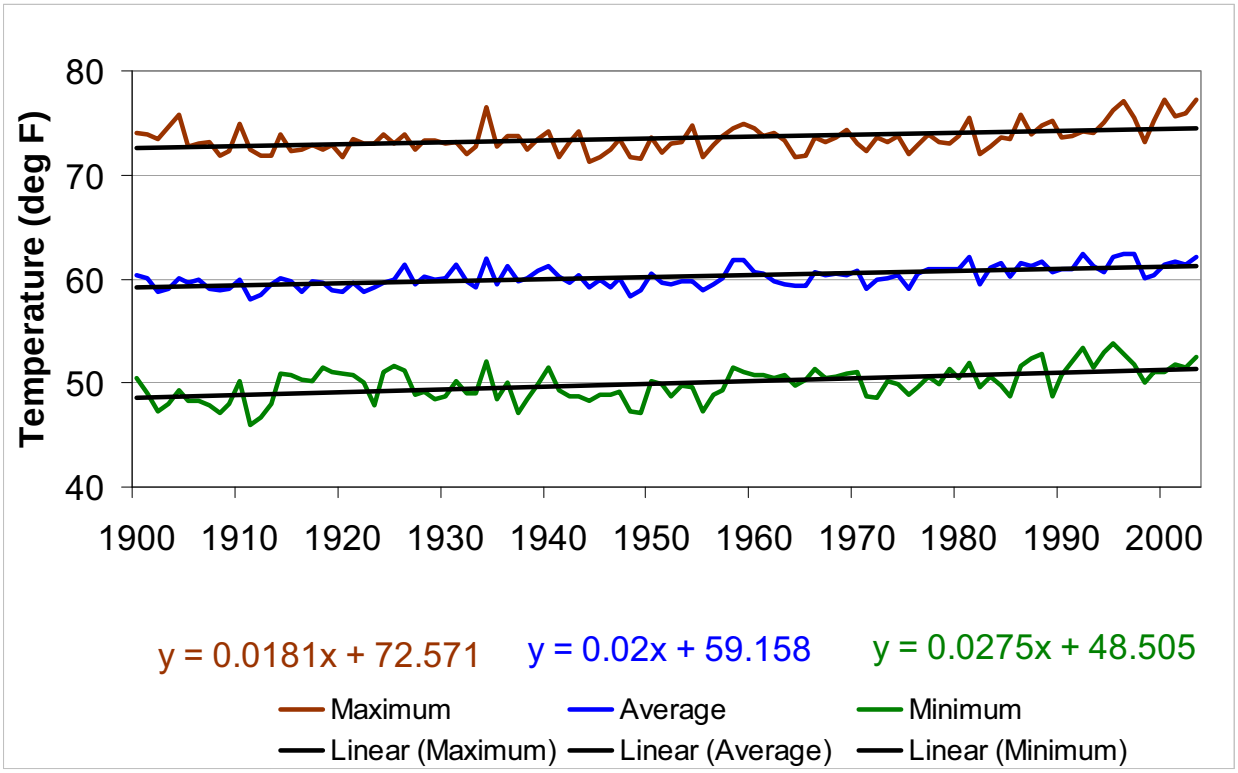
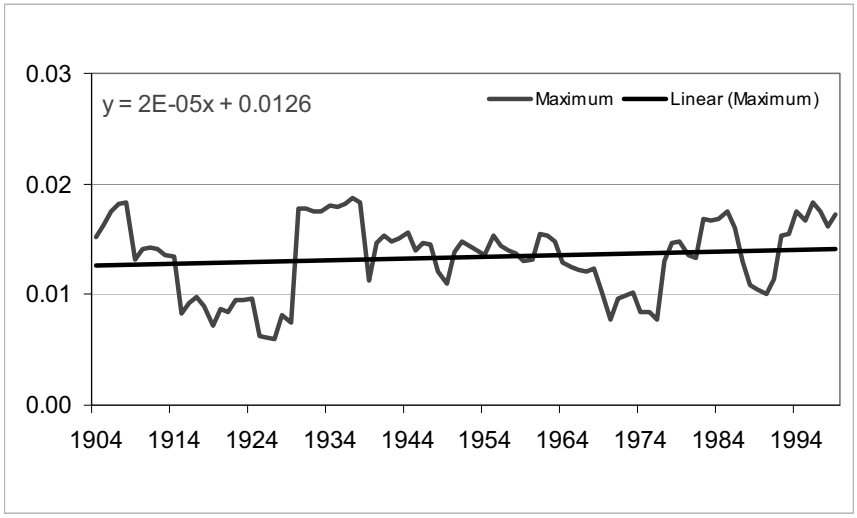
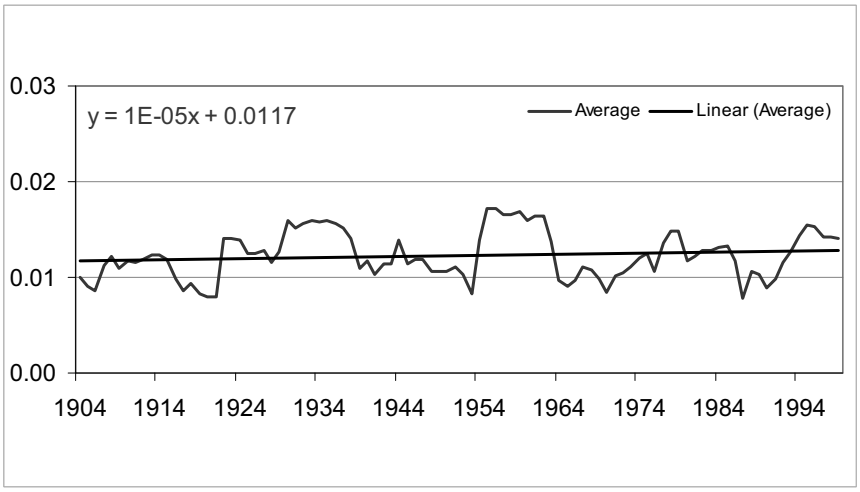


Figure 6-6 State average maximum, average, and minimum temperature time series

a) Coefficient of Variation over time for maximum temperature



b) Coefficient of Variation over time for average temperature



c) Coefficient of Variation over time for minimum temperature

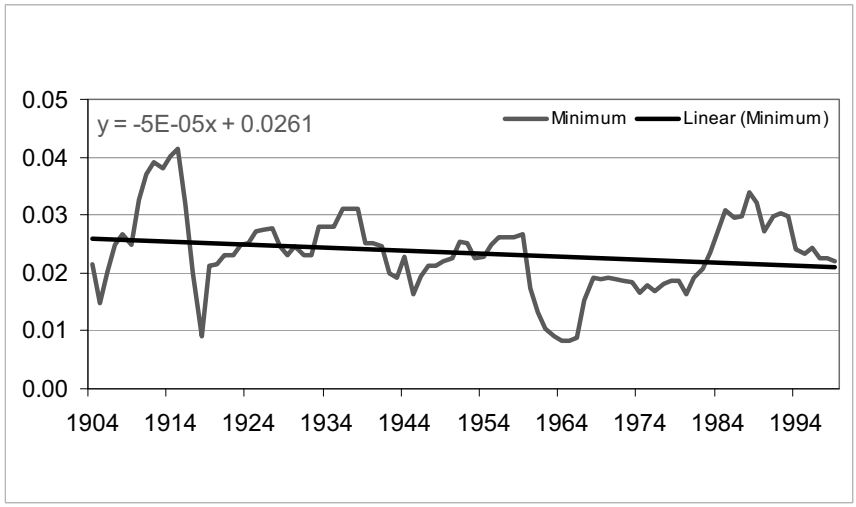


Figure 6-7 Variability of annual maximum, average and minimum temperature

Other state temperature trends can be identified. Figure 6-8 shows the change in trend of average temperature identified over the past 100 years versus latitude in 2.5 degree increments. The magnitude of the temperature trend decreases with latitude from over 3 degrees Fahrenheit per century in the south part of the state to less than a degree Fahrenheit in the northernmost part of the state.

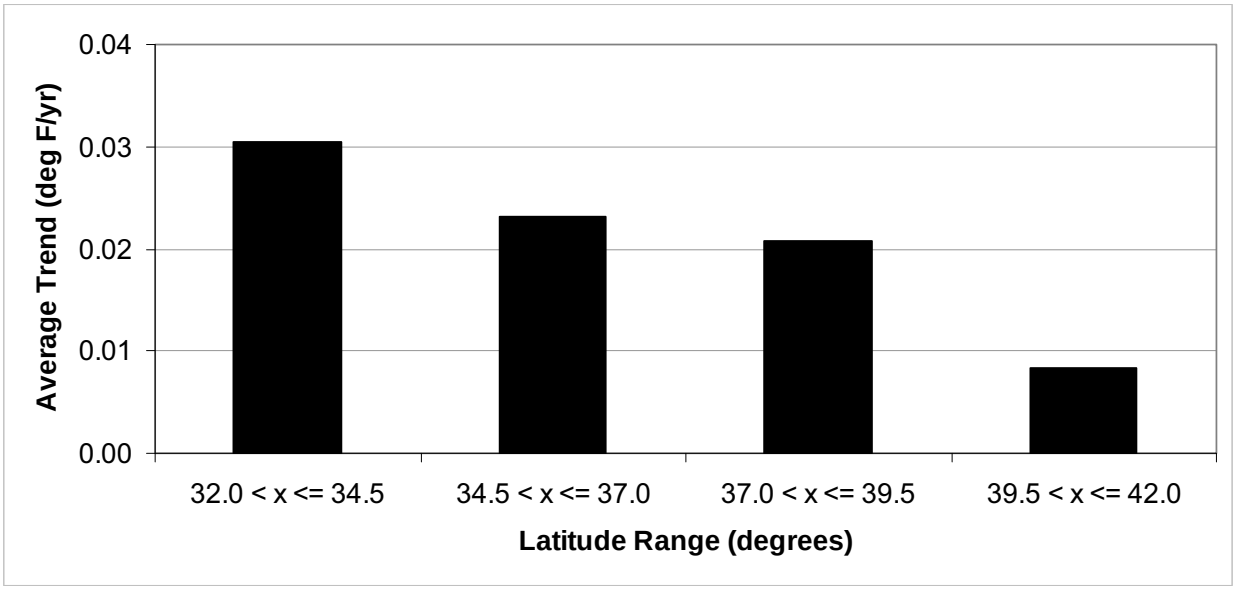


Figure 6-8 Temperature trend variation with latitude

Former state climatologist James Goodridge found a difference in temperature trend with population as seen in Figure 6-9. The lowest trend line is associated with a rural county with a population of less than 100,000 people while the topmost trend line is associated with a highly urbanized county with a population greater than 1 million. As noted in the figure, these trends are based on 65 stations sorted by county population. Note that all three lines show an increasing trend in temperature indicating that temperatures have been increasing even in rural areas. In addition, in urban areas, temperature increases are accentuated indicating that future temperature increases will be even greater in urban areas.

Peterson (2003) of the National Climatic Data Center offers a different point of view. He conducted a study that rigorously removed elevation, equipment, and location variations from temperature records at urban and rural sites. His work indicates that there is no urban heating effect. This is an area of ongoing research and debate among scientists.

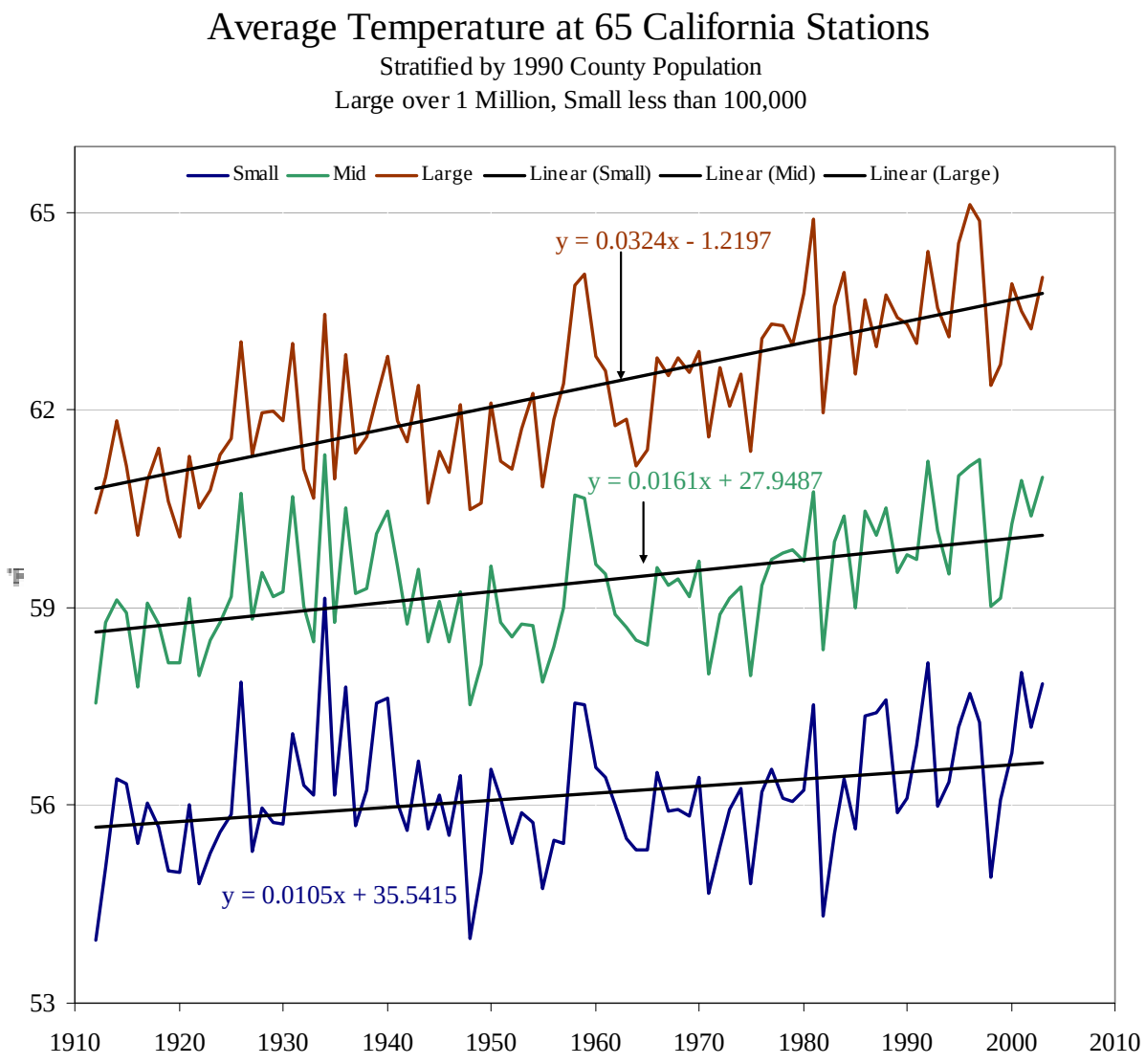


Figure 6-9 Temperature trends by county population in California.

6.3.3 Runoff

Runoff trends can be divided into two categories. The first is trends in annual-water-year-runoff volumes. The second is trends associated with peak runoff for different return periods. Both trends are investigated here.

6.3.3.1 Annual Runoff

Annual water year (October 1 to September 30) unimpaired runoff time series were computed for 24 rivers across the state whose locations are shown in Figure 6-10. The time frame for most basins runs from 1905 to 2005. Total period and split period statistics were generated for each basin. The dividing year for the split period statistics is 1955 which is approximately halfway through the observed record.

Table 6-2 lists the total period, pre-1955 period and post-1955 period average annual runoff in thousand acre-feet for the 25 basins. Table 6-2 also includes the percent change from pre-1955 to post 1955. The sum of all 25 basins shows a 9 percent increase in average annual runoff from 1905-1955 to 1956-2005. In general, the northern rivers show a larger increase in average annual runoff than the southern rivers.

Table 6-2 Average Annual Water Year Runoff for Selected California Watersheds

Station	Total Period (taf)	Pre 1955 (taf)	Post 1955 (taf)	% Change
Klamath Copco to Orleans	4,646	4,144	4,916	19%
Salmon River at Somes Bar	1,288	1,212	1,338	10%
Eel River at Scotia	5,493	4,921	6,007	22%
Russian near Healdsburg	897	817	921	13%
Napa River at St. Helena	72	60	76	27%
Sacramento River at Bend Bridge	8,476	8,052	8,901	11%
Feather River at Oroville	4,490	4,360	4,621	6%
Yuba River at Smartville	2,372	2,375	2,369	0%
American River at Folsom Reservoir	2,739	2,759	2,717	-2%
East Carson and West Walker Rivers	433	396	459	16%
Truckee River at Farad	402	395	408	3%
Cosumnes River at Michigan Bar	369	348	389	12%
Mokelumne River at Pardee Reservoir	758	762	753	-1%
Stanislaus River at New Melones Reservoir	1,175	1,178	1,171	-1%
Tuolumne River at New Don Pedro Reservoir	1,911	1,875	1,951	4%
Merced River at Exchequer Reservoir	997	988	1,008	2%
San Joaquin River at Millerton Reservoir	1,816	1,798	1,835	2%
Kings River at Pine Flat Reservoir	1,683	1,650	1,720	4%
Kaweah River at Terminus Reservoir	432	412	454	10%
Tule River at Lake Success	145	139	148	6%
Kern River at Lake Isabella	697	633	730	15%
Arroyo Seco nr Soledad	122	120	124	3%
Nacimiento River below Nacimiento Dam	200	183	213	16%
Arroyo Seco nr Pasadena	7	6	8	26%
Total	41,620	39,582	43,239	9%

Figure 6-10 Map of Runoff Forecast Points

In addition to the individual basin runoff, runoff of four major rivers is used to compute the Sacramento and San Joaquin River Indices. The index values not only look at current year runoff, but incorporate a term for last year's conditions as well. Figure 6-11 shows the time series plot and linear trend fit for the Sacramento River Index and Figure 6-12 shows the time series plot and linear trend fit for the San Joaquin River Index. From these figures it can be seen that there is a slight decreasing trend in the San Joaquin Index and a slight increasing trend in the Sacramento River Index. These results are consistent with the precipitation trend results over the past century described earlier. However, neither trend was identified as being statistically significant.

In terms of runoff variability, the coefficient of variation is plotted for the Sacramento and San Joaquin River Indices in Figure 6-13. Both time series show an increase with the linear trend fit, but only the Sacramento trend is statistically significant. In fact, the variability increases markedly in both series from the 1970s through the mid-1990s. Since 1995, both series' variability has dropped back to values consistent with the beginning of the period.

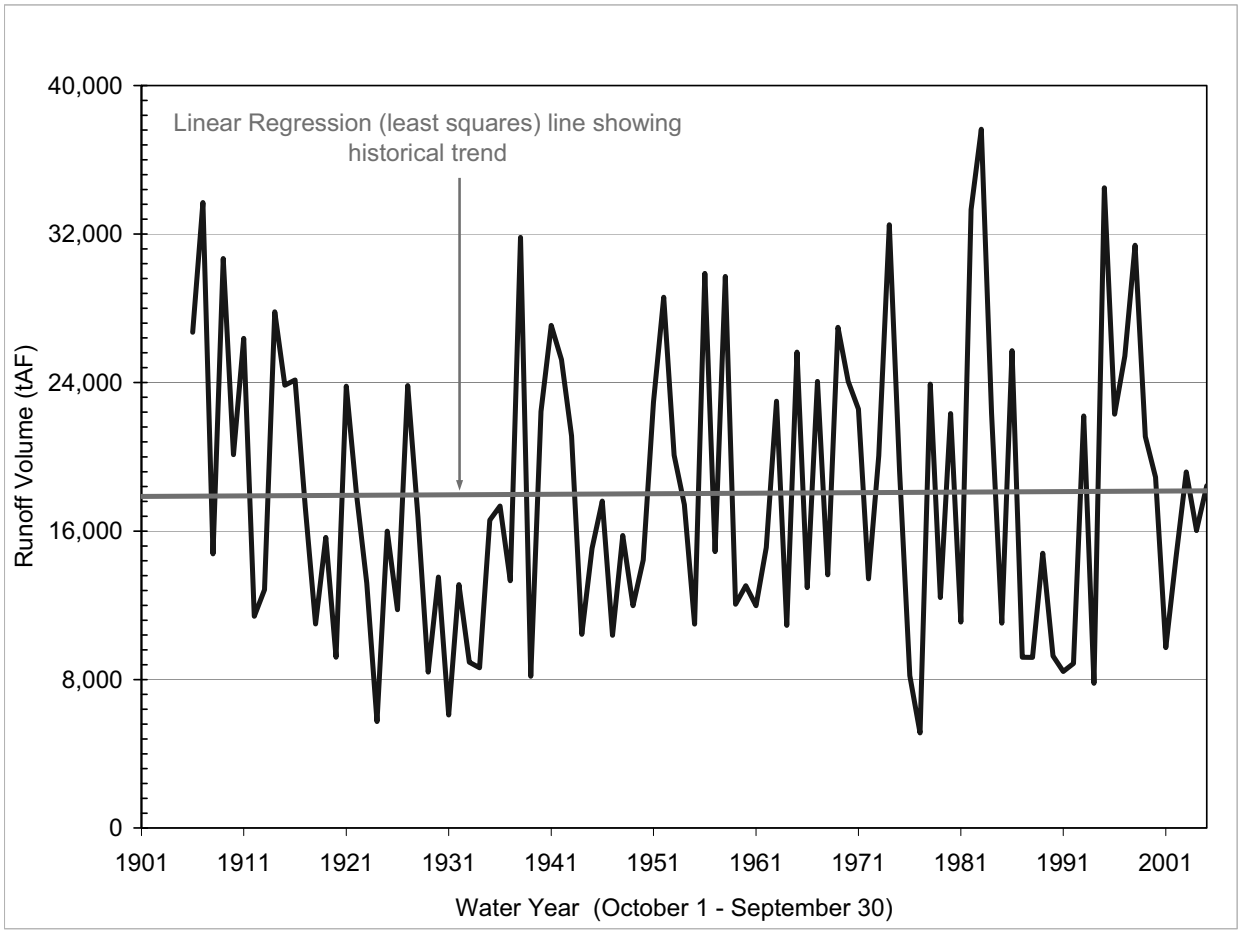


Figure 6-11 Time series of Sacramento River Index water year runoff with fit linear trend

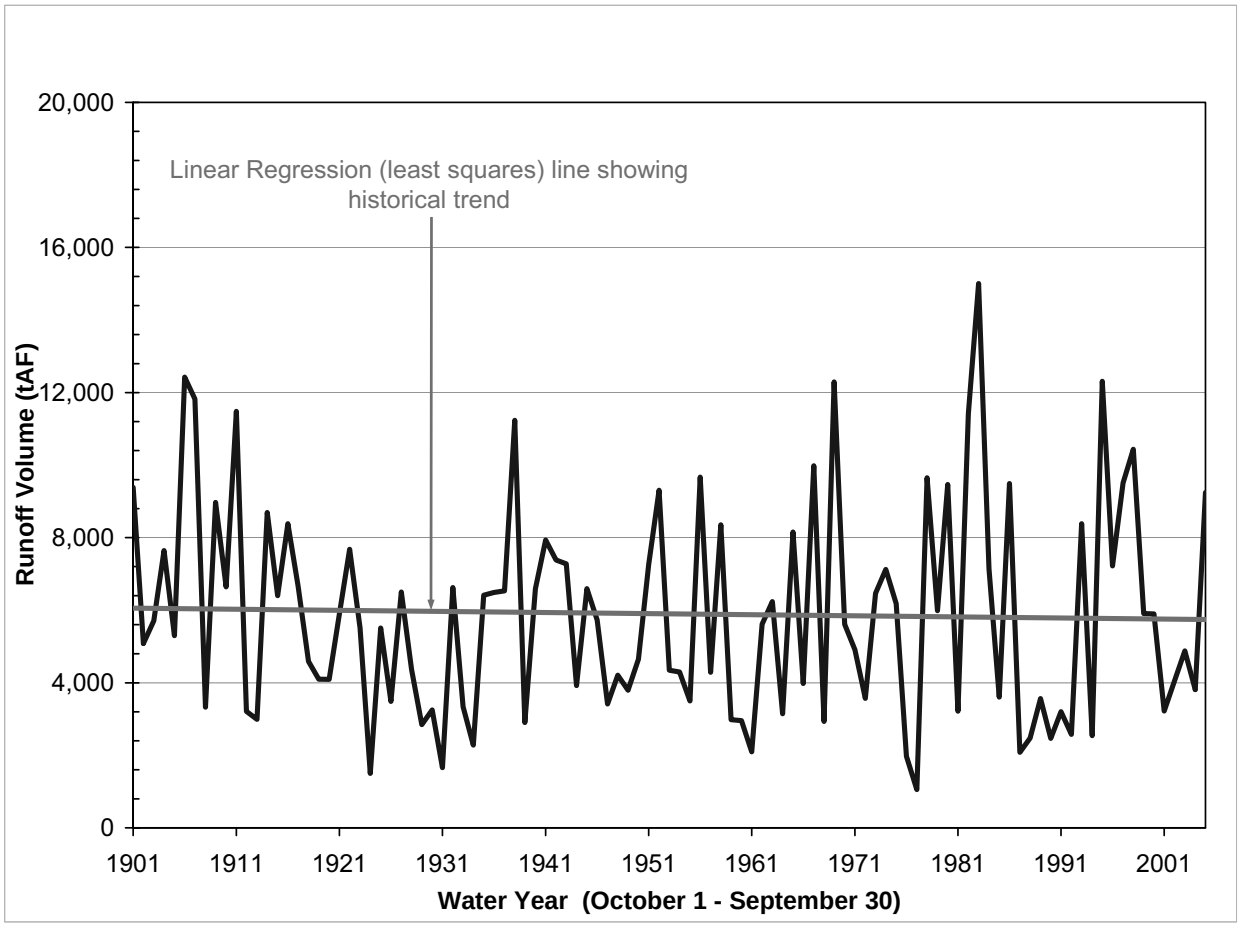


Figure 6-12 Time series of San Joaquin River Index water year runoff with fit linear trend

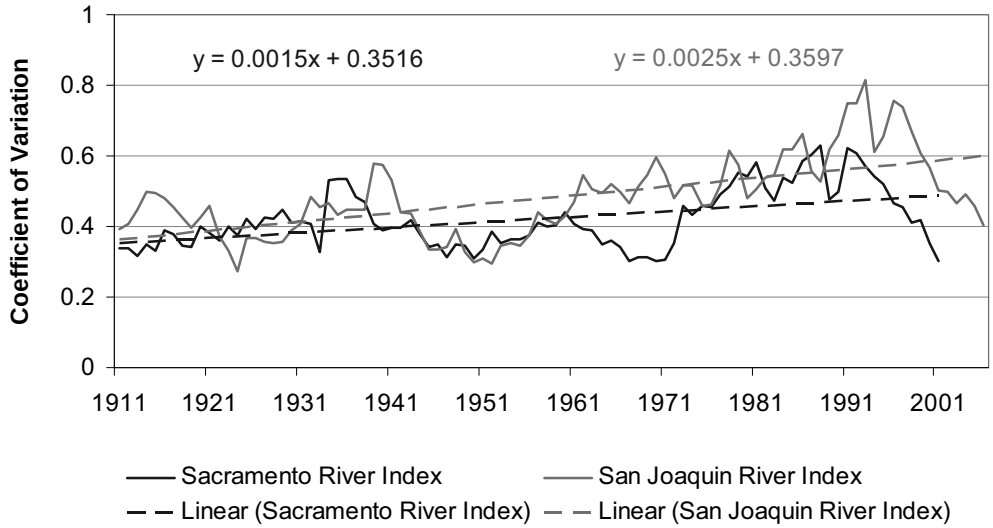


Figure 6-13 Variability of Sacramento and San Joaquin River Index through time

Another element to annual runoff is the timing of that runoff. Winter storms deliver snow to higher elevations that historically has melted in April – July. This spring runoff serves as a significant portion of the water supply for dry summers and falls. The April – July runoff over time is shown in Figure 6-14 for the Sacramento River system and in Figure 6-15 for the San Joaquin River system. Both indices show a decrease in the fraction of annual runoff made up from April – July runoff over the past 100 years. This indicates that a greater percentage of the annual runoff is occurring earlier in the year when flood control needs supersede water storage in reservoirs with flood control and water supply purposes. However, in terms of the t-test for statistical significance, neither trend was identified as statistically significant.

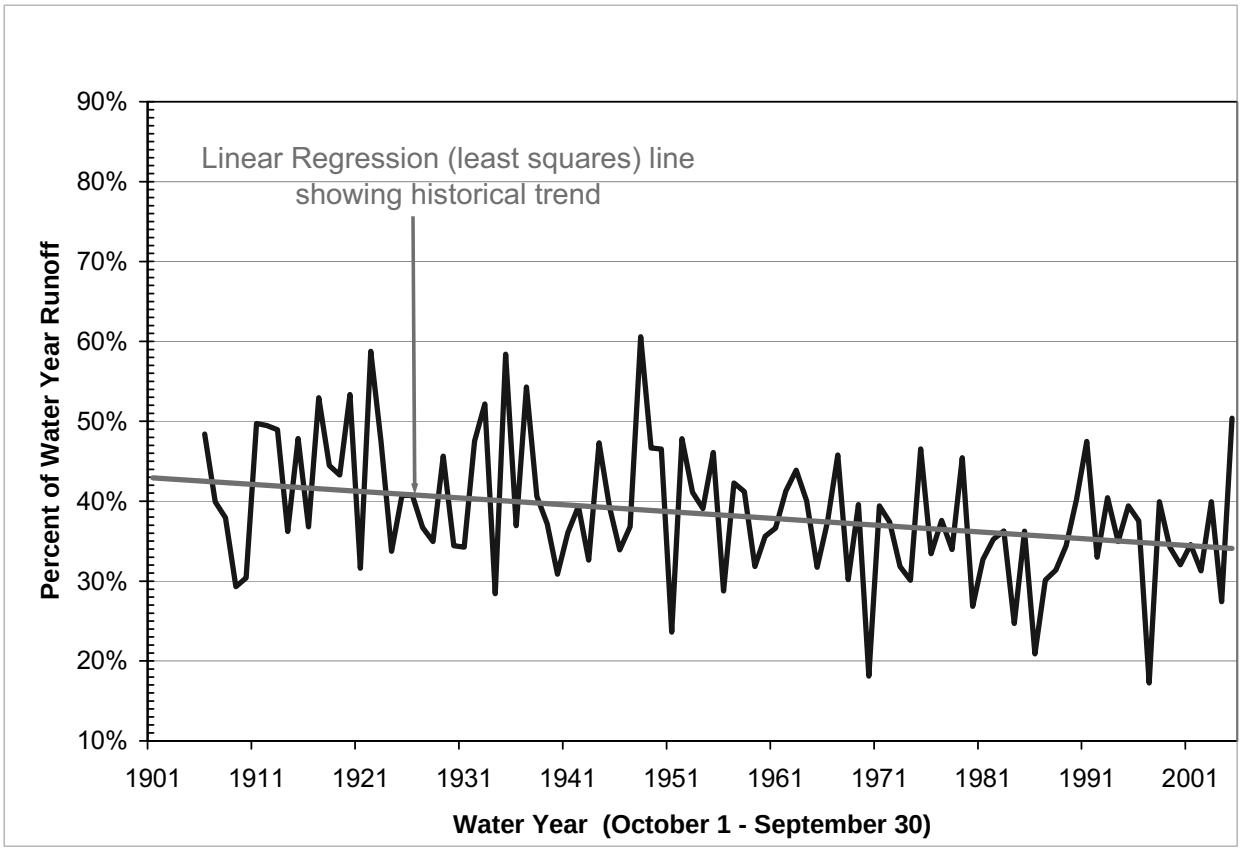


Figure 6-14 April-July Runoff as a percent of water year runoff for the Sacramento River System

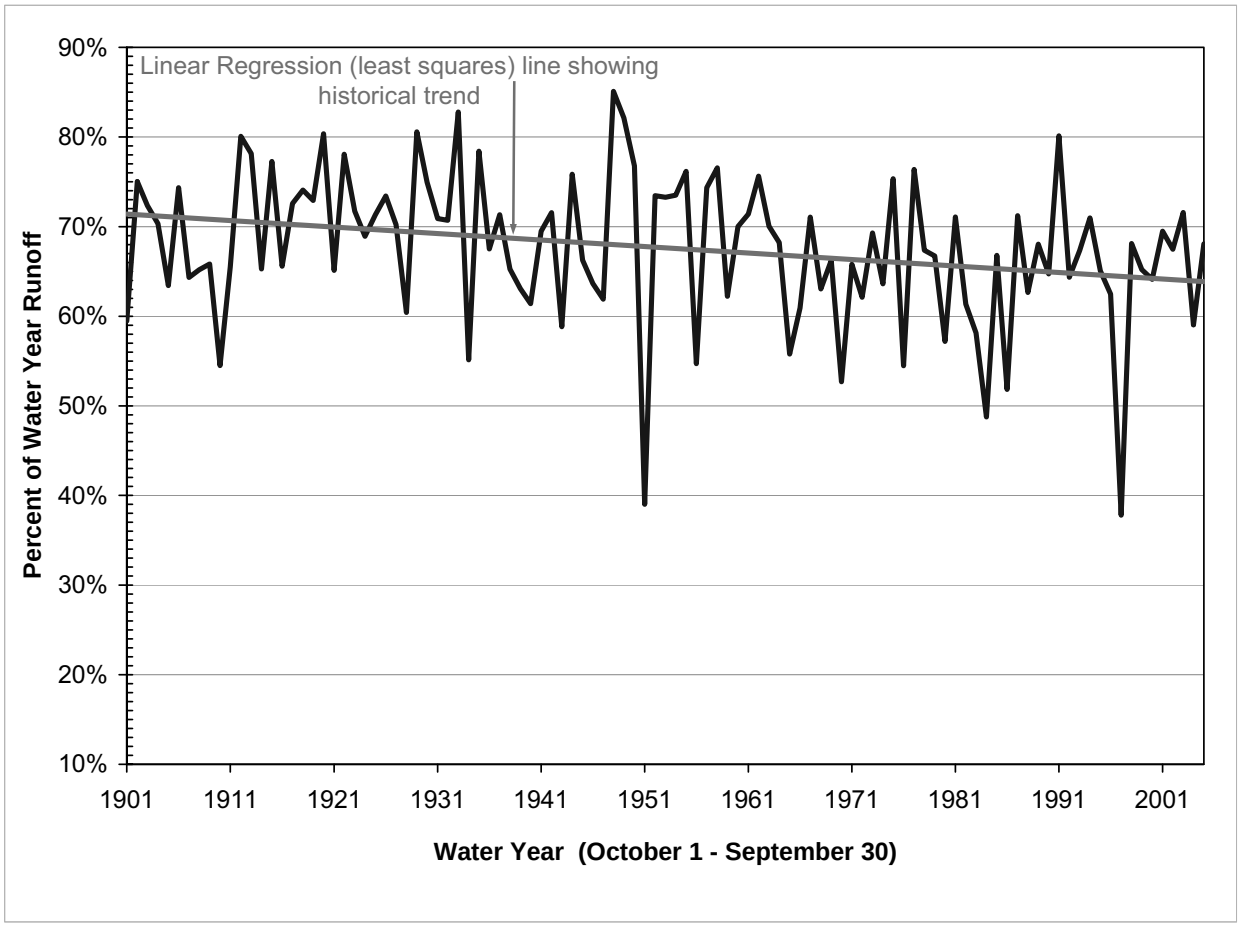


Figure 6-15 April-July Runoff as a percent of water year runoff for the San Joaquin River System

Another indication that spring runoff is occurring earlier in the year can be seen in Figure 6-16. It depicts the flow centroid day at the Michigan Bar stream gage on the Cosumnes River computed from historical flow data. A flow centroid day is the number of days after October 1 for 50 percent of the annual volume to pass. For watersheds with snowmelt, this day is usually in April or May (Julian day 182-243). The Cosumnes River is a lower-elevation watershed with a maximum elevation of slightly less than 8,000 feet. It has a modest snowpack in the upper reaches of the basin. There is also a 40,000 acre-foot reservoir on a tributary to the North Fork (Jenkinson Reservoir) that diverts water from the basin. In the absence of a major runoff event (seen as the sharp downward spikes in the time series such as 1986 and 1997) in the basin, the snowmelt makes up a significant portion of the annual runoff in the watershed and drives the location of the flow centroid day. As can be seen from the above figure, the movement over time of the flow centroid day to earlier in the year indicates that, on average, the snowmelt in the basin is occurring earlier (from mid March in 1908 to the beginning of March in 1998). Based on the linear trend line fit to the data, this change in timing is about 10 days over 90 years. However, based on the t-test, the trend was not identified as statistically significant.

With more of the annual runoff including some snow melt occurring earlier in the year, runoff historically used for water supply starts to overlap the time period when reservoir space is reserved for flood control. This overlap may lead to the need to carefully review early spring reservoir operation.

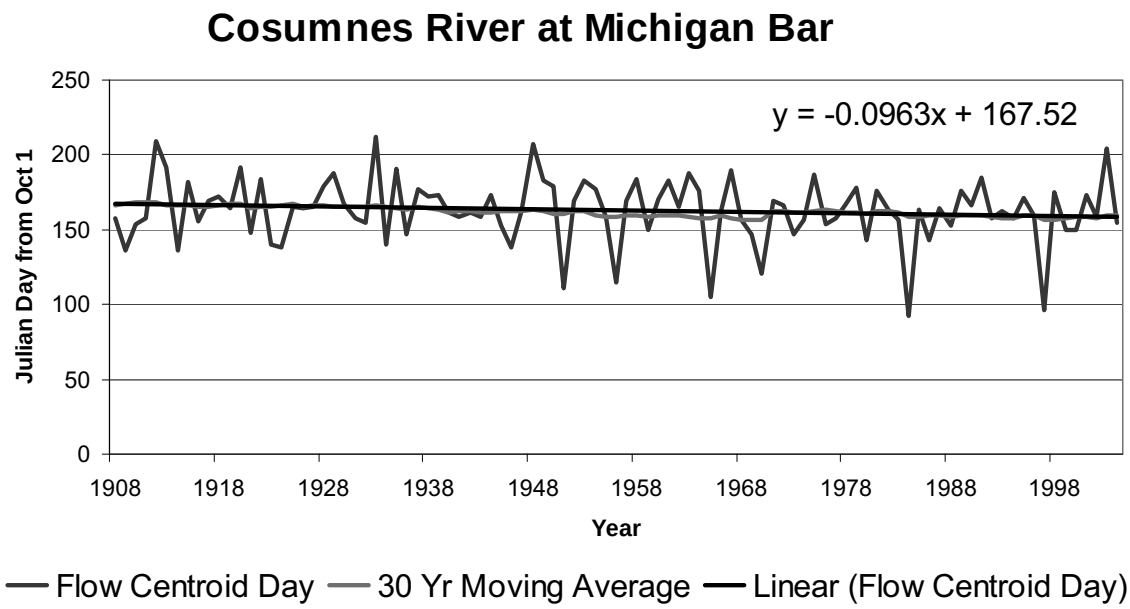


Figure 6-16 Flow centroid day versus time for the Cosumnes River at Michigan Bar

6.3.3.2 Annual Maximum Flood from Three Day Average Flows

For peak runoff analysis, six rivers were chosen with long peak flow records. The peak flows evaluated here are three-day average peak flows. The six rivers chosen include three in the Central Valley: Feather, American, and Tuolumne; and three coastal rivers: the Eel River in the north, the Arroyo Seco in central California, and the Santa Margarita River in the south. Their locations are shown in Figure 6-17.

For the analysis, total period mean, standard deviation, and skew statistics are computed for each river. In addition, the records were divided into two time periods with 1955 as the boundary. The year 1955 was chosen as the boundary because it divides the data sets in half. Mean, standard deviation and skew statistics were computed for the two time periods as well. These values are shown in Table 6-3. As can be seen from Table 6-3, the means and standard deviations all increased from the pre 1955 time period to the post 1955 time period with the exception of the Arroyo Seco mean which remained constant. The skew statistics increased except for the Arroyo Seco which remained constant and the Santa Margarita, which decreased.

Figure 6-17 Map of station location for peak flow analysis

Using these statistics, Bulletin 17-B (Water Resources Council, 1982) procedures were used to compute the 10-year, 50-year, and 100-year return period flows for the six rivers for the total period, pre-1955 period, and post-1955 period. The Bulletin 17-B procedures fit the data to a log-Pearson type III distribution. The flow values for the different return periods are shown in Table 6-4. Percent differences from Pre-1955 conditions to Post-1955 conditions are shown in Table 6-5.

Table 6-3 Comparison of discharge statistics by basin and time period (values in 1000 cfs)

River Basin	American	Feather	Tuolumne	Eel	Arroyo Seco	Santa Margarita
Total Period Mean	32.73	47.61	14.51	110.08	3.12	1.37
Total Period Std Dev	33.68	42.06	15.26	71.13	2.53	2.71
Total Period Skew	2.14	1.89	2.42	2.14	1.02	3.04
Pre55 Mean	28.04	42.38	12.22	92.99	3.09	1.24
Pre55 Standard Deviation	24.23	33.00	10.85	47.97	2.38	2.35
Pre55 Skew	1.76	1.38	1.72	0.47	1.03	3.51
Post55 Mean	37.00	52.23	17.20	123.26	3.09	1.42
Post55 Standard Deviation	41.00	49.68	19.33	84.18	2.71	2.93
Post 55 Skew	1.88	1.81	2.12	2.05	1.02	2.88

Table 6-4Comparison of different return period flows by basin and time period

River Basin (Values in 1000 cfs)	American (1905-2004)	Feather (1904-2004)	Tuolumne (1897-2000)	Eel (1917-2004)	Arroyo Seco (1902-2004)	Santa Margarita (1931-2004)
Total Period Q10	72	101	32	210	7	6
Total Period Q50	150	186	65	334	14	10
Total Period Q100	194	228	83	392	15	12
Pre 1955 Q10	58	88	26	162	6	5
Pre 1955 Q50	103	152	48	236	13	9
Pre 1955 Q100	126	182	58	268	14	11
Post 1955 Q10	88	117	40	257	7	7
Post 1955 Q50	199	221	88	446	14	11
Post 1955 Q100	266	274	117	540	15	13

Table 6-5 Percent increase in return period discharges from pre-1955 to post-1955 by basin

River Basin	American	Feather	Tuolumne	Eel	Arroyo Seco	Santa Margarita
Q10	51%	32%	49%	58%	7%	22%
Q50	92%	46%	85%	88%	10%	23%
Q100	111%	51%	102%	101%	11%	23%

As can be seen from Table 6-5, the 100-year three-day peak flows have more than doubled for the American, Tuolumne, and Eel rivers. The only river with little change in its return period flows is the Arroyo Seco. Examination of the data shows that there was only one major event (defined as a value greater than the mean plus two standard deviations) for the Feather, American, and Tuolumne Rivers in the pre-1955 period. In the post 1955 period, the number of major events jumps to four. For the coastal rivers a similar pattern emerges. From this information it can be seen that the annual peak three-day mean discharges are becoming more variable and larger for many sites in California.

Climate model studies such as Miller and others (2003) and Dettinger and others (2004) indicate that this trend will continue in response to global warming. Stedinger and Crainiceanu (2001) examine frequency analysis issues when the underlying statistical moments are not stationary as has been assumed in this section. They find that the stationary model works just as well at identifying flood risk as more complex models that try to incorporate trends in historical data.

6.3.4 Historical Trend Summary

Over the past 100 years the following trends have been identified and were described in preceding sections:

Precipitation

- No significant trend exists in statewide average precipitation from 1890-2000
- A small increasing trend in statewide precipitation is found from 1970-2000
- A slight increasing trend in precipitation appears in the north part of the state
- A slight decreasing trend in precipitation appears in the south part of the state
- Precipitation variability increased during the 20th century

Temperature

- A slight increasing temperature trend is observed in statewide average of maximum, average and minimum temperatures
- Larger temperature trends are associated with urban areas
- Variability in minimum temperature is slightly decreasing
- Variability in maximum and average temperature is slightly increasing

Runoff – Annual

- Annual runoff shows increasing trend in Sacramento River System
- Annual runoff shows slight decreasing trend in San Joaquin River System
- April-July runoff as percentage of annual runoff is decreasing in both Sacramento and San Joaquin River Systems
- Variability in annual runoff is increasing

Runoff – Peak Flow

- Increase in 10, 50 and 100 year return period peak flows are observed for six basins studied
- Variability in annual peak flows is increasing in six basins studied
- Change between the first and last half of the record are large except for Arroyo Seco

6.4 Climate Change Scenario Simulation Data

6.4.1 GCM Simulation Results

The studies presented in this report focus on the four climate change scenarios selected by the Climate Action Team appointed in response to the governor's Executive Order S-3-05 on climate change. The four climate change scenarios consist to two greenhouse gas (GHG) emissions scenarios developed by the Intergovernmental Panel on Climate Change (IPCC), known as A2 and B1, each represented by two different Global Climate Models (GCMs), the Geophysical Fluid Dynamic Lab model (GFDL) and the Parallel Climate Model (PCM).

The A2 emissions scenario assumes high population growth, regional based economic growth, and slow technological changes which results in significantly higher GHG emissions. The B1 scenario represents low population growth, global based economic growth and sustainable development which results in the lowest increase of GHG emissions of the IPCC scenarios. For more information on the GCMs and scenarios used in this report, refer to Chapter 3. For the following sections examining impacts based on climate change simulation results, the four climate change scenarios are referred to as:

- GFDL A2
- PCM A2
- GFDL B1
- PCM B1

Precipitation and temperature time series for southern and northern California were created using the GCM simulation results. Precipitation results are shown in Figure 6-18 for Northern California and Figure 6-19 for Southern California. Note that scenario simulations for a given GCM do not differ until after year 2000. For both Northern and Southern California, neither model accurately reproduces historical precipitation variability. Because of this, future variability represented by the model can not be considered reliable.

In terms of average precipitation, for Northern California, the GFDL model predicts a 20 percent decrease in precipitation after 2050 for the A2 scenario and a 10 percent decrease for the B1 scenario. The PCM model predicts no change for either scenario. For Southern California, the GFDL model predicts a 10 percent decrease in precipitation after 2050 for both scenarios while the PCM model predicts a 1 percent decrease in precipitation for both scenarios. By 2100 however, the PCM model predicts a 10 percent increase in precipitation for both scenarios.

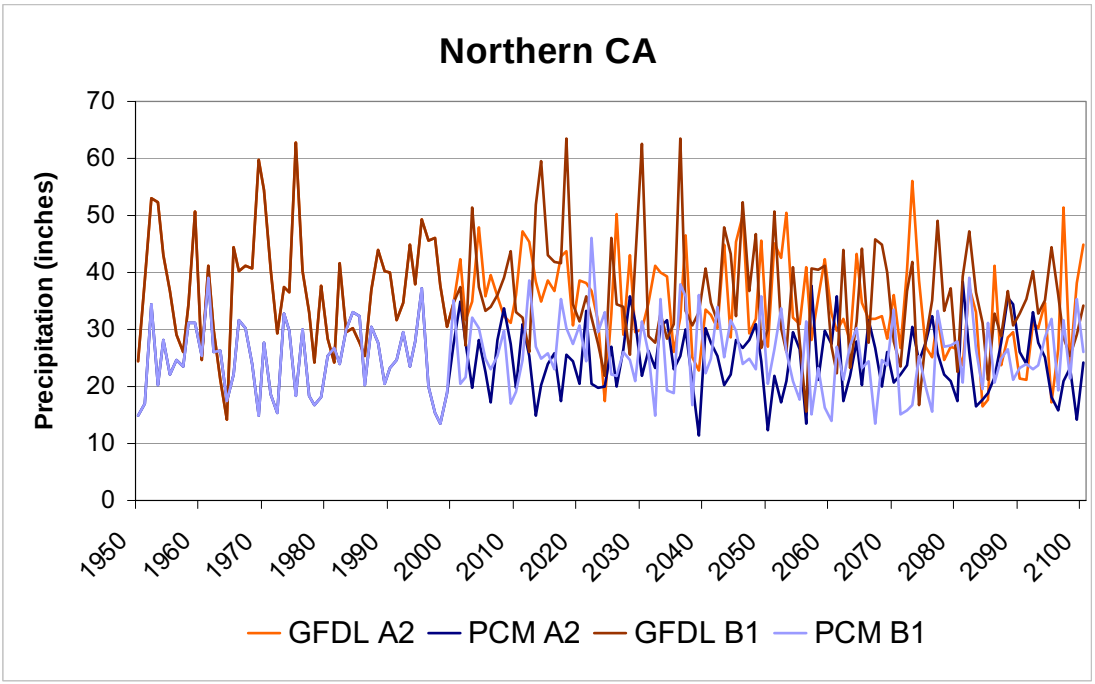


Figure 6-18 GCM precipitation results for Northern California

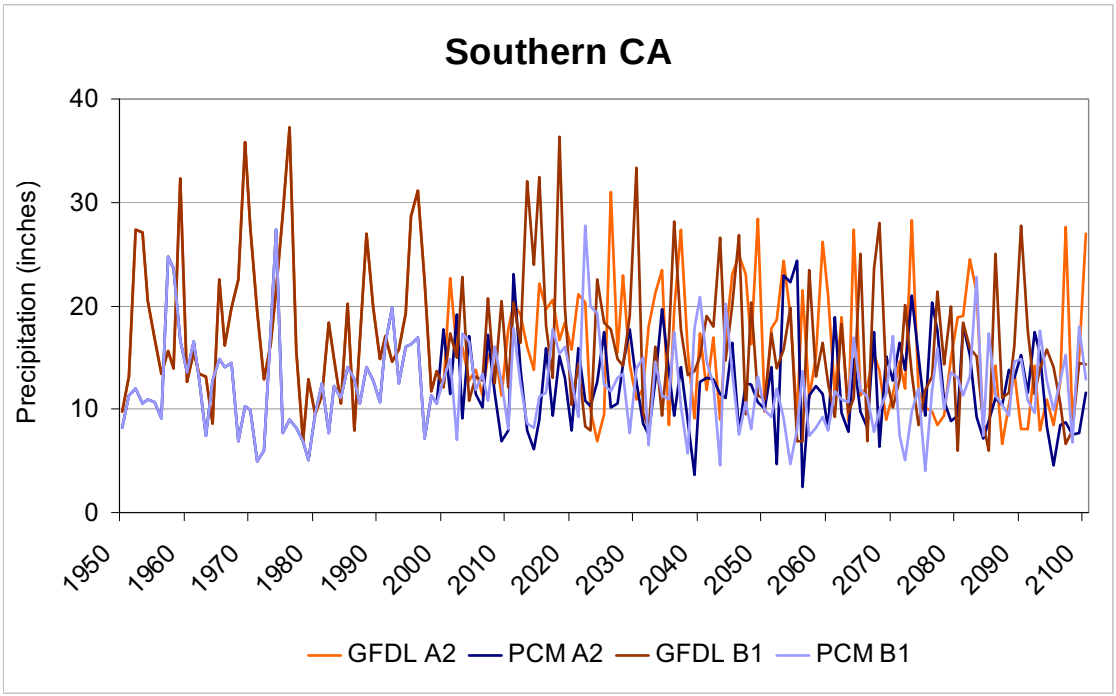


Figure 6-19 GCM precipitation results for Southern California

Temperature results for both models are shown in Figure 6-20 for Northern California and in Figure 6-21 for Southern California. For Northern California, the GFDL model predicts a larger temperature increase than the PCM model. By 2050, the PCM model predicts a one degree Celsius increase in temperature for both scenarios while the GFDL model predicts a 2.25-degree increase for both scenarios. Increases up to 5 degrees C occur by 2100 in the GFDL model.

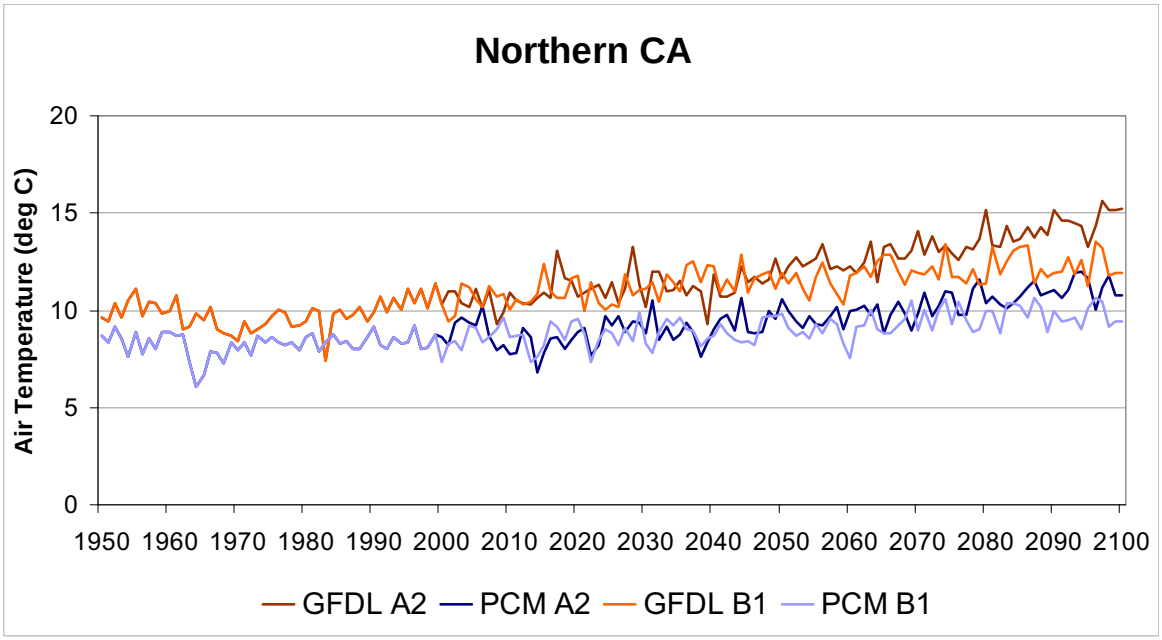


Figure 6-20 GCM temperature results for Northern California

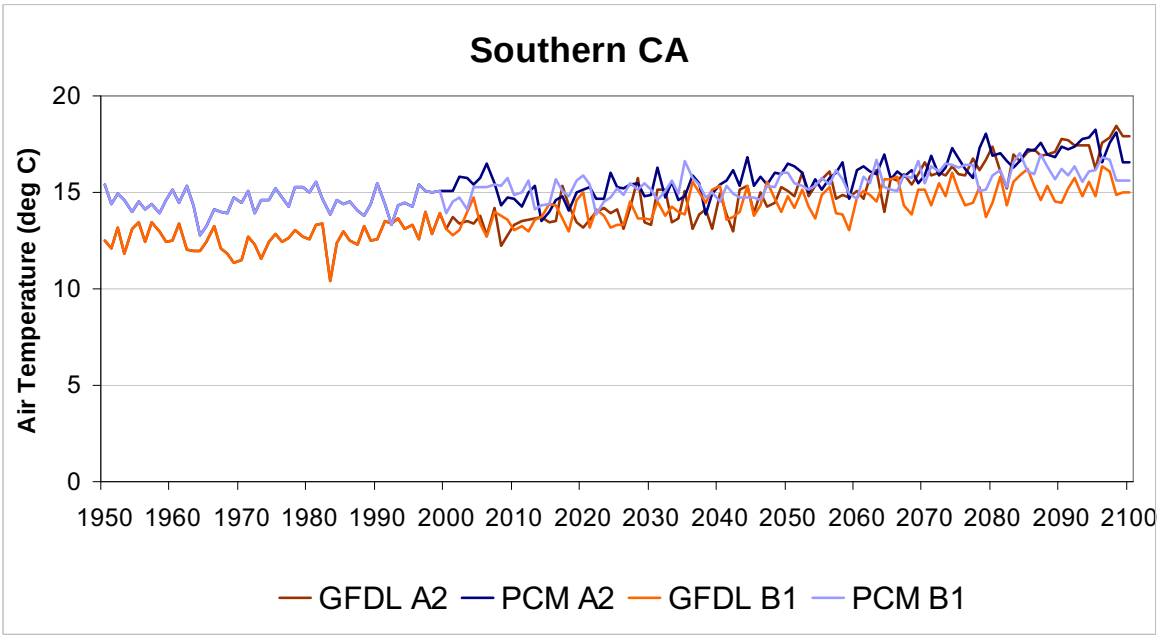


Figure 6-21 GCM temperature results for Southern California

The GCM results presented here are at a scale of about 100-200 km horizontal resolution. California's topography is highly varied which leads to a more complex temperature and precipitation patterns than can be expected from a GCM simulation at this resolution. Because of this, downscaling procedures were carried out on the GCM scale results to create finer resolution (10-20 km) data suitable for analysis over California.

6.4.2 Downscaled Results

Professor Ed Maurer of Santa Clara University statistically downscaled monthly data from each of the GCM simulations to California and then used the data to drive a land surface model known as the VIC (Variable Infiltration Capacity) model. Details of the downscaling and VIC model can be found in Maurer (2005). Data from these simulations were provided to Department of Water Resources staff for analysis. VIC model results for 12 sites across the state were averaged to obtain the precipitation and temperature time-series plots shown in Figure 6-22 and Figure 6-23 respectively. Runoff results from the VIC model were sampled from seven Central Valley watersheds. Annual, October through March, and April through July runoff volumes were analyzed and compared to historical records.

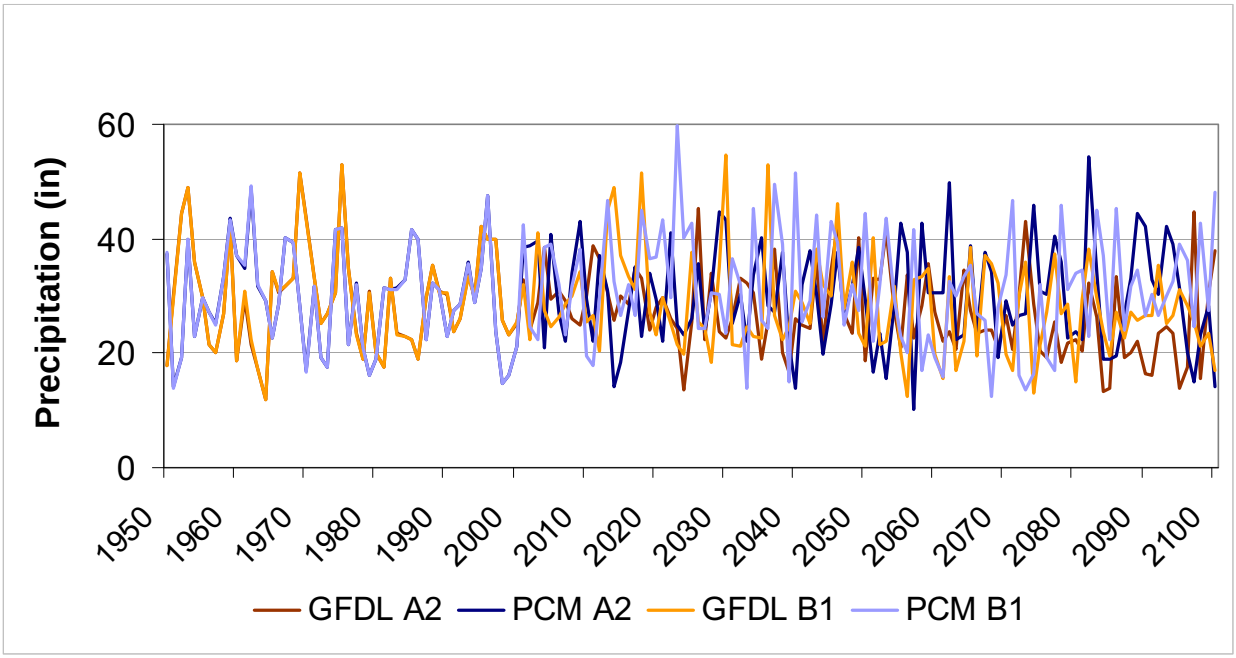
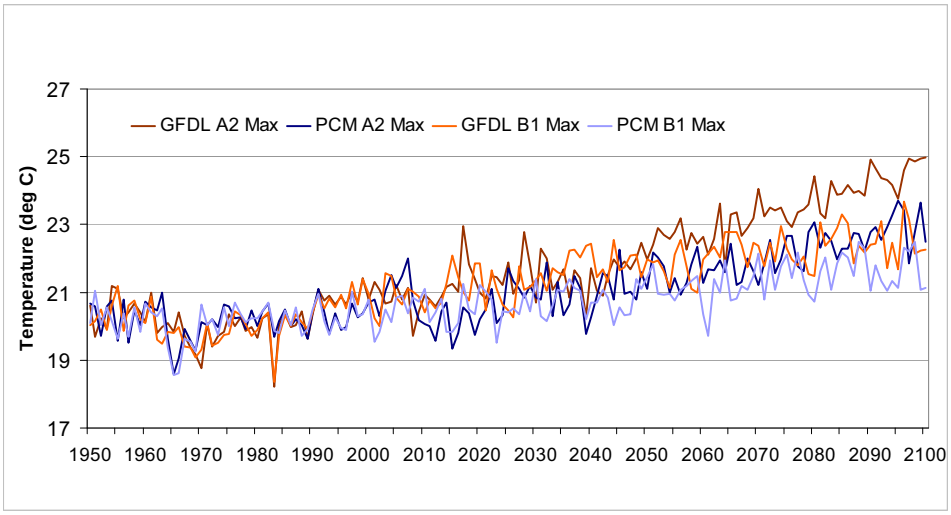
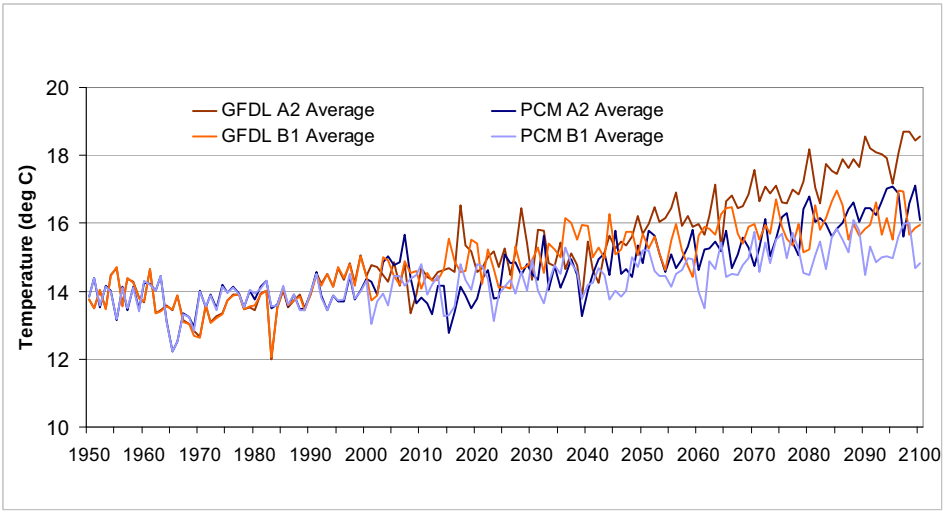


Figure 6-22 Downscaled precipitation time series from VIC model

a) Maximum air temperature from VIC model



b) Average Temperature from VIC model



c) Minimum temperature from VIC model

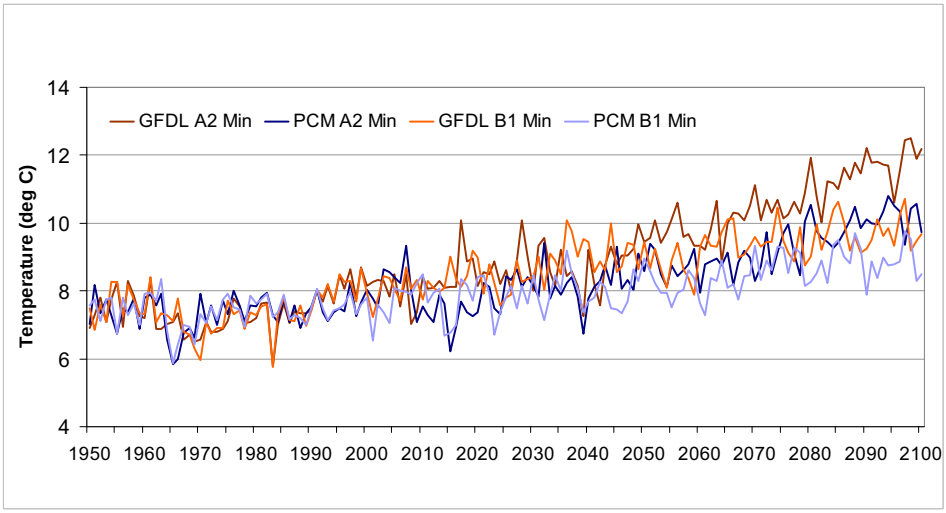


Figure 6-23 Downscaled average maximum, and minimum temperature time series

6.4.2.1 Precipitation

The scenario simulation results shown in Figure 6-22 depict little change in precipitation by 2050. Comparison of 30-year averages for the end of the 20th century and middle 21st century show a 5 percent decrease in precipitation for the GFDL model for both scenarios. The PCM model on the other hand shows no change for the A2 scenario and a 5 percent increase for the B1 scenario.

6.4.2.2 Temperature

For temperature there is a distinct increasing trend in average, maximum, and minimum temperature for both models and both scenarios. By 2050, the PCM model shows an average 1 degree C increase in average, maximum, and minimum temperature, while the GFDL shows an average 2 degree C increase. As in the GCM results, increases up to 5 degrees C exist by 2100 in the GFDL model results.

6.4.2.3 Runoff

In order to verify the ability of the scenario simulation data to represent water supply elements in California, the October-March, April-July, and annual runoff volume averages and standard deviations for the years 1951-2000 were compared for seven basins. The percent differences, computed as (modeled – observed)/observed, from observed average values for October-March are shown in Table 6-6, for April-July in Table 6-7, and annual values in Table 6-8. The percent differences from observed values for the standard deviations are shown in Table 6-9 for October-March, Table 6-10 for April-July, and Table 6-11 for annual values. In general, the simulated runoff values were closer to the observed values during the October-March period. Only the American and Kings basins have errors greater than 10 percent. However, in April-July, which is the important time period for water supply, the simulated data does not match up as well. Two basins, the Feather and Merced watersheds match up within 7 percent or less. The Sacramento and Tuolumne errors are between 10 percent and 20 percent, while the others are all greater than 30 percent.

The standard deviation represents the year-to-year variability in the system. As can be seen from Table 6-9, Table 6-10, and Table 6-11 with a few exceptions, both models had difficulty representing the historical year-to-year variability for the October through March, April through July, and annual periods. Both the GFDL and PCM models show less variability than has been observed. This inability to capture the historical year-to-year variability means that any prolonged dry or wet periods during the future portion of the simulations are suspect and cannot be interpreted as prolonged flood or drought cycles.

Table 6-6 Modeled vs Observed Percent Differences in Oct-Mar Runoff Average

Watershed	Inflow Location	PCM-B1	PCM-A2	GFDL-B1	GFDL-A2
Sacramento	Shasta	2%	1%	3%	2%
Feather	Oroville	7%	6%	8%	8%
American	Folsom	37%	36%	37%	35%
Stanislaus	New Melones	1%	-1%	1%	0%
Merced	Lake McClure	-4%	-3%	-6%	-5%
Tuolumne	Don Pedro	-3%	-4%	-4%	-5%
Kings	Pine Flat	-13%	-14%	-15%	-14%

Table 6-7 Modeled vs Observed Percent Differences in Apr-July Runoff Average

Watershed	Inflow Location	PCM-B1	PCM-A2	GFDL-B1	GFDL-A2
Sacramento	Shasta	18%	16%	20%	19%
Feather	Oroville	6%	7%	2%	4%
American	Folsom	42%	43%	40%	42%
Stanislaus	New Melones	32%	33%	30%	31%
Merced	Lake McClure	5%	3%	6%	6%
Tuolumne	Don Pedro	13%	14%	11%	12%
Kings	Pine Flat	44%	47%	44%	43%

Table 6-8 Modeled vs Observed Percent Differences in Annual Runoff Average

Watershed	Inflow Location	PCM-B1	PCM-A2	GFDL-B1	GFDL-A2
Sacramento	Shasta	25%	25%	9%	9%
Feather	Oroville	7%	6%	-1%	-2%
American	Folsom	-32%	-32%	-35%	-36%
Stanislaus	New Melones	-11%	-11%	-13%	-13%
Merced	Lake McClure	3%	4%	2%	2%
Tuolumne	Don Pedro	2%	3%	1%	1%
Kings	Pine Flat	33%	34%	35%	34%

Table 6-9 Modeled vs Observed Percent Differences in Oct-Mar Runoff Standard Deviation

Watershed	Inflow Location	PCM-B1	PCM-A2	GFDL-B1	GFDL-A2
Sacramento	Shasta	-21%	-21%	-15%	-17%
Feather	Oroville	8%	9%	23%	20%
American	Folsom	12%	12%	22%	21%
Stanislaus	New Melones	11%	9%	21%	24%
Merced	Lake McClure	-18%	-18%	-17%	-13%
Tuolumne	Don Pedro	9%	9%	17%	21%
Kings	Pine Flat	13%	9%	20%	26%

Table 6-10 Modeled vs Observed Percent Differences in Apr-Jul Runoff Standard Deviation

Watershed	Inflow Location	PCM-B1	PCM-A2	GFDL-B1	GFDL-A2
Sacramento	Shasta	8%	14%	27%	21%
Feather	Oroville	33%	33%	16%	25%
American	Folsom	35%	35%	21%	25%
Stanislaus	New Melones	30%	31%	21%	20%
Merced	Lake McClure	10%	7%	3%	0%
Tuolumne	Don Pedro	4%	4%	4%	6%
Kings	Pine Flat	61%	61%	75%	78%

Table 6-11 Modeled vs Observed Percent Differences in Annual Runoff Standard Deviation

Watershed	Inflow Location	PCM-B1	PCM-A2	GFDL-B1	GFDL-A2
Sacramento	Shasta	26%	26%	19%	20%
Feather	Oroville	-15%	-16%	-17%	-16%
American	Folsom	-15%	-16%	-15%	-14%
Stanislaus	New Melones	-20%	-20%	-16%	-16%
Merced	Lake McClure	1%	2%	10%	11%
Tuolumne	Don Pedro	-5%	-6%	1%	1%
Kings	Pine Flat	26%	26%	44%	45%

With the understanding that the simulated runoff does not match historically observed statistics very well, the following tables show the percent change from historical conditions that occurs for the 2035-2064 period relative to the 1961-1990 period. Table 6-12 shows the percent changes in the mean for October through March. The April-July percent changes in the mean are shown in Table 6-13 and the annual changes in the mean are shown in Table 6-14.

While the magnitude of the changes may be suspect due to the large errors in representing the historical conditions, some general trends can be noted. With the exception of the PCM-A2 simulation for inflows to Shasta reservoir, all October through March runoff values are larger in the 30 years centered on 2050 (future) than the 30 years centered on 1975 (present). For the April through July runoff all future values are less than present with the exception of inflows to Shasta and Oroville for the PCM-B1 scenario. On an annual basis, the PCM model predicts changes less than 10 percent for all basins for both scenarios. However, the changes are positive (increase in annual runoff) for the B1 scenario and negative (decrease in annual runoff) for the A2 scenario. The GFDL model predicts less than 20 percent changes all basins for both scenarios. The GFDL predicts decreases in annual runoff with the exception of Shasta and Oroville inflows for the B1 scenario.

Table 6-12 Percent Differences in Future to Present Oct-Mar Runoff Average

Watershed	Inflow Location	PCM-B1	PCM-A2	GFDL-B1	GFDL-A2
Sacramento	Shasta	8%	7%	9%	3%
Feather	Oroville	14%	10%	11%	13%
American	Folsom	13%	17%	0%	4%
Stanislaus	New Melones	16%	12%	9%	14%
Merced	Lake McClure	22%	13%	2%	13%
Tuolomne	Don Pedro	13%	9%	5%	11%
Kings	Pine Flat	15%	17%	4%	11%

Table 6-13 Percent Differences in Future to Present Apr-Jul Runoff Average

Watershed	Inflow Location	PCM-B1	PCM-A2	GFDL-B1	GFDL-A2
Sacramento	Shasta	-9%	0%	-20%	-22%
Feather	Oroville	-14%	-5%	-26%	-30%
American	Folsom	-23%	-13%	-43%	-40%
Stanislaus	New Melones	-13%	-9%	-34%	-33%
Merced	Lk McClure	-10%	-14%	-27%	-29%
Tuolomne	Don Pedro	-6%	-8%	-25%	-26%
Kings	Pine Flat	-6%	-12%	-29%	-28%

Table 6-14 Percent Differences in Future to Present Annual Runoff Average

Watershed	Inflow Location	PCM-B1	PCM-A2	GFDL-B1	GFDL-A2
Sacramento	Shasta	2%	4%	-2%	-6%
Feather	Oroville	3%	4%	-5%	-5%
American	Folsom	-2%	4%	-19%	-15%
Stanislaus	New Melones	1%	1%	-13%	-10%
Merced	Lk McClure	2%	-3%	-16%	-13%
Tuolomne	Don Pedro	1%	-1%	-13%	-11%
Kings	Pine Flat	2%	-2%	-17%	-14%

6.4.2.4 Peak Flow Runoff

Data provided from the GCM simulations is at a monthly time scale. Such data are not suitable to investigate peak flow runoff changes associated with climate change. Peak flows are associated with given weather events that are a fundamentally different scale from climate. In order to generate data appropriate for peak flow runoff analyses, the GCM simulations would have to be able to correctly simulate the magnitude, location, and variability of the atmospheric circulations associated with extreme rainfall and runoff. For future climate scenarios, a large sample of GCM realizations would enable a probabilistic approach to assess changes in extreme precipitation and runoff frequency. At this time, this analysis is left for future work.

6.4.3 Summary of GCM Model Results

There is great uncertainty in the magnitude, timing, and location of precipitation and runoff changes associated with climate change. Historical trends depend on the time frame chosen, although most changes are small. The magnitude of model-derived changes is less than the magnitude of the differences between observed and modeled statistics for the historical period. One way to avoid this problem is to use multiple simulations and compute averages of the multiple simulations. These ensemble averages are then used to analyze expected changes associated with climate change.

It should be noted that maximum, minimum and average temperatures have risen in the past and are expected to continue to rise across the state based on model simulations. There is some range (1 to 5 degrees C) in the amount of warming expected depending on the model and scenario. While changes in flood frequency can not be quantified from the simulation results, some elements of climate change based runoff changes can be quantified. These are explored in the next section.

6.5 Potential Impacts

Changes in runoff associated with climate change can be related to the changes in watershed response due to the modification of the seasonal snowpack. Increasing temperatures will likely push the snow level in watersheds to higher elevations leaving more of the watershed available to contribute to direct winter runoff processes. In addition, higher elevation snow levels decrease the available watershed area for snowpack to develop. Both of these issues are explored in this section. For other studies, see a special issue of Climatic Change (Vol. 62, 2004) which included a number of studies on climate change impacts on California water resources.

A simple hydrologic model of the Feather River watershed, HED71 (Buer, 1988), is used to illustrate the effects of greater contributing area on direct runoff. It is a simple forecasting model and is not a physically based model of the watershed. However, the HED71 model has the ability to specify the elevation where the snowpack starts. Elevations below this are used to generate direct runoff from an input precipitation event. As such the HED71 model can be used to evaluate the relative changes in runoff associated with different contributing areas.

A winter storm pattern of rainfall was chosen which dropped a total of 10 inches of rain in a 72 hour period. This corresponds to a 10-15 year return period event. The timing of the rainfall is shown in Figure 6-24. The HED71 model was run with a base case snow elevation of 4500 feet. Three scenario simulations were run with snow elevations at 5000, 6000, and 7000 feet which are associated with a respective 1, 3, and 5 degree Celsius rise in mean atmospheric temperature. These values are based on the assumption of a 500 foot increase in snow elevation for each 1 degree Celsius increase in mean atmospheric temperature. The percent increases in contributing area over the base case for these three temperature changes are 57 percent, 184 percent, and 250 percent respectively. Note that for the 5 degree increase in temperature, only 2 percent of the watershed is covered with snow and is assumed not to contribute to direct runoff.

Based on these simulations, the peak runoff from this storm increased 23 percent, 83 percent and 131 percent respectively. The runoff hydrographs scaled by the peak flow of the base case are

shown in Figure 6-25. As can be seen from Figure 6-25, there is a significant increase in direct runoff volume associated with higher elevations for snowpack due to the increased contributing area of the watershed. The more than doubling of the peak runoff associated with a 5 degree Celsius increase in mean atmospheric temperature would cause significant changes in the return period of peak runoff associated with a specified rainfall event.

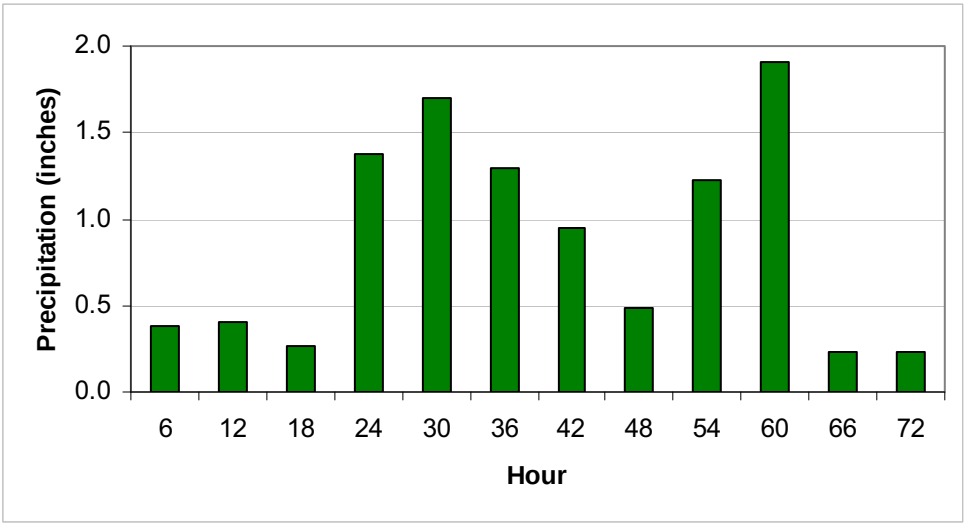


Figure 6-24 Input hyetograph to HED71 model.

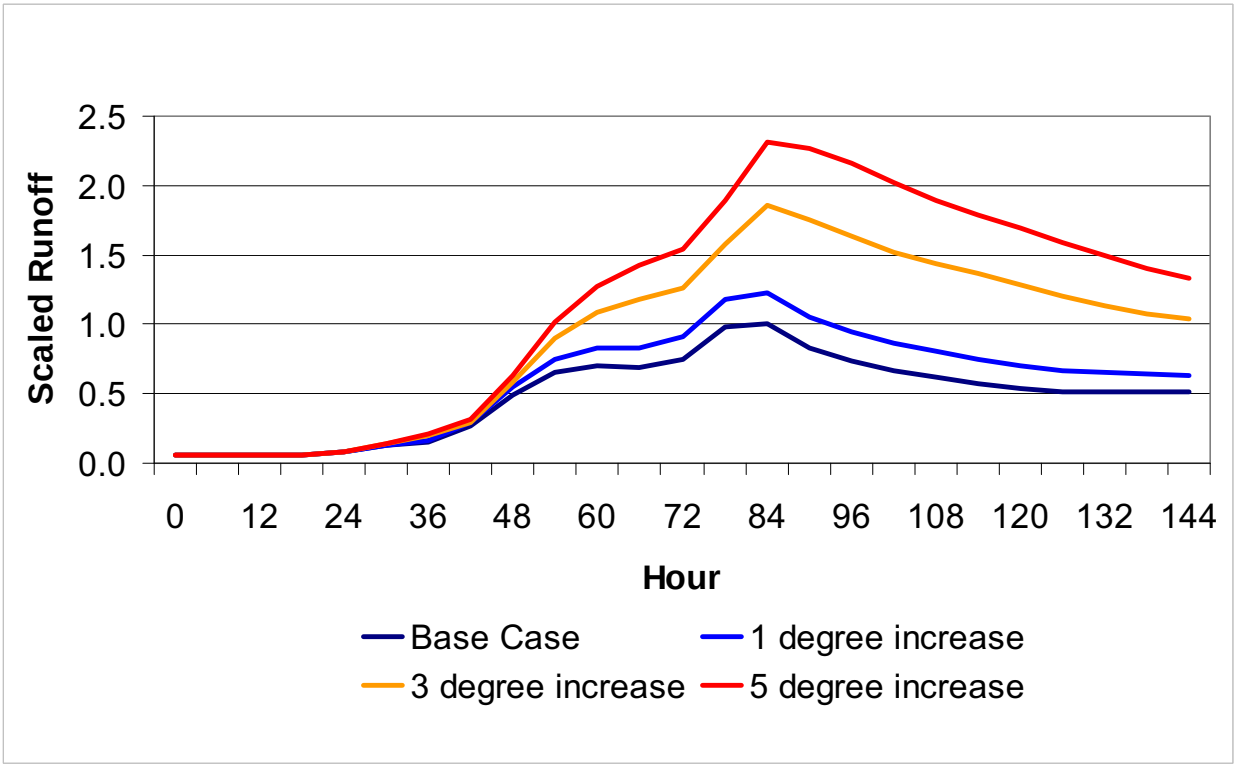


Figure 6-25 Direct runoff changes due to increasing contributing area of watershed

As pointed out earlier, higher snow elevations not only mean more area to contribute to direct runoff for a given winter storm, but there is less area for snowpack to develop at higher elevations. The impact of higher snow elevations due to higher atmospheric temperatures is estimated using area-elevation curves for watersheds. Computations assumed a 500 foot increase in elevation of snowpack for each degree Celsius of atmospheric temperature warming. Table 6-15 lists the percentage of watershed area covered with snow for 25 basins given mean atmospheric temperature increases from 1 to 5 degrees Celsius.

Table 6-15 Snow Covered Area Changes with Temperature for Selected Watersheds

Basin	Mean elevation	Average Apr. 1 snow line	Total area	Snow Covered Area	1° C Rise	2° C Rise	3° C Rise	4° C Rise	5° C Rise
	[ft]	[ft]	[mi2]	[percent of basin]	[% of basin]	[% of basin]	[% of basin]	[% of basin]	[% of basin]
Trinity	4,740	4,000	700	63%	56%	47%	36%	24%	11%
Sac/Delta	4,130	4,000	418	48%	36%	26%	19%	10%	7%
McCloud	4,370	4,000	607	56%	40%	25%	16%	10%	6%
Pit	4,830	4,000	4,768	81%	62%	42%	24%	11%	6%
Shasta	4,550	4,000	6,400	71%	54%	36%	21%	10%	6%
Bend	3,870	4,000	9,030	54%	41%	28%	17%	8%	5%
Feather	4,940	4,500	3,624	72%	56%	36%	20%	9%	2%
Yuba	4,470	4,500	1,191	50%	42%	34%	28%	17%	8%
American	4,300	4,500	1,900	48%	42%	34%	26%	19%	12%
Cosumnes	3,100	4,500	530	25%	15%	9%	6%	3%	1%
Mokelumne	5,030	5,000	575	50%	43%	38%	31%	26%	20%
Stanislaus	5,530	5,000	935	60%	55%	48%	42%	33%	26%
Tuolumne	5,960	5,000	1,530	60%	54%	49%	44%	39%	35%
Merced	5,470	5,500	1,020	47%	43%	42%	38%	32%	26%
San Joaquin	7,130	5,500	1,640	72%	67%	62%	57%	49%	43%
Kings	7,700	5,500	1,540	76%	73%	69%	64%	59%	54%
Kaweah	5,600	6,000	563	44%	39%	34%	27%	23%	18%
Tule	3,950	6,000	390	23%	15%	13%	8%	6%	3%
Kern	7,410	6,000	2,080	73%	65%	56%	49%	41%	33%
Truckee	6,790	5,500	430	100%	84%	58%	35%	17%	8%
Tahoe	7,030	6,000	510	100%	55%	41%	29%	18%	8%
W. Carson	8,050	6,000	70	100%	100%	100%	71%	51%	25%
E. Carson	7,530	6,000	350	86%	77%	66%	54%	47%	22%
W. Walker	8,650	6,500	180	100%	94%	83%	67%	53%	41%
E. Walker	8,250	6,500	360	97%	83%	69%	50%	36%	26%
Average	5,735	5,120	1,654	66%	56%	46%	35%	26%	18%

As can be seen from Table 6-15, the northern watersheds lose the majority of their area for snowpack development once the temperature increases reach or exceed 2 degrees Celsius. Lower elevation basins such as the Cosumnes, may lose their snowpack entirely in drier years. Higher elevation basins tributary to the San Joaquin River are less impacted than the northern basins. However, these basins produce less annual runoff than the basins in the north. Increasing peak flows due to winter storms and smaller snowpacks in terms of the percentage of the watershed

covered can have significant impacts on the operation of flood control and water supply structures in California.

Knowles and Cayan (2004) and Mote and others (2005) discuss how snow responds to climate change based on latitude and elevation. Knowles and Cayan (2004) note that the greatest changes to snowpack due to climate change are in the 4000 to 9000 foot elevation range for the Sacramento River Basin. Mote and others (2005) show that the trends in spring snowpack in the western United States are largely due to long-term warming trends. Year-to-year variability due to changes in the Pacific Ocean like El Nino at most only account for one third of the magnitude of the trend. They also note that future warming will likely change most seasonal snowpack sites to sites that will accumulate and melt several times each year.

6.6 Discussion

Over the past century there have been observed changes to the average, maximum, and minimum temperatures and their variability, changes to the annual precipitation variability, and changes to the three-day peak discharge statistics. Over the past 30 years there has been a small increase in observed statewide average annual precipitation as well.

For this report, four climate-change simulations (two models x two scenarios) were evaluated for information on potential impacts to runoff patterns in California. Increasing temperatures are likely to lead to increased elevations for snowpack formation which leads to a greater contributing area available for winter storm runoff. In a sample calculation, the peak runoff for a given event is shown to double under a 5 degree Celsius warming. The percent decrease in watershed area available for snowpack was also shown for 1 to 5 degree Celsius warming. In addition to these changes, warmer temperatures may lead to early melting of the snowpack. Analysis of observed data indicates that a two-week shift has already occurred for lower elevations. The combination of earlier melt times, greater variability and greater potential for direct storm runoff may challenge the current system of flood protection and water supply in the state. Because of this, future work is needed in the following areas.

In order to better understand the risks associated with global climate change on California's runoff patterns, it is important to be able to quantify the uncertainty in projected changes to flood and drought frequencies and to the quantity and timing of water supply runoff. Future efforts to address these issues include:

- Continue historical data trend and variability evaluation
- Periodically update frequency-based data for design computations
- Evaluate new climate change model-derived data sets
- Develop new water supply forecasting technologies that can adapt to the changing distribution of the state's annual water supply
- Incorporate methodologies to quantify the uncertainty in potential climate change based impacts into the water supply planning process

For flood frequency analysis, future synthetic daily flow datasets may eventually be produced from climate change model output that will be suitable for flood frequency analyses. As these

future datasets become available, they must be evaluated for their ability to represent current magnitude and variability as well as predicted changes due to climate change. At this time there is no dataset that would provide meaningful results.

Another area that may produce useful flood forecasting information examines historical data in order to identify critical atmospheric circulation parameters and their threshold values associated with extreme flooding events. As the circulation patterns in the GCMs improve and are shown to represent current conditions (location, frequency, variability) correctly, circulation patterns under increased greenhouse gas concentrations can be examined for the flood producing patterns or critical threshold characteristics. Improved forecasting technologies will help the implementation of adaptive strategies to mitigate the atmospheric and hydrologic changes that may increase flood risk.

For water supply analyses, it is important to identify potential changes to the land covered by snowpack and to identify changes to the magnitude and timing of snowpack growth and decay. Earlier melt patterns may necessitate new forecast bulletin products such as a March to May runoff forecast being created to complement existing April-July water supply forecasts. The inclusion of March in the forecast process introduces a large element of variability. Uncertainties related to this variability would have to be quantified as part of the water supply forecast product. Improved understanding of the potential future changes to the magnitude and timing of water supply runoff will enable better forecast products which can improve adaptive strategies for water supply operations in the state.

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Progress on Incorporating Climate Change into Management of California's Water Resources

1st Progress Report
July 2006

Chapter 7:
Climate Change Impacts on Evapotranspiration

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7 Climate Change Impacts on Evapotranspiration

7.1 Introduction

Possible increases in crop water demand and reduced water resource availability due to climate change are a growing concern among scientists and policy makers. We discuss the potential response of evapotranspiration (ET) to global climate change. Evapotranspiration is the vaporization or release of water vapor to the atmosphere from the terrestrial landscape. There are two parts to ET. First is evaporation, which includes vaporization of water from the soil and wet plant surfaces. Second is transpiration, which is vaporization that occurs within the leaves with the water vapor diffusing through pores in the leaves to the atmosphere. Water for transpiration comes from the soil through the plants and to the atmosphere. So the transpiration rate depends on the integration of soil, plant, and atmospheric factors. The evaporation rate depends on soil factors and frequency and amount of precipitation and irrigation, which determine water availability for vaporization.

In this chapter, we provide the current ET demand in California together with possible future ET demand under climate change. Population growth and likely crop pattern shifts are considered as factors that affect climate change ET estimates. An energy budget analysis to examine the net energy flux involved with ET and the physiological processes that influence ET are provided to explain the ET mechanisms affected by climate change. We describe a promising water management simulation model, SIMulation ET of Applied Water (SIMETAW). It is described in relation to climate prediction to estimate future net irrigation needs for crops.

7.2 Evaporative Demand for Applied Water in California

7.2.1 Current settings

California has produced the highest agricultural value in the country for the past 50 years. In 1997, 10.8 million acres of the state were devoted to harvested crops with another 14.4 million acres devoted to pasture and rangeland. Half of the fruits, nuts and vegetables in the country are produced in California. It is the only state producing commercial quantities of almonds, artichokes, clingstone peaches, figs, raisins, walnuts, pistachios, nectarines, olives, dates, and prunes. California also leads the nation in dairy production. In 2003, the latest available information for California agriculture production, California earned $29.4 billion in agriculture income (USDA, 2003).

This land of milk and honey results from a geography of fertile valleys, coastal plains, and gently rolling foothills and sharp tall mountains. The tall mountains in the north and on the eastern side of the state accumulate snow in winter for a water reserve during the next growing season. A semiarid Mediterranean climate provides a long frost-free growing season in most of the state. And there is abundant sunshine, a key to a plentiful agriculture and lush native vegetation.

The native vegetation of the state has a net primary productivity (NPP) that reflects the natural carrying capacity with respect to water and other natural resources. The native NPP is less than that of the state's crop production mainly because of the supplemental irrigation water applied. Figure 7-1 provides a regional map of California with the state's 10 hydrologic regions and Figure 7-2 is a map of 18 reference evapotranspiration (ET_o) zones California. The hydrological zones have traditionally been used for water resources planning and the ETo zone map has further refined ET estimation in California. Reference evapotranspiration is the ET from a vegetated surface with an approximate height of 0.12 m that is similar to clipped, cool-season grass (ASCE-EWRI, 2005). DWR's California Irrigation Management Information System (CIMIS) network (Snyder and Pruitt, 1992) was the main source of data used to develop the ET_o map. The Pruitt and Doorenbos (1977) hourly ET_o equation rather than the hourly ASCE-EWRI Penman-Monteith equation is used in CIMIS. The results, however, are similar for both equations (Ventura et al., 1999). The monthly and annual total ET_o for each of the eighteen zones is listed in Table 7.1 to illustrate the variability through the year and between zones. The ETo rates listed for the zones show the spatial patterns and relative variation of average annual ETo with extremes from 32.9 to 71.6 inches per year.

Rainfall and irrigation water are the principal sources of water for agricultural production. Irrigation water includes groundwater pumped from aquifers and surface water delivered through natural and man-made and watercourses. The surface water generally originates in the mountains as snowmelt and surface runoff from precipitation. It is temporarily stored in reservoirs for later distribution during the peak-demand season. Excluding water used to meet instream flow requirements, Delta water quality, and other environmental uses, 80 percent of the developed water supply supports agriculture while 20 percent serves urban uses.

Most of the agricultural water contributes to crop ET. But water is also used for cultural practices, such as leaching salts and for frost protection. It is also used for groundwater recharge. The term consumptive use is used and it refers to the water vaporized to produce a crop or ET. Evapotranspiration of applied water (ET_{aw}) is equal to ET minus effective precipitation, the amount of rainfall available for use by a crop. Therefore, ET_{aw} is the amount of irrigation water that is consumed by the crop. Additional irrigation water is applied to account for non-uniform distribution of the irrigation water and to control salinity. Most of the applied irrigation water contributes to ET_{aw}, so it is essential information for water resources planning and management. Projections for the actual demand for irrigation water are predicted using estimates of irrigation application efficiency. These estimates depend on the irrigation system and management, water requirements for leaching and other cultural practices, and ET_{aw} or applied irrigation water is transpired by crops and evaporated from soil and plant surfaces.

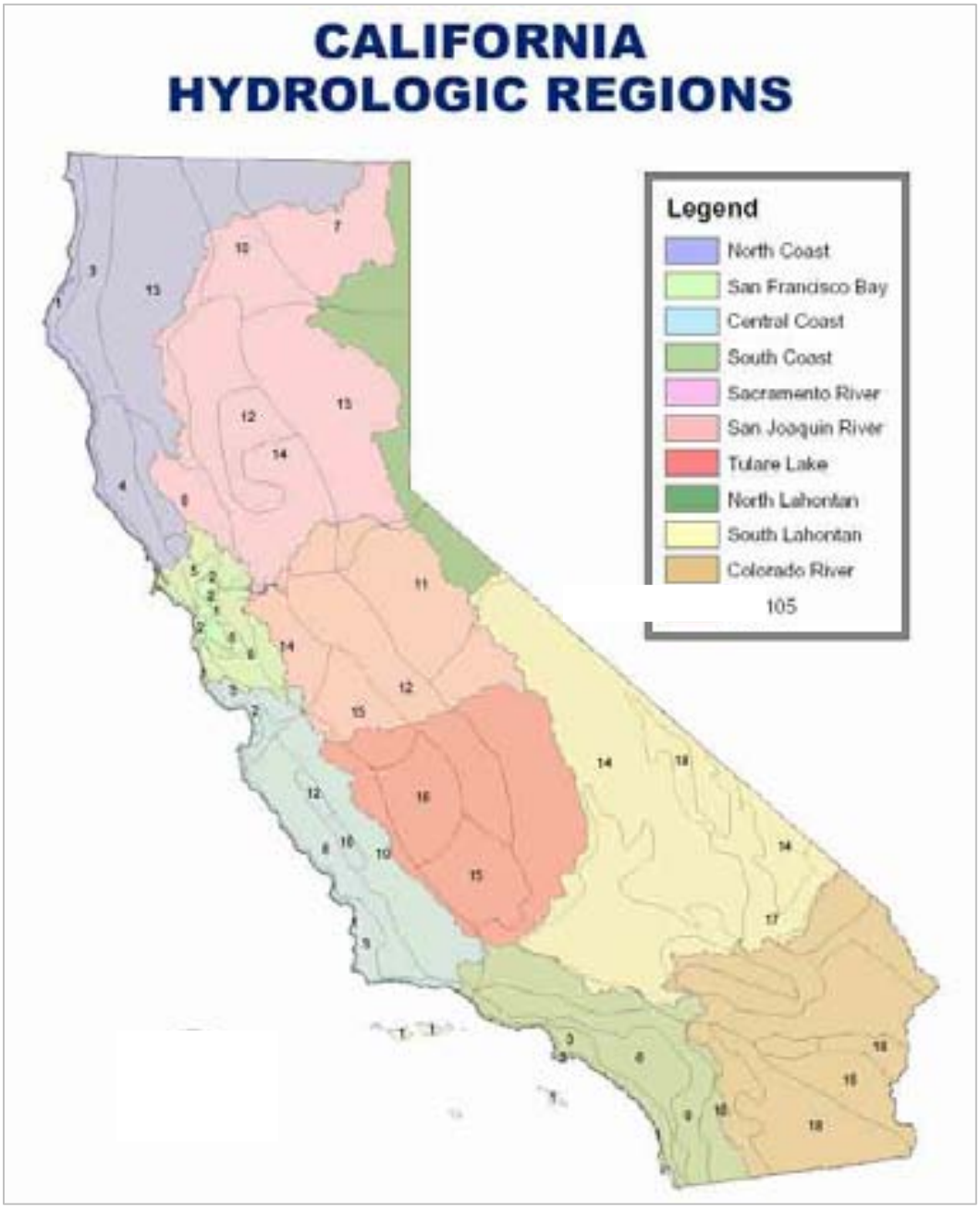

Figure 7-1 Hydrological regions coded by color
(Numbers are the ET zones listed in the legend and coded by color in Figure 7-2)

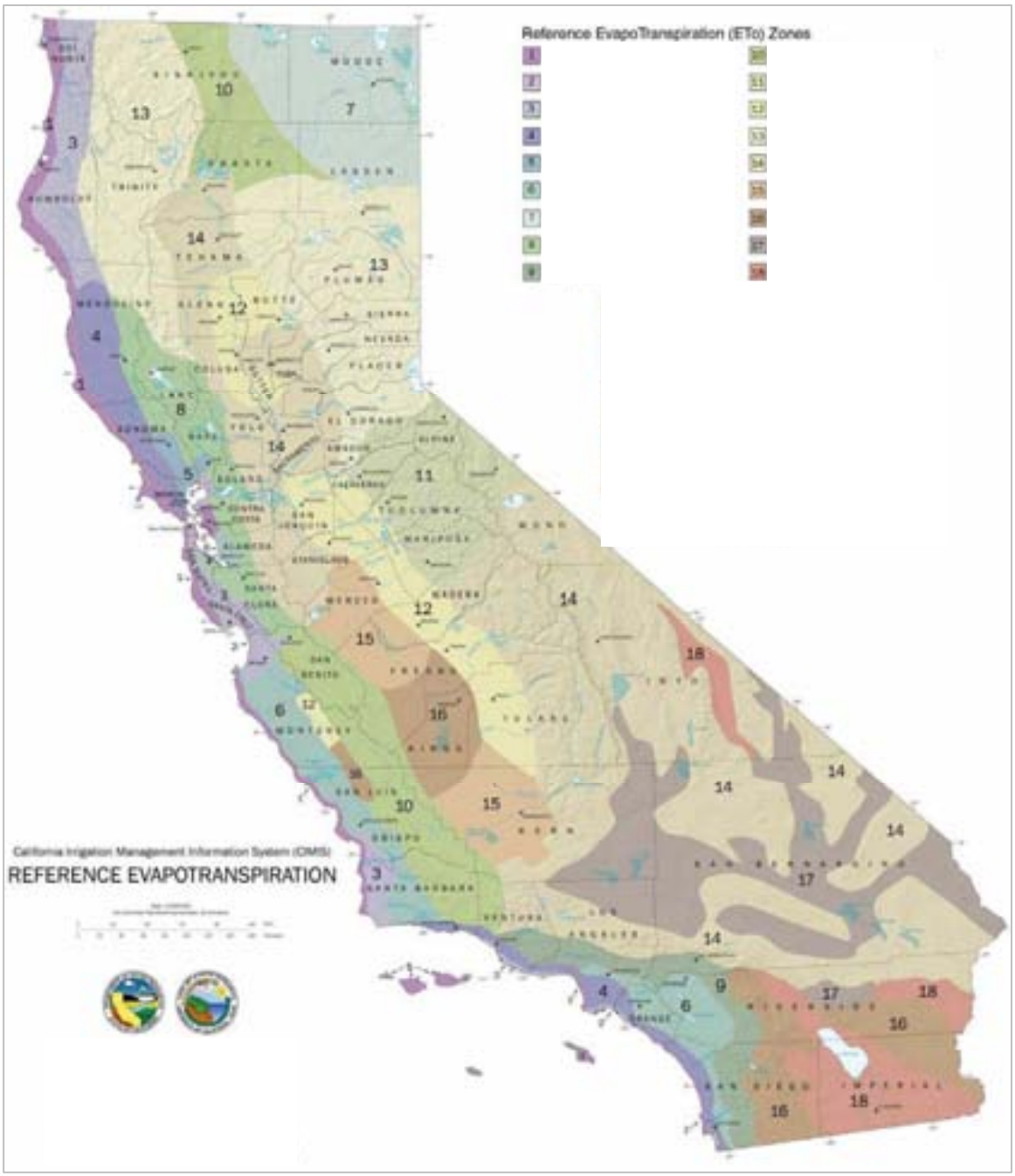

Figure 7-2. Reference evapotranspiration zones

Table 7.1. Monthly and total reference evapotranspiration (ETo) by ETo zone for the California ETo zone map in inches per month.

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1	0.9	1.4	2.5	3.3	4.0	4.5	4.7	4.0	3.3	2.5	1.2	0.6	32.9
2	1.2	1.7	3.1	3.9	4.7	5.1	5.0	4.7	3.9	2.8	1.8	1.2	39.0
3	1.9	2.2	3.7	4.8	5.3	5.7	5.6	5.3	4.2	3.4	2.4	1.9	46.3
4	1.9	2.2	3.4	4.5	5.3	5.7	5.9	5.6	4.5	3.4	2.4	1.9	46.6
5	0.9	1.7	2.8	4.2	5.6	6.3	6.5	5.9	4.5	3.1	1.5	0.9	43.9
6	1.9	2.2	3.4	4.8	5.6	6.3	6.5	6.2	4.8	3.7	2.4	1.9	49.7
7	0.6	1.4	2.5	3.9	5.3	6.3	7.4	6.5	4.8	2.8	1.2	0.6	43.3
8	1.2	1.7	3.4	4.8	6.2	6.9	7.4	6.5	5.1	3.4	1.8	0.9	49.4
9	2.2	2.8	4.0	5.1	5.9	6.6	7.4	6.8	5.7	4.0	2.7	1.9	55.1
10	0.9	1.7	3.1	4.5	5.9	7.2	8.1	7.1	5.1	3.1	1.5	0.9	49.1
11	1.6	2.2	3.1	4.5	5.9	7.2	8.1	7.4	5.7	3.7	2.1	1.6	53.1
12	1.2	2.0	3.4	5.1	6.8	7.8	8.1	7.1	5.4	3.7	1.8	0.9	53.4
13	1.2	2.0	3.1	4.8	6.5	7.8	9.0	7.8	5.7	3.7	1.8	0.9	54.3
14	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.0
15	1.2	2.2	3.7	5.7	7.4	8.1	8.7	7.8	5.7	4.0	2.1	1.2	57.9
16	1.6	2.5	4.0	5.7	7.8	8.7	9.3	8.4	6.3	4.3	2.4	1.6	62.5
17	1.9	2.8	4.7	6.0	8.1	9.0	9.9	8.7	6.6	4.3	2.7	1.9	66.5
18	2.5	3.4	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.6

The average annual ET_{aw} in the state's ten hydrologic regions, during the most recently recorded normal water year 2000 (DWR-DPLA, 2005), ranged from 13.56 acre-inch per acre per year to 44.52 acre-inch per acre per year (Table 7.2). These ET_{aw} values are weighted by the acreages of crops grown in each region. They also reflect the variability in planting and harvest dates, ETo, and effective precipitation for each crop in each hydrologic region. Crop coefficients used to calculate crop ET_{aw} from ET_o came from a variety of sources including DWR Bulletin 113-3, April 1975, Bulletin 113-4, April 1986 and Food and Agriculture Organization of the United Nations Irrigation and Drainage Paper 56 Crop Evapotranspiration, 1998. Soil available water estimates were based on data in soil survey publications from the USDA National Resources Conservation Service. Records of daily precipitation from weather stations located near agricultural areas are used in a model along with ETo data and soil information to estimate the amount of precipitation available for crop consumption. The ET_{aw} values extend from October 1, 1999 through September 30, 2000. ET_{aw} values vary from year-to-year with changes in the proportions of irrigated acreage planted to each crop category, change in cultivars planted, the quantity and distribution (spatial and temporal) of precipitation, water applied for cultural practices, irrigation water management, variation in ETo and other factors.

The statewide average annual ET_{aw} for 20 important agricultural crop categories are listed in Table 7.3. These average ETaw values reflect the distribution of crops across the ETo zones in California. They are based upon the same data from Water Year 2000 used to estimate the average ET_{aw} for each hydrologic region. Safflower used the least water, averaging 9.48 acre-inch per acre while alfalfa used the most, averaging 42.72 acre-inch per acre.

Table 7.2 Estimated Annual ET of applied water by hydrologic region during the 2000 water year in acre feet per acre, from DWR-DPLA 2005

Region	Name	ETaw (acre-inch/acre)
01	North Coast	20.28
02	San Francisco Bay	14.16
03	Central Coast	13.56
04	South Coast	27.60
05	Sacramento River	28.92
06	San Joaquin River	26.04
07	Tulare Lake	26.76
08	North Lahontan	28.92
09	South Lahontan	44.52
10	Colorado River	42.96

Table 7.3 ET of applied water in acre inch per acre for some of the main commodities grown in California.

Commodity	ETaw (acre-in/acre)
Grains	12.72
Rice	37.44
Cotton	28.44
Sugar Beet	30.72
Corn	22.20
Dry Bean	18.36
Safflower	9.48
Other Field Crops	22.44
Alfalfa	42.72
Pasture	34.68
Processing Tomatoes	24.36
Fresh Market Tomatoes	20.40
Cucurbits	18.72
Onions Garlic	29.16
Potatoes	20.04
Other Truck Crops	15.84
Almonds Pistachios	33.12
Other Deciduous Orchards	32.16
Subtropical Crops	30.36
Vineyards	17.3

7.2.2 Projected ET changes for the California landscape impacted by climate change

Hidalgo et al. (2005) investigated the impacts of climate change on irrigation water demand with respect to reference ET (ET_o) in California and found that the highest interseasonal variability of ET_o daily anomalies occurs during the spring, mainly in response to variations in cloudiness. Daily ET_o values were closely associated with net radiation (R_n), relative humidity, and cloud cover, and are less related to average daily temperature. In the next section about energy budget the relationships between climatic factors are discussed along with relative influences they exert. Although Hidalgo et al (2005) concluded that to maintain ET_o in the current condition requires a decrease in R_n of about 6 percent to compensate for a temperature increase of 3ºC, they did not account for increased stomatal resistance that is likely to result from higher CO_2 concentration, which is discussed in detail later in this chapter. Hidalgo et al. were clearly correct in that the effects of climate change on ET_o are difficult to forecast because of the uncertainty of cloud cover and relative humidity. Allen et al. (1991) concluded that a CO_2 induced climate change resulted in an increased ET_o which then translated to an increased ET_{aw}.

7.2.3 Landscape influences on ET that complicate climate change effects

Climate influences biophysical features in the landscape, but the physical landscape also influences climate and affects the interaction between climate and landscape. For example, crop irrigation reduces the air temperature and urban surfaces commonly increase temperature.

Future urban growth affects the statewide ET demand by decreasing irrigated agriculture land. In population studies, Landis and Reilly (2004) reported that the greatest urban expansion is likely to happen on flat land of valley floors. They listed the greatest risk to important farmland as land in the Inland Empire and in the Central Valley.

Increasing urbanization can increase the heat-island effect (a localized elevation in temperature over the ambient air temperature) and could lead to small increases in advection of additional heat to nearby crops. Advection is the horizontal transfer of heat or scalars, such as water vapor or CO_2, that results when wind blows air reflecting characteristics of one surface over another surface with different characteristics. Energy fluxes over irrigated crops are usually vertical, but there can be edge effects when local advection occurs. When there is warm air advection, the horizontal transfer of energy can increase ET on crop edges. This can lead to moderate stress, which reduces plant size, or severe stress that reduces ET and photosynthesis. This is quite noticeable where irrigated fields are surrounded by bare, dry soil. Affected crops are often shorter and appear more stressed on the edges than in the middle of the field. There is also regional warm air advection, which occurs when heat is horizontally transferred over cropped areas. This often happens in the Central Valley where warm air from the drier foothills moves over irrigated land in the middle of the valley. For regional advection, however, the heat transfer is mostly vertical. This means there is more available energy for evaporation than is supplied by net radiation and soil heat flux. The result is a reduced ET_c/ET_{pot} ratio because Et_{pot} increases due to advection. Urbanization could lead to some additional warming and it might increased advection. Although small in its reach, increased advection could result from urban expansion into irrigated crops in an increasing dentate edge.

Other effects on ET from growing urbanization next to agricultural land include physiological impacts from air toxicants, most notably ozone, and regional atmospheric dimming from particulates and pollutants above and around urban centers and held in place by inversion due to high atmospheric pressure during the summer growing season.

7.2.4 Changes in cropping and irrigation methods that interact with climate change

Throughout the 150 years of California agriculture, many changes in crop types and shifts in cropping patterns have occurred. In addition to land loss to urbanization, land use conversions for agriculture are driven by irrigation water availability, changes in multiple cropping, and changes in the crops due to economics. Biophysical changes that result from climate change could contribute to these factors. For example, with warming temperatures, citrus production could move farther north in the Central Valley and deciduous orchard crops that have large chill requirements might have reduced production or be forced out of the area. Shifts in cropping patterns are likely to continue with increased water cost and possibly with changes in regional climates. There are, however, no comprehensive studies of projected changes in California agriculture resulting from climate change (Hayhoe et al., 2004). Water resources availability will likely be the main environmental variable determining shifts in crop distribution (Field et al., 1999).

Based on surveys conducted jointly by the University of California and California Department of Water Resources, a definite trend towards growing more perennial crops and using low-volume, pressurized irrigation systems has occurred during the past 30 years (CDWR Bulletin 160-05). While this has improved the economic benefits resulting from irrigation and has likely improved on-farm irrigation efficiency during years with adequate water supplies, growers have reduced ability to adapt during dry periods. For example they don't have annual field or row crops that could be fallowed during droughts. With adequate water supplies, this trend is good, but it is financially dangerous in terms of drought response and mitigation.

The value integration network simulation model (CALVIN) and the statewide water and agricultural production simulation model (SWAP) were developed at the University of California, Davis, and they were coupled to investigate climate change in California by modifying crop yields and amount of irrigated water used (Tanaka et al., 2005). They concluded that by the end of the century there will be a 24 percent decrease in the amount of water devoted to agriculture and only a 6 percent decrease in agricultural income. The differences in water use and income were attributed to growing higher value crops and increased irrigation application efficiency. Higher application efficiencies mean higher ratios of water consumption by evapotranspiration to water applied. This can reduce both diversions for irrigation and reduced return flow. In some instances, this may reduce supplies to downstream projects depending on whether the reduction in diversions or return flow is larger. Generally, if outflows from basins are near minimum values, only reductions in ET upstream will free up water for transfer from irrigated agriculture.

7.3 Energy Budget

An energy budget can account for all input and output energy fluxes to a terrestrial landscape. Among these fluxes is the mass balance of water phase change of liquid water to gaseous water vapor. This accounting is a useful analytic tool to investigate the affect of climate change on

evapotranspiration. The Penman-Monteith equation, which is described in Appendix 1, is a partly empirical algorithm that was derived from energy budget considerations. It was modified by the ASCE-EWRI (2005) to derive a reference evapotranspiration (ETo) rate from meteorological measurements of minimum and maximum temperature, humidity, solar radiation and wind speed. There is, however, a difficulty in estimating crop evapotranspiration (ETc) or ETo for a climate-changed environment because of a lack of knowledge about canopy resistance to water vapor loss in an elevated CO_2 environment. Nonetheless, using FACE measurements of stomatal resistance (Long et al., 2004) for elevated CO_2 and the same approach used by Allen et al. (1989) to estimate canopy from stomatal resistance for use in estimating ETo, an increase in CO_2 concentration to 550 ppm is expected to increase the daily mean canopy resistance from 70 to 87 s m^{-1}.

It is important that the ASCE-EWRI (2005) has fixed the ET_o canopy resistance at 70 s m^{-1} for daily calculations and it is unlikely to be changed in the near future. The equation, however, should be updated if the canopy resistance changes. This is necessary because crop coefficient values were mostly developed by calculating the ratio $K_c = ET_c/ET_o$, where ET_o was the ET of the reference grass surface and ET_c was the crop ET. Consequently, the standardized reference ET equation should provide a good estimate of the ET of a 0.12 m tall, cool-season grass surface or the K_c values will surely be incorrect. It is possible that K_c values could change because of differences in stomatal responses to climate change, but changing the ET_o equation and assuming that the K_c ratio will be conserved is more plausible than maintaining a standardized equation that gives an incorrect estimate of the K_c ratio denominator. To investigate possible ET changes in response to climate change, the daily (24-hour) ASCE-EWRI (2005) ET_o equation is used and the temperatures and canopy resistance are changed to investigate how the ET of a 0.12 m tall, cool-season grass might change. It is assumed that other crops will respond similarly to the grass and the K_c values will not change.

The Consumptive Use Program (CUP) was developed by DWR and the University of California, Davis to estimate crop evapotranspiration for planning purposes. CUP was written, using MS Excel software, as a tool to help California growers and water purveyors obtain accurate estimates of crop water requirement information from monthly mean data. The program takes input weather data and estimates monthly reference evapotranspiration (ETo) using the Penman-Montieth equation. Then the program uses a curve fitting technique to derive one year of daily weather and ETo data from the monthly data. A feature to vary the canopy resistance as well as the temperature allows users to investigate the effects of increasing canopy resistance on ET_o. Current monthly mean climate data from Davis, CA and a canopy resistance of 70 s m^{-1} were input into CUP to calculate ET_o rates using the Penman-Monteith equation. The process was repeated using an elevated 3^oC minimum and maximum temperature, holding all other variables constant. The process was repeated a third time with an increase in the minimum and maximum temperature and the dew point temperature by 3^oC while holding other variables constant. Finally, the combination of the air and dew point temperature increase by 3^oC and a canopy resistance increase to 87 s m^{-1} was computed. Figure 7-3 shows a comparison of the smoothed curves of calculated ET_o for the four scenarios. Increasing only air temperature, resulted in a 18.7 percent increase in ET_o. Increasing the air and dew point temperatures led to a 8.5 percent increase in ET_o. Increasing the temperatures and the canopy resistance to 87 s/m led to a 3.2 percent increase in ET_o over current conditions. While the percentage increase is small when the

canopy resistance is included, the volume of water relative to California is considerable. Other factors like changes in solar radiation due to changes in cloudiness or air pollution and changes in wind speed were not considered.

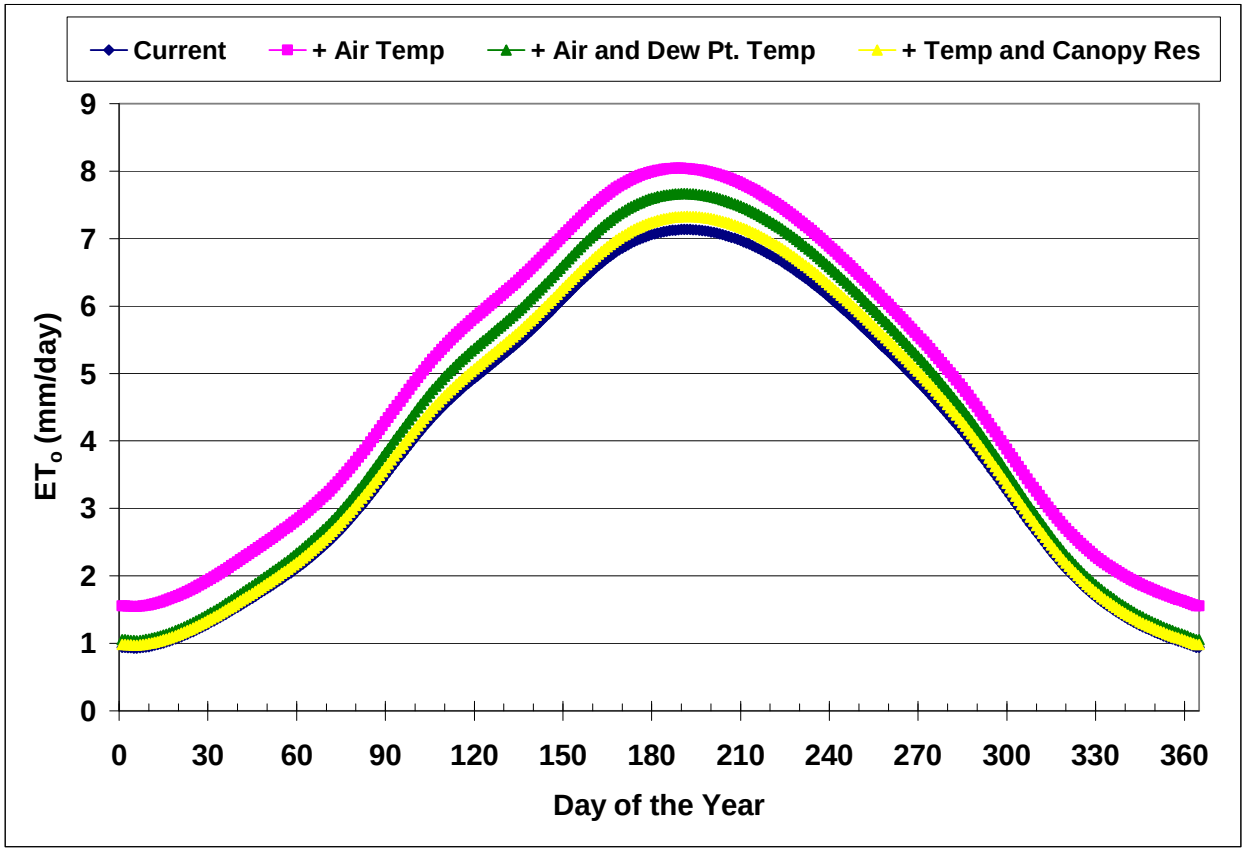

Figure 7-3 ET_o comparison for current and climate change conditions
ETo comparison for current conditions (navy), for minimum and maximum temperature elevated 3°C (pink), for minimum and maximum and dew point temperature elevated by 3°C(green), and for temperature elevated 3°C and canopy resistance increased to 87 s/m (yellow).

7.4 Plant Physiology and Climate Change

7.4.1 Plant physiological and morphological adaptation

Plants adapt to a changed physical environment through physiologically and morphologically modification. For changes in temperature and CO_2, the two main plant adaptations are to control the water continuum between soil and atmosphere and to adjust photosynthetic carbon fixation.

In transpiration, water vaporizes inside leaves and diffuses through stomata (i.e., pores in the leaf surface) to the ambient air. Simultaneously, CO_2 is diffusing from the atmosphere into the leaves through the same stomata. When stomata partially close, CO_2 flow into the leaves and H_2O flow from the leaves are both affected at the same time. However, since mesophyl resistance (i.e., resistance of the cell walls to passage of the CO_2) is typically much higher than stomatal resistance, stomatal closure has less effect on CO_2 uptake than it does on transpiration, which is

restricted by the smaller stomatal aperture. In experiments carried out in enriched CO_2 environments, which are described later, typical agronomic plants exhibited a 20 percent reduction in stomatal conductance and a 20 percent increase in photosynthesis (Long et al., 2004).

In addition to being influenced by the environment, plants also influence their environment. Evaporation from the soil is directly affected by the plant canopy shading. The canopy size and density (i.e., coverage) and the rate of development all influence crop ET. The plant coverage is often quantified with the leaf area index (LAI), which is determined as the ratio of the canopy leaf area per unit ground area under the canopy. Theoretically, there is an optimal LAI that reduces soil evaporation on one hand, which increases water for transpiration and other plant processes, and that minimizes self shading of leaves that decreases growth and reproduction. The rate of canopy growth and closure is often quantified using the relative growth rate (RGR) or the growth per unit of biomass. The RGR optimization depends on below ground and above ground assimilate allocation that influence depth of rooting for water and nutrient attainment as well as canopy development, photosynthesis, and ground shading. To varying degrees, depending on the specific crop or even cultivars, there is a possibility for adaptation during plant growth and development (phenotypic plasticity) or for genetically fixed trait expression regardless of the environment.

What is most important for the ET, is not the total amount of leaf area produced but the rate of canopy development and closure (Hsiao and Xu, 2005), which can take up to two months in herbaceous crops. That is, the LAI is less important than the rate at which the canopy foliage develops and shades the ground. The rate of canopy closure is important for determining the relative contributions of evaporation and transpiration to ET. At planting, soil evaporation comprises 100 percent of the ET_c, but the contribution from the soil decreases until it is small relative to transpiration once a canopy reaches about 75 percent ground cover for field and row crops, and about 70 percent for tree and vine crops. This change occurs because the crop canopy intercepts most of the radiation before it reaches the ground once 75 percent ground cover is attained.

7.4.2 Transpiration and photosynthesis

Several plant physiology processes are often simultaneously influenced by environment factors. Figure 7-4 shows the relation of photosynthesis and transpiration together with the climatological factors influencing the two processes. Nitrogen assimilation, which occurs through the plant roots, can be affected by transpiration rate. It is included because of its importance as a control node in the photosynthetic process. Nitrogen is particularly important as part of the of Rubisco assimilation pathway. Rubisco is said to be the most abundant protein, and is an enzyme with a low efficiency that is pivotal as the initial and limiting step in the fixation of carbon in photosynthesis of most agronomic crops. Appendix 2, detailing the photosynthesis response curve to CO_2, provides a fuller description of Rubisco and photosynthesis).

There are several photosynthetic pathways found in different plant species. In the C_3 pathway, which is the most widespread and is the photosynthetic system of most agriculture plant species, CO_2 is initially fixed by Rubisco during the day (i.e. in the presence of light) and then converted

to a three-carbon intermediate. In the C_4 pathway CO_2 is initially fixed by PEP carboxylase during the day to form four-carbon acids. The C_3 and C_4 plants also differ anatomically, with C_4 plants maintaining a higher c_i (intercellular CO_2 concentration) and a lower stomatal conductance for the same CO_2 assimilation rate.

Both light and dark respiration are included Figure 7-4 because respiration accounts for about 25 percent of plant energy expenditure. Respiration is an intercellular process in which molecules, particularly pyruviate in the citric acid cycle, are oxidized with the release of energy. It involves the complete breakdown of sugar or other organic compounds to CO_2 and H_2O. In addition to respiration relating photosynthesis, transpiration and nitrogen metabolism in an energy currency, optimization respiration is also important in the differential responses of plant biomass production to changes in atmospheric CO_2, which in turn is related to nitrogen form involved in intermediate metabolism. This concept is developed further in the physiological response section.

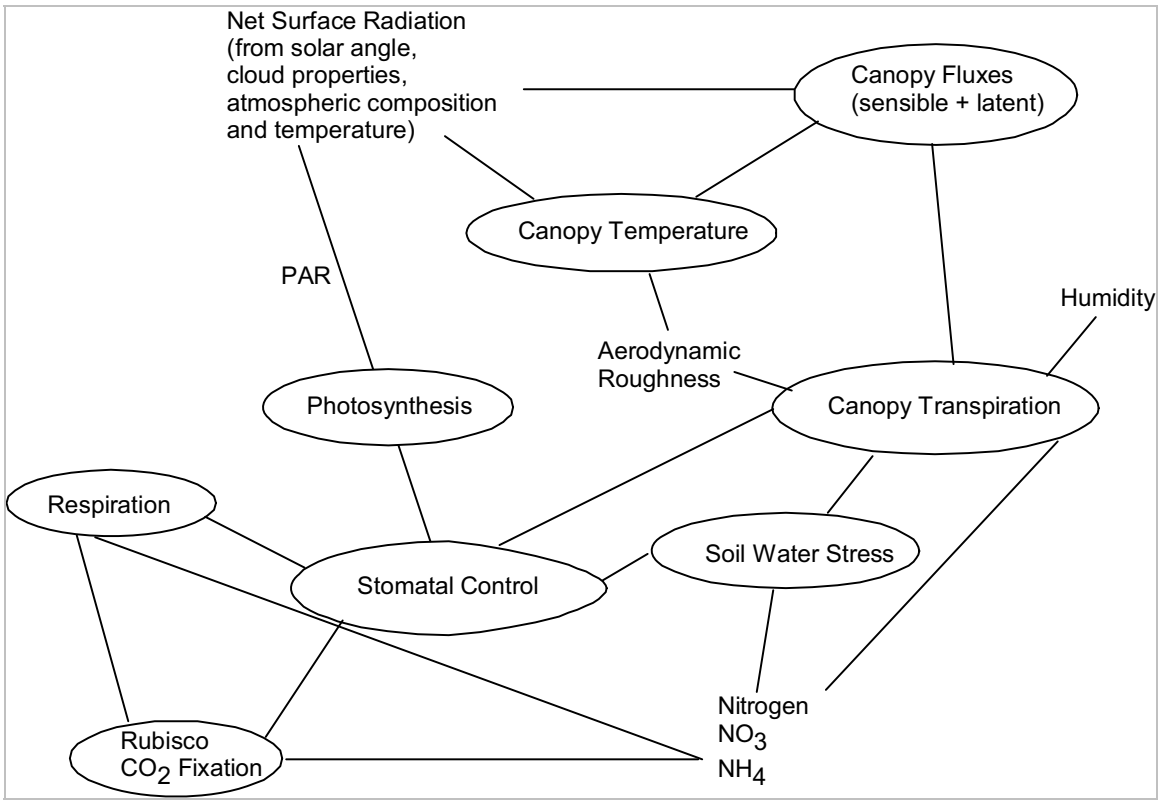

Figure 7-4 Relation of transpiration, photosynthesis and nitrogen.
Photsynthetically available radiation (PAR) indicates the total energy available for photosynthesis

In summary, the relation of the three physiology processes diagramed in Figure 1 are not necessarily direct but rather optimizations which can be either passive or active. Therefore, care is needed in extrapolating relations such as the total leaf area and stomatal density where feedback loops involving Rubisco density and its long term adaptations influence the relation of

stomata function in CO_2 enriched environments. This concept will be discussed in a later section. The water use efficiency (WUE) quantitatively relates assimilation to transpiration. Assimilation is used here as the incorporation of an inorganic resource such as CO_2 or NH_4 into organic compounds; it is often synonymous with net photosynthesis. WUE = A/T, where A is assimilation and T is transpiration. Transpiration efficiency has been used to describe the ratio of carbon gained to water transpired at the whole plant level, that is assimilation per transpiration (Condon and Hall, 1977). In agronomy, WUE is typically regarded as the ratio of carbon fixed per unit water use; so at a crop level it is the amount of dry matter production per unit of total water transpired (T).

7.4.3 Effect of increased CO_2 on plant physiology and morphology

In an atmosphere with increased CO_2, the balance between photosynthesis and transpiration appears to change (Long et al., 2004). Plants adjust their stomatal opening to maintain the CO_2 concentration within the plant leaf intercellular space (c_i) so that it does not limit photosynthesis. Less stomatal opening is required at high atmospheric CO_2 concentration (c_a). Many researchers report that stomatal conductance decreases with rising atmospheric CO_2 concentration to maintain a constant (c_i/c_a) (Long et al, 2004; Hsiao and Jackson, 1999). Because the stomata partially close to maintain the concentration gradient between the air and stomatal cavities under elevated CO_2 concentration and the water vapor gradient is unchanged, the photosynthesis rate is little affected and the transpiration rate declines because of the stomatal closure, resulting in a small increase in WUE though an increase in photosynthetic demand (see Appendix 2 The photosynthesis Response Curve to CO_2).

With increased CO_2 for fixing carbon in photosynthesis, the diffusion of CO_2 into the plant leaf and water vaporization out through the same stomata is influenced by the availability of activation sites for fixing CO_2, which in turn is influenced by the availability of nitrogen to make the sites (i.e. enzymes, which for most crops is Rubisco). New findings suggest respiration could prove important to nitrogen assimilation at elevated CO_2 (Rachmilevitch et al., 2004). The forms of nitrogen used by a plant and elevated CO_2 can influence respiration (Rachmilevitch et al., 2004). The form of nitrogen used in plant intermediate metabolism, whether NO_3 or NH_4, varies between species and even at different growth stages for the same plant. Plants that use NO_3 as their primary nitrogen source are unable to sustain rapid growth under elevated CO_2 because of interferences with respiration.

Figure 7-5 provides response relationships to increased atmospheric CO_2 for processes shown in Figure 7-4. The initial finding for this summarization of responses to CO_2 increase comes from growth chamber studies performed usually on individual leaves or individual plants. More recently, a good body of evidence for plant physiological responses to elevated CO_2 (about 570 $\mu mole\ mol^{-1}$) has been reported from FACE field studies on small plots.

Long et al. (2004) summarized the findings from these FACE sites in a meta analysis, which allows statistical analysis of the studies as a whole to understand elevated CO_2 influences. They found that biomass assimilation increased by about 20 percent while seed production increased about 24 percent. However, nitrogen in the leaves of longer-term plants decreased 17 percent and Rubisco decreased 15 percent. The LAI increased but not significantly.

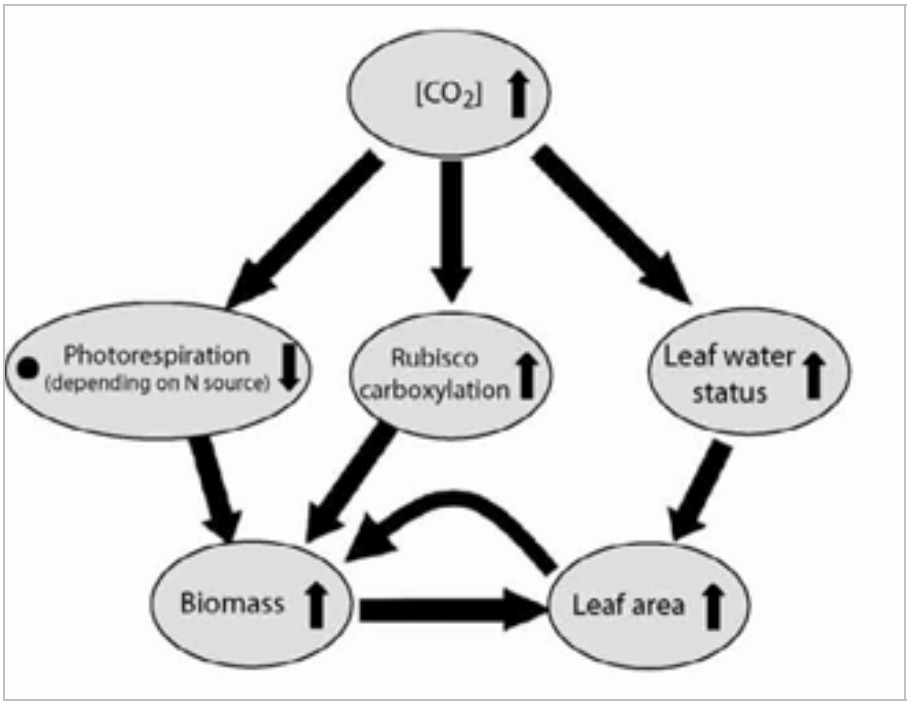

Figure 7-5. CO_2 effects and interactions on C_3 plant production.
CO2 effects and interactions on C3 plant production. The small arrows inside ovals indicate influence of CO2 on process (modified from Long et al, 2004)

Influences of elevated temperature and CO_2 on crop growth and phenology are topics of importance in determining ET for a future California landscape. For both herbaceous plant life and woody perennials, the influence of climate change on leaf senescence needs further study. Physiological changes like the apparent earlier or faster leaf aging in deciduous tress at elevated CO_2 can reduce seasonal ET. Evaporation from the soil is mainly affected by wetness of the soil surface, hydraulic properties of the soil, energy availability, and wind speed beneath the canopy so that advances in regional climate scale models are needed to understand influences of radiation and wind speed trends. Wind speed in particular is difficult to model and projects and accurate modeling of wind speed is unlikely to occur in the near future. Physiological changes like the apparent earlier or faster leaf aging in deciduous tress at elevated CO_2 can reduce seasonal ET and can be estimated.

It is widely held that increased CO_2 concentration could improve WUE, and needs more analysis at least on a whole plant level, if not the plant community level. When using whole plant examination of climate change impact that considers WUE by scaling up from relations such as LAI and stomata conductance there is a need to consider the influence of carbon assimilation from increased carbon fixation efficiency. Groups are using a variety of methods to investigate WUE. The isotope discrimination methodology for WUE is a direct measure that is easily obtained from any tissue in a plant. Seed companies are using this technique to develop plants with increased assimilation relative to transpiration to achieve a better WUE at elevated CO_2 or temperature. There is, however, a likely maximum theoretical upper bound to the gains in plant

WUE that are obtainable (Cowan and Farquhar, 1977). The likely upper bound to WUE brings into focus the need to look at a systems level for both understanding and for possible water use reductions per unit production. A system vision needs to considers the CO_2 and temperature environmental influence on plants, the plants influence on the local ET environment and the on farm water delivery to plants.

7.5 A Simulation Model for Estimating ET of Applied Water (SIMETAW)

7.5.1 SIMEATAW model description

SIMETAW (Simulation of Evapotranspiration of Applied Water) is a computer application program that can simulate several decades of daily weather data from climate records. It is useful for studying the effect of climate change on Crop evapotranspiration (ET_c) and evapotranspiration of applied water (ET_{aw}). SIMETAW was written mainly for use in water demand planning. SIMETAW can use either observed daily climate records or it can simulate daily weather data from monthly means for a specified period of years. The observed or simulated daily data are then used to estimate reference evapotranspiration (ET_o). Crop evapotranspiration is calculated for each day in the period of record using the product of the daily ET_o values and a crop coefficient (K_c) factor. The seasonal change in Kc factors is determined using a slightly modified procedure that was originally presented by Doorenbos and Pruitt (1977). This method enables the representation of day-to-day variations in evaporative demand.

Monthly climate data include solar radiation (R_s), maximum (T_x) and minimum (T_n) air temperature, wind speed at 2 m height (U_2), dew point temperature (T_d), number of rainy days per month (NRD), and monthly total rainfall (Pcp). SIMETAW computes ET_o using the daily (24-hour) Penman-Monteith equation (ASCE-EWRI, 2005). Daily ET_c rates are estimated by multiplying ET_o by a crop coefficient (K_c) factor. In addition, observed or simulated daily rainfall, soil water holding characteristics, effective rooting depths, maximum soil depths, and ET_c are used to determine effective rainfall and to generate hypothetical irrigation schedules to estimate the seasonal and annual ET_{aw}. All of the water balance calculations are done on a daily rather than monthly basis, which improves the estimation of effective rainfall and, hence, ET_{aw}. A two-stage soil evaporation model is used to estimate bare soil evaporation as a function of mean ET_o and wetting frequency in days. The bare soil evaporation rates are used to determine the off-season evapotranspiration and as a base-line for in-season K_c calculations. Since ET_c is unlikely to fall below the evaporation from an unirrigated bare soil, the crop Kc factors are not allowed to fall below the bare soil K_c value on any given date. In addition, SIMETAW accounts for the influence of orchard cover crops on K_c values, and it adjusts for tree and vine crop immaturity.

Combining atmospheric general circulation models (GCMs) with regional landscape models for downscaled model climatic results can provide estimates of future monthly climate variables, which can be used as simulation input for SIMETAW. Daily means of R_s, T_x, T_n, U_2, and T_d by month are used to simulate daily weather data for several decades and the Penman-Monteith equation is then used to estimate daily ET_o for the period of record. Increasing or decreasing one or more of the weather variables in the monthly climate prediction will influence the daily

weather simulation and hence ET_o calculation. For example, changing the rainfall pattern to have more precipitation in the fall and spring with less in the winter can be used to study the impact on the ET_{aw}. The ability to change the canopy resistance in response to higher CO_2 concentration was included in SIMETAW to more accurately estimate the effect of climate change on ET_o by accounting for both canopy resistance and temperature changes.

7.5.2 Input data requirement

Either observed or simulated daily climate data are used in SIMETAW to determine ET_o. When monthly data are input, the daily data are simulated. Data from CIMIS or from a non-CIMIS data source can be input as long as data are in the correct format. For the water balance calculations, soil and crop information are input to calculate ET_c and ET_{aw}.

A main feature of SIMETAW is that it simulates daily weather data from monthly climate data and estimates reference ET_o. Because of this feature, SIMETAW can be used to examine a range of climate scenarios for California's agricultural water demand using GCM scenarios and regional downsizing models. Using four climate change scenarios and a downsizing model to determine a running mean of monthly climate data centered around 2020 and 2050, SIMETAW can simulate daily weather data, and determine ET_o, ET_c, and ET_{aw} for some major crops grown in California. Possible values for canopy resistance can be input into the program to determine the effect of canopy resistance on ET_o.

SIMETAW was developed for water demand planning and it can help to plan for the effects of climate change as well as for current climate conditions. At this time, the limitation is the downscaling of GCMs to a regional scale. When regional long range predictions of R_s, T_x, T_n, T_d, U_2, and precipitation resulting from climate change are available, predicted daily means of the data by month can be input into SIMETAW to provide estimates of agricultural water demand.

7.5.3 Output files

Files created by SIMETAW are listed as following:

- Several years of raw or simulated daily weather data including calculated ET_o from raw or simulated data by weather station
- Several years of daily calculated crop coefficients, crop evapotranspiration and water balance calculations by crop within a study area
- One year mean of simulated or non-simulated daily and monthly ET_c and ET_{aw} data averaged over the data set
- Several years of simulated or non-simulated seasonal and annual total of ET_c and ET_{aw} by crop within a study area
- Simulated or non-simulated seasonal and annual total of ET_c and ET_{aw} averaged over the years of record

7.5.4 Weather simulation

Weather simulation models are often used in conjunction with other models to evaluate possible crop responses to environmental conditions. In SIMETAW, daily climate data are used to estimate ET_o and K_c values are used with the ET_o to estimate ET_c. Rainfall data are then used with estimates of ET_c to determine ET_{aw}. Either daily climate records or simulated daily data can be used for the calculations.

7.5.4.1 Rainfall

Characteristics and patterns of rainfall are highly seasonal and localized, and it is difficult to create a general, seasonal model that is applicable to all locations. Recognizing the fact that rainfall patterns are usually skewed to the right toward extreme heavy amount and that rain status of the previous day tends to affect the present day condition, a gamma distribution and Markov chain modeling approach was applied to described rainfall patterns for periods within which rainfall patterns are relatively uniform. This approach consists of two models: two-state, first order Markov chain and a gamma distribution function. These models require long-term daily rainfall data to estimate model parameters. SIMETAW, however, uses monthly averages of total rainfall amount and number of rain days to obtain all parameters for the Gamma and Markov Chain models.

7.5.4.2 Wind speed

The simulation of wind speed is a simpler procedure, requiring only the gamma distribution function as described for rainfall. Although using a gamma distribution provides good estimates of extreme values of wind speed, there is a tendency to have some unrealistically high wind speed values generated for use in ET_o calculations. Because wind speed depends on atmospheric pressure gradients, no correlation between wind speed and the other weather parameters used to estimate ET_o exists. Therefore, the random matching of high wind speeds with conditions favorable to high evaporation rates leads to unrealistically high ET_o estimates on some days. To eliminate this problem, an upper limit for simulated wind speed was set at twice the mean wind speed. This is believed to be a reasonable upper limit for a weather generator used to estimate ET_o because extreme wind speed values are generally associated with severe storms and ET_o is generally not important during such conditions.

7.5.4.3 Temperature, solar radiation, and humidity

Temperature, solar radiation, and humidity data usually follow a Fourier series distribution. Therefore, the model of these variables may be expressed as:

$$Xki = mki\ (1 + dki\ Cki) \qquad (1)$$

where k = 1, 2 and 3 (k=1 represents maximum temperature; k = 2 represents minimum temperature; and
k =3 represents solar radiation), mki is the estimated daily mean, and Cki is the estimated daily coefficient of variation of the ith day, i = 1, 2, … , 365 and for the kth variable.

SIMETAW simplifies the parameter estimation procedure of Richardson and Wright (1984), requiring only monthly means as inputs. From a study of 34 locations within the United States, the coefficient of variability (CV) values appear to be inversely related to the means. The same approach is used to calculate the daily CV values. In addition, a series of functional relationships were developed between the parameters of the mean curves and the parameters of the coefficient of variation curves, which made it possible to calculate Cki coefficients from mki curves without additional input data requirement.

7.5.5 Validation of daily simulated weather data of SIMETAW

Validity of the SIMETAW model was tested by comparing simulated with observed daily weather data. In this section, nine years of daily measured weather data from the CIMIS station in Davis were compared with 30 years of simulated daily weather data. Figure 7-6, Figure 7-7, and Figure 7-8 show that R_s, T_x, and P values from the simulation were well correlated with values from CIMIS. Similar results were observed for T_n, u_2, and T_d data. Although comparisons are only shown for Davis, similar results were found in other climatic regions of the state.

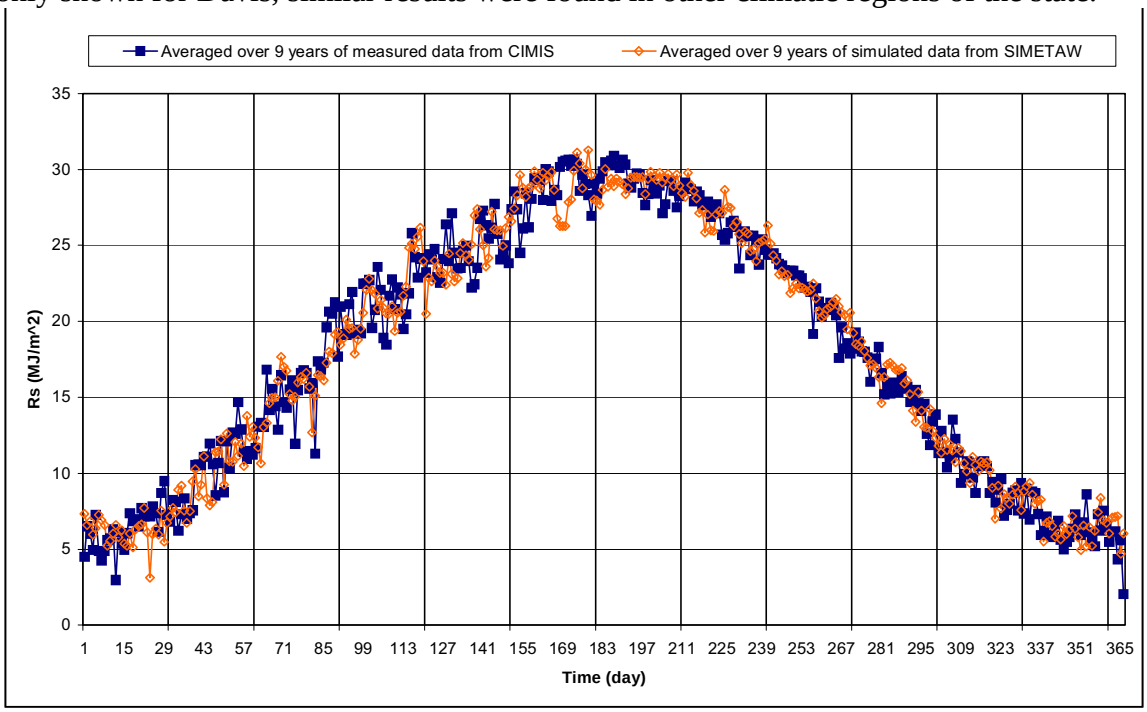

Figure 7-6. Comparison of measured and simulated daily solar radiation at Davis

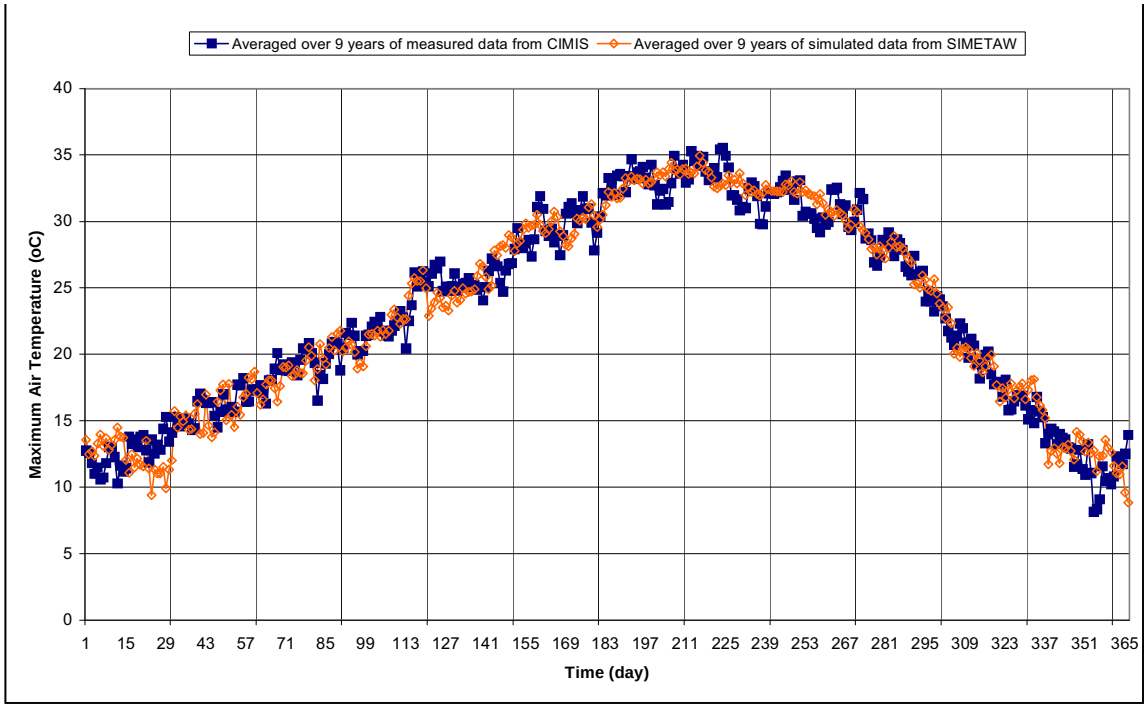

Figure 7-7. Comparison of measured and simulated air temperature at Davis

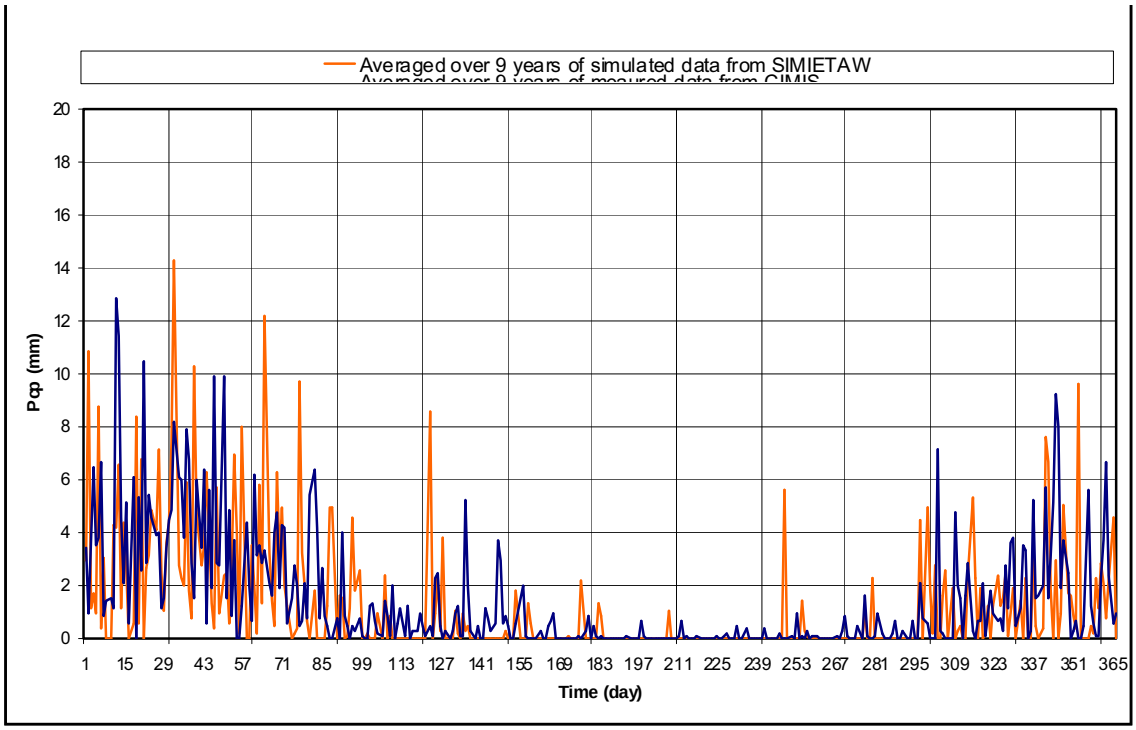

Figure 7-8. Comparison of measured and simulated precipitation at Davis

Using weather data from CIMIS stations near Davis, Oceanside, and Bishop, comparisons were made between ET_o from CIMIS and ET_o simulated from SIMETAW and averaged over the period of record (Figure 7-9, Figure 7-10, and Figure 7-11). CIMIS-based estimates of ET_o closely matched those from the SIMETAW program.

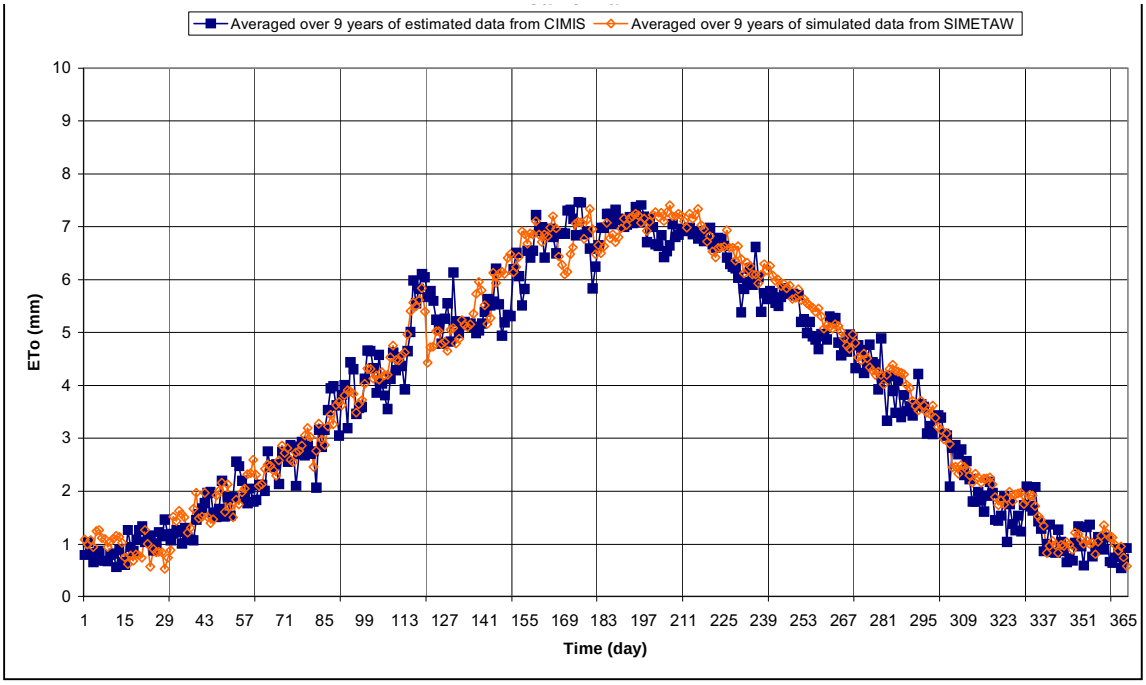

Figure 7-9. Comparison of estimated and simulated reference ET at Davis

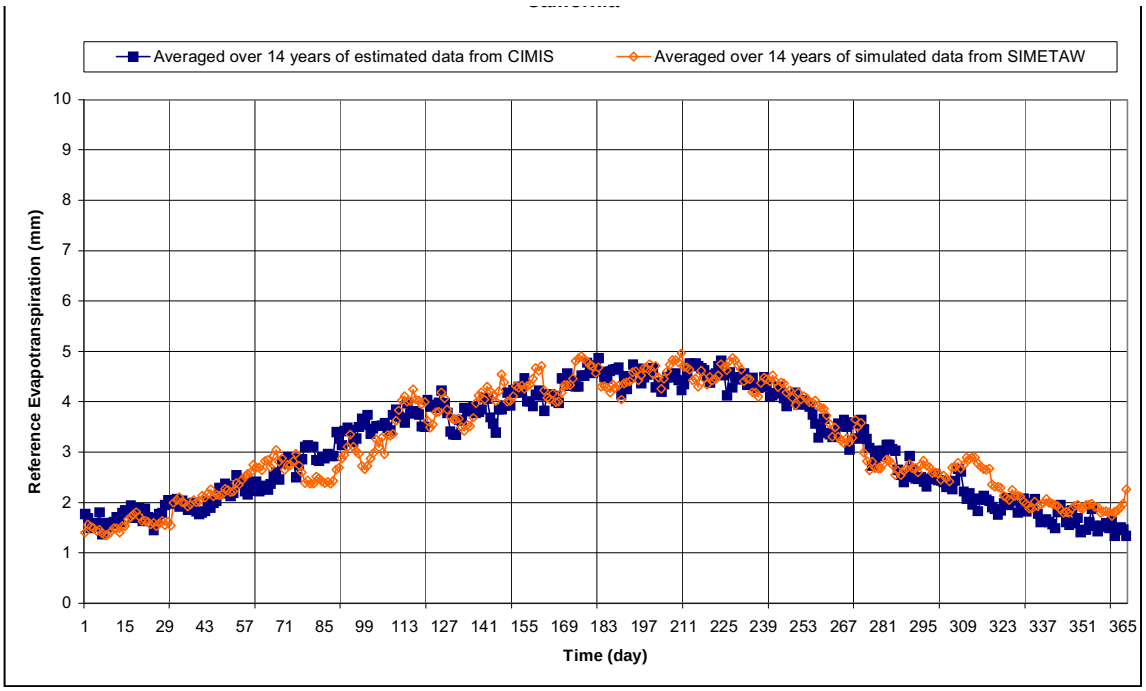

Figure 7-10. Comparison of estimated and simulated reference ET at Oceanside

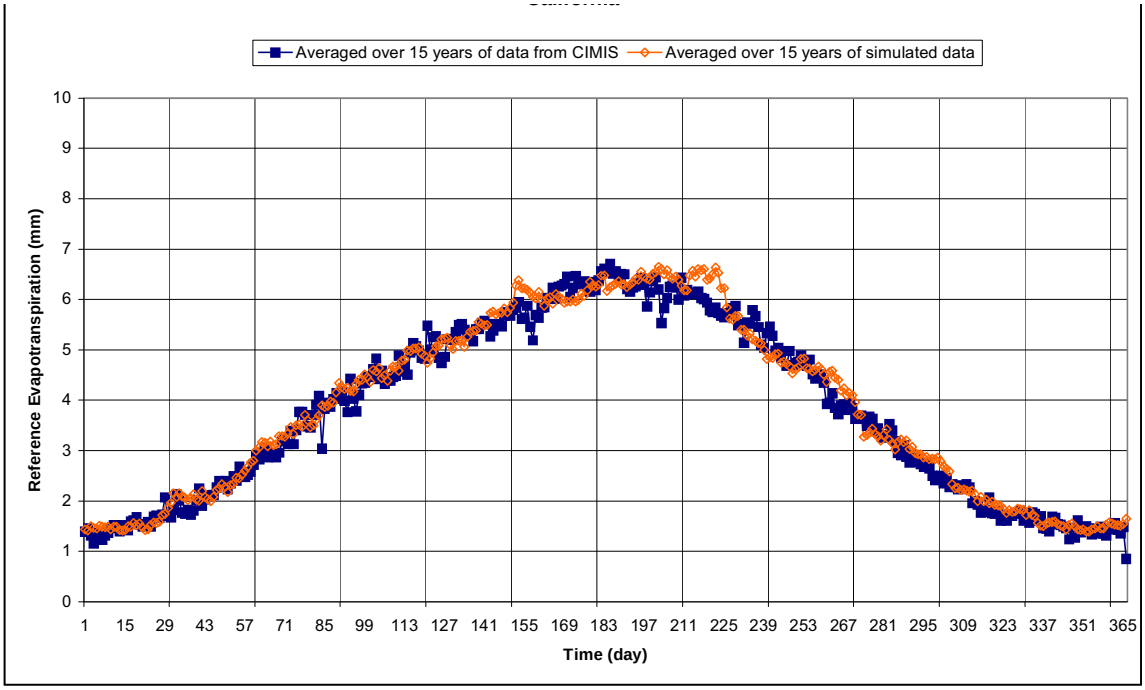

Figure 7-11. Comparison of estimated and simulated reference ET at Bishop

7.5.6 Canopy resistance sensitivity test for SIMETAW calculation of ET

To determine the influence of canopy resistance on ET_o rates, three values of canopy resistance (70, 85, and 100 s m^{-1}) with the current monthly climate data from Davis were used with SIMETAW to simulate 30 years of daily ET_o data. As canopy resistance value increased to 85 and 100 s m^{-1}, the ET_o rate decreased by 4.7 percent and 9.0 percent, respectively (Figure 7-12). The ET_o increase due to a 3^oC temperature increase, however, will more than offset the decrease due canopy resistance. The effect of CO_2 concentration on canopy resistance and ET_o rates was roughly estimated and more intensive research on canopy resistance under higher temperature and CO_2 concentrations is needed to confirm the estimates.

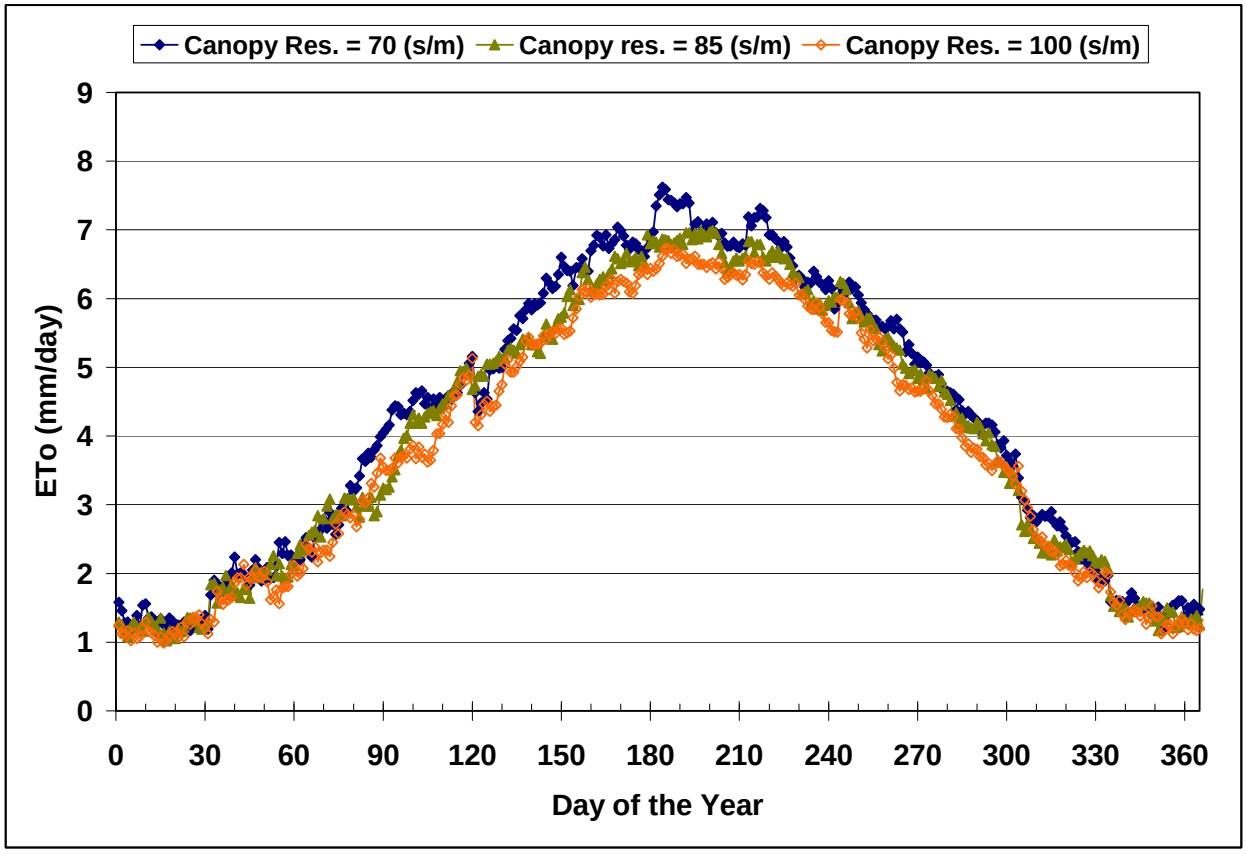

Figure 7-12. Comparison of simulated daily ET_o using the canopy resistance values 70, 85, and 100 s/m and current climate data from Davis

7.6 Using SIMETAW as a DWR Modeling Tool for Climate Change Planning

The preceding sections on using SIMETAW to calculate ET_o, ET_c and ET_{aw} demonstrate the potential to use SIMETAW, with downscaled GCM simulation data as input, for calculation of ET_o, ET_c, and $ET_{aw.}$ SIMETAW has potential as both a stand alone model for evaluating hypothetical climate change impact on ET_c and ET_{aw} or by coupling with downscaled GCM models to provide predictions of future agricultural water needs (Figure 7-13). The ET_c and ET_{aw} output from SIMETAW can serve as input to the DWR Consumptive Use Model to calculate crop water requirement for given planning areas. This possible integration is discussed in Chapter 8 of this report.

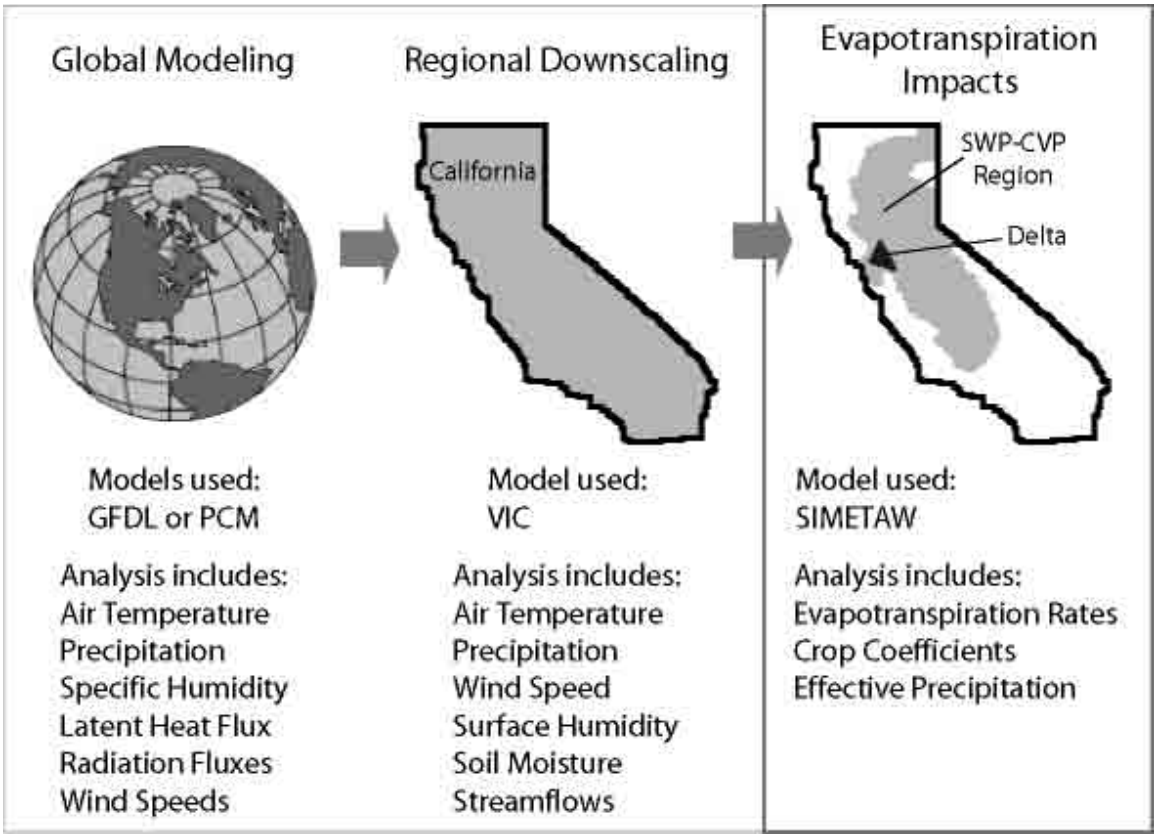

Figure 7-13. Use of SIMETAW for climate change impacts on water resource planning

7.7 Conclusions

It is difficult to accurately estimate the direct effect of global temperature on ET. As long as the minimum temperature and the dew point temperature continue to increase faster than the maximum temperature, the aerodynamic term of the Penman-Monteith ET_o equation is unlikely to increase substantially. This has been the pattern during the past five decades of global temperature rise. Increasing air temperature causes the weighting factor of the radiation-term of the Penman-Monteith equation to increase, but, because of the effect on stomatal closure, increasing CO_2 concentration causes it to decline. Based on limited information, the two effects seem to partially offset one another with the temperature rise resulting in a slightly greater influence on ET than CO_2 in our analysis. Though the net rise in ET we derived is small the influence in water demand for California as a whole is notable. Since natural environments of elevated temperature and CO_2 do not exist on a scale large enough to provide natural boundary layer conditions, it is difficult to study the effects of climate change on ET. More research is needed on the influence of elevated CO_2 and air temperature on canopy resistance.

The SIMETAW model is a promising analytic tool for water management planning that can use input from regional downscaled climate change models. Although it seems that little increase in ET is expected, the net statewide water demand from even a small ET increase is important for

water management. The effect of global change on regional precipitation, wind speed, and cropping pattern shifts are unknown at this time. Climate change could affect California agriculture and water resources, and wise planning is required to avoid serious problems.

7.8 Acknowledgments

We thank Jeff Amthor, Peter Curtis and Arnold Bloom for their thoughtful suggestions. Ed Morris, Jean Woods and Harry Spanglet read and made comments on an earlier version of this chapter for which we are grateful.

7.9 References

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7.10 Appendix 1 Energy Budget Analysis for Climate Change

7.10.1 Physical bases for temperature, sensible heat and water vapor transfer

Any moving object has kinetic energy that is proportional to the product of half of the mass and the square of its velocity. Although air molecules have small mass, they move fast (1,600-2,000 km h^{-1}) and there are many (2.65×10^{25}) molecules per cubic meter. Therefore, there are many collisions between air molecules and objects within the air volume. When the air molecules strike an object such as a thermometer some kinetic energy is transferred to the object. In the case of a glass thermometer, the energy resulting from air molecule impacts increases movement of molecules in the glass and transfers by conduction into the instrument where it transfers to the liquid temperature indicator. As energy is absorbed, liquid in the thermometer expands and moves up the thermometer tube. When molecules strike the outside of the thermometer at a faster velocity, and more frequently more heat is transferred and the measured temperature rises. If molecules strike the thermometer at lower velocity and at lower frequency the liquid contracts and the measured temperature drops. The kinetic energy contained in air is commonly called "sensible heat" because it is heat (energy) that one can sense. Generally, small volumes of air have uniform heat content, but big differences can occur between the large air parcels due to energy transfers by radiation, conduction and latent heat exchanges. Wind and turbulence cause

air parcels with different sensible heat content to move and mix with other air parcels and to transfer sensible heat between objects.

Evaporation of liquid water requires energy to break hydrogen bonds between water molecules. It is widely believed that evaporation increases with air temperature. Strictly speaking, it is actually the water temperature at the surface that determines the evaporation rate. Air temperature can affect the evaporation rate if sensible heat is transferred from the air to the water surface. The rate of heat transfer, however, depends on turbulence as well as the temperature difference between the air and water. Sensible heat transfer to a wet surface depends on atmospheric stability, wind speed, and surface roughness. For transpiration from plants, the rate of water vapor transfer is further complicated by plant morphology that affects energy absorption and turbulence and by plant physiology (i.e., stomatal opening and closing) in response to environmental factors including water availability and CO_2 concentration.

Vaporization of water occurs when energy (sensible heat or radiant energy) is used to break hydrogen bonds between the water molecules. Therefore, the rate of energy consumed in the vaporization process provides a measure of the evaporation rate. Evapotranspiration rates are commonly estimated using energy balance by considering the net radiation (R_n), heat conduction into and out of the soil and plants (G), atmospheric sensible heat flux density (H), and atmospheric latent heat flux density (LE). Net radiation is the amount of short- and long-wave radiation absorbed by a surface, and it is the main source of energy for vaporization. Net radiation (R_n) is commonly partitioned into soil heat flux density (*G*), sensible heat flux density, and latent heat flux density (*LE*) and the energy consumed in the evaporation process is therefore expressed as:

$$LE = R_n - G - H \qquad (\mathrm{W\ m^{-2}}) \qquad (1)$$

where L is the latent heat of vaporization ($L \approx 2454$ J g^{-1} at 20^oC) and *E* is the water vapor flux density (g m^{-2} s^{-1}). In equation 1, R_n is positive when the energy flux is towards the surface and LE, G and H are positive for fluxes away from the surface.

Using Equation 1, one could measure R_n, G, and H to estimate LE. Then the rate of evaporation is calculated by dividing LE by L to determine the mass flux density of water vapor. There are methods available to measure the components in Equation 1, but they are not widely used because it is somewhat difficult and expensive to measure the variables, especially H, accurately. Efforts to obtain a simple and inexpensive technique continue, but there is still no perfect method. Other methods to estimate ET using more readily available variables are available.

7.10.2 Penman-Monteith equation

Penman (1948) presented a method to estimate *LE* for short, uniform vegetation using readily available weather variables measured at one level assuming the surface was wet with a canopy resistance $r_c = 0$. Monteith (1966) refined Penman's equation to adjust LE for canopy resistances greater than zero. The so-called Penman-Monteith equation is expressed as:

$$LE = \left(\frac{\Delta}{\Delta + \gamma *}\right)(R_n - G) + \left(\frac{\rho C_p}{\Delta + \gamma *}\right)\left(\frac{e_s - e}{r_a}\right) \qquad (\mathrm{W\ m^{-2}}) \qquad (2)$$

In Equation 2, Δ is the slope of the saturation vapor pressure curve at the air temperature, $\gamma \approx 0.066$ kPa K^{-1} is the psychrometric constant, r_c is the canopy resistance, r_a is the aerodynamic resistance, ρ is the air density (g m^{-3}), C_p is the specific heat at constant pressure (J $g^{-1}K^{-1}$), e_s is the saturation vapor pressure, and *e* is the actual atmospheric vapor pressure. For more information on the variables in Equation 2, see ASCE-EWRI (2005). The parameter $\gamma^* = \gamma\left(1+\frac{r_c}{r_a}\right)$ in Equation 2 is a modified psychrometric constant, which was introduced by Monteith to account for the effects of canopy resistance on *ET*. The left-hand term of Equation 2 is often called the radiation or available energy term and the right-hand term is called the aerodynamic term because it accounts for the contribution of aerodynamic transfer of sensible heat to *ET*.

Aerodynamic resistance (r_a) is equal to the reciprocal of the aerodynamic conductance (g_a), which is defined as the rate that 1 m of a particular scalar will transfer through 1 m^2 horizontal plane. Therefore, g_a and r_a have the units m s^{-1} and s m^{-1}, respectively. When r_a increases, then g_a decreases, the vertical transfer of sensible and latent heat decreases, and the LE rate falls. Like r_a, the canopy resistance (r_c) equals the reciprocal of the canopy conductance (g_c) and the canopy conductance is the rate at which 1 m^3 of air will pass through 1 m^2 of horizontal plane. When r_c increases, g_c decreases and LE is reduced. The r_c is the resistance to water vapor transfer from the canopy elements and soil to a level near the top of a canopy and r_a is the resistance to vapor transfer from that level to the ambient air above the canopy. The r_a and r_c resistances are in series, so the higher of the two resistances limits the LE rate. As plant stomata close, r_c increases, γ^* increases, and LE decreases (Equation 2). When the surface is wet, then $r_c = 0$, $\gamma^*=\gamma$ and the Penman-Monteith equation reduces to the Penman (1948) form.

7.10.3 Aerodynamic term response to temperature rise

The Penman-Monteith equation is useful to investigate the effect of possible climate change on evapotranspiration. Roderick and Farquar (2002) noted that the global mean maximum and minimum temperatures have increased by approximately 0.1 and 0.2 ^oC per decade during the last 50 years and there has been no observable change in the vapor pressure deficit (e_s – e) during the same time period. The minimum temperature is highly correlated with the dew point temperature, which is directly related to the actual vapor pressure of the atmosphere. The fact that the minimum has risen faster than the maximum temperature supports the idea that the dew point temperature and hence the actual vapor pressure (e) have risen and compensated for the temperature induced rise in saturation vapor pressure (e_s).

The temperature weighting function term $\left(\frac{\rho C_p}{\Delta+\gamma^*}\right)$ in Equation 2 decreases with rising temperature and with increasing r_c (Figure 7-14). Since e_s - e has not changed in recent decades and the weighting function decreases with increasing temperature, it is likely that the aerodynamic term of Equation 2 has not changed or slightly decreased with global temperature rise during the past 50 years. Unless the e_s term begins to increase more rapidly than e, the aerodynamic term is unlikely to be greatly affected by global temperature increase.

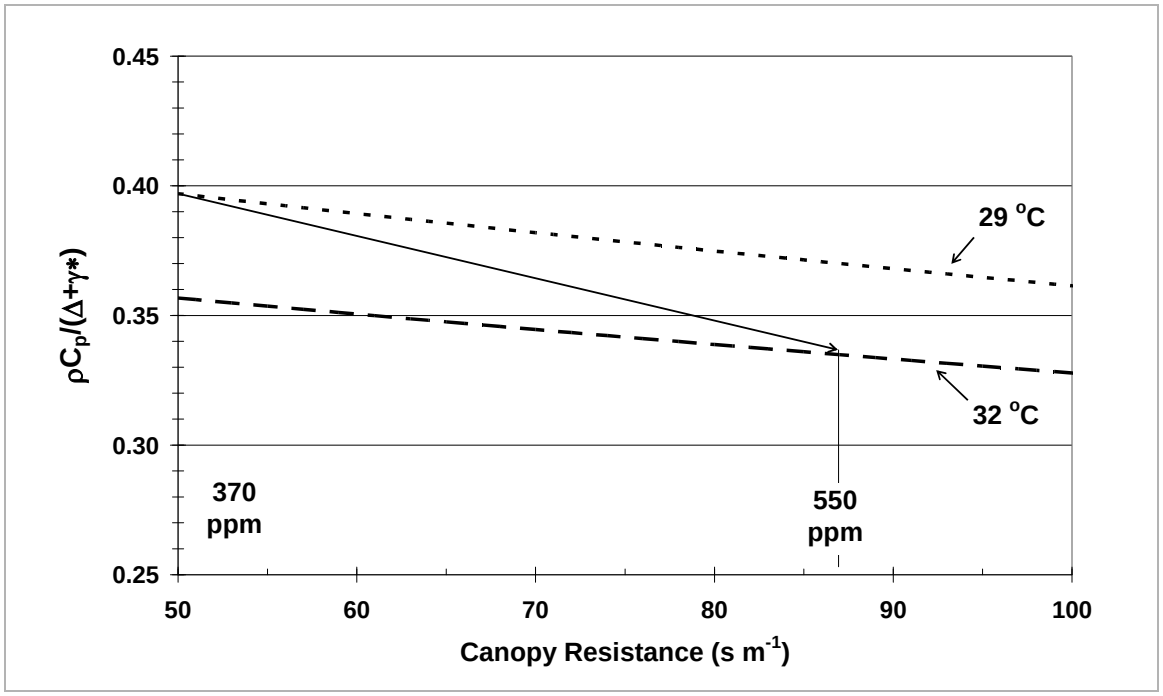

Figure 7-14. A plot of $(\rho C_p)/(\Delta + \gamma^*)$ versus canopy resistance for a 3 °C temperature increase as a function of canopy resistance

7.10.4 Radiation term response to temperature rise

A 3 °C temperature rise will increase the $\left(\frac{\Delta}{\Delta + \gamma^*}\right)$ radiation-term weighting function by about 4.5 percent so the effect is to increase the contribution of the radiation term to LE, causing a higher ET rate. There is, however, some evidence that increased turbidity of the atmosphere has globally decreased the amount of solar (short-wave) radiation reaching the surface (Roderick and Farquar, 2002), and the radiation-term weighting function increase with temperature is partially offset by decreasing solar radiation received at the surface.

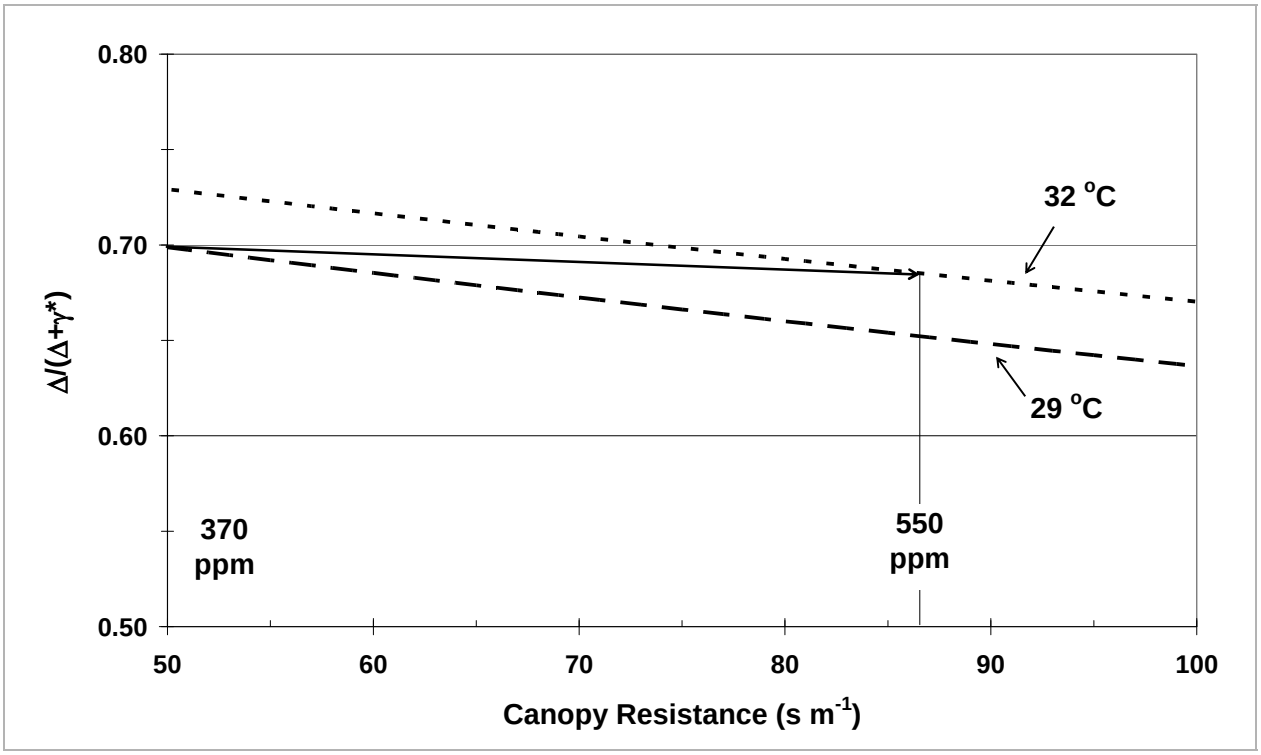

Figure 7-15. A plot of $\Delta/(\Delta+\gamma^*)$ versus canopy resistance for a 3 °C temperature increase as a function of canopy resistance.

Another factor that is often neglected in predictions of temperature effects on ET is the influence of increased CO_2 on stomatal closure and hence canopy resistance. Stomata exhibit partial closure with increasing CO_2 content, but, there is little information on the effect of CO_2 concentration on canopy resistance. The typical enhanced CO_2 concentrations reported in the FACE projects was about 550 ppm, and Long et al. (2004) indicated that the leaf stomatal conductance decreased about 20 percent for C_3 species plants under those conditions. Then using the same procedure to estimate canopy resistance for reference evapotranspiration (Allen et al., 1989) with today's CO_2 concentration, the midday canopy resistance is predicted to increase from about 50 to 87 s m^{-1} as shown in Fig. 7.3. Therefore, if the canopy resistance does increase to 87 s m^{-1}, the increase in the radiation-term weighting factor due to a 3 °C increase in temperature is nearly offset by the higher canopy resistance. For comparison, the midday canopy resistances of tall alfalfa (50 cm) and tall grass (12 cm) are approximately 30 s m^{-1} and 50 s m^{-1}, respectively (ASCE-EWRI, 2005). The r_c is high at night (≥ 200 s m^{-1}) when the stomata are closed. There is a decrease in rc after sunrise to the minimum value and then an increase in the late afternoon as the sun descends toward the horizon. The mean 24-hour r_c is about 70 s m^{-1} for the grass and about 45 s m^{-1} for the alfalfa (ASCE-EWRI, 2005). Again, there is a paucity of research on the effect of CO_2 concentration on canopy resistance, but it clearly will increase and the reduction in the radiation-term weighting function will at least partially offset the increase due to temperature. The magnitude of the change depends on how much the temperature and CO_2 concentration increase. Clearly, more research is needed to determine the influence of temperature and CO_2 concentration on canopy resistance before a truly accurate assessment is possible.

Evaporation from ponds, lakes, rivers, and other bodies of water can also be impacted by climate change. Recently, several groups have reported decreasing evaporation rates from standard pans, and they used this as evidence that the climate is cooling rather than warming. However, the surface resistance of water is zero and the aerodynamic resistance is high, so $\gamma^* = \gamma$ in Equation 2 and the equation simplifies to the Penman (1948) equation. Again, $e_s - e$ has not changed in recent decades, so the change in the aerodynamic term is unlikely to influence evaporation from bodies of water. Increasing temperature does increase the weighting function of the radiation term and there is no stomatal influence, so canopy resistance will not counteract the temperature effect on the radiation term of the ET_o equation. There is some evidence for the reduction in solar radiation due to pollution effects on atmospheric turbidity or perhaps reflectivity of clouds and other factors (Stanhill and Cohen, 2001; Gilgen et al., 1998), and this might be the cause for reduced pan evaporation reported in some regions of the world.

Assuming a little or no increase in the radiation-term weighting function in response to rising temperature, the increasing CO_2 concentration effect on canopy resistance, and a decrease in short-wave radiation at the surface, little or no increase in the radiation term contribution to ET is expected with climate change. Since the aerodynamic term also shows little response to climate change, it is anticipated that the effect of climate change on *ET* will be minimal. Other environmental responses to climate change such as precipitation and wind patterns and changes in cropping and irrigation methods, however, could greatly affect water resource availability and hence irrigation water requirements.

7.11 Appendix 2 The photosynthesis Response Curve to CO_2

The assimilation of CO_2 as a function of intercellular CO_2 is provided in Figure 7-16.
The rate of carbon assimilation is determined by supply and demand for CO_2. The supply of CO_2 is determined by diffusion in the gas and liquid phases. It can be limited by essential constraints in the pathway from the atmosphere to the leaf sites of carbon fixation (carboxylation) most notably at the canopy boundary and at the stomata, which are related to the plants energy budget. The demand for CO_2 is determined by the rate of processing CO_2 in the chloroplast, which is determined most importantly by biochemistry, in particular Rubisco, the first enzyme in the metabolic pathway for assimilation of CO_2. It can also be limited by environmental factors such as irradiance. The electron transport plot relative to CO_2 concentration is included in Figure 7-16 for comparison to the carbon assimilation. The assimilation of CO_2 plot in Figure 7-16 has two principal regions, the first occurs at lower CO_2 concentrations and is referred to as the CO_2 limited region. The second at the higher CO_2 concentrations is the place where available limits to precursors of Rubisco are limiting. Two horizontal lines of Figure 7-16 indicate the intercellular CO_2 concentration at the atmospheric CO_2 concentration given the supply function indicated by the line from the atmospheric concentration to the response curve. The slope of the supply function is the leaf conductance measured. The possible long-term adjustment of plants to elevated CO_2 by sifting the supply curve downward is referred to as downregulation. Long et al (2004) concluded that there is a substantial reduction in Rubisco at elevated CO_2, suggesting acclimation to elevate CO_2, but that there was not downregulation.

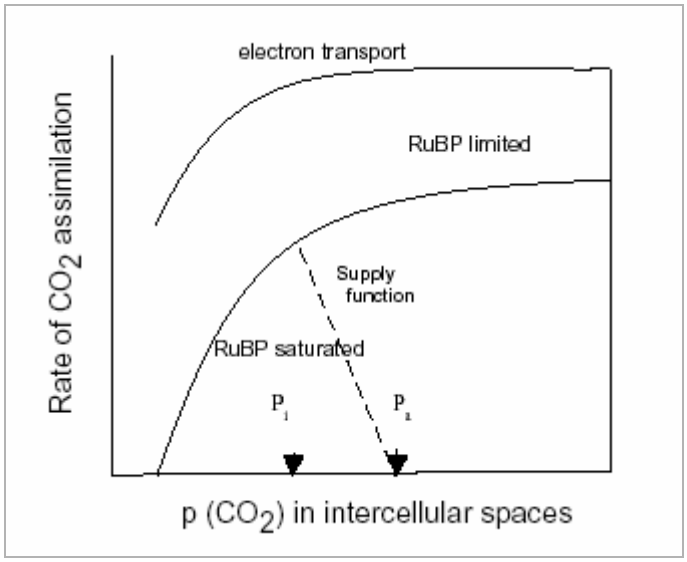

Figure 7-16. Photosynthesis Response Curve to CO_2
(After Lambers et al, 1998)

7.12 Appendix 3 The Penman-Monteith equation for reference evapotranspiration (ET_o) used in SIMETAW

Reference evapotranspiration (ET_o) is estimated from daily weather data using a modified version of the Penman-Monteith equation (Allen et al., 1998; ASCE-EWRI, 2005). The equation is:

$$ET_o = \frac{0.408\ \Delta\ (R_n - G) + \gamma \frac{900}{T + 273} u_2\ (e_s - e_a)}{\Delta + \gamma\ (1 + 0.34\ u_2)} \qquad (3)$$

where Δ is the slope of the saturation vapor pressure at mean air temperature curve (kPa $^oC^{-1}$), R_n and G are the net radiation and soil heat flux density in MJ $m^{-2}d^{-1}$, γ is the psychrometric constant (kPa $^oC^{-1}$), T is the daily mean temperature (^oC), u_2 is the mean wind speed in m s^{-1}, e_s is the saturation vapor pressure (kPa) determined as the mean saturation vapor pressure calculated from the daily maximum and minimum air temperature (^oC), and e_a is the actual vapor pressure (kPa) calculated from the mean dew point temperature (^oC) for the day. The coefficient 0.408 converts the R_n – G term from MJ $m^{-2}d^{-1}$ to mm d^{-1}, and the coefficient 900 combines several constants and converts units of the aerodynamic component to mm d^{-1}. The product 0.34 u_2 in the denominator is an estimated ratio of the 0.12-m tall canopy surface resistance (r_c=70 s m^{-1}) to the aerodynamic resistance (r_a=205/u^2 s m^{-1}). It is assumed that the temperature, humidity, and wind speed are measured between 1.5 m (5 ft) and 2.0 m (6.6 ft) above a grass-covered soil surface. For a complete explanation of the equation, see (ASCE-EWRI, 2005).

7.13 List of Abbreviations

ASCE-American Society of Civil Engineers
CALVIN-The California value integration network model
CIMIS-California Irrigation Management Information System
CUP-Consumptive use program
ET-Evapotranspiration
ETo-Reference Evapotranspiration
ETAW-Evapotranspiration of applied water
EWRI- Environmental and Water Resources Institute
FACE-Free-Air Carbon dioxide enrichment
GCM-General Circulation Model
LAI-Leaf Area Index
NPP-Net primary production
PAR-Photosynthetically Available Radiation
RGR-Relative Growth Rate
SIMETAW-SIMulation ET of Applied Water
SWAP-statewide water and agricultural production model (WUE-Water use efficiency
WUE-Water use efficiency

Progress on Incorporating Climate Change into Management of California's Water Resources

1st Progress Report
July 2006

Chapter 8:
Future Directions

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8 Future Directions

8.1 Introduction

This report demonstrates growth in federal and state agency capability to provide planners with relevant information on potential climate change impacts. The joint Department of Water Resources (DWR) and U.S. Bureau of Reclamation (Reclamation) Climate Change Work team has built coalitions with California climate change research groups to improve federal and state agency knowledge on climate modeling and uncertainties in future climate projections. Additional products from work team activities include identification of data and technology gaps and development of innovative analytical approaches using familiar planning tools. The work team will continue to evolve to meet the needs of water resources managers and to use new information and methodologies as they become available. Future activities will focus on probabilistic based potential effects of climate change. A summary of future directions is presented in this chapter.

8.2 SWP-CVP Operations Impacts

The State Water Project (SWP) and Central Valley Project (CVP) operations impacts studies presented in this report only considered climate change affects on runoff patterns. However, a warming climate may lead to changes in the seasonal pattern and magnitude of evaporation/evapotranspiration and, thereby, higher water demands. Rising sea levels would lead to greater fresh water demands in the Delta to maintain water quality. Both increased demands and increased salinity in the Delta could have significant impacts on the ability of the SWP and CVP to meet California's future needs. Impacts from a wider range of climate change effects need to be addressed.

In the climate change scenario studies presented in this report, one significant issue was the critical shortages of water in reservoirs north of the delta that occurred when present operating rules were applied. Future directions would include examining increases in carryover storage in Shasta and Oroville reservoirs to prevent loss of operational control of the Sacramento and Feather rivers during droughts. Corresponding reductions to delivery allocations would be required. If those measures weren't sufficient to provide a reliable water supply, additional measures would be investigated such as rebalancing of the water sharing mechanisms established in the Coordinated Operations Agreement.

System flexibility should be sought to mitigate climate change effects on SWP and CVP deliveries. In the current analysis, flood control spaces were left unchanged. In the future, it is planned to vary the flood control space with different climate change scenarios. Furthermore, refined flood forecasting might allow more runoff to be captured in the early spring than is otherwise possible now. Also, operational rules and regulations will have to be reassessed given a changed hydrology. Current operations studies using the CalSimII model use an Artificial Neural Network (ANN) to represent Delta water quality. Future directions include development

of a new ANN or similar tool that would be incorporated into CalSimII to represent Delta water quality for sea level rise conditions.

Lastly, we need to explore ways of increasing supply to or reducing demand of SWP and CVP contractors. New reservoirs, increased pumping capacity, and groundwater banking are ways that more winter runoff can be captured for later delivery. On the demand side, CalSim-II doesn't deal with specific conservation measures. But the effects of conservation – whether from drip irrigation or low-flow toilets – can be represented in the input water demands and the effects to CVP and SWP operations simulated.

8.3 Delta Impacts

Improving analysis of potential effects of a rising sea level on the Delta will be a focus of future studies. Changes in salt water intrusion from the ocean need to be represented for different sea level increases. Better understanding and mathematical representation of salt water intrusion under conditions of sea-level rise should be incorporated into planning tools such as CalSim-II and DSM2. For this report, results from the sea level rise simulations could be used for levee stability analyses.

Flexibility of the existing water-conveyance system to lessen the effects of climate change will also be explored. In addition to potential changes to system operations mentioned in the previous section, mitigation measures in the Delta could include modifying Delta Cross Channel operations, changing land use patterns and temporary barrier operations. If present system flexibility can't sufficiently decrease the impacts of climate change, other measures will be investigated such as modifying operating rules or considering new system components such as gates proposed to be installed the south Delta.

8.4 Flood Management

In order to better understand the risks associated with global climate change on California's water resources, it is important to be able to quantify climate change effects on the ability to provide adequate flood control and to quantify climate change impacts on seasonal water supply. The Division of Flood Management at DWR will address these issues. It plans to:

1) continue the evaluation of historical data to identify trends and changes in precipitation and runoff patterns
2) periodically update frequency-based data for design computations
3) evaluate new climate change model-derived data for use in flood frequency and water supply forecasting applications
4) develop new forecasting technologies that can adapt to the changing distribution of the state's annual water supply
5) incorporate methodologies to quantify the uncertainty in the expected changes in the annual cycle of water supply into the water supply forecast process

For flood frequency analysis, future efforts at synthetic daily flow data produced from climate change model output may be suitable for traditional flood frequency analyses. As these data become available, they must be evaluated for their ability to represent present-day magnitude and

variability as well as predicted changes caused by climate change. At this time, however, there are no such data that would provide meaningful results.

Another area which may produce useful flood forecasting information examines historical data in order to identify critical atmospheric circulation parameters and their threshold values associated with extreme floods. As the circulation patterns in the GCMs improve and are shown to represent present-day conditions correctly, circulation patterns under increased greenhouse gas concentrations can be examined for the flood producing patterns or critical threshold characteristics. Improved forecasting technologies will help implement adaptive strategies to decrease flood risk changes associated with climate change.

8.5 Evapotranspiration

To further analyze the effects of climate change on evapotranspiration (ET) future efforts will focus on improvements to the SIMETAW (Simulation of Evapotranspiration of Applied Water) model. SIMETAW development and analysis for climate change studies will be a complex process. How will a world with higher atmospheric CO_2 and higher temperatures influence the resistance to water vapor diffusion to the atmosphere (the boundary layer around plants)? No one knows. While we are continuing to search the literature and research programs for boundary-layer data at elevated temperatures and CO_2 concentrations, we need to explore the SIMETAW model's performance by using reasonable analogs for boundary-layer values. Direct measurement of boundary-layer information is limited in the near future, but we are developing an analysis to work around the limitation.

To validate the SIMETAW calculation of ET using downscaled model weather data, a set of comparative simulations is needed using historic California Irrigation Management Information System (CIMIS) data and downscaled regional model output for the same time period. Analysis periods and CIMIS sites will be chosen to obtain a range of extremes of the primary SIMETAW input variables: net radiation, wind speed, relative humidity, temperature and precipitation.

Simulations for several principal herbaceous crops, a row crop, tomatoes, and a field crop, alfalfa, will be tested with SIMETAW first at Central Valley CIMIS stations and then at other CIMIS sites throughout the state. The simulations will be analyzed at 2020 and 2050. The 2020 year is meant to correspond with the current CalSimII capabilities. The 2050 year is the far planning horizon. All four climate change scenarios selected by the Climate Action Team (see Chapter 3) will be analyzed at each location and time. An orchard crop, almonds, will then be added to contrast boundary layer and cropping patterns with the herbaceous crops. Eventually, a wider geographic range and longer list of crops is needed for a comprehensive analysis.

Currently there is no comprehensive study of crop changes or regional cropping pattern shifts in relation to climate change. There are methodologies and experts that we can reach to describe differences in climate change impacts on: (1) crop water use efficiencies (WUE) at a systems level, for the growers' water delivery on site, and as crop differences in WUE, and (2) crop production values both for growers and for water resource planners. This is a high priority need.

As an ad hoc climate change group, it might serve us to establish guidelines for managing regional climate downscaled data. Questions regarding averaging techniques including span of time to use, and quality assurance of the downscaled data are important to address. A workshop including other experts, such as statisticians, would be helpful.

For future SIMETAW studies, an average period is planned to describe the two analysis times. For 2020, we plan to use 2015 through 2025 for averaging; and for 2050, we plan to use 2045 through 2055 for averaging. If possible, we think it is useful to coordinate with the other parts of the work team to have a standard in analysis time sampling.

For an understanding of ET demand there is a need to track irrigation conservation technologies and irrigation system pattern shifts including precision agriculture. This information can help anticipate probable shifts in agricultural applied water.

There is also a need to proportionally sum the evapotranspiration and evaporative demands impacted by different climate change scenarios on an annual perspective over the entire state. The precision of this analysis will improve as we improve our knowledge of evaporative processes and refine the SIMETAW model for climate change study.

8.6 Modeling Tool Integration

Several different mathematical models and analysis techniques can be used to assess impacts of climate change by translating changes in factors such as precipitation, sea level and crop evapotranspiration into water supply changes. Examples of modeling tools used in this report include the SWP-CVP operations model CalSim-II (Chapter 4), the Delta hydrodynamics and water quality model DSM2 (Chapter 5), and the Simulation of Evapotranspiration of Applied Water model SIMETAW (Chapter 7). Additional tools may also be available for climate change studies. Future directions include identifying 1) additional tools that could be used for climate change studies 2) input data requirements for each tool, 3) output produced by each tool and 4) more efficient ways to use these tools separately or in conjunction with other models to address water resources planning and management related climate change issues.

8.7 Coordination of State Climate Change Research Activities by the California Energy Commission

At the national and international levels a considerable amount of funds are being devoted to climate change science. Most of these research initiatives are designed to elucidate fundamental scientific questions such as the role of clouds on climate, or the direct and indirect effect of aerosols. The 2001 National Assessment of the Potential Consequences of Climate Variability and Change was a landmark effort resulting in a series of regional assessments that identified key vulnerabilities to a changing climate. Recently the U.S. Climate Change Science Program has embarked on the production of several synthesis and assessment products designed to support decision making on how to prepare for a changing climate.

Even though all of these national and international efforts are extremely informative, they usually are not adequate to answer policy relevant questions at the state and local levels or for detailed long-term planning in California. For this reason, The California Energy Commission through its Public Interest Energy Research (PIER) Program has created the first state-sponsored climate change research program in the nation designed to complement national and international research efforts producing policy-relevant research products. The Commission has created the California Climate Change Center (Center) with the University of California to implement its research plan on climate change. The Center is producing research products that are directly applicable for the preparation of long-term plans. Examples of such plans are the State Water Plans prepared by the Department of Water Resources and the Integrated Energy Policy Reports prepared by the California Energy Commission.

All the state agencies in California are supporting research on climate change. For example, the Air Resources Board is supporting studies on greenhouse gas tailpipe emissions from automobiles and recently has requested expanding its research program on climate change. The Department of Water Resources has an in-house effort designed to use existing planning modeling tools to better understand the potential effects of climate change on water resources in the state. CALFED is funding projects on the potential effect of climate change in the Delta region. Informally all of these efforts are being coordinated through extensive exchanges of information between technical staff from the different agencies and by the fact that some key researchers are involved in most of these research activities. The annual conferences on climate change organized by the Energy Commission and the California Environmental Protection (CalEPA) Agency are also a forum for exchange of ideas and for coordination.

Governor Schwarzenegger signed an Executive Order on June 1, 2005 requiring, among other things, the preparation of periodic assessment reports on the impacts of climate change on key sectors of the California economy. This effort, headed by CalEPA, is also serving as a catalyst for additional coordination and more intense research efforts.

In short, a great deal of coordinated research activities on climate change is already occurring in California. Formalizing these coordinated activities may be advisable, but extreme care should be taken to avoid hampering these activities with onerous requirements.

8.8 Risk Assessment

A major goal of the work team is to extend the analysis prospective for long-term water resources planning from "assessing impacts" to "assessing risk". Impacts assessment identifies possible outcomes resulting from a given change. Risk assessment takes the impacts assessment and investigates the likelihood or probability of occurrence that a particular outcome may occur. The work team's goal of extending our analyses from impacts assessment to risk assessment is shown in Figure 8.1. The bulls-eye nature of the figure symbolizes the work-team's goal of aiming for risk-based assessments for resource management with respect to climate change.

This report represents an example of an impacts assessment based on four scenarios defining an expected range of potential climate change impacts. Such assessments are good for informing

managers of potential future issues that may require management action. However in order for managers to make decisions related to potential climate change impacts, they need information on the probability that any particular scenario will occur relative to other scenarios under consideration.

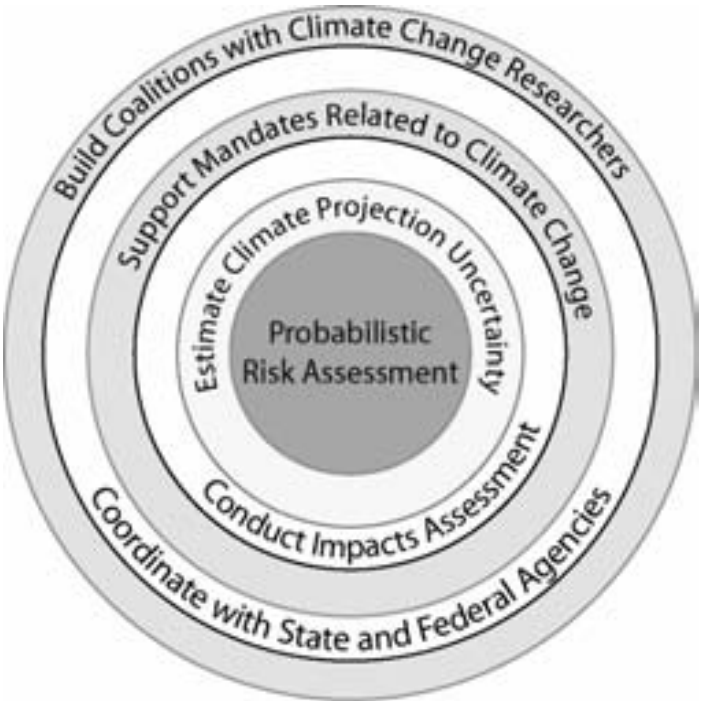

Figure 8.1: DWR-Reclamation Climate Change Work Team Goals
Yellow and red shading indicates future directions.

8.8.1 Compilation of Additional Climate Change Scenarios

An integral component of risk assessment is having as large of a data set as possible to define the range of potential outcomes. The work team plans to collaborate with climate change research groups on the selection of an ensemble of climate change scenarios for analysis, representing a spectrum of climate models and emission scenarios. For this report, analysis focused on four scenarios reflecting two greenhouse gas (GHG) emissions scenarios each represented by two Global Climate Models (GCM's) (see Chapter 3). However, many other emissions scenarios and climate models may be considered for generating future climate scenarios.

Greenhouse Gas Emissions Scenarios

The Intergovernmental Panel on Climate Change's (IPCC's) emissions scenarios cover a wide range of main demographic, economic, and technological driving forces GHG and sulfur emissions and are representative of the literature (IPCC, 2000). Four main storylines representing possible future evolutions of these factors were identified (see Chapter 3).

Scenarios were developed that represent a specific quantitative interpretation of one of the four storylines. All of the scenarios within a given storyline are referred to as a scenario family.

Following an integrated assessment framework, initially six global climate models (GCMs) were used to represent the various climate change scenarios. One advantage of a multi-model approach is that the resultant 40 SRES (Special Report on Emissions Scenarios) encompass the current range of uncertainties of future GHG emissions arising from different characteristics of these models. In addition, the current knowledge of uncertainties that arise from scenario driving forces such as demographic, social and economic, and broad technological developments that drive the models, are described in the storylines. Figure 8.2 shows the SRES emissions scenario tree starting with the four storylines and showing the 40 specific scenarios modeled.

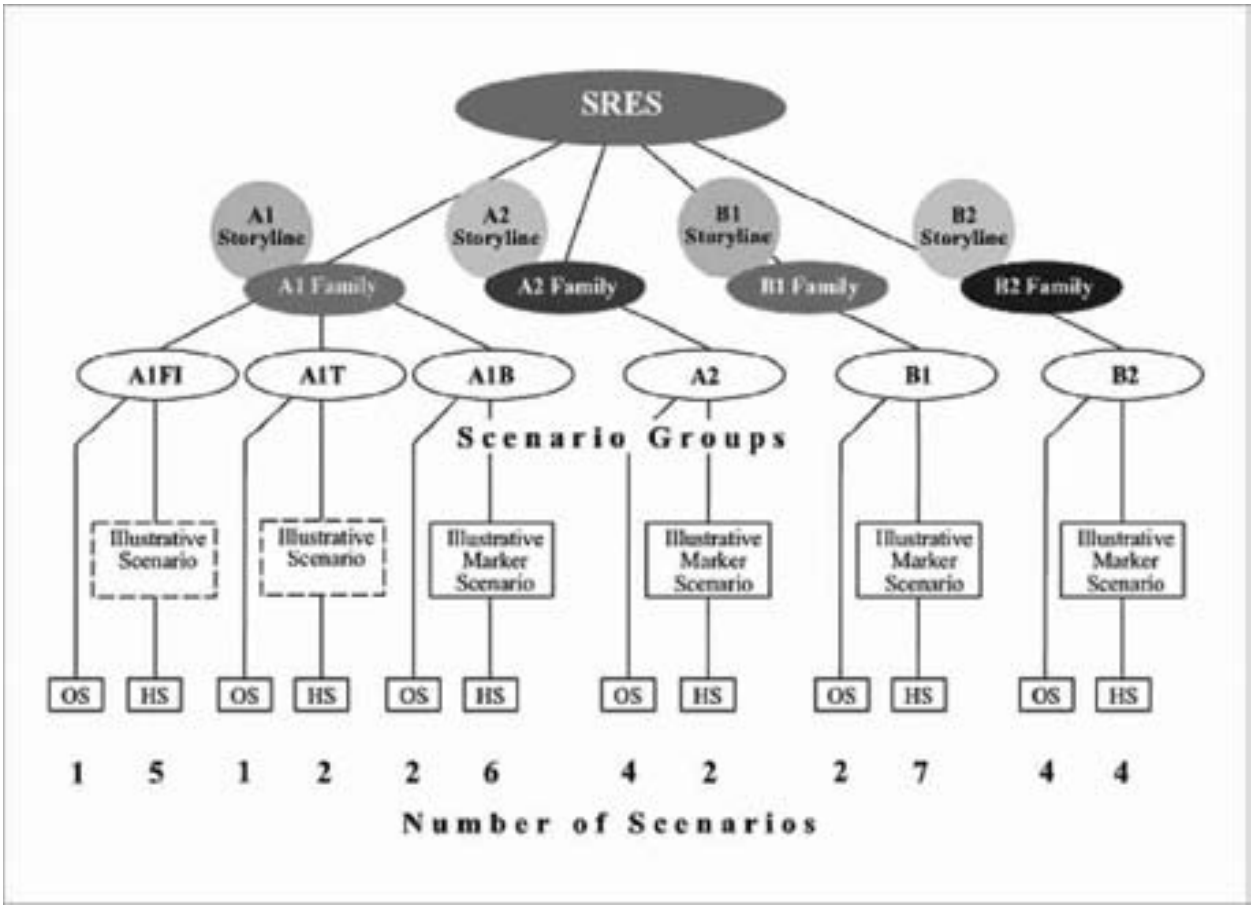

Figure 8.2: Schematic Representation of 40 Emissions Scenarios

Global Climate Models

Nineteen different GGMs have been used to represent the 40 SRES greenhouse gas emissions scenarios (Santer, 2006). The climate processes in a GCM are driven by factors known as forcings, such as greenhouse gas emissions, ozone concentrations, sulfate aerosols, solar irradiance, mineral dust, sea salts, land use/land cover and volcanic aerosols. Different climate

models use different combinations of these forcings to represent the evolution of the climate system (Figure 8.3). The studies presented in this report used climate change projections from two GCMs. Climate change projections produced by additional GCMs are desired to span the range of uncertainty associated with the representation of the climate system.

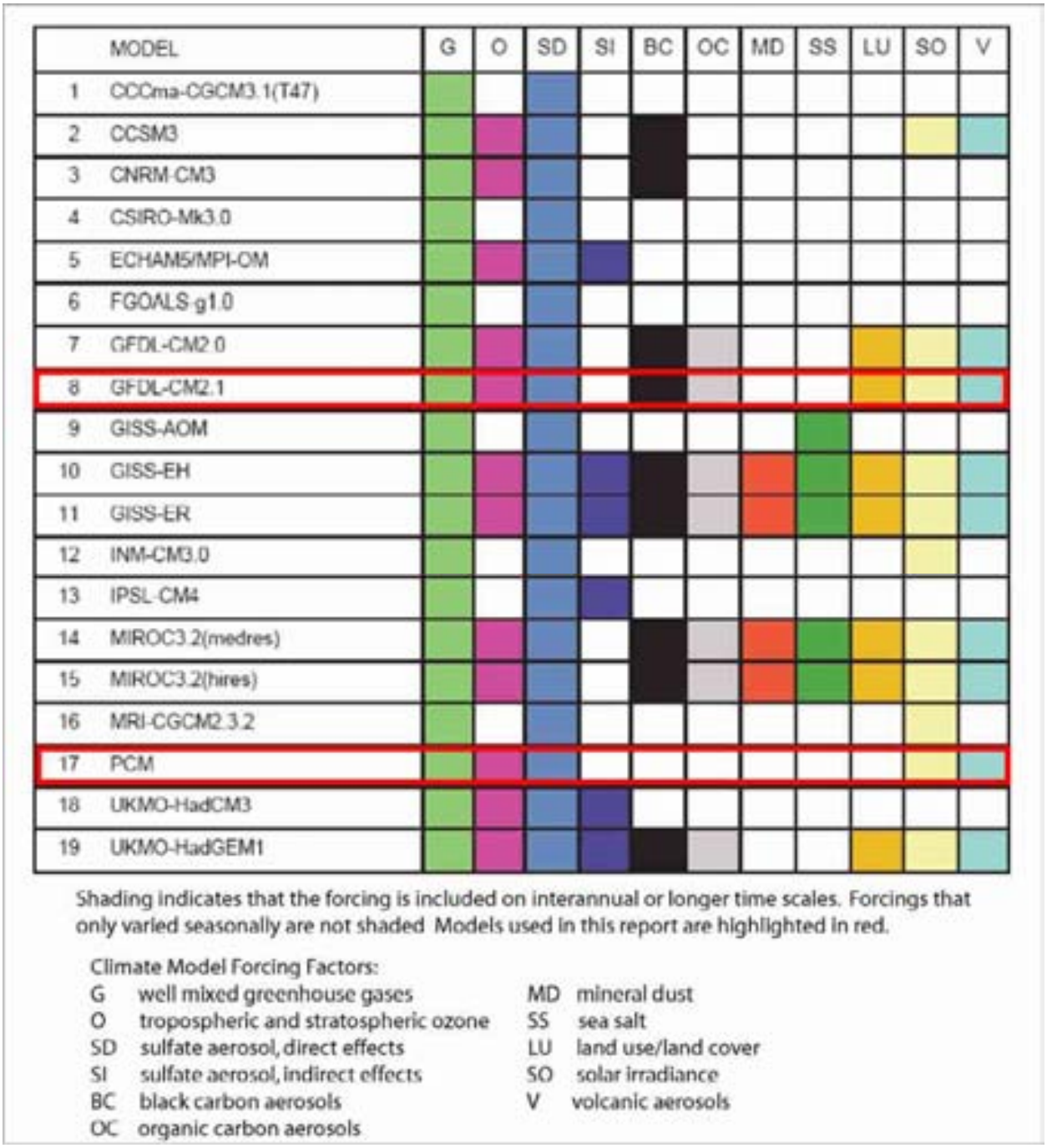

Figure 8.3: Forcing Factor Represented in Various Global Climate Models
Adapted from Table 5.2 (Santer et al., 2006)
Red highlighting indicated models used in this report.

8.8.2 Probability Assessments

As described in the previous section, the work team will compile a larger ensemble of climate change scenarios, hopefully 20 to 30 or more scenarios. The ensemble uncertainty would then be quantified at the regional-scale in terms of probability distributions of annual shifts in precipitation and air temperature. Ensemble members' probabilistic classification (scenario probabilities) would make use of techniques such as those developed by Dettinger (2004). Assumptions would be clearly noted. These scenario probabilities would then be combined with associated impacts assessed using methodologies discussed in this report in order to produce risk information on a variety of system metrics such as annual water deliveries, end-of-September storage, or summer stream temperature. This risk information becomes the baseline for subsequent mitigation studies which look to reduce the risk of negative impacts.

This effort will provide decision makers with both ranges of impacts of climate change and their associated likelihoods. Perceived risk allows planners to make statements about the probability of impacts exceeding certain established thresholds and can be weighed against reliability levels for establishing planning directions. A better understanding of the likelihoods associated with potential climate change impacts will aid decision makers in planning appropriate response strategies. With the accomplishments to date and planned future directions, DWR is collaborating with other agencies and researchers to provide leadership in incorporating climate change impacts and risks into the planning and management of California's precious water resources.

8.9 References

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8.10 Abbreviations

ANN-Artificial Neural Network
CalSimII-Simulation model of the SWP and CVP
CIMIS-California Irrigation Management Information System
CVP-Central Valley Project
GCM-Global Climate Model
GHG-Greenhouse Gas
IPCC-Intergovernmental Panel on Climate Change
SIMETAW-Simulation of Evapotranspiration of Applied Water Model
SRES-IPCC Special Report on Emissions Scenarios
SWP-State Water Project
WUE-Water Use Efficiency

Pondering a Climate Conundrum in Antarctic, *Nature*
January 13, 2002

NSF Press Release

Embargoed until 2:00 P.M., EST
NSF PR 02-03 - January 13, 2002

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Pondering a Climate Conundrum in Antarctica

Unique, distinct cooling trend discovered on Earth's southernmost continent

Antarctica overall has cooled measurably during the last 35 years - despite a global average increase in air temperature of 0.6 degrees Celsius during the 20th century - making it unique among the Earth's continental landmasses, according to a paper published today in the online version of *Nature*.

Sunlight plays off the Canada Glacier in the Wrigth Valley, one of the McMurdo Dry Valleys.
Photo credit: Peter Doran/National Science Foundation
Select image for larger version
(Size: 1MB)

Researchers with the National Science Foundation (NSF) Long-term Ecological Research (LTER) site in Antarctica's Dry Valleys - a perpetually snow-free, mountainous area adjacent to McMurdo Sound - argue in the paper that long-term data from weather stations across the continent, coupled with a separate set of measurements from the Dry Valleys, confirm each other and corroborate the continental cooling trend.

"Our 14-year continuous weather station record from the shore of Lake Hoare reveals that seasonally averaged surface air temperature has decreased by 0.7 degrees Celsius per decade," they write. "The temperature decrease is most pronounced in summer and autumn. Continental cooling, especially the seasonality of cooling, poses challenges to models of climate and ecosystem change."

The U.S. Antarctic Program field camp at Lake Hoare in the McMurdo Dry Valleys, with the Canada Glacier in the background.
Photo credit: Peter West/National Science Foundation
Select image for larger version
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The findings are puzzling because many climate models indicate that the Polar regions should serve as bellwethers for any global warming trend, responding first and most rapidly to an increase in temperatures. An ice sheet many kilometers thick in places perpetually covers almost all of Antarctica.

Temperature anomalies also exist in Greenland, the largest ice sheet in the Northern Hemisphere, with cooling in the interior concurrent with warming at the coast.

➤ **Note About Images**

Peter Doran, of the University of Illinois at Chicago, the lead author of the paper, and his co-authors, acknowledge that other studies conducted in Antarctica have deduced a warming trend elsewhere in the continent. But they note that the data indicate that the warming occurred between 1958 and 1978. They

also note that the previous claims that Antarctic is warming may have been skewed because the measurements were taken largely on the Antarctic Peninsula, which extends northwards toward South America. The Peninsula itself is warming dramatically, the authors note, and there are many more weather stations on the Peninsula than elsewhere on the continent.

Averaging the temperature readings from the more numerous stations on the Peninsula has led to the misleading conclusion that there is a net warming continent-wide. "Our approach shows that if you remove the Peninsula from the dataset, and look at the spatial trend. The majority of the continent is cooling," said Doran.

He added that documentation of the continental cooling presents a challenge to climate modelers. "Although some do predict areas of cooling, widespread cooling is a bit of a conundrum that the models need to start to account for," he said.

The Dry Valleys are the largest ice-free area in Antarctica, a desert region that encompasses perennially ice-covered lakes, ephemeral streams, arid soils, exposed bedrock and alpine glaciers. All life there is microscopic.

The team argues that the cooling trend could adversely affect the unique ecosystems in the region, which live in a niche where a delicate balance between freezing and warmer temperatures allows them to survive and where liquid water is only available during the very brief summer. They argue that a net cooling of the continent could drastically upset that balance.

"We present data from the Dry Valleys representing the first evidence of rapid terrestrial ecosystem response to climate cooling in Antarctica, including decreased lake primary productivity and declining soil invertebrates," they write.

Their data, they argue, are "the first to highlight the cascade of ecological consequences that result from the recent summer cooling."

-NSF-

Editors: For available photography and b-roll, call Dena Headlee, (703) 292-8070/dheadlee@nsf.gov

For more information about the Dry Valleys LTER, see: http://huey.colorado.edu/LTER/

For more information about NSF's network of LTER sites, see: http://lternet.edu/

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Buried Soil Cement Evaluation after 2004/05 Winter Storm, PACE

May 8, 2007

PACIFIC ADVANCED CIVIL ENGINEERING, INC.

17520 Newhope Street, Suite 200 • Fountain Valley, California 92708 • 714.481.7300 • fax: 714.481.7299

MEMORANDUM

DATE: May 8, 2007

TO: Glenn Adamick/Newhall Land

FROM: Mark Krebs, P.E.
David Jaffe, P.E.

RE: Buried Soil Cement Evaluation after 2004/05 Winter Storms

---

Bank protection on the Santa Clara River and main tributaries of the river constructed by Newhall Land since 1999 has primarily utilized a buried soil cement technique. Soil cement bank protection uses 89 to 94% native soil material excavated within the project area and introduces 6 to 11% cement. With a small amount of moisture, mixing and compaction of the processed soil material, a non-erodible bank protection in produced. In most cases the soil cement is placed on a 1 to 1 or 1.5 to 1 slope face. This slope face is then “buried” or backfilled with native soils at a slope between 3 to 1 to 5 to 1. This soil backfill is then planted with native plant species. The native plantings and gradual slope of the soil in these areas will encourage river bank stabilization and resist most frequent river flow events.

The majority of the river bank protection construction in this method includes a horizontal location of the bank protection that is located outside of or adjacent to the existing riparian edge. The placement of the bank protection outside of the existing river corridor substantially decreases the likelihood that the river scour will remove the buried soil & vegetation placed over the soil cement bank protection. As noted above, the majority of the bank protection is located outside of the existing riparian corridor where areas will typically experience velocities much less than the main channel creek velocities (typically velocities of 2-8 fps along the banks while velocities >15 fps in the main channel occur adjacent to these locations during the 100-year discharge). Lower, non-erosive, velocities in the areas along the buried bank stabilization indicate that it is unlikely that all or part of the buried bank stabilization will become exposed.

A real world example was provided in winter 2004/2005. The 2004/2005 winter rainy season proved to be one of the wettest years on record and produced an approximate 50 year flood in the Santa Clara River at the LA/Ventura County line. River flows at this location have been estimated by LA County at 49,800 cfs, the second highest on record.

The 2004/2005 storm runoff and river/tributary flows provided a good test for the buried soil cement bank protection. Figures #1 and #2 show the Santa Clara River between Bouquet Canyon Creek and San Francisquito Creek along the Bridgeport project. The Bridgeport soil cement bank protection was constructed in 1999 and has substantial revegetation growth in the backfilled area. As shown in the photos the 2004/2005 storms cleared vegetation in the active channel (riverbed) but no damage occurred in the revegetated Bridgeport area.

Several buried soil cement bank protection projects were constructed along San Francisquito Creek in 2003. These projects include West Creek, Creekside and Hidden Creek which are located between Copper Hill Road and Newhall Ranch Road. Though not revegetated at the

time of the photo, Figures #3 and #4 of the San Francisquito Creek show the major flooding did not expose any of the buried soil cement.

Figure #5 shows the limit of the 2004/2005 flooding of the Santa Clara River in the proposed Newhall Ranch development. The proposed project bank protection is shown as overlay on the aerial photo and it indicates that if the bank protection had been in place during these heavy flow events very little, if any, would have become exposed.

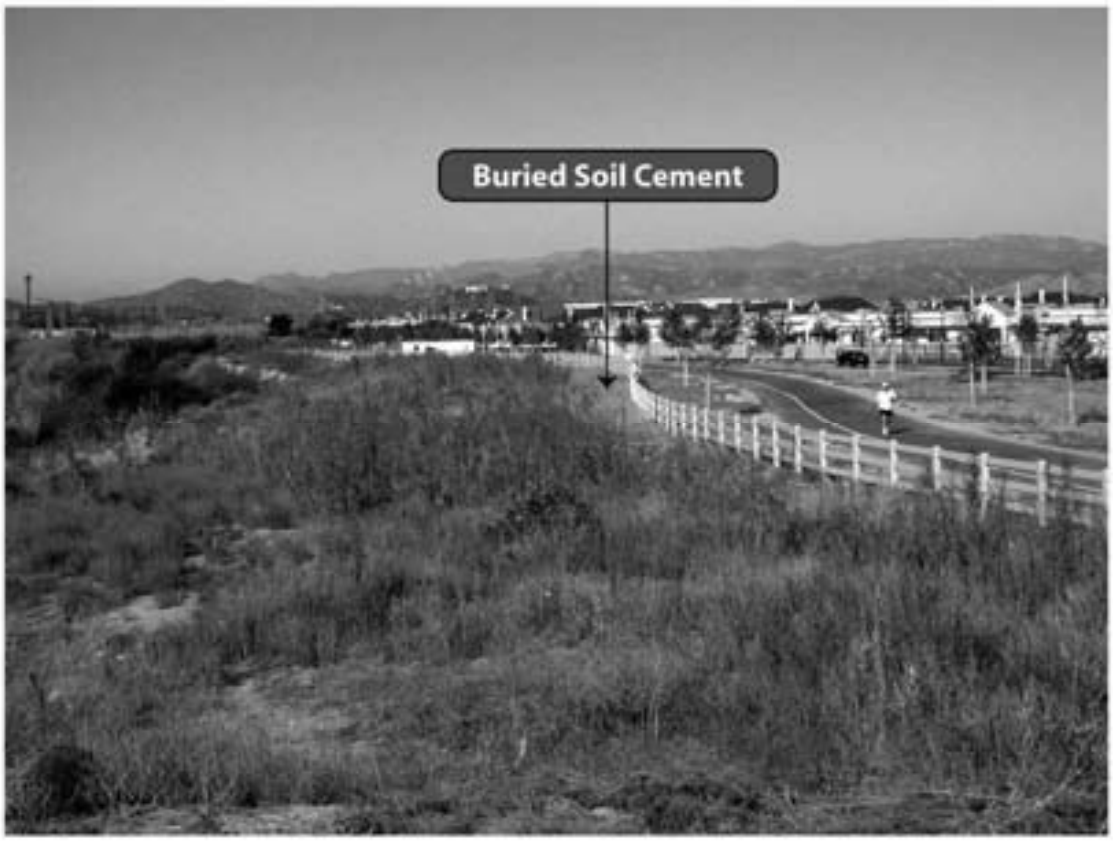

Figure 1: Existing buried and revegetated soil cement bank protection along Santa Clara River at Bridgeport.

Figure 2: Buried soil cement at Bridgeport after 2004/05 storms

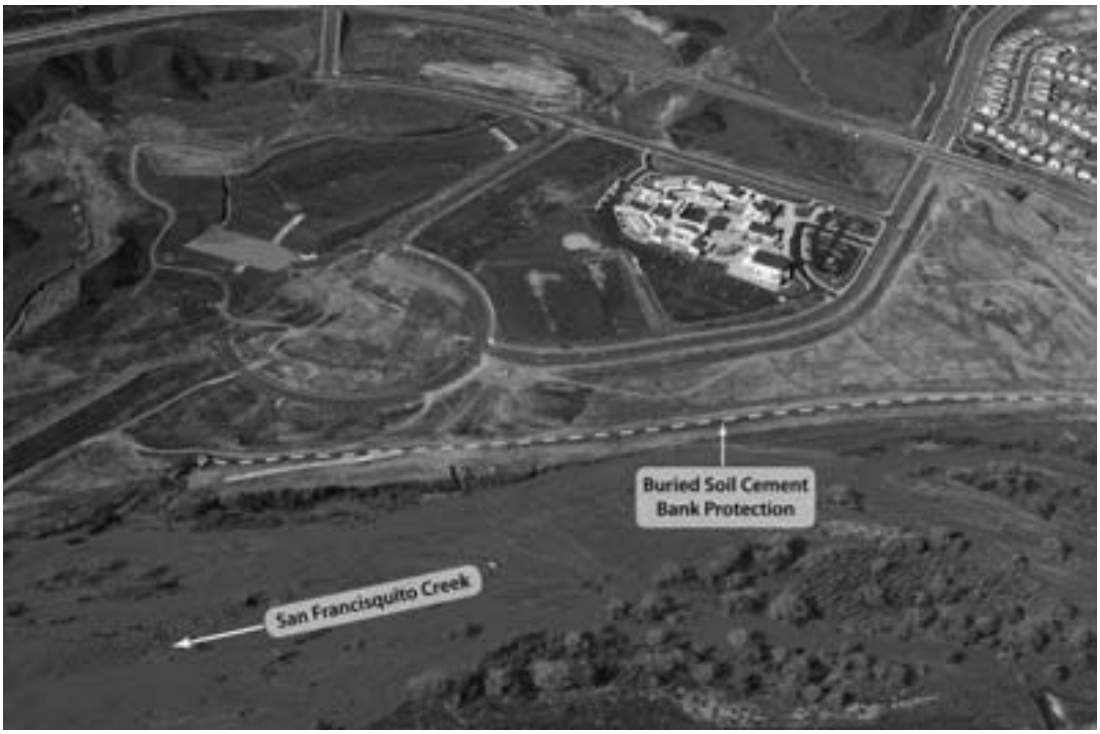

Figure 3: Aerial photograph of buried soil cement bank protection on San Francisquito Creek near Copper Hill Road following the 2004/2005 winter high flow events.

Figure 4: San Francisquito Creek after 2004/05 winter high flow event

July 2007

In Hot Water

Water Management Strategies to Weather the Effects of Global Warming

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About the Water Policy Program

The Water Policy Program at the Donald Bren School of Environmental Science and Management, University of California, Santa Barbara, advances the theory and practice of water management. Contact:Wilkinson@es.ucsb.edu

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Foreword

The effects of global warming on the health of the planet has been a topic of discussion for decades. However, only recently have the potential impacts of climate change on Western communities become a focus for water resource scientists, planners, and managers. In the American southwest, the severe drought on the Colorado River that began in 2000 served as a wakeup call to water utility managers regarding the possible implications of global warming. Those implications are sobering.

During the last century, long-range forecasts of population growth and water demands in the West have often been underestimated. Add to this fact the reality that stable and reliable water supplies in the West are, for the most part, already allocated. In this age of scarce water supplies, the prospect of climate change should serve as a catalyst for paradigm shifts in the way we manage water. Long-term climate change is adding even more uncertainty to the already difficult task of water resource planning and management.

To respond to the challenges posed by climate change, water managers will need to reevaluate their assumptions concerning storage and use of existing supplies, the amount of water expected to be available in the future, and how scarce or limited supplies should be shared among competing interests. Continued scientific study and dialogue will be of paramount importance to this effort, not only in terms of providing data to help individual utilities manage their respective situations, but also to facilitate the development of practical local, regional, and national policies.

With this in mind, the Natural Resources Defense Council, Desert Research Institute, and Southern Nevada Water Authority co-sponsored a 2005 conference entitled "Urban Water Supplies and Climate Change in the West." The objectives of the conference were threefold: to educate participants about the most recent studies of climate change and potential water supply impacts; to increase understanding and facilitate dialogue between water scientists and water managers; and to discuss options for addressing the potential impacts of climate change on water supplies. The presentations and discussion at that conference led to this report.

It is clear that global warming is occurring, particularly in the West. In general, temperatures are increasing. Scientists predict that this will likely lead to more runoff from rain, less alpine snow pack, larger winter streamflows, and hotter, drier summers. Communities are likely

to face more flooding and more frequent drought. As the West experiences earlier snowmelts and warmer, rainier winters, rivers and streams will be altered. Natural recharge to groundwater basins could decrease.

To cope with these changes effectively, water utilities will need to act quickly to develop diverse and flexible water resource portfolios that will allow them to reduce demands and adapt their supplies to changing climatic and hydrological conditions. However, from a regional and national perspective, perhaps the most important goal for water utilities will be to pursue increased cooperation and collaboration. In the past, models of water resource planning have emphasized competition for water resources. However, as communities throughout the West become more dependent upon each other to manage available resources, and as these resources prove to be interconnected in a myriad of ways, this competitive model of resource allocation is no longer prudent. Without open, collaborative dialogue among utilities and other stakeholders, competition for scarce water resources will only result in conflict, stalemate, and shortages.

The accompanying report and recommendations, and the conference that led to them, represent a first step toward addressing some of these difficult long-term issues. This report summarizes the broad potential water management impacts of climate change, the many existing climate-related activities of water managers around the West, and a full range of recommendations for water managers and staff to consider as they incorporate global warming into the planning and management of their agencies.

As the drought on the Colorado River has shown us in the West, even seemingly "permanent" water resources are susceptible to climatic variability. The time to prepare is now.

Patricia Mulroy
General Manager
Southern Nevada Water Authority

Executive Summary

The world's climate is warming—by an average of 1.3 degrees Fahrenheit in the past century. Unless current trends are reversed, global warming pollution is projected to keep increasing rapidly, raising temperatures by as much as 11.5 degrees Fahrenheit by the end of this century and compromising our water supply, flood management systems, and aquatic ecosystems. Experts predict that rising temperatures will lead to less alpine snowpack, earlier and larger peak streamflows, potential reductions in total streamflows, greater evaporative losses, declining ecosystem health, sea level rise, more extreme weather events—including both floods and droughts—and hotter, drier summers. We're already seeing evidence of these trends around the West.

Water managers—including water districts and local, state, and federal agencies with water-related resource management responsibilities—play a key role in Western communities by identifying potential water-related problems and pointing the way to solutions. As stewards of one of the West's most valuable —and scarce—resources, water managers can lead the response to ongoing climate changes and help stave off further damage.

WATER MANAGEMENT IN A CHANGING CLIMATE

Global warming presents challenges regarding water supply, water quality, ecosystem protection, and flood management—issues that water managers face every day. NRDC has created a blueprint for action, including a set of specific strategies water managers and other decision makers can use as they incorporate climate change issues into management decisions.

Action 1: Evaluate the Vulnerability of Water Systems to Global Warming Impacts

• ***Conduct agency assessments of climate change impacts on water supply.*** Assessments should analyze water supply and other impacts from projected climate change effects, including reductions of snow pack and earlier

peak streamflows, as well as from projected increases in temperature, which may result in greater environmental protection requirements and higher urban and agricultural water demand.

• ***Work with other water managers to evaluate regional vulnerability.*** Regional analyses can help water managers understand the common challenges they face and lay the groundwork for cooperative responses. They are especially important for water agencies in large watersheds and regions facing similar climate change–related challenges.

Action 2: Develop Response Strategies to Reduce Future Impacts of Global Warming

■ ***Consider the impact of climate change on future water management tools.*** Water management tools will be affected significantly—but not equally—by climate change. In general, climate change will make increases in efficiency more effective and reduce the yields from traditional surface storage and diversion projects. The table on the next page shows which water management tools will be most helpful in a climate-altered world.

■ ***Put conservation first.*** Increased investments in water efficiency represent a sound and basic "no regrets" water management approach to future climate change impacts. Cost-effective water conservation investments can generate significant benefits for water supplies and aquatic ecosystems, as well as reduced energy consumption and greenhouse gas emissions.

■ ***Incorporate climate and energy issues into statewide water planning.*** State-level planning efforts should incorporate climate change vulnerability analyses, global warming impacts on management tools, and the energy implications of water management decisions.

■ ***Consider integrated regional water management strategies.*** Water managers should carefully consider an integrated regional water management approach to climate change response. A robust climate change response strategy should include:

• Analysis of potential climate impacts on existing systems, as well as future water supply strategies

• Multiple benefits (e.g., supply, water quality, energy, flood management, and ecosystem benefits)

• An examination of unique regional conditions

• Potential partners to assist in financing and implementation (e.g., energy, stormwater, wastewater, and land use agencies)

• Institutional strengths and responsibilities

The Impacts of Climate Change on Water Management

Global warming is not an issue that we can afford to address with a "wait and see" approach. We must take action immediately or we are at risk of irreversibly damaging some of the West's precious water resources:

• For every rise of one degree Celsius (1.8 degrees Fahrenheit) in the West, researchers predict that snow levels will retreat upward by 500 feet in elevation.

• Extreme weather events such as floods and large storms could increase in size and frequency, straining the limits of flood control systems and exposing some floodplains and low-lying coastal regions to damage reminiscent of Hurricane Katrina.

• The IPCC projects that sea level will rise by 7 to 23 inches by 2100, affecting water supplies, eroding wetlands, diminishing coastal protection from storms, and exposing residents to severe flood damage. This projection assumes no acceleration of ice melt in Greenland or Antarctica. A new study, published after the deadline for consideration by the IPCC, projects that sea levels will rise by 20 to 55 inches this century based on recent observations.

• The stability of levees in the San Francisco Bay-Delta, which provides a portion of the water supply for more than 20 million Californians, will be threatened by rising sea levels.

• Higher temperatures will decrease salmon, trout, and other fish habitat, thereby increasing conflicts over water resources. Scientists estimate that up to 38 percent of locations currently suitable for coldwater fish could become too warm to provide habitat by 2090.

• A full range of potential water supply and demand strategies

• A full range of flood management options

• "Efficiency first" investments

• A clear "with and without" project analysis for major infrastructure investments

• Stronger, enforceable environmental protections, such as flow and temperature requirements for protected species

• Economic analysis and "beneficiary pays" financing

• Clear objectives and performance standards

• Educating the public and decision makers about climate change

■ ***Collaborate with energy utilities.*** Water conservation generates substantial water and energy savings, and thus reductions in greenhouse gas emissions. Water agencies should work with local energy utilities to develop joint programs, such as rebate offers, to encourage customers to conserve water and energy.

■ ***Consider climate change when making commitments about future water deliveries.*** In particular, agencies should avoid promising increased water deliveries based solely on current hydrology, without consideration of future climatic conditions.

■ ***Factor in flood management.*** For agencies with flood management responsibilities, an awareness of climate change should be integrated into future management decisions. Managers should investigate opportunities such as the reoperation of existing facilities, floodplain restoration, groundwater recharge, and flood-compatible agriculture. To reduce future damage, floodplains should be managed with an awareness that they will be inundated more frequently. This suggests placing an increased emphasis on land use issues.

■ ***Protect and restore aquatic ecosystems.*** Degraded aquatic ecosystems result in the loss of species and create endangered species conflicts. Healthy aquatic ecosystems will be more resistant to climate impacts, help reduce conflicts, and provide other benefits to water quality, recreation, and flood protection.

Action 3: Prevent Future Impacts by Reducing Greenhouse Gas Emissions

■ ***Support policies including mandatory caps on emissions.*** The IPCC found with at least 90 percent certainty that the current global warming trend is caused primarily by greenhouse gas emissions—particularly carbon dioxide—released through the burning of fossil fuels. Enforcing a mandatory national cap on the pollution that causes global warming is the single most important step in controlling and reducing the future impacts of global warming. While caps would be most effective at the federal level, local, state, and regional initiatives are also important tools in the face of federal inaction.

Table ES-1: Performance of Water Management Strategies After Considering Global Warming Effects

More effective	Not affected	Less effective
• Landscape conservation • Conservation rate structures • Agricultural water conservation • Water marketing • Urban stormwater management • Saltwater groundwater intrusion barriers to protect coastal aquifers • Water system reoperation • Interagency collaboration and integrated water management strategies • Floodplain management • Watershed restoration	• Wastewater recycling • Interior water conservation • Groundwater cleanup	• Traditional river diversions • Traditional groundwater pumping • Traditional surface storage facilities • Ocean water desalination*

*Given existing energy requirements.

■ ***Take action at the district level.*** Water agencies should develop programs to reduce their energy consumption and greenhouse gas emissions. A thorough understanding of the energy implications of water management decisions can lead to a range of options for achieving this goal. (NRDC's 2004 report *Energy Down the Drain* explores this relationship in detail.)

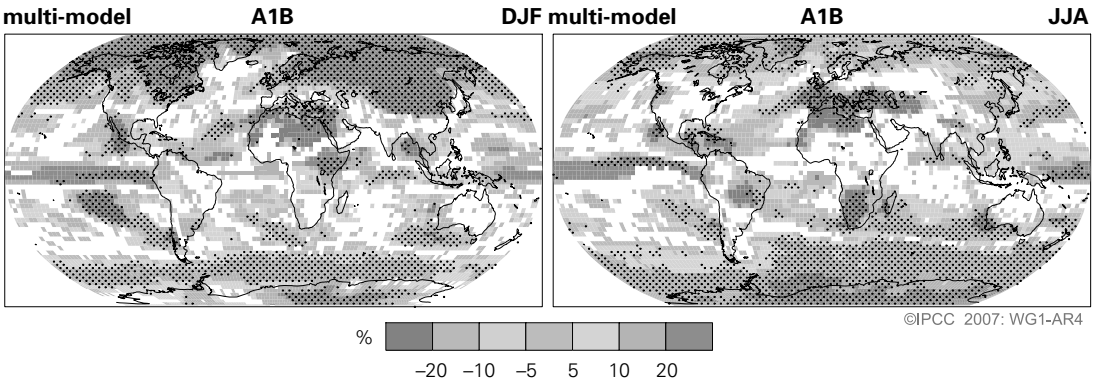
Action 4: Increase Awareness of Global Warming and Water Impacts

■ ***Educate customers and decision makers.*** Global warming is not just an environmental concern—it affects the future of all Western communities, particularly through water-related issues. Addressing the impacts of climate change on water management will require increased awareness and involvement by water district customers and decision makers, including elected officials.

■ ***Raise public awareness.*** Given the global nature of climate change and the need for far-reaching actions to address its causes, raising public awareness is essential to encouraging effective action. Water managers can play an important role in increasing awareness of global warming and the need to take action. Outreach can take the form of advertisements, media outreach, discussions with business groups, conferences, community forums, and more.

Western communities look to water managers for leadership on water issues. With global warming changing

Figure ES-1: Projected Patterns of Precipitation Changes for Period 2090-2099, relative to 1980-1999



Source: IPCC 2007:: WG1-AR4

the way we think about water in the American West and around the globe, water managers and other decision makers must lead the way in ensuring that our drinking water supply is safe, that our communities are protected from floods, and that our aquatic ecosystems support healthy fish and wildlife populations. The time to prepare is now.

HIGHLIGHTS OF EFFORTS TO INCORPORATE CLIMATE CHANGE INTO WATER MANAGEMENT

Across the West, water agencies and other water managers have begun taking action to address the challenges presented by climate change. Here are a few highlights of those efforts.

Evaluating the Vulnerability of Water Systems to Global Warming Impacts

• Many Western communities, including Seattle, Portland, Denver, the San Francisco Bay Area, and water districts in the Sierra Nevada foothills have undertaken analyses of potential impacts to their existing water systems.

• New Mexico and California have released statewide vulnerability analyses.

• In 2005, the American Water Works Association Research Foundation released *Climate Change and Water Resources: A Primer for Municipal Water Providers*.

Implementing Response Strategies to Reduce Future Impacts

• Denver Water has decided to dramatically accelerate its long-range water conservation program, partially in response to potential impacts from global warming.

• California's Department of Water Resources has issued multiple reports regarding climate impacts, including *Progress on Incorporating Climate Change into Management of California's Water Resources*.

• Southern California's Santa Ana Watershed Project Authority has created a national model for integrated regional water management, producing far-reaching water supply, water quality, energy, and climate benefits.

Preventing Future Impacts by Reducing Greenhouse Gas Emissions

• In California, three water agencies—the Santa Clara Valley Water District, the East Bay Municipal Utility District, and the Marin Municipal Water District—supported AB 32, which Governor Schwarzenegger signed into law in September 2006, creating the nation's first state-level mandatory cap on greenhouse gas emissions.

• The Santa Clara County Water District has helped to create a public/private partnership called Sustainable Silicon Valley, which is working to reduce the emission of global warming gases and other pollutants.

• The Bay Area's East Bay Municipal Utility District (EBMUD) has joined the California Climate Action Registry to report its greenhouse gas emissions, earning the district a "Green Power Leadership" award from the Environmental Protection Agency. Since EBMUD joined the registry, more than a dozen California water agencies have joined as well as Seattle Public Utilities and the Salt River Project.

• The Marin Municipal Water District has joined the Cities for Climate Protection campaign, uniting with dozens of other Western cities that run municipal water utilities to create a strategic agenda to reduce global warming.

Increasing Public and Decision Maker Awareness

• The Santa Clara Valley Water District has added a discussion of global warming to its website, stating that "The reality of global warming and climate change is the most significant long-term threat to water resources management in Silicon Valley."

• In January 2007, the San Francisco Public Utilities Commission convened a Water Utility Climate Change Summit attended by more than 150 water managers and other stakeholders. The conference received significant media coverage.

Chapter 1

An Overview of Major Scientific Findings on Climate Change

All elements of water systems, from watershed catchment areas to reservoirs and conveyance systems to wastewater treatment, will likely be affected by climate change and variability.[1] Rising temperatures, a greater proportion of annual precipitation falling in the form of rain instead of snow, altered streamflow timing, reduced snowpack, increased evaporation and transpiration, greater risk of fires, and a sea level rise—all effects of climate change—will require changes in how our current water systems are managed. And with virtually every major water supply source in the West already overallocated beyond its physical and/or legal capacity to be sustained, the consequences could be significant for Western water supply, water quality, and aquatic ecosystems.

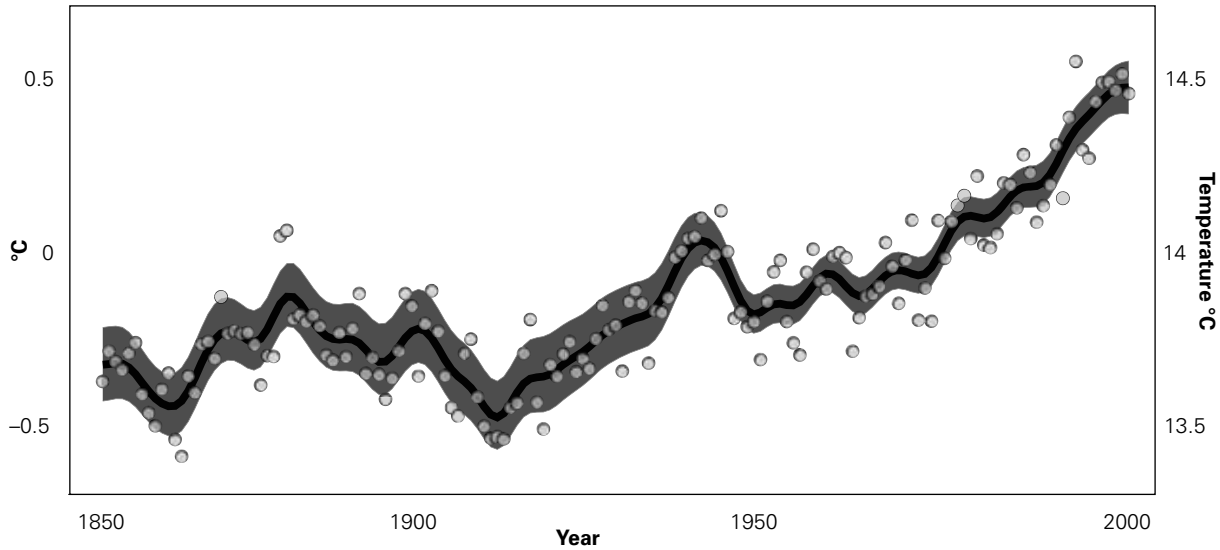
There is broad scientific agreement that climate change is occurring, that emissions of heat-trapping pollution are the primary cause, and that the resulting climate change and variability pose significant dangers to our environment, our health, and our economy.

The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report released in 2007 found, with at least 90 percent certainty, that human activities are causing global warming.[2] This comprehensive review confirms and lends even greater confidence to the conclusions of the U.S. National Research Council's (NRC) Committee on the Science of Climate Change 2001 report, *Climate Change Science: An Analysis of Some Key Questions,* which found that greenhouse gases are accumulating in the earth's atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise. Temperatures are, in fact, rising.[3] It also found that the combustion of fossil fuels (coal, oil, and natural gas) is the major source of greenhouse gas emissions (see Figures 1-1 and 1-2).

The IPCC in 2007 projected that the rate of warming over the 21st century—up to 11.5 degrees Fahrenheit—would be much greater than the changes observed during the 20th century. The IPCC projects the following changes as a result of increased temperatures:

- more frequent hot extremes, heat waves, and heavy precipitation events
- more intense hurricanes and typhoons
- decreases in snow cover, glaciers, ice caps, and sea ice

Figure 1-1: Changes in Global Average Temperatures, 1850-2000



Source: IPCC 2007: WG1-AR4

Global Warming Basics

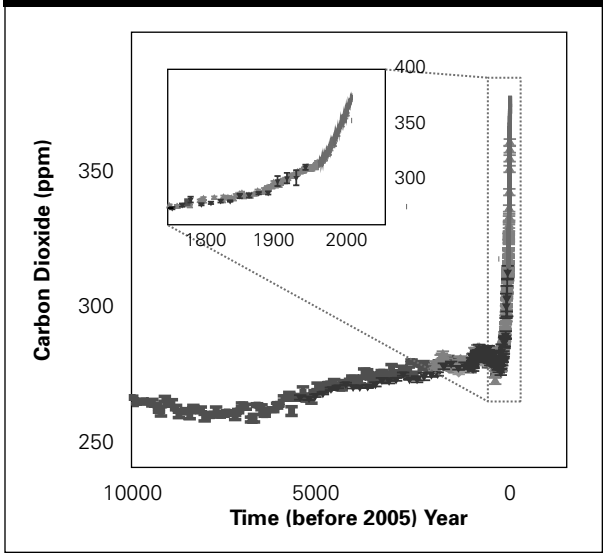
The basic dynamic of global warming is that the earth's temperature is largely regulated by gases that trap heat in the earth's atmosphere. This so-called greenhouse effect allows the earth's temperature to be in the range at which all life on earth has evolved. Increased concentrations of specific gases increase the heat-trapping ability of the atmosphere and are responsible for increasing temperatures. The composition of the earth's atmosphere is particularly important, because certain gases (including water vapor, carbon dioxide, methane, halocarbons, ozone, and nitrous oxide) absorb heat radiated from the earth's surface. Changes in the composition of the atmosphere alter the intensity of the greenhouse effect.

Although natural variability in climate occurs, it is now clear that human activities have been causing most of the global warming since the mid-20th century. We are exerting a major and growing influence on some of the key factors that govern climate by changing the composition of the atmosphere and by modifying the land surface. The concentration of carbon dioxide (CO_2) has risen about 30 percent since the late 1800s. The concentration of CO_2 is now higher than it has been in for at least the last 650,000 years. This increase is the result of the burning of coal, oil, and natural gas and the destruction of forests around the world to provide space for agriculture and other human activities. Rising concentrations of CO_2 and other greenhouse gases are intensifying earth's natural greenhouse effect. Projections of population growth and energy use indicate that, on our current course, the CO_2 concentration will continue to rise, likely reaching between two and three times late-19th-century levels by 2100. This dramatic doubling or tripling will have occured in the space of about 200 years.

Sources: National Assessment Synthesis Team, 2001. *Climate Change Impacts on the United States, report for the United States* Global Change Research Program. Cambridge University Press, p.12. http://prod.gcrio.org/nationalassessment/.

Climate Change 2007: The Physical Science Basis: Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, p.4.

Figure 1-2: Changes in Atmospheric Concentrations of Carbon Dioxide from Ice Core and Modern Data



Source: IPCC 4 Summary for Policy Makers, p. 3

• a rise in global mean sea level of 7 to 23 inches (this projection does not include accelerated ice-sheet melting and other factors)[4]

Recent studies indicate that the range of possible sea level rise may be even greater. A report in *Science* magazine projects a 20- to 55-inch rise in sea levels over the 21st century, based upon recent observations.[5] This study was published after the deadline for consideration for the IPCC's Fourth Assessment Report.

Changes caused by a warming climate will not necessarily occur in a steady and predictable fashion. A recent report from the NRC, *Abrupt Climate Change: Inevitable Surprises*, shows that some major and widespread climatic changes have occurred with startling speed. The study notes that abrupt changes were most common when the earth's climate was being heated most rapidly, concluding that "greenhouse warming and other human alterations of the earth system may increase the possibility of large, abrupt, and unwelcome regional or global climatic events."[6]

Although difficult to predict or plan for, climatic shifts—gradual or dramatic—are among the scenarios that water managers must consider in future modeling and planning. Fortunately, some in the water management community are actively engaged in the analysis of climate change impacts and are undertaking analyses of water system vulnerabilities to future climate change effects. For example, in 2005, the American Water Works Association Research Foundation (AWWARF) and the National Center for Atmospheric Research (NCAR) released a report entitled *Climate Change and Water Resources: A Primer for Municipal Water Providers,* and in July 2006 the California Department of Water Resources released *Progress on Incorporating Climate Change into Management of California's Water Resources.*[7,8] It is clear that water managers will have to adapt to changing climate conditions.

> **"The water supply for any utility will depend on the quantity and timing of local and regional precipitation, both of which may change with global climate change… Climate change is an additional source of uncertainty that will become increasingly relevant to water resource managers in the 21st century. Just as with any other source of uncertainty, best practice requires understanding as much as possible about the changes that can occur and their implications for operation and management of the utility."**
>
> Source: Kathleen Miller and David Yates, Climate Change and Water Resources: A Primer for Municipal Water Providers (AWWARF 2006).

Chapter 2

How Climate Change Will Affect Western Water Supply and Management

The snow and ice of western mountain ranges are the lifeblood of water supply and storage in the western United States; their melting snowpack feeds rivers that provide that area of the country with as much as 75 percent of its water supply.[1] An elaborate system of reservoirs, aqueducts, pumping plants, treatment facilities, and other engineered facilities moves the West's water supply from two principal sources: (1) surface water, which is often stored in reservoirs and (2) groundwater.

This water supply infrastructure, matched by an even more elaborate set of laws and policies that govern water use and rights, was designed and engineered for timing and magnitudes of runoff based on our understanding of past hydrological conditions, including temperature, precipitation, and snowmelt patterns.

Climate change and variability will affect the timing, amounts, and form of precipitation, in turn, affecting all elements of water systems from watershed catchment areas to reservoirs, conveyance systems, and wastewater treatment plants.[2] These systems are already stressed today. Overdraft and contamination of groundwater sources have reduced the availability of groundwater supplies in many areas. Saltwater intrusion in coastal aquifers is a problem in many areas. Climate change has the potential to exacerbate these situations, requiring increased attention from water managers. Extreme events such as droughts and major flood events are particularly challenging for water managers. Climate modeling indicates that these kinds of extreme events are likely to become more frequent and intense in the future. In fact, there is strong evidence that wildfires, precipitation patterns, and

Figure 2-1: Total Surface and Groundwater Withdrawals by U.S. County

The Western United States withdraws more water than any other region in the nation. The changes to hydrology and water supply that are likely to be caused by global warming threaten to have serious implications for western water management. Source: USGS 2004

> **"Climate change has the potential of affecting a wide variety of water resource elements. These range from water supply, hydroelectric power, sea level rise, more intense precipitation events, water use, and a number of miscellaneous items which include water temperature changes."**
>
> Source: Maurice Roos, California's state hydrologist in draft materials prepared for the California Energy Commission for the Public Interest Research Program (PIER) on Climate Change.

snowmelt are already being influenced by anthropogenic climate change.[3]

CLIMATE CHANGE EFFECTS WILL RESHAPE WATER SUPPLY IN THE WEST

As the U.S. National Assessment water sector report summarizes, "More than 20 years of research and more than 1,000 peer-reviewed scientific papers have firmly established that a greenhouse warming will alter the supply and demand for water, the quality of water, and the health and functioning of aquatic ecosystems."[4] The most significant impacts of global warming on water management—rising temperatures, increasing proportions of annual precipitation in the form of rainfall, disrupted streamflow timing, altered snowpack conditions, increased evaporation and transpiration, greater risk of fires, and sea level rise—are discussed in more detail in the following sections.

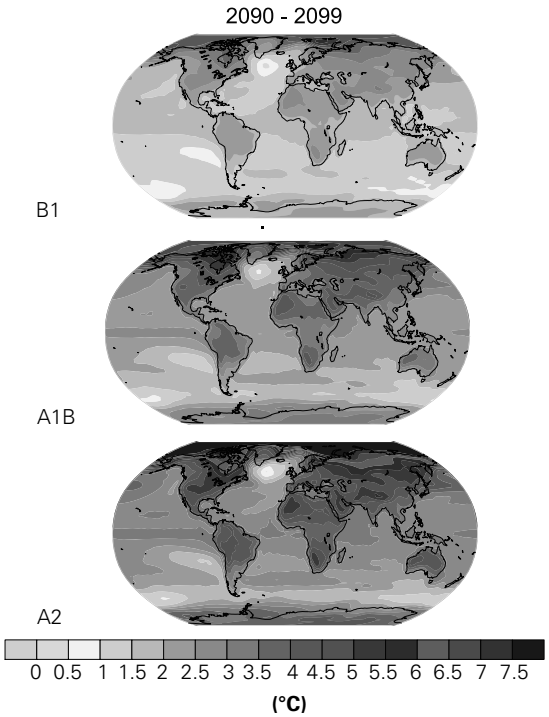
Rising Temperatures Could Mean Earlier Snowmelts and Outflows

The IPCC 2007 report found that "11 of the last 12 years (1995 to 2006) rank among the 12 warmest years... since 1850".[5] Climate models also consistently indicate a warmer future for the U.S. West (see Figure 2-2). Evidence of warming trends is already being seen in winter temperatures in the Sierra Nevada, which rose by almost 2 degrees Celsius (4 degrees Fahrenheit) during the second half of the 20th century. Trends toward earlier snowmelt and runoff to the San Francisco Bay-Delta over the same period have also been detected.[6] Water managers are particularly concerned with the mid-range elevation levels where snow shifts to rain under warmer conditions, thereby changing the snow storage. Research is also indicating earlier melting and spring flows, as described in more detail in a later section.

Greater Extremes in Precipitation Will Challenge Flood Control and Water Storage

Climatologists expect that global average precipitation will increase, however, some areas will become wetter while others will become drier. In addition, the timing, location, and form (rain versus snow) will likely differ from historical norms. Studies have found an average increase in precipitation in the continental United States of about 10 percent over the last century. The intensity of precipitation has increased for very heavy and extreme precipitation days, with most of the increase in the highest annual one-day precipitation events. Plots of global and U.S. precipitation changes over roughly the past century reveal considerable variation by region. Such findings have serious implications for flood control as well as water supply storage.[7]

Figure 2-2: Projections of Surface Temperature Changes for Late 21st Century



Source: *Climate Change 2007: The Physical Scientific Basis: Summary for Policymakers*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change

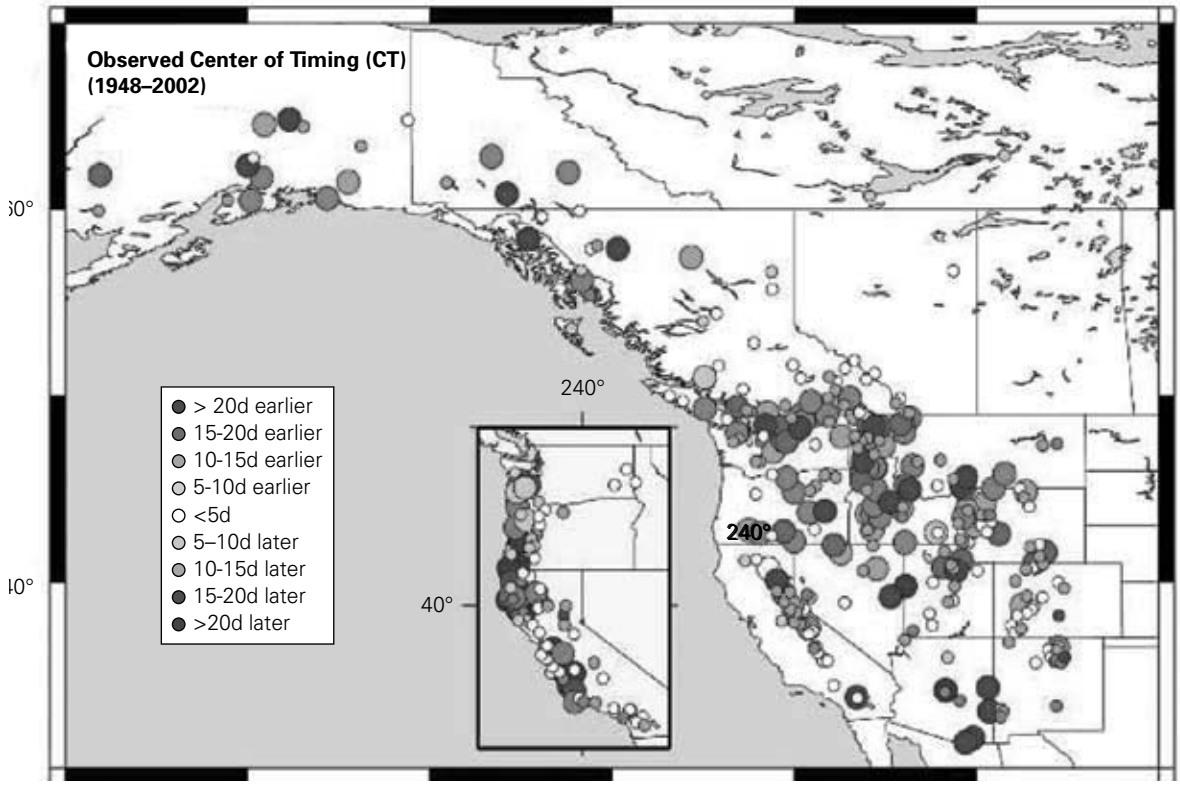
Although there is uncertainty regarding how climate change will affect regional precipitation patterns throughout the American West, several analyses indicate that the Southwest may be drier and that high latitudes may be wetter in the future. For example, a 2007 National Research Council report on Colorado River basin hydrology concluded, "Over the next 10–40 years, there is a tendency in the results of climate model super-ensembles to forecast slightly increased annual precipitation in the Northwestern United States by about ten percent above current values and to forecast slightly decreased annual precipitation in the Southwestern United States by less than ten percent below current values, with relatively little change in annual precipitation amounts forecast for the headwaters regions of the Colorado River."[8] Potential changes in precipitation patterns will have far reaching implications for water managers, particularly in oversubscribed river basins—which includes most rivers in the West.

Reduced Snowpack and Earlier Snowmelt Disrupt Streamflows

In the West, streamflow is often strongly influenced by runoff from melting winter snowpacks. Streamflow is characterized by timing, magnitude, frequency, and duration of water flows, all of which are affected by climate change. Water management strategies for supply and flood control are therefore highly attuned to streamflow timing, making any changes in streamflow timing a critical management issue.

Recent studies indicate that changes have already occurred in snowmelt and spring runoff throughout the western region of North America. The United States Geological Survey (USGS), which has been measuring

Figure 2-3: Accelerated Runoff in the West, 1948-2002



Spring runoff in the West, measured in terms of center of timing—the date at which 50% of annual runoff is reached—now occurs 1–4 weeks earlier than 50 years ago.

Source: Steward, Iris T., Daniel R. Cayan, Michael D. Dettinger, April 2005. "Changes toward Earlier Streamflow Timing across Western North America". Journal of Climate. http://meteora.ucsd.edu/cap/pdffiles/stewart_timing.pdf

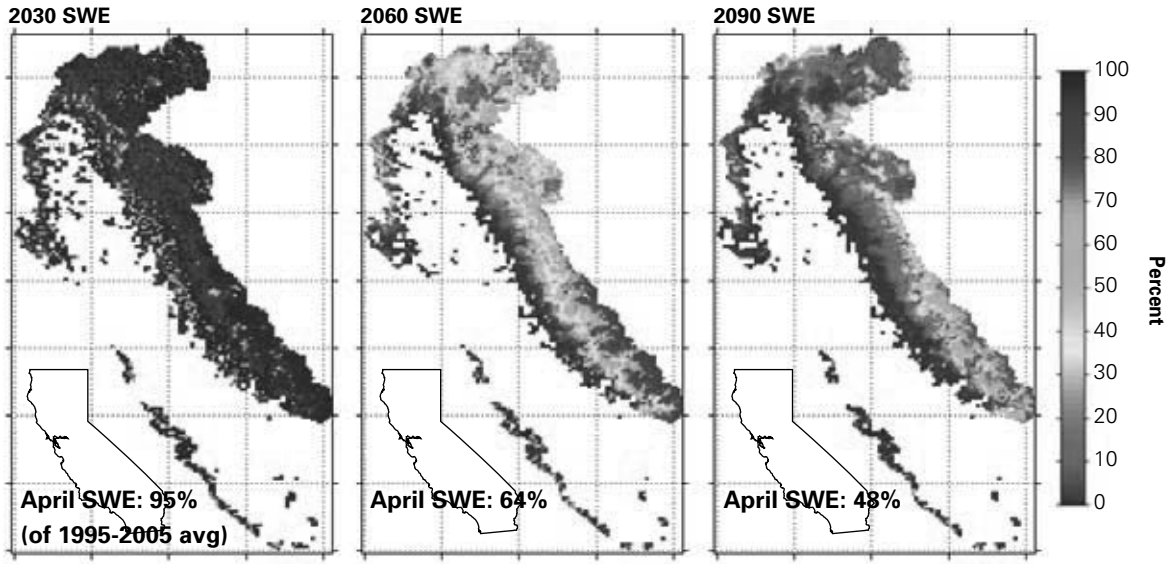
streamflows and spring runoff since the late 19th century, observes that "both measures indicate that flows in many western streams arrive a week to almost 3 weeks earlier now than they did in the middle of the 20th century. The largest changes have been identified in the Pacific Northwest, but the trends also are present in the Sierra Nevada of California, in the Rocky Mountains, and in parts of British Columbia and southern Alaska."[9] Figure 2-3 shows accelerated spring runoff across the West for the latter half of the 20th century.

Water agencies have found the same changes in streamflow when analyzing climate changes impacts upon their water systems. For example, Seattle Public Utilities sponsored a study by University of Washington's Climate Impact Group (CIG) to examine global warming's potential effects on Seattle's water system. Their modeling indicates an average decrease in combined inflow volumes to its two primary water sources, the Cedar and Tolt Reservoirs, of approximately 6 percent per decade through 2040—totaling about 5,000 acre-feet by 2040 when compared to historical record.[10]

Other recent studies indicate that both early snowmelt and diminished snowpack in the West may be related to increased temperatures due to global warming.[11] Runoff indexes for both the Sacramento and San Joaquin rivers in California, for example, show a marked decline in flows during the critical April to July period over the past century. And researchers have shown that for most of the second half of the 1900s, snowmelt-generated runoff came increasingly early in the water year in many basins in California.[12] A declining fraction of the annual runoff was occurring during the months of April to June in middle-elevation basins, while an increasing fraction was occurring earlier in the water year, particularly in March.[13] Other studies have reached similar findings of increasing winter and spring floods under conditions in which rain falls on snow.[14]

Future changes in snowpack are a cause for concern. One study projected that snow levels will retreat 500 feet in elevation in California for every rise of one degree Celsius.[15] Figure 2-4 shows projections for snowpack impacts in California through the 21st century. An analysis by Peter Gleick published in the journal *Water Resources Research* examined the potential for shifts in runoff in California due to increased temperature.[16] For the study, Gleick used a water-balance model developed for the Sacramento Basin. He based his climate change scenarios on increases in average monthly temperature of 2 and 4 degrees Celsius (4 and 7 degrees Fahrenheit) and changes in precipitation of +/–10 and 20 percent. The study found that summer runoff decreased in all scenarios, whereas winter runoff rose in all those scenarios in which precipitation was kept constant or increased. With an increase in temperature of 4 degrees Celsius (7 degrees

Figure 2-4: Evolution of Average Annual Snow Water Equivalent as a Percentage of Average 1995-2005 Values



Source: Knowles, N. and Dan Cayan. Potential effects of global warming on the Sacramento/San Joaquin watershed and the San Francisco estuary. September 28, 2002. Geophysical Research Letters. Vol. 29, No. 18.

Fahrenheit) and an increase in precipitation of 20 percent, the winter runoff rose by 75 percent and the summer runoff decreased by 49 percent.

Increased Evapotranspiration Reduces Total Streamflows

Although there is still significant uncertainty regarding how climate change will affect precipitation patterns in the West, a significant body of analysis suggests that total streamflows in the future will be reduced in comparison with historical levels. This change has powerful implications for water managers.

Increased temperatures are expected to lead to increased evaporation and transpiration, which will increase water loss from standing water and decrease soil moisture levels. A seminal study by Gleick and Nash of the Colorado River basin demonstrated the crucial role evapotranspiration plays in water availability. The authors found that with no change in precipitation, a 2 degree Celsius increase in temperature would reduce mean annual runoff by 4 to 12 percent and that the reduction in runoff for a 4 degree Celsius increase would be between 9 and 21 percent. The authors concluded that if temperature rose by 4 degree Celsius, precipitation would need to jump by nearly 20 percent to maintain historical runoff levels.[17]

In 2007, the National Research Council reached similar conclusions in a review of the science regarding hydrologic variability in the Colorado River basin. The investigation included analyses of historical hydrology and likely future variability, as a result of climate change. The report projects that future reductions in total Colorado River streamflow are likely:

"This body of research collectively points to a future in which warmer conditions across the Colorado River region are likely to contribute to reductions in snowpack, an earlier peak in spring snowmelt, higher rates of evapotranspiration, reduced late spring and summer flows and a reduction in annual runoff and streamflow."[18]

This projected reduction in total runoff is anticipated as a result of increased losses to evapotranspiration. Specifically, "(h)igher temperatures will cause higher evaporative losses from snowpack, surface reservoirs, irrigated land and land cover surfaces across the river basin."[19]

The report discusses the significance of this change from a policy perspective. "Any future decreases in Colorado River streamflow, driven primarily by increasing temperatures, would be especially troubling because the quantity of water allocations under the Law of the River already exceeds the amount of mean annual Colorado River flows."[20]

Other efforts have also projected potential decreases in total streamflows. For example, analysis by the California Climate Change Center in 2006 found that climate change could lead to significant reductions in total reservoir inflows and total Delta inflows. Approximately two-thirds of model runs revealed likely reductions in total inflows for major northern California reservoirs, with maximum projected reductions of approximately 12 percent.[21] It is important to note that this analysis does not clearly separate the factors anticipated to cause this reduction.

Potential reductions in total streamflows have far-reaching implications for water managers. This is particularly true because, in many cases, additional water

Table 2-1: Predicted Changes in California's Reservoir and Delta Inflows in 2050 with Climate Change

	Lake Shasta			Folsom Lake			Total Delta Inflows		
	Annual Avg. Inflow (TAF)	Change From Base (TAF)	Change From Base (%)	Annual Avg. Inflow (TAF)	Change From Base (TAF)	Change From Base (%)	Annual Avg. Inflow (TAF)	Change From Base (TAF)	Change From Base (%)
Base	5492			2670			20850		
GFDL A2	5442	–51	–1%	2355	–315	–11.80%	20258	–592	–3%
PCM A2	5177	–315	–5.70%	2410	–260	–9.70%	19939	–911	–4%
GFDL B1	5601	109	2.00%	2368	–302	–11.30%	20071	–778	–4%
PCM B1	5854	362	6.60%	2829	159	6.00%	21789	939	5%

Data derived from Chapter 4 of California Department of Water Resources, Progress on Incorporating Climate Change into Management of California's Water Resources. Technical Memorandum Report. July 2006.

development could be designed to capture flows that are not captured by the current infrastructure. If future average streamflows are lower, it suggests that this infrastructure could be wasted—designed to capture flows that may not be there in the future.

A Warmer Climate Increases the Risk of Fires

Fire is already a serious concern in the West. Where wildlands meet development, fire poses a particular danger to life and property. But fire also provides important benefits and is a necessary process in the West's ecosystems. Many plants actually depend on periodic fire cycles to maintain health and some plants require fire for seed germination. Whether a benefit to the ecosystem or a threat to property, fire can have serious water supply impacts in terms of reduced downstream water quality and loss of reservoir storage capacity due to sedimentation.[22]

Studies show that earlier loss of snowpack will lead to increased stress on vegetation, reduced summer soil moisture, and, therefore, increased threat of fire, particularly in the arid West. There is strong evidence from research at Scripps Institute that this is already occurring in the western United States.[23] Two primary ways for climate change and variability to increase the threat of fire are: an oscillation between periods of increased precipitation and periods of drought—as projected in some climate scenarios—could increase fuel loads and create extreme fire conditions, and; warmer temperatures and consequent low moisture content in soils and fuel could create increased fire risk. Heat waves and high winds would exacerbate these conditions. Frank Davis at University of California Santa Barbara notes that "fire behavior models predict a sharp increase in both ignition and fire spread under warmer temperatures combined with lower humidities and drier fuels."[24]

A particularly interesting finding from the Southwest Regional Assessment is the relationship of climate to fire cycles evident in the tree-ring record.[25] Reconstruction from tree-ring data of wildfire occurrence in the Southwest reveals simultaneous changes occurring after 1700 that reflect climate impacts to wildfire patterns over interannual to centennial time scales.[26] Research by Swetnam et al. highlights the importance of understanding how lag times between climatic events and vegetation response influence subsequent fire patterns.[27] These lag times have important implications for long-range fire hazard forecasting and ecosystem management. For example, based on a 300-year record of climate and fire derived from tree-ring analysis, a pattern of one or more wetter-than-normal El Niño winters in the Southwest, followed by a drier-than-normal La Niña winter, establishes preconditions for unusually large and intense wildfires.[28] Further, certain kinds of episodic ecological disturbances, such as insect outbreaks, may be traceable to patterns in climatic variability.[29]

Sea Level Rise Threatens Water Supply, Water Quality and Wetlands

Global warming drives two primary mechanisms of sea level rise: thermal expansion of seawater as the oceans warm, and; melting of mountain glaciers and massive bodies of polar ice—particularly the Antarctic and Greenland ice sheets.

The Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report projects that sea levels will rise by 7 to 23 inches by the year 2100—a consequence that brings profound implications for water resources in the West.[30] This estimate does not account for the accelerated melting of the Antarctic and Greenland ice sheets.

The melting of ice sheets brings the largest potential rise in total sea levels, as their complete melting would result in a 70-meter increase in global sea levels.[31]

A great deal of uncertainty exists regarding ice sheet dynamics and the limitations of current modeling. For example, a NASA/University of Kansas study published in the March 24, 2006 issue of *Science* by Jonathan Overpeck and co-authors, estimated that the last time Arctic temperatures were as high as those projected for the 21st century (about 125,000 years ago), sea levels was 4 to 6 meters higher than it is today.[32] It is difficult to estimate how long it would take for sea level to rise this much, University of Texas researchers determined that the Greenland ice sheet is currently melting three times faster than during the previous five years, underscoring the already accelerating rates of ice sheet melting.[33] Although uncertainties exist in forecasting the rate of ice sheet melting, acceleration in sea level rise is real, bringing serious implications for coastal land and water supply.

On the West coast, sea level rise presents potentially severe impacts. For example, for the San Francisco Bay and the Sacramento-San Joaquin River Delta, global warming impacts will compromise ecosystem health, water supply, and water quality (see "The Rising Costs of Rising Sea Level"). Sea level rise could also affect water supply by causing wetland erosion and surface water and

The Rising Costs of Rising Sea Level

The predicted increase in physical damage to the coastal structures and coastal erosion associated with sea level rise inundation will have significant and far-reaching costs. The IPCC Third Assessment Report estimates that in the case of a 0.5-meter sea level rise, the financial costs of cumulative flooding impacts to U.S. coastal property would reach at least $20 billion to $150 billion. Storm surges and floods have the potential to breach levees, leading to massive economic and social costs—as seen in the aftermath of Hurricane Katrina in New Orleans. These costs must be considered when evaluating the reliability of future water supply projects, particularly those that include the building of storage facilities and physical ocean barriers, such as levees.

Source: Burkett, V., J.O. Codignotto, D.L Forbes, N. Mimura, R.J. Beamish, V. Ittekkot. "Coastal Zones and Marine Ecosystems" in *Climate Change 2001: Impacts, Adaption, and Vulnerability,* James J. McCarthy, Osvaldo F. Canziani, Neil A. Leary, David J. Dokken, Kasey S. White, eds. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change. 881 p.

groundwater salination. The inundation of wetlands induced by climate change could weaken their critical role as a natural water filtration system.[34] In addition, inundation due to sea level rise will increase salinity intrusion into coastal aquifers.[35]

CLIMATE CHANGE WILL AFFECT FLOOD MANAGEMENT

Flood management has been the cause of growing concern—and cost—throughout the United States, particularly in the West as floodplains are urbanized. According to data from the National Weather Service, from 1955 to 2003 the average annual cost of flood damages combined for California, Washington, Oregon, Nevada, New Mexico, Utah, Colorado, Arizona, and Montana has been more than $332 million in today's dollars.[36] However, for the period between 1994 and 2003 the annual average was almost $930 million per year—an increase reflecting the growing severity of a situation that will only be made worse by the effects of climate change.

In the West, the majority of the annual precipitation occurs in the winter and early spring. That timing creates a tension between flood control and water supply. Most large reservoirs serve a dual purpose: providing flood protection during the wet months and water supply during the rest of the year. In order to provide flood protection, reservoirs must keep a percentage of their total storage capacity empty in the event that space is needed to capture high flows and prevent flooding downstream. But as the end of the wet season nears, water managers must balance the risk need to maintain sufficient storage space in their reservoirs for flood protection against the risk of leaving too much storage space and not filling reservoirs with water that will be needed during the dry season.

Scientists indicate that climate change will exacerbate the problem of flooding by increasing the frequency and magnitude of large storms, which in turn will cause an increase in the size and frequency of flood events. The increasing cost of flood damages and potential loss of life will put more pressure on water managers to provide greater flood protection. At the same time, changing climate conditions (decreased snowpack, earlier runoff, larger peak events, etc.) will make predicting and maximizing water supply more difficult. Water managers should be prepared to respond to these new challenges by improving floodplain management, and considering the reoperation of existing reservoirs and other water supply infrastructure.

Walking the Tightrope: Managing Dams for Water Supply and Flood Protection

Even under normal circumstances, maximizing water supplies is complicated by the inherent unpredictability of weather. To walk this tightrope, water managers work throughout the spring with snowpack data, and often aided

> **"Intensification of the hydrological cycle could make reservoir management more challenging, since there is often a tradeoff between storing water for dry-period use and evacuating reservoirs prior to the onset of the flood season to protect downstream communities. It may become more difficult to meet delivery requirements during prolonged periods between reservoir refilling without also increasing the risk of flooding."**
>
> Source: Climate Change and Water Resources, AWWARF

by computer models, to assess likely runoff into storage facilities. However this is an imprecise science at best because forecasting seasonal weather patterns for even a few weeks, let alone a month or two, is highly uncertain. The changes in snowpack and precipitation patterns related to global warming will make maximizing water supplies without increasing the risks of flooding even more challenging.

Despite some increases in winter precipitation, much of the mountainous West has experienced declines in spring snowpack over the past 50 years. According to two studies by climate scientists at the University of

The Other New Orleans: California's Delta and Sea Level Rise

Sea level rise has the potential to be among the most visible, harmful, and costly impacts of climate change. A rising sea level presents particular challenges for low-lying urban areas. California's San Francisco Bay-Delta provides an important example of the potential water supply impacts of climate-driven sea level rise.

The Delta represents the upper tidal reach of San Francisco Bay, the largest estuary on the western coast of the Americas. The Delta's watershed includes 40 percent of the state. The Delta is a significant surface water source and the state's largest riverine ecosystem—a resource of enormous environmental and economic value.

Farm flooding resulting from 2004 Jones Tract levee failure

More than 20 million people rely on it for a portion of their water supply; water for Central Valley farms, parts of the San Francisco Bay Area, and Southern California is diverted by massive water pumps in the Southern Delta. And although most of the 1,000-square-mile tule marsh that was once the Delta has been converted to farmland, the Delta still plays a critical role in supporting the biggest salmon run south of the Columbia River. Every winter its islands fill with swans, geese, and sandhill cranes. The hundreds of miles of channels that wind through dozens of leveed agricultural islands are a Mecca for boaters, windsurfers, and anglers. Four-hundred-thousand Californians live in Delta communities. The Delta is also crisscrossed by infrastructure, including power lines, and highways.

The Achilles heel of the San Francisco Bay-Delta may be the confluence of three factors: subsidence, sea level rise, and high levels of water diversions. When the Delta's light peat soils are farmed, they blow away, compact, and oxidize, causing the elevation of these farmlands to fall. Today, thousands of acres of Delta islands are 20 feet or more below sea level. It's not uncommon to stand on Delta farmland and look up at a boat 20 feet overhead as it sails by on the other side of a levee. In parts of the Delta, subsidence is continuing at 1 to 3 inches per year.

A recent study by Jeffrey Mount of the University of California at Davis and Bob Twiss of the University of California at Berkeley found that the Delta's future is threatened by several factors: ongoing subsidence, shaky century-old levees, floods, earthquakes, and sea level rise. Mount and Twiss estimated that the Delta has a 64 percent chance of a catastrophic failure of multiple Delta levees by 2050. Such a failure would threaten the Delta's residents, farms, and infrastructure.

If many islands were to flood simultaneously, particularly during the summer when less fresh water flows from the rivers that feed the Delta, it could draw salty San Francisco Bay water into the Delta, threatening important water supplies. The economic impacts of such a catastrophic failure could be widespread and long lasting. The failure of New Orleans' levees has awakened California water users and agencies to the long-term risks to stability of the Delta. Of all of the challenges facing the San Francisco Bay-Delta, sea level rise may be the most critical. There are more than 1,100 miles of Delta levees, many of which are in poor repair. Improving and raising all of these levees several feet may be financially infeasible.

Sources: U.S. Geological Survey, "Delta Subsidence in California," April 2000. http://science.calwater.ca.gov/pdf/fs00500.pdf.

Mount, Jeffrey, UC Davis, and Bob Twiss, UC Berkeley. "Subsidence, Sea Level Rise and Seismicity in the Sacramento-San Joaquin Delta." *San Francisco Estuary and Watershed Science,* Vol. 3, No. 1, March 2005.

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> **"Models project that increasing atmospheric concentrations of greenhouse gases result in changes in frequency, intensity and duration of extreme events, such as more hot days, heat waves, heavy precipitation events and fewer cold days. Many of these projected changes would lead to increased risks of floods and droughts in many regions..."**
>
> Source: Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2001: Synthesis Report, Summary for Policymakers*

Washington and the University of Colorado, snowpack has decreased by 15 to 75 percent in parts of Oregon, western Washington, northern California and the northern Rockies, mainly because of climate change.[37] Increased temperatures cause a greater percentage of wintertime precipitation to fall as rain instead of snow.[38] The resulting reduction in snowpack causes a drop in the total amount of spring snowmelt runoff. The snowpack that does form is melting earlier in the year, further exacerbating changes in stream hydrology.[39]

The magnitude and frequency of larger high flow events are predicted to increase under climate change for two primary reasons. The first is related to the decrease in snowpack. Several 2002 climate change studies found that in California, peak streamflow occurred up to two months earlier in the year due to a decrease in the number of freezing days in the season, a drop in snowpack, and an increase in early snow melt.[40] The studies also showed that such changes "suggest that 50 percent of the season runoff will have occurred early in the year for many snow melt driven watersheds in the West, and the resulting early snow melt implies higher streamflow increases and an increased likelihood of more flood events in future years."[41]

A second factor causing higher peak flows is the basic relationship among temperature, evaporation rates, and the amount of moisture in the atmosphere. Climate models show that the warming of the earth's surface increases evaporation and the amount of water vapor in the atmosphere. Increases in water vapor, a primary factor in providing moisture for rain, will mean heavier precipitation during storm events. The USGS modeled the effects of climate change on increased storm intensity and found that the risk of a 100-year flood event will grow larger in the 21st century. Instead of a 1 percent chance that in any year there will be a 100-year flood event, the likelihood in a single year could become as high as one in seventeen.[42]

CLIMATE CHANGE WILL AFFECT WATER QUALITY

Changes in precipitation, flow, and temperature associated with climate change will likely exacerbate water quality problems. Changes in precipitation affect water quantity, flow rates, and flow timing.[43] Decreased flows can exacerbate the effect of temperature increases, raise the concentration of pollutants, increase residence time of pollutants, and heighten salinity levels in arid regions.[44]

On the one hand, higher water flows can dilute point-source pollutants, drive up loadings from non-point source pollutants, and reduce the residence time for contaminants. Higher flows can also increase the export of pollutants to coastal wetlands and deltas.[45] In addition, higher flows can cause higher turbidity in lakes, which reduces the light penetration crucial to the health of aquatic life.[46] On the other hand, where surface flows decline, erosion rates and sediment transport may drop, and lake clarity may improve but this may increase the concentration of pollutants.

The effect of climate change on water quality will also be felt at our beaches, as the rate of beach closures will likely go up. In recent years, beaches have been closed repeatedly because of unhealthy levels of bacteria and other contaminants in the water.[47] The primary cause of these high bacterial levels is runoff from storms. Rain that is channeled into storm drains and backed up into sewage systems flushes bacteria, feces, pesticides and pollutants such as motor oil and trash into coastal waters. The increase in severe storm events predicted by global warming models is likely to mean more polluted runoff in a climate-altered future.

Finally, as discussed earlier, climate change is likely to increase fire risks in much of the West. This increase in burning in western watersheds has the potential to increase downstream fire-related sedimentation and other water quality problems. For example, heavy rainfall in Colorado in 1996, following the 12,000-acre Buffalo Creek fire, deposited 600,000 cubic yards of sediment into a Denver Water storage facility in the Upper South Platte River basin.[48] This amounted to more than 13 years of average siltation in just a few days. Such events may be larger and more frequent with climate change.

> **"Aquatic and wetland ecosystems are very vulnerable to climate change. The metabolic rates of organisms and the overall productivity of ecosystems are directly regulated by temperature. Projected increases in temperature are expected to disrupt present patterns of plant and animal distribution in aquatic ecosystems. Changes in precipitation and runoff modify the amount and quality of habitat for aquatic organisms, and thus, they indirectly influence ecosystem productivity and diversity."**
>
> Source: Pew Center on Global Climate Change, *Aquatic Ecosystems and Global Climate Change: Potential Impacts on Inland Freshwater and Coastal Wetland Ecosystems in the United States,* 2002.

CLIMATE CHANGE WILL AFFECT AQUATIC ECOSYSTEMS

The United States is home to more than 800 fish species and thousands of aquatic invertebrates and insects found nowhere else.[49] The extinction rate for freshwater species in this country equals or exceeds that of other ecosystems.[50] The aquatic ecosystems found within our streams, lakes, and wetlands have been negatively affected for decades by changes in the environment such as dam construction and flow diversions, loss of habitat associated with development, decreased water quality, and now, climate change. Climate change will further exacerbate the current challenges faced by aquatic ecosystems. Understanding how climate change impacts aquatic ecosystems will allow water managers to implement appropriate strategies that support long-term aquatic ecosystem health, reduce endangered species related conflicts, and minimize impacts on water supplies. There are two major ways that climate change will impact ecosystems: increased temperatures and altered hydrology.

Increased Temperatures

Water temperature influences aquatic ecosystems primarily in terms of ecological and biological factors such as dissolved oxygen levels and the ability of a species to exist within the range of temperatures. Climate change will increase air temperatures, and hotter air will translate into warmer water temperatures in streams and rivers.[51,52] Warmer water will cause increased stress on aquatic species that may already be near their limit of temperature tolerance because they inhabit low-elevation areas or are near the southern edge of their distribution.

In response to climate change, many species will need to expand their range northward, or into cooler, higher elevations upstream, otherwise they will disappear from the watershed. Studies have found that a 4 degree Celsius increase would require some species to move approximately 420 miles northward to find temperature conditions similar to that of their original habitat.[53] The ability of species to adjust their range depends on its ability to move and find suitable habitat. Although avian species may be more mobile, resident fish and plants are less likely to be able to disperse to new locations, even over several generations. Migration barriers and the highly fragmented nature of most of our remaining riverine ecosystems pose many challenges to such geographic shifts.

Even if species can move within a watershed, new conditions at higher elevations may not be suitable for the displaced species. Fish that need deep pools or the lower flow velocities conditions typical of lower elevations within a watershed may be unable to find such conditions in the steeper reaches upstream. Dams and other infrastructure may also prevent access to portions of the river upstream. Overcoming these challenges is made all the more difficult by the fact that the current rapid rate of climate change will pressure species to adapt over decades, not the centuries normally needed to adapt to historic climate change.

Increased water temperatures and seasonally reduced streamflows will alter many ecosystem processes, with potential direct societal costs.[54] In addition to negatively impacting species, higher water temperatures will decrease water quality. As water temperatures rise, the amount of dissolved oxygen in water drops.

On the lower San Joaquin River in California, reduced dissolved oxygen levels have caused fish kills and created temporary seasonal barriers to the migration of salmon. Upstream dams and diversions have lowered streamflows. Lower flows have in turn led to increased water temperatures, concentrated nutrient loading from agriculture runoff and wastewater discharge.[55]

When higher water temperatures promote the growth of algae, this can further cut the amount of dissolved oxygen in the water, creating stressful or fatal conditions for fish. Higher water temperatures can also negatively impact ecosystem dynamics, including predator-prey relationships. On the Columbia River in Washington, for instance, warmer temperatures have created a thermal

Fish at Risk: Salmon in the Klamath River and Silvery Minnow in the Rio Grande

In recent years, the West has seen numerous water resource conflicts pitting protection of threatened and endangered species against the need for water supplies. The salmon kills on the Klamath River and the near extinction of the silvery minnow on the Rio Grande are the kinds of conflicts likely to become more common due to climate change impacts on already impaired aquatic water ecosystems.

A series of dams and diversions provide water for agriculture on the Klamath River in the northern California. At the same time, these dams and diversions significantly reduce in-streamflows. In 2002, low flows contributed to high water temperatures, which impeded migration and caused the death of more than 35,000 adult salmon. As a result of the adult fish kills in 2002 and the severely reduced population of juveniles the following year, salmon fisheries were heavily restricted in 2006 in California to protect the few returning Klamath adults, even though strong runs of salmon were returning on other rivers along the coast and in the Central Valley. The fishing restrictions hit the already struggling fishing industry hard.

Similarily, the Rio Grande silvery minnow was listed under the Endangered Species Act in 1994; it faced possible because of loss of habitat and the effects of dams and diversions constructed for municipal and agricultural use. Continued declines in the silvery minnow population lead to lawsuits against the Bureau of Reclamation and the Army Corps of Engineers. Today, this species is found in less than 5 percent of its historic range and is heavily managed to prevent its extinction.

Climate change will add new stresses to those associated with water supply diversions. As a result, aquatic ecosystems and sensitive species may be pushed to the point of collapse, thereby increasing the likelihood of even greater conflicts and the need to reduce water supply diversions to meet regulatory protections.

Source: Ikenson, B., 2002. "Rio Grand Silvery Minnow." *Endangered Species Bulletin,* March/June 2002, Vol. XXVII, No. 2.

barrier to migration for Coho salmon and have resulted in increased predation on juveniles by predator species.[56]

Not all impacts of warming will be harmful. For species that are limited in range due to cold temperatures, particularly in the northern latitudes, a warmer climate may have benefits. However, the benefits to relatively few species are vastly outweighed by the negative impacts that climate change will have on other species and ecosystems in the western states.

Altered Hydrology

The effects of climate change on seasonal variations in streamflows may have significant impacts on fish species, regardless of changes in water temperature. The hydrology of streams—including the timing, magnitude, frequency, and duration of flows—significantly influences the nature of stream ecosystems, particularly the physical characteristics such as the shape of the channel. Many species time their movements up or downstream or out to sea to take advantage of often temporary in-streamflow conditions. Regional shifts in climate that substantially and permanently alter the timing and magnitude of flows can further impact habitat suitability for many species.[57] As a result, alterations in timing and amount of rainfall can significantly impact their ability to reproduce and cause decreases in population numbers.

In the West, the typical snowmelt-driven stream hydrology entails high spring flows followed by lower summer, fall and winter base flows. But global warming is causing earlier snowmelt by increasing winter and springtime temperatures. Earlier snow melt changes the timing of high flows that are important to aquatic species for reproduction and predator avoidance.[58] In many western streams, spring runoff is critical to the rearing of

juvenile fish and the downstream migration for salmon on their way to the sea.

Earlier runoff can also result in lower streamflows in the summer and fall. Lower flows may result in warmer and shallower stream conditions that make it more difficult for migratory fish. Similar impacts of reduced in-streamflows already occur on many major rivers due to impoundment or flow diversion. Climate change could exacerbate this problem by shifting seasonal patterns of precipitation and in-streamflow.

Increased frequency and magnitude of peak flows have been observed and they are predicted by a number of climate models.[59,60] In the West, models show that an increased percentage of precipitation falling as rain instead of snow will mean higher peak flows even if total precipitation stays the same. The resulting increase in peak flows has implications for public safety as discussed earlier in this report and can also negatively impact aquatic ecosystems. Increased intensity of precipitation will lead to more runoff, which in turn can cause more sediment and pollution from the contributing watershed to make their way into water bodies. Higher flows can increase the rate at which beneficial nutrients are flushed out of the watershed and can displace species downstream to potentially less suitable habitat. The cumulative effects of higher peak flows can also cause significant shifts in species composition and may change some habitats so much that some species are eliminated from affected areas.[61]

For many species that are already struggling, the relatively rapid change in seasonal hydrology combined with increasing water temperatures will further degrade important habitats, increasing the need for environmental protection measures, such as flow and temperature requirements. The extent to which water supplies are affected by management actions requiring decreased flow diversion will largely depend on whether there are other management options to mitigate the impacts related to climate change. Adequate flows are essential to sustain aquatic ecosystems and sensitive species. But nonflow actions such as removing migration barriers, improving water quality, and restoring habitat can significantly reduce the need for additional flows.

Cold-Water Fish Such as Trout and Salmon Threatened by Warmer Waters

Cold-water species such as trout and salmon will be particularly vulnerable to warming waters. A study by Eaton and Scheller found that higher maximum temperatures in streams across the continental United States caused by an average air temperature increase of about 4 degrees Celsius would result in a decline of about 50 percent in thermally suitable habitat for 57 species that require cold or cool water—including game fish such as trout, salmon, and perch. Other researchers have predicted that an increase in air temperature of 3 degrees Celsius in streams of the Rocky Mountain region would reduce suitable stream habitat for trout by up to 54 percent.

Of particular concern is the number of streams that will cease to support a wide range of trout and salmon species due to increased temperatures. An analysis based on emission scenarios provided by the Intergovernmental Panel on Climate Change (IPCC) found that up to 38 percent of locations currently suitable for cold-water fish will become too warm to provide habitat by 2090.

Sources: Eaton, J.G., and R.M. Scheller, 1996. "Effects of Climate Warming on Fish Thermal Habitat in Streams of the United States." *Limnology & Oceanography* 41:1,109-1,115.

Keleher, C.J., and F.J. Rahel, 1996. "Thermal Limits to Salmonid Distributions in the Rocky Mountain Region and Potential Habitat Loss Due to Global Warming: A Geographic Information System (GIS) Approach." *Transactions of the American Fisheries Society* 125:1-13.

Rahel, F.J., C.J. Keleher, and J.L. Anderson, 1996. "Habitat Loss and Population Fragmentation for Coldwater Fishes in the Rocky Mountain Region in Response to Climate Warming." *Limnology & Oceanography* 41:1116-1123.

O'Neal, K., 2002. *The Effects of Global Warming on Trout and Salmon in U.S. Streams*. Natural Resources Defense Council and Defenders of Wildlife.

HOW CLIMATE CHANGE WILL AFFECT WESTERN HYDROPOWER

The West relies on dams, in addition to water supply and flood control, for hydropower generation. In California, for example, hydropower provides an annual average of 15 percent of California's electricity production.[62] But hydropower production is heavily influenced by variations in weather. In 2001, low snowpack in the Pacific Northwest diminished hydropower generation and contributed to energy shortages along the West Coast, illustrating just how vulnerable hydropower in the West is to climate change.[63]

Global warming could have a detrimental effect on the relationship between hydropower production and energy

demand. As discussed in earlier sections, scientists anticipate a shift in hydrology that includes in reduced winter snowpack, higher peak flows, earlier snowmelt runoffs in spring, and decreased summer streamflows. This shift would likely increase hydropower production supply in winter and spring, but decrease it during summer when less water is available as inflows. However demand for power, intensified by climate change, is likely to follow an opposite trajectory. An overall increase in temperatures could lead to lower winter demand for heating and greater summer demand for air conditioning. Thus, when energy is needed in summer to meet the greater demand for air conditioning, hydropower's energy production will likely be hindered, given the predicted decrease in summer flows. Another vulnerability of higher peak streamflows is an elevated risk of reservoir spills, are a key vulnerability of higher peak streamflows, which would contribute to an overall reduction of net generation.

The Portland Water Bureau (PWB) sponsored a study by Richard Palmer and Margaret Hahn of the University of Washington. The study concluded that a change in runoff timing would create problems for both water supply reliability and hydropower capacity. In Palmer and Hahn's analysis of future climate change scenarios, they found that the PWB system's winter flows could increase by as much as 15 percent and that late spring flows could decrease by 30 percent.[64] These changes, combined with an summertime increases in water and electricity use, present serious challenges for PWB. Simply put, early runoff results in water being less available when demand is highest for both water supply and hydropower energy production. Further, the Palmer and Hahn study found that global warming could exacerbate this water and energy supply problem because one of its key effects is an increased possibility of flooding. As fewer freezing days may raise runoff levels, the need intensifies to manage hydroelectric dams for greater flood protection at the expense of hydropower production and water supplies.[65]

For more information regarding the Palmer and Hahn study, please see the Portland Water Bureau Case Study in Appendix A.

Chapter 3

The Water and Energy Connection

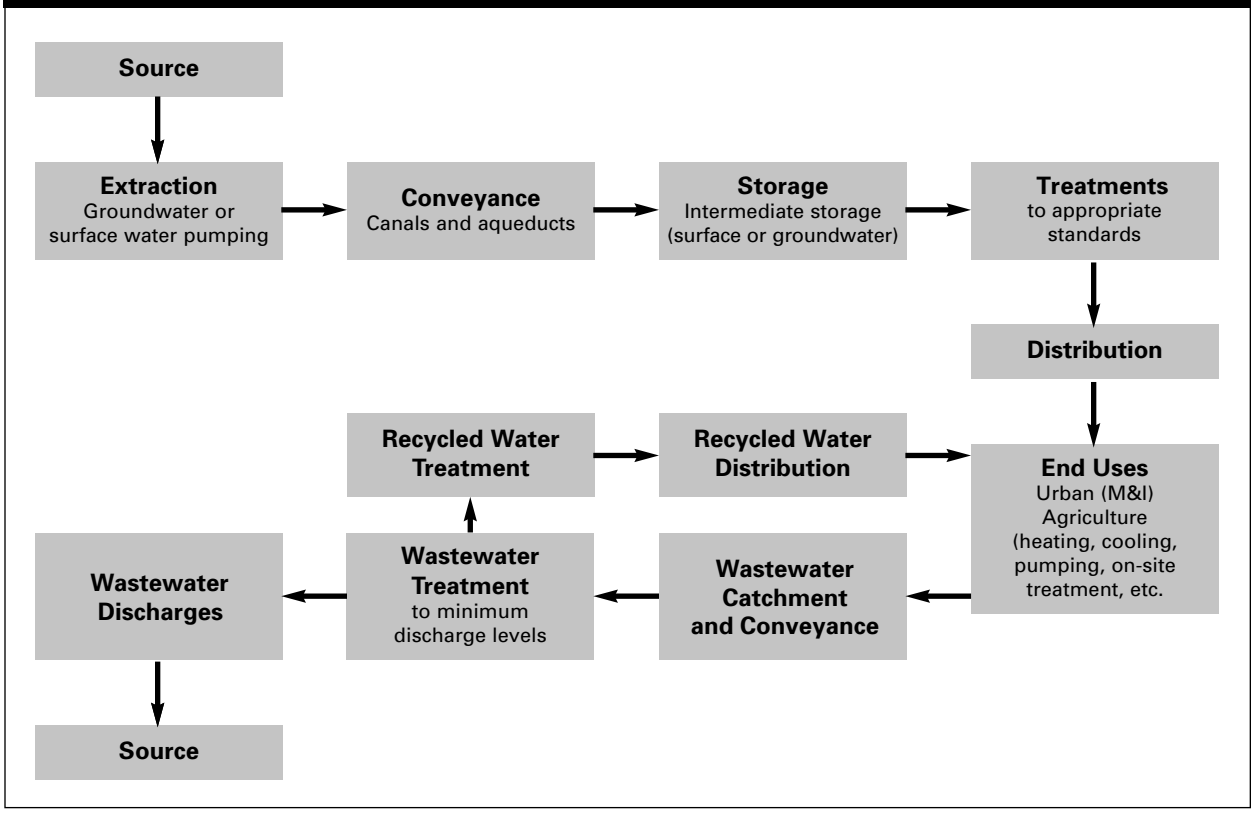
The strong connection between energy use and water management is often overlooked. Because the energy implications of water supply decisions can be so large,[1] the water/energy nexus will be increasingly important to future efforts to reduce greenhouse gas emissions. The California Energy Commission estimates that 19 percent of the state's electricity use, more than 30 percent of the natural gas use (aside from what is consumed by power plants), and 88 million gallons of annual diesel fuel consumption, are associated with water use.[2] In fact, the California State Water Project (SWP) is the single largest energy user in the state. The water and energy connection is discussed in greater detail in the report *Energy Down the Drain*, by NRDC and The Pacific Institute.

Water use efficiency and water recycling, along with groundwater recharge and stormwater management options, can provide significant opportunities for water managers to simultaneously improve water supply reliability, cut costs, save energy and reduce greenhouse gas emissions. An improved understanding of the relationship between energy and water will assist water managers incorporating climate change into management plans (see Figure 3-1).

The four principal elements of water systems use energy are: (1) water extraction, conveyance, and storage; (2) water treatment and distribution within service areas; (3) end use, including on-site water pumping, treatment, and thermal inputs (heating and cooling); and (4) wastewater collection, treatment, and discharge. Energy intensity, or embedded energy, is the total amount of energy calculated on a whole-system basis that is required for the use of a given amount of water in a specific location (see Figure 3-1).

Energy inputs to water systems, and related greenhouse gas emissions, vary considerably by energy sources and geographic location of both end users and water sources and end users. Water use in certain areas is highly energy intensive due to the combined requirements of extraction, conveyance, local treatment and distribution, and wastewater collection and treatment processes. In areas where a large percentage of power is provided by coal-fired plants, the greenhouse gas intensity of water use is particularly high.

Figure 3-1: Flow Diagram of Energy Inputs to Water Systems



Source: This schematic and method is based on Wilkinson (2000) with refinements by Gary Klein, California Energy Commission; Gary Wolff, Pacific Institute; and others. It is available as a simple spreadsheet tool from Wilkinson at Wilkinson@es.ucsb.edu.

Source and Conveyance of Water

Significant amounts of energy are often required to extract a source of water usable and to move the water to where it will be treated and used. Most water used in the United States is diverted from surface sources, such as rivers, streams and lakes, or pumped from groundwater aquifers. Conveying water often requires pumps to lift the water over hills and mountains, a process that can require large amounts of energy. In California, the State Water Project lifts water 2,000 feet over the Tehachapi Mountains—the highest lift of any major water system in the world. Where water is stored in intermediate facilities, additional energy may be required to store and then recover it. Smaller amounts of freshwater are produced from saltwater, brackish water, or wastewater using desalination or recycling technologies. Desalination requires energy to remove salts from water through reverse osmosis or other processes. Water recycling also requires energy to remove pollutants from wastewater.

Treatment and Distribution

Water treatment facilities use energy to pump and process water. The amount of energy required for treatment depends on source water quality. The energy required nationally for water treatment is expected to increase over the next decade as treatment capacity expands, new water quality standards are put in place, and new treatments are developed to improve drinking water quality, including taste and color. After water is treated, additional energy is typically required for local pumping and pressurization, but gravity pressurization and distribution is also possible when reservoirs are sufficiently higher than residences and businesses. Agricultural water generally is not treated before use.

End Uses

Water users require energy to further treat water supplies (e.g., softeners and filters), circulate and pressurize water supplies (e.g., building circulation pumps), and heat and cool water for various purposes. End use energy comprises

a major portion of water-related energy use. For example, water heating for one inefficient showerhead can use up to 2,800 kilowatt hours per year—almost as much energy as it takes to pump the annual water supply for two Southern California homes over the Tehachapi Mountains.[3]

Wastewater Collection and Treatment

Wastewater is collected and treated by a wastewater system (unless a septic system or other alternative is being used) and discharged. Wastewater is often pumped to treatment facilities where gravity flow is not possible and standard treatments requires energy for pumping, aeration, and other processes.

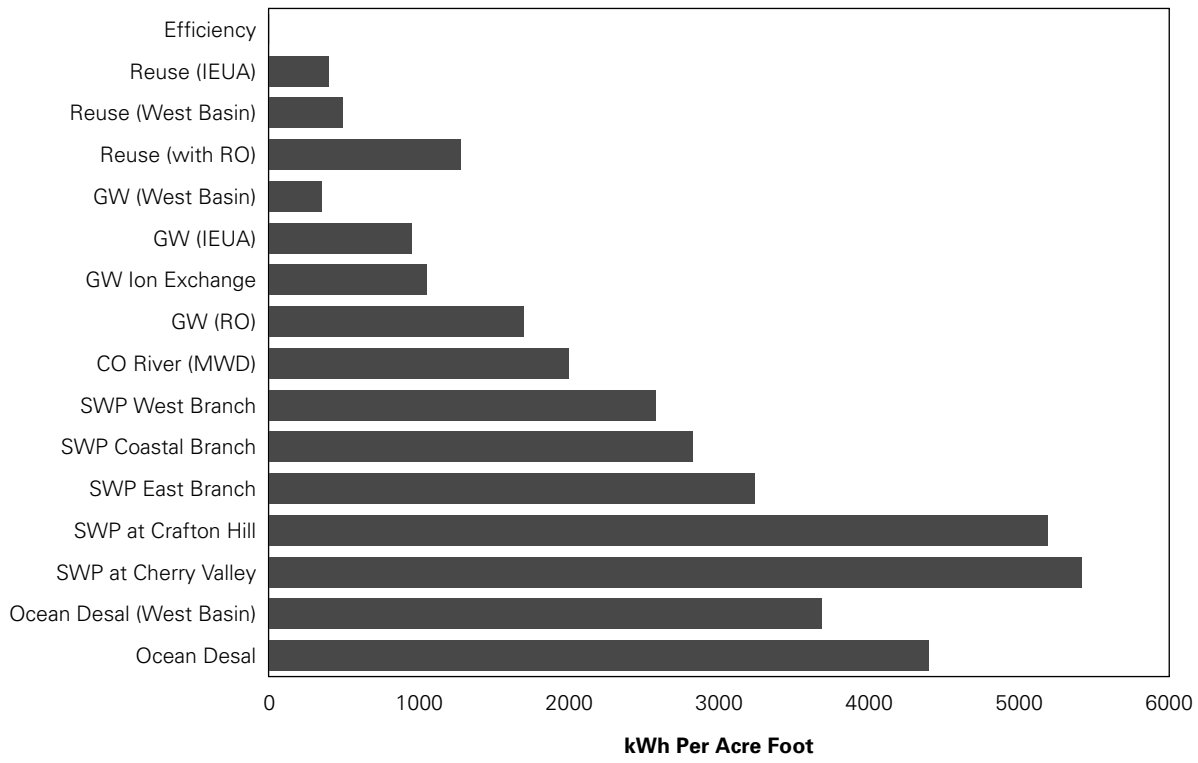
Reducing Water-Related Energy Use

Water use efficiency is the single best way to reduce water-related energy use. As noted above, the energy required for end uses of water (e.g., washing machines, cooling towers) is a major component of energy use in the urban water supply cycle. Water use efficiency saves end use energy, as well as the upstream energy needed to convey, treat, and distribute that water and the downstream energy needed to treat and dispose of wastewater. Therefore, improving water use efficiency, particularly for energy intensive uses of water, is important regardless of the source of the water or location of its use.

An analysis of water management options for the San Diego County Water Authority found that the total energy savings from relying on improved water use efficiency instead of additional State Water Project deliveries to provide the next 100,000 acre-feet of supply would be approximately 770 million kWh, This would be enough to supply electricity to 118,000 households—25 percent of the homes in San Diego—for a year.[4]

Most local sources are more energy efficient than imported water supplies. Figure 3-2 shows the energy intensity of water supply options for two southern California water agencies:

Figure 3-2: Energy Intensity of Alternative Supply Sources in Two Southern California Water Agencies



Source: Wilkinson based on data from Inland Empire Utilities Agency (IEUA), West Basin Municipal Water District, and California Department of Water Resources.

the Inland Empire Utilities Agency and the West Basin Municipal Utility District. The analysis indicates that water use efficiency is the least energy intensive option and that recycled water and local groundwater sources are a relative energy bargain compared with imported supplies. Even the Chino desalter, a reverse osmosis (RO) process for contaminated groundwater that includes groundwater pumping and RO filtration, is far less energy intensive than any of the imported sources of water. From an energy standpoint, local sources of reclaimed water and groundwater—including contaminated sources requiring advanced treatment—are remarkably efficient. Similar findings were made for the Central Basin Municipal Water District.

The energy intensity of many water supply sources may increase in the future due to regulatory requirements for water quality.[5] Advanced treatment systems such as reverse osmosis (RO) are being used to treat groundwater, reclaimed supplies, and ocean water. They can produce very high quality water. As a result, they are likely to face fewer energy impacts from more stringent water quality regulations. By contrast, some of the raw water supplies, such as Colorado river and Delta water, may require larger incremental energy inputs for treatment, due to high salinity, including arsenic and perchlorate. This may further increase the advantage of obtaining water from local sources.

Recent State and National Actions to Address Energy-Water Issues

Recently, the link among water, energy, and climate has been getting increased attention. For example, the California Energy Commission (CEC) issued a report on the water/energy relationship and incorporated recommendations into its *Integrated Energy Policy Report* (IEPR) submitted to the state legislature in December 2005. According to the IEPR, investing in water conservation can achieve 95 percent of the energy and demand-reduction goals planned by the state's investor-owned energy utilities for the 2006–2008 program period at 58 percent of the cost of traditional energy efficiency measures.[6] The CEC report noted that "water agencies are seldom given credit, nor are they able to secure funding, for the electricity savings that result from water conservation and efficiency efforts."[7]

In the IEPR, the CEC recommended that "the California Public Utilities Commission (CPUC), Department of Water Resources, the Energy Commission, local water agencies and other stakeholders should assess efficiency improvements in hot and cold water use in homes and businesses and include these improvements in 2006–2008 programs."[8] To address this important implementation obstacle to integrated water and energy conservation programs, the CPUC has embarked upon a process for rulemaking on issues related to embedded energy, and is currently evaluating proposals for pilot programs that focus on saving embedded energy through improved water use efficiency.[9]

Building on the CEC work, California's Climate Action Team recently took the unprecedented step of identifying water use efficiency as a tool to reduce climate change emissions and the California State Legislature is considering legislation requiring water agencies to evaluate the energy impacts of its water management alternatives. As California implements AB 32, The Global Warming Solutions Act, water efficiency measures are among the suite of actions that will be evaluated for their ability to help the state meet its greenhouse gas emission reduction goals.

On the national level, the U.S. Department of Energy's Sandia National Laboratory is leading the National Energy/Water Roadmap Program initiated in 2005, as requested by Congress. The purpose of this integrated energy/water research and development program is "to assess the effectiveness of existing programs within the Department of Energy and other Federal agencies in addressing energy and water related issues, and to assist the DOE in defining the direction of research, development, demonstration, and commercialization efforts."[10]

These efforts represent the beginning of better-integrated water, energy, and climate policy. Information about the energy and climate implications of water use can help improve public policy and facilitate combined investment and management strategies among energy, water, and wastewater entities. Potential benefits include improved allocation of capital, avoided capital and operating costs, reduced burdens on ratepayers, emission reductions, and environmental benefits.

Chapter 4

A Guide for Water Managers: Designing a Comprehensive Response to Climate Change

Many water managers are already taking action to understand and address impacts related to climate change. This section is designed to summarize some of these actions and review "best management practice" approaches to these important challenges. Given the wide range of potential climate change impacts on water systems across the West, water managers have numerous options at their disposal to address the effects of climate change.

If well designed, these tools can provide a robust response, potential climate change impacts on water management, and a broad array of additional benefits. This chapter outlines four critical steps water managers can take to ensure a steady supply of quality water in the face of the challenges that climate change poses to the system. It sets forth strategies to make each step successful given the limited resources every water manager faces. Here are the four steps:

1. Vulnerability analysis: Evaluating the vulnerability of water supply systems, flood management systems, watersheds, and aquatic ecosystems to water-related climate impacts.

2. Response strategies: Implementing response strategies to reduce future impacts of climate change in two major areas: water supply and water management, including flood management and aquatic ecosystems.

3. Prevention: Taking immediate and sustained action to reduce greenhouse gas emissions in order to minimize future impacts.

4. Public outreach: Increasing public awareness of climate change and potential water-related impacts and opportunities.

VULNERABILITY ANALYSIS

An essential first step for water managers is to examine both local and regional effects of climate change. Given that a variety of factors can influence how climate change affects water resources, including the geographic location of sources, end uses, and the nature of the existing water supply infrastructure, each water resource agency should undertake an agency-level analysis to understand how climate change will impact their specific water-related resources and to lay the groundwork for the development of a response plan.

Agencies should also consider joining with other agencies to undertake analysis on a regional level because the impacts of climate change will affect agencies that derive water supplies from a larger shared resource (e.g., the

Colorado River, San Francisco Bay-Delta) and because some agencies in the same region may face similar challenges (e.g., the Sierra Nevada, the Rocky Mountains and the Northwest). Regional analysis will also facilitate cooperative responses and leverage limited resources to produce better results.

Elements that should be considered in conducting local and regional analyses of the effects of climate change on water supply are provided on the following pages. See Appendix A for detailed case studies illustrating how particular water agencies have tackled the challenge of climate change at the local, state and regional levels.

Assessing Water Supply System Vulnerabilities

Water supply systems are designed and operated to meet numerous objectives including water supply, flood protection, hydropower generation, and in-streamflow requirements—all of which are based on a retrospective view of hydrology. As climate change occurs, water infrastructure systems will face conditions different from those for which they were designed, presenting significant challenges for managers. Vulnerability analysis should be done to investigate how specific systems will react to climate-related changes. An analysis should examine a range of fundamental factors, including watershed characteristics, allocation, storage versus runoff ratio, diversity of water supply, flood management, shared regional water resources, water quality impacts, resource allocation and environmental water requirements.

Location and Watershed Characteristics

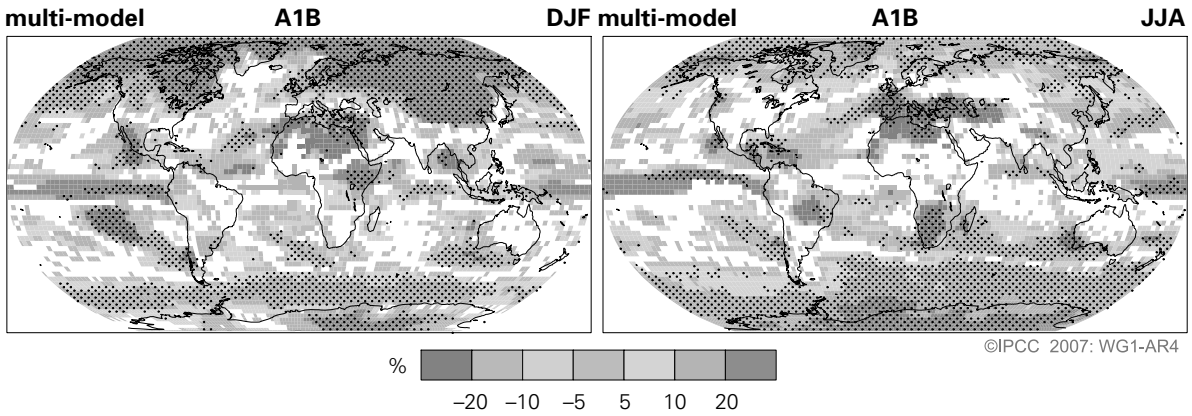
The geographic location and the watershed characteristics of the area being assessed are critical starting points. Although precipitation predictions are coarse, there are studies predicting regional changes related to climate change. Some analyses suggest that northern latitudes may become slightly wetter and drier regions, such as the Southwest, may receive even less precipitation.[1] As the science improves regarding regional impacts on precipitation patterns and total precipitation, water agencies will be increasingly able to identify regional or watershed-specific impacts. In addition, watersheds in the Southwest may be more significantly affected in the future by increases in evaporative losses within watersheds and from reservoirs.[2] Potential regional changes should be considered as a basis for further analysis.

Watershed characteristics are important. Elevations within the watershed will affect many attributes of a watershed's runoff characteristics including snowline, evaporation, dew point, and temperature. Other important characteristics are vegetation, slope aspect, and soils. A useful model focusing on the Sierra Nevada was developed by the American River Watershed Institute to examine these elements. Climate scenarios can be analyzed for specific watershed conditions to examine potential impacts.[3,4]

Allocation

Vulnerability analyses should include a determination of how much of the annual runoff is committed to use, including extraction for municipal, industrial, and agricultural uses; and in-stream, recreational, and

Figure 4-1: Projected Patterns of Precipitation Changes for Period 2090-2099, relative to 1980-1999



Source: IPCC 2007: WG1-AR4

environmental uses. If most, all, or more than all of the annual runoff is needed to meet existing uses, then the system is already stressed. Therefore, changes to the timing of hydrology from climate change, much less a change in natural inflow quantities, are likely to exacerbate the stress and result in negative impacts on the reliability of supplies. It is important to assess the reliability of water supplies to meet demands under both past and future climate variability.

Storage Versus Runoff Ratio

Vulnerability analyses should examine to what extent structural storage (dams) and non-structural storage (snowpack, groundwater) are relied on to meet demands. Although individual water supply systems vary in the degree to which they rely on storage, most of the West's water supplies depend on snowpack, reservoirs, and groundwater basins to provide annual and carryover storage. The amount of surface and groundwater storage in relation to the mean annual runoff diverted for beneficial use is one simple indicator of a water provider's reliance on snowpack. It is, however, important to recognize that each of these forms of storage has different operational characteristics. Climate change is expected to negatively affect water storage by reducing the snowpack and changing the timing and volume of runoff inflow, which may affect the yield of existing reservoirs. Climate change could also impact groundwater storage by reducing natural recharge and surface water supplies available for groundwater recharge.

Water managers have a wide range of tools to meet future needs. Some tools, such as water transfers, dam reoperation, floodplain management, and landscape conservation, can help conserve water in storage or provide "virtual" storage through cooperation with other agencies. Thus, water managers could respond to a potential future loss of supplies from existing storage by implementing a range of water management tools.

Diversity of Water Supply

Different water supply sources, including groundwater, surface supplies, transfers, and importation, have important water management implications. With climate change likely causing alterations in timing of precipitation and runoff, reduction of natural snowpack storage, and management of surface supplies, a portfolio of water supply alternatives can serve as a hedge strategy. Having a variety of alternatives available, such as wastewater recycling, increased groundwater, water conservation, and transfers among users, can reduce vulnerability of an individual system.

Water agencies seeking to diversify their existing water supplies should carefully consider potential pitfalls. For example, many river basins are already overcommitted and environmentally degraded. In some areas groundwater is overdrafted or contaminated. In many cases, increasing the diversity of supply for one agency could increase stress for other communities or environments (e.g. over allocated river systems). Moving from a reliance on vulnerable supplies (e.g. surface and groundwater sources) toward water use efficiency and reuse represent measures to diversify water supply portfolios that are appropriate in nearly all circumstances.

Flood Management

Water managers are constantly challenged with balancing flood safety and water supply. Surface storage operations are often designed to provide multiple benefits, including recreation, hydropower production, and flood safety. Flood management presents a particular challenge because when storage space within a multipurpose reservoir is set aside for attenuating flood flows, storage operating rules often can pit flood protection against operations that would maximize water supply.

Climate change is likely to complicate these operational choices. The earlier snowmelt brought on by a warming climate could increase the likelihood that snowmelt runoff will need to be released to maintain flood storage, but this may increase the risk that a given reservoir will not end the rainy season full. In some watersheds, an increase in storm intensity could directly increase peak flows and increase the likelihood of "rain on snow" events, which can result in dramatic increases in flows. If peak flows increase, the existing operating rules may no longer provide an appropriate level of protection. There will likely be a need to increase flood reservation capacity within existing storage facilities thereby exacerbating existing tensions with water supply. However, in some areas with limited existing snowpack, declining snowpack could decrease the likelihood of "rain on snow" events, providing an opportunity to reoperate existing facilities.

Shared Regional Water Resources

Dividing water resources among several water providers can result in shared risks and benefits. A relevant factor in assessing climate change impacts on water supply is whether a particular water supply is wholly appropriated

by local, regional, state, or federal entities. As illustrated by the Colorado River Compact, the effects of climate change may be addressed by increased coordination and planning among agencies and states.

Water Quality Impacts

Water supply could be threatened by water quality changes resulting from increased temperatures, increased peak runoff; decreased summer flows; and sea level rise with saltwater intrusion into coastal aquifers, streams, and estuaries. Where water quality standards are already an issue, climate change will likely exacerbate conditions. Watersheds may see an increase in sediment and non-point source pollution related to larger storm events. In California, for example, saltwater intrusion exacerbated by sea level rise could result in groundwater degradation. In the San Francisco Bay-Delta, saltwater intrusion could increase the salinity of Delta water. Increases in sedimentation due to climate change could result in lost storage capacity, degraded water quality, and increased treatment costs.

Assessing Water Demand Vulnerabilities

A critical consideration in evaluating the stresses and vulnerabilities of a water system is the current level of demand and the ability to manage increases in demand. Demand for water is as much a response to land use and resource management policies as it is a response to climate signals. Higher temperatures will push up demand for agricultural and landscape irrigation water. Those demands may be offset by conservation, changes in crop types, and irrigation practices for agriculture as well as increased use of xeriscaping and more efficient irrigation systems on the municipal side.

Conservation

Communities throughout the West have implemented a wide variety of water conservation measures to improve water use efficiency. Some of these efforts have produced striking results (see Appendix B). Per capita consumption gives a rough estimate of the degree to which a water provider can mitigate water supply impacts through increased investments in water conservation measures. For example, areas with large landscape water use have greater potential for benefits from landscape water conservation. Communities with high interior per capita use have the potential for significant savings from interior water conservation tools. It is important to note that because the technology of water conservation will improve over time. This water source will grow in the future.

Peak summer water use should also be considered when evaluating possible conservation opportunities. This factor takes into account the difference between summer and winter water use patterns. High peak summer water use in many municipal systems indicates a high degree of outdoor use, which can be reduced through landscape water conservation programs. Many providers have also developed effective indoor residential and industrial/commercial/institutional water user programs to reduce overall consumption.

Resource Allocation

The allocation of water to various sectors (agriculture, commercial, institutional, industrial, and residential) is an important consideration when analyzing the potential flexibility of a water provider to cope with dry years. Each sector has varying degrees of flexibility and requires different strategies for managing decreased water supplies, particularly in extremely dry years. For example, agricultural water users can fallow fields planted with annual crops during critical dry years. Different sectors will be affected differently by climate change. For example, outdoor residential and agricultural water consumption may increase with warmer temperatures. Industrial use may not.

Assessing Environmental and Water Quality Requirements

Rising temperatures, decreased summer streamflows, and increased evapotranspiration will likely increase the need for in-streamflow to meet ecosystem and water quality needs. Environmental requirements such as minimum in-streamflows and water quality standards are increasingly common for western rivers, wetlands, and lakes. Such requirements can significantly affect the operations of both large and small water systems. Most large dams must release water to maintain downstream water quality and provide benefits to aquatic ecosystems, including protected species. Often minimum flow requirements are based on meeting critical temperature and other standards that will require greater releases to maintain. Agencies should assess the degree to which climate change will alter existing environmental conditions with an eye on potential future environmental constraints on operations.

RESPONSE STRATEGIES FOR DEALING WITH WATER SUPPLY IMPACTS

Although prompt action to lessen greenhouse gas emissions can reduce the future impacts of climate change on western water supplies, it is clear that climate change will produce supply impacts for which water managers should be prepared. A vulnerability analysis can reveal the extent of the climate change-related risks to an existing system. This section discusses how climate change will affect the tools available to respond to these climate impacts and presents a framework for a robust, resilient, and flexible water management approach to handling the effects of climate change on water resources.

Seven Guiding Principles for Responding to Water Supply Impacts

The scope of the potential impacts of climate change makes this issue different from other challenges facing water managers. The following guiding principles are designed to assist forward-thinking water decision-makers in crafting strategies to respond to this challenge.

Strengthen Institutional Capacity. Responding to climate change will require a broad set of management and technical skills, including expertise that builds on traditional water management, such as:

- reoperating existing water systems
- understanding climate impacts
- evaluating opportunities to finance and implement integrated strategies for multiple benefits

Water managers should evaluate their institutional strengths and weaknesses, seek opportunities to improve institutional capacity, and reognize that responding to climate change will require new skills. As Roger Revelle and Paul Waggoner recommended in a 1990 American Association for the Advancement of Science publication, "Governments at all levels should reevaluate legal, technical, and economic procedures for managing water resources in the light of climate changes that are highly likely."[5]

Build In Flexibility. Climate change places managers in a difficult position. There is now a strong scientific consensus that climate change is happening and that it will result in significant impacts because preparing effectively will require investment of effort and time, water managers should begin such efforts immediately. However, there is still uncertainty regarding how rapidly these impacts will develop and how climate change will affect some water resource characteristics (e.g., total precipitation.)

The solution to this apparent paradox is to design flexible responses to climate change. Locking in large, long-term capital investments under conditions of uncertainty is a risky strategy. Whenever possible, flexibility is desirable as a management strategy. Specifically, strategies that allow for mid-course corrections and redirection of investments toward the most effective tools and that reduces the risk of stranded investments will increase the flexibility of water systems and the ability of water managers to adapt to changing conditions.

Increase Resilience. Even absent any change in climate, we can expect both wet and dry conditions. The relatively new science of paleoclimatology has revealed that the climate in the West has, historically, experienced significant variation, including extended drought periods. For example, the Colorado River basin has seen extended drought periods. In particular, the period used as the historical baseline for Colorado River water allocations was one of the wettest periods in five centuries, resulting in an overallocated river.[6] Climate change is likely to result in even greater divergence from the recent historical record. Scientists agree that we will see increased temperatures in coming years and we may see wetter wet periods and drier dry periods. Therefore, it makes sense to consider a range of water management options that build resilience through cost-effective strategies to meet future needs under conditions of greater variability and uncertainty.

Seek "No Regrets" and "Multiple Benefits" Strategies. Management strategies that cost-effectively improve a water system's ability to deal with existing stresses and problems (e.g., drought, population growth, land-use changes, and environmental impacts) are often characterized as no-regrets strategies because they make sense today, even before factoring in climate change. Where possible, water managers should seek to implement no-regrets strategies and secure multiple benefits (e.g., water, energy, and cost savings, emissions reductions and reduced environmental impacts) through well-designed policies, investments, and strategies. The focus of good policy is to build resilience in various systems ranging from whole water systems to local landscape conservation programs.

Multiple benefits strategies address more than one objective through a single targeted investment or policy measure. Some multiple benefit strategies that can enhance performance and build resilience through a single investment include:

• improving water use efficiency

• designing policies and management systems that provide better signals to consumers regarding the cost and scarcity of resources

• instituting flood plain management approaches that reduce damage from flooding, provide habitat, and increase groundwater recharge

Address Multiple Stresses. Climate change is just one of a number of factors putting pressure on water supply systems. Rapid population growth, land-use changes, contamination of surface and groundwater resources, and the need for ecosystem protection and restoration are all occurring simultaneously. Many water managers and users are effectively addressing these combined challenges through measures such as dramatically improving water use efficiency and restoring and protecting watersheds and groundwater sources. (See Appendix A.)

Invest in Cross-Agency Relationships. Many of the measures discussed in this chapter begin with developing relationships among agencies that can be partners in innovative approaches to water management. (Integrated approaches are discussed in more detail later in this section and Appendix A includes a number of case studies showing ways in which water managers across the West are developing their own integrated approaches.) Water managers seeking to position their agencies to best respond to climate challenges should begin by strengthening their relationships with potential partner agencies, including neighboring water agencies, as well as those with authority on energy, wastewater, stormwater, environmental quality, and land use issues.

Incorporate Climate Change into Ongoing Project Design. Water managers constantly face a wide range of design decisions regarding existing and new facilities. The design of those facilities should incorporate climate impacts. Managers should begin such work now, rather than waiting for the completion of a comprehensive response plan to address climate change. Several examples illustrate where climate issues are being incorporated into design decisions. For example, the California Department of Water Resources (DWR) is working to design operable barriers in the Sacramento-San Joaquin River Delta. Those barriers are designed to use tidal currents to control water levels and circulation in the south Delta. DWR recognizes that climate change is likely to produce significant sea level rise. Such changes could affect the operations and effectiveness of these Delta barriers. To reduce this risk, DWR decided to redesign these barriers so they could be retrofitted in the future to accommodate up to an additional foot of sea level rise. Given the probable useful life of these barriers, DWR believed that this was an appropriate design target. This decision required a redesign for a larger foundation, capable of accommodating larger gates in the future—and resulted in significant expense.[7]

The San Francisco Public Utilities Commission (SFPUC) is currently developing a long-term wastewater master plan designed, in part, to address climate change impacts. Perhaps the most significant climate change-related challenge for San Francisco is the potential for rising sea levels to result in seawater intruding through outfalls into waste treatment facilities.[8] Such saltwater intrusion could kill the microbes that serve as the foundation of secondary treatment. The SFPUC has already experienced these seawater intrusion events, even without storms, as the result of 7 inches of sea level rise in the past century. The SFPUC is currently designing valves to prevent such sea level rise-related inflows into the wastewater system. Seattle Public Utilities has made several significant design decisions to address potential climate change impacts.[9] Such water agencies are beginning to discuss how climate change could affect decisions such as the design of drinking water treatment facilities.

By incorporating climate change in ongoing design decisions, water managers can reduce risks and expenses in the future.

Expand Dialogue with the Scientific Community. The scientific community is an essential resource to water managers. Expanded dialogue with the scientific community can increase the effectiveness of measures designed to meet the challenges posed by climate change. A healthy dialogue with water managers will also help scientists develop a more realistic and accurate analysis of potential climate change impacts on water management. The September 2005 conference in Las Vegas, co-sponsored by the Natural Resources Defense Council, the Southern

Nevada Water Authority, and the Desert Research Institute represents an example of this kind of extended dialogue. Such conferences should be held with greater frequency.

The AWWARF Public Advisory Forum developed the following two recommendations regarding climate and science:

* Cooperation of water agencies with the leading scientific organizations can facilitate the exchange of information on state-of-the-art thinking about climate change and impacts on water resources.

• The timely flow of information from the scientific global change community to the public and the water-management community would be valuable. Such lines of communication need to be developed and expanded.[10]

Given the need discussed earlier to improve institutional capacity, a robust dialogue between water managers and scientists could be particularly valuable as water agencies move past vulnerability analyses to develop future response strategies that incorporate climate issues.

Determining the Best Mix of Water Management Tools

A century ago, water managers had a limited range of water management tools. Today, water managers have a much greater range of options to manage water in communities around the West:

• Technological advances have dramatically improved the water use efficiency of wide range of devices, including low-flow showerheads, low-flush toilets, water-efficient washing machines and dishwashers, and water-saving irrigation systems guided by satellite weather data.

• Wastewater recycling, groundwater cleanup, urban stormwater capture projects, water marketing, and active groundwater storage projects have also become proven water management tools.

• Pricing mechanisms, such as inclining block rates (the practice of increasing volumetric prices with increasing water use) and seasonal rates (which modify summer water rates to encourage landscape conservation), can encourage efficient water use.

• In some coastal areas, urban water agencies are beginning to explore desalination, previously dismissed as impractically expensive.

Given the impressive array of water management tools available, how should water managers determine the best mix of responses to climate change—particularly as the performance of water management tools will be affected in different ways as a result of climate change? This section is designed to help water managers answer this question. (See Table 4-1 for a summary of NRDC's findings.)

Water Management Tools that Will Perform Better as the Climate Changes

Some water management tools are likely to perform better in the future in the face of global warming. This effect is likely to be most significant for tools that reduce landscape water use.

Table 4-1: Performance of Water Management Strategies After Considering Global Warming Effects

More effective	Not affected	Less effective
• Landscape conservation • Conservation rate structures • Agricultural water conservation • Water marketing • Urban stormwater management • Saltwater groundwater intrusion barriers to protect coastal aquifers • Water system reoperation • Interagency collaboration and integrated water management strategies • Floodplain management • Watershed restoration	• Wastewater recycling • Interior water conservation • Groundwater cleanup	• Traditional river diversions • Traditional groundwater pumping • Traditional surface storage facilities • Ocean water desalination*

*Given existing energy requirements.

Landscape Irrigation Conservation. Urban water conservation programs often underemphasize the demands of urban landscaping. With climate change likely to increase evaporation and transpiration rates in planted landscapes, a lawn or landscape could consume more water in the future than it consumes today. One implication of this trend is that landscape irrigation conservation programs have the potential to save more water in a warmer future than they do today.

Landscape irrigation already represents a significant percentage of urban water use in the West. For example, it accounts for approximately half of urban water use in California, or about 10 percent of statewide water use.[11] Urban water agencies are increasingly turning to landscape irrigation to find new opportunities to increase urban water use efficiency.[12] For example:

• The Southern Nevada Water Agency offers customers a $1 per square foot rebate for all turf that is removed and replaced with drought-tolerant landscaping.[13]

• The Metropolitan Water District of Southern California has developed a website (www.bewaterwise.com) devoted to educating ratepayers about landscape conservation opportunities.[14]

• The East Bay Municipal Utility District (EBMUD) in California has published a comprehensive book aimed at encouraging appropriate landscape design. EBMUD also offers residential landscape conservation rebates of up to $1,000.[15]

• The Marin Municipal Water District, also in California, offers financial incentives to encourage the installation of weather-based irrigation controllers.[16]

As climate change reduces late season snowmelt, measures such as landscape conservation that reduce peak summer demands—often a key constraint on water systems—could be particularly effective. Water managers should incorporate such conservation measures in their plans to meet future water needs and respond to climate change impacts.

Conservation Water Rate Structures. Water rate structures are among the most effective tools to encourage water conservation because they give customers a price signal about the value of this resource. To maximize the effectiveness of this signal, agencies should strive to recover as much revenue as possible through volumetric charges, rather than high fixed charges. Increasing block, or tiered rate structures, offer an initial allocation at a base rate. Additional tiers or blocks of water increase in price. Some utilities offer a lifeline, or below cost rate, for low-income customers. University of California economists Hewitt and Hanemann found a significant positive response to block rate structures in California applications.[17] In addition, seasonal water rates, which increase prices during the warm irrigation season, can be particularly effective in encouraging landscape conservation and in reducing peak summer demands. Water managers seeking to encourage conservation in the future should pay particular attention to rate structures designed to encourage conservation.

> **"We have to attack both sides of the supply-demand equation when faced with more variable water supply due to global warming."**
>
> Source: Chips Barry, General Manager, Denver Water, 2006.

Agricultural Water Conservation. According to the U.S. Department of Agriculture, agricultural water represents 81 percent of all consumptive water use in the nation.[18] In the West, agriculture represents 90 percent of the consumptive use of the developed water supply.[19] Future agricultural water use is difficult to predict because of complex interactive impacts of climate change on international trade, crop selection, and yields. Nevertheless, as in the case of urban landscaping, rising temperatures may increase evapotranspiration rates-meaning that irrigating an acre of crops such as alfalfa or lettuce could take more water in the future than is currently required.[20] As a result, agricultural water conservation and fallowing could generate even more water savings in the future than they do today.

Even without considering potential climate change impacts, there is significant potential for agricultural water conservation around the West. For example, in much of the arid West, flood irrigation is still the predominant irrigation technology, and in states including Arizona, Montana, and Idaho, water application rates often exceed 5 feet per acre.[21] In agricultural areas working to cope with the impacts of climate change, conservation programs and related water transfers could provide valuable revenue.

Market-Based Transfers, Sales of Water. With agricultural water conservation and fallowing programs increasing in effectiveness as temperatures rise, there also may be

Restoring the Wet Meadows of Sierra Nevada's Feather River Basin

A public/private partnership called the Feather River Coordinated River Management Group (CRM) has been working for more than a decade to implement wet meadow restoration projects in the Sierra Nevada's Feather River Basin. The Feather River is an important source of water for California's State Water Project, which provides a portion of the water supply for Southern California, the San Joaquin Valley, and Silicon Valley. There are 250,000 acres of high altitude meadows and valleys in the Feather River's Sierra Nevada watershed. These mountain meadows have been degraded by decades of grazing, road building, and other activities. Streams have eroded deep gullies in meadows, rapidly draining groundwater from these natural high-altitude reservoirs; and incised creek beds have dramatically reduced natural infiltration of runoff.

The Feather River CRM has used several techniques to help restore its degraded meadows. For example, creek beds have been regraded to restore natural drainage elevations by the replacement of incised gullies with barriers and pools. Subsequent monitoring has verified that such projects can significantly increase natural storage in these meadows, thus retaining additional winter rainfall and snowmelt. This additional stored water is naturally released later in the spring and summer. Analysis of the CRM Big Meadow Cottonwood Creek project found that groundwater levels were within 1 foot of the surface for an average of 8 days prior to restoration, and an average of 223 days after. As a result, the ephemeral stream in the meadow returned to nearly perennial flows, increasing from 214 to 344 days of flow.

This project creates additional active water storage, which could have increasingly important water supply and ecosystem benefits in the future. These projects can also decrease stream temperatures, addressing a key potential climate change impact on cold-water fisheries. As a result, the CRM estimates that large-scale restoration projects have the potential to create large amounts of increased natural groundwater storage.

Sources: http://www.feather-river-crm.org/.

Wilcox, Jim, January 2005. "Water Management Implications of Restoring Meso-Scale Watershed Features." http://www.feather-river-crm.org/publications/tech/IAHS%20Full%20Paper.htm.

a growing incentive for some farmers to sell a portion of their water supplies through voluntary, market-based transfers. Three factors suggest that incentives for water marketing that moves water from low-value agriculture to high-value urban uses are likely to increase as a result of global warming. First, as urban water agencies face reduced yields from existing water systems, they may be increasingly motivated to pursue, and increasingly willing to pay for, water transfers. Increasing scarcity could raise prices received by agriculture for marketed water. Second, climate change will create increasing uncertainty for agriculture. It may be a challenge for some farmers to cope with warming temperatures and more extreme weather events, increasing their interest in water transfers that could provide them with greater flexibility and revenue. And third, around the West, many agricultural water users have more senior water rights than their urban counterparts have. To a certain extent, this system will insulate the holders of senior water rights holders from the impacts of climate change—making their water supply more reliable than that of junior holders (including many growing urban areas). All of these factors suggest that the economic rationale for water marketing may increase.

It should be noted that water marketing does not create new water, it simply reallocates it. Various sources of water can potentially be transferred by market transactions, each constrained by legal, regulatory, market, and physical parameters. A California Legislative Analyst's Office report identifies the following sources:[22]

- Land fallowing and crop shifts to less water-intensive crops.
- Water recycling, such as recycling water from wastewater treatment plants for industrial and irrigation purposes.
- Groundwater pumping instead of using surface water rights, thereby freeing up surface water for transfer.
- Storing excess surface water from wet years in underground aquifers to be pumped in the future when surface supplies are low.
- Water conservation, in both the agricultural and urban sectors. This includes, for example, farmers using water-saving irrigation technologies and homes and businesses using water-efficient landscaping and bathroom fixtures.

FEATHER RIVER CRM.

Cottonwood Creek in California's Sierra Nevada, with Degraded Meadow. Before (left) and After (right) Restoration.

• Withdrawals from surface storage supplies that were not otherwise planned to be made.

If a water marketing system is to work optimally, care must be taken to design appropriate transfers and to avoid impacts to third parties and the environment. Efficient markets require that buyers and sellers bear the full costs and benefits of transfers. However, when water is transferred, third parties are likely to be affected. Where such externalities are ignored, the market transfers not only water, but also other benefits and costs from non-consenting third parties to the participants in the transfer.[23] Finally, the practice of "paper water" transfers—attempts to sell rights to water that exist only on paper—must be prevented.[24] Paper transfers can be highly disruptive, leading to environmental impacts and water management challenges.

Watershed Restoration. Watershed restoration has the potential, in some cases, to help mitigate impacts of climate change. As climate change reduces natural storage through a reduction of snowpack, watershed restoration efforts may be increasingly valuable to reduce peak flows, recharge groundwater, and delay spring runoff. Restoration projects may also decrease stream temperatures—reducing another impact of climate change—and provide additional environmental benefits such as riparian habitat. (See Restoring the Wet Meadows.)

Urban Stormwater Management. Throughout the West, there are abundant opportunities to manage urban stormwater to reduce runoff, flood damage, and pollution and to improve water supply availability and quality. As climate change affects rainfall volumes and storm intensity, the value of water supply tools that provide stormwater management benefits may increase.[25] Climate change will likely force urban communities to invest in additional flood management, creating willing partners for water agencies seeking to invest in integrated stormwater management and water supply strategies.

One approach is to direct stormwater runoff from impermeable surfaces, such as roofs and paved areas, to landscaped areas where the water can percolate into the soil, and recharge the groundwater. Impervious surfaces increase runoff during storm events. The first "flush" often collects and concentrates contaminants from those surfaces such as oils and sediment. When flows exceed the infiltration capacity of the soils, water flows into storm drains. By diverting a portion of the first flows, improved stormwater management reduces demands on storm drain systems. This strategy slows the rate of runoff and allows for recharge. Designs such as shallow depressions, or "swales" and the sloping of both the paved areas and the landscaped areas to follow normal drainage patterns facilitate the redirection of stormwater runoff to landscaped areas where it is intercepted and infiltrated into groundwater aquifers. Some of the most innovative work in this area has been done by Tree People, a non-profit organization in Los Angeles that is advocating the construction of a citywide system of cisterns, groundwater infiltration facilities and urban forestry in order to recharge groundwater and provide other benefits.[26]

Another stormwater management related strategy, called "daylighting," involves taking surface flows that are currently conveyed in underground culverts and restoring them to creeks. Daylighting can offer groundwater recharge and environmental benefits, as well as increase property values and recreation in adjacent communities.

Another strategy involves diverting water into groundwater infiltration basins from urban streams during high flow events.

Reoperation of Water Systems. Water agencies have extensive experience with water system management, particularly the operation of storage facilities to meet the different demands of flood management and water supply. As a result of climate change, it will likely be necessary in the future to reconsider operating rules for major water supply systems. The Intergovernmental Panel on Climate Change (IPCC) called for "a systematic reexamination of engineering design criteria, operating rules, contingency plans, and water allocation policies," noting that "water demand management and institutional adaptation are the primary components for increasing system flexibility to meet uncertainties of climate change."[27] Investigations of reoperation opportunities should be broadly conceived to reflect the interactions of the many elements of complex water systems.

For example, the Seattle Public Utilities (SPU) analysis of potential climate change impacts to the water supply system (see Appendix A) helped SPU identify potential future management challenges that could arise from climate change. SPU created a series of adaptive management strategies for reoperating the water system to improve day-to-day management and to provide greater flexibility. They now use a dynamic reservoir elevation rule curve to help guide the management of flood storage capacity and refill of mountain reservoirs, thereby adjusting reservoir level targets based on real-time snowpack measurements and soil moisture conditions. This information, coupled with simulation models, helps to set reservoir targets during the refill season. Using a dynamic rule curve allows SPU to be more adaptive than if they used a traditional fixed rule curve.

SPU's experience during the winter of 2005 demonstrates the operational flexibility that can be provided by utilizing the dynamic rule curve. Low snowpack in the winter reduced the probability of floods from snowmelt. Due to this reduced probability of flooding, SPU water managers captured more spring rains than in a normal year. This adaptation of operations to weather conditions provided Seattle with enough water to return to normal supply conditions by early summer, despite the lowest snowpack on record. It also demonstrated the flexibility in the water system to adjust operations for changing weather conditions, whether they are low snowpack or abnormal levels of precipitation. This system reoperation not only helps in managing the system for the variations in weather that occur now, but also can be used in the future to adjust to further climate change.[28]

The potential to reoperate reservoirs can also be increased by investments in groundwater storage, downstream channel conveyance capacity and integrated operations of operationally connected reservoir systems.

Saltwater Intrusion Barriers. In many coastal areas, increased seawater intrusion resulting from sea level rise threatens coastal aquifers. In some areas, high rates of groundwater pumping are already drawing saltwater into aquifers, threatening the utility of aquifers and wells. In order to prevent such intrusion, some water districts are injecting freshwater into aquifers to create a saltwater intrusion barrier. For example, Southern California's West Basin Municipal Water District is injecting highly treated wastewater into coastal aquifers. As sea level rise increases, such saltwater intrusion barriers may be increasingly important to protect coastal aquifers. These barriers may be given additional value in the future because of the importance of local groundwater storage as part of wastewater reclamation and stormwater management programs. As agencies expand their use of wastewater reclamation and stormwater management programs to respond to climate change, seawater intrusion barriers may become key tools.

Water Management Tools Relatively Unaffected by Climate Change

In general, the tools discussed in this section are more resistant to the effects of climate change because they do not rely on precipitation, snowpack or other climate-sensitive water sources. During the past several decades, these tools have proven themselves to be highly productive and cost-effective. For example, in California, these tools are expected to be the backbone of efforts to meet future water needs. They will likely become even more valuable in water management portfolios.

Water managers are starting to link major new investments in water conservation to their desire to prepare for potential climate change impacts. For example, Denver Water is addressing the potential effects of climate change by ramping up its water conservation efforts with its recent $400 million conservation plan. This plan is designed to cut annual water use by 22 percent, or 16.7 billion gallons per year, during the next 10 years. Although this plan was initially developed without regard to potential climate change effects upon its system, Denver Water is now seeking to reach this 22 percent reduction goal far

more rapidly in order to further protect water users from climate change impacts. The plan includes new strategies and increased investments in existing conservation programs, such as rebates for low-flow toilets and efficient clothes washers. The plan's new programs include:

• establishing a water efficiency rating program for new construction so that builders who do not meet new standards could find it more difficult to connect to the water system.

• installing water meters for landscape irrigation systems.

• initiating water audits of homes before they are sold, and requiring the replacement of leaking or inefficient plumbing fixtures.

• installing low-flow urinals in new commercial buildings.

The actions in the plan are expected to pay for themselves, through reduced water bills, within six years. Denver water users have already cut consumption by about 20 percent since local drought conditions began in 2002. The plan's first year has been approved by Denver Water's board and executive staff, with an initial $8 million.[29]

Interior Water Conservation. Although climate change is likely to improve the performance of landscape conservation programs, it will leave interior water conservation programs relatively unaffected. Interior water conservation technology, including water efficient showerheads, toilets, urinals, dishwashers and washing machines, will not perform significantly differently as a result of climate change. However, the value of the saved water may increase over time.

Water Recycling. Just as other forms of recycling have become commonplace, wastewater recycling has increased dramatically in recent decades. Today, for example, Southern California recycles approximately 500,000 acre-feet of water annually.[30] (This represents approximately 10 percent of total wastewater generated in this region.) The California Department of Water Resources projects that by 2030, an additional 0.9 million to 1.4 million acre-feet of water recycling will be developed. This still represents a small fraction of total wastewater. One of the advantages of this tool is its resistance to drought effects. Similarly, because the sourcewater supply for water recycling is municipal wastewater, it is far less susceptible to potential climate change impacts than traditional water supply projects.

Groundwater Cleanup and Protection. Although traditional groundwater pumping may be negatively affected by climate change (discussed in more detail in the next section), water projects, such as those in the Santa Ana watershed that are designed to clean up contaminated groundwater, may be less affected (see Integrated Regional Management Case Study: Santa Ana). The relative stability of groundwater cleanup, in the context of global warming, comes from the fact that the purpose of many of these projects is not simply to withdraw water but to comply with regulatory requirements and to create more usable, uncontaminated groundwater storage capacity. Where groundwater cleanup is intended to provide opportunities for conjunctive use, water managers should pay careful attention to the potential impacts of climate change on the source of water to be stored.

Water Management Tools That May Perform Poorly in the Future

The water management tools that are most likely to be negatively affected by climate change are those that rely primarily on historical precipitation, runoff, and recharge patterns, including both groundwater and surface water sources.

Traditional Groundwater Extraction. As discussed above, some analyses suggest that climate change may lead to significant reductions in groundwater. Shorter periods of high streamflows may decrease percolation, while longer, hotter summers are likely to decrease soil moisture. Therefore, projects that rely on traditional pumping of natural infiltration of precipitation could suffer a loss of yield in the future. In already overdrafted areas, this impact could increase competition for groundwater resources. We have not identified conjunctive use, the combined use of surface and groundwater systems, including active groundwater recharge, as a separate category in this report. Climate change impacts on conjunctive use projects will be determined in significant part by the source of stored water. Conjunctive use projects designed to rely on current snowpack or traditional river diversions may be negatively affected by climate change; however, conjunctive use projects using recycled wastewater may not be affected. Conjunctive use projects in low elevation coastal areas may be negatively affected by sea level rise.

The Conservation Technology Edge: A Water Management Tool That Will Be Increasingly Important in the Face of Climate Change

Conservation will remain a highly effective water management tool in a climate-altered world. Because climate change may make snowpack-based supplies and diversions less reliable over time, the advantages of new supplies produced by technological innovation should increase. The water sector analysis of the National Assessment of the Potential Consequences of Climate Variability and Change confirms this finding: "Evidence is accumulating that such improvements can be made more quickly and more economically, with fewer environmental and ecological impacts, than future investments in new supplies." Conservation tools have been central to the significant progress made in Los Angeles, the San Francisco Bay Area, Seattle, and Denver to meet the needs of growth without increasing water use (see Appendix B).

Innovation and technology development in the areas of end-use water applications have progressed rapidly in the past few decades. Techniques and technologies from laser leveling of fields and high-efficiency irrigation systems to the design of toilets, urinals, and showerheads have changed the demand side of the equation. Efficiency standards and code requirements have been particularly effective in promoting widespread application of these water saving technologies. End-use applications of water now require much less volume than before to provide equivalent or superior services, and uses of these new technologies often provide immediate economic savings.

These analyses of conservation potential are based on existing technology. Despite significant investments in conservation already, considerable potential remains. In California, 2.5 million toilets have been replaced with high-efficiency models since 1992. There's still room for expansion, with approximately 10 million low-efficiency toilets remaining to be replaced.

The impetus for technological development and innovation in efficient use comes from both price signals and policy. As water gets more expensive and because legal requirements are enacted prohibiting waste and limiting extraction from natural systems, technology has provided a wide range of options for expanding the benefits derived from a given amount of water. Broader application of these techniques will yield significant new supplies and innovations are likely to create improved water conservation technologies. The waterless urinal represents an example of such a relatively recent innovation. It is reasonable to anticipate that ongoing technological innovation will continue to expand the potential benefits of water conservation. In addition, collaborations among agencies with different missions (e.g., water and energy) are expanding water conservation efforts. In short, water use efficiency programs have several significant advantages that are likely to grow over time as a result of collaborations among agencies, technological innovation, and the direct and indirect effects of climate change.

Sources: California State Water Plan, Department of Water Resources, Vol. 2, p.16.1. http://www.waterplan.water.ca.gov/docs/cwpu2005/

Gleick, Peter H. et al., 2000. *Water: The Potential Consequences of Climate Variability and Change for the Water Resources of the United States.* The report of the Water Sector Assessment Team of the National Assessment of the Potential Consequences of Climate Variability and Change, U.S. Global Change Research Program, Pacific Institute for Studies in Development, Environment, and Security.

Gleick, Peter H., Dana Haasz, Christine Henges-Jeck, Veena Srinivasan, Gary Wolff, Katherine Kao Cushing, and Amardip Mann, November 2003. *Waste Not, Want Not: The Potential for Urban Water Conservation in California.* Pacific Institute.

Finally, conjunctive use projects designed to take advantage of floodplain restoration, storing and infiltrating high flows, may be an increasingly important tool in the future. Water managers should evaluate local conditions to understand the implications of climate change on local groundwater resources.

Traditional River Diversions. Declining snowpack, receding glaciers, increased evaporation, flood control requirements, more frequent droughts, reduced dry-season runoff, and potential reductions in total runoff could render surface water diversion projects less reliable in the future. For example, the Canadian city of Calgary has concluded that the melting of glaciers as a result of climate change could reduce the long-term yield of its surface water supply.[31] Colorado River water users are increasingly concerned about reduced flows and loss of stored supplies to evaporation, due to climate change.[32]

Changes in river hydrography expected as a result of global warming will likely result in alterations in stream-

flows and a direct reduction in water supply reliability. The most obvious impact in this regard is the increase in peak flows and the reduction of dry season streamflows.

The environmental impacts of climate change could exacerbate impacts on the reliability of surface water diversions. As discussed in Chapter 2, climate change could lead to environmental impacts including increased stream temperatures, exacerbated water quality problems and damage to sensitive and listed species—impacts likely to result in more requirements to protect aquatic resources, and greater competition for and conflict over surface water resources.

In addition, as rivers approach the ocean, climate change-driven sea level rise could result in a serious reduction in the reliability and cost-effectiveness of traditional river diversion projects. This has serious implications for coastal communities that rely on low-elevation surface water diversions or on groundwater diversions with a direct connection to surface waters. The Sacramento–San Joaquin Delta is an example of an area vulnerable to these potential effects.

Traditional Surface Storage. Although dams are central to water supply in the West, they have often led to high-profile, protracted policy conflicts. This is true of proposed dams on the Colorado, Yellowstone, Green, Missouri, Platt, Tuolumne, Stanislaus, and American rivers. There are cases in which new surface storage projects have generated significantly less conflict, particularly when the surface storage system is well designed, such as in the case of the existing Los Vaqueros Reservoir in the eastern San Francisco Bay Area. This off-stream project was designed to improve water quality and provide emergency supplies and was seen by many as having fewer environmental impacts than traditional surface storage development.[33,34] However, most dam sites have high financial and environmental costs, with low potential water supply yields. Given the high capital cost of surface storage projects, water managers should consider how climate change will affect this water management option.

> **"Immediate prospects for major new water supply reservoirs or inter-basin transfers are limited. Consequently, new water project prototypes that emphasize conservation, landscaping, new technologies, and other measures are being promoted across the West."**
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> Source: Committee on the Scientific Bases of Colorado River Basin Water Management, February 2007. *Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability*. National Research Council, p.96.

Western dam operators could face increased challenges from seven potential climate-related impacts: reductions in reservoir inflows, increases in the percentage of precipitation falling as rain, rather than snow (and related increases in flood control requirements), decreased snowpack, more severe weather events (both droughts and floods), greater environmental requirements, increased evaporative losses from reservoirs and increased spills from existing reservoirs.

Potential climate change impacts have been cited by some agricultural water agencies as justification for more surface storage facilities.[35] Some new surface or groundwater storage may be developed in the West to cope with the challenges presented by climate change. However, it is important for water managers to recognize that, just as climate change can reduce the yield of existing reservoirs, it can also reduce the potential water yield of new dams.

Although site-specific analyses will be required to evaluate potential climate change impacts on proposed new storage facilities, particularly in highly engineered watersheds, some general conclusions are clear. In relatively undeveloped watersheds, a shift toward more rainfall and less snowpack is likely to reduce the yield of most new proposed dams. With shorter high-flow periods, the window for filling off-stream storage facilities could be shorter in the future. Potential reductions in total streamflows as a result of climate change could have profound implications for new surface storage projects. Frequently, new surface storage facilities utilize junior water rights in a river basin. If climate change reduces average total runoff in a basin, water managers could find themselves in a position where they have constructed a new surface storage facility to capture runoff that may be lost in the future as a result of climate change impacts.

In highly engineered watersheds, the potential interactions of existing and proposed facilities can be complex. For example, the climate change effects listed earlier could reduce potential yield from a proposed new storage facility but at the same time, increased climate-driven spills from existing dams could increase the amount of water that could be captured by a new facility.

Finally, surface storage projects in some river systems could face increased operating restrictions to mitigate for the environmental impacts of climate change. The most likely additional operating restrictions include flow

Summary of Potential Climate Change Impacts on Potential New Traditional Surface Storage Facilities

Climate Change Impacts that Could Reduce Potential Yields from New Traditional Surface Storage

- potential decreases in total annual runoff
- decreased late-season runoff, as a result of reduced snowpack
- increased winter runoff, as a result of greater rainfall, increasing spills and flood control storage requirements
- more extreme weather events (droughts and storms)
- increased evaporative losses from reservoirs.
- potential new environmental requirements regarding flow and temperature

Climate Change Impacts that Could Increase Potential Yields

- increased uncaptured spills from existing storage facilities

and temperature requirements. Such requirements could decrease the expected water supply yield of existing and proposed surface storage facilities.

The authors of this report are not aware of any proposed new surface storage facilities that have undergone a comprehensive analysis mentioning the seven factors addressed above. It is likely in many cases that estimates of potential yields from proposed new surface storage projects will be reduced when climate impacts are considered. As a result, these projects, already expensive today, could be more expensive per acre-foot of yield, when future climate change impacts are considered. The potential impact of climate change on new surface storage facilities should be carefully evaluated.

This report is not the first to suggest diminishing prospects for traditional surface storage development in the West and an increase in alternative approaches. For example, the National Research Council's 2007 report on Colorado River basin hydrology observed that "(t)he declining prospects for traditional water supply projects are perhaps more correctly seen not as an end to 'water projects', but as part of a shift toward non traditional means for enhancing water supplies and better managing water demands."[36] The report went on to state that "(i)mmediate prospects for major new water supply reservoirs or inter-basin transfers are limited. Consequently, new water project prototypes that emphasize conservation, landscaping, new technologies, and other measures are being promoted across the West."[37]

Desalination. Evaluating the performance of desalination in the context of climate change raises issues different from those raised by other water management tools and some of these emerging issues support different conclusions. Ocean water, the source for many proposed desalination projects will be far less affected than freshwater sources by climate change. However, water managers making decisions on siting and design for coastal desalination facilities should carefully consider the likelihood of significant sea level rise as a result of climate change. For water managers in coastal areas with existing water systems that could be negatively affected by climate change (e.g. those that rely on snowpack and rivers), the reliability of seawater desalination could be an important consideration.

However, desalination raises another significant issue in the context of climate change. As discussed in Chapter 3, ocean water desalination is a very energy intensive water supply option. Indeed, energy is the primary operating cost of ocean water desalination facilities. Climate change prevention efforts are likely to result in a dramatic increase in efforts to reduce energy consumption, in order to decrease greenhouse gas emissions. Thus, a dramatic increase in energy-intensive seawater desalination facilities raises significant issues in the context of climate change. In addition, because of its high energy requirements, seawater desalination is also particularly vulnerable to any future energy price fluctuations.

Although climate change will not have the same impact on this tool as it is likely to have on water management tools that rely on rivers, historical groundwater recharge and snowpack, consideration of climate change raises serious concerns regarding the energy implications of desalination. Energy requirements of desalination have declined significantly in the past decade, largely as a result of the improvement of membrane technology for reverse osmosis plants and improvements in pressure recovery.[38] In addition, desalination of less saline sources, such as brackish and contaminated groundwater, requires significantly less energy. Efforts to reduce greenhouse gas emissions will raise additional issues regarding desalination. This climate change-related implication for desalination is less direct than the impacts affecting the other tools discussed in this section. As technology improves, this con-

cern will lessen. In fact, if the energy required for ocean desalination declines by a relatively small amount, some Southern California water agencies could save energy by substituting ocean water desalination for diversions from the Bay-Delta estuary.

Integrated Regional Water Management Planning

Many of the tools discussed above—water conservation, wastewater reclamation, and stormwater management—offer potential benefits to other public entities, including wastewater and stormwater agencies, energy utilities, and

Six Concerns Regarding Surface Storage Analyses

In some cases, project evaluation methodologies have exacerbated controversies around proposed surface storage projects. Future evaluations of surface storage projects should address these issues. Problematic approaches in past dam feasibility studies include:

1. Projections based on historical hydrology: Traditional water development has not considered the potential impacts of global warming on future hydrology. The case of the Colorado River shows how important assumptions regarding future hydrology can be. On the Colorado River, a relatively short hydrologic record led water managers to conclude that the river's long-term average flow would be higher than it has proven to be. As a result, the Colorado River Compact assumed that river flows would average 17 million acre-feet. In fact, average flows have proven to be less than 15 million acre-feet.This discrepancy has significantly increased conflicts on the river. With additional climate change impacts, reliance on historic hydrology will be even riskier.

2. Lack of demand side analysis: The supply side approach has traditionally focused on increasing supply through dams and diversions. Demand management and alternative approaches, which can be less expensive and environmentally damaging, have often been overlooked or their potential underestimated. Addressing both supply and demand side strategies—and comparing all available tools on a level playing field—is a key feature of an integrated approach to water management planning.

3. Flawed economic analysis: Some surface storage studies, particularly those undertaken by the federal government, have failed to include credible economic analysis. For example, the U.S. Bureau of Reclamation is currently studying a potential surface storage project in California's upper San Joaquin River basin to provide additional supply for agricultural water users. Water from this facility is likely to cost far more than the new water supply would be worth to the agricultural community. When the Bureau of Reclamation last studied a surface storage project in this region, the agency concluded that raising Friant Dam would produce water costing approximately $3,000 per acre-foot-twice the cost of desalinated seawater and approximately 100 times the cost of water provided by federal water contracts in the region. Recent analysis of Auburn Dam by the Bureau of Reclamation revealed lower water yields and a significantly higher cost than had been previously estimated.

4. Subsidies that encourage waste: In many water projects, a reliance on subsidies and artificially low water prices encourage under-investment in efficiency and over-use of water resources. Supply-side subsidies skew water management plans against conservation programs. These subsidies have, historically, been focused primarily on dramatically lowering costs for agricultural water users.

5. Underestimates of environmental damage: There is a long history of promises regarding environmental benefits from dams. However, dam building has a clear record of negative impacts on the environment. For example, 60 years ago, Friant Dam in California was authorized, in part, due to claimed benefits to the San Francisco Bay-Delta. In practice, Friant Dam has resulted in severe degradation of water quality and fisheries.

6. Unrealistic anticipated benefits: For many dam projects, a portion of the cost has been written off (i.e. paid by taxpayers rather than water users) because of claimed environmental, recreation, or other benefits. These benefits have frequently proven to be illusory.

Sources:

http://www.sciencedaily.com/releases/2006/05/060529082300.htm.

Committee on the Scientific Bases of Colorado River Basin Water Management, February 2007.

Department of the Interior, Bureau of Reclamation Mid-Pacific Region, Fish and Wildlife Service, October 1995. "Least-Cost CVP Yield Increase Plan," pp.III-41, III-51.

Bureau of Reclamation Mid-Pacific Region, December 2006. "Auburn-Folsom South Unit Special Report: Benefits and Cost Update."

local governments. These approaches are also often less centralized and less capital-intensive than traditional water development. Integrated regional water management offers the potential to maximize the benefits from these new tools.

Wastewater, stormwater, and conservation programs are often best implemented through collaborations among agencies. Where a water supply agency does not have wastewater or stormwater responsibilities, designing and implementing climate change response strategies in these areas will require interagency collaboration. In addition, water conservation offers significant energy benefits, inviting the participation of energy utilities and state agencies with energy regulatory and planning responsibilities. Finally, water conservation and stormwater management programs can benefit greatly through the participation of local governments with land-use authority.

Agencies with different missions do not always share identical service boundaries, creating a potential obstacle to interagency efforts. In many cases, this obstacle can be overcome by bringing together multiple agencies on a regional basis. Such an integrated regional approach can offer broad benefits. Integrated regional water management is emerging as a particularly important strategy. The 2005 California State Water Plan identifies integrated regional water management as an initiative co-equal with statewide water management planning efforts.[39]

California's Proposition 50, The Water Security, Clean Drinking Water, Coastal and Beach Protection Act, and Proposition 84, which were approved by the voters in November of 2002 and 2006 respectively, provided a total of $1.5 billion in general obligation bond financing for integrated regional water management efforts across the state. This new direction represents a decreased reliance on large traditional water projects and on state and federal agencies to guide planning and decision making. Increasingly, innovative thinking is showing how integrated regional strategies can supplement traditional statewide and federal planning.

Integrated regional planning has several advantages. It encourages collaboration among the diverse agencies in a particular region. As in the case of the projects in the Santa Ana watershed to clean up contaminated groundwater and generate electricity through "cow-power" (see Integrated Regional Management Case Study: Santa Ana), an integrated approach can reveal opportunities that cannot be implemented without cooperation among stakeholders and agencies. It tailors strategies to meet unique local needs. It can maximize the potential for multiple funding partners and multiple benefits, including reduced dependence on water supplies vulnerable to climate change impacts, reduced urban runoff pollution, groundwater cleanup and improved groundwater management, flood damage reduction, ecosystem restoration, energy conservation, and public education. And integrated regional planning offers the potential for water managers to address, in one program, multiple stresses facing current water supplies. These include population growth, land-use changes, contamination of surface and groundwater resources, and the need for ecosystem protection and restoration.

Moreover, an integrated approach can increase system flexibility. The massive investment required for a traditional water project can be highly inflexible because, if the construction cost of such a water project proves to be higher than expected, water managers with a partially constructed project cannot redirect investments, without losing the yield of the entire project. These large projects create a significant sunk cost risk. By contrast, investments in an integrated portfolio of conservation, reclamation, and stormwater projects, all of which can be scalable and less capital-intensive, can be more easily redirected to respond to changing conditions or to adjust for an underperforming water management tool.

Effective integrated planning can require the use of many water management tools, with varying potential benefits in different regions. For example, without debating the merits of desalination in general, we can examine how desalination might fit into an integrated regional strategy. In Southern California's Chino Basin, desalination is being used to clean up contaminated groundwater, thus fixing an existing problem and generating water supply reliability and wetland restoration benefits. In San Diego, desalination, although energy intensive and expensive, could provide high quality water that could be blended with existing supplies, facilitating energy-conserving wastewater reclamation programs. In contrast, on California's Central Coast, seawater desalination could be highly growth-inducing, leading to urban sprawl, with potentially serious environmental impacts. The implications of this technology and the case for public funding can be very different in different regional settings.

Integrated Water and Energy Management

Integrated water management efforts should pay particular attention to energy issues. Managing and using water more efficiently can reduce related energy requirements and greenhouse gas emissions. Efficiency as used here

Integrated Regional Management Case Study: The Santa Ana River Watershed

Water managers in Southern California's Santa Ana River watershed are leaders in designing integrated regional water management strategies, relying on an array of tools to produce a wide range of water management and environmental benefits.

The Santa Ana River drains 2650 square miles and runs 100 miles from the peaks of the San Bernardino Mountains to the beaches of Orange County. Five million people live within this "Inland Empire" watershed, a population that is expected to double within 50 years.The watershed is also home to the world's densest populations of cows, a fact that surprises most outsiders. At its peak, the basin held more than 300 dairies, with up to 400,000 head of cattle, operated in less than 220 square miles of the upper part of the watershed—the Chino Basin. These cows produce 1 million tons of manure per year and another 2 million tons of manure currently sit on dairy lands. Runoff from these dairies has contaminated one of Southern California's largest groundwater sources with salts, dissolved solids and nitrates.

Urbanization, dairy operations, habitat destruction and other activities have taken a toll on the Santa Ana River's ecosystem. Today, some of the river's residents, including the Santa Ana sucker, the Least Bell's vireo and the southwestern willow flycatcher, are listed under the Endangered Species Act.

In 1968, local water agencies formed the Santa Ana Watershed Project Authority (SAWPA) in order to develop an integrated approach to address the challenges discussed above. After decades of effort, this integrated approach includes strategies such as water conservation, wastewater reclamation, and storm water infiltration. What makes the SAWPA case study so interesting is that it shows how multiple problems can be addressed simultaneously.

The juxtaposition of the local dairy industry with growing cities has created challenges—and opportunities—for local leaders. The Inland Empire Utility Agency (IEUA) is diverting dairy waste for composting and marketing to agricultural users. The methane derived from anaerobic digestion of this waste is used to generate renewable electricity. Thus, by diverting dairy waste and reducing ongoing groundwater contamination, IEUA has created a new energy source and a marketable compost product.

The value of new water sources, as well as regulatory and legal pressure to clean up groundwater contamination have also led IEUA to construct two groundwater desalters, which use desalination technology to clean up contaminated groundwater. (Desalting groundwater requires far less energy than desalinating seawater.) The two desalters have a combined capacity of more than 23 million gallons per day.These facilities provide usable water supply and help remediate contaminated groundwater basins. Agencies in the watershed are also recharging the basin's aquifers using storm water runoff and recycled wastewater.

The energy and climate benefits of this integrated approach are also notable. By reducing reliance on energy-intensive imported water (see discussion in Chapter 3), IEUA is able to reduce the electricity consumed to meet water supply needs. In addition to avoiding energy and other costs associated with imported water supplies, increasing local supplies reduces pressure on stressed ecosystems such as the San Francisco Bay-Delta. IEUA has also built a new energy-efficient headquarter building that has received a platinum certification from the U.S. Green Building Council's LEED program. The building uses waste heat to reduce heating and cooling costs, and photovoltaic cells to generate electricity.

The benefits of SAWPA's integrated approach are impressive, including:

- creation of local drought-proof water supplies.
- reduced reliance on imported water supplies that are vulnerable to environmental constraints and climate impacts.
- reductions in groundwater contamination
- flood management improvements
- enhanced wetlands
- marketable organic composed dairy waste
- improved air quality
- renewable energy generation
- reduced energy use and greenhouse gas emissions
- marketable greenhouse gas credits

The roots of this effort are more than three decades old. Climate considerations did not lead SAWPA and IEUA to launch this integrated regional effort. However, the energy and climate benefits of their approach are significant. The integrated approach reduces the vulnerability of the region to water supply impacts from climate change. It also shows how water utilities can make cost-effective contributions to efforts to reduce greenhouse gas emissions, through water and energy conservation, wastewater reclamation, better groundwater management and renewable electricity generation.

This integrated approach demonstrates how far water management has come from the days when dams and increased water diversions were the all-purpose solutions to meeting water supply needs. In California, the SAWPA effort has become a model for other integrated efforts around the state.

Sources: Santa Anna Integrated Watershed Plan, 2005 Update, Santa Anna Water shed Project Authority, Riverside, CA, June 2005.

Atwater, Rich and Paul Sellew. "Organics management, clean water and renewable energy: Focus on California." *BioCycle: The Journal of Composting & Organics Recycling*, February 2002.

http://www.ieua.org/desalter.html.

The LEED program itself reflects an integrated approach to green building. IEUA was able to use its institutional strengths to design on-site stormwater recharge facilities and to locate the headquarters building adjacent to a wastewater treatment plant, in order to provide renewable energy from its digesters and reclaimed water for use on site. The design reduced potable water demand by 73 percent and energy use by 90 percent.

describes the useful work or service provided by a given amount of water. Significant economic and environmental benefits can be cost-effectively achieved through improving water system efficiency. The energy/water nexus will make water conservation programs more attractive to agencies planning a response to climate change. In particular, as greenhouse gas emission reduction programs increasingly emphasize energy conservation, water agencies are likely to find additional benefits from more fully integrating energy and water management. Taking both

12 Elements to Consider When Designing an Integrated Response to Climate Change

When evaluating options for responding to the water management challenges presented by climate change, water agencies should consider the benefits of comprehensive integrated regional water management planning (IRWMP). Such strategies should incorporate the following elements:

1. Climate Impacts on Existing Systems and Future Strategies. Water agencies should analyze the potential impacts of climate change on existing facilities and on the tools under consideration to meet future demands.

2. Unique Regional Conditions. A careful examination of regional conditions will reveal challenges and suggest unique opportunities for future strategies to produce multiple benefits.

3. Evaluation of Multiple-Benefits and Funding Partners. IRWMP can provide potential multiple benefits and attract new funding partners to address water, energy, and environmental challenges.

4. Efficiency First. In most cases, greater investments in water-use efficiency are cost-effective and environmentally preferable—and result in significant energy savings. California electricity utilities recently adopted a "loading order" that requires investments in efficiency as a first priority before additional supply-oriented power strategies are pursued.[54] Water utilities should consider adopting a similar approach in response to anticipated climate change impacts.

5. A Full Range of Water Supply and Demand Options. All of the many supply and demand-side water management options should be considered in designing an effective response to climate change.

6. A Full Range of Flood Management Options. Land use controls, setback levees, floodways, and other floodplain management techniques are likely to become increasingly important flood management tools in the future. Given the high cost of new surface storage facilities and levees, and the residual flood risk for communities behind levees (e.g., pre-Katrina New Orleans), decision makers should encourage appropriate land use in floodplains to reduce risk to life and property.

7. Clear Objectives and Performance Standards. In order to evaluate the costs and benefits of alternative strategies, water managers should include clear objectives and performance standards to evaluate all tools on a level playing field.

8. "With-and-Without Project" Baseline Analysis. Analysis of proposed surface storage projects and other large infrastructure investments should include an accurate baseline and a clear "with and without project" analysis. Such analysis can help avoid stranded investments.

9. Economics and Cost-Based Financing. IRWMP should include careful evaluation of the economic costs and benefits of alternative strategies. Financing plans in which beneficiaries, rather than taxpayers, pay for the benefits they receive will provide incentives to ensure cost-effective investments.

10. Enforceable Environmental Protections. IRWMP efforts to restore and enhance the aquatic environment should take the form of specific, enforceable commitments.

11. Institutional Capacity. IRWMP will benefit from efforts to strengthen particular disciplines, including economics, climate-related expertise, and designing interagency partnerships.

12. Outreach to the Public and Decision Makers. IRWMP efforts to educate the public will increase public acceptance of investments to address climate-related problems. Agencies preparing plans to respond to climate change should also encourage decision makers to take prompt action to lessen future climate change-related impacts by reducing greenhouse gas emissions.

Together, the above recommendations represent a new approach to the foreseeable water management impacts of climate change. Though this approach is a dramatic departure from historic water project planning efforts, it is based on the experiences of water agencies around the West. This integrated regional approach can produce water supply, water quality, environmental, and other water management benefits, as well as greenhouse gas reduction and other societal benefits.

resources into account will improve the cost-effectiveness of water use efficiency programs, allowing, for example, higher rebates that should result in greater participation. Eventually, greenhouse gas reduction programs are likely to generate new opportunities for funding and revenue for water agencies that master the connections between energy and water.

The energy intensity of water varies considerably by source, geographic location and end use. A number of water management entities, government agencies, professional associations, private-sector users, and non-governmental organizations have already demonstrated potential savings in the area of combined end-use efficiency strategies:

• *Water-efficiency improvements:* Implementing cost-effective water efficiency improvements can generate significant energy savings. For example, in some areas, water, and energy utilities have designed joint rebate programs for appliances that save water and energy (e.g. washing machines). Some efficiency improvements can result in direct energy savings for water districts. For example, most of the electricity use in water and wastewater treatment plants is for pumping. Programs that reduce the volume of wastewater can result in significant energy savings for agencies with treatment plants. In addition, water conservation efforts that reduce peak water use can also reduce energy consumption, thus reducing peak energy demands as well.

• *Operations-efficiency improvements:* Energy management benefits can also be obtained by improving pumping equipment and operational control systems at existing facilities, including the use of high-efficiency motors and adjustable-speed drives, efficient pumps, and effective instrumentation and controls. In many applications, these measures can be implemented with payback periods of three years or less.[40]

Response Strategies for Addressing Other Water Resource Impacts

Climate change will have direct effects on water supply resources as discussed in the sections above. However, impacts to water supplies will be compounded by indirect effects that climate change will have on other water resources including aquatic ecosystems and flood management. It is essential to understand and address these important water resource in order to formulate an effective response plan to minimize water supply impacts.

Goods and Services of Aquatic Ecosystems

Water supply
Drinking, cooking, washing and other household uses
Manufacturing, thermoelectric power generation and other industrial uses
Irrigation of crops, parks, golf courses, etc.
Aquaculture

Supply of goods other than water
Fish
Waterfowl
Clams, mussels, other shellfish, crayfish
Timber products

Nonextractive benefits
Biodiversity
Transportation
Recreational swimming, boating, etc.
Pollution dilution and water quality protection
Hydroelectric generation
Bird and wildlife habitat
Enhanced property values
Coastal shore protection

Source: Pew Report on the Climate Effects on Aquatic Ecosystems.

Aquatic Ecosystems

Climate change will likely have significant impacts on riverine and estuarine ecosystems throughout the West, diminishing the wide array of societal benefits these ecosystems provide. As water managers consider how to respond to climate change, they should evaluate the need to manage and protect aquatic systems to maintain these benefits. In the West, water supply has often been prioritized over competing concerns, resulting in a loss of other benefits—particularly environmental benefits. As a result, many western rivers have been degraded to the point where species have been listed as threatened or endangered.

Today, the public seeks—and environmental laws require—a better balance among beneficial uses, and water managers must help find that balance. Water resource managers and the public share a mutual interest in addressing the impacts of global warming on aquatic ecosystems, in order to reduce future conflicts such as

> **"The manner in which humans adapt to a changing climate will greatly influence the future status of inland freshwater and coastal wetland ecosystems. Minimizing the adverse impacts of human activities through policies that promote more science-based management of aquatic resources is the most successful path to continued health and sustainability of these ecosystems. Management priorities should include providing aquatic resources with adequate water quality and amounts at appropriate times, reducing nutrient loads, and limiting the spread of exotic species."**
>
> Source: Pew Center on Global Climate Change, Aquatic Ecosystems and Global Climate Change: Potential Im*pacts on Inland Freshwater and Coastal Wetland Ecosystems in the United States*, 2002.

those that have occurred on the Klamath, Rio Grande, and other rivers.

Around the West, many water managers have been leaders in implementing practices that can minimize the effects of climate change and help preserve the health of aquatic ecosystems. These practices include:

Protecting the Ability for Aquatic Species to Adapt to Changing Conditions. Species naturally seek out conditions favorable to their survival and success. In a warmer climate, some aquatic species experiencing increased stress will try to move higher within watersheds to find suitable habitat. Therefore, maintaining or improving conditions necessary for migration within a watershed is critical for the survival of species at the limits of their temperature tolerances. For example:

• Existing water infrastructure has, in many cases, reduced the ability of species to move throughout a watershed. Barriers such as dams and diversion structures should be assessed to determine the potential for improving movement of critical species. In some cases, particularly regarding antiquated infrastructure, retrofitting structures to enable passage, or removing barriers altogether, can allow species to utilize suitable habitat upstream.

• Maintaining free-flowing rivers allows natural migration to take place and helps maintain other physical processes such as sediment transports that are critical for functioning ecosystems. When developing new storage, seek to locate new storage off-stream or utilize groundwater resources.

Restoring aquatic ecosystems. Restoring in-stream, riparian and floodplain ecosystems will increase the resilience of ecosystems to the effects of climate change and other stressors. Aquatic ecosystems where the natural, physical (i.e., sediment transport) and biological processes (i.e., recruitment of new riparian trees) are largely intact will be healthier and better able to support aquatic species, reducing the challenges that managers will face as climate change impacts intensify. Specifically, managers should consider that:

• Restoration of riparian habitat can play a crucial role in mitigating the effects of increased temperatures. Shading from trees reduces water temperatures. Riparian vegetation provides nutrients critical to aquatic species and improves the stability of stream banks, reduces bank erosion, and creates important aquatic habitat. In addition, large trees that fall into streams provide important in-stream habitat, particularly for juvenile salmon and other small fish.

• In many systems, restoration of periodic high flows is vital for maintaining in-stream habitat. High flows, often in the spring, are needed to establish riparian vegetation. Mobilization of sediment in the channel during high flows is essential for maintaining spawning habitat for salmon and trout. High flows also help move out-migrating juvenile anadromous fish downstream. They can also inundate natural floodplains, which are critical for some species to reproduce.

• Restoration of floodplain ecosystems can provide increased flood protection, groundwater infiltration for water supply, and improved water quality by reducing runoff into streams.

Improving Water Quality by Reducing Runoff of Pollutants. Runoff from urban, agricultural and other managed landscapes into rivers and streams can severely impair water quality through discharges of excess nutrients, sediment, and toxic chemicals. Poor water quality can in turn reduce the biological productivity of rivers and stress aquatic species. Increased flows may be required to mitigate adverse water quality impacts, or meet water quality standards. Reductions in polluting runoff can be achieved through a variety of approaches:

• Support practices such as increased use of permeable surfaces that allow infiltration of rainwater. Impervious surfaces can produce up to 16 times the volume of urban runoff compared to natural, permeable surfaces, reducing natural groundwater recharge and moving pollution into waterways. These practices can not only directly support multiple benefits including water quantity and community aesthetics, but can be more cost effect water quality solutions compared to traditional storm water management which relies on wastewater treatment.

• Riparian and floodplain habitats act as buffers between surface water sources and adjacent land uses, by filtering runoff and reducing direct input of pollutants.

• Watershed education programs have been effective at informing people about actions they can take to protect their local rivers and lakes. Water supply and flood management districts have a unique ability to educate their customers about the need to protect the quality of their water supplies.

Managing Water Supply Systems to Meet the Temperature Needs of Sensitive Species. Maintaining the health of aquatic ecosystems while meeting water supply needs will require data collection, analysis and actions to mitigate or prevent temperature impacts on sensitive species. Such efforts include:

• Data collection and computer modeling of seasonal water temperatures downstream of reservoirs to enable water managers to identify potential temperature problems before a crisis occurs.

• Data collection and computer modeling of reservoir temperatures under different operations scenarios to help water managers identify opportunities to reoperate reservoirs in order to preserve cold water for release later in the year, and to minimize potential water supply impacts.

• Retrofitting existing surface storage with flow curtains or installing flow outlets at a range of elevations within the reservoir to help meet water temperature needs downstream.

• Managing local groundwater levels to preserve subsurface inflow of cold water that may be critical to maintaining cold-water habitat for fish. Local groundwater pumping can also harm riparian vegetation that provides temperature and other ecosystem benefits.[41]

Flood Control

The frequency and the size of flood events are expected to increase due to climate change. Water managers are considering the challenge of reoperating reservoirs that serve the dual purpose of flood control and water supply. Because there are competing operational elements between these two purposes, reoperation may result in reduced water supply yield. Flood protection actions downstream of reservoirs, such as levee setbacks, can in some cases reduce the tension that dam operators face in managing for water supply and flood protection.

The most common form of flood protection has been the construction of storage facilities, levees and flood bypasses, but today there are a number of options for improving flood protection that may be more cost effective and provide additional benefits. This section discusses a number of planning considerations as well as structural and nonstructural options for improving flood management in order to address the impacts of climate change. Emphasis has been placed on response measures that not only increase flood protection, but also benefit ecosystem health, water quality, and water supply. Many of these measures may be significantly more cost effective than traditional approaches—particularly over time—because they reduce the potential for flood damage.

Manage Floodplains Knowing that They Will Flood Eventually. Regardless of existing reservoirs or levees, most lands within the floodplain of a river will flood at some point, damaging property and resulting in the potential loss of life. It is not a question of *if*, but rather *when* such floods will happen. However, many local, state, and federal land-use and planning agencies only plan for the 100-year flood event. With climate change likely increasing the frequency and size of peak events, existing flood control systems may not be adequate. As such, the extent to which land uses within the floodplain can be limited to those compatible with periodic flooding will reduce the cost of flood damages and the need for increased levels of protection.

Many cities and counties currently use planning guidelines and zoning requirements to manage development within the floodplain to provide for public safety. Often only areas within the 100-year floodplain are subject to such regulations. Land that is adjacent to a river but protected by a levee built to withstand a 100-year flood event may not be considered to be within the floodplain. Areas deemed to have a 100-year level of protection may not be adequately protected in the future. The California

> **"A reasonably foreseeable flood is a flood event that is realistically probable for a particular area. In many cases, this event could exceed a predicted "100-year" flood... Sources of information on reasonably foreseeable floods may include historic floods, paleo-floods, hydrologic modeling using transposition, historical flood damage data, and hydrologic models."**
>
> Source: California Floodplain Management Report, 2002

Department of Water Resources notes that "during a typical 30 year mortgage period, a homeowner living behind a levee has a 26 percent chance of experiencing a flood larger than a 100 year event. This is almost twice the likelihood of a house fire."[42]

The single most effective flood management strategy is to avoid development in floodplains that is not compatible with occasional flooding.

Plan for More Extreme Flood Challenges. Current climate modeling does not yet provide precise estimates of the degree to which climate change will increase the frequency and magnitude of flood events in any given area. The need to prevent future flood damage and the time required to implement mitigation measures suggests the importance of immediate planning for increases in flood events. Because simply planning for the 100-year flood may not be adequate in the future, water resource managers should therefore plan for the "reasonably foreseeable flood", taking into consideration the hydrologic impacts of climate change among other factors.

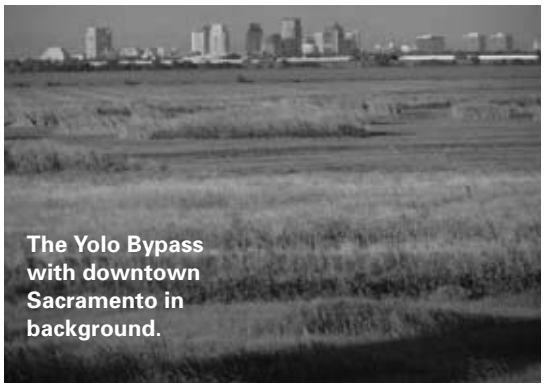
Restore Floodplain Habitat. Traditional flood control projects have been designed to control flows without considering the importance of maintaining floodplains as part of a healthy riverine ecosystem. Floodplain ecosystems provide essential habitat for a multitude of plants, aquatic species, and other wildlife. Lands adjacent to rivers, particularly those subject to frequent or deep flooding should be strongly considered for preservation or restoration as floodplain habitat. In the last several decades, a growing number of flood management projects are incorporated floodplain protection and restoration as a strategy to reduce flood damage and increase ecosystem health.

Promote Flood-Compatible Agriculture. One of the best economic uses of floodplain lands is for agriculture compatible with periodic flooding. Not only does this encourage the preservation of productive agricultural lands, but periodic flooding also replenishes nutrients and soils, reducing the need for fertilizers. In addition, managed inundation of seasonal agricultural lands can provide valuable habitat for wildlife. The purchase of flood easements on private lands being used for flood control can also deliver financial benefits to farmers while creating a more cost effective way of meeting the need for improved flood management.

Build Flood-Resistant Infrastructure. In the valleys of large rivers such as the Sacramento, floodplain areas can extend great distances due to the low slope of the land. Making all of such land off-limits to development may not be necessary or feasible. Where construction occurs in an area that could be inundated to a shallow depth by a reasonably foreseeable flood event, structures should be built to withstand damage by requiring raised foundations or non-inhabited first floors. It is important for decision-makers to acknowledge and for residents to understand

Multi-beneficial Floodplains: The Yolo Bypass

The Yolo Bypass in California's Central Valley is a good example of incorporating agriculture and wildlife habitat into a local flood management plan. In the winter and spring months, the Bypass is employed as a flood control tool that plays a critical role in the Central Valley flood control system including protecting Sacramento and other neighboring cities. When flooded, the Bypass provides valuable habitat for native fish, and a resting stop for migratory birds. During the dry months of the year the Yolo Bypass is farmed with annual crops. Because of the important habitat the Yolo Bypass provides it is home to a national wildlife refuge.



The Yolo Bypass with downtown Sacramento in background.

TSPAULD

that this approach will not eliminate risk as climate change increases the frequency and magnitude of floods.

Expand Flood Insurance. The most common form of flood insurance is obtained through the National Flood Insurance Program (NFIP). NFIP makes flood insurance available to communities that have enacted ordinances requiring, among other things, that all new construction have its lowest floor elevated at or above 100-year flood elevation. Under federal law, flood insurance must be purchased when obtaining a federally backed loan for a home within the Flood Insurance Rate Maps 100-year floodplain. But it is well recognized that these maps are often out of date and do not include areas that are within the 100-year floodplain due to the existence of levees. Cities and counties should assess the adequacy of their flood mapping based on existing and likely future flood hydrology. Additionally, all homes and businesses in areas at risk of flooding in a reasonably foreseeable flood event should be required to have flood insurance, particularly if they would be at risk of flooding to significant depth in the event of a levee failure.

Floodplain Mapping: The Need for Further Information

The West is growing rapidly and millions of people will be living in areas with the potential to flood. Yet many communities do not have the necessary information to determine the risk or the type of flooding they face. Floodplain mapping involves analyzing the hydrology of flood events of varying sizes and then charting what areas are likely to flood given current flood protection. Programs such as the Flood Insurance Rate Maps are essential tools in enabling cities and counties to make informed management decisions. They also help ensure that development within floodplains is sufficiently protected. Cities and counties, in coordination with state and federal agencies, should ensure that floodplain mapping is adequate by using updated hydrological information that reflects reasonably foreseeable flood events. Development, especially the increase in impermeable surfaces, can significantly alter natural hydrology, increasing downstream risks. Therefore, mapping should also incorporate the flood impacts related to past and future development within the watershed.

Improve Monitoring, Forecasting, and Early Warning Systems. Collection of river and streamflow data is a critical component of water supply and flood management. To adequately manage rivers and meet ecosystem needs, water officials rely on streamflow data taken at all times of the year. Data collected during storm events is particularly relevant. Because every year is different, long records of data collection are extremely valuable in predicting future flows and rare high-flow events. Streamflow gauging is also an essential tool for developing early warning systems as part of evacuation plans that can both reduce flood damages and the loss of life. Unfortunately, recent cuts in federal spending have decreased the number of gauges throughout the West, undermining water resource managers and those responsible for public safety and ecosystem health. As climate change alters current hydrology, a robust stream gauge system will be essential to assist water managers and other decision makers.

Watershed and meteorological conditions vary greatly depending upon place, so no single strategy or suite of strategies will be appropriate for all locations. As a result, land-use planners and water resource managers should consider all options. They should also give priority to the response measures which are most cost effective, provide the most multiple benefits, and are easiest to implement given cost and political considerations.

PREVENTION

Decision makers in the West have traditionally looked to water leaders, particularly those from rapidly growing urban areas, to inform them about problems related to water supply, and to develop solutions. The scope and extent of potential worst-case climate change impacts, ranging from lost snowpack to rising sea levels, could result in serious challenges for water managers. As in the case of the gasoline additive methyl tertiary-butyl ether MTBE (see The MTBE Story: Urban Water Agency Leadership) the wisest course for water managers is to be proactive, to reach out to decision makers and the public, and to encourage preventative action. Regarding climate change, prevention means comprehensive, ambitious, and prompt action to reduce greenhouse gas pollution. Such actions could have profound benefits for water management for decades to come.

The MTBE Story: Urban Water Agency Leadership

Perhaps the best example of proactive action by water managers in responding promptly to threats to urban water supplies is the effort to address the contamination of groundwater by the gasoline additive methyl tertiary butyl ether (MTBE). Water agencies were on the forefront of efforts regarding MTBE contamination long before regulatory agencies took action regarding this suspected carcinogen. A decade ago, urban water managers became aware of the threat posed by MTBE contamination to water supplies. MTBE threatened thousands of wells across the country in places where this gasoline additive had leached into groundwater.

Instead of waiting for regulators to assess the scope of the problem and design a response, water managers proactively educated the public and decision makers about MTBE's sources, potential health impacts, and potential costs to water agencies. They took the lead in urging regulatory agencies and legislators to address the threat posed by MTBE. Water agencies also opposed oil company efforts to obtain a congressional waiver of liability. The consensus regarding MTBE among water managers led to the involvement of the American Water Works Association (AWWA). Thanks to water managers, states began banning MTBE, reducing future contamination—and future costs—far more rapidly than would otherwise have been the case. The MTBE case illustrates the impact that proactive water managers can have on public education and prevention on critical water issues.

There were several reasons for this decision to take a leadership role in the MTBE debate. The scientific evidence regarding MTBE contamination was clear. The water management implications of MTBE were serious in terms of public health, the contamination of existing water supplies, and economic costs. Regulatory agencies were slow to respond to the problem when action by policymakers could have had a major impact. And finally, water managers are respected community leaders; decision makers and the public look to them for information about serious water-related problems. Each of these factors now applies in the case of climate change.

For many of the same reasons as the MTBE case, water managers should take the lead in advocating climate change prevention measures.

This would not be the first time that water managers have taken the lead on water management issues without waiting for intervention by regulatory agencies. In December 1991 in California, urban water agencies and environmental organizations signed a memorandum of understanding regarding urban water conservation. This landmark agreement included 14 best management practices for urban conservation. Membership in the California Urban Water Management Council has now grown to 354 members.[43] These urban water agencies could have waited for the state legislature or regulatory agencies to mandate conservation efforts. Although the state has raised significant concerns regarding the pace of implementation of the best management practices, this agreement remains a significant pro-active step.[44]

Western water agencies and other decision makers with water management responsibilities have already demonstrated a broad approach as they begin to reduce climate change impacts. The pace of action to prevent future damage from climate change is accelerating dramatically. Concerns about water impacts are a significant factor in these developments, and water managers are beginning to take clear, action to help prevent climate change. This section provides a brief survey of best practices regarding these actions at the local, state, regional, and national levels.

Action at the Local Level

Although reducing the future impacts of climate change will require action at all levels of government, steps taken at the local level can result in innovative approaches to prevention, and can point the way to broader action. Several examples of such local action are cited here.

Action by Individual Water Agencies

Some water agencies are laying the groundwork for programs to reduce their greenhouse gas emissions. For example, the East Bay Municipal Utilities District (EBMUD) is working to minimize the district's climate change footprint. EBMUD is the first water district to join the California Climate Action Registry. As a member of the registry, EBMUD pledges to annually track, report, and certify its greenhouse gas emissions. The district has also replaced nearly its entire passenger vehicle fleet

with electric-gas hybrids and installed microturbine and photovoltaic systems on the roofs of its two main offices to power business operations. EBMUD was recently awarded the Environmental Protection Agency's Green Power Leadership Club award for exemplary green power production—the first water/wastewater agency to receive this honor. (See Appendix A for a detailed discussion of EBMUD's approach to climate change.) Since EBMUD joined the registry, more than a dozen California water agencies have joined as well as Seattle Public Utilities and the Salt River Project.

Public/Private Partnerships

In some areas in the West, water agencies are collaborating with local businesses to address global warming. The Santa Clara Valley Water District's (SCVWD) partnership with Sustainable Silicon Valley is an excellent example. Formed in 2001, Sustainable Silicon Valley (SSV) is a collaboration of businesses, government agencies, and nongovernmental organizations aimed at addressing environmental and resource pressures in the San Francisco Bay Area's Silicon Valley.[45] SSV is working towards a goal of reducing regional carbon dioxide emissions to 20 percent below 1990 levels by 2010.

To meet the goal, the partnership is focusing on energy efficiency, fuel efficiency, and increased use of renewable energy. This partnership with high technology firms reveals an understanding of the need to take action to prevent climate change and of the opportunities for businesses pioneering. It also shows an understanding of effective new technologies that assist in achieving this goal. Many Silicon Valley entrepreneurs see climate change reduction efforts as a major growth industry. As part of this effort, SCVWD has installed high-efficiency photovoltaic cells above a parking area on its San Jose campus, reducing carbon dioxide emissions by an estimated 412,699 pounds per year and supplying 20 percent of the facility's energy needs with clean energy. (See Appendix A for a detailed discussion of how SCVWD is working to address climate change.)

Cities for Climate Protection

Local governments across the United States are beginning to address the challenge of reducing climate change emissions. More than 670 cities worldwide have joined the Cities for Climate Protection campaign. These include at least 150 in the United States, more than 45 of which are in the West.[46] These local governments include many with water management responsibilities. Of the western cities that are members of the campaign, more than 30 serve as direct municipal water providers. In addition, the Marin (California) Municipal Water District has signed on to the campaign as an individual water district—the first water district to do so. As part of the agreement, signatories analyze their greenhouse gas emissions, set emissions reduction goals, develop and implement local greenhouse actions plans, and monitor and report results. This campaign represents a major movement of cities to address climate change-related issues directly.

U.S. Mayors' Climate Protection Agreement

On June 13, 2005, the U.S. Conference of Mayors unanimously passed a resolution regarding global warming.[47] Remarkably, this measure received more support than any resolution in the organization's history.[48] Of the more than 410 mayors who had signed the agreement as of March 8, 2007, (representing more than 60 million people), at least 133 are mayors of western cities. At least 85 of those cities provide water services directly through municipal water agencies.[49] The agreement commits signatories to strive to meet or exceed Kyoto Protocol targets for reducing climate change pollution—a reduction of 5.2 percent below 1990 emissions levels by 2012.

Action at the State Level

Around the nation, a growing number of states are also taking action to address climate change. In the West, governors are stressing the potential impacts on water supplies as major reasons for taking comprehensive action. State-based strategies include gubernatorial initiatives, programs to reduce carbon pollution, and a move toward renewable portfolio standards.

Comprehensive Gubernatorial Initiatives

California. On June 1, 2005, Governor Arnold Schwarzenegger signed an executive order establishing greenhouse gas emissions targets for the state. The targets call for reducing California's emissions 11 percent below current levels by 2010, 25 percent by 2020, and 80 percent by 2050. Scientists agree that reductions of about 80 percent below current levels are needed to stave off the most serious effects of climate change.

In addition to highlighting potential impacts to water supply, the California initiative also emphasizes that water managers can be part of a comprehensive climate change strategy. The final March 2006 report from the

Governor's Climate Action Team underscores the fact that water conservation has the potential to generate significant energy savings, thus reducing greenhouse gas emissions. (See the discussion of energy and water issues in Chapter 3 for a more complete discussion of this issue.)

Three California urban water agencies have become directly involved in supporting the state's efforts to mandate cuts in climate change pollution. The East Bay Municipal Utility District, the Santa Clara Valley Water District, and the Marin Municipal Water District have all written to the governor, urging him to adopt an aggressive greenhouse gas pollution control strategy. For example, the Santa Clara Valley Water District stated in its letter to Governor Schwarzenegger, "(W)e are very concerned about the impacts of global warming on Sierra snow pack and on water quality in the Delta. The district has supported policies that would reduce the effects of greenhouse gases. We urge you to take the necessary next steps to further the goals and commitments made by your Administration to prevent and defer global warming in California."[50]

Arizona. On February 2, 2005, Governor Janet Napolitano signed an executive order creating a 36 person Climate Change Advisory Group. The group was charged with producing a Climate Change Action Plan that gives recommendations for reducing greenhouse gas emissions in Arizona.[51] The suite of recommendations issued by the task force would reduce emissions to 20 percent below 2006 levels, while saving the state approximately $6 billion, creating 300,000 new jobs, and saving 172,000 barrels of oil.

Oregon. On April 13, 2005, Governor Ted Kulongoski announced five new initiatives designed to curb climate change. These initiatives, based on the Governor's Advisory Group on Global Warming, include:

- establishing new greenhouse gas reduction goals
- developing a plan for stricter emission standards for vehicles, along the lines of California's program
- developing carbon dioxide reduction schedules for utilities and other large emitters
- reducing state agency energy use by 20 percent by 2025
- increasing renewable and bio-fuel production and use[52]

New Mexico. On June 9, 2005, Governor Bill Richardson signed an executive order setting greenhouse gas emis-

Western Leaders Speak Out About Climate—and Potential Water Impacts

"Global warming threatens California's water supply, public health, agriculture, coastlines and forests, our entire economy and way of life. We have no choice but to take action to reduce greenhouse gas emissions." (California Governor Arnold Schwarzenegger, July 3, 2005)

"Arizona and other Western States have particular concerns about the impacts of climate change and climate variability on our environment, including the potential for prolonged drought, severe forest fires, warmer temperatures, increased snowmelt, reduced snow pack and other effects." (Governor Janet Napolitano, Climate Change Executive Order, February 2, 2005)

"Coastal and river flooding, snowpack declines, lower summer river flows,... and increased pressure on many fish and wildlife species are some of the effects anticipated by scientists at Oregon and Washington universities." (Oregon Strategy for Greenhouse Gas Reductions, Governor's Advisory Group on Global Warming, p. i)

"The southwestern United States will likely suffer significant impacts from temperature changes, such as decreased annual precipitation, faster evaporation of surface water supplies, and increased runoff at the end of winter when snow will melt faster." (Governor Bill Richardson, Climate Change and Greenhouse Gas Reduction Executive Order, June 9, 2005)

"Montana has been locked in the grip of a drought for most of the past two decades...I am very concerned about the connection these conditions have to global climate change... I am intrigued by the fact that every city, state, corporation, province and country that has resolved to control its respective green house gas emissions has reaped substantial economic benefits from those efforts...I ask you to establish a Climate Change Advisory Group that will examine agriculture, forestry, energy, government and other sectors of our state. I want this broad-based group of Montana citizens to identify ways in which we can reduce our collective greenhouse gas emissions while saving money, conserving energy and bolstering our economy." (December 13, 2005 letter from Governor Brian Schweitzer to Richard Opper, director of the state Department of Environmental Quality)

sions reduction targets at 2000 emissions levels by 2012, 10 percent below 2000 levels by 2020, and 75 percent below 2000 levels by 2050. The order created the New Mexico Climate Change Advisory Group to write a plan to meet the targets.[53] New Mexico thus became the first major energy producing state to set targets for cutting global warming emissions.

Montana. On December 13, 2005, Governor Brian Schweitzer called for the creation of a Climate Change Advisory Group, charged with developing recommendations to help Montanans save energy and reduce greenhouse gas emissions. The effects of climate change on water were cited first in the governor's letter, quoted below:

State-Level Programs to Reduce Carbon Pollution

States are taking a wide range of individual actions to reduce the emissions that cause global warming. For example, several states are adopting renewable portfolio standards or California's pioneering legislation regulating automobile tailpipe emissions of greenhouse gases. However, these efforts represent only two possible state-level responses to address global warming. In addition to the broad gubernatorial initiatives discussed above, state-based programs include:

- Automobile tailpipe emissions standards
- Appliance efficiency standards
- Renewable energy generation requirements, known as renewable portfolio standards
- Incentives for renewable energy production and generation
- Green building standards, such as the U.S. Green Building Council's Leadership in Environmental Design (LEED) program
- Requiring utility energy plans to include the cost of carbon emissions

California's Global Warming Solutions Act. The Global Warming Solutions Act (AB 32) authored by Assembly Speaker Fabian Núñez (D-Los Angeles), was signed into law by Governor Arnold Schwarzenegger on September 27, 2006. This made California the first state in the nation to set limits on heat-trapping pollution by implementing the pollution reduction targets laid out by Governor Schwarzenegger in June 2005. It set limits to cut the state's global warming pollution 25 percent by 2020. In recognition of the water supply benefits of reducing global warming, AB32 was supported by three California urban water agencies: the East Bay Municipal Utilities District, the Marin Municipal Water District, and the Santa Clara Valley Water District. Water agency staff and board members lobbied in support of AB 32 and helped spread awareness of the potential water-related impacts of climate change, and contributed to the bill's passage.

California's Vehicle Tailpipe Greenhouse Gas Emissions Program. In 2002, California passed pioneering legislation to reduce global warming pollution from all new passenger cars and trucks sold in the state, the largest automobile market in the United States. The law takes effect with the 2009 model year. At least 10 states, including Arizona, Oregon, and Washington, and Canada have adopted or indicated their intention to adopt California's tailpipe pollution standards. Together, these states and Canada represent one-third of the North American automobile market, providing a significant incentive for automobile manufacturers to improve the emissions of their entire fleet.

Renewable Portfolio Standards. At least seven western states have adopted renewable portfolio standards, which require electric utilities to purchase specified percentages of their power from renewable energy sources by specific target dates.[54] There are many benefits of such standards, including reduced pollution from coal-fired power plants and lower greenhouse gas emissions.

- Arizona: Requires electricity retailers to purchase 15 percent of their power from renewable sources by 2025
- California: Requires 20 percent renewables by 2017
- Colorado: Requires 10 percent renewables by 2015
- Montana: Requires 15 percent renewables by 2015
- Nevada: Requires 20 percent renewables by 2015
- New Mexico: Requires 10 percent renewables by 2011
- Washington: Requires 15 percent renewables by 2020

Action at the Regional Level

Western Regional Climate Action Initiative

On February 26, 2007, the governors of Arizona, New Mexico, Oregon, Washington and California, launched

> **"In the Southwest, water is absolutely essential to our quality of life and our economy... Addressing climate change now, before it is too late, is the responsible thing to do to protect our water supplies for future generations."**
>
> Source: Governor Bill Richardson, February 28, 2006

a joint effort to reduce their emissions of global warming pollution. Through the Western Regional Climate Action Initiative, these states will create a regional system to promote clean energy and energy efficiency to slow emissions of carbon dioxide and other heat-trapping pollutants that are contributing to global warming. The new agreement is similar to the Regional Greenhouse Gas Initiative among 8 northeastern states and will include regulatory and market mechanisms.

West Coast Governors Global Warming Initiative

In September 2003, the governors of California, Oregon, and Washington launched a regional initiative designed to address climate change.[55] This effort includes setting emissions targets for state vehicle fleets, creating targets and incentives for renewable energy, and developing efficiency standards for appliances.

Southwest Climate Change Initiative

In February 2006, Governor Richardson of Arizona and Governor Napolitano of New Mexico announced the creation of the Southwest Climate Change Initiative, aimed at reducing global warming effects and cutting greenhouse gas emissions.

Regional Greenhouse Gas Initiative

The largest regional global warming effort, known as the Regional Greenhouse Gas Initiative (RGGI), has been launched among eight Northeast and mid-Atlantic states.[56] The initiative's goals include capping carbon dioxide emissions from power plants at current levels in 2009 and reducing them by 10 percent from current levels by 2019. RGGI may become the nation's first cap and trade carbon program. This market-based approach to emission reductions is expected to drive investments to the least cost strategies, encourage technological innovation, and bring net economic benefits to the region. State modeling has estimated that, along with expected investments in efficiency, RGGI will result in a net savings on consumer energy bills of more than $100 per household.

Sense of the Senate Resolution—Passed on June 22, 2005

On June 22, 2005, the United States Senate passed a resolution (54–43), which for the first time called for mandatory limits on U.S. global warming pollution. The bipartisan resolution was offered by Senators Bingaman (D-NM), Byrd (D-WV), and Domenici (R-NM). The passage of the resolution marked the first time that a majority of the Senate has voted in support of mandatory caps to limit global warming pollution. The resolution read: Congress finds that

(1) Greenhouse gases accumulating in the atmosphere are causing average temperatures to rise outside of the range of natural variability and are posing a substantial risk of rising sea levels, altered patterns of atmospheric and oceanic circulation, and increased frequency and severity of floods and droughts;

(2) There is a growing scientific consensus that human activity is a substantial cause of greenhouse gas accumulation in the atmosphere; and

(3) mandatory steps will be required to slow or stop the growth of greenhouse gas emissions into the atmosphere.

(b) Sense of the Senate—It is the sense of the Senate that Congress should enact a comprehensive and effective national program of mandatory market-based limits and incentives on emissions of greenhouse gases that slow, stop and reverse the growth of such emissions at a rate and in a manner that

(1) will not harm the United States economy; and

(2) will encourage comparable action by other nations that are major trading partners and key contributors to global emissions.

Action at the National Level

Progress on global warming can be made at the local, state, and regional level. However, the United States will not fully or adequately address climate change-related issues until it develops a mandatory national program to slow, stop, and reverse the emissions of pollutants that cause global warming. Though Congress has not passed

U.S. Climate Action Partnership: A Joint Business and Environmental Program

The business community is taking a leadership role in calling for an ambitious, effective national program to reduce greenhouse gas emissions. On January 22, 2007, the U.S. Climate Action Partnership, a diverse group of businesses and environmental organizations called on the federal government to quickly enact strong national legislation to achieve significant reductions of greenhouse gas emissions. It further stated:

"We, the members of the U.S. Climate Action Partnership, pledge to work with the President, the Congress, and all other stakeholders to enact an environmentally effective, economically sustainable, and fair climate change program consistent with our principles at the earliest practicable date."

This unprecedented alliance, called the U.S. Climate Action Partnership (USCAP), consists of businesses including Alcoa, BP America, Caterpillar, Duke Energy, DuPont, FPL Group, General Electric, Lehman Brothers, PG&E, and PNM Resources, along with four non-profit organizations, including NRDC. The USCAP document, "A Call for Action," includes a goal of reducing greenhouse gas concentrations to a level "that minimizes large-scale adverse climate change impacts to human populations and the natural environment." According to the group, "Each year we delay action to control emissions increases the risk of unavoidable consequences that could necessitate even steeper reductions in the future, at potentially greater economic cost and social disruption." The group supports "mandatory approaches" to reduce heat trapping pollutants, as well as flexible strategies to achieve these reductions. According to these business and environmental leaders, confronting this challenge "will create more economic opportunities than risks for the U.S. economy."

Source: United States Climate Action Partnership, January 2007. "A Call for Action." www.us-cap.org.

comprehensive legislation to this end, there has been some significant action at the federal level. The U.S. Senate has adopted a bipartisan resolution calling for mandatory limits on greenhouse gas emissions.

Mandatory Federal Limits on Global Warming Pollution

Recent scientific consensus has solidified around the need for decisive federal action to limit global warming pollution in order to stave off dangerous impacts on the earth's climate. Industry had recognized this urgency and called on Congress to act. Most significantly, in January of 2007, some of America's largest corporations called for mandatory limits on the pollution that causes global warming under a newly formed alliance called the United States Climate Action Partnership (USCAP). The group, which consists of such industry-leading companies as General Electric, Caterpillar, Duke Energy, Alcoa, Lehman Brothers and DuPont, noted in its report that "each year we delay actions to control emissions increases the risk of unavoidable consequences." USCAP went on to call for "prompt enactment of national legislation in the United States to slow, stop, and reverse the growth of greenhouse gas emissions over the shortest period of time reasonably achievable."[57]

Like USCAP, NRDC supports aggressive emissions reductions measures such as those outlined in Congressman Henry Waxman's *Safe Climate Act* (HR 5642), and in Senators' James Jeffords and Barbara Boxer's *Global Warming Pollution Reduction Act* (S. 3698). Both pieces of legislation call for reducing emissions to 1990 levels by 2020, and for further reductions to levels approximately 80 percent below 1990 levels by 2050. Such cuts are needed to avoid atmospheric concentrations of carbon dioxide that would lead to dangerously increased global temperatures and catastrophic changes in the earth's natural systems.

For up-to-date information, on federal global warming legislation, please visit the NRDC Global Warming web page at: http://www.nrdc.org/globalWarming/default.asp.

PUBLIC OUTREACH

As respected community leaders, water managers can have a significant impact in shaping public opinion and awareness. The role of water managers in shaping public awareness is particularly significant in the American West; where water is scarce, water leaders bear a greater burden in educating the public and decision makers regarding water-related issues. Some water officials are already beginning to educate the public about the connections between climate change and water management. Water districts use a wide range of educational tools: materials for children, billboards and other paid advertising, outreach and meetings with—and letters to—elected officials. These educational efforts can have a significant effect on the public debate when it comes to climate change.

How Water Managers Are Leading the Way

Today, some western urban water managers are meeting the challenge of calling for action on global warming. As early as 1998, the Water Education Foundation, a California nonprofit organization with many board members from water agencies, major water users, and water-related engineering firms, devoted an issue of its magazine to climate change, discussing the growing scientific evidence regarding climate change and potentially significant water-related impacts such as a reduction of snowpack.[58] In October 2001, the American Water Works Association's journal discussed some of the potential climate-related impacts on water supplies that are reviewed in this report.[59] These discussions, in turn, have helped water managers to begin to analyze how their systems are vulnerable to the impacts of climate change.

As public awareness about the threat posed by global warming has grown, so too has the awareness of water managers. In 2005 the American Water Works Association Research Foundation issued a seminal report entitled *Climate Change and Water Resources: A Primer for Municipal Water Providers.* Though written primarily for water managers, the report discusses the importance of public education about the water-related potential impacts of climate change. And there are more signs that awareness among water managers is continuing to build:

• The Santa Clara Valley Water District's website includes strong statements about climate change "The reality of global warming and climate change is the most significant long-term threat to water resources management in Silicon Valley."[60]

• Three San Francisco Bay Area urban water agencies wrote to Governor Schwarzenegger in early 2006, urging him to take prompt action to address climate change. These three urban water agencies have also supported state legislation that would create mandatory caps on greenhouse gas emissions.

• In January 2007, the San Francisco Public Utilities Commission convened a Water Utility Climate Change Summit attended by more than 150 water managers and other stakeholders. The conference received significant media coverage.

The message is beginning to get through to decision makers, as indicated by public comments made by governors around the West about the need to act to reduce climate change impacts. Nearly all of those comments (see Western Leaders Speak Out about Climate) highlight the effect global warming will have on water resources.

Chapter 5

Conclusions and Recommendations

The research, analysis, and best practices reviewed in this report suggest several broad conclusions related to climate change and water management. These conclusions, as well as the conclusions in the American Water Works Association Research Foundation (AWWARF) report, lead to a number of specific recommendations for water managers that fall into the four action areas outlined in the previous chapter: vulnerability analysis, response, prevention, and public awareness.

CONCLUSIONS

The Science Is Clear

The scientific community has provided clear and urgent evidence that global warming is already happening and that it is caused by the increase in greenhouse gas concentrations in the atmosphere, particularly carbon dioxide. This increase is largely human-caused, primarily through the burning of fossil fuels in power plants and cars.

Climate Change Will Affect Water Management

There are a variety of ways in which climate change will negatively affect water resources in the American West. Considered together, these changes could have a significant impact on water supply, water quality, aquatic ecosystems, and flood management. We are already experiencing serious impacts of climate change, including sea level rise, decreased snowpack and earlier peaks in spring runoff.

Immediate and Sustained Action Can Reduce Future Impacts

Broad and strong actions will slow, stop, and reverse rising emissions of greenhouse gases, reducing future impacts on water resources. Immediate action is required to reduce long-lasting climate effects. Cost-effective opportunities for emission reductions can provide immediate multiple benefits.

Water Managers are Taking Action on Climate Issues

Water managers need to provide leadership to address the impacts of climate change on water resources and lead by example by reducing greenhouse gas emissions. Around the West, some water managers have undertaken

a broad range of actions on issues related to all aspects of climate change.

RECOMMENDATIONS

Water managers work with their communities to meet future water needs. The comprehensive recommendations presented in this section are designed to assist managers in helping Western communities face the new challenges posed by climate change.

Vulnerability Analysis

Local, regional, state and national water resource managers should assess the vulnerability of water supplies, flood management and aquatic ecosystems to impacts from climate change.

■ *Conduct Local Analyses*

Water managers should analyze the potential effect of climate change on water supply systems, water demand, and environmental and water quality requirements.

■ *Assess Regional Impacts*

Water managers should undertake cooperative regional vulnerability analyses to develop an understanding of the common challenges they face and lay the groundwork for cooperative responses. Such regional efforts could also produce better results and reduce expenses for individual participating agencies.

■ *Undertake State- and Federal-Level Evaluations*

Agencies should undertake state level analyses of likely climate change impacts on a full range of water management issues. Federal agencies including the Bureau of Reclamation, the the U.S. Army Corps of Engineers, Fish and Wildlife Service, the Federal Emergency Management Agency, the Environmental Protection Agency, the National Oceanic and the Atmospheric Administration, Federal Energy Regulatory Commission and the United States Geologic Survey should undertake evaluations of the likely impacts of climate change on water resources, and federal facilities and on the communities they serve.

Response

The following recommendations are designed to help water managers respond effectively to likely climate change impacts.

■ *Guiding Principles for Water Resource Management Response*

The following general principles are designed to assist forward-thinking water decision makers in crafting strategies to respond to this challenge.

• *Strengthen Institutional Capacity.* Responding to climate change will require agencies to invest in inter-agency collaborations, stakeholder involvement and technical analysis.

• *Maximize Flexibility.* Develop strategies that allow for mid-course corrections and redirection of investments toward the most effective tools, and strategies that reduce the risk of stranded investments in order to increase the ability of water managers to adapt to changing conditions.

• *Increase Resilience.* Water managers should consider a range of water management options that increase their ability to meet future needs under conditions of greater variability and uncertainty.

• *Implement "No Regrets" and "Multiple Benefits" Strategies.* Choose cost-effective strategies providing multiple benefits that make sense both today, and in a world altered by climate change.

• *Address Multiple Stresses.* Climate change is intensifying the stress put on water resources by other factors (e.g., population growth, land-use changes, contamination of surface and groundwater resources, and the need for ecosystem protection.) Water managers should seek to address these combined challenges through measures such as improving water use efficiency and protecting surface and groundwater sources.

• *Invest in Inter-Agency Relationships.* Water managers should partner with neighboring water agencies, as well as with agencies managing energy, environmental resources, wastewater, stormwater, and land use .

• *Incorporate Climate Change into Ongoing Project Design.* Water managers should incorporate climate change impacts into the design of existing and new facilities now, rather than waiting for the completion of comprehensive response plans to address climate issues.

• *Expand Dialogue with the Scientific Community.* Water managers and scientists should exchange information to increase the effectiveness of measures designed to meet the challenges posed by climate change and should develop a more accurate analysis of potential impacts on water resources.

■ *Restore and Protect Aquatic Ecosystems in Preparation for Climate Change*

In recent years, the West has seen numerous water resource conflicts pitting protection of threatened and endangered species against the demand for water supplies. To prevent future conflicts, to minimize impacts to water supplies and to protect our aquatic ecosystems, water managers should incorporate the following actions into their climate change strategies:

• Restore degraded rivers and floodplain habitats to buffer the impacts of climate change and provide critical habitat for sensitive species.

• Improve water quality by reducing runoff of pollutants through watershed management, increasing urban retention and infiltration of precipitation.

• Manage water supply systems to meet the temperature needs of sensitive species.

■ *Implement Water Management Tools That Are Effective in the Context of Climate Change*

Prior to making long-term investment decisions, water managers should carefully consider climate change effects on the tools available to meet future water needs. Climate change is likely to improve, or leave unchanged, the performance of tools such as water use efficiency and water recycling. Other tools that rely on historical hydrology (e.g., traditional river diversions, traditional groundwater pumping and traditional surface storage), are likely to perform less effectively in the future.

■ *Put Conservation First*

Water efficiency represent a sound and basic "no regrets" water management approach to future climate change impacts. Cost-effective water conservation investments can generate significant benefits on multiple fronts, including water supply, environmental, energy use, and greenhouse gas emissions reductions. Water managers should support conservation strategies that:

• *Transform markets through plumbing code changes and appliance standards.* These changes are the most successful and cost-effective way to save water. In California, a recent study found that between 50 percent and 85 percent of the conservation likely to occur under a variety of scenarios by 2030 will be attributable to changes in the plumbing code.[1]

• *Offer rebates for and make investments in interior water use efficiency.* Ultra-low flush or dual-flush toilets, low-flow showerheads and faucets, efficient appliances, and waterless urinals are proven cost-effective tools.

• *Promote landscape conservation.* Promote landscape water conservation including selection of drought-tolerant plants, landscape design that groups plants with similar water needs, efficient irrigation technology (including "smart-controllers" that automatically adjust to changes in weather), training for irrigation managers and maintenance personnel and seasonal rate structures

• *Use water metering and volumetric pricing to provide accurate price signals.* Water metering remains the single most effective water conservation tool. Measures such as submetering for multiple-unit residential and commercial buildings, and dedicated landscape meters, are particularly effective.

• *Price water to reflect its true cost and reduce existing water subsidies.* Water agencies should maximize the percentage of revenue recovered through volumetric charges rather than fixed charges, and should adopt tiered and seasonal water rate structures that encourage efficiency.

• *Support efficient product labeling.* The EPA has initiated the WaterSense program, comparable to the Energy Star™ program, to label products that meet its standards for water efficiency. Such a labeling program will help guide customers to the water-efficient choices already on the market and will encourage manufacturers to develop new, efficient products.

• *Use system leak detection to reduce unaccounted-for water.* In some systems these leaks can account for 30 percent or more of water use.

• *Implement commercial, industrial, and institutional conservation programs.* These can include programs targeted at individual measures, such as cooling towers, pre-rinse spray valves in restaurants, X-ray machines, and more customized initiatives designed to address industrial processes, and institutions, including universities and hospitals.

• *Create statewide and national programs for water conservation*. The California Urban Water Conservation Council is a good model for how to develop, implement, and monitor best management practices for water conservation. The new Alliance for Water Efficiency, which plans to bring together agencies, business interests

and environmental groups, should be an effective voice for advancing national water conservation standards and raising the profile of water conservation. [2]

• *Broaden public awareness.* Except in a handful of water-short regions, the public is generally unaware of the myriad benefits of water conservation. Regional campaigns to boost public awareness could generate substantial water savings.

■ *Incorporate Climate and Energy Issues in Water Planning*

By implementing tools ranging from efficiency improvements to reuse and recharge, there is an enormous opportunity to simultaneously save water and energy and to reduce greenhouse gas emissions. Water agencies should evaluate their energy consumption, particularly energy consumption driven by water use. Such an analysis should consider each phase of water use—storage and diversion, conveyance, treatment, local distribution, end use, wastewater treatment, and disposal.

■ *Collaborate with Energy Utilities.*

Water conservation generates substantial water and energy savings, and thus reductions in greenhouse gas emissions. Water agencies should work with local energy utilities to develop joint programs, such as rebates, to encourage water and energy conservation. Energy utilities should be appropriately credited for the embedded energy savings that accompany water conservation. Furthermore, water conservation activities that also save energy should qualify for public funding available for energy conservation.

■ *Integrate Regional Water Management*

Water managers should approach climate change response by utilizing an integrated regional water management approach, including a broad range of issues, multi-disciplinary analysis, stakeholders and agencies with multiple interests, and solutions tailored to local conditions. An integrated approach can produce broad benefits, including water supply, water quality, fish and wildlife, habitat improvements, recreational opportunities, flood damage reduction, energy supplies, greenhouse gas emissions, and regulatory compliance. Such integrated efforts should consider:

• potential climate change impacts on existing facilities and future water management tools

• unique regional conditions

• potential multiple benefits and potential funding and implementation partners (e.g. water supply, water quality, ecosystem management, recreation, land use and flood management)

• "efficiency first" investments

• a full range of potential demand and supply strategies

• a full range of potential flood management options

• clear objectives and performance standards for evaluating options

An Integrated New Vision for the San Francisco Bay-Delta Ecosystem

California recently created a new "Delta Vision" process to develop a plan to address the multiple crises currently facing the Bay-Delta estuary, including climate change-caused sea level rise and increased flood risks. This plan will be developed by state agencies, with input from a new blue ribbon panel and a stakeholder group, including urban and agricultural water interests. A new plan for the Bay-Delta should include prompt action in several areas:

• strengthening efforts to reduce future global warming, thus minimizing future risks to the Delta,

• implementing short-term actions to protect and restore endangered species, including, when necessary, reductions in Delta pumping

• reducing reliance on the Delta for water supplies (by investing in more reliable alternatives), thus reducing the economic risks associated with reliance on a vulnerable Delta

• stopping ongoing urbanization that is putting more Californians at risk of a Katrina-style disaster as they move into homes on vulnerable Delta islands

• maintaining the most important Delta levees and

• restoring other Delta islands to natural habitat, thus lessening the risk of a catastrophic failure, lowering levee maintenance costs, and helping to restore a healthy ecosystem.

Although a successful solution will cost billions of dollars, the price tag could be far higher if California fails to respond effectively to this challenge.

• "with and without project" baseline analysis for large infrastructure investments

• economic analysis and "beneficiary pays" financing

• enforceable environmental requirements

• strengthening institutional capacity

• educating the public and decision-makers about the need to reduce and prevent climate change

■ ***Evaluate Surface Storage***

Evaluations of any potential surface storage facilities should take place as part of a fully integrated approach, including the following specific actions

• base analyses on likely future hydrology

• give demand side approaches an emphasis at least equal to alternatives that would increase supply

• include a comprehensive economic analysis

• establish beneficiary pays pricing policies, rather than relying on subsidies

• fully incorporate potential environmental impacts

• avoid assigning costs to unrealistic potential benefits

■ ***Carefully Consider Commitments Regarding Future Water Deliveries***

Water agencies, including the Bureau of Reclamation, should consider climate change carefully when making commitments regarding future water deliveries. In particular, agencies should avoid promising increased water deliveries based on current hydrology.

■ ***Factor Climate Change into Flood Management Decisions***

For agencies with flood management responsibilities, an awareness of climate change should be integrated into future management decisions. For example:

• avoid development in floodplains that is not constructed to be compatible with occasional flooding

• dam operators should develop plans to reoperate surface storage facilities and other infrastructure in response to changing hydrology, caused by global warming

• managers should investigate floodplain management opportunities, such as floodplain, riparian and wetland restoration and the establishment of flood-compatible agricultural practices. These actions can generate public safety, flood damage-reduction, environmental and agricultural preservation benefits

• planners should incorporate climate change in analyses of future flood risk, including planning for the "reasonably foreseeable flood", which is larger than the 100-year flood

• support expansions in flood insurance

• improve mapping, monitoring, forecasting, and early warning systems

Prevention

Water managers can contribute to efforts designed to reduce greenhouse gas emissions to reduce future climate change impacts.

■ ***Support Mandatory Caps on Emissions***

Support the creation and enforcement of a mandatory national cap on the pollution that causes global warming (mainly carbon dioxide), as the single most important step in controlling and reducing the future impacts of global warming. The problem can be addressed most effectively addressed through federal caps, but local, state, and regional initiatives are also effective and important tools in the face of federal inaction.

■ ***Support Alternative Energy and Energy Efficiency Programs***

Energy efficiency and renewable energy programs are necessary elements for any plan to achieve a dramatic reduction in carbon emissions. The following programs can be implemented at the state and/or national levels:

• appliance efficiency standards

• renewable energy generation requirements

• incentives for renewable energy production and generation

• green building standards, such as the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) standards

• requiring utility energy plans to include the cost of carbon emissions

■ ***Take Action at the District Level***
Water agencies should develop programs to reduce their energy consumption and greenhouse gas emissions. Districts should consider joining the Cities for Climate Protection campaign.[3]

■ ***Develop Community Partnerships***
Partnerships with the business community and local governments can enable water districts to broaden participation in ambitious greenhouse gas emissions reductions programs.

Public Outreach

Given the global nature of climate change and the need for far-reaching actions to address its causes, raising public awareness is essential to encourage effective action.

■ ***Educate Ratepayers***
Ultimately, water district ratepayers could feel significant impacts and be forced to bear significant costs as a result of climate change. Water managers have a range of tools, such as newsletters, billboards, bill inserts, websites, and more, to educate ratepayers. An increased understanding of the challenges posed by climate change will promote ratepayer acceptance of programs designed to address this issue.

■ ***Educate Decision Makers***
The involvement of water managers is important to convince agency and legislative decision makers that climate change is more than simply an environmental issue. Water managers are in a unique position in the West to educate decision makers about the water supply and economic consequences of climate change and the need to prevent worst-case climate scenarios.

■ ***Educate the Media***
Water managers should strive to improve the media's understanding of these significant potential impacts and help raise awareness to reduce climate change impacts and risk.

■ ***Incorporate Climate Issues into Conferences and Publications***
Water community conferences on water issues regularly include a presentation or two regarding climate issues. Given the significance of the potential effects, climate-related water management issues should play a more central role in water agency conferences, newsletters, reports, and other publications. These efforts should be crafted to help water managers and users to take action.

ADDITIONAL RESEARCH NEEDS

The more we know about global warming and the effect it will have on our water resources, the better prepared water managers can be to prevent the most serious consequences of rising temperatures. Water agencies, academic institutions, and state and federal agencies should consider funding research designed to address the following areas:

- the potential groundwater impacts of climate change
- the impact of climate change on water demands.
- the impact of climate change on potential new surface storage facilities in highly engineered systems
- likely future changes in precipitation patterns (including totals and variability)
- potential future reductions in total streamflows
- improved maps and data showing flood risks and other flood-related information
- improved modeling of changes in the frequency and magnitude of peak flows
- potential impacts on water quality
- potential impacts on aquatic ecosystems
- downscale climate modeling for local and regional applications

Appendix A

Case Studies: Water Agency Action on Climate Change

Throughout the West, agencies of all sizes have conducted vulnerability analyses to evaluate the reliability of their water systems in the face of climate change. A number of agencies, such as the Santa Clara Valley Water District and Seattle Public Utilities have been studying potential climate change effects for years, while others have only recently begun to investigate these potential impacts. Each agency and utility's experience in analyzing potential climate change impacts has produced unique findings and has consistently given critical insight for water managers to prepare for the potential effects of climate change on their particular water systems.

Denver Water

Denver Water, a separate entity from the City of Denver, serves a total of 1,104,400 customers in the Denver Metro area, approximately one-fourth of Colorado's population. The agency uses one-third of the state's treated water supply. Its primary water sources are the Blue and South Platte rivers.

"We want to find out as much as we can about [climate change]," says Denver Water general manager Chips Barry.[1] To achieve that objective, Denver Water hired Stratus Consulting, an environmental and engineering research firm, to conduct an analysis of Denver's system in order to test the district's sensitivity to changes in temperature and precipitation as a result of climate change.[2] The findings of this analysis will be outlined in a general briefing paper presented to Denver Water on its completion. In the district's next Integrated Resources Plan (expected to be completed in 2007), Denver Water plans to include a scenario designed to produce a rough estimate of possible impacts on its supply and demand.[3] "Most of us operate on the premise that the future will be pretty much as it has been in the past," Barry points out. "Global warming has created greater doubt as to that proposition."[4] By reducing the uncertainty regarding the particular impacts of climate change on its system, Denver Water can effectively plan to mitigate its effects and increase supply reliability.

Denver Water is ramping up its water conservation efforts with a $400 million conservation plan designed to cut annual water use, over the next 10 years, to a level 22 percent below levels that prevailed prior to the 2002–2005 regional drought.[5] Although this conservation

CITY LEVEL
Denver Water at a Glance

- hired an environmental engineering and research firm to analyze the effects of global warming on its system, including changes in temperature and precipitation.
- plans to include in its next Integrated Resources Plan a sample scenario of the potential effect of climate change on its supply and demand.
- accelerated investments in conservation, in part as a response to potential global warming impacts.

plan was initially established without regard to potential climate change effects on the Denver Water system, the agency accelerated its implementation, in part because it provides Denver Water with the ability to use saved water to mitigate impacts from climate change. Denver Water's board and executive staff approved the plan with an initial allowance of $8 million for the first year. Moving forward, the plan's funding will be appropriated by the board and executive staff on an annual basis.[6]

Portland Water Bureau

The Portland Water Bureau supplies drinking water to more than 787,000 customers in the Portland region. The primary source of the bureau's water supply system is the Bull Run watershed, located in Mount Hood National Forest, 26 miles east of downtown Portland. Groundwater significantly supplements the agency's supply.

The Portland Water Bureau (PWB) incorporated climate change into its water supply planning analysis by commissioning a seminal study in 2002 by the University of Washington Climate Impacts Group.[7] The study used a series of four linked Global Circulation Models—the Department of Energy's Parallel Climate Model, the Max Planck Institute's ECHAM4 model, and the Hadley Centre's HasCM2 and HasCM3 models—to estimate climate change impacts upon its system. The studies focused particularly on the Bull Run watershed, the district's primary water source.

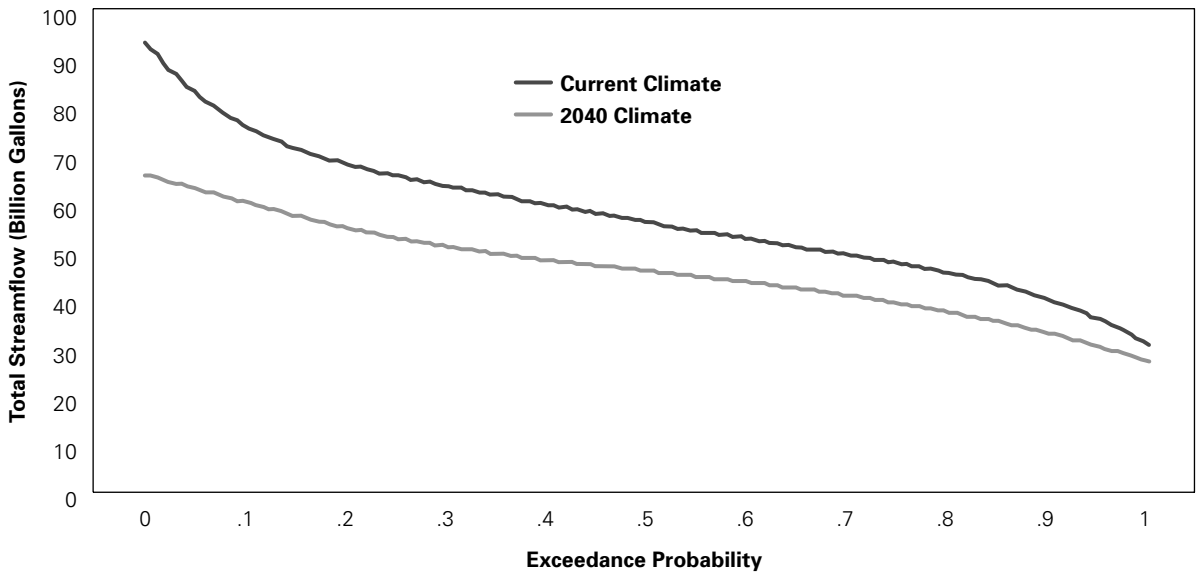
All four models were used to develop water demand forecasts and a hydrologic model for the Bull Run watershed. The output of these models were then applied to its Supply Transmission Model, which takes inputs of demand, weather, and water supplies to create different reliability scenarios. These model runs suggest that the Bull Run watershed will experience warmer and drier summers due to climate change, with an increase in general year-round temperature. The hydrologic models predict that precipitation will increase in the winter and decrease in the spring, with less snow melt remaining in the spring, making the Bull Run Watershed an increasingly rain-driven system with more years of lower summer streamflows into the storage reservoirs. This is particularly an issue in the Portland surface water storage system because the system's reservoirs are kept full during the winter, so an increase in earlier drawdown years with lower summer streamflows will affect overall system yield.[8]

Using the 60-year hydrological record, the study then evaluated the impacts of climate-altered streamflows and increased water demands on water supply performance with consideration given to three factors: (1) changes in water availability, (2) changes in water demand created by anticipated regional growth, and (3) changes in water demand as a result of hotter summer temperatures. The study estimated that the average impact of climate change alone on the current storage system could require approximately 1.3 billion gallons more water per year to meet demand. A change in runoff timing is PWB's supply threat, as it could reduce storage levels in comparison with historical record. This shift in runoff increases the number of years with longer drawdown periods due to lower flows and higher demand, requiring increased use of alterna-

CITY LEVEL
Portland Water Bureau at a Glance

- commissioned a study to analyze the potential effects of climate change on its system, with a particular focus on the district's primary water source.
- found that climate change will alter basic hydrology of the Bull Run watershed.
- projected that demand on the system will increase during the summer as a result of global warming, requiring an additional 1.3 billions gallons to meet demand.
- concluded that overburdening of the system will ultimately result in a reduction of Portland's surface water system safe yield during the summer, requiring additional conjunctive use of Portland's existing groundwater system.

Figure A-1: Portland Water Bureau's Projected Streamflow Shift Due to Climate Change



From the Powerpoint Presentation, "The Impacts of Climate Change on Portland's Water Supply." Portland Water Bureau and University of Washington Climate Impacts Group. 8/29/06

tive sources of supply, in addition to already anticipated reductions due to conservation measures. The study concludes that climate change will alter the basic hydrology of the Bull Run watershed as well as the system's demand, ultimately resulting in a reduction in the reliable yield of Portland's surface water system.

PWB is exploring the many alternatives to enhance its water supply reliability in the face of climate change, with an emphasis on flexibility in infrastructure development. Some of the strategies PWB is considering are conservation and conjunctive use that could be coordinated with reoperated existing surface and groundwater supplies. Other water suppliers in the Portland metropolitan area have conducted similar studies, in recognition of the need to collaboratively assess the impacts of climate change on regions with multiple water supplies.[9]

Santa Clara Valley Water District

The Santa Clara Water District (SCVWD) is the primary water agency for the residents of Santa Clara County, California. SCVWD provides water for the 1.7 million residents of the county, as well as serving as its flood protection agency and as the steward of the county's streams, creeks, underground aquifers, and reservoirs.

The Santa Clara Valley Water District (SCVWD) began incorporating the uncertainties posed by climate change in its water supply planning processes about a decade ago. The district is continuously updating its analyses

CITY LEVEL

Santa Clara Valley Water District at a Glance

- conducted a risk analysis in 2003 and determined that global warming could have serious implications for the district's water supply after 2020.
- concluded that the district's projects to meet water demand beyond 2020 must consider the effects of climate change on water quality, saltwater intrusion, imported and local water supplies, and the water transfer market.
- plans to complete a Water Supply Sustainability Plan in 2008, which will update its Integrated Water Resources Plan to include more detailed regional climate modeling and an analysis of local and regional impacts of future climate scenarios.
- is analyzing its climate footprint and has started tracking and reporting CO_2 emissions.

as more information about climate change emerges. In SCVWD's 2003 Integrated Water Resources Planning Study (IWRP), the district assessed global warming's threat to supply reliability. It applied vulnerability assessment models on five portfolios composed of various water supply options. These five hybrid portfolios were built to meet three planning objectives: high water quality, natural environment protection, and minimum cost impacts.

• SCVWD's "Extend" simulation model analyzed potential portfolio performance through 2040 based on historical hydrology

• The Economic Analysis Tool compared water supply options on equal economic footing

• The Risk Analysis Tool used statistical techniques and estimation of seven risk likelihoods to test the portfolios under a variety of possible future scenarios, including climate change

SCVWD considered its results over three time frames: Phase I (2003 through 2010), Phase II (2011–2020), and Phase III (2021–2040).[10]

In its risk analysis, SCVWD determined that global warming could have serious implications for the district's water supply after 2020. The analysis concluded that the district's projects designed to meet water demand beyond 2020 must consider the effects of climate change on water quality, saltwater intrusion, imported and local water supplies, and the water transfer market. SCVWD has concluded that its water supply is particularly vulnerable to certain climate change effects such as sea level rise, loss of snowpack, and a shift in runoff timing. Pursuant to its 2005 Urban Water Management Plan, SCVWD is assessing various options to address the impacts of climate change, including additional water recycling, additional water banking, and dry-year transfer options. Another option the agency is considering is employing additional treatment options to address water quality impacts such as increased salinity in the Delta, from which the district receives approximately 50 percent of its water supply.[11]

A key aim of the district is to increase the flexibility of its water supply portfolio in the face of potential water supply threats by securing baseline water supply programs, investing in "no regrets" actions, and focusing on the long term.[12] The district is moving forward by developing a robust framework for sustainability and investment decision making. It also plans to complete a Water Supply Sustainability Plan in 2008, which will update its IWRP analyses to include more detailed regional climate modeling and an analysis of both local and regional impacts of future climate scenarios. As a comprehensive water management agency, SCVWD is gearing up to both mitigate and adapt to global climate change. SCVWD is also analyzing its own climate change footprint and reporting its CO_2 emissions as a member of the Sustainable Silicon Valley Initiative (SSV).[13] See page 46 for more on the district's involvement with SSV.

Additionally, SCVWD is communicating its concern about the impacts of climate change to the community it serves and to state decision-makers. SCVWD wrote a letter in March 2006 supporting the governor's acknowledgement of global warming's effects on California industry in his 10-Year Strategic Growth Plan. The following month, the district wrote a letter of support for California Assembly Bill 32 (AB 32), which places a cap on greenhouse gas emissions from the electrical power, industrial, and commercial sectors, and establishes a program to track and report greenhouse gas emissions.

Seattle Public Utilities

Seattle Public Utilities provides water to a customer base of more than 1.3 million people in the metropolitan area of Seattle, Washington. The utility receives almost all of its water supply from two watersheds in the Cascade Mountains: the Cedar and Tolt River watersheds.

Seattle Public Utilities (SPU) has been actively involved in climate change as related to water supply issues for more than 15 years. Based on currently available information regarding the potential effects of climate change, the utility's analyses concluded that it is unlikely to need new water supply sources to meet water demand in the next 40 to 50 years, despite its region's

CITY LEVEL
Seattle Public Utilities (SPU) at a Glance:

• uses a dual approach to climate change vulnerability analysis process that incorporates both a bottom-up perspective (historical hydrology) and a top-down strategy (using modeling to assess local watershed levels).

• forming partnerships with other regional groups—including state agencies, county and city governments, water districts, and an Indian tribe—to better prepare the region for the effects of climate change.

growing population. However, SPU acknowledges the many uncertainties surrounding climate change's potential impacts on its water system. SPU's 2007 Water System Plan describes how the utility will continue to monitor its system vulnerabilities, engage in research, and employ scenario planning in order to make system investments and operational changes that will prepare the utility for possible impacts.[14]

SPU uses a two-pronged approach to investigate its system's vulnerabilities to climate change. To assess climate change from a bottom-up perspective, SPU began by examining its historical hydrology, using streamflow records to reconstruct inflows into its surface water supplies. The utility now has an inflow dataset for the past 76 years, from water year 1929 through 2004. SPU also uses a system stimulation model to estimate the firm yield of its supply in order to meet the utility's 98 percent reliability standard, while accounting for climate variability. This bottom-up approach has underscored that a key vulnerability of SPU's water supply system is the timing of the return of fall rains. SPU's reservoirs are operated on a single-year drawdown cycle, and delays in the fall rainy season can force SPU to draw down deeper into reservoir storage. When this occurs, SPU relies on emergency storage reserves to meet the needs of its customers and downstream habitat. Research on future climate change has not directly addressed the timing of fall rains, but SPU is taking steps to ensure that its emergency supplies can be relied on during times of extreme drought.[15]

Potential climate change-driven loss of snowpack represents another system vulnerability. To mitigate this threat, SPU routinely monitors snowpack conditions and uses a dynamic rule curve that adjusts reservoir refill targets according to actual snowpack and soil-moisture conditions. This approach utilizes real-time conditions to regulate reservoir management and increases the likelihood of a full reservoir refill prior to the summer drawdown period. The dynamic rule curve also assists in managing the utility's risk from increases in precipitation variability, another potential climate change impact. SPU does not have a sizeable reservoir capacity compared to many other water systems, and it therefore relies on the dynamic rule curve and other operational management strategies to make the most of current water supplies.

As mentioned earlier in this report, SPU worked with the University of Washington's Climate Impacts Group (CIG) to analyze its water system's susceptibility to climate change from a top-down perspective. CIG's analysis involved examining the SPU watershed's susceptibility by employing a statistical downscaling method to translate the average monthly meteorological data from the General Circulation Models (GCMs) at nearby grid points down to local weather station locations. This method used cumulative distribution curves and historic weather patterns to generate a time series of meteorological data representing future climate from the GCMs. These data were input into a hydrology model and then fed into Seattle Public Utilities' system simulation model using some simplifying assumptions, including the use of static reservoir operating rules. These loosely linked models complete the process of translating information from the GCMs to the local watershed level.[16]

This downscaling method reveals a series of potential climate change impacts that affect water supply. Although there is significant cumulative modeling uncertainty associated with this method, the modeling results are useful for water supply planning purposes and for reexamining existing and planned water management systems under a wider range of climatic conditions. This model examined several elements that affect water supply, including temperature, snowpack, yield and precipitation. The results show:

- an increase in temperature of 2.3 degrees Fahrenheit in the Seattle region by 2040
- a decrease in snowpack of 50 percent by 2040
- a 6 percent decrease in combined inflows from the Cedar and Tolt reservoirs from June to September per decade through 2040
- a reduction in yield of 24 million gallons per day by 2040

The model results also indicate that the predicted deviation in precipitation does not range significantly outside the range of natural variability.

SPU is widening the scope of its climate change analyses by co-sponsoring regional studies with King County (in which Seattle is located), the Cascade Water Alliance, and the Washington Department of Ecology as part of a larger regional water supply planning process, which also incorporates climate change. A wide cross-section of organizations are participating in the planning process—including state agencies, county and city governments, water districts, and the Muckleshoot Indian Tribe—with the University of Washington's Climate Impacts Group as the technical lead on climate change. The process is designed to develop information regarding

current and emerging water resource management issues in and around King County, including climate change. This partnership is a multi-year effort to analyze water resource conditions and management in order to better meet the region's water demand. The process will examine all available water sources, including reclaimed water and conservation. Climate change is one of five resource management issues under study, with a technical committee in place on each issue to produce reports and recommendations that could be included in water planning processes in the region.[17]

Building on past research and other endeavors, SPU plans to expand its knowledge of the evolving science behind climate change by continuing to partner with leading scientists. This research will help to further refine SPU's understanding of the local impacts of climate change and provide an increased understanding of how its system can adapt over time. SPU is particularly interested in learning more about the impacts of climate change on frequency of flood events, water demand, and fall rains, because the timing and intensity of these events are key vulnerabilities for the Seattle water supply system. Additionally, SPU seeks to develop hydroclimatic reconstructions, a practice that involves using tree-ring samples to reconstruct past hydroclimatic conditions in order to assess its system's vulnerability to climate change. The utility also aims to utilize more scenario planning, employ physical downscaling methods, and quantify the effectiveness of its changes in operations.[18] SPU anticipates revisiting its climate change analysis at least every six years in conjunction with its Water Supply Plan update, or sooner, if new significant information becomes available.

East Bay Municipal Utility District

The East Bay Municipal Utility District supplies water and provides wastewater treatment for customers in parts of Alameda and Contra Costa counties in the Eastern portion of the San Francisco Bay Area, including Oakland and Berkeley. Its water system serves approximately 1.3 million people in a 325-square mile region.

East Bay Municipal Utility District (EBMUD) is another agency that has emerged as a leader in assessing the impacts of climate change on water resources. In 2003, EBMUD conducted a dual-faceted vulnerability analysis to quantify impacts on its system: a planning model operated on a monthly timestep, and an operations model based on a daily hydrograph. Its monthly planning model used a database of historical river flows and tested its sensitivity to climate change by shifting 28 percent of historical April to July runoff volume into the November to March period, to estimate the reliability of system operations with less late-season snowmelt. The 28 percent figure was based on a study conducted by Maurice Roos, Chief Hydrologist of the California Department of Water Resources, which assessed how a shift in climate would impact the Mokelumne watershed, EBMUD's primary water source. Roos estimated that a 5 degree Fahrenheit temperature increase in the Mokelumne watershed might result in a 28 percent shift in runoff. EBMUD's analysis did not reveal significant impacts from this shift, as the historical record shows that in most years there has been more snowmelt in the watershed than can be stored. However, the extent of future precipitation changes in this watershed due to climate change is unknown. In dry years, annual runoff volume is less than the total reservoir capacity, and the timing of snowmelt would have little effect on system reliability. An overall reduction in precipitation, however, would have direct effects on this runoff and the amount of water available for storage. Model simulation of the historical record adjusted for an earlier snowmelt confirmed that the district's water supply and carryover storage would not be reduced significantly in most years. The only exception is water year 1997, which was exceptionally wet and warm in early winter but dry beginning in February. If the spring runoff from snowmelt in that year reduced by 28 percent, EBMUD found that the carryover storage would have been reduced, which would affect system reliability if a drought period were to follow. Such a sequence of events is of concern to

CITY LEVEL

East Bay Municipal Utility District (EBMUD) at a Glance

- conducted a dual-faceted vulnerability analysis to quantify climate change impacts on its system: a planning model operated on a monthly time step and an operations model based on a daily hydrograph.
- concluded that changes in precipitation patterns and flooding due to climate change could compromise system reliability.
- became the first water district to join the California Climate Action Registry by pledging to annually track, report, and certify its greenhouse gas emissions.

EBMUD. The operations model analyzed the impacts of a 5 degree Fahrenheit temperature increase on water year 1997's daily hydrograph based on historical sequence of snowfall and rainfall inputs. The results of this analysis were intuitive: with a climate change-induced runoff shift, flood control consistently was revealed as an issue that the district must be prepared to address.[19,20]

EBMUD has made it a priority to invest in the production, use, and refinement of new supply-forecasting tools. By developing and using these tools, the district further reduces the uncertainties of climate change impacts on its water supply. By better understanding its water system's particular vulnerabilities, EBMUD can effectively managing the stresses on its supply. In order to diversify its water supply sources, the district is also constructing the Freeport Regional Water Project, in partnership with the Sacramento County Water Agency. This project, which will allow EBMUD to divert water from the Sacramento River, was carefully negotiated with Sacramento County, environmentalists and other interests.

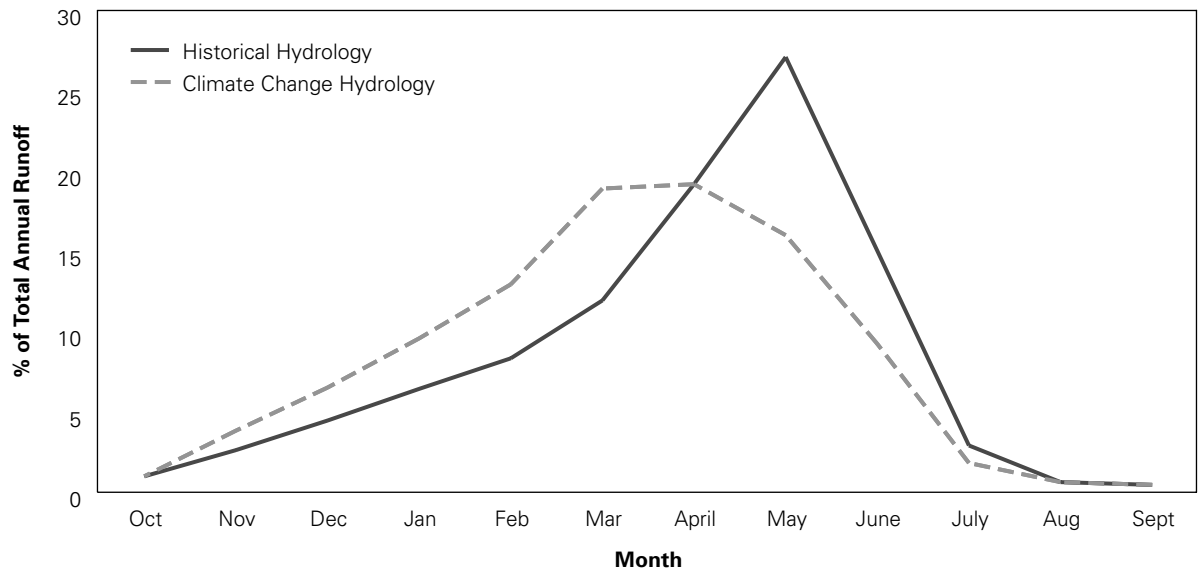
EBMUD is also working to prevent global warming by minimizing its climate change footprint. As discussed, it was the first water district to join the California Climate Action Registry—a non-profit public/private partnership established by California statute, which provides a voluntary greenhouse gas (GHG) registry to promote early actions to reduce GHG emissions. As a member of the Registry, EBMUD pledges to annually track, report, and certify its greenhouse gas emissions. EBMUD's efforts to mitigate its own impact on global warming were recognized by the Environmental Protection Agency, who presented the district with a Green Power Leadership Award. [21]

Furthermore, EBMUD has taken its concerns about global warming beyond district boundaries to California Governor Arnold Schwarzenegger and the state legislature. In a December 2005 letter, General Manager Dennis Diemer urged the Governor and the Climate Action Team to proactively assess how global warming may affect water supply and the economy in California's 10-Year Strategic Growth Plan. Then in March 2006, the District actively supported California's Assembly Bill 32.

Cosumnes, American, Bear and Yuba (CABY) Watersheds

The Cosumnes, American, Bear and Yuba rivers are four adjacent watersheds located in California's central-Sierra region. The CABY alliance involves a diverse membership

Figure A-2: EBMUD's Projected Streamflow Shift Due to Climate Change



EBMUD's comparison of long-term average unimpaired runoff under historical conditions and with its climate change model's 28% shift from April-July runoff volume to the November-March time period.

body including representatives from agriculture, recreation, Native American tribes, the business community and local, state, and federal governments.

Various stakeholders of four watersheds: Cosumnes, American, Bear, and Yuba (CABY) have cited climate change as a guiding principle in their first-ever collective Integrated Regional Water Management Plan (IRWMP). The purpose of the IRWMP is to provide an integrative approach to water management that is oriented toward the collective goals of the region's water users.[22] The plan was adopted by ten participating organizations as of December 2006, including the El Dorado Irrigation District, Gold County Fly Fishers, the U.S. Tahoe National Forest, the Yuba Watershed Council, the Bear River Watershed Group, American Rivers, Natural Heritage Institute, and the Nevada Irrigation District. Implementation by a regional entity is expected to begin in 2007, which will oversee the execution, monitoring, and success of projects in the IRWMP.

As it lays the framework for its IRWMP, CABY is assessing how it can prepare for climate change by maximizing its tools, policies, and current system infrastructure. CABY is using the Water Evaluation And Planning (WEAP) system to help measure potential climate change impacts on hydrology . The WEAP system, developed by the Stockholm Environmental Institute's Boston Center and the Tellus Institute, is a microcomputer tool developed for integrated water resources planning. It analyzes a system's water supply generated through watershed hydrological processes using a water management model driven by water demand and environmental requirements, governed by the natural watershed and the region's network of reservoirs, canals, and diversions. WEAP generates scenarios that examine a full range of water planning issues, including climate change. [23]

Liz Mansfield, CABY Project Director and El Dorado Irrigation District Watershed Coordinator, explains that WEAP can assist the region in developing a plan to manage climate change effects on its regional system. The CABY planning team has highlighted specific vulnerabilities to investigate, such as reservoir operations. A shift in runoff timing could have significant effects on the region's water supply, due to the delicate balance involved in reservoir management. The CABY region is at a high altitude with limited-capacity reservoirs that often remain full year-round for recreational and hydropower purposes. Analyzing how climate change will shift runoff in this region is critical to planning efforts for effective reservoir management.[24]

CABY also recognizes its elevated susceptibility to fire in the face of climate change. The region is densely vegetated, with a high volume of forested areas. CABY's planning community is seeking to understand the extent to which the expected increase in fires brought on by climate change will affect regional water supply and water quality. By gaining a clearer sense of climate change's effects on their system, the CABY planners can develop proactive strategies to meet effectively the needs of the region's water users.

What we are seeing in the CABY regional planning effort is part of a new trend—water managers using climate change vulnerability analyses to shape integrated planning efforts. In the past, climate change analyses have generally been produced as stand-alone documents, CABY uses the findings from its vulnerability analyses as a pillar in its planning framework.

AGENCY LEVEL

CABY at a Glance

- the managers of four watersheds—Cosumnes, American, Bear, and Yuba (CABY)—joined forces to examine how global warming will impact its watershed on a regional level.
- used a microcomputer tool that analyzed climate change vulnerability.
- used the findings of the vulnerability analysis as a foundation of CABY's integrated planning efforts.
- determined that reservoir operations and vulnerability to forest fires were two particular threats to the region, and are planning response strategies to mitigate these risks.

California Department of Water Resources

The California Department of Water Resources manages the State Water Project, including the California Aqueduct. The department's numerous roles include providing flood control services, aiding local water districts in water management and conservation activities, and planning for future statewide water demands.

In July 2006, The California Department of Water Resources (DWR) released the first statewide analysis of

likely climate change effects on water supply. The agency commissioned the study in response to Governor Arnold Schwarzenegger's June 2005 Executive Order, which established greenhouse gas emissions targets for California and required biennial reports regarding potential climate change effects in numerous areas.

Progress on Incorporating Climate Change into Management of California's Water Resources, is the product of the Climate Change Work Team, a group formed by DWR in conjunction with the U.S. Bureau of Reclamation to incorporate climate change science into California's water resources planning and management. DWR is communicating to local water agencies the results of the report and the various analysis tools used therein, which could be used by others to address climate change-related issues. The goal of these efforts is to assist water managers in future climate change analysis and to help them identify information gaps for future research.

DWR's report concludes that climate change has the potential to reduce the yield of the state's two major water projects by as much as 10 percent—a highly noteworthy figure considering that over 20 million California residents receive a portion of their water supply from those two projects (the State Water Project, or SWP, and the federal Central Valley Project, or CVP). The report notes that climate change creates a more active hydrological cycle, thereby altering the timing, intensity, location, amount and variability of precipitation. The study anticipates that these variations in precipitation events may lead to increases in extreme weather events, such as storms, flood events, and droughts. DWR expects more floodwaters to manage in winter, followed by less snowmelt to store in reservoirs for use during the warmer, summer months. By the year 2050, an average loss of 5 million acre-feet or more of annual water storage in the state's snowpack is expected—more than the capacity of the state's largest reservoir, Lake Shasta. In addition, the combination of more frequent extreme events coupled with lower winter reservoir storage levels, which may be required in response to higher peak streamflows, presents a key challenge for operators of the state's reservoirs.

In addition, the study points out that sea level rise due to climate change could have multiple implications for California, including erosion of coastal land area and possible sea water intrusion in coastal aquifers. Sea water flooding may pose a serious threat to land, at the mouths of rivers and streams, and in estuaries.

The San Francisco Bay-Delta, an important source of water for Southern California, the San Joaquin Valley and the Bay Area, is particularly susceptible to several effects of climate change. From a water resources perspective, the most significant effects of climate change on the Delta are increased salinity intrusion, as well as increased vulnerability of Delta levees to sea level rise. An increase in sea water intrusion in the Delta could lead to a degradation of water quality for the State Water Project and the Central Valley Project. Climate change also has significant, if uncertain, implications for the Delta's fragile ecosystem, which is home to various threatened and endangered species. (See The Other New Orleans: California's Delta Water Supply and Sea Level Rise.)

DWR researchers expect that higher air temperatures due to climate change will likely elevate water temperatures in the ocean as well as in the state's lakes and waterways. These increased water temperatures may harm aquatic species sensitive to temperature, particularly threatened and endangered aquatic species. In addition, some foreign invasive species may thrive in these new warmer conditions, further threatening the health of aquatic ecosystems. Water quality could be compromised as well, including a reduction in dissolved oxygen levels. Warmer water will raise the need for temperature control releases from reservoirs. Simultaneously, however, cold-water storage in reservoirs will be constrained due to the expected effects of climate change, such as diminished snowpack and lower storage levels.

According to DWR, future water demand is expected to grow, as a result of global warming. The report finds that warming-caused impacts to evapotranspiration, commercial and industrial use, environmental water demand, and domestic water use may be some of the most significant climate change-related challenges facing California. Increases in evaporative cooling demand and a higher consumption of water by concentrated animal feeding

STATE LEVEL

California Department of Water Resources (DWR) at a Glance

- commissioned a study to determine how global warming will affect California's water resources on a state-wide level.
- helped local and regional water managers understand how its climate change response strategies fit into the larger statewide plan for action, enabling decision makers to plan a more coordinated response to rising temperatures.

facilities are also expected. Moreover, climate change could require more water in order to control rising temperatures for sensitive aquatic species. This need to mitigate rising water temperatures could be an important issue in fragile areas such as the San Francisco Bay-Delta, a delicate ecosystem that provides habitat for many threatened and endangered species. In addition, DWR predicts that basic domestic water demand will rise with higher temperatures, mainly from drinking water for humans and pets, and increased bathing and evaporative cooling. Future population growth in the state promises to bring additional water demand, tightening the squeeze on this limited resource.

DWR emphasizes the need for water agencies and researchers to incorporate climate change impacts and potential associated risks into the planning and management of California's water supply. DWR emphasizes the need to understand the probability of various climate change scenarios and to evaluate how they could affect different regions. By better understanding these potential impacts, decision makers are better equipped to plan appropriate response strategies.[25]

STATE LEVEL

New Mexico Office of the State Engineer and Interstate Stream Commission at A Glance

- commissioned a report to determine what specific global warming effects are likely to be of particular importance in New Mexico.
- recommended proactive, immediate action to mitigate the impacts of climate change, such as exploring options such as desalination of brackish water supplies and water reuse.
- recommended an integrated approach that brings together water management and policy expertise as well as state government, environmental, and agricultural representatives.

New Mexico Office of the State Engineer/ Interstate Stream Commission

The Office of the State Engineer is responsible for administering the state's water resources by supervising, measuring, appropriating, and distributing all surface and groundwater in New Mexico. The Interstate Stream Commission duties include protecting New Mexico's water rights under eight interstate stream basins, ensuring the state's compliances with each basin, and planning for future water needs.

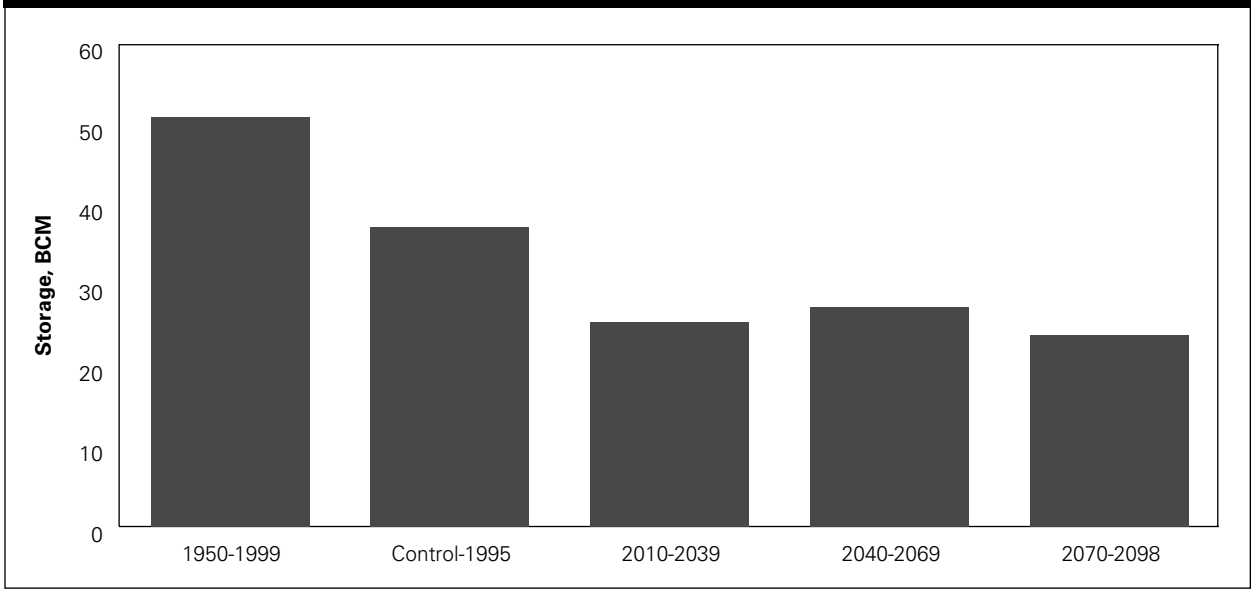
New Mexico is the next state after California to analyze the potential impacts of climate change on its state's water resources. Governor Bill Richardson's 2005 Executive Order directed the New Mexico Office of the State Engineer to prepare an analysis of the likely effects of global warming on the state's ability to manage water resources in collaboration with other state agencies, research institutions, and water planners. The report, *The Impact of Climate Change on New Mexico's Water Supply and Ability to Manage Water Resources,* summarizes its findings.

Based on 18 climate simulations prepared by scientists throughout the world, the report highlights potential impacts to New Mexico that generally reflect those expected throughout the West, including changes in snowpack, variability in available water, increased unpredictability in precipitation patterns, and a rise in extreme events such as droughts and flooding. These changes will bring additional challenges to the management of the state's water resources. One such challenge is the fact that the water resources in the Colorado River Basin—one of New Mexico's primary sources of water supply—are expected to decline by as much as 40 percent over the next century. In addition, mountain snowpack in the state's southern half could vanish by the late 21st century, completely eliminating natural storage that is critical for meeting demands during peak summer months.

Climate change is likely to bring significant implications for the state's rangelands, farmland, and aquatic ecosystems. Warmer temperatures combined with changing precipitation patterns suggest the possibility of increased fire activity in the state's rangelands, which make up more than two-thirds of the state's land area. In turn, the more fires are likely to intensify stress on future water resources. New Mexico's farming community is also predicted to feel serious effects from climate change. Farmland in the state could decrease as much as 25 percent as a result of increased evaporation and earlier spring runoff. Additionally, shifts in water temperature and changes in runoff timing could critically alter aquatic habitats, resulting in species loss or migration and causing new combinations of species.

The state's report emphasizes the need for water managers to begin preparing for these potential impacts. The first step for water managers is to identify and quantify the range of climate change vulnerabilities specific to their area. Water managers are advised to conduct a vulnerability analysis of current reservoir infrastructure in order to ensure that they are capable of withstanding the additional

Figure A-3: Projected Changes in Average Total Colorado River Basin Reservoir Storage



For downscaled climate simulations of the U.S. Department of Energy/National Center for Atmospheric Research Parallel Climate Model (PCM) based on projected 'business-as-usual' (BAU) greenhouse gas emissions and a control climate simulation based on static 1995 greenhouse gas concentrations, and an ensemble of three 105-year future climate. Simulations for three periods, and a comparison with observed historical (1950-1999) climate. From p. 21 of report.

Source: http://www.nmdrought.state.nm.us/ClimateChangeImpact/completeREPORTfinal.pdf

pressures likely to be caused by climate change. The report also suggests that as science and technology advance, water managers should consider expanding water supplies through reuse, desalination of brackish water supplies, weather modification, expanded use of low-quality water, and reduced reservoir evaporation.

The report determines that the key to successful adaptation is a "robust scenario-based planning structure."[26] The report, compiled with input from numerous published reports and assistance from a broad group of professionals, emphasized that while a degree of uncertainty regarding possible effects of global warming will inevitably remain, we can control the degree to which climate change will affect water sources by planning for action today. The report encourages government collaboration with the various stakeholders in water planning—i.e., cities, agriculture, and the environment—as well as within the education and science community, in order to develop comprehensive planning strategies. It advises water resource planners and managers to employ an adaptive, proactive planning approach in conjunction with a "no regrets" decision-making process that focuses on desirable outcomes regardless of uncertainties.

Appendix B

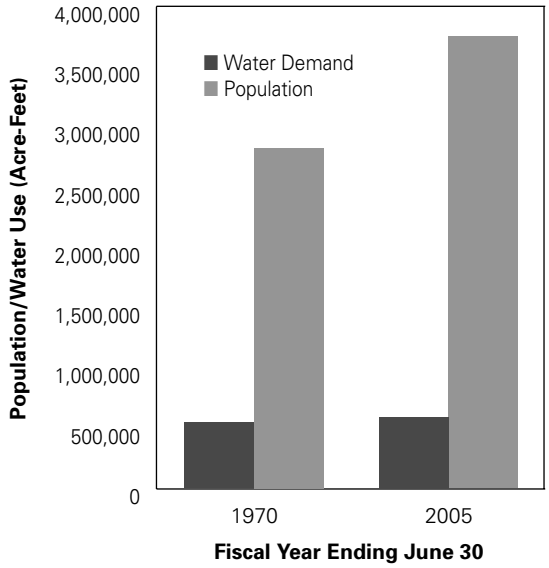
Decoupling Population Growth and Water Use

During the past several decades, many urban communities across the West have grown dramatically. Traditionally, many water planners have assumed that urban water use would grow in proportion to population. Yet in Western states, urban water use remains approximately 10 percent of the total developed water supply.[1]

In fact, as the figures below indicate, some communities have succeeded in keeping water use relatively flat, despite dramatic population growth. Los Angeles, Seattle, the San Francisco Bay area, and Denver have all experienced significant population growth in the past quarter century, yet for each, total water use has remained relatively constant. This remarkable accomplishment has been made possible by significant investments in water conservation

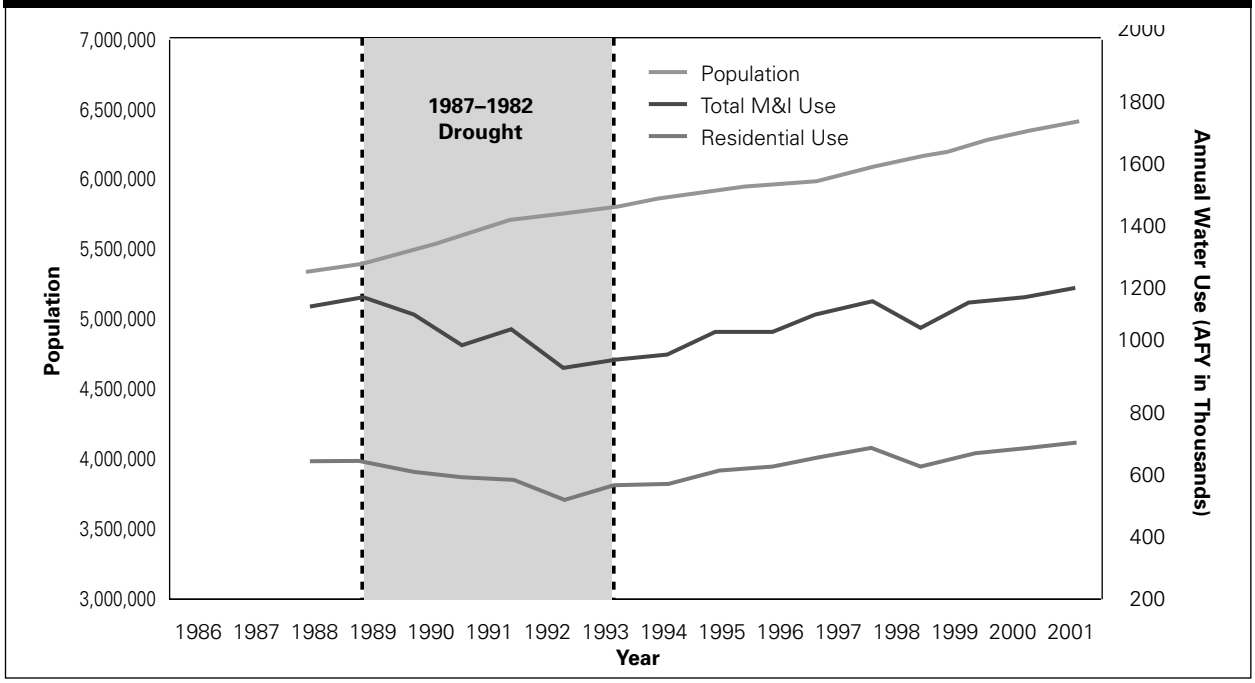
In addition to water conservation investments, some areas have also made major investments in wastewater recycling and groundwater cleanup. Several of these efforts have been prompted by droughts. In Southern California, conservation and recycling investments have also been motivated by pressure to reduce deliveries from the Colorado River and the Mono Lake basin (see Figure B-1). The progress made by these communities demonstrates the effectiveness of efficiency as a water supply tool. As discussed earlier in the report, California's new State Water Plan indicates that these tools are likely to remain the largest sources of supply for future growth. Figures B-2, B-3, and B-4 show similar progress in the San Francisco Bay area, Denver, and Seattle.

Figure B-1: Los Angeles Department of Water and Power Water Use and Population



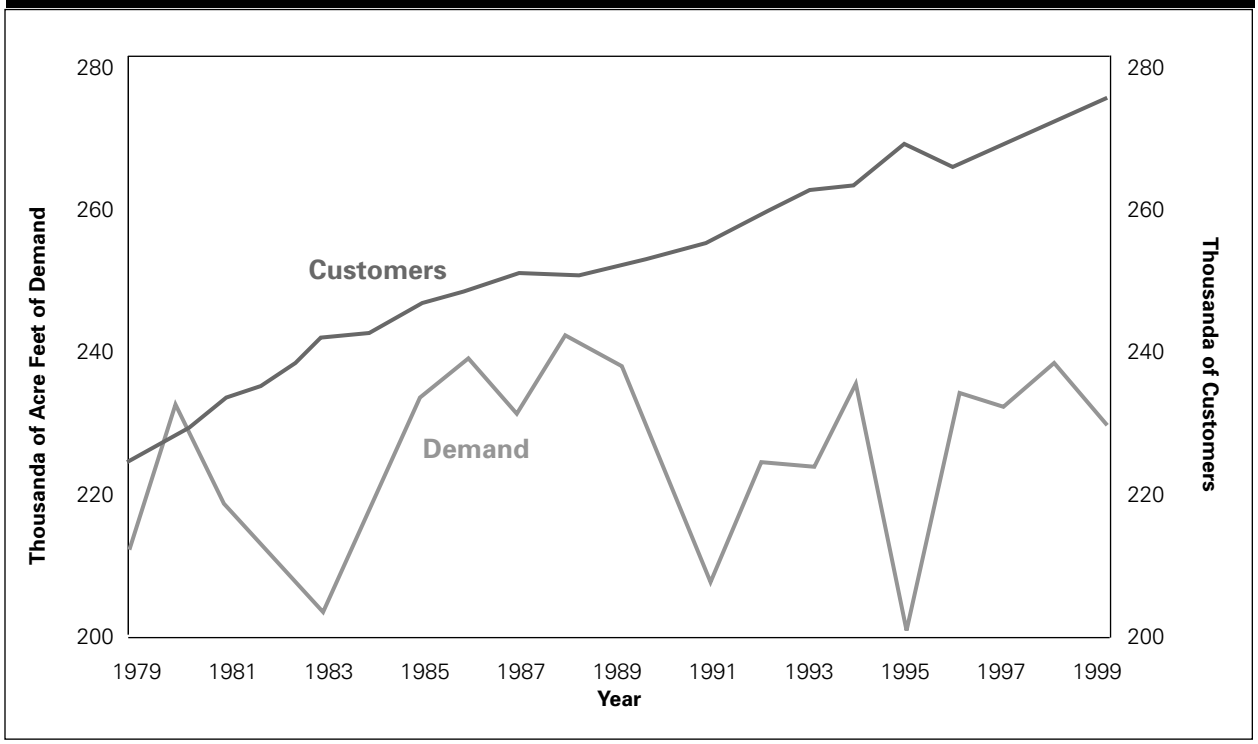
Source: Fatema Akhter, LADWP: 8/31/06 and from California Water Decisions booklet published by Environmental Water Caucus, 7/00.

Figure B-2: San Francisco Bay Area Population and Water Use



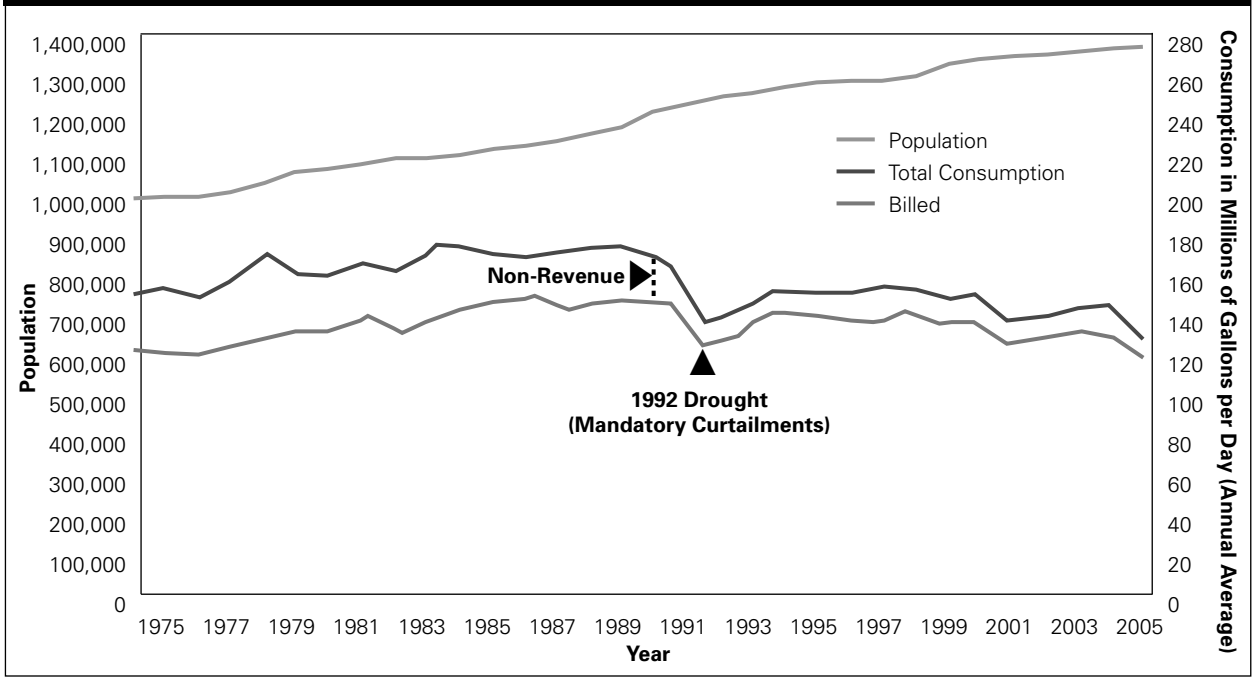
Source: Randy Kanouse, East Bay Municipal Utility District Sacramento Lobbyist. From Bay Area Integrated Regional Water Management Plan, Administrative Draft: 6/06.

Figure B-3: Denver Demand and Customer Growth of Treated Water



Source: Elizabeth Gardener, Denver Water Conservation Manager: 8/29/06.

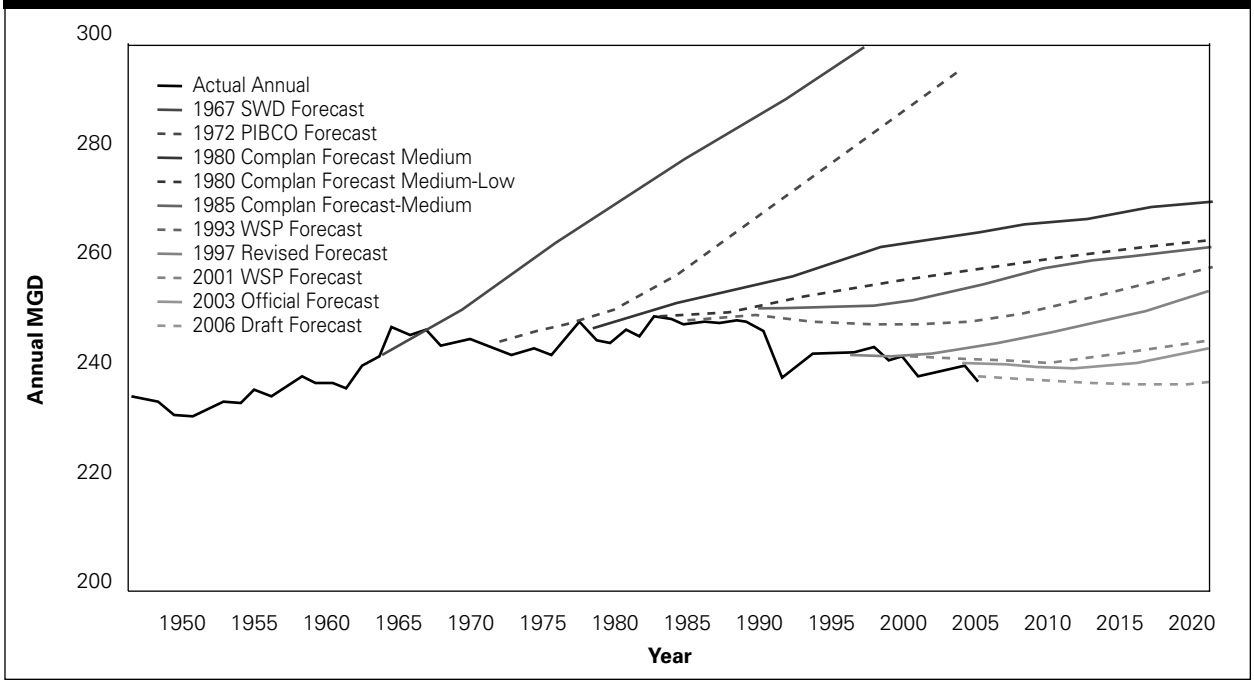
Figure B-4: Population Growth and Water Consumption from Seattle Public Utilities



Source: Pg. 2-15. Seattle Public Utilities, 2007 Water System Plan, Public Review Draft. Online access: http://www.cityofseattle.net/util/About_SPU/Water_System/Plans/2007WaterSystemPlan/index.asp.

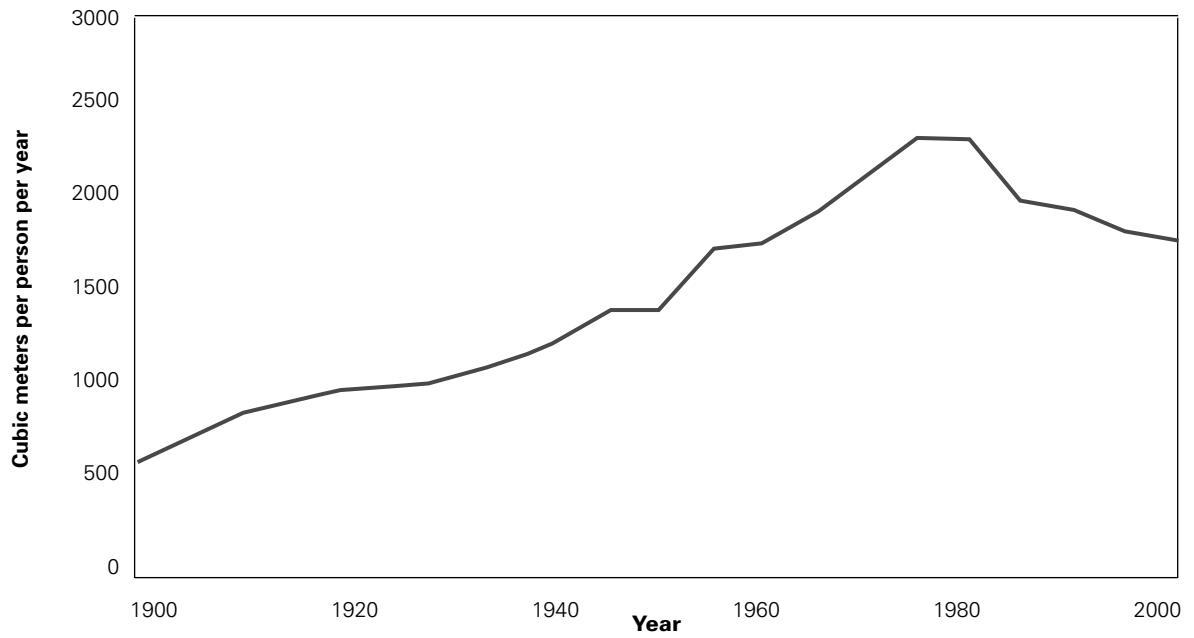
Note: Issaquah, Sammamish Plateau, and Covington area are not included in historic data because they did not become customers until 2004 when contract with CWA was signed.

Figure B-5: Seattle Public Utilities Forecasting Demand



Source: Chuck Clarke, Director, Seattle Public Utilities, personal communication with Barry Nelson.

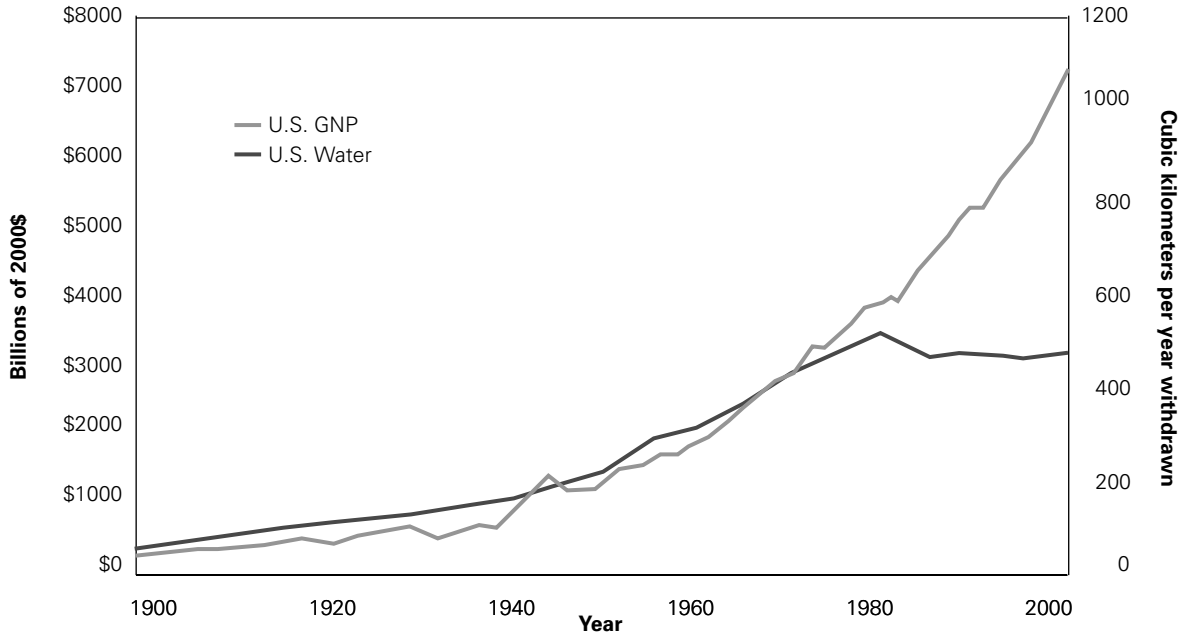
Figure B-6: United States Per Capita Water Withdrawals



Source: Source: Peter Gleick, Pacific Institute (www.pacinst.org). See also, The World's Water (Island Press, Washington DC

Note: Nationally, this figure diminishes to 6.5%.

Figure B-7: U.S. Economic Growth and Total Water Withdrawals



Source: Source: Peter Gleick, Pacific Institute (www.pacinst.org). See also, The World's Water (Island Press, Washington DC

Note: Nationally, this figure diminishes to 6.5%.

This decoupling of population and water use can be seen on the national level as well. Figure B-7 shows that, for the past quarter century, water withdrawals across the nation have remained essentially flat despite a significant increase in GNP. Figure B-6 shows that per capita water withdrawals have declined significantly over the same period. This trend is due to both increased investments in water use efficiency and a shift in the nation's economy toward industries that are less water-intensive.

INCORPORATING DEMAND MANAGEMENT IN PROJECTIONS OF FUTURE WATER USE—THE SEATTLE PUBLIC UTILITIES EXPERIENCE

Even where water agencies have made significant investments in conservation, it has taken a sustained effort for planners to incorporate fully the benefits of conservation—and the decoupling of growth and water use. Figure B-5 from Seattle Public Utilities illustrates this challenge. Total water SPU water demand has been remarkably flat for approximately three decades. For many years, however, demand forecasts projected dramatically higher future demand than has proven to be the case based largely on assumptions that previous water use trends would continue. Demand forecasting methodologies have improved significantly in a number of areas in the past thirty years. For example, since the 1980's, SPU forecasters have worked to incorporate the long-term savings as a result of conservation programs. Figure B-5 indicates, in the most recent SPU projections, demand projections track actual past water use trends.

Water demand forecasts are often designed to be conservative, because water managers are understandably hesitant to risk underestimating future demand. However, overestimations of future demand—frequently based in part on underestimations of the performance of efficiency measures—tend also to overestimate the importance of water management tools designed to increase supply. Today, conservation, water recycling and other demand management tools are now well enough established that water managers can rely on their performance over time. These tools should be carefully incorporated into future demand projections. The results of this effort can be seen in SPU's increasingly accurate demand projections—which now anticipate a continued ability to meet future water needs without a significant increase in supply.

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Appendix A

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APPENDIX B

Water Resources (continued)

Minute Order and Statement of Decision for the 2005 UWMP

SUPERIOR COURT OF CALIFORNIA, COUNTY OF LOS ANGELES

DATE: 08/03/07			DEPT. 85
HONORABLE Dzintra Janavs	JUDGE	S. BARRETT	DEPUTY CLERK
HONORABLE	JUDGE PRO TEM		ELECTRONIC RECORDING MONITOR
A. GODINEZ, C.A.	Deputy Sheriff	NONE	Reporter

BS103295

CALIF. WATER IMPACT NETWORK ET

VS

CASTAIC LAKE WATER ETAL

170.6 DAVID P. YAFFE

Plaintiff Counsel NO APPEARANCES

Defendant Counsel

NATURE OF PROCEEDINGS:

RULING ON SUBMITTED MATTER (HEARING ON PETITION FOR WRIT OF MANDATE);

The Court having taken this matter under submission on June 25, 2007 now rules as follows:

Petition for Writ of Mandate is denied and the Court rules in favor of Respondents on the Complaint for Declaratory Relief. Respondents are entitled to costs pursuant to Code of Civil Procedure Section 1032.

Statement of Decision is signed and filed this date.

Objections, if any, to this Statement of Decision shall be filed in Department 85 on or before August 20, 2007

CLERK'S CERTIFICATE OF MAILING/
NOTICE OF ENTRY OF ORDER

I, the below named Executive Officer/Clerk of the above-entitled court, do hereby certify that I am not a party to the cause herein, and that this date I served Notice of Entry of the above minute order of 8-3-07 upon each party or counsel named below by depositing in the United States mail at the courthouse in Los Angeles, California, one copy of the

MINUTES ENTERED
08/03/07
COUNTY CLERK

SUPERIOR COURT OF CALIFORNIA, COUNTY OF LOS ANGELES

DATE: 08/03/07	DEPT. 85
HONORABLE Dzintra Janavs JUDGE	S. BARRETT DEPUTY CLERK
HONORABLE JUDGE PRO TEM	ELECTRONIC RECORDING MONITOR
A. GODINEZ, C.A. Deputy Sheriff	NONE Reporter

BS103295

CALIF. WATER IMPACT NETWORK ET

VS

CASTAIC LAKE WATER ETAL

170.6 DAVID P. YAFFE

Plaintiff Counsel NO APPEARANCES

Defendant Counsel

NATURE OF PROCEEDINGS:

original entered herein in a separate sealed envelope for each, addressed as shown below with the postage thereon fully prepaid.

Date: August 3, 2007

John A. Clarke, Executive Officer/Clerk

By: S. BARRETT
S. Barrett, Judicial Assistant

Stephan Volker
436 14th Street #1300
Oakland, CA 94612

Mark Dillon
Gatze Dillon & Ballance
1525 Faraday Avenue #150
Carlsbad, CA 92008

David Boyer
McCormick, Kidman & Behrens
650 Town Center Drive #100
Costa Mesa, CA 92626

MINUTES ENTERED
08/03/07
COUNTY CLERK

SUPERIOR COURT OF CALIFORNIA, COUNTY OF LOS ANGELES

DATE: 08/03/07	DEPT. 85
HONORABLE Dzintra Janavs JUDGE	S. BARRETT DEPUTY CLERK
HONORABLE JUDGE PRO TEM	ELECTRONIC RECORDING MONITOR
A. GODINEZ, C.A. Deputy Sheriff	NONE Reporter

BS103295

CALIF. WATER IMPACT NETWORK ET

VS

CASTAIC LAKE WATER ETAL

170.6 DAVID P. YAFFE

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Pasadena, CA 91101

MINUTES ENTERED
08/03/07
COUNTY CLERK

FILED
LOS ANGELES SUPERIOR COURT
AUG 03 2007
JOHN A. CLARKE, CLERK
BY S. BARRETT, DEPUTY

SUPERIOR COURT OF CALIFORNIA

COUNTY OF LOS ANGELES

CALIFORNIA WATER IMPACT NETWORK and FRIENDS OF THE SANTA CLARA RIVER, Petitioners/Plaintiffs, vs. CASTAIC LAKE WATER AGENCY; NEWHALL COUNTY WATER DISTRICT; CLWA SANTA CLARITA WATER DIVISION; VALENCIA WATER COMPANY; and DOES 1-20, inclusive, Respondents/Defendants, Real Parties in Interest.	Case No. BS 103 295 STATEMENT OF DECISION [Transferred from Ventura County Superior Court, Case No. CIV 239 359] Assigned for all purposes to: Honorable Dzintra I. Janavs Department 85 Complaint Filed: February 27, 2006

Having taken the matter under submission on June 25, 2007, having considered all the evidence admitted and the parties' oral and written arguments, the Court rules as follows:

Petitioners, California Water Impact Network ("CWIN") and Friends of the Santa Clara River ("Friends") (collectively referred to as "Petitioners") seeks a peremptory writ of mandate, declaratory judgment, and preliminary and permanent injunctions setting aside, enjoining, and restraining the approval by Respondents, Castaic Lake Water Agency ("CLWA"), Newhall County Water District ("NCWD"), and Valencia Water

Company ("VWC") collectively referred to as "Respondents") of their 2005 Urban Water Management Plan ("2005 UWMP" or "Plan").[1]

The 2005 UWMP is a detailed water supply management plan, which describes the water demand, water supply, water conservation, water recycling, and water reliability planning for the CLWA service area. (AR[2] 1:1-425.) The 2005 UWMP was prepared pursuant to the Urban Water Management Planning Act ("UWMP Act" or "Act") (Wat. Code, §§ 10610-10656), which requires every urban water supplier to prepare and adopt an urban water management plan. (Wat. Code, § 10620.) As encouraged by the UWMP Act, Respondents jointly prepared the 2005 UWMP as a cooperative regional plan for the CLWA service area. (Wat. Code, § 10620, subd. (d); *see also* AR 1:13.) In addition, numerous water resource specialists with expertise in water management planning were retained to assist Respondents in preparing the Plan. (AR 4:2479.) As required by the Act, the 2005 UWMP was approved and adopted separately by each Respondent. (AR 2:578-591.)

The 2005 UWMP covers the CLWA service area, which generally encompasses the Santa Clarita Valley. (AR 1:16-19.) Total water supply available to meet demands in the Valley is comprised of a combination of imported water, local groundwater, and local recycled water. (AR 1:8-9.) The groundwater source is supplemented with imported supplies. (AR 1:8-9, 37-38, and 42-47.) Imported water includes State Water Project

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[1]Petitioners also identify CLWA Santa Clarita Water Division as a Respondent. CLWA Santa Clarita Water Division, however, is the retail division of CLWA and is not a separate public entity.

[2]The Administrative Record will be cited as AR [Volume Number]:[Start Bates Page]-[End Bates Page].

("SWP") Table A water[3] and stored water. (AR 1:37.) Local groundwater is extracted from two different aquifer systems that comprise the local groundwater Basin, the Alluvium Aquifer and the Saugus Formation.[4] (AR 1:42.) The Alluvium Aquifer generally underlies the Santa Clara River and its several tributaries; the Saugus Formation underlies essentially the entire Upper Santa Clara River Area. (*Ibid.*)

Petitioners CWIN and FSCR are non-profit public benefit corporations formed under the laws of the State of California. Petitioners dispute the sufficiency of the analysis contained in the 2005 UWMP, as well as the various conclusions reached in the Plan. Specifically, Petitioners assert that the Plan "(1) fails to accurately estimate future demand; (2) overstates supply; and (3) fails to address alternatives to bridge the gap between supply and demand." (Petitioners' Opening Brief ["POB"] 1:6-7.) Petitioners contend that these alleged failings in the Plan constitute a violation of the Act, as well as a violation of the Public Trust Doctrine. (POB 1:6-7.)

Respondents contend that they exceeded the procedural requirements of the Act in adopting their Plan. Beginning in April 2005, Respondents held various public community workshops in the CLWA service area. (AR 1:128, 5:2953-3001 and 3279-3305.) On July 27, 2005, a preliminary draft of the 2005 UWMP was released to the public to solicit public input. (AR 5:3011-3278.) The draft 2005 UWMP was released on August 31, 2005, at a public community workshop, and was subsequently posted on CLWA's

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[3]The SWP Table A Amount is an annual contractual right to SWP water, named for the "Table A" in each SWP contractor's Water Supply Contract.

[4]This groundwater Basin is identified in the DWR Bulletin 118, 2003 Update, as the Santa Clara River Valley Groundwater Basin, East Subbasin. (AR 1:42.)

website. (AR 2:578, 4:2535-2590 and 2608-2952.) Copies were also delivered to the three area public libraries, to the City of Santa Clarita, and to the Counties of Los Angeles and Ventura. (AR 2:578.) This was followed by a six-week written public comment period. (AR 1:135.) On September 28, 2005, and October 26, 2005, joint public hearings were held, during which time Respondent's respective Boards heard staff and consultants describe the contents of the draft Plan, additional public comments were received, and staff and consultants responded to public comments. (AR 2:1150-1257 and 4:2299-2476.)

On November 3, 2005, Respondents circulated the Revised Final Draft 2005 UWMP. (AR 2:579 and 772-1149.) On November 9, 2005, CLWA and NCWD held a joint meeting at which time each Board reviewed and adopted the Revised Final Draft 2005 UWMP. (AR 2:578-586 and 611-696.) Respondent VWC adopted the Revised Final Draft 2005 UWMP on December 14, 2005. (AR 2:587-591.)

Petitioners filed a verified petition for writ of mandate and complaint for declaratory and injunctive relief in the Ventura county Superior Court on February 27, 2006. The action was ordered transferred to the Los Angeles County Superior Court on May 18, 2006.

To establish a violation of the UWMP Act, Petitioners must establish a prejudicial abuse of discretion by showing that Respondents either failed to proceed in the manner required by law in their preparation and adoption of the 2005 UWMP or Respondents' decisions to adopt the 2005 UWMP were not supported by substantial evidence. (Wat. Code, § 10651.) At issue here is a challenge to a quasi-legislative action, which is governed by traditional mandamus. This requires "scrutiny of the nature of the alleged defect" depending upon whether Petitioners' claim is predominantly "one of improper procedure or a

dispute over the facts." (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* ("*Vineyard*") (2007) 40 Cal.4th 412, 435.) As explained by the California Supreme Court in *Vineyard*, "while we determine *de novo* whether the agency has employed the correct procedures, . . . we accord greater deference to the agency's substantive factual conclusions," for a court's task "is not to weigh conflicting evidence and determine who has the better argument." (*Ibid.*)

"Substantial evidence" has been defined as "enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion, even though other conclusions might also be reached." (*Laurel Heights Improvement Assn. Of San Francisco, Inc. v. The Regents of the University of California* (1988) 47 Cal.3d 376, 393, citing Cal. Code Regs., tit. 14, § 15384, subd. (a).) This is the same "highly deferential substantial evidence standard of review" as prescribed for appellate review of trial court decisions. (*Western States Petroleum Assn. v. Super. Ct.* (1995) 9 Cal.4th 559, 572.) This review standard was recognized by the Court of Appeal in *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2004) 123 Cal.App.4th 1, 9 ("[a]s it is not our function to reweigh the evidence, but to determine if there is substantial evidence to support the findings of the UWMP, the plaintiffs must fail if there is such substantial evidence"). Accordingly, this Court will uphold Respondent's decision to adopt the 2005 UWMP if substantial evidence supports that decision. In addition, this "deferential standard" requires the court to presume the correctness of the agency decision, as all reasonable doubts must be resolved in favor of it. (*Ryan v. Cal. Interscholastic Federation -- San Diego Section* (2001) 94 Cal.App.4th

1048, 1077-1078.) There is an exception to this deferential standard, when a court reviews the record and statutes to determine what is "required by law," and whether the agency has employed the correct procedures, which is subject to *de novo* review. (*Vineyard, supra,* 40 Cal.4th at p. 435; *People ex rel. Lockyer v. Shamrock Foods Co.* (2000) 24 Cal.4th 415, 432.)

The proper standard of review to be applied to Petitioners' public trust claim is the "abuse of discretion" standard. (*Baldwin v. City of Los Angeles* (1999) 70 Cal.App.4th 819, 836 [applying the abuse of discretion standard in mandamus action specifically to public trust issues].) In such cases, the Court should "determine only whether the action taken was arbitrary, capricious, or entirely lacking evidentiary support, or whether it failed to conform to procedures required by law." (*Ibid.*) Further, "[t]he inquiry into arbitrariness or capriciousness is like substantial evidence review in that both require reasonable basis for the decision."

I. The Plan's Water Use Projections and Estimate of Water Conservation Savings Meet The Requirements of the UWMP Act and Are Supported by Substantial Evidence

Petitioners argue that the 2005 UWMP's "conservation measures are unsubstantiated," and that because Respondents have relied upon 10 percent water savings to reach an "*ultimate conclusion*" that "adequate water exists for all future needs," the 2005 UWMP does not adequately quantify current water use and projected water use, as required by the UWMP Act. (POB 9, and Petitioners' Reply Brief ("PRB") 8:24-28 and 9:20-22.) Petitioner's arguments on this issue are without merit.

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A. The Plan Provides Adequate Support and Explanation For the 10 Percent Conservation Savings Estimate

The 10 percent conservation savings provided in the 2005 Plan is an estimate. Petitioners claim that the UWMP Act does not permit such an estimate of conservation savings. (PRB 7:23-24.) That is not so, as the Act specifically permits such an estimate. (Wat. Code, § 10631, subd. (f)(4) [requires a plan to provide a "[a]n *estimate*, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand"], emphasis added.)

Table 2-2 meets this requirement in that it provides such an estimate of existing conservation savings and demonstrates the effect of the savings on the suppliers' ability to further reduce demand by comparing it to the projected water demands. (AR 1:26.)

In addition, the UWMP Act does not require description and evaluation of water demand management measures for members of the California Urban Water Conservation Council. (Wat. Code, § 10631, subd. (j).) Instead, the Act simply requires that Council members include in their plans copies of the annual reports they submit to the Council. (*Ibid.*) As Respondents are each members of the Council, and as copies of their annual submitted reports are attached to the Plan, they are in compliance with subdivisions (f) and (g) of Section 10631 of the Act. (Wat. Code, § 10631, subd. (j).) (*See also* AR 1:235-384.)[5]

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[5]Moreover, because Respondents are members of the Conservation Council, the 2005 UWMP need not comply with that provision of the UWMP Act because section 10631, subdivision (h), of the UWMP Act also exempts members of the Conservation Council from the provisions of Section 10631, subdivision (f). (Wat. Code, § 10631, subd. (j).)

In this case, the estimate of conservation savings is supported by empirical data, based on the 1987-1992 drought and the results of *voluntary* conservation efforts. (AR 1:34 [explaining that past extreme conservation measures resulted in a 20 percent reduction in water demand (despite an expected 10 percent *increase* in water needs due to dry weather, overall water requirements actually *decreased* by more than 10 percent as a result of extraordinary conservation measures)]).

B. The Plan Provides Substantial Evidence to Support Its Conclusion That There Is Sufficient Water To Meet Future Demands

Petitioners claim that the 10 percent reduction due to conservation measures skews the Plan's ultimate conclusion that Respondents have identified enough water to meet future demands and point to a deficiency in future water supply identified in Tables 6-3 and 6-4 without the 10 percent reduction. (PRB 8:18-12:4.) Tables 6-2 through 6-4 summarize the supplies and demand for projected average/normal years, single-dry years, and multiple-dry years, respectively. (AR 1:95-97.) In average/normal years, the 10 percent reduction due to conservation measures is not relied upon to meet demands. (AR 1:95.) Only in dry years is the conservation amount necessary to meet demands (AR 1:96-97); however, the conservation estimates cannot be read without an understanding of the water shortage contingency plan outlined in Section 8.6 of the 2005 UWMP, which provides for *mandatory* conservation measures that could be reactivated, pursuant to local ordinances during dry years (AR 1:115-116); and Section 8.7, which provides for mandatory rationing or consumptive reduction measures (AR 1:116-117). Such mandatory conservation measures would be implemented and would ensure a conservation savings of 10 percent. Thus, in a dry year, with the implementation of such mandatory conservation measures, the 10 percent

conservation estimate is more certain than in an average/normal year, in which only voluntary conservation measures may be relied upon.

The 2005 UWMP has identified adequate supplies to meet future demands.

II. The Plan's Identification and Quantification of Surface Water Supplies Meets The Requirements Of The UWMP Act and Is Supported By Substantial Evidence

The UWMP Act requires that an urban water management plan identify and quantify existing and planned sources of water available to the supplier in five-year increments for the entire planning period, which is defined as the next 20 years. (Wat. Code, § 10631, subd. (b).) The Act further requires that a plan describe the reliability and vulnerability of the water supply. (*Id.*) at subd. (c)(1).) For any water source identified that may not be available at a consistent level of use, "given specific legal, environmental, water quality, or climatic factors," the Act requires that a plan include a description of any proposed alternative sources or water demand management measures "to the extent practicable." (*Id.* at subd. (c)(2).)

Chapter 3 of the Plan identifies and quantifies Respondents' current and planned sources of water. (AR 1:35-61.) Current supplies include CLWA's SWP Table A supplies, Flexible Storage Accounts in Castaic Lake, Semitropic Water Bank, and local groundwater. (AR 1:36, Table 3-1.) In addition, the Plan identifies near term future sources of water supply, including Rosedale-Rio Bravo Water Storage District Water Banking and Buena Vista Water Storage District/Rosedale-Rio Bravo Water Storage District Water Storage and Recovery Program. (AR 1:36, Table 3-1; see also AR 1:58-59.)

Chapter 3 in the Plan also contains an explanation of the reasons Respondents must rely on DWR in order to accurately assess the impacts

of varying conditions on SWP supply reliability -- an assessment that is required by the Act. (AR 1:39 & 90.) (See also Wat. Code, § 10620, subd. (d)(2); AR 6:3543.) As regards these supplies, DWR publishes every two years a reliability report that contains data concerning the reliability of current and projected SWP deliveries in conformance with the Act. (AR 1:90.) This reliability data is generated from CALSIM II, DWR's computer simulation model of SWP and Central Valley Project ("CVP") operations. (AR 3:1284, 4:2364-2367, 16:6988 & 6997-7002; *see also* Respondents' Request for Judicial Notice, Exhibit 1, pp. 9-11.)

In preparing its Plan, Respondents relied upon DWR's "Excerpts from the Working Draft of 2005 State Water Project Delivery Reliability" ("Draft 2005 Report"), as directed by DWR. The Draft 2005 Report contained DWR's most recent and authoritative projections of deliveries of the SWP. According to the Draft 2005 Report, the existing SWP facilities operated under current regulatory and operational constraints and, with all contractors requesting delivery of their full Table A Amounts in most years, could deliver 77 percent of total Table A Amounts on a long-term average basis. (AR 1:39 and 12:5398-5418.)

Chapter 6 of the Plan addresses in detail the reliability of Respondents' current and future water supply, including CLWA's SWP Table A supplies. (AR 1:91 and 93-97.) In describing the reliability of the water supply, the UWMP Act requires that a plan provide data for specific hydrologic scenarios: (1) an average year, (2) a single-dry year, and (3) multiple-dry years. (Wat. Code, § 10631, subd. (c)(1).) The discussion in Chapter 6 of the 2005 UWMP addresses each of these hydrologic scenarios and, using DWR's 2005 Draft Report, concludes that: (1) in an average water year, SWP delivery reliability will be 71 percent in 2010, and 77 percent in 2025/2030; (2) in a single-dry year,

SWP delivery reliability will be four percent in 2010, and five percent in 2010 and (3) in multiple-dry years, SWP delivery reliability will be 32 percent in 2010, and 33 percent in 2025/2030. (AR 1:40 and 95-97.)

Chapter 6 of the Plan also contains a comparison of current and future supply and demand for Respondents' service areas under the same three hydrologic scenarios. (AR 1:95-97.) That discussion includes the identification of various potential alternative supplemental and replacement supply sources and demand management measures for those supply sources that may vary between the three hydrologic scenarios. (AR 1:90-93.)

Petitioners contend that the 2005 UWMP overstates the quantity of surface water supplies and their reliability, contending that the Plan: (1) relies upon water supply sources that are the subject of pending litigation; (2) inflates SWP delivery numbers; (3) relies upon a flawed SWP delivery model; and (4) fails to consider other relevant factors that will impact the future reliability of SWP Table A deliveries. Contrary to these contentions, substantial evidence supports each of the Plan's conclusions regarding water supply and reliability.

A. The Plan Adequately Considers Pending Litigation

1. Kern-Castaic Transfer

CLWA's current SWP Table A Amount of 95,200 acre feet per year ("afy") includes 41,000 afy that is a result of the Kern-Castaic Transfer. (*See, Cal. Oak Foundation v. City of Santa Clarita* ("*California Oak*") (2005) 133 Cal.App.4th 1219, 1229-1230.) This transfer was completed in 1999, and is memorialized in a purchase agreement and in amendments to CLWA's and Kern County Water Agency's Water Supply Contracts with DWR. (*See, Friends of Santa Clara River v. Castaic Lake Water Agency* ("*Friends 1*") (2002) 95 Cal.App.4th 1373,

1379-1380.) The Environmental Impact Report ("EIR") for the transfer was challenged in 1999, in *Friends of the Santa Clara River v. Castaic Lake Water Agency* (Los Angeles County Superior Court Case No. BS056954) ("Friends Action"). (*Id.* at 1381.) Although CLWA was ultimately ordered to revise its EIR, no court has ever enjoined implementation of the Kern-Castaic Transfer Project, nor suggested that it should be unwound. (*California Oak, supra*, 133 Cal.App.4th at pp. 1228-1229.)

Under the jurisdiction of the Los Angeles County Superior Court in the Friends Action, CLWA prepared and circulated a revised EIR for the transfer, adopted the revised EIR, and lodged the revised EIR with the Los Angeles County Superior Court as part of its Return to the Peremptory writ of mandate in the Friends Action. Thereafter, the petition was dismissed with prejudice. In January 2005, two new challenges to CLWA's environmental review for the Kern-Castaic Transfer were filed in the Ventura County Superior Court by Planning and Conservation League ("PCL") and by California Water Impact Network ("CWIN"). Those cases were consolidated, transferred to the Los Angeles County Superior Court (Case No. BS098724), and were pending in Department 13 at the time Respondents adopted the 2005 Plan. (AR 1:41.)

All of the above is described in detail in the 2005 UWMP. (AR 1:41-42 and 91.)[6] The 2005 UWMP also identifies in detail the

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[6]The Los Angeles County Superior Court has since ruled that the dismissal with prejudice of Petitioner Friends' earlier CEQA petition challenging the original Kern-Castaic EIR is a retraxit and bars Friends from raising issues concerning the validity of the Kern-Castaic Transfer or the sufficiency of its environmental documents. (*See*, Respondents' RJN, Exhibit "4.") Therefore, Petitioner Friends is barred by the doctrines of retraxit and res judicata from challenging the validity of the Kern-Castaic Transfer (which includes asserting that the Kern-Castaic Transfer could be unwound) in this action. (*Le Parc Community Assn. v. Workers' Comp. Appeals Bd.* (2003) 110 Cal.App.4th 1161, 1169,

substantial evidence that supports its determination that the Kern-Castaic Transfer remains a valid and reliable water source. (AR 1:41-42.) This evidence includes the following: (1) the Kern-Castaic Transfer was completed in 1999, and DWR has allocated and annually delivered the water in accordance with the completed transfer; (2) the Court of Appeal held that the only defect in the 1999 EIR was that it tiered from the Monterey Agreement EIR, which was later decertified. (*Friends 1, supra,* 95 Cal.App.4th at p. 1387); (3) the defect has been remedied by the preparation of a revised EIR that did not tier from the Monterey Agreement EIR; (4) the Monterey Amendments settlement agreement expressly authorized the operation of the SWP in accordance with the Monterey Amendments, which facilitated the Kern-Castaic Transfer; (5) the Court of Appeal refused to enjoin the Kern-Castaic Transfer, and instead rquired preparation of a revised EIR; and (6) the Kern-Castaic Transfer contracts remain in full force and effect, and no court has ever enjoined the use of this portion of CLWA's SWP Table A Amount.

Petitioners cite the *California Oak* decision, in which the Court of Appeal set aside the EIR for its failure to explain the reasons it was appropriate to rely on the Kern-Castaic Transfer despite pending litigation. (*California Oak, supra,* 133 Cal.App.4th at p. 1240.) Here, however, the 2005 UWMP contains a detailed explanation of such reasons.

Substantial evidence supports including the Kern-Castaic Transfer amount as part of CLWA's total SWP table A Amount.

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quoting *Torrey Pines Bank v. Superior Court* (1989) 216 Cal.App.3d 813, 820 and *Rice v. Crow* (2000) 81 Cal.App.4th 725, 733-734.) Additionally, the Court in *CWIN v. CLWA* (LASC Case No. BS098724) recently entered Judgment ruling that the Kern-Castaic Transfer and its underlying contract documents are valid and not subject to being unwound or set aside.

2. Semitropic Groundwater Bank

In 2002, CLWA stored 24,000 acre-feet ("af") of its Table A Amount in an account in Semitropic's Banking Program ("2002 Groundwater Banking Project").[7] (AR 12:5419-5422, 5449.) Prior to opening its account, CLWA adopted a negative declaration under CEQA. (*Ibid.*) CWIN and Friends filed a CEQA action in the Ventura County Superior Court challenging CLWA's adoption of the negative declaration for the 2002 Groundwater Banking Project (*Cal. Water Network v. Castaic Lake Water Agency* [(Ventura County Superior Court Case No. CIV 215327]) ("Network Action"). (AR 1:57.) (Respondents' RJN, Exhibit 5.) Shortly thereafter, Petitioners filed essentially the identical action in the Sacramento County Superior Court (*Friends of the Santa Clara River v. State of California Department of Water Resources* [Sacramento County Superior Court Case No. 03CS00258]) ("Sacramento Action"). (*See*, Petitioners' Joshua Harris Declaration, Exhibit 2.) The *Sacramento Action* challenged the same negative declaration, involved the same parties, and asserted the same violations as the *Network Action*. (*Ibid.*) As the *Network Action* was filed first, the *Sacramento Action* was stayed until judgment was entered in the *Network Action*. (*See*, Petitioners' Joshua Harris Declaration, Exhibit 3.)

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[7]In 2004, CLWA stored 32,522 af of its 2003 Table A Amount in another account in Semitropic's program ("2003 Groundwater Banking Project"). (AR 12:5449-5484.) Only CLWA's 2002 Groundwater Banking Project was legally challenged. (AR 1:57.) Therefore, the 2003 Groundwater Banking Project is conclusively presumed to comply with CEQA. (Pub. Resources Code, § 21167.2.)

On July 14, 2004, the trial court in the *Network Action* entered judgment in favor of CLWA. (AR 1:57; *see also*, Respondents' RJN, Exhibit 6.) Petitioners appealed, and that appeal was pending at the time the 2005 UWMP was adopted. (AR 1:57.)

Petitioners contend that the Plan erroneously relies upon CLWA's 24,000 af of water banked at the Semitropic Storage District since that banking project was still under legal challenge when the 2005 UWMP was adopted. However, as the CLWA was the prevailing party in the trial court at the time of the adoption of the Plan[8], substantial evidence existed to support the Plan's reliance upon the banked water supplies. (*See, e.g.*, Publ. Resources Code, § 21167.3, subd. (b); Cal. Code Reg., tit. 14, § 15231; *see also, Barthelemy v. Chino Basin Mun. Water Dist.* (1995) 38 Cal.App.4th 1609, 1617 [agency actions are presumed to comply with applicable law, until proof is presented to the contrary].) Furthermore, the Plan's reliance on this water supply is limited. The 2002 Groundwater Banking Project has a term of ten years for the water to be withdrawn and delivered to CLWA. It is limited in the Plan for use in a dry year, and only for short-term reliability purposes (*i.e.*, prior to 2013).

Petitioners also claim that there is "contamination in the Semitropic aquifer," and that "water pumped into Semitropic may not meet DWR standards for water wheeling back into the California Aqueduct." (POB 15:5-8.) The record, however, establishes that water transported in SWP facilities would be required to meet DWR pump-in requirements for water quality and would meet all applicable drinking water standards and water quality criteria. (AR 15:6938.) Furthermore, this claim has

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[8]The Second District Court of Appeal subsequently affirmed the trial court's judgment. (*See*, Respondents' RJN, Exhibit 7.)

already been rejected both by the trial court and by the Court of Appeal in the Network Action. Contamination of the Semitropic Basin creates no water quality problems for CLWA or its retailers since, under the terms of the 2002 Groundwater Banking Project, CLWA may recover its water stored at Semitropic by either: (1) having Semitropic pump the water from the groundwater bank and transporting it to CLWA via the California Aqueduct, or (2) requesting an "in lieu exchange" (*i.e.*, that an equivalent amount of Semitropic's SWP water for a particular year be delivered directly to CLWA). (AR 12:5438 and 5452.) (*See also*, Respondents' RJN, Exhibit 6.)

B. The Plan Does Not Rely Upon Inflated SWP Delivery Numbers

Petitioners contend that Respondents improperly relied on DWR's projections for the reliability of the SWP.

DWR is responsible for the delivery of water to 29 state contractors throughout California; which water is then provided to hundreds of intermediate suppliers, the overwhelming proportion of whom have to prepare urban water management plans. (*See*, Wat. Code, §§ 10620 [requiring urban water management plans], and 10617 [defining "urban water supplier" as "a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water."]) The notion underlying Petitioners' argument -- that each of these hundreds of urban water suppliers should conduct their own SWP reliability analysis -- has no support in the UWMP Act and, in fact, would render the purposes of the Act unachievable.

Requiring urban water suppliers to conduct their own analysis of SWP reliability would also be contrary to the court-approved settlement

in connection with *PCL*. That settlement requires DWR to prepare SWP delivery reliability reports every two years commencing 2003 and contemplates each SWP contractor's reliance on the data generated in them. (AR 6:3543 and 16:7248.)

Petitioners' claim that SWP deliveries to contractors will never exceed 50 percent is based mainly on dicta from *PCL*. (POB 17:6-20.) Dicta cannot serve as factual support for such argument. (*Fireman's Fund Ins. Co. v. Maryland Casualty Co.* (1998) 65 Cal.App.4th 1279, 1301 ["In every case, it is necessary to read the language of an opinion in the light of its facts and the issues raised, in order to determine which statements of law were necessary to the decision, and therefore binding precedent, and which were general observations unnecessary to the decision. The latter are dicta, with no force as precedent."].)

PCL involved a challenge to an EIR that was certified in 1996, long before DWR had any type of computer modeling tool at the level of sophistication of CALSIM II. The dicta from *PCL* quoted by Petitioners describes the historical "gap" between SWP deliveries and SWP Table A entitlements prior to implementation of the Monterey Amendment to the SWP contracts in 1996. (*PCL, supra,* 83 Cal.App.4th at pp. 901-903.) The Monterey Amendment was intended to narrow that gap. (*Ibid.*) That amendment has been in effect since 1996, and *PCL* does not and could not have analyzed the impacts (positive or negative) of the Monterey Amendment upon the reliability of SWP deliveries.

PCL, however, does defer to the expertise of DWR with respect to SWP operations, which includes projecting SWP capacity and delivery reliability. (*PCL, supra,* 83 Cal.App.4th at pp. 906-907), and the Court of Appeal in *Santa Clarita Organization for Planning the Environment v. County of Los Angeles* (2003) 106 Cal.App.4th 715, citing *PCL*, held that

data from DWR concerning SWP reliability is the standard for planning. (*Id.* at p. 22.)

Furthermore, in asserting that the SWP facilities are incapable of ever delivering supplies to contractors in excess of 50 percent of Table A Amounts, Petitioners demonstrate their misunderstanding of the difference between the actual current capacity of SWP storage facilities and the actual current capacity of SWP conveyance facilities. As explained in the 2005 UWMP, while there are limitations on SWP storage capacity, similar limitations do not exist for its conveyance facilities (AR 1:37-38.)

Petitioners also claim internal inconsistencies in the 2005 UWMP with respect to SWP deliveries and SWP reliability. They argue that Table 3-2 in Chapter 3 of the Plan establishes that "[i]n 2004, CLWA received approximately 50 percent of its Table A allocation, or 47,205 af . . . . In all years prior, it received even less." (POB 16:21-23.) Petitioners contrast what they characterize as "unpredictable allotment schedule and low historical delivery numbers" with the Plan's conclusions regarding reliability of SWP deliveries. (*Id.* at 16:25.)

Petitioners are incorrect. Table 3-2 does not identify the historical total SWP deliveries *to* CLWA, but the historical total SWP deliveries delivered *by* CLWA to the retail water agencies in the Santa Clarita Valley. (AR 1:38.) As Respondents explain, this is not a distinction without a difference. As an example, Table 3-2 indicates that in 2002, CLWA delivered to its retailers 41,768 af of SWP water. 41,768 af, however, is not the total amount of SWP water deliveries received by CLWA in 2002. In addition to the amount reflected Table 3-2 as delivered in 2002, CLWA also stored an additional 24,000 af of its SWP deliveries at Semitropic's Groundwater Bank as part of its 2002

Groundwater Banking Project. (AR 1:57 and 12:5419-5422.) Thus, in 2002, CLWA's SWP deliveries exceeded 65,000 af.

Similarly, in addition to the 44,419 af of SWP water that CLWA delivered to its retailers in 2003, CLWA also stored an additional 32,522 af of its SWP deliveries at Semitropic Groundwater Bank as part of its 2003 Groundwater Banking Project. (AR 1:57 and 12:5449-5454.) Thus, in 2003, CLWA's SWP deliveries were approximately 76,000 af.

Further, while CLWA delivered only 47,205 af of SWP supplies to its retailers in 2004, this has no relationship to the actual amount of SWP supplies delivered to CLWA in 2004, which was approximately 65 percent of its total Table A Amount, or 61,880 af. (AR 11:4642-4643.) (*See also*, Respondents' RJN, Exhibit 2.)

It should also be noted that when reviewing Table 3-2, although the Kern-Castaic Transfer contract documents were executed in 1999, CLWA did not see an increase in its SWP Table A allocation as a result of the Transfer until 2001. Prior to 2000, CLWA's SWP Table A Amount was 53,700 af. Thus, in 2000, CLWA's total SWP deliveries were 60 percent of its total SWP Table A Amount.

Nor is the declaration executed by CLWA's General Manager Dan Masnada, on September 12, 2002, in other litigation inconsistent with the DWR's 2005 Draft Report. (POB 18:14-18.) In that declaration, Mr. Masnada questions the ability of the SWP to maintain high delivery percentages on a yearly basis "in the near term given current hydrologic conditions and existing SWP facilities in operation." (AR 1:760.) Masnada's statement is not inconsistent with the 2005 Draft Report. First, said statements were made concerning the reliability percentage that would be required immediately in the absence of the Kern-Castaic Transfer. (*Ibid.*) Second, as reflected in Table 3-4 of the Plan,

average/normal year near-term SWP delivery reliability for year 2010 is 71 percent, and will increase by the year 2025, to 77 percent. (AR 1:40.) The Plan, however, projects single-dry year reliability to be five percent and multiple-dry year reliability to be 33 percent in year 2025. (AR 1:40 and 96-97.) Thus, the Plan is not projecting 77 percent reliability for SWP deliveries every year, even in year 2025. (*Ibid.*)

Substantial evidence supports Respondents' reliance upon DWR's projections for the reliability of SWP delivery numbers, and such reliance is permitted under the UWMP Act.

C. The Plan Does Not Rely Upon A Flawed SWP Delivery Model

Petitioners argue that DWR's SWP analysis is unreliable because it is based upon the "flawed" "CALSIM II" model. (POB 19:20-21.) Petitioners contend that these "flaws" are identified in the Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operation in Central California. (POB 19:22-26, citing AR 3:1438.)

The Strategic Review, however, acknowledges that CALSIM II was a "substantial improvement" over the previous models that DWR had used for that work, was comparable to other state of the art models for projecting deliveries, and was "admirable" for its "openness and availability." (AR 3:1439.) While the reviewers made suggestions for future improvement of the model and noted that it was of limited use in predicting deliveries in any one year, to date there is no other model that does a better job of predicting deliveries -- nor have Petitioners identified one.

The case that Petitioners cite as undercutting the validity of the CALSIM II model -- *Planning and Conservation League v. U.S. Bureau of Reclamation*, No. C05-3527 (N.D. Cal. Feb. 14, 2006) (hereafter, the "Intertie Case"), Order on Preliminary Injunction -- recognizes that the

model is the best one presently available for projecting water supplies: "CALSIM II is not a perfect model; no model is. But its use alone [does not make out a violation of the National Environmental Policy Act ("NEPA")]." (See Respondents' Request for Judicial Notice, filed October 2, 2006, Exhs. "2" & "3.") While Petitioners cite the Intertie Case as supporting a conclusion that CALSIM II is flawed, the Court's Order simply supports a conclusion that the Bureau of Reclamation's use of CALSIM II for purpose of conducting abbreviated environmental review under NEPA was not warranted. (*Ibid.*) This case does not present that question, and the Intertie Case preliminary injunction ruling is not relevant.

Respondents made use of the best information available to them regarding SWP deliveries. In doing so, they complied with the UWMP Act.

D. The Plan Adequately Considers All Other Relevant Factors That Will Impact The Future Reliability Of SWP Table A Deliveries

The UWMP Act requires that urban water suppliers identify "[a]ctions to be undertaken . . . to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster." (Wat. Code, § 10632, subd. (c).) Respondents described in the 2005 UWMP the effects of a levee failure impacting its SWP water supply for a six-month period. (AR 1:106-121.) Citing a newspaper article's misquote of the statements of DWR Director Lester Snow published after the Draft 2005 UWMP had been published and circulated, Petitioners argue that the six-month anticipated outage is not long enough for contingency planning purposes, and that Respondents should have anticipated a five-year interruption in supply. (POB 21:17-18, citing AR 2:731.)

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Respondents point out, the "five year" statement was, in fact, a misreport of Director Snow's testimony, and Director Snow stated that a levee failure could take at least 15 months to repair. (AR 1:768.) In any case, though, Director Snow's testimony came after the final draft of the 2005 UWMP was issued and the voters subsequently approved bonds to provide for levee strengthening that would address this issue, Respondents provided analysis in support of the 2005 UWMP showing that an interruption of up to *three years* could be accommodated. (*See* AR 1:630-634, 658-659, and 768.) The UWMP Act does not require suppliers to include this analysis in their plan; it simply requires that the analysis be conducted, which has been done here. (Wat. Code, § 10632, subd. (c).)

Petitioners next argue that the Bay-Delta Plan, as enforced in the *State Water Resources Control Board Cases* (2006) 136 Cal.App.4th 674, 777, will require reduced SWP deliveries. The ruling post-dates Respondents' approval of the Plan. Furthermore, Petitioners have not made an adequate record in this Court on the point, nor have they demonstrated that they exhausted their administrative remedies.

Petitioners also contend that the Plan "fails to adequately address the known, foreseeable declines in SWP deliveries due to global warming, despite undisputed evidence documenting accelerating declines in summer Sierra Nevada snow pack and reservoir storage." (POB 22:8-12.)

Projections related to climate change and its potential impact(s) on future SWP deliveries are among the issues DWR will need to address in the future. The record establishes that no conclusion had been reached by DWR at the time of adoption of the 2005 Plan. The material cited by those commenting on the Plan makes clear their belief that Respondents must follow DWR's lead on this issue. (See AR 6:3657,

1:657.) It was appropriate for Respondents to rely on DWR's most recent water supply projections.

III. The 2005 Plan Adequately Assesses Water Quality Issues and Any Impacts on Water Availability

Petitioners contend that the 2005 UWMP fails to comport with the Act by failing to address various water quality issues and by failing to provide alternative or supplemental water sources as a result of those claimed limitations. (POB 25:21 - 31:4.) Petitioners assert that the 2005 UWMP: (1) overstates the quantity and quality of groundwater that can be delivered from the Alluvial Aquifer; (2) inadequately discloses the spread of perchlorate in the groundwater basin and does not identify "alternative water sources"; and (3) inadequately addresses the likelihood that the Newhall Ranch planned community may not be able to convert to potable use the groundwater from the Alluvial Aquifer historically used for its agricultural operations, due to allegedly "excessive" levels of total dissolved solids ("TDS"). (*Ibid.*)

Substantial evidence supports Respondents' contrary conclusions and findings on each issue.

A. Groundwater Overdraft and Excessive Nitrate and Chloride Recharge from SWP Water

Petitioners assert that Respondents' planned pumping from the Alluvial Aquifer represents a "two-fold increase," "threatens to reduce surface flows into the Santa Clara River," and will result in "higher levels of nitrates and increased chlorides due to recharge from SWP supply." (POB 26:12-16, citing AR 3:1850.) The record, however, does not show that Respondents plan a "two-fold increase" in pumping, because the figure they claim has doubled does not reflect historical agricultural and miscellaneous uses of this aquifer. (*See*, AR 1:46.)

Rather, planned pumping from the Alluvial Aquifer is approximately the same as historical pumping, which has ranged from between 20,000 afy to slightly more than 43,000 afy. (*Ibid.; see also,* AR 1:169-176 and 11:4634-4637.)

At these levels of pumping, the Alluvia Aquifer "shows no signs of water level-related overdraft." (AR 11:4637.) The groundwater component of overall water supply in the Santa Clarita Valley derives from a groundwater operating plan developed over the last 20 years to meet water requirements while maintaining the groundwater basin in a sustainable condition. (AR 1:45.) The 2005 UWMP's conclusions with respect to the availability of groundwater supplies are based on the groundwater operating plan and the sustainability analyses of two formal reports prepared to analyze the groundwater flow and sustainability (AR 1:45); the groundwater operating plan is summarized in Table 3-6. (AR 1:46.) When overall groundwater pumping is maintained in accordance with the groundwater operating plan, sustainable groundwater conditions will be maintained to support groundwater use on an ongoing basis. (AR 1:47.)

Respondents' conclusion that the planned yield from the groundwater basin is sustainable is supported by substantial evidence. (*See,* AR 1:51.)

The assertion that any "increase in Alluvial pumping" will "result in 'higher levels of nitrates and increased chlorides due to recharges from SWP supply'" also has no support in the record. As an initial matter, there is no nexus between an increase in Alluvial pumping and higher levels of nitrates or chlorides due to recharges from SWP supply. Assuming, however, that there were an "increase" in pumping levels (which is not the plan), and assuming that this would lead to increased

recharge from SWP supply, there is no basis in the record for concluding that this would lead to increased chlorides. To the contrary, the most recent evidence suggests that groundwater "may . . . contain higher concentrations of nitrates and chlorides when compared to SWP water." (AR 1:76; *see also*, AR 1:75 [noting that the chloride content in SWP water varies from below 40 mg/l to over 100 mg/l and does not pose a human health risk, and noting that the nitrate content of SWP water is very low], AR 2:657 & 1218 [General Manager and consultant statement on this point].)

B. The 2005 UWMP Adequately Discloses the Nature of Perchlorate Contamination, Remediation Efforts, and Their Effect on Groundwater

Petitioners generally contend that the 2005 UWMP fails to address adequate and timely remediation of the groundwater basin, and specifically assert that "the reactivation of [the] Q2 [Well] will draw the perchlorate plume towards the Santa Clara River and potentially cause long-term contamination of the river," and that the Plan "fails to adequately address and assure the timely remediation of the growing contamination of the Saugus Formation." (POB 27:9-17.) Each of these assertions, lacks evidentiary support from the record.[9]

As to Petitioners' assertions concerning the Q2 Well, the 2005 UWMP discloses that the well was returned to service in October 2005, after

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[9]In addition, these are not proper arguments for consideration here, as the Act exempts the preparation and adoption of an urban water management plan from CEQA. (Wat. Code, § 10652.) Conversely, the 2005 UWMP's identification of projects, like groundwater banking projects, does not render those projects exempt from CEQA. (*Ibid.*) As a result, while the environmental impacts of an identified project listed in an urban water management plan are not required to be analyzed in the plan, all potentially significant impacts resulting from implementation of such a project must be assessed in the environmental documents for that particular project at the time of its implementation.

the installation of wellhead treatment and after the completion of environmental review related thereto; although, as the Plan acknowledges, that well was not necessary for the anticipated production from the Alluvial Aquifer. (AR 1:48-49 and 78.) More importantly, the 2005 UWMP explains (and Figure 5-1 of the 2005 UWMP illustrates) that the two-year groundwater capture zone analysis of Alluvial wells suggests that inflow to those wells will either be upgradient of the contamination site or will be from Alluvium beyond where perchlorate is to be transported. (AR 1:79-80; *see also*, AR 10:4598-4599 [describing the results of the Alluvial production wells] and AR 16:7177.) Therefore, it does not appear that the Q2 Well will draw that perchlorate plume towards the Santa Clara River. With respect to Petitioners' latter two assertions, the Groundwater Perchlorate Contamination Amendment to the 2000 UWMP and 2005 UWMP belie their assertions, as the documents contain substantial evidence to support the conclusion that adequate non-impacted water is available from the Alluvial Aquifer (AR 1:77 and 195-209; AR 10:4464-4605); that a plan for containing the contamination has been prepared and is being implemented; and that contamination clean-up is planned under the direction of the Department of Toxic Substances Control. (AR 1:81-87.)

Finally, Petitioners argue that the 2005 UWMP should have analyzed alternative sources of water that can be used in place of contaminated supplies "if" remediation plans fail. (POB 28.) Substantial evidence in the record, however, supports the conclusion in the 2005 UWMP that alternative water sources are *not* needed.

The 2005 UWMP assessed the adequacy and availability of groundwater supplies in both the Alluvial Aquifer and Saugus Formation. (AR 1:45-54.) As to the Alluvial Aquifer, the 2005 UWMP disclosed that the

combined active Alluvial groundwater source capacity of non-impacted municipal wells is approximately 58,000 afy. (AR 1:48.) It concluded that this capacity is "more than sufficient to meet the municipal, or urban, component of groundwater supply from the Alluvium, which is currently 20,000 to 25,000 afy of the total planned Alluvial pumping of 30,000 to 40,000 afy." (*Ibid.*) As to the Saugus Formation, the 2005 UWMP found that the combined active Saugus groundwater source capacity for municipal wells is 24,000 afy, which is "more than sufficient to meet the planned use of Saugus groundwater in normal years of 7,500 to 15,000 afy." (AR 1:52.) The 2005 UWMP also addressed Saugus capacity in the near-term:

> During the currently scheduled two-year time frame for restoration of impacted Saugus capacity (as discussed further in Chapter 5), this currently active capacity is more than sufficient to meet water demands, in combination with other sources, if both of the next two years are dry. At that time, the combination of currently active capacity and restored impacted capacity, through a combination of treatment at two of the impacted wells and replacement well construction, will provide sufficient total Saugus capacity to meet the planned use of Saugus groundwater during multiple dry-years of 35,000 af, if that third year is also a dry year. (AR 1:52.)

The Plan further identified that in actual practice, however, pumping from the Saugus Formation was *only* about 6,500 af in 2004; and, on average, Saugus pumping has been *only* about 7,000 afy since 1980. (AR 11:4615.) Because groundwater supplies are both adequate and available, even after accounting for the perchlorate-impacted municipal supply wells, there is no legal requirement to assess "alternative" sources of supply under the UWMP Act or any other law or regulation.

C. **The Groundwater for the Newhall Ranch Project and TDS**

Petitioners also contend that the 2005 UWMP is inadequate because it does not address a particular development project's (*i.e.*, Newhall

Ranch's) potential for not being able to convert its agricultural water supplies to urban uses due to TDS levels. (POB 28:17-21.)

Petitioners offer no evidence to support the claim that TDS levels are "excessive," and only rely on two comment letters that essentially repeat the same point. (*See* AR 3:1331 and 1852.) As reported in the 2005 UWMP, "all groundwater meets or exceeds drinking water standards." (AR 1:76.) Similarly, the 2004 Santa Clarita Valley Water Report, upon which the 2005 UWMP relies, "CLWA produces water that meets drinking water standards set by [the U.S. Environmental Protection Agency] and [the California Department of Health Services]." (AR 11:4644.) In any case, the UWMP Act does not require an urban water management plan to evaluate specific development projects. (Wat. Code, § 10652.) At the project level, all development projects are required to perform the necessary environmental review under CEQA, and this review will necessarily address project-specific water quality issues, if any.

IV. The UWMP Act Does Not Require Cumulative Impacts Analysis

Petitioners argue that the 2005 UWMP fails to address the cumulative impacts of urbanization on local water resources. (POB 29-31.) Specifically, Petitioners claim that the 2005 UWMP: (1) *fails* to address impacts such as decreased recharge due to decreasing percolation rates caused by the increase in the acreage of impervious surface area; and (2) *fails* to catalogue private groundwater well pumping. (POB 29-31; PRB 30:21-24.)

There is, however, no legal requirement in the UWMP Act for an urban water management plan to discuss "cumulative impacts." The analysis of cumulative impacts is a CEQA requirement only.[10] (Wat. Code,

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[10]CEQA requires that an EIR discuss cumulative impacts if a project's incremental environmental effects, combined with the effects

§ 10652.) Cumulative impacts are not *mentioned* in the UWMP Act. Water Code section 10631, subdivision (c)(2) reads: "For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable." Therefore, the 2005 UWMP is not inadequate and Respondents did not abuse their discretion for failing to discuss cumulative impacts.

As previously stated, substantial evidence supports the water supply projections in the 2005 UWMP. That is all that is required.

V. The Public Trust Doctrine

Petitioners argue that the 2005 UWMP violates the Public Trust Doctrine, because the 2005 UWMP will "encourage" local governments to approve urban growth, which *may* cause lower flows in the Santa Clara River. (POB 31-34.)

Petitioners' Public Trust doctrine cause of action fails to state a claim.

An urban water management plan is merely a planning document, and itself has no direct impact on public trust resources. For that reason, urban water management plans are specifically exempt from the application of the CEQA. (Wat. Code, § 10652.) Furthermore, a Public Trust Doctrine claim is not ripe unless and until an agency takes an action that has the potential to harm the public trust. (*See, Santa Teresa Citizen Action Group v. City of San Jose* (2003) 114 Cal.App.4th 689, 707-709 [nuisance and public trust causes of action not ripe where alleged injury to water supply depended on the assumption that city

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of other projects, are "cumulatively considerable." (Cal. Code Regs., tit. 14, § 15130, subd. (a).)

would approve uses for recycled water that posed a significant risk to the aquifer from which petitioners obtained their drinking water].)

In view of these conclusions, the Court need not reach the other Public Trust issues raised by Petitioners.

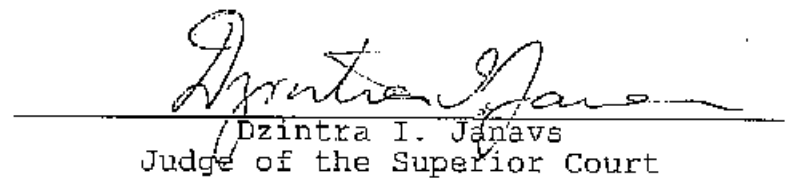
VI. Conclusion

The Court finds that Respondents proceeded in the manner required by law and that the actions by Respondents were supported by substantial evidence. The Petition for Writ of Mandate is denied and the Court rules in favor of Respondents on the Complaint for Declaratory Relief.

As the prevailing parties, Respondents are entitled to costs pursuant to Code of Civil Procedure section 1032.

Objections, if any, to this Statement of Decision shall be filed in Department 85 on or before August 20, 2007.

DATED: August 3, 2007



Dzintra I. Janavs
Judge of the Superior Court

DIJ:dl

FILED
LOS ANGELES SUPERIOR COURT
AUG 15 2007
JOHN A. CLARKE, CLERK
BY S. BARRETT, DEPUTY

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

SANTA CLARITA OAK CONSERVANCY, CALIFORNIA OAK FOUNDATION and SANTA CLARITA ORGANIZATION FOR PLANNING THE ENVIRONMENT, Plaintiffs and Petitioners, vs. CITY OF SANTA CLARITA, a municipal corporation, SANTA CLARITA CITY COUNCIL, and DOES 1-25, inclusive, Defendants and Respondents.	CASE NO. BS 084677 **STATEMENT OF DECISION**
GATE KING PROPERTIES, et al., Real Parties in Interest.	

Having taken the matter under submission on August 9, 2007, after parties' submission of proposed Statements of Decision, having considered all the evidence admitted and the parties' oral and written arguments, the Court rules as follows:

Petitioners Santa Clarita Oak Conservancy, California Oak Foundation, and Santa Clarita Organization for Planning the Environment ("Petitioners") seek a Writ of Mandate commanding Respondents City of Santa Clarita and Santa Clarita City Council ("City" or "Respondents") to set

aside its decision certifying the recirculated Final Additional Analysis ("FAA") to the Environmental Impact Report ("EIR") for the Gate King Industrial Park. The Gate-King Project is a research and development/industrial park, consisting of approximately 106 lots on 508.2 acres, of which 68 lots on 170.1 acres will be used for industrial development. The remainder will be retained in open space. (Supplemental Administrative Record ("SAR") volume 24: page 6324) The project's water demand is estimated to be 386 acre feet per year ("afy"). (SAR 10:2620; 24:6341.)

The City originally certified an EIR for the Gate-King Industrial Park Project ("Gate King") in June of 2003 and approved the project which is the subject of this action. (SAR 10:2619.) The 2003 Gate King EIR included a discussion of available water supplies, including the City's reliance on the availability of 41,000 afy of surface water transferred from the Kern County Water Agency to the Castaic Lake Water Agency ("CLWA") in 1999 ("41,000 afy Transfer"). (*Id.*) CLWA is the "wholesale" water agency to the Newhall County Water District ("NCWD"). NCWD has agreed to annex the project and supply water to it. (SAR 10:2620; 24:6324). Various parties challenged the certification of the Gate King EIR, which was upheld by this Court. (*Id.*)

On appeal, the Court of Appeal reversed and directed this Court to issue a writ of mandate vacating the City's certification of the 2003 EIR on the grounds that the EIR failed to contain substantial evidence of sufficient water supplies. (*California Oak Foundation v. City of Santa Clarita* (2005) 133 Cal.App.4th 1219 ("*California Oak*").) The Court of Appeal held that the Gate King EIR did not sufficiently address uncertainties relating to CLWA's entitlement to the 41,000 afy Transfer. (*Id.*) The Court of Appeal found no other defects in the 2003 EIR. (*Id.* at 1236-41.) On February 15, 2006, this Court issued a Writ of Mandate ordering the City to "certify a Final Environmental Impact Report complying with CEQA consistent with the Court of Appeal's opinion in *California Oak* []."

On March 28, 2006, the City recirculated a "Draft Additional Analysis to the Final Environmental Impact Report for the Gate-King Project" ("DAA"), which "completely replace[d]" the water analysis presented in the 2003 EIR. (SAR 10:2615 – 25:6725.) As required under Public Resources Code section 21151.9 and Water Code section 10910, the DAA included a Water Supply Analysis ("WSA") prepared by NCWD. The WSA analyzed the sufficiency of water supplies for the project and concluded that: (1) the project had been included in NCWD's and CLWA's most recent

2005 Urban Water Management Plan ("UWMP") (SAR 24:6321-6351); (2) that, "[b]ased on the analysis set forth in this WSA and as supported by the documents relied on for its preparation, NCWD's total projected water supplies available during the ensuing twenty years will meet the projected water demands associated with the Gate-King Project and existing and other planned uses within NCWD's service area" (SAR 24:6351); and (3) that, based on a number of factors, including the Department of Water Resources ("DWR")'s and the court's treatment of the 41,000 afy to date, it is "unlikely" that DWR's on-going preparation of an EIR and any litigation arising out of it will "unwind" a completed and executed water transfer of 41,000 afy. (SAR 24:6331.) NCWD also based its conclusion about the sufficiency of water on State Water Project ("SWP") water reliability projections provided by DWR in its State Water Project Delivery Reliability Report. (SAR 24:6329.)

Further, the DAA discussed other concerns affecting the reliability of SWP water, providing information about climate change, the reliability of the CALSIM II model (one of DWR's water reliability modeling tools), and other SWP water issues, such as salinity in the Bay Delta. The DAA also acknowledged DWR's on-going ability to curtail Table A water deliveries of SWP water, including the 41,000 afy based on "environmental considerations." (SAR 10:2628, 2657; 31:8038-8040.) After acknowledging that these factors could affect the reliability of SWP deliveries, the DAA evaluated the likelihood that these factors in fact would significantly undermine DWR's, CLWA's and NCWD's water supply reliability projections. The DAA concluded that

> these events do not significantly affect the reliability of the transfer amount, and therefore, it is still appropriate for the City of Santa Clarita to conclude that CLWA and NCWD properly included the transfer amount as part of CLWA's 95,200 afy Table A Amount [].

(SAR 10:2662.)

The City held a public comment period to receive comments on the DAA from March 31, 2006 through May 8, 2006, and the City's Planning Commission held a public hearing on May 2, 2006 to receive public testimony on the DAA. (SAR 10:2612; 28:7240.) On May 25, 2006, the City published the "Final Additional Analysis to the Environmental Impact Report for the Gate-King

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Industrial Park" ("FAA"). (SAR 28:7234 – 37:9677.)[1] The FAA responded to comments regarding the reliability of the 41,000 afy Transfer, and affirmed the finding that, despite some uncertainty, it was appropriate for the City to conclude that the 41,000 afy Transfer was sufficiently reliable to consider it to be an available water source for planning purposes. (SAR 31:8047-8075.) On June 6, 2006, the City's Planning Commission adopted a resolution recommending re-certification of the Gate King EIR with the FAA. (SAR 38:9699-9702.) On July 11, 2006 the City Council adopted a resolution recertifying the Gate King EIR with the FAA. (SAR 38:9944-9949.) The City issued a Notice of Determination regarding the recertification on July 13, 2006. (SAR 38:9950-9951.)

On August 16, 2006, the City filed a Return to Peremptory Writ of Mandate and Request for Discharge ("Return") with this Court. On October 2, 2006, Petitioners filed an Objection to Return to Peremptory Writ and Request for Discharge.

Standard of Review

To establish a violation of the California Environmental Quality Act ("CEQA"), Petitioners must show an abuse of discretion in that the City either failed to proceed in the manner required by law or the determination or decision is not supported by substantial evidence. (*Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* ("Vineyard") (2007) 40 Cal. 4th 412, 426, Code Civ. Proc. § 1094.5(b); Pub. Resources Code §§ 21168, 21168.5.) This requires "scrutiny of the nature of the alleged defect" depending upon whether petitioners' claim is predominantly "one of improper procedure or a dispute over the facts." (*Vineyard,* 40 Cal.4th 412, 435.) As explained by the California Supreme Court in *Vineyard,* "while we determine *de novo* whether the agency has employed the correct procedures, . . . we accord greater deference to the agency's substantive factual conclusions," for a court's task "is not to weigh conflicting evidence and determine who has the better argument." (*Id.*)

"Substantial evidence" is defined as "enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion, even though other

[1] As the final CEQA document, the FAA includes the DAA plus responses to comments and modifications to the text of the DAA where required. (14 Cal. Code of Regs. § 15362 (b); hereafter "CEQA Guidelines."

conclusions might also be reached." CEQA Guidelines § 15384(a); *Laurel Heights Improvement Ass'n v. Regents of Univ. of Cal.* (1988) 47 Cal.3d 376, 393.) Substantial evidence may include facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts, but not argument, speculation, unsubstantiated opinion, or clearly erroneous evidence. (Pub. Res. Code §§ 21080(e)(1)(2), 21082.2(c).)

"[I]n applying the substantial evidence standard, the reviewing court must resolve reasonable doubt in favor of the administrative finding and decision. As such, if there are conflicts in the evidence, their resolution is for the agency." (*River Valley Preservation Project v. Metropolitan Transit Dev. Bd.* (1995) 37 Cal.App.4th 154, 168.) Determinations in an EIR must be upheld if supported by substantial evidence, and the mere presence of conflicting evidence in the administrative record does not invalidate them. (*Chaparral Greens v. City of Chula Vista* (1996) 50 Cal.App.4th 1134, 1143.) An agency's approval of an EIR may not be set aside on the ground that an opposite conclusion would have been equally or more reasonable. (*Laurel Heights Improvement Ass'n v. Regents of Univ. of Cal.* (1988) 47 Cal.3d 376, 393.) The Court passes only upon the EIR's sufficiency as an informative document, not upon the correctness of its environmental conclusions. (*Laurel Heights* at 392.) An EIR's informational content needs to be adequate to fulfill its informational purpose. It need not be perfect: "CEQA requires an EIR to reflect a good faith effort at full disclosure; it does not mandate perfection, nor does it require an analysis to be exhaustive. The absence of information in an EIR does not per se constitute a prejudicial abuse of discretion." (*Dry Creek Citizens Coalition v. County of Tulare* (1999) 70 Cal.App.4th 20, 26.)

"As with all substantial evidence challenges, an appellant challenging an EIR for insufficient evidence must lay out the evidence favorable to the other side and show why it is lacking. Failure to do so is fatal. A reviewing court will not independently review the record to make up for appellant's failure to carry his burden." (*Defend the Bay v. City of Irvine* (2004) 119 Cal.App.4th 1261, 1266; *see also Environmental Council of Sacramento v. City of Sacramento* (2006) 142 Cal.App.4th 1018 at 1029 ["plaintiffs bear the burden of proving a prejudicial abuse of discretion by establishing that the agencies' decisions are not supported by substantial evidence or that they failed to proceed in a manner required by law"].)

A. The City Was Not Legally Precluded From Relying on the 41,000 afy Transfer Pending Completion of Litigation Surrounding the Monterey Agreement and DWR's Programmatic EIR.

Petitioners contend that the City is precluded from relying on the 41,000 afy Transfer for planning purposes. The argument rests predominantly on the relationship between the 41,000 afy Transfer and on-going proceedings involving the Monterey Agreement, summarized hereafter.

In 1999, CLWA entered into a contract with the Kern Delta Water District for transfer of 41,000 afy. The CLWA certified an EIR for the 41,000 afy Transfer tiered on the earlier program EIR that had been prepared for the Monterey Agreement, a multi-party agreement among SWP contractors setting forth allocations and other provisions concerning SWP deliveries.

In *Planning and Conservation League v. Dept. of Water Resources* (2000) 83 Cal.App.4th 892 ("*PCL*"), the PCL successfully challenged the Monterey Agreement program EIR. The Court of Appeal held that the EIR should have been prepared by DWR as the lead agency, rather than by one of the contractors, and that a new EIR must be prepared and certified by DWR. The Court did not invalidate the Monterey Agreement or enjoin the water transfers effected thereunder, but directed the trial court to consider whether the Monterey Agreement should remain in place pending preparation of DWR's new EIR, and to retain jurisdiction pending certification of DWR's EIR.

In *Friends of Santa Clara River v. CLWA* (2002) 95 Cal.App.4th 1373 ("Friends I"), the Court of Appeal ordered CLWA's EIR for the 41,000 afy Transfer decertified because it had been tiered from the Monterey Agreement EIR, adjudged inadequate: "We have examined all of appellant's other contentions and find them to be without merit. If the PCL/tiering problem had not arisen, we would have affirmed the judgment" (*Friends, supra*, at 1387.) The Court did not issue any ruling affecting CLWA's ability to continue to use and rely on water supplies from the 41,000 afy Transfer, leaving it to the trial court's discretion whether to enjoin CLWA's use of the water pending its completion of a new EIR. (*Friends, supra*, at 1388.)

In September 2002, on remand to the Los Angeles County Superior Court, the *Friends* petitioners applied under CEQA section 21168.9 to enjoin CLWA from continuing to use and rely on water from the 41,000 afy Transfer. The trial court rejected that request, and in December 2003, the Court of Appeal affirmed the trial court's ruling allowing CLWA to continue to use and rely on water

from the 41,000 afy Transfer pending completion of its new EIR. (*Id.*; *see also Friends of the Santa Clara River v. Castaic Lake Water Agency*, 2003 WL 22839353 ("*Friends II*") at SAR 34:8741.)

Meanwhile, in May 2003, before the trial court acted on remand, the parties to the PCL litigation entered into the Monterey Settlement Agreement. Section II of that Agreement provides that SWP would continue to be administered and operated in accord with both the Monterey Amendments and the terms of the Monterey Settlement Agreement. (SAR 34:8832.) The Monterey Settlement Agreement did not invalidate or vacate the Monterey Amendments, or any water transfer effected under them. The Agreement called for DWR to prepare a programmatic EIR for the Monterey Amendment and to evaluate the environmental impacts of eight completed water transfers, including the 41,000 afy Transfer, within the broad context of the Monterey Agreement.

In December, 2004, CLWA certified a new EIR for the 41,000 afy which did not tier off of the Monterey Agreement EIR. DWR did not object to CLWA acting as lead agency for the 41,000 afy Transfer and, in fact, commented favorably on the CLWA's EIR. (SAR 31:8049-8050.) That EIR was again subsequently challenged. (*California Water Impact Network v. Castaic Lake Water Agency*, LASC Case No. BS 098724.)

In March, 2007, the California Supreme Court decided *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412. In *Vineyard*, plaintiff challenged the EIR for a large, residential development project on the basis that the project's projected water supply was so uncertain that the EIR effectively failed to identify the source of the water needed to supply the project in the long term.[2] According to the petitioner, this failure of the EIR could not be cured since the EIR improperly deferred analysis of the project's true water supply impacts.

The Sunrise Douglas EIR projected water supplies to come from two sources: groundwater supplies in the near-term and additional surface water sources in the long-term. With respect to long-term supplies, the court held that the EIR had failed to proceed in accordance with law for failure to provide sufficient information. It leaves "too great a degree of uncertainty regarding the long-term availability of water for this project. Factual inconsistencies and lack of clarity in the [analysis] leave

[2] The Sunrise Douglas project would demand approximately 22,000 afy based on a projected build-out of 22,000 units of housing, housing approximately 60,000 people.

the reader[,] and the decision-maker[,] without substantial evidence for concluding that sufficient water is, in fact, likely to be available for the Sunrise Douglas project at full buildout." (*Vineyard,* 40 Cal.4th at 439.) With respect to the need to identify replacement supplies, the court held that, "[w]here, despite a full discussion, it is impossible to confidently determine that anticipated future water sources will be available, CEQA requires some discussion of possible replacement sources or alternatives to use of the anticipated water, and of the environmental consequences of those contingences." (*Vineyard*, 40 Cal.4th at 432.)

On the other hand, the court upheld as adequate the Sunrise Douglas EIR's analysis of near-term groundwater supplies and held that the EIR's conclusions should not be set aside if supported by substantial evidence. Despite *some uncertainty* about the availability of the near-term supplies, which had been specifically identified but were subject to competing demands, the court held that substantial evidence supported the city's determination that the supplies were sufficiently reliable to be used for planning purposes and did not require an analysis of replacement sources. (*Vineyard*, 40 Cal.4th at 436-438; see also *Western Placer Citizens for an Agric. and Rural Env't v. County of Placer* (2006) 144 Cal.App.4th 890, 908 [an EIR need not identify a "guaranteed" source of water; "if an EIR were required to identify a guaranteed source of water, then no EIR would ever be sufficient."].)

In April, 2007, Department 13 of the Los Angeles Superior Court issued a Statement of Decision in Case No. BS 098724 (the second challenge to CLWA's 2004 EIR referred to above) and ruled that (1) the 41,000 afy Transfer was final and not subject to invalidation; (2) that CLWA was the proper lead agency to have prepared the EIR on the 41,000 afy and; (3) that CLWA was not required to await preparation of DWR's programmatic EIR on the Monterey Agreements before it could certify its own EIR.[3] The court nonetheless identified an analytical "hole" in CLWA's EIR based on its failure to explain the relationship between DWR's ability to impact the 41,000 afy Transfer as a result of its programmatic EIR and the three future water supply scenarios CLWA studied in its EIR. However, like all other courts that have faced this issue, the court refused to invalidate the Transfer or set it aside pending correction of this analytical defect.

[3] The court grants Petitioner's Request for Judicial notice of the trial court's Statement of Decision in *California Water Impact Network v. Castaic Lake Water Agency*, Case No. BS 098724.

1. *PCL, Friends of the Santa Clara River* and *California Oak* Do Not Preclude Reliance on the 41,000 afy Transfer

Petitioners contend that legal uncertainties surrounding the 41,000 afy Transfer due to the *PCL* and *Friends* lawsuits and the on-going preparation by DWR of a programmatic EIR preclude the City from relying on water from that transfer for planning purposes. Specifically, Petitioners contend that because *PCL* requires the Department of Water Resources ("DWR") to prepare an EIR analyzing the effects of the eight SWP water transfers completed under the Monterey Agreement, none of those transfers, including the 41,000 afy Transfer, are sufficiently reliable for planning purposes until DWR has completed and certified that EIR.

PCL, *Friends* and *California Oak* do not preclude reliance on the 41,000 afy Transfer for planning purposes. While the Courts of Appeal could have simply said that all EIRs requiring reliance on the 41,000 afy Transfer must await the certification of a new FEIR by DWR (and resolution of any litigation challenging such FEIR), they have not done that. In fact, no court has said that.

Although the Court in *Friends* and *California Oak* observed that CLWA "may be able to cure the PCL problem by awaiting action by the [DWR] complying with the PCL decision, then issuing a subsequent EIR, supplement to EIR, or addendum . . . tiering upon a newly certified Monterey Agreement EIR" (*California Oak, supra*, 133 Cal.App.4th at 1229," n.6), neither court said that local water or planning agencies must await the DWR Programmatic EIR. In fact, the *California Oak* court made it clear that as long as the basis for the decision was transparent and reasoned, it was *up to the City* to decide whether the 41,000 afy is sufficiently reliable for planning purposes. (*Id.* at 1237-38, emphasis added.)

2. The Monterey Settlement Agreement and DWR's Pending EIR Does Not Preclude Reliance on the Transfer.

The Monterey Settlement Agreement does not prohibit local agencies from relying on the 41,000 afy Transfer. Rather, the Settlement Agreement simply requires DWR to conduct an "[a]nalysis of the potential environmental [impacts] relating to" several undisputedly final and completed water transfers, not just of the 41,000 afy Transfer (SAR 34:8834) and to analyze all of the transfers in the same manner, even though seven of them, defined in the Agreement as the

"Attachment E Transfers," were beyond challenge. (*Id.*) All of the water transfers were effected as permanent transfers under the Agreement and are to be analyzed in the same way in DWR's new EIR and no material distinction is made between them. Nothing in the Settlement Agreement requires cities and counties to stop land use planning efforts until the DWR's EIR is certified, and no court has so held.

Nor is the fact of DWR's pending programmatic EIR a bar to the City's reliance on the 41,000 afy. While it is possible that DWR's EIR could impact the Transfer (a fact disclosed in the FAA), the preparation of that EIR by DWR is not a legal prerequisite for the approval of this Project by the City. Further, NCWD, the expert water agency that prepared the WSA for the Gate-King project, determined that it is "unlikely" that DWR's on-going preparation of an EIR and any litigation arising out of it will "unwind" completed and executed water transfers, such as the 41,000 afy Transfer. (SAR 24:6331.) The City's reliance on this conclusion was reasonable, based on evidence that showed (1) that DWR has treated and continues to treat the 41,000 afy as a valid, final transfer (SAR 31:8046); (2) that the 41,000 afy Transfer was memorialized in a 1999 supply contract amendment approved by DWR (SAR 31:8050); (3) that DWR has allocated and delivered the water in accordance with the transfer since 2000, seven years ago and increased CLWA's SWP maximum Table Amount by that amount (*Id.*); (4) that CLWA has paid $47 million for the water, monies which have been delivered and which were financed by tax-exempt bonds (*Id.*); (5) that DWR has always treated the transfer as a "permanent" and final Table A transfer and has stated that it is consistent with the implementation of the Monterey Amendments (*Id.*); (6) that DWR praised CLWA's 2004 EIR as a comprehensive and thorough analysis (SAR 10:2672); (7) that no court has ever set aside the Transfer pending preparation of CLWA's EIR or SWR's programmatic EIR; and (8) that DWR included the 41,000 afy in its most recent SWP Reliability Projections. (SAR 10:2671; 31:8050-8051.) These factors support the City's conclusion that neither the DWR (nor the courts) are likely to significantly disturb the 41,000 afy Transfer.

In summary, contrary to Petitioners' arguments, no *legal* bar exists to the City's reliance on the 41,000 afy Transfer for planning purposes. *California Oak* held that it was up to *the City* to determine whether or not to rely on the 41,000 afy Transfer in its planning pending the completion of the

litigation. The Court stated: "*[T]he question is whether the entitlement should be used for purposes of planning future development*, since its prospective availability is legally uncertain. *Although this decision must be made by the City*, the EIR is intended to serve as an informative document to make government action transparent. Transparency is impossible without a clear and complete explanation of the circumstances surrounding the reliability of the water supply." (*Id.* at 1237-38; emphasis supplied.)

The City's recirculated FAA transparently discussed the uncertainties related to the 41,000 afy Transfer, including disclosing the possibility that future actions by DWR could adversely impact the Transfer. Based on the evidence before it, the City reasonably concluded that it was unlikely that the 41,000 afy would cease to be available to serve this project and other projects.

3. The Invalidation of CLWA's EIR Does Not Undermine the City's EIR.

Petitioners contend that the April 2007 Statement of Decision invalidating of CLWA's EIR for the 41,000 afy Transfer in *California Water Impact Network v. Castaic Lake Water Agency* (Case No. BS 098724) undermines the adequacy of the City's FAA, which was certified in July, 2006. But as recognized by the *California Oak* court:

> It is well-established that once a project is approved, new information does not require reopening the approval. (*SCOPE, supra*, 106 Cal.App.4th at p. 723; Cal.Code Regs., tit. 14, § 15162, subd. (c).) Gate King is thus correct that it is "simply too late to raise this [the invalidation of the UWMP 2000] as an issue." (133 Cal.App.4th at 1243.)

As with the invalidation of the 2000 UWMP in the *California Oak* case, the setting aside of CLWA's EIR nearly a year after the City's certification of the FAA cannot re-open the validity of that certification. When the City certified the Gate King FAA in July, 2006, it was entitled to assume that the CLWA's certified EIR was adequate to support CLWA's approval of the 41,000 afy Transfer. (*State of California v. Superior Ct.* (1990) 222 Cal.App.3d 1416, 1419.)

But in any event, the City's FAA anticipated the possibility that CLWA's EIR might be invalidated, but concluded that the Transfer was still likely to prove reliable. The City's FAA said:

> "[T]he City has determined that it is reasonable to conclude that *even if a court finds that the CLWA 2004 EIR legally deficient*, that court, like all others before it, will again refuse to enjoin the permanent 41,000 afy water transfer, and instead require further revisions to the EIR." (SAR 31:8052 (emphasis added).)

That is what happened. Although the court in Department 13 found an "analytical hole" in CLWA's EIR, it refused to set aside the Transfer.

Finally, Petitioners suggest that the City's FAA suffers from the same "analytical hole" as identified in CLWA's EIR, namely that the FAA should have predicted how the outcome of DWR's programmatic EIR might affect the three allocation scenarios examined in the CLWA's EIR—namely (1) a pre-Monterey Amendments scenario without Article 18 cutbacks, (2) a pre-Monterey Amendments scenario with Article 18 cutbacks and (3) a post-Monterey Amendments scenario.

The defect identified in the CLWA EIR does not apply to the FAA. First, Petitioners' failure to exhaust their administrative remedies with respect to these arguments bars them from raising them for the first time now. (Pub. Res. Code § 21177(a); *Sierra Club v. California Coastal Comm'n* (2005) 35 Cal.4th 839, n. 20; *Central Delta Water Agency v. State Water Res. Control Bd.* (2004) 124 Cal.App.4th 245, 274.)

Assuming *arguendo,* that Petitioners' arguments are not barred, CEQA imposes on the City no duty to examine in its project EIR the three "Monterey" allocation scenarios assessed in CLWA's EIR for the 41,000 afy . Public Resources Code § 21002.1 provides that "[t]he purpose of an [EIR] is to identify the significant effects on the environment *of* [*the*] *project* . . . ." (emphasis added.) In CLWA's EIR, the "project" was a 41,000 afy Transfer. In the City's FAA, the "project" was a local industrial park project. None of the Monterey allocation scenarios are a direct or indirect environmental consequence of approval of *this* project. Petitioners stretch CEQA beyond its limits to suggest that the City's FAA should have contained a detailed environmental assessment of the 41,000 afy Transfer, a project under the jurisdiction of a different agency, and with very different environmental ramifications.

Rather, under CEQA, the FAA was required to contain a reasoned and adequate assessment of whether there will be sufficient water to serve *the project* and, to the extent water is deemed *not* available, the environmental impacts of acquiring needed water. (*California Oaks* at 448, *Vineyard* at 432.) In this case, the FAA contained a reasoned, good faith analysis, identified specific, available water supplies, and discussed the reliability of those supplies. Acknowledging potential uncertainties (including DWR's ability to curtail Table A deliveries in the future based on "environmental

considerations,") of the available supplies, the FAA nonetheless concludes that DWR's future activities are "unlikely to 'unwind' [a] completed and executed…transfer[]." (SAR 24:6331) There is no "analytical hole" here. The FAA identifies water available to serve the project, discusses the degree of uncertainty related to those identified supplies, and based on substantial evidence, concludes that the supplies are *sufficiently* reliable to use for planning purposes.

4. The FAA was not required to identify supplies to replace the 41,000 afy

Petitioners claim that *California Oak* and *Vineyard* required the City to identify permanent replacement water supplies to serve the project, should the 41,000 afy Transfer at some point cease to be available. Petitioners misread *California Oak* and *Vineyard*. Rather, *California Oak* requires that the City explain why it can rely on the 41,000 afy Transfer, despite the legal uncertainties, ***or*** identify additional water supplies for the project. (*California Oak, supra*, 133 Cal.App.4th at 1242 [emphasis added].) It does not require that the City do both. (See also *id.* at 1244 calling for the EIR to demonstrate how "demand for water would be met without the 41,000 afy entitlement, ***or*** of why it is appropriate to rely on the 41,000 afy Transfer in any event." (*Id.* at 1242 [emphasis added].) "Whether the [41,000 afy] entitlement should be used for purposes of planning future development" is a decision that "must be made by the City." (*Id.* at 1237-1238.)

In the FAA, the City chose to rely upon the continued availability of 41,000 afy Transfer in its water supply analysis and to explain why. As ordered by the Court of Appeal, it provided a reasoned analysis based on substantial evidence as to why it was appropriate to do so. (SAR 10:2615 – 25:6726; SAR 28:7234 – 37:9677.) Having done so, the City was not required to also identify water supplies to replace the 41,000 afy.

Nor does *Vineyard Area Citizens* require the City to identify replacement sources of water. In *Vineyard*, the Supreme Court held that "where, despite a full discussion, it is *impossible to confidently determine* that anticipated future water sources will be available, CEQA requires some discussion of possible replacement sources or alternatives to use of the anticipated water, and of the environmental consequences of those contingences." (*Vineyard*, 40 Cal.4th at 432.) Here, it was *not* impossible to confidently determine that the 41,000 afy would continue to be available based on the record before the City. While *some* uncertainty existed, there was sufficient certainty for the City to confidently

predict that water supplies would in fact continue to be available. The *Vineyard* court does not require a *guarantee* of certainty for an EIR's water analysis to be considered adequate, just a "likelihood of actually proving available." (*Id.*)

In fact, whether a specifically identified source, such as the 41,000 afy, is *sufficiently* reliable is the kind of factual dispute that *Vineyard Area Citizens* cautioned should be subject to deference as long as the City's conclusion is supported by substantial evidence. (*Vineyard Area Citizens*, 40 Cal.4th at 436.) In *Vineyard,* the court applied this deferential approach to City's conclusion about the reliability of near-term groundwater supplies (5,000 afy). Although the 5,000 afy was specifically identified as available to serve the development, the EIR acknowledged there were competing demands for it. (*Id.*) "*While much uncertainty remains*," the court said, "the record contains substantial evidence demonstrating *a reasonable likelihood* that a water source the provider plans to use for the Sunrise Douglas project . . . will indeed be available at least in substantial part to supply the Sunrise Douglas project's near-term needs." (*Id.* at 437, emphasis added.) The *Vineyards* court did not require either a guarantee of availability or an analysis of replacement sources for the 5,000 afy of near-term supplies.

Here, as in *Vineyards,* the FAA discloses "potential uncertainty" over the 41,000 afy, but also explains why the City concluded that this specifically identified source was not *so* uncertain as to not "bear a likelihood of actually proving available" or to require identification of replacement sources. Under well-established principles, this Court must defer to the City's factual conclusion.

Finally, *Vineyard* recognizes that CEQA does not require the city to "reinvent the water planning wheel" each time it approves an individual development project if a water planning agency has already included the project in its most recently adopted Urban Water Management Plan. (UWMP) (*Vineyard*, 40 Cal.4th at 434.)[4] "The analysis in an individual project's CEQA evaluation may incorporate [an UWMP's] previous overall water planning projections," and need not "reinvent the wheel." (*Id.* at 434; see also Water Code §10910 (c)(1), (2) and (3), allowing incorporation of an UWMP analysis into an EIR) In *Vineyard,* the Sunrise Douglas project was *not* accounted for in the

[4] A UWMP must describe estimated past, present and future water sources, supply and demand for at least 20 years into the future. (Water Code §§ 10610-10656)

applicable UWMP. Here, in contrast, the Gate King project was fully accounted for in NCWD's most recently adopted UWMP, and this information was incorporated into the FAA. (SAR 10:2621; 24:6326.) Under CEQA and the Water Code, the City was entitled to incorporate the UWMP's projections of available water supplies, which included the 41,000 afy, into its water supply analysis. This is what it did.

B. Substantial evidence supports City's reliance on 41,000 afy water transfer

As noted, *California Oak* held that, as long as the City's conclusions were supported by substantial evidence, it is within the City's province to decide whether to rely on the 41,000 afy Transfer for planning purposes. (*California Oak, supra*, 133 Cal.App.4th at 1237-38.)

The FAA, here, contains a discussion of *why* the City chose to rely on the 41,000 afy as a reliable source, despite the identified uncertainties. While disclosing that future activities by DWR involving SWP water (including its programmatic EIR) *could* affect the 41,000 afy Transfer, the FAA concludes that such DWR's future activities were "unlikely" to "unwind" executed and completed agreements with respect to the permanent transfer of SWP Water Amounts." (SAR 10:2661-2664.) To support this conclusion, the FAA explains that the 41,000 afy Transfer was completed in 1999; CLWA has paid approximately $47 million for the additional Table A Amount, the monies have been delivered, the sales price has been financed through CLWA by tax-exempt bonds, and DWR has increased CLWA's SWP maximum Table A Amount and delivered or made available to CLWA the 95,200 afy because it was a permanent transfer/reallocation of SWP Table A entitlement between SWP contractors. (SAR 31:8046-8050.)[5]

The FAA also explains that DWR itself lists the 41,000 afy as part of CLWA's allocation in its published "Notices to State Water Project Contractors" (SAR 31:8046); treats the transfer as a permanent and final transfer (*Id.*); did not object to CLWA's preparation of its own EIR for the 41,000

[5] Included in the DAA's and FAA's Appendices are the necessary documents to support the FAA's analyses, including the Water Supply Assessment prepared by NCWD PCL decision (SAR 34:8916-8936), the Monterey Settlement Agreement (SAR 34:8816-8897), the Sacramento County Superior Court's "Order Pursuant to Public Resources Code Section 21168.9" (SAR 36:9410-9413), the *Friends* decision (SAR 34:8771-8779), the Los Angeles County Superior Court's Judgment on remand in the *Friends* litigation (SAR 34:8781-8791), CLWA's final EIR for the 41,000 afy Transfer (SAR 16:4029 – 19:5126), and CLWA's Resolution certifying that EIR (SAR 33:8522-8527).

afy (SAR 31:8051) and expressly allocates the 41,000 afy as part of Castaic Lake Water Agency's 95,200 afy in its 2005 State Water Project Delivery Reliability Report (SAR 22:05930), which contains "DWR's current information regarding the annual water delivery reliability of [SWP] for existing and future levels of development . . . , assuming historical patterns of precipitation." (SAR 22:5874.) This evidence—unrefuted by Petitioners—supports the City's determination that, although *possible*, it is *unlikely* that DWR will impose conditions on the Transfer that will significantly impair DWR's own projections about its reliability. (SAR 24:6331.) While the City's determinations about the reliability of the 41,000 afy contain a degree of projection, "[d]rafting an EIR . . . necessarily involves some degree of forecasting." (CEQA Guidelines 15144.) Where an agency uses its best efforts to disclose and forecast all that it reasonably can about the reasonable likelihood of future activities, it has complied with CEQA. (*Id.*)

Importantly also, Petitioners have not produced substantial evidence that DWR *will* significantly change DWR's own projections concerning the reliability of SWP water. Rather, Petitioners simply speculate that DWR might do so. Nor have Petitioners shown why the evidence relied on by the City to conclude such a result is "unlikely" is insubstantial, incorrect or flawed. Petitioners' failure to explain why the evidence favorable to the City's determination is lacking is "fatal" to its case. A reviewing court will not make up for appellant's failure to carry its burden. (*Defend the Bay*, *supra*, 119 Cal.App.4th 1261 at 1266.)

The City reviewed the evidence provided by the expert water agencies, NCWD, CLWA and DWR, as well as the views of commentators opposed to the City considering the 41,000 afy Transfer, and determined that the 41,000 afy was *sufficiently* reliable to be able to confidently use it for planning purposes. This determination is supported by substantial evidence in the record, and thus, comports with CEQA. (*Vineyard Area Citizens*, 40 Cal.4th at 436.)

C. The FAA properly relied on data developed by DWR using the CalSim II model.

Petitioners' criticize the City's reliance on DWR's use of the CALSIM II model and contend that other experts have said the model does not reliably predict water supplies. However, as stated in CEQA Guidelines section 15151 "[d]isagreement among experts does not make an EIR inadequate." Rather, section 15151 provides that "[an] EIR should summarize the main points of disagreement

among the experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure." (*Association of Irritated Residents v. County of Madera* (2003) 107 Cal. App. 4th 1383, 1390-91) The City, after disclosing and discussing the expert controversy, appropriately chose to rely upon DWR's Reliability Report, which includes water supply availability data developed using the CALSIM II model. Substantial evidence in the record supports City's determination that DWR, the state's expert agency on water supplies, reasonably employed CALSIM II as the best available tool for assessing water supplies in California.

Petitioners focus on the "Strategic Review of CALSIM II and its Use for Water Planning, Management and Operations in Central California" ("Strategic Review") contending that the Strategic Review supports their contention that CALSIM II should not be used for absolute predictions. (SAR 35:9107-9150.) In relying on DWR's Reliability Report, the City acknowledged the Strategic Review, recognized that it identified some weaknesses with the model, but concluded – as did the Strategic Review – that CALSIM II is a valuable tool for planning purposes. (SAR 31:8074; 35:9110.) In fact, the Strategic Review viewed CALSIM II as "a very impressive modeling effort on the part of all those involved with its development and application," (SAR 35:9110, 9132) and concluded: "Few, if any, modeling organizations in the country have consistently done as good a job on model development and application for such a large, complex, and controversial system as the modeling group which developed CALSIM II. . . . Most areas and suggestions for improvement . . . are meant to aid the model developers in moving further and faster in the direction they are already heading." (SAR 35:9127.) That same experts believe the model can be improved does not detract from it being the best available currently.

Petitioners suggest that the use of CALSIM II for making absolute predictions about future SWP water deliveries conflicts with DWR's and the United States Bureau of Reclamation position on the model, but DWR and the Bureau of Reclamation's ("Bureau") primary position paper on this issue: "Peer Review Response: A Report by DWR/Reclamation in Reply to the Peer Review of the CALSIM II Model" ("Peer Review Response") does not support this. (SAR 37:9592-9660.) The Peer Review Response, which responds to the Strategic Review, states that the CALSIM II Model *can* be

used to make absolute predictions in certain circumstances, including for "local planning efforts by project contractors and local agencies." (SAR 37:9619.)

Petitioners further argue that in an unpublished U.S. District Court opinion, *Planning and Conservation League v. U.S. Bureau of Reclamation*, ("*PCL/Bureau*") the Bureau "essentially admitted that the model is too unreliable for making absolute predictions." But the decision only highlights a fact which is not in dispute, and which the City prominently disclosed in the FAA: there are perceived shortcomings to the CALSIM II model. The *PCL/Bureau* decision (discussed in the FAA, included in the FAA's appendices), did not restrict "the Bureau or any other agency from using or relying on the CalSim-II model but, rather, stated that the Bureau could rely on the model, provided it disclosed relevant shortcomings in the data or model itself." (SAR 31:8074; *see also* 34:8938-8955.) The FAA did disclose these shortcomings.

Finally, the City's responses to comments by the Planning and Conservation League and California Water Impact Network were appropriate. (*See* SAR 31:8097-8098, 8102-8103.) In those responses the City recognized that the CALSIM II model has shortcomings, but concluded that it may still be relied on, as it is relied upon by experts DWR and the Bureau. (*Id.*) CEQA requires nothing more. (*See Greenbaum v. City of Los Angeles* (1984) 153 Cal.App.3d 391, 412-13 [agency has discretion to determine what methodology to use].)

D. The FAA properly evaluated the potential impact of global warming on water supplies.

The FAA appropriately concluded, based on adequate review of global warming literature and relevant studies, that the impact of climate change on water supplies was too speculative to conduct further meaningful quantitative review.

The FAA reviewed literature on global climate change, and has a seven-page discussion of the issue in Topical Response 3. (SAR 31:8076-8082.) The FAA recognizes that a broad consensus has concluded that the global climate is warming and that this change may adversely impact California's water supplies. (*Id.*) After reviewing the relevant studies, however, the FAA determined that the timing and extent of any impact to water supplies remains highly uncertain. (*Id.*) While DWR and other agencies and institutions continue to study the implications of global warming on water supplies, the FAA notes that DWR itself has determined that the science "has not reached a level at which it can

be quantitatively incorporated into delivery projections of the SWP." (SAR 31:8077.) The FAA states that the City reviewed these studies and DWR's approach and independently determined that it would be speculative to try to quantify the effects of climate change on water supply reliability at this point. (SAR 31:8082.)

CEQA permits such an approach. Given DWR's expert opinion that the quantitative impact of global warming on water supplies is speculative, CEQA did not require further analysis of those impacts. CEQA Guidelines § 15145 provides: "If, after thorough investigation, a lead agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact." (*See also Marin Municipal Water Dist. v. KG Land California Corp.* (1991) 235 Cal.App.3d 1652, 1662-63 [upholding approach in which EIR investigated potential long-term impacts, but found analysis would be speculative].)

Petitioners argue that the City was required to make a "good faith effort to analyze the potential impacts on supply reliability based on the available data." It did. FAA Topical Response 3 contains an adequate discussion of global warming, including a summary of the various studies which examine the potential impact on water supplies in California. (SAR 31:8076-8082.) It recognizes that some studies have concluded that less water will be available as a result of global warming. (SAR 31:8078, 8080.) However, the FAA also reviewed studies that found that global warming may result in more water for California. (*Id.*) After summarizing the main points of these studies, the City exercised its discretion as lead agency, and chose to adopt DWR's expert opinion that quantifying the impact of global warming on water supplies at this time would be speculative:

> [B]ased on the above data, the City agrees with DWR that it would be speculative at this time to quantify the effects of climate changes on the reliability of the SWP . . . [a]t this time, the City believes it is appropriate to terminate any further analysis of potential future climatic changes, consistent with Section 15145 of the California Environmental Quality Act Guidelines.

(SAR 31:8082.)

Climate change is clearly an issue of vital importance, particularly to water supplies in California. DWR, the state agency with the most expertise on water supplies in California, has determined that the science on global warming has not reached a point where it can be "quantitatively

incorporated into delivery projections of the SWP." (SAR 31:8077.) The City Council of the City of Santa Clarita is in no better position to do so and CEQA does not require it to do so.

1. The FAA adequately addressed State Water Resources Control Board Order 2006-0006.

The FAA adequately addresses the State Water Resources Control Board's Order 2006-0006 ("Order")[6] concerning the maintenance of salinity standards in the Sacramento Bay Delta. Petitioners argue that the City must forecast the "extent to which meeting the salinity standard in DWR's State Water Board permit may result in reductions to SWP deliveries." However, as explained by the FAA, there are a variety of overlapping methods by which DWR may comply with the Order. (SAR 31:8070-8071.) After examining these methods and considering the current efforts underway by DWR to meet the salinity standards, as well as noting that, even if DWR were to be found in violation of the Order, a reduction in water deliveries is not required. The City's conclusion that the Order does not result in a reduction of State Water Program supplies to the DWR is supported by the evidence.

As described in the FAA, in the event that DWR or the Bureau projects that there may be a "potential exceedance in the salinity objectives" of the Board Order the "two agencies are required to immediately inform the State Board . . . and describe the corrective actions they are initiating to avoid the exceedance." The 'corrective actions' may include, but are not limited to:

> [A]dditional releases from upstream [CVP] facilities or south of the Delta [SWP] or CVP facilities, modification in the timing of releases from Project facilities, reduction in exports, recirculation of water through the San Joaquin River, purchases or exchanges of water under transfers from other entities, modified operations of temporary barriers, reductions in highly saline drainage from upstream sources, or alternative supplies to Delta farmers (including overland supplies).

(SAR 31:8070.) The FAA finds that, "While the reduction of exports is listed as one means of improving salinity concentrations, it is only one of many such methods. As noted above, implementation of a barrier program is another means for improving salinity concentrations and, in fact, DWR and the Bureau are working on such a program." (*Id.*)

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[6] Although the text of the Order itself was not included in the Administrative Record, it is apparent the City had access to the Order as part of its deliberations, as the City's FAA contains a detailed analysis of it. It appears to have been inadvertently omitted from the Supplemental Administrative Record. The Court grants Real Parties' Request for Judicial Notice of SWRCB Order 2006-0006 under Evidence Code §452.

The FAA further notes that, even if there was an "exceedance," an enforcement action would not be automatic, as the Executive Director of the State Water Board would first have to consider if any action was appropriate and whether the "non-compliance was beyond DWR's or the Bureau's control." (SAR 31:8071.) Given the variety of methods available to DWR and the Bureau to meet the salinity standards, the current efforts towards implementation of a barrier program, and the administrative provisions of the Order, the FAA appropriately concludes that "nowhere does the Order mandate that DWR and the Bureau shut down their pumps." (*Id.*) Analyzing the impacts of speculative future enforcement actions is not required under CEQA.

CONCLUSION

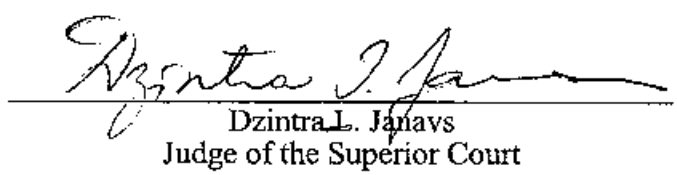
As directed by *California Oak*, the City has adequately analyzed the uncertainties surrounding the 41,000 afy water Transfer and explained in good faith the basis for its reliance on that Transfer. That analysis need not be exhaustive, but with a sufficient degree of analysis to make a decision which intelligently takes account of environmental consequences. (CEQA Guidelines § 15151.) Perfection is not required: adequacy, completeness and a good faith effort at full disclosure are. The City's determinations are not an abuse of discretion, but supported by substantial evidence.

The Court accepts the City's Return to the Writ of Mandate and the Final Additional Analysis to the Environmental Impact Report for the Gate-King Industrial Park as adequate and, accordingly, IT IS SO ADJUDGED that the Peremptory Writ of Mandate is DISCHARGED.

Counsel for respondent shall prepare, serve and lodge in Department 85 a proposed order/judgment discharging the writ on or before August 21, 2007.

Objections to this Statement of Decision and proposed order and judgment shall be served and filed on or before August 31, 2007.

DATED: August 15, 2007



Dzintra I. Janavs
Judge of the Superior Court

Adopted Waste Discharge Requirements and National Pollutant Discharge Elimination System (NPDES) Permit – Newhall Ranch Sanitation District, Newhall Ranch Water Reclamation Plant (NPDES No. CA0064556, CI No. 9322)

California Regional Water Quality Control Board
Los Angeles Region

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.waterboards.ca.gov/losangeles

Linda S. Adams
Cal/EPA Secretary

Arnold Schwarzenegger
Governor

COMMUNITY

SEP 14 2007

DEVELOPMENT

September 11, 2007

Mr. Mark Subbotin
Senior Vice President
Newhall Land/Newhall Ranch Division
23823 Valencia Boulevard
Valencia, CA 91355

Dear Mr. Subbotin:

ADOPTED WASTE DISCHARGE REQUIREMENTS AND NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT – NEWHALL RANCH SANITATION DISTRICT, NEWHALL RANCH WATER RECLAMATION PLANT (NPDES NO. CA0064556, CI No. 9322)

Our letter dated August 6, 2007, transmitted revised tentative Waste Discharge Requirements for the discharge of treated municipal and industrial wastewater from the Newhall Ranch Water Reclamation Plant (WRP) into the Santa Clara River.

Pursuant to Division 7 of the California Water Code, this Regional Board at a public hearing held on September 6, 2007, reviewed the revised tentative requirements, considered all factors in the case, and adopted Order No. R4-2007-0046 (copies attached) relative to the Newhall Ranch WRP's waste discharge. Order No. R4-2007-0046 serves as your NPDES permit, for the Newhall Ranch WRP and expires on August 10, 2012. Section 13376 of the California Water Code requires that a complete application for a new permit must be filed at least 180 days before the expiration date.

The monitoring and reporting programs require you to implement the monitoring programs on the first of the month following the month of the effective date of the Order (i.e., on November 1, 2007). Your first monitoring report must be received in the Regional Board office by February 15, 2008, and will cover the November 2007 sampling period. If no discharge occurred, the report shall so state. Bioassessment annual monitoring is required to begin in the 2008 spring/summer period.

When submitting monitoring or technical reports to the Regional Board, as required by your "Monitoring and Reporting Program", please send them ATTN: Information Technology Unit and include a reference to "Compliance File No. 9322" for the Newhall Ranch WRP. This will assure that the reports are directed to the appropriate file and staff. Also, please do not combine other reports with your monitoring reports. Submit each type of report as a separate document.

We are sending the final copy of Order No. R4-2007-0046 only to Newhall Land, to save printing and postage costs. For those on the mailing list, an electronic copy will be emailed to you.

If you have any questions, please contact Veronica Cuevas at (213) 576-6662 or call me at (213) 576-6720.

Sincerely,

Blythe Ponek-Bacharowski

Blythe Ponek-Bacharowski
Unit Chief, Municipal Permitting Unit (NPDES)

Enclosures

cc: Environmental Protection Agency, Region 9, Permits Branch (WTR-5)
Jody Cook, U.S. Forest Service
U.S. Army Corps of Engineers
NOAA, National Marine Fisheries Service
Department of Interior, U.S. Fish and Wildlife Service
Mr. Philip Isorena, State Water Resources Control Board, Division of Water Quality
Mr. Michael Levy, State Water Resources Control Board, Office of Chief Counsel
Department of Fish and Game, Region 5
California State Parks and Recreation
Mr. Christopher Kroll, State Coastal Conservancy
Los Angeles County, DPW, Environmental Programs
Mr. Rod Kubumoto, Los Angeles County, DPW, Watershed Division
Los Angeles County, Department of Health Services
Heal the Bay
Environment Now
Santa Monica Baykeeper
Natural Resources Defense Council
Tim Malloy, UCLA School of Law
Ventura Coast Keeper
City of Santa Clarita
City of Valencia
Ms. Dana Wisehart, United Water Conservation District
Stephan C. Volker
Sierra Club, Los Angeles Chapter
Friends of the Santa Clara River

MAILING LIST (Cont.)

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Mr. Dennis Slivinski, County of Ventura
Mr. Gerald Johns, CA Department of Water Resources
Mr. Jeffrey M. Smith, Southern California Association of Governments
Russ Behrens, McCormick, Kidman & Behrens, LLP
Mr. Chris Stephens, Resource Management Agency County of Ventura
Mr. James Hartl, County of Los ANgeles
Mr. Michael Murphy, City of Santa Clarita
Ms. Judy Reinsma, Santa Clarita Valley Well Owners Association
Sand Canyon Well Owners Association
Paul Fancett, Castaic Area Town Council
Paul Ash, Westranch Town Council
Santa Clarita Sierra Club
Santa Clarita Organization for Planning the Environment (SCOPE)
Jae Kim, Tetra Tech

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

REGION 4, LOS ANGELES REGION

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http://www.waterboards.ca.gov

ORDER NO. <R4-2007-0046>
NPDES NO. <CA0064556>

WASTE DISCHARGE REQUIREMENTS FOR THE NEWHALL RANCH SANITATION DISTRICT (Newhall Ranch Water Reclamation Plant) DISCHARGE TO THE SANTA CLARA RIVER

The following Discharger is subject to waste discharge requirements as set forth in this Order:

Table 1. Discharger Information

Discharger	Newhall Ranch Sanitation District
Name of Facility	Newhall Ranch Water Reclamation Plant
Facility Address	Hwy 126 at Los Angeles/Ventura County Line
	Newhall, California, 91355
	Los Angeles County
The U.S. Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a major discharge.	

The discharge by the Newhall Ranch Sanitation District from the discharge points identified below is subject to waste discharge requirements as set forth in this Order:

Table 2. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Tertiary treated effluent	34 °, 0.403166',," N	118°, 0.6896667',," W	Santa Clara River

Table 3. Administrative Information

This Order was adopted by the Regional Water Quality Control Board on:	September 6, 2007
This Order shall become effective on:	October 27, 2007
This Order shall expire on:	August 10, 2012
The Discharger shall file a Report of Waste Discharge in accordance with title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than:	180 days prior to the Order expiration date

IT IS HEREBY ORDERED, that in order to meet the provisions contained in division 7 of the Water Code (commencing with section 13000) and regulations adopted thereunder and the provisions of the federal Clean Water Act (CWA) and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order.

I, Deborah J. Smith, Interim Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Los Angeles Region, on September 6, 2007.

Deborah J. Smith, Interim Executive Officer

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I. FACILITY INFORMATION

The following Discharger is subject to waste discharge requirements as set forth in this Order:

Table 4. Facility Information

DISCHARGER	Newhall Ranch Sanitation District
NAME OF FACILITY	Newhall Ranch Water Reclamation Plant
FACILITY ADDRESS	Hwy 126 at Los Angeles/Ventura County Line
	Newhall, California, 91355
	Los Angeles County
FACILITY CONTACT, TITLE, AND PHONE	Steve Sheridan, Principal Engineer (626) 458-7151
MAILING ADDRESS	900 South Fremont, Alhambra, CA 91803
TYPE OF FACILITY	POTW
FACILITY DESIGN FLOW	2 million gallons per day (MGD) in Phase I

II. FINDINGS

The California Regional Water Quality Control Board, Los Angeles Region (hereinafter Regional Water Board), finds:

A. **Background.** Newhall Land and Farming Company (Newhall Land) submitted a Report of Waste Discharge (ROWD), dated April 23, 2004, and applied for a National Pollutant Discharge Elimination System (NPDES) permit authorization to discharge up to 2 MGD of tertiary treated wastewater from a new privately owned treatment works that would treat the sewage generated by the inhabitants of Landmark Village, a new housing development. Newhall Land indicated to Regional Water Board staff that they were interested in applying for the NPDES permit as a publicly owned treatment works, not a privately owned treatment works. However, Newhall Land was in the process of applying to the Local Agency Formation Commission for Los Angeles County (LAFCO), for approval of the formation of a new sanitation district. On July 27, 2006, the Newhall Ranch Sanitation District (Newhall Ranch SD) was formed. In September 2007, the grant deed will be transferred from Newhall Land to Newhall Ranch SD. In January 2008 grading activities are scheduled to begin. In June 2008 Newhall Ranch SD is scheduled to approve the plans for the plant design. In September 2008, construction of the Newhall Ranch Water Reclamation Plant (Newhall Ranch WRP) is scheduled to begin. By August 2009, the Newhall Ranch WRP should be constructed. The Newhall Ranch WRP would have an initial design capacity of 2 MGD, and incrementally increase its design capacity to 6.8 MGD [2.0 MGD in Phase I; 4.0 MGD in Phase II; and 6.8 MGD in Phase III], to accommodate the sewage generated by new inhabitants, as additional tracts of the Landmark Village development project are completed. Newhall Land submitted a revised ROWD on September 27, 2004. Their consultants have been submitting additional information, including receiving water sampling analytical results to supplement the ROWD. On March 30, 2007, additional receiving water data was received at the Regional Water Board, submitted by Geosyntec on behalf of Newhall Land. The application has not been deemed complete because Newhall Ranch SD has not submitted the required signatures on the ROWD. Upon receipt of the revised ROWD with the signatory requirements for the Newhall SD, the ROWD may be considered as complete as possible, except for the effluent data which will need to be collected after start-up. On May 4 and May 23, 2007, the Regional Water Board received the required signatory statement.

   For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

B. **Facility Description.** Newhall Land is planning on transferring ownership of the land to Newhall Ranch SD in September 2007. Newhall Ranch SD will make a formal application to the existing twenty-four County Sanitation Districts to become signatory to the amended Joint Administration Agreement, dated July 1, 1980, of the County Sanitation Districts of Los Angeles County. Newhall Ranch SD will also make a formal

application to the Santa Clarita Valley Sanitation District to enter into an agreement regarding the ownership and operation of the Newhall Ranch WRP. These agreements will allow the Los Angeles County Sanitation District to be the operator of the Newhall Ranch WRP, and to provide engineering and administrative staff at the Newhall Ranch WRP. However, Newhall Ranch SD will retain ownership of the Newhall Ranch WRP.

Treatment at the Newhall Ranch WRP, a publicly owned treatment works (POTW), will consist of screening, activated sludge secondary treatment with membrane bioreactors, nitrification/denitrification, ultraviolet disinfection, and partial reverse osmosis (RO). There will be no solids handling facilities in the near term. Waste activated sludge, or biosolids, will be hauled away to the Valencia Water Reclamation Plant for further treatment and disposal; and will be regulated under the Valencia WRP's NPDES permit No. CA0054216. Brine from the RO system will be disposed of through deep well injection, under a separate USEPA permit. Treated wastewater will be discharged from Discharge Point 001 (see Table on Cover Page) to the Santa Clara River, a water of the United States, tributary to the Santa Clara River Estuary, within the Santa Clara River Watershed. Attachment B provides a map of the area around the facility. Attachment C provides the flow schematic of the facility.

C. **Legal Authorities.** This Order is issued pursuant to section 402 of the Federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. Environmental Protection Agency (USEPA) and Chapter 5.5, Division 7 of the California Water Code (CWC). It shall serve as a NPDES permit for point source discharges from this facility to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to Article 4, Chapter 4 of the CWC.

D. **Background and Rationale for Requirements**. The Regional Water Board developed the requirements in this Order based on information submitted as part of the application, through monitoring and reporting programs, and other available environmental information. Attachment F, which contains background information and rationale for Order requirements, is hereby incorporated into this Order and constitutes part of the Findings for this Order. Attachments A through E, and others are also incorporated into this Order.

E. **California Environmental Quality Act (CEQA).** The discharger is not a new source, as defined in the CWA. (See 40 CFR part 122.2.) Therefore, the approval of this permit is not subject to the California Environmental Quality Act (CEQA), as stated in section 13389 of the CWC.

F. **Technology-based Effluent Limitations.** The Code of Federal Regulations (CFR) at 40 CFR Section 122.44(a) requires that permits include applicable technology-based limitations and standards. This Order includes technology-based effluent limitations based on tertiary treatment or equivalent requirements that meet both the technology-based secondary treatment standards, at 40 CFR Part 133, for POTWs and protect the beneficial uses of the receiving waters. The Regional Water Board has considered the factors listed in CWC Section 13241 in establishing these requirements and Best Professional Judgment (BPJ) in accordance with 40 CFR Section 125.3. A detailed

discussion of the technology-based effluent limitations development is included in the Fact Sheet (Attachment F).

G. **Water Quality-Based Effluent Limitations.** Section 301(b) of the CWA and section 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. Section 122.44(d)(1)(i) mandates that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, water quality-based effluent limitations (WQBELs) must be established using: (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in section 122.44(d)(1)(vi).

H. **Water Quality Control Plans.** The Regional Water Board adopted a Water Quality Control Plan for the Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (hereinafter Basin Plan) on June 13, 1994 that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, State Water Resources Control Board (State Water Board) Resolution No. 88-63 requires that, with certain exceptions, the Regional Water Board assign the municipal and domestic water supply use to water bodies that do not have beneficial uses listed in the Basin Plan. Beneficial uses applicable to the Santa Clara River are as follows:

Table 5. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	Santa Clara River (Hydro Unit 403.51)	Existing: Industrial Service Supply (IND), Industrial Process Supply (PROC), Agricultural Supply (AGR), Ground Water Recharge (GWR), Freshwater Replenishment (FRSH), Water Contact Recreation (REC1), Non-contact Water Recreation (REC2), Warm freshwater habitat (WARM); Wildlife habitat (WILD), preservation or rare, threatened or endangered species (RARE), and Wetland Habitat (WET). Potential*: Municipal and domestic water supply (MUN).
	Santa Clara River (Hydro Unit 403.41)	Existing: IND, PROC, AGR, GWR, FRSH, REC1, REC2, WARM, WILD, RARE, Migration of Aquatic Organisms (MIGR) and WET. Potential*: MUN.

	Santa Clara River (Hydro Unit 403.31)	Existing: IND, PROC, AGR, GWR, FRSH, REC1, REC2, WARM; WILD, RARE, MIGR and WET. Potential*: MUN.
	Santa Clara River (Hydro Unit 403.21)	Existing: IND, PROC, AGR, GWR, FRSH, REC1, -REC2, WARM; WILD, RARE, MIGR and WET. Potential*: MUN.
	Santa Clara River (Hydro Unit 403.11)	Existing: IND, PROC, AGR, GWR, FRSH, REC1, REC2, WARM; Coldwater Habitat (COLD), WILD, RARE, MIGR and WET. Potential*: MUN.
	Santa Clara River Estuary (Hydro Unit 403.11)	Existing: Navigation (NAV); , REC1, REC2, Commercial and Sport Fishing (COMM); Estuarine Habitat (EST); Marine Habitat (MAR); WILD, RARE, MIGR; Spawning Reproduction, and/or Early Development (SPWN); and, WET.

* The potential municipal and domestic supply (p* MUN) beneficial use for the waterbody is consistent with the State Water Resources Control Board Order No. 88-63 and Regional Water Board Resolution No. 89-003; however, the Regional Water Board has only conditionally designated the MUN beneficial use of the surface water and at this time cannot establish effluent limitations designed to protect the conditional designation.

Requirements of this Order implement the Basin Plan.

On July 25, 2003, USEPA approved the State's most recent list of impaired waterbodies. The list (hereinafter referred to as the 303(d) list) was prepared in accordance with Section 303(d) of the Federal Clean Water Act to identify specific impaired waterbodies where water quality standards are not expected to be met after implementation of technology-based effluent limitations on point sources.

Santa Clara River, Santa Clara River Estuary, and their tributaries were on the 2002 303(d) List. The following pollutants/stressors, from point and non-point sources, were identified as impacting the receiving waters:

1. Santa Clara River Estuary: Chem A, High Coliform Count, Toxaphene;

2. Santa Clara River Reach 3 (Freeman Diversion to A Street): Ammonia, Chloride, Total Dissolved Solids;

3. Santa Clara River Reach 7 (Blue Cut to West Pier Hwy 99 Bridge): Chloride, High Coliform Count, Nitrate and Nitrite;

4. Santa Clara River Reach 8 (W. Pier Hwy 99 to Bouquet Canyon Rd. Bridge) -- Hydrologic Unit 403.51: Chloride and High Coliform Count; and,

5. Santa Clara River Reach 9 (Bouquet Canyon Rd to above Lang Gaging) – Hydrologic Unit 403.51: High Coliform Count.

On October 25, 2006, the State Water Board adopted a revised 303(d) list. The 2006 303(d) list was partially approved by the USEPA on November 30, 2006. However, on March 8, 2007, USEPA partially disapproved the State's 303(d) list, by disapproving the State's omission of impaired waters that met federal listing regulations or guidance. USEPA is adding 64 waters and 37 associated pollutants to the State's 303(d) list.

Santa Clara River, Santa Clara River Estuary, and their tributaries are on the 2006 303(d) List. The following pollutants/stressors, from point and non-point sources, were identified as impacting the receiving waters:

1. Santa Clara River Estuary: Chem A, Coliform Bacteria, and Toxaphene;

2. Santa Clara River Reach 1 (Estuary to Hwy 101 Bridge): Toxicity:

3. Santa Clara River Reach 3 (Freeman Diversion to A Street): Total Dissolved Solids;

4. Santa Clara River Reach 5 [formerly Reach 7 in 2002 303d list] (Blue Cut to West Pier Hwy 99 Bridge): Coliform Bacteria;

5. Santa Clara River Reach 6 [formerly Reach 8 in 2002 303d list] (W. Pier Hwy 99 to Bouquet Canyon Rd. Bridge) -- Hydrologic Unit 403.51: Chlorpyrifos, Coliform Bacteria, Diazinon, and Toxicity; and,

6. Santa Clara River Reach 7 [formerly Reach 9 in 2002 303d list] (Bouquet Canyon Rd to above Lang Gaging) -- Hydrologic Unit 403.51: Coliform Bacteria.

I. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995 and November 9, 1999. About forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants.

J. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP became effective on April 28, 2000 with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Board in the Basin Plan. The SIP became effective on May 18, 2000 with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005 that became effective on July 13, 2005. The SIP establishes

implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

K. **Compliance Schedules and Interim Requirements.** Section 2.1 of the SIP provides that, based on a Discharger's request and demonstration that it is infeasible for an existing Discharger to achieve immediate compliance with an effluent limitation derived from a CTR criterion, compliance schedules may be allowed in an NPDES permit. Unless an exception has been granted under section 5.3 of the SIP, a compliance schedule may not exceed 5 years from the date that the permit is issued or reissued, nor may it extend beyond 10 years from the effective date of the SIP (or May 17, 2010) to establish and comply with CTR criterion-based effluent limitations. Where a compliance schedule for a final effluent limitation exceeds 1 year, the Order must include interim numeric limitations for that constituent or parameter. Where allowed by the Basin Plan, compliance schedules and interim effluent limitations or discharge specifications may also be granted to allow time to implement a new or revised water quality objective. This Order does not include compliance schedules or interim effluent limitations.

L. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards (WQS) become effective for CWA purposes. (40 C.F.R. § 131.21; 65 Fed. Reg. 24641 (April 27, 2000).) Under the revised regulation (also known as the Alaska rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000 may be used for CWA purposes, whether or not approved by USEPA.

M. **Stringency of Requirements for Individual Pollutants.** This Order contains restrictions on individual pollutants that are no more stringent than required by the federal CWA. Individual pollutant restrictions consist of technology-based restrictions and water quality-based effluent limitations. The technology-based effluent limitations consist of restrictions on biochemical oxygen demand (BOD), total suspended solids (TSS), and hydrogen ion concentration (pH). Restrictions on BOD, TSS, and pH are specified in federal regulations as discussed in Finding F, and the permit's technology-based pollutant restrictions are no more stringent than required by the CWA. Water quality-based effluent limitations have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant water quality-based effluent limitations were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The scientific procedures for calculating the individual water quality-based effluent limitations are based on the CTR-SIP, which was approved by USEPA on May 18, 2000. Most beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA"

pursuant to 40 CFR 131.21(c)(1). For the most part, this Order's restrictions on individual pollutants are no more stringent than required to implement the requirements of the CWA.

This Order contains pollutant restrictions that are more stringent than applicable federal requirements and standards. Specifically, this Order includes effluent limitations for bis(2-ethylhexyl)phthalate that are more stringent than applicable federal standards, but that are nonetheless necessary to meet numeric objectives or protect beneficial uses. The rationale for including these limitations is explained in this Fact Sheet. In addition, the Regional Water Board has considered the factors in Water Code section 13241 in Facts Sheet Section IV.D.3.

N. **Antidegradation Policy.** Section 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the state and federal antidegradation policies. As discussed in detail in the Fact Sheet the permitted discharge is consistent with the antidegradation provision of section 131.12 and State Water Board Resolution No. 68-16.

O. **Anti-Backsliding Requirements.** Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at 40 CFR Section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. Since this is a new discharge, all effluent limitations and requirements contained in this Order are new. Therefore, there is no relaxation of effluent limitations. The WDR is consistent with the anti-backsliding requirements of the CWA and federal regulations.

P. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the state. The discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

Q. **Monitoring and Reporting.** Section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code sections 13267 and 13383 authorizes the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program establishes monitoring and reporting requirements to implement federal and State requirements. This Monitoring and Reporting Program is provided in Attachment E.

R. **Standard and Special Provisions.** Standard Provisions, which apply to all NPDES permits in accordance with section 122.41, and additional conditions applicable to specified categories of permits in accordance with section 122.42, are provided in Attachment D. The discharger must comply with all standard provisions and with those additional conditions that are applicable under section 122.42. The Regional Water Board has also included in this Order special provisions applicable to the Discharger. A rationale for the special provisions contained in this Order is provided in the attached Fact Sheet.

S. **Provisions and Requirements Implementing State Law.** The provisions/requirements in subsection IV.C of this Order is included to implement state law only. These provisions/requirements are not required or authorized under the federal CWA; consequently, violations of these provisions/requirements are not subject to the enforcement remedies that are available for NPDES violations.

T. **Notification of Interested Parties.** The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe Waste Discharge Requirements for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet of this Order.

U. **Consideration of Public Comment.** The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet of this Order.

III. DISCHARGE PROHIBITIONS

A. Wastes discharged from Discharge Serial No. 001 shall be limited to tertiary-treated wastewater, as proposed in the ROWD.

B. Discharges not specifically authorized under this Order are prohibited.

C. The bypass or overflow of untreated wastewater or wastes to surface waters or surface water drainage courses is prohibited, except as allowed in Standard Provision I.G. of Attachment D, Federal Standard Provisions.

D. The effluent temperature shall not exceed 86°F, except as a result of external ambient temperature.

E. Radioactivity of the wastes discharged shall not exceed the limits specified in Title 22, Chapter 15, Article 5, Section 64443, CCR, or subsequent revisions.

F. In accordance with 40 CFR, Parts 133.102(a)(3) and 133.102(b)(3), for BOD and total suspended solids, respectively, the 30-day average percent removal shall not be less than 85 percent. Percent removal is defined as a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent pollutant concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

G. The wastes discharged to water courses shall at all times be adequately disinfected. For the purpose of this requirement, the wastes shall be considered adequately disinfected if the median number of coliform organisms at some point in the treatment process does not exceed 2.2 per 100 milliliters, and the number of coliform organisms does not exceed 23 per 100 milliliters in more than one sample within any 30-day period. The median value shall be determined from the bacteriological results of the last seven (7) days for which analysis has been completed. Samples shall be collected at a time when wastewater flow and characteristics are most demanding on treatment facilities and the disinfection processes.

H. For the protection of the water contact recreation beneficial use, the wastes discharged to water courses shall have received adequate treatment, so that the turbidity of the treated wastewater does not exceed: (a) 0.2 Nephelometric turbidity units (NTUs) more than 5 percent of the time (72 minutes) during any 24 hour period; and (b) 0.5 NTUs at any time.

I. To protect underlying ground water basins, pollutants shall not be present in the wastes discharged at concentrations that pose a threat to ground water quality.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations – Discharge Point 001

1. Final Effluent Limitations – Discharge Point 001

a. The Discharge of tertiary-treated effluent shall maintain compliance with the following effluent limitations at Discharge Point 001, with compliance measured at Monitoring Location EFF-001, RSW-001U, RSW-001D and RSW-002D as described in the attached Monitoring and Reporting Program (Attachment E):

Table 6. Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Biochemical Oxygen Demand 5-day @ 20°C	mg/L	20	30	45	--	--
	lbs/day[1]	330	500	750	--	--
Total Suspended Solids	mg/L	15	40	45	--	--
	lbs/day	250	670	750	--	--
pH	standard units	--	--	--	6.5	8.5
Settleable solids	mL/L	0.1	--	0.3	--	--
Oil and grease	mg/L	10	--	15	--	--
	lbs/day[1]	170	--	250	--	--
Total dissolved solids	mg/L	1000	--	--	--	--
	lbs/day[1]	16,700	--	--	--	--
Chloride	mg/L	100[2]	--	--	--	--
	lbs/day[1]	1,700	--	--	--	--
Sulfate	mg/L	400	--	--	--	--
	lbs/day[1]	6,700	--	--	--	--

[1] The mass emission rates are based on the plant design flow rate of 2.0 mgd, and are calculated as follows: Flow(MGD) x Concentration (mg/L) x 8.34 (conversion factor) = lbs/day. However, the design capacity will incrementally increase to 6.8 MGD, as the phased plant upgrades approach completion. The mass-based effluent limitation will accordingly be modified following an Anti-degradation analysis demonstration conducted by the Discharger, and upon certification and approval of increased treatment plant capacity. During wet-weather storm events in which the flow exceeds the design capacity, the mass discharge rate limitations shall not apply, and concentration limitations will provide the only applicable effluent limitations.

[2] This is the water quality objective for chloride in the current Basin Plan. This effluent limitation is consistent with the assumptions of the Chloride TMDL for the Santa Clara River, Resolution No. 2002-018, *Amendment to the Water Quality Control Plan for the Los Angeles Region to Include a TMDL for Chloride in the Santa Clara River (Chloride TMDL)*. This effluent limitation applies immediately. However, if a chloride site specific objective (Chloride SSO) is adopted for the reach of the Santa Clara River in which Newhall Ranch WRP will discharge, then the permit may be reopened to make the necessary changes to this permit, following USEPA approval of the Chloride SSO.

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Boron	mg/L	1.5	--	--	--	--
	lbs/day[1]	25	--	--	--	--
Total ammonia (NH_3 as N)	mg/L	1.93[3]	--	3.87[4]	--	--
	lbs/day[1]	25	--	65	--	--
Nitrate-N + Nitrite-N	mg/L	5	--	--	--	--
	lbs/day[1]	80	--	--	--	--
Nitrite-N	mg/L	0.9	--	--	--	--
	lbs/day[1]	15	--	--	--	--
Detergents (as MBAS)	mg/L	0.5	--	--	--	--
	lbs/day[1]	8	--	--	--	--
Total residual chlorine	mg/L	--	--	0.1	--	--
Antimony	µg/L	6	--	--	--	--
	lbs/day[1]	0.1	--	--	--	--
Arsenic	µg/L	10	--	--	--	--
	lbs/day[1]	0.2	--	--	--	--
Copper	µg/L	22	--	44	--	--
	lbs/day[1]	0.37	--	0.73	--	--
Lead	µg/L	13	--	26	--	--
	lbs/day[1]	0.22	--	0.43	--	--
Mercury	µg/L	0.051	--	0.10	--	--
	lbs/day[1]	0.00085	--	0.0017	--	--
Nickel	µg/L	100	--	--	--	--
	lbs/day[1]	1.7	--	--	--	--
Selenium	µg/L	4.1	--	8.2	--	--
	lbs/day	0.068	--	0.14	--	--
Zinc	µg/L	5000	--	--	--	--
	lbs/day[1]	83	--	--	--	--
Cyanide	µg/L	4.2	--	8.5	--	--
	lbs/day[1]	0.07	--	0.14	--	--
Acrylonitrile	µg/L	0.66	--	1.3	--	--
	lbs/day[1]	0.011	--	0.022	--	--
Tetrachloroethylene	µg/L	5	--	--	--	--
	lbs/day[1]	0.08	--	--	--	--

[3] This is the monthly average effluent limit calculated according to the Implementation Plan for ammonia in the Basin Plan, which specifies how to translate the Ammonia WQO into a final effluent limit, consistent with the assumptions of the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011.

[4] This is the daily maximum effluent limit calculated according to the Implementation Plan for ammonia in the Basin Plan, which specifies how to translate the Ammonia WQO into a final effluent limit, consistent with the assumptions of the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011.

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Bis(2-ethylhexyl)phthalate	µg/L	4	--	--	--	--
	lbs/day[1]	0.07	--	--	--	--
p-Dichlorobenzene (1,4-Dichlorobenzene)	µg/L	5	--	--	--	--
	lbs/day[1]	0.08	--	--	--	--
Lindane	µg/L	0.2	--	--	--	--
	lbs/day	0.003	--	--	--	--
4,4-DDE	µg/L	0.00059	--	0.0012	--	--
	lbs/day	0.0000098	--	0.00002	--	--
Iron	µg/L	300	--	--	--	--
	lbs/day	5	--	--	--	--

b. **Percent Removal:** The average monthly percent removal of BOD 5-day 20°C and total suspended solids shall not be less than 85 percent.

c. Acute Toxicity Limitation and Effluent Requirements:

1. The acute toxicity of the effluent shall be such that:
   (i) the average survival in the undiluted effluent for any three (3) consecutive 96-hour static renewal bioassay tests shall be at least 90%, and
   (ii) no single test producing less than 70% survival

2. If either of the above requirements IV.A.1.c.1.i. or IV.A.1.c.1.ii. is not met, the Discharger shall conduct six additional tests over a twelve-week period. The Discharger shall ensure that they receive results of a failing acute toxicity test within 24 hours of the completion of the test and the additional tests shall begin within 5 business days of the receipt of the result. If the additional tests indicate compliance with acute toxicity limitation, the Discharger may resume testing at the regular frequency as specified in the monitoring and reporting program. However, if the results of any two of the six accelerated tests are less than 90% survival, then the Discharger shall begin a Toxicity Identification Evaluation (TIE). The TIE shall include all reasonable steps to identify the sources of toxicity. Once the sources are identified, the Discharger shall take all reasonable steps to reduce toxicity to meet the limits.

3. If the initial test and any of the additional six acute toxicity bioassay tests result in less than 70 % survival, the Discharger shall immediately implement the Initial Investigation Toxicity Reduction Evaluation (TRE) Workplan described later in this section.

4. The Discharger shall conduct acute toxicity monitoring as specified in Monitoring and Reporting Program (MRP) No. YYYY.

d. Chronic Toxicity Requirements

1. The chronic toxicity of the effluent shall be expressed and reported in toxic units, where:

$$TU_c = \frac{100}{NOEC}$$

The No Observable Effect Concentration (NOEC) is expressed as the maximum percent effluent concentration that causes no observable effect on test organisms, as determined by the results of a critical life stage toxicity test.

2. There shall be no chronic toxicity in the effluent discharge

3. If the chronic toxicity of the effluent exceeds the monthly median of 1.0 TUc, the Discharger shall immediately implement accelerated chronic toxicity testing according to MRP CI No. 9322, Section V.B.3. If any three out of the initial test and the six accelerated test results exceed 1.0 TUc, the Discharger shall initiate a TIE and implement the Initial Invetsigation TRE Workplan, as specified in the MRP section of this Order (Sections V.D and V.E).

4. The Discharger shall conduct chronic toxicity monitoring as specified in MRP CI No. 9322.

5. This permit may be reopened to include effluent limitations for pollutants found to be causing chronic toxicity and to include numeric chronic toxicity effluent limitations based on direction from the State Water Resources Control Board or failure of the District to comply fully with the TRE/TIE requirements.

2. Interim Effluent Limitations

a. Interim Effluent Limitations are not applicable for new dischargers.

Table 7. Interim Effluent Limitations

Parameter	Units	Effluent Limitations			
		Average Monthly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum

B. Land Discharge Specifications

[Not Applicable. Holding ponds at the Newhall Ranch WRP will be concrete-lined and are not designed for purposeful groundwater recharge.]

Table 8. Land Discharge Specifications

Parameter	Units	Discharge Specifications		
		Average Monthly	Maximum Daily	Average Annual

C. Reclamation Specifications

[Not Applicable. Water recycling requirements will be regulated under a separate order. Newhall intends on recycling all of its treated effluent during dry weather.]

Table 9. Reclamation Discharge Specifications

Parameter	Units	Discharge Specifications		
		Average Monthly	Maximum Daily	Average Annual

V. RECEIVING WATER LIMITATIONS

A. Surface Water Limitations

Receiving water limitations are based on water quality objectives contained in the Basin Plan and are a required part of this Order. The discharge shall not cause the following in the Santa Clara River:

1. For waters designated with a warm freshwater habitat (WARM) beneficial use, the temperature of the receiving water at any time or place and within any given 24-hour period shall not be altered by more than 5°F above the natural temperature (or above 70°F if the ambient receiving water temperature is less than 60°F) due to the discharge of effluent at the receiving water station located downstream of the discharge. Natural conditions shall be determined on a case-by-case basis.

2. The pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of wastes discharged. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of wastes discharged. Natural conditions shall be determined on a case-by-case basis.

3. The dissolved oxygen in the receiving water shall not be depressed below 5 mg/L as a result of the wastes discharged.

4. The fecal coliform concentration in the receiving water shall not exceed the following, as a result of wastes discharged:

    a. Geometric Mean Limits

        i. E.coli density shall not exceed 126/100 mL.

        ii. Fecal coliform density shall not exceed 200/100 mL.

    b. Single Sample Limits

        E.coli density shall not exceed 235/100 mL.

        ii. Fecal coliform density shall not exceed 400/100 mL.

5. Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in natural turbidity attributable to controllable water quality factors shall not exceed the following limits, as a result of wastes discharged:

    a. Where natural turbidity is between 0 and 50 NTU, increases shall not exceed 20%, and

b. Where natural turbidity is greater than 50 NTU, increases shall not exceed 10%.

6. The wastes discharged shall not produce concentrations of toxic substances in the receiving water that are toxic to or cause detrimental physiological responses in human, animal, or aquatic life.

7. The wastes discharged shall not cause concentrations of contaminants to occur at levels that are harmful to human health in waters which are existing or potential sources of drinking water.

8. The concentrations of toxic pollutants in the water column, sediments, or biota shall not adversely affect beneficial uses as a result of the wastes discharged.

9. The wastes discharged shall not contain substances that result in increases in BOD, which adversely affect the beneficial uses of the receiving waters.

10. Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.

11. The wastes discharged shall not cause the receiving waters to contain any substance in concentrations that adversely affect any designated beneficial use.

12. The wastes discharged shall not alter the natural taste, odor, and color of fish, shellfish, or other surface water resources used for human consumption.

13. The wastes discharged shall not result in problems due to breeding of mosquitoes, gnats, black flies, midges, or other pests.

14. The wastes discharged shall not result in visible floating particulates, foams, and oil and grease in the receiving waters.

15. The wastes discharged shall not alter the color of the receiving waters; create a visual contrast with the natural appearance of the water; nor cause aesthetically undesirable discoloration of the receiving waters.

16. The wastes discharged shall not contain any individual pesticide or combination of pesticides in concentrations that adversely affect beneficial uses of the receiving waters. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life as a result of the wastes discharged.

B. Groundwater Limitations

1. In ground waters used for domestic or municipal supply the concentration of coliform organisms over any seven day period shall be less than 1.1/ 100 ml.

2. Ground waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents and radionuclides in excess of the limits specified in the provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into the Basin Plan.

3. Ground waters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen (NO_3-N + NO_2-N), 45 mg/L as nitrate (NO_3), 10 mg/L as nitrate-nitrogen (NO_3-N), or 1 mg/L as nitrite-nitrogen (NO_2-N).

4. Groundwaters shall not contain taste or odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

VI. PROVISIONS

A. Standard Provisions

1. The Discharger shall comply with all Standard Provisions included in Attachment D of this Order.

2. The Discharger shall comply with the following provisions:

   a. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.

   b. Odors, vectors, and other nuisances of sewage or sludge origin beyond the limits of the treatment plant site or the sewage collection system due to improper operation of facilities, as determined by the Regional Water Board, are prohibited.

   c. All facilities used for collection, transport, treatment, or disposal of "wastes" shall be adequately protected against damage resulting from overflow, washout, or inundation from a storm or flood having a recurrence interval of once in 100 years.

   d. Collection, treatment, and disposal systems shall be operated in a manner that precludes public contact with wastewater.

   e. Collected screenings, sludges, and other solids removed from liquid wastes shall be disposed of in a manner approved by the Executive Officer of the Regional Water Board.

   f. The provisions of this order are severable. If any provision of this order is found invalid, the remainder of this Order shall not be affected.

   g. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the CWA.

   h. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

   i. The Discharger must comply with the lawful requirements of municipalities, counties, drainage districts, and other local agencies regarding discharges of

storm water to storm drain systems or other water courses under their jurisdiction; including applicable requirements in municipal storm water management program developed to comply with NPDES permits issued by the Regional Water Board to local agencies.

j. Discharge of wastes to any point other than specifically described in this Order is prohibited, and constitutes a violation thereof.

k. The Discharger shall comply with all applicable effluent limitations, national standards of performance, toxic effluent standards, and all federal regulations established pursuant to Sections 301, 302, 303(d), 304, 306, 307, 316, 403, and 405 of the Federal CWA and amendments thereto.

l. These requirements do not exempt the operator of the waste disposal facility from compliance with any other laws, regulations, or ordinances which may be applicable; they do not legalize this waste disposal facility, and they leave unaffected any further restraints on the disposal of wastes at this site which may be contained in other statutes or required by other agencies.

m. Oil or oily material, chemicals, refuse, or other contaminating materials shall not be stored or deposited in areas where they may be picked up by rainfall and carried off of the property and/or discharged to surface waters. Any such spill of such materials shall be contained and removed immediately.

n. A copy of these waste discharge specifications shall be maintained at the discharge facility so as to be available at all times to operating personnel.

o. If there is any storage of hazardous or toxic materials or hydrocarbons at this facility and if the facility is not manned at all times, a 24-hour emergency response telephone number shall be prominently posted where it can easily be read from the outside.

p. The Discharger shall file with the Regional Water Board a report of waste discharge at least 120 days before making any material change or proposed change in the character, location or volume of the discharge.

q. In the event of any change in name, ownership, or control of these waste disposal facilities, the discharger shall notify the Regional Water Board of such change and shall notify the succeeding owner or operator of the existence of this Order by letter, copy of which shall be forwarded to the Regional Water Board.

r. The CWC provides that any person who violates a waste discharge requirement or a provision of the CWC is subject to civil penalties of up to $5,000 per day, $10,000 per day, or $25,000 per day of violation, or when the violation involves the discharge of pollutants, is subject to civil penalties of up to $10 per gallon per

day or $25 per gallon per day of violation; or some combination thereof, depending on the violation, or upon the combination of violations. Violation of any of the provisions of the NPDES program or of any of the provisions of this Order may subject the violator to any of the penalties described herein, or any combination thereof, at the discretion of the prosecuting authority; except that only one kind of penalty may be applied for each kind of violation.

s. Under CWC 13387, any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this order, including monitoring reports or reports of compliance or noncompliance, or who knowingly falsifies, tampers with, or renders inaccurate any monitoring device or method required to be maintained in this order and is subject to a fine of not more than $25,000 or imprisonment of not more than two years, or both. For a second conviction, such a person shall be punished by a fine of not more than $25,000 per day of violation, or by imprisonment of not more than four years, or by both.

t. The discharge of any waste resulting from the combustion of toxic or hazardous wastes to any waste stream that ultimately discharges to waters of the United States is prohibited, unless specifically authorized elsewhere in this permit.

u. The Discharger shall notify the Executive Officer in writing no later than 6 months prior to planned discharge of any chemical, other than the products previously reported to the Executive Officer, which may be toxic to aquatic life. Such notification shall include:
(1) Name and general composition of the chemical,
(2) Frequency of use,
(3) Quantities to be used,
(4) Proposed discharge concentrations, and
(5) USEPA registration number, if applicable.

v. In the event the Discharger does not comply or will be unable to comply for any reason, with any prohibition, maximum daily effluent limitation, or receiving water limitation of this Order, the Discharger shall notify the Watershed Regulatory Section Chief at the Regional Water Board by telephone (213) 576-6616, or electronically, within 24 hours of having knowledge of such noncompliance, and shall confirm this notification in writing within five days, unless the Regional Water Board waives confirmation. The written notification shall state the nature, time, duration, and cause of noncompliance, and shall describe the measures being taken to remedy the current noncompliance and, prevent recurrence including, where applicable, a schedule of implementation. Other noncompliance requires written notification as above at the time of the normal monitoring report.

B. Monitoring and Reporting Program (MRP) Requirements

The Discharger shall comply with the MRP, and future revisions thereto, in Attachment E of this Order.

C. Special Provisions

1. Reopener Provisions

a. This Order may be modified, revoked and reissued, or terminated for cause, including, but not limited to:

(1) Violation of any term or condition contained in this Order;

(2) Obtaining this Order by misrepresentation, or by failure to disclose fully all relevant facts;

(3) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the Discharger for an Order modification, revocation, and issuance or termination, or a notification of planned changes or anticipated noncompliances does not stay any condition of this Order.

b. This Order may be reopened and modified, in accordance with SIP section 2.2.2.A to incorporate the results of revised reasonable potential analyses to be conducted upon receipt of additional data.

c. This Order may be modified, in accordance with the provisions set forth in 40 CFR, Parts 122 and 124 to include requirements for the implementation of the watershed protection management approach.

d. The Board may modify, or revoke and reissue this Order if present or future investigations demonstrate that the discharge(s) governed by this Order will cause, have the potential to cause, or will contribute to adverse impacts on water quality and/or beneficial uses of the receiving waters.

e. This Order may also be modified, revoked, and reissued or terminated in accordance with the provisions of 40 CFR, Parts 122.44, 122.62 to 122.64, 125.62, and 125.64. Causes for taking such actions include, but are not limited to, failure to comply with any condition of this Order, endangerment to human health or the environment resulting from the permitted activity, or acquisition of newly obtained information which would have justified the application of different conditions if known at the time of Order adoption. The filing of a request by the

District for an Order modification, revocation and issuance or termination, or a notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

f. This Order may be modified, in accordance with the provisions set forth in 40 CFR, Parts 122 to 124, to include new MLs.

g. If applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under section 307(a) of the CWA for a toxic pollutant and that standard or prohibition is more stringent than any limitation on the pollutant in this Order, the Regional Water Board may institute proceedings under these regulations to modify or revoke and reissue the Order to conform to the toxic effluent standard or prohibition.

h. The waste discharged shall not cause a violation of any applicable water quality standard for receiving waters. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the CWA, or amendments, thereto, the Regional Water Board will revise and modify this Order in accordance with such standards.

i. This Order may be reopened and modified, to revise effluent limitations as a result of future Basin Plan Amendments, such as an update of a water quality objective, the adoption of a site specific objective, or the adoption of a TMDL for the Santa Clara River Watershed.

j. This Order may be reopened and modified to revise the chronic toxicity effluent limitation or the residual chlorine effluent limitation, to the extent necessary, to be consistent with State Water Board precedential decisions, new policies, new laws, or new regulations.

k. This Order may be reopened to modify final effluent limits, if at the conclusion of necessary studies conducted by the Discharger, the Regional Water Board determines that dilution credits, attenuation factors, or metal translators are warranted.

l. This Order may be reopened to increase the design capacity, following certification of the EIR for subsequent housing developments, those which will come after the Landmark Village project.

m. This Order may be reopened to re-calculate the ammonia-nitrogen water quality based final effluent limitations, if the effluent pH and temperature differ significantly from the receiving water pH and temperature monitoring data.

2. Special Studies, Technical Reports and Additional Monitoring Requirements

a. Treatment Plant Capacity

The Discharger shall submit a written report to the Executive Officer of the Regional Water Board within 90 days after the "30-day (monthly) average" daily dry-weather flow equals or exceeds 75 percent of the design capacity of waste treatment and/or disposal facilities. The Discharger's senior administrative officer shall sign a letter, which transmits that report and certifies that the discharger's policy-making body is adequately informed of the report's contents. The report shall include the following:

(1) The average daily flow for the month, the date on which the peak flow occurred, the rate of that peak flow, and the total flow for the day;

(2) The best estimate of when the monthly average daily dry-weather flow rate will equal or exceed the design capacity of the facilities; and

(3) A schedule for studies, design, and other steps needed to provide additional capacity for waste treatment and/or disposal facilities before the waste flow rate equals the capacity of present units.

This requirement is applicable to those facilities which have not reached 75 percent of capacity as of the effective date of this Order. For those facilities that have reached 75 percent of capacity by that date but for which no such report has been previously submitted, such report shall be filed within 90 days of the issuance of this Order.

b. Toxicity Reduction Requirements.

The Discharger shall prepare and submit a copy of the Discharger's initial investigation Toxicity Reduction Evaluation (TRE) workplan to the Executive Officer of the Regional Water Board for approval within 90 days of the effective date of this permit. If the Executive Officer does not disapprove the workplan within 60 days from the date in which it was received, the workplan shall become effective. The Discharger shall use USEPA manual EPA/833B-99/002 (municipal) as guidance, or most current version. At a minimum, the initial investigation TRE workplan must contain the provisions in **Attachment G**. This workplan shall describe the steps the Discharger intends to follow if toxicity is detected, and should include, at a minimum:

(1) A description of the investigation and evaluation techniques that will be used to identify potential causes and sources of toxicity, effluent variability, and treatment system efficiency.

(2) A description of the facility's methods of maximizing in-house treatment efficiency and good housekeeping practices, and a list of all chemicals used in the operation of the facility; and,

(3) If a toxicity identification evaluation (TIE) is necessary, an indication of the person who would conduct the TIEs (i.e., an in-house expert or an outside contractor).

If the effluent toxicity test result exceeds the 1.0 TUc toxicity trigger, then the Discharger shall immediately implement accelerated toxicity testing that consists of six additional tests, approximately every two weeks, over a 12-week period. Effluent sampling for the first test of the six additional tests shall commence within 5 business days of receipt of the test results exceeding the toxicity trigger.

If the results of any two of the six tests (any two tests in a 12-week period) exceed the limitation, the Discharger shall initiate a Toxicity Reduction Evaluation (TRE).

If results of the implementation of the facility's initial investigation TRE workplan (as described above) indicate the need to continue the TRE/TIE, the Discharger shall expeditiously develop a more detailed TRE workplan for submittal to the Executive Officer within 15 days of completion of the initial investigation TRE.

Detailed toxicity testing and reporting requirements are contained in Section V of the MRP (Attachment E).

3. Best Management Practices and Pollution Prevention

a. Storm Water Pollution Prevention Plan (SWPPP)

Within 90 days from the Newhall Ranch WRP's start-up date, the Discharger shall submit an updated SWPPP that describes site-specific management practices for minimizing contamination of storm water runoff and for preventing contaminated storm water runoff from being discharged directly to waters of the State to the Regional Water Board. The SWPPP shall be developed in accordance with the requirements in *Storm Water Pollution Prevention Plan Requirements* **(Attachment H)**. If all storm water is captured and treated on-site and no storm water is discharged or allowed to run off-site from the Facility, the Discharge shall provide certification with descriptions of on-site storm water management to the Regional Water Board.

b. Spill Contingency Plan (SCP)

The Discharger shall maintain a SCP for the Newhall WRP and its sanitary sewage collection system in an up-to-date condition and shall amend the SCP

whenever there is a change (e.g. in the design, construction, operation, or maintenance of the sewage system or sewage facilities) which materially affects the potential for spills. The Discharger shall review and amend the SCP as appropriate after each spill from the Newhall WRP or in the service area of the Facility. Upon request of the Regional Water Board, the Discharge shall submit the SCP and any amendments to the Regional Water Board. The Discharger shall ensure that the up-to-date SPC is readily available to the sewage system personnel at all times and that the sewage system personnel are familiar with it.

c. **Pollutant Minimization Program (PMP)**

Reporting protocols in the Monitoring and Reporting Program, Attachment E, Section VIII.B.4 describe sample results that are to be reported as Detected but Not Quantified (DNQ) or Not Detected (ND). Definitions for a reported Minimum Level (ML) and Method Detection Limit (MDL) are provided in Attachment A. These reporting protocols and definitions are used in determining the need to conduct a Pollution Minimization Program (PMP) as follows:

The Discharger shall be required to develop a PMP as further described below when there is evidence (e.g., sample results reported as DNQ when the effluent limitation is less than the MDL, sample results from analytical methods more sensitive than those methods required by this Order, presence of whole effluent toxicity, health advisories for fish consumption, results of benthic or aquatic organism tissue sampling) that a pollutant is present in the effluent above an effluent limitation and either:

(1) The concentration of the pollutant is reported as DNQ and the effluent limitation is less than the reported ML; or

(2) The concentration of the pollutant is reported as ND and the effluent limitation is less than the MDL.

The goal of the PMP shall be to reduce all potential sources of a pollutant through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Regional Water Board may consider cost-effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to CWC Section 13263.3(d), shall be considered to fulfill the PMP requirements.

The PMP shall include, but not be limited to, the following actions and submittals acceptable to the Regional Water Board:

(1) An annual review and semi-annual monitoring of potential sources of the reportable pollutant(s), which may include fish tissue monitoring and other bio-uptake sampling;
(2) Quarterly monitoring for the reportable pollutant(s) in the influent to the wastewater treatment system;

(3) Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable pollutant(s) in the effluent at or below the effluent limitation;

(4) Implementation of appropriate cost-effective control measures for the reportable pollutant(s), consistent with the control strategy; and

(5) An annual status report that shall be sent to the Regional Water Board including:

(a) All PMP monitoring results for the previous year;

(b) A list of potential sources of the reportable pollutant(s);

(c) A summary of all actions undertaken pursuant to the control strategy; and

(d) A description of actions to be taken in the following year.

4. Construction, Operation and Maintenance Specifications

a. Wastewater treatment facilities subject to this Order shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Chapter 3, Subchapter 14, Title 23 of the California Code of Regulations (Section 13625 of the California Water Code).

b. The Discharger shall maintain in good working order a sufficient alternate power source for operating the wastewater treatment and disposal facilities. All equipment shall be located to minimize failure due to moisture, liquid spray, flooding, and other physical phenomena. The alternate power source shall be designed to permit inspection and maintenance and shall provide for periodic testing. If such alternate power source is not in existence, the discharger shall halt, reduce, or otherwise control all discharges upon the reduction, loss, or failure of the primary source of power.

5. Special Provisions for Municipal Facilities (POTWs Only)

a. **Biosolids Requirements**

(1) The Discharger shall comply with the requirements of 40 CFR 503, in general, and in particular the requirements in **Attachment I** of this Order, [Biosolids/sludge Management]. These requirements are enforceable by USEPA.

(2) The Discharger shall ensure compliance with the requirements in SWRCB Order No. 2004- 10-DWQ, General Waste Discharge Requirements for the Discharge of Biosolids to Land for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural and Land Reclamation Activities" for those sites receiving the Discharger's biosolids which a Regional Water Quality Control Board has placed under this general order, and with the requirements in individual Waste Discharge Requirements (WDRs) issued by a Regional Water Board for sites receiving the Discharger's biosolids.

(3) The Discharger shall comply, if applicable, with WDRs issued by other Regional Water Boards to which jurisdiction the biosolids are transported and applied, and with the State of Arizona's biosolids rule for biosolids transported to Arizona for treatment and/or use.

(4) The Discharger shall furnish this Regional Water Board with a copy of any report submitted to USEPA, State Water Board or other Regional Water Board, with respect to municipal sludge or biosolids.

b. **Pretreatment Requirements**

(1) This Order does not include any requirements for a Pretreatment Program because the discharge is less than 2.0 MGD and because the POTW does not have any significant industrial users (SIUs). In the future, once the design flow approaches 5.0 MGD, the Discharger will be required to develop a Pretreatment Program; and implement and enforce the pretreatment program in its entire service area.

(2) Once an approved Pretreatment Program has been developed, the Discharger shall evaluate whether its pretreatment local limits are adequate to meet the requirements of this Order. If the Newhall Ranch WRP becomes interconnected with the Los Angeles County Sanitation Districts of Los Angeles County's Saugus and Valencia WRPs joint outfall sewer system, then the Discharger will consider, in the development of local limits, the effluent limitations contained in these Orders, and other relevant factors due to the interconnectedness of the system and protection of the upstream plants. One year prior to increasing the design capacity to 5 MDG or prior to having a significant industrial user (SIU) discharge into the treatment plant's collection system, the Discharger shall submit to the Regional Water Board their proposed Pretreatment Program and the results of the evaluation indicating whether local limits are needed. Any revised local limits shall be

submitted to the Regional Water Board for approval under 40 CFR 403.18. In addition, the Discharger shall consider collection system overflow protection from such constituents as oil and grease, etc. Lack of adequate local limits shall not be a defense against liability for violations of effluent limitations and overflow prevention requirements contained in this Order.

(3) Any substantial modifications to the approved Pretreatment Program, as defined in 40 CFR 403.18(b), shall be submitted in writing to the Regional Water Board and shall not become effective until Regional Water Board approval is obtained.

(4) The Discharger shall enforce the requirements promulgated under Sections 307(b), 307(c), 307(d), and 402(b) of the CWA with timely, appropriate, and effective enforcement actions. The Discharger shall require all nondomestic users subject to the federal categorical standards to comply with those standards and shall take enforcement actions against those users who do not comply with the standards. Such enforcement actions shall be consistent with an enforcement response plan, developed pursuant to 40 CFR 403.8(f)(5). The Discharger shall ensure that all nondomestic users subject to the federal categorical standards achieve compliance no later than the date specified in those requirements or, in the case of a new nondomestic user, upon commencement of the discharge.

(5) The Discharger shall perform the pretreatment functions as required in Federal Regulations 40 CFR 403 including, but not limited to:

(a) Implement the necessary legal authorities as provided in 40 CFR 403.8(f)(1);

(b) Enforce the pretreatment requirements under 40 CFR 403.5 and 403.6;

(b) Implement the programmatic functions as provided in 40 CFR 403.8(f)(2); and

(d) Provide the requisite funding and personnel to implement the Pretreatment Program as provided in 40 CFR 403.8(f)(3).

(6) The Discharger shall submit semiannual and annual reports to the Regional Water Board, describing the Discharger's pretreatment activities over the period. The annual and semiannual reports shall contain, but not be limited to, the information required in the attached *Pretreatment Reporting Requirements* (**Attachment J**), or an approved revised version thereof. A full scan of the priority pollutants for the influent and effluent should be conducted at least annually in August. If the Discharger is not in compliance with any conditions or requirements of this Order, the Discharger shall include the

reasons for noncompliance and shall state how and when the Discharger will comply with such conditions and requirements.

(7) The Discharger shall be responsible and liable for the performance of all control authority pretreatment requirements contained in 40 CFR 403, including subsequent regulatory revisions thereof. Where Part 403 or subsequent revision places mandatory actions upon the Discharger as Control Authority but does not specify a timetable for completion of the actions, the Discharger shall complete the required actions within six months from the effective date of this Order or the effective date of Part 403 revisions, whichever comes later. For violations of pretreatment requirements, the Discharger shall be subject to enforcement actions, penalties, fines, and other remedies by the Regional Water Board, USEPA, or other appropriate parties, as provided in the CWA. The Regional Water Board or USEPA may initiate enforcement action against a nondomestic user for noncompliance with applicable standards and requirements, as provided in the CWA and/or the California Water Code.

c. **Spill Reporting Requirements**

(1) Notification

For certain spills, overflows and bypasses, the Discharger shall make notifications as required below:

a. For any spills or overflows of any volume, discharged where they are, or will probably be discharged, to waters of the State, the Discharger shall immediately notify the local health agency in accordance with the California Health and Safety Code section 5411.5. This notification shall occur no later than two hours after the knowledge of the incident.

b. For any spills or overflows of 1000 gallons or more discharged where they are, or probably be discharged to waters of the State, the Discharger shall immediately notify the State Office of Emergency Services pursuant to Water Code section 13271. This notification shall occur no later than two hours after the knowledge of the incident.

c. For spills, overflows or bypasses of any volume that flowed to receiving waters or entered a shallow ground water aquifer or has public exposure, the Discharger shall notify such spills to the Regional Water Board, by telephone or electronically as soon as possible but not later than two hours of knowledge of the incident. The following information shall be included in the initial notification: location; date and time of spill; volume and nature of the spill; cause(s) of the spill; mitigation measures implemented, if known at the time.

(2) Monitoring

For certain spills, overflows and bypasses, the Discharger shall monitor as required below:

a. To define the geographical extent of spill's impact the Discharger shall obtain grab samples for spills, overflows or bypasses of any volume that reach receiving waters. The Discharger shall analyze the samples for total and fecal coliforms or E. coli, and enterococcus, and relevant pollutants of concern, upstream and downstream of the point of entry of the spill (if feasible, accessible and safe). This monitoring shall be done on a daily basis from time the spill is known until the results of two consecutive sets of bacteriological monitoring indicate the return to the background level or the County Department of Health Services authorizes cessation of monitoring.

b. The Discharger shall obtain a grab sample (if feasible, accessible, and safe) for spills, overflows or bypasses of any volume that flowed to receiving waters, entered a shallow ground water aquifer, or have the potential for public exposure; and for all spills, overflows or bypasses of 1,000 gallons or more. The Discharger shall analyze the sample for total and fecal coliforms or E. coli, and enterococcus, and relevant pollutants of concern depending on the area and nature of spills or overflows if feasible, accessible and safe.

(3) Reporting

The Regional Water Board initial notification shall be followed by:

a. A written preliminary report five working days after disclosure of the incident (submission to the Regional Water Board of the log number of the Sanitary Sewer Overflow Database entry shall satisfy this requirement). Within 30 days after submitting the preliminary report, the Discharger shall submit the final written report to this Regional Water Board. (A copy of the final written report, for a given incident, already submitted pursuant to a Statewide General Waste Discharge Requirements for Wastewater Collection System Agencies, may be submitted to the Regional Water Board to satisfy this requirement.) The written report shall document the information required in paragraph 4. below, monitoring results and any other information required in provisions of the Standard Provisions document including corrective measures implemented or proposed to be implemented to prevent/minimize future occurrences. The Executive Officer for just cause can grant an extension for submittal of the final written report.

b. The Discharger shall include a certification in the annual summary report (due according to the schedule in the Monitoring and Reporting Program) that states—the sewer system emergency equipment, including alarm systems, backup pumps, standby power generators, and other critical emergency pump station components were maintained and tested in accordance with the Discharger's Preventative Maintenance Plan. Any deviations from or modifications to the Plan shall be discussed.

(4) Records

The Discharger shall develop and maintain a record of all spills, overflows or bypasses of raw or partially treated sewage from its collection system or treatment plant. This record shall be made available to the Regional Water Board upon request and a spill summary shall be included in the annual summary report. The records shall contain:

a. the date and time of each spill, overflow or bypass;

b. the location of each spill, overflow or bypass;

c. the estimated volume of each spill, overflow or bypass including gross volume, amount recovered and amount not recovered, monitoring results;

d. the cause of each spill, overflow or bypass;

e. whether each spill, overflow or bypass entered a receiving water and, if so, the name of the water body and whether it entered via storm drains or other man-made conveyances;

f. mitigation measures implemented; and,

g. corrective measures implemented or proposed to be implemented to prevent/minimize future occurrences.

(5) Activities Coordination

In addition, Regional Water Board expects that the POTW's owners/operators will coordinate their compliance activities for consistency and efficiency with other entities that have responsibilities to implement: (i) this NPDES permit, including the Pretreatment Program, (ii) a MS4 NPDES permit that may contain spill prevention, sewer maintenance, reporting requirements and (iii) the SSO WDR.

(6) Consistency with Sanitary Sewer Overflows WDRs

The Clean Water Act prohibits the discharge of pollutants from point sources to surface waters of the United States unless authorized under a NPDES permit. (33 U.S.C. §§1311, 1342). The State Water Board adopted General Waste Discharge Requirements (WDRs) for Sanitary Sewer Systems, (WQ Order No. 2006-0003) on May 2, 2006, to provide a consistent, statewide regulatory approach to address Sanitary Sewer Overflows (SSOs). The SSOs WDR requires public agencies that own or operate sanitary sewer systems to develop and implement sewer system management plans and report all SSOs to the State Water Board's online SSO database.

The requirements contained in this Order in Sections VI.C.3.b. (Spill Contingency Plan Section), VI.C.4. (Construction, Operation and Maintenance Specifications Section), and VI.C.6. (Spill Reporting Requirements) are intended to be consistent with the requirements of the SSO WDR. The Regional Water Board recognizes that there may be some overlap between the NPDES permit provisions and SSO WDR requirements. The requirements of the SSO WDR are considered the minimum thresholds (see Finding 11 of WQ Order No. 2006-0003). The Regional Water Board will accept the documentation prepared by the Permittees under the SSO WDR for compliance purposes, as satisfying the requirements in Sections VI.C.3.b., VI.C.4., and VI.C.6. provided any more specific or stringent provisions enumerated in this Order, have also been addressed

(7) The Discharger shall provide standby or emergency power facilities and/or storage capacity or other means so that in the event of plant upset or outage due to power failure or other cause, discharge of raw or inadequately treated sewage does not occur.

7. Compliance Schedules

a. Since this is a new discharge, Newhall Ranch WRP is not eligible for interim effluent limitations or compliance schedules. Final effluent limitations shall apply at all times. However, there may be an exception during the start-up operations of a new biological system. Compliance will be measured at Monitoring Location EFF 001, RSW-001U, and RSW-002D as described in the attached Monitoring and Reporting Program.

b. As effluent data becomes available, and it is demonstrated that the Discharger will have difficulty meeting an effluent limitation, Newhall Ranch SD may request that the Board revisit the idea of issuing a compliance schedule with interim limits under a separate enforcement order, such as a Time Schedule Order (TSO) or a Cease and Desist Order (CDO).

VII. COMPLIANCE DETERMINATION

Compliance with the effluent limitations contained in section IV of this Order will be determined as specified below:

A. General.

Compliance with effluent limitations for priority pollutants shall be determined using sample reporting protocols defined in the MRP and Appendix A of this Order. Dischargers shall be deemed out of compliance with effluent limitations if the concentration of the monitoring sample is greater than the effluent limitation and greater than or equal to the reported minimum level (ML).

B. Multiple Sample Data Reduction.

When determining compliance with a measure of central tendency (arithmetic mean, geometric mean, median, etc.) of multiple sample analyses and the data set contains one or more reported determinations of "Detected, but Not Quantified" (DNQ) or "Not Detected" (ND). In those cases, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

1. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

2. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

C. Average Monthly Effluent Limitation (AMEL).

If the average (or when applicable, the median determined by subsection B above for multiple sample data) of daily discharges over a calendar month exceeds the AMEL for a given parameter, this will represent a single violation, though the Discharger may be considered out of compliance for each day of that month for that parameter (e.g., resulting in 31 days of non-compliance in a 31-day month). If only a single sample is taken during the calendar month and the analytical result for that sample exceeds the AMEL, the Discharger may be considered out of compliance for that calendar month. The Discharger will only be considered out of compliance for days when the discharge occurs. For any one calendar month during which no sample (daily discharge) is taken, no compliance determination can be made for that calendar month.

If the analytical result of a single sample, monitored monthly, quarterly, semiannually, or annually, does not exceed the AMEL for a given parameter, the Discharger will have demonstrated compliance with the AMEL for each day of that month for that parameter.

If the analytical result of any single sample, monitored monthly, quarterly, semiannually, or annually, exceeds the AMEL for any parameter, the Discharger shall collect up to four additional samples within the same calendar month. All analytical results shall be reported in the monitoring report for that month. The concentration of pollutant (an arithmetic mean or a median) in these samples estimated from the "Multiple Sample Data Reduction" Section above, will be used for compliance determination.

In the event of noncompliance with an AMEL, the sampling frequency for that parameter shall be increased to weekly and shall continue at this level until compliance with the AMEL has been demonstrated.

D. Average Weekly Effluent Limitation (AWEL).

If the average of daily discharges over a calendar week exceeds the AWEL for a given parameter, an alleged violation will be flagged and the discharger will be considered out of compliance for each day of that week for that parameter, resulting in 7 days of non-compliance. The average of daily discharges over the calendar week that exceeds the AWEL for a parameter will be considered out of compliance for that week only. If only a single sample is taken during the calendar week and the analytical result for that sample exceeds the AWEL, the discharger will be considered out of compliance for that calendar week. For any one calendar week during which no sample (daily discharge) is taken, no compliance determination can be made for that calendar week.

A calendar week will begin on Sunday and end on Saturday. Partial weeks consisting of four or more days at the end of any month will include the remaining days of the week, which occur in the following month in order to calculate a consecutive seven-day average. This value will be reported as a weekly average or seven-day average on the SMR for the month containing the partial week of four or more days. Partial calendar weeks consisting of less than four days at the end of any month will be carried forward to the succeeding month and reported as a weekly average or a seven-day average for the calendar week that ends with the first Saturday of that month.

E. Maximum Daily Effluent Limitation (MDEL).

If a daily discharge exceeds the MDEL for a given parameter, an alleged violation will be flagged and the discharger will be considered out of compliance for that parameter for that 1 day only within the reporting period. For any 1 day during which no sample is taken, no compliance determination can be made for that day.

F. Instantaneous Minimum Effluent Limitation.

If the analytical result of a single grab sample is lower than the instantaneous minimum effluent limitation for a parameter, a violation will be flagged and the discharger will be considered out of compliance for that parameter for that single sample. Non-compliance for each sample will be considered separately (e.g., the results of two grab samples taken within a calendar day that both are lower than the instantaneous minimum effluent limitation would result in two instances of non-compliance with the instantaneous minimum effluent limitation).

G. Instantaneous Maximum Effluent Limitation.

If the analytical result of a single grab sample is higher than the instantaneous maximum effluent limitation for a parameter, a violation will be flagged and the discharger will be considered out of compliance for that parameter for that single sample. Non-compliance for each sample will be considered separately (e.g., the results of two grab samples taken within a calendar day that both exceed the instantaneous maximum effluent limitation would result in two instances of non-compliance with the instantaneous maximum effluent limitation).

H. Six-month Median Effluent Limitation.

If the median of daily discharges over any 180-day period exceeds the six-month median effluent limitation for a given parameter, an alleged violation will be flagged and the discharger will be considered out of compliance for each day of that 180-day period for that parameter. The next assessment of compliance will occur after the next sample is taken. If only a single sample is taken during a given 180-day period and the analytical result for that sample exceeds the six-month median, the discharger will be considered out of compliance for the 180-day period. For any 180-period during which no sample is taken, no compliance determination can be made for the six-month median limitation.

I. Percent Removal.

The average monthly percent removal is the removal efficiency expressed in percentage across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of pollutant concentrations (C in mg/L) of influent and effluent samples collected at about the same time using the following equation:
Percent Removal (%) = $[1-(C_{Effluent}/ C_{Influent})] \times 100$ %
When preferred, the Discharger may substitute mass loadings and mass emissions for the concentrations.

J. Mass and Concentration Limitations

Compliance with mass and concentration effluent limitations for the same parameter shall be determined separately with their respective limitations. When the concentration of a constituent in an effluent sample is determined to be ND or DNQ, the corresponding mass emission rate determined from that sample concentration shall also be reported as ND or DNQ.

K. Compliance with single constituent effluent limitations

Dischargers are out of compliance with the effluent limitation if the concentration of the pollutant (see Section B "Multiple Sample Data Reduction" above) in the monitoring sample is greater than the effluent limitation and greater than or equal to the RML.

L. Compliance with effluent limitations expressed as a sum of several constituents

Dischargers are out of compliance with an effluent limitation which applies to the sum of a group of chemicals (e.g., PCB's) if the sum of the individual pollutant concentrations is greater than the effluent limitation. Individual pollutants of the group will be considered to have a concentration of zero if the constituent is reported as ND or DNQ.

M. Mass Emission Rate.

The mass emission rate shall be obtained from the following calculation for any calendar day:

$$\text{Mass emission rate (lb/day)} = \frac{8.34}{N} \sum_{i=1}^{N} Q_i C_i$$

$$\text{Mass emission rate (kg/day)} = \frac{3.79}{N} \sum_{i=1}^{N} Q_i C_i$$

in which 'N' is the number of samples analyzed in any calendar day. 'Qi' and 'Ci' are the flow rate (MGD) and the constituent concentration (mg/L), respectively, which are associated with each of the 'N' grab samples, which may be taken in any calendar day. If a composite sample is taken, 'Ci' is the concentration measured in the composite sample and 'Qi' is the average flow rate occurring during the period over which samples are composited.

The daily concentration of all constituents shall be determined from the flow-weighted average of the same constituents in the combined waste streams as follows:

$$\text{Daily concentration} = \frac{1}{Q_t} \sum_{i=1}^{N} Q_i C_i$$

in which 'N' is the number of component waste streams. 'Qi' and 'Ci' are the flow rate (MGD) and the constituent concentration (mg/L), respectively, which are associated with each of the 'N' waste streams. 'Qt' is the total flow rate of the combined waste streams.

N. Bacterial Standards and Analysis.

1. The geometric mean used for determining compliance with bacterial standards is calculated with the following equation:

   Geometric Mean = (C1 x C2 x ... x Cn)1/n

   where n is the number of days samples were collected during the period and C is the concentration of bacteria (MPN/100 mL or CFU/100 mL) found on each day of sampling.

2. For bacterial analyses, sample dilutions should be performed so the expected range of values is bracketed (for example, with multiple tube fermentation method or membrane filtration method, 2 to 16,000 per 100 ml for total and fecal coliform, at a minimum, and 1 to 1000 per 100 ml for enterococcus). The detection methods used for each analysis shall be reported with the results of the analyses.

3. Detection methods used for coliforms (total and fecal) shall be those presented in Table 1A of 40 CFR 136 (revised March 12, 2007), unless alternate methods have been approved by USEPA pursuant to 40 CFR 136, or improved methods have been determined by the Executive Officer and/or USEPA.

4. Detection methods used for enterococcus shall be those presented in the USEPA publication EPA 600/4-85/076, *Test Methods for Escherichia coli and Enterococci in Water By Membrane Filter Procedure* or any improved method determined by the Executive Officer and/or USEPA to be appropriate.

O. Single Operational Upset

A single operational upset (SOU) that leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation and limits the Discharger's liability in accordance with the following conditions:

1. A single operational upset is broadly defined as a single unusual event that temporarily disrupts the usually satisfactory operation of a system in such a way that it results in violation of multiple pollutant parameters.

2. A Discharger may assert SOU to limit liability only for those violations which the Discharger submitted notice of the upset as required in Provision V.E.2(b) of Attachment D – Standard Provisions.

3. For purpose outside of CWC Section 13385 (h) and (i), determination of compliance and civil liability (including any more specific definition of SOU, the requirements for Dischargers to assert the SOU limitation of liability, and the manner of counting violations) shall be in accordance with USEPA Memorandum "Issuance of Guidance Interpreting Single Operational Upset" (September 27, 1989).

4. For purpose of CWC Section 13385 (h) and (i), determination of compliance and civil liability (including any more specific definition of SOU, the requirements for Dischargers to assert the SOU limitation of liability, and the manner of counting violations) shall be in accordance with CWC Section 13385 (f)(2).

ATTACHMENT A – DEFINITIONS

Acutely Toxic Conditions, as used in the context of mixing zones, refers to lethality that occurs to mobile aquatic organisms that move or drift through the mixing zone.

Arithmetic Mean (μ), also called the average, is the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$ where: Σx is the sum of the measured ambient water concentrations, and **n** is the number of samples.

Average Monthly Effluent Limitation (AMEL): the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL): the highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Best Management Practices (BMPs) are methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint source discharges including storm water. BMPs include structural and non-structural controls, and operation and maintenance procedures, which can be applied before, during, and/or after pollution producing activities.

Bioaccumulative pollutants are those substances taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Biologically-Based Receiving Water Flow refers to the method for determining receiving water flows developed by the U.S. EPA Office of Research and Development which directly uses the averaging periods and exceedance frequencies specified in the acute and chronic aquatic life criteria for individual pollutants (e.g., 1 day and 3 years for acute criteria, and 4 days and 3 years for the chronic criteria). Biologically-based flows can be calculated using the program DFLOW.

Carcinogenic pollutants are substances that are known to cause cancer in living organisms.

Coefficient of Variation (CV) is a measure of the data variability and is calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Completely-Mixed Discharge condition means not more than a 5 percent difference, accounting for analytical variability, in the concentration of a pollutant exists across a transect of the water body at a point within two stream/river widths from the discharge point.

Daily Discharge: Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ) are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

Dilution Credit is the amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Dilution Ratio is the critical low flow of the upstream receiving water divided by the flow of the effluent discharged.

Discharger-Specific WER is a WER that is applied to individual pollutant limits in an NPDES permit issued to a particular permit holder. A discharger-specific WER applies only to the applicable limits in the discharger's permit. Discharger-specific WERs are distinguished for WERs that are developed on a waterbody or watershed basis as part of a water quality standards action resulting in adoption of an SSO.

Dynamic Models used for calculating effluent limitations predict the effects of receiving water and effluent flow and of concentration variability. The outputs of dynamic models can be used to base effluent limitations on probability estimates of receiving water concentrations rather than critical conditions (which are used in the steady-state model). The three dynamic

modeling techniques recommended by the U.S. EPA for calculating effluent limitations are continuous simulation, Monte Carlo simulation, and lognormal probability modeling.

Effluent Concentration Allowance (ECA) is a value derived from the water quality criterion/objective, dilution credit, and ambient background concentration that is used, in conjunction with the coefficient of variation for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as waste load allocation (WLA) as used in USEPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays means indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration is the estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

Estuaries means waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters included, but are not limited to, the Sacramento-San Joaquin Delta, as defined in Water Code section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Existing Discharger means any discharger that is not a new discharger. An existing discharger includes an "increasing discharger" (i.e., an existing facility with treatment systems in place for its current discharge that is or will be expanding, upgrading, or modifying its existing permitted discharge after the effective date of this Policy).

Four-Day Average of Daily Maximum Flows is the average of daily maximums taken from the data set in four-day intervals.

Harmonic Mean flows are expressed as $Q_{hm} = (n)/(\Sigma^{n}_{i=1} 1/x_i)$, where x_i = specific data values and n = number of data values.

Incompletely-Mixed Discharge is a discharge that contributes to a condition that does not meet the meaning of a completely-mixed discharge condition.

Infeasible means not capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

Inland Surface Waters are all surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation: the highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation: the lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Load Allocation (LA) is the portion of a receiving water's total maximum daily load that is allocated to one of its nonpoint sources of pollution or to natural background sources.

Long-Term Arithmetic Mean Flow is at least two years of flow data used in calculating an arithmetic mean as defined in this appendix.

Maximum Daily Flow is the maximum flow sample of all samples collected in a calendar day.

Maximum Daily Effluent Limitation (MDEL) means the highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median is the middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the $n/2$ and $n/2+1$).

Method Detection Limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in title 40 of the Code of Federal Regulations, Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML) is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone is a limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

Mutagenic pollutants are substances that are known to cause a mutation (i.e., change in a gene or chromosome) in living organisms.

Mutual Water Company is defined in the Public Utilities Code, section 2725 as: "any private corporation or association organized for the purpose of delivering water to its stockholders and members at cost, including use of works for conserving, treating and reclaiming water".

New Discharger includes any building, structure, facility, or installation from which there is, or may be, a discharge of pollutants, the construction of which commenced after the effective date of this Policy.

Not Detected (ND) are those sample results less than the laboratory's MDL.

Objectionable Bottom Deposits are an accumulation of materials or substances on or near the bottom of a water body, which creates conditions that adversely impact aquatic life, human health, beneficial uses, or aesthetics. These conditions include, but are not limited to, the accumulation of pollutants in the sediments and other conditions that result in harm to benthic organisms, production of food chain organisms, or fish egg development. The presence of such deposits shall be determined by RWQCB(s) on a case-by-case basis.

Ocean Waters are the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Water Board's California Ocean Plan.

Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pollutant Minimization Program (PMP) means waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of the PMP shall be to reduce all potential sources of a priority pollutant(s) through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Regional Water Board may consider cost effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to Water Code section 13263.3(d), shall be considered to fulfill the PMP requirements.

Pollution Prevention means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State or Regional Water Board.

Process Optimization means minor changes to the existing facility and treatment plant operations that optimize the effectiveness of the existing treatment processes.

Public Entity includes the federal government or a state, county, city and county, city, district, public authority, or public agency.

Reporting Level (RL) is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from Appendix 4 of the SIP in accordance with section 2.4.2 of the SIP or established in accordance with section 2.4.3 of the SIP. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Satellite Collection System is the portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility that a sanitary sewer system is tributary to.

Source of Drinking Water is any water designated as municipal or domestic supply (MUN) in a Regional Water Board Basin Plan.

Standard Deviation (σ) is a measure of variability that is calculated as follows:

$$\sigma = (\Sigma[(x - \mu)^2]/(n - 1))^{0.5}$$

where:

x is the observed value;

μ is the arithmetic mean of the observed values; and

n is the number of samples.

Teratogenic pollutants are substances that are known to cause structural abnormalities or birth defects in living organisms.

Toxicity Reduction Evaluation (TRE) is a study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

Use Attainability Analysis is a structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological and economic factors as described in 40 CFR 131.10(g) (40 CFR 131.3, revised as of July 1, 1997).

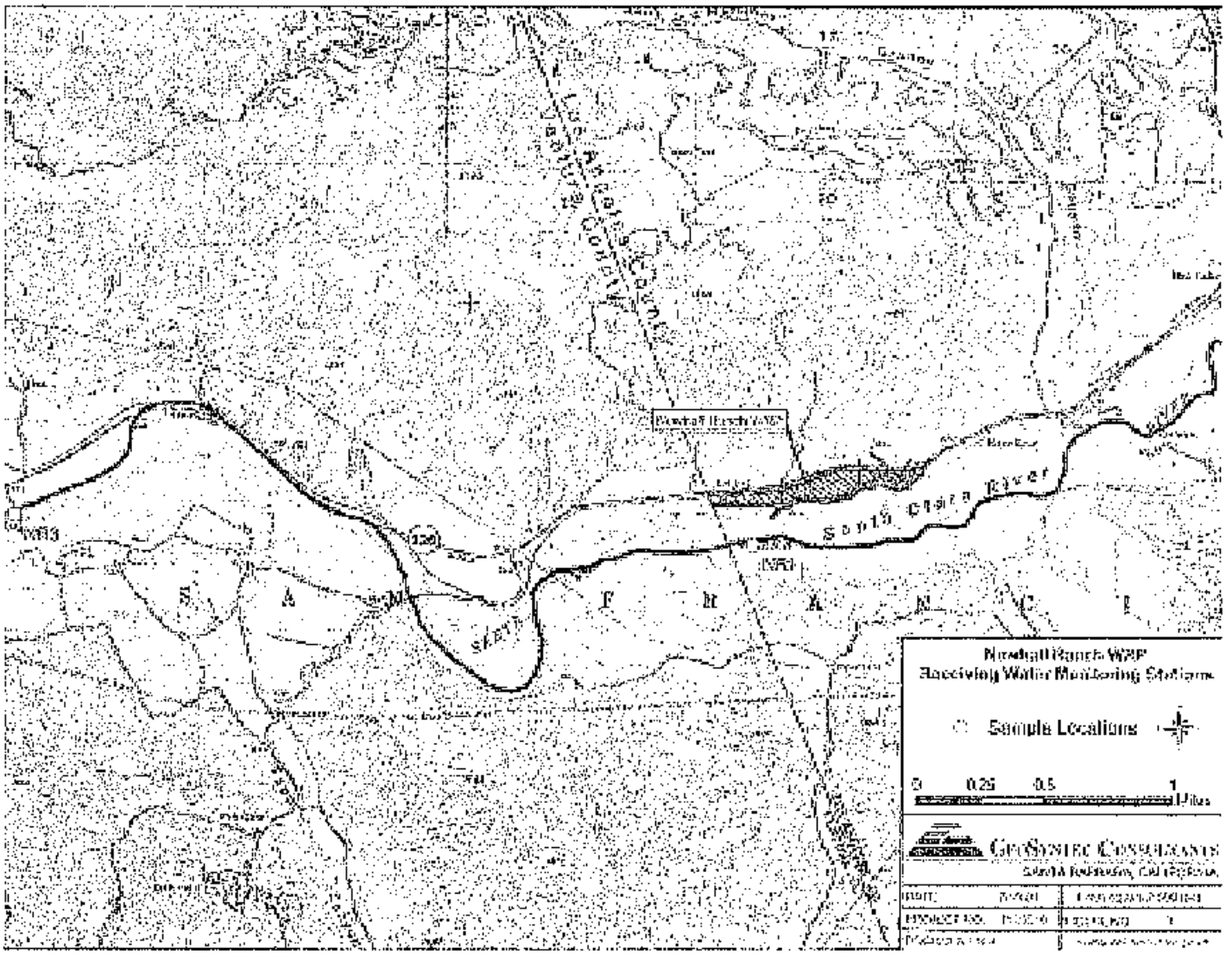
Water Effect Ratio (WER) is an appropriate measure of the toxicity of a material obtained in a site water divided by the same measure of the toxicity of the same material obtained simultaneously in a laboratory dilution water.

1Q10 is the lowest flow that occurs for one day with a statistical frequency of once every 10 years.

7Q10 is the average low flow that occurs for seven consecutive days with a statistical frequency of once every 10 years.

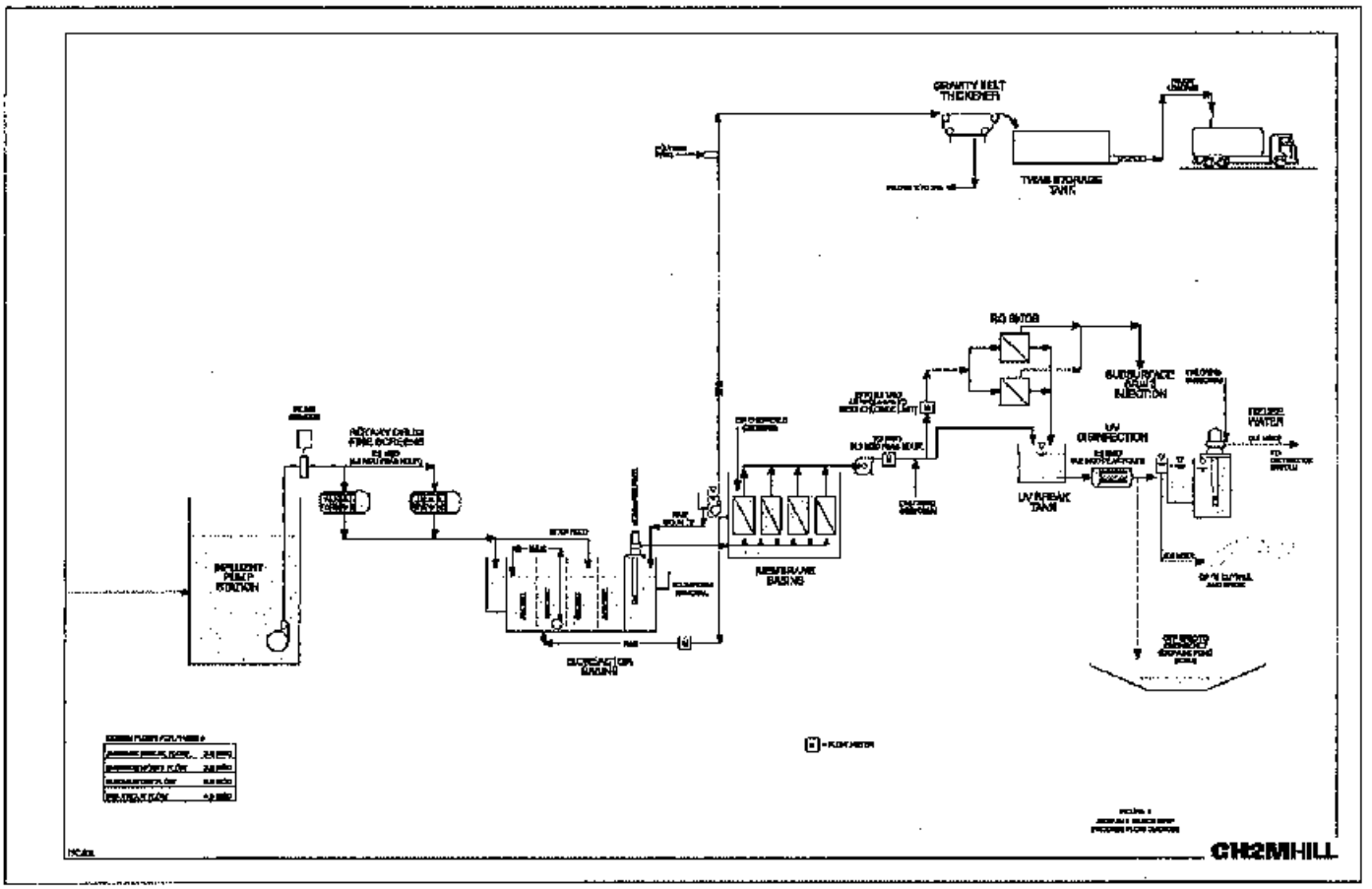
90th Percentile of Observed Data is the measurement in the ordered set of data (lowest to highest) where 90 percent of the reported measurements are less than or equal to that value.

ATTACHMENT B – MAP



ATTACHMENT C – FLOW SCHEMATIC

Phase I



ATTACHMENT D – STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. (40 C.F.R. § 122.41(a).)

2. The Discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 C.F.R. § 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 C.F.R. § 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 C.F.R. § 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order. (40 C.F.R. § 122.41(e).)

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 C.F.R. § 122.41(g).)

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 C.F.R. § 122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Regional Water Board, State Water Board, United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (40 C.F.R. § 122.41(i); Wat. Code, § 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (40 C.F.R. § 122.41(i)(1));

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (40 C.F.R. § 122.41(i)(2));

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (40 C.F.R. § 122.41(i)(3)); and

4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (40 C.F.R. § 122.41(i)(4).)

G. Bypass

1. Definitions

   a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 C.F.R. § 122.41(m)(1)(i).)

   b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does

not mean economic loss caused by delays in production. (40 C.F.R. § 122.41(m)(1)(ii).)

2. Bypass not exceeding limitations. The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3, I.G.4, and I.G.5 below. (40 C.F.R. § 122.41(m)(2).)

3. Prohibition of bypass. Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless (40 C.F.R. § 122.41(m)(4)(i)):

   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 C.F.R. § 122.41(m)(4)(i)(A));

   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 C.F.R. § 122.41(m)(4)(i)(B)); and

   c. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance I.G.5 below. (40 C.F.R. § 122.41(m)(4)(i)(C).)

4. The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above. (40 C.F.R. § 122.41(m)(4)(ii).)

5. Notice

   a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass. (40 C.F.R. § 122.41(m)(3)(i).)

   b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). (40 C.F.R. § 122.41(m)(3)(ii).)

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 C.F.R. § 122.41(n)(1).)

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance I.H.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 C.F.R. § 122.41(n)(2).).

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 C.F.R. § 122.41(n)(3)):

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 C.F.R. § 122.41(n)(3)(i));

   b. The permitted facility was, at the time, being properly operated (40 C.F.R. § 122.41(n)(3)(ii));

   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 C.F.R. § 122.41(n)(3)(iii)); and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 C.F.R. § 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 C.F.R. § 122.41(n)(4).)

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or

termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 C.F.R. § 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 C.F.R. § 122.41(b).)

C. Transfers

This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the Water Code. (40 C.F.R. § 122.41(l)(3); § 122.61.)

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 C.F.R. § 122.41(j)(1).)

B. Monitoring results must be conducted according to test procedures under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503 unless other test procedures have been specified in this Order. (40 C.F.R. § 122.41(j)(4); § 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by Part 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 C.F.R. § 122.41(j)(2).)

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 C.F.R. § 122.41(j)(3)(i));

2. The individual(s) who performed the sampling or measurements (40 C.F.R. § 122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 C.F.R. § 122.41(j)(3)(iii));

4. The individual(s) who performed the analyses (40 C.F.R. § 122.41(j)(3)(iv));

5. The analytical techniques or methods used (40 C.F.R. § 122.41(j)(3)(v)); and

6. The results of such analyses. (40 C.F.R. § 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 C.F.R. § 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 C.F.R. § 122.7(b)(1)); and

2. Permit applications and attachments, permits and effluent data. (40 C.F.R. § 122.7(b)(2).)

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Regional Water Board, State Water Board, or USEPA within a reasonable time, any information which the Regional Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or USEPA copies of records required to be kept by this Order. (40 C.F.R. § 122.41(h); Wat. Code, § 13267.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, and V.B.5 below. (40 C.F.R. § 122.41(k).)

2. All permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA). (40 C.F.R. § 122.22(a)(3).).

3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 C.F.R. § 122.22(b)(1));

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 C.F.R. § 122.22(b)(2)); and

   c. The written authorization is submitted to the Regional Water Board and State Water Board. (40 C.F.R. § 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting V.B.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 C.F.R. § 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.3 above shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 C.F.R. § 122.22(d).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 C.F.R. § 122.22(l)(4).)

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. (40 C.F.R. § 122.41(l)(4)(i).)

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Water Board. (40 C.F.R. § 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 C.F.R. § 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 C.F.R. § 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. (40 C.F.R. § 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 C.F.R. § 122.41(l)(6)(ii)):

   a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(A).)

   b. Any upset that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

3. The Regional Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours. (40 C.F.R. § 122.41(l)(6)(iii).)

F. Planned Changes

The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 C.F.R. § 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in section 122.29(b) (40 C.F.R. § 122.41(l)(1)(i)); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 C.F.R. § 122.41(l)(1)(ii).)

3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. (40 C.F.R.§ 122.41(l)(1)(iii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with General Order requirements. (40 C.F.R. § 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above. (40 C.F.R. § 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information. (40 C.F.R. § 122.41(l)(8).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Regional Water Board is authorized to enforce the terms of this permit under several provisions of the Water Code, including, but not limited to, sections 13385, 13386, and 13387.

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Publicly-Owned Treatment Works (POTWs)

All POTWs shall provide adequate notice to the Regional Water Board of the following (40 C.F.R. § 122.42(b)):

1. Any new introduction of pollutants into the POTW from an indirect discharger that would be subject to sections 301 or 306 of the CWA if it were directly discharging those pollutants (40 C.F.R. § 122.42(b)(1)); and

2. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of the Order. (40 C.F.R. § 122.42(b)(2).)

3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW. (40 C.F.R. § 122.42(b)(3).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

The Code of Federal Regulations section 122.48 requires that all NPDES permits specify monitoring and reporting requirements. Water Code Sections 13267 and 13383 also authorize the Regional Water Quality Control Board (Regional Water Board) to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements, which implement the federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. All samples shall be representative of the waste discharge under conditions of peak load. Quarterly effluent analyses shall be performed during the months of January, April, July, and October. Semiannual analyses shall be performed during the months of January and July. Annual analyses shall be performed during the month of July (except for bioassessment monitoring, which will be conducted in the spring/summer). Should there be instances when monitoring could not be done during these specified months, the Discharger must notify the Regional Water Board, state the reason why monitoring could not be conducted, and obtain approval from the Executive Officer for an alternate schedule. Results of quarterly, semiannual, and annual analyses shall be reported in the third monthly monitoring report following the analysis.

B. Pollutants shall be analyzed using the analytical methods described in 40 CFR, Part 136.3, 136.4, and 136.5 (revised March 12, 2007); or where no methods are specified for a given pollutant, by methods approved by this Regional Water Board or the State Water Board. Laboratories analyzing effluent samples and receiving water samples shall be certified by the California Department of Health Services Environmental Laboratory Accreditation Program (ELAP) or approved by the Executive Officer and must include quality assurance/quality control (QA/QC) data in their reports. A copy of the laboratory certification shall be provided each time a new certification and/or renewal of the certification is obtained from ELAP.

C. Water/wastewater samples must be analyzed within allowable holding time limits as specified in 40 CFR, Part 136.3. All QA/QC analyses must be run on the same dates that samples are actually analyzed. The Discharger shall retain the QA/QC documentation in its files and make available for inspection and/or submit them when requested by the Regional Water Board. Proper chain of custody procedures must be followed and a copy of that documentation shall be submitted with the monthly report.

D. The Discharger shall calibrate and perform maintenance procedures on all monitoring instruments and to insure accuracy of measurements, or shall insure that both equipment activities will be conducted.

E. For any analyses performed for which no procedure is specified in the USEPA guidelines, or in the MRP, the constituent or parameter analyzed and the method or procedure used must be specified in the monitoring report.

F. Each monitoring report must affirm in writing that "all analyses were conducted at a laboratory certified for such analyses by the Department of Health Services or approved by the Executive Officer and in accordance with current USEPA guideline procedures or as specified in this MRP."

G. The monitoring report shall specify the USEPA analytical method used, the Method Detection Limit (MDL), the minimum level (ML), and the Reported Minimum Level (RML) for each pollutant. The MLs are those published by the State Water Board in the *Policy for the Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California,* February 9, 2005, Appendix 4. The ML represents the lowest quantifiable concentration in a sample based on the proper application of all method-based analytical procedures and the absence of any matrix interference. When all specific analytical steps are followed and after appropriate application of method specific factors, the ML also represents the lowest standard in the calibration curve for that specific analytical technique. When there is deviation from the method analytical procedures, such as dilution or concentration of samples, other factors may be applied to the ML depending on the sample preparation. The resulting value is the reported minimum level.

H. The Discharger shall select the analytical method that provides a ML lower than the permit limit established for a given parameter, unless the Discharger can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR, Part 136, and obtains approval for a higher ML from the Executive Officer, as provided for in Section J below. If the effluent limitation is lower than all the MLs in Appendix 4, SIP, the Discharge must select the method with the lowest ML for compliance purposes. The Discharger shall include in the Annual Summary Report a list of the analytical methods employed for each test.

I. The Discharger shall instruct its laboratories to establish calibration standards so that the ML (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve. In accordance with section J, below, the Discharger's laboratory may employ a calibration standard lower than the ML in Appendix 4 of the SIP.

J. In accordance with Section 2.4.3 of the SIP, the Regional Water Board Executive Officer, in consultation with the State Water Board's Quality Assurance Program Manager, may establish an ML that is not contained in Appendix 4 of the SIP to be included in the discharger's permit in any of the following situations:

a. When the pollutant under consideration is not included in Appendix 4, SIP;

b. When the discharger and the Regional Water Board agree to include in the permit a test method that is more sensitive than those specified in 40 CFR, Part 136 (revised as of March 12, 2007);

c. When a discharger agrees to use an ML that is lower than those listed in Appendix 4;

d. When a discharger demonstrates that the calibration standard matrix is sufficiently different from that used to establish the ML in Appendix 4 and proposes an appropriate ML for the matrix; or,

e. When the discharger uses a method, which quantification practices are not consistent with the definition of the ML. Examples of such methods are USEPA-approved method 1613 for dioxins, and furans, method 1624 for volatile organic substances, and method 1625 for semi-volatile organic substances. In such cases, the discharger, the Regional Water Board, and the State Water Resources Control Board shall agree on a lowest quantifiable limit and that limit will substitute for the ML for reporting and compliance determination purposes.

If there is any conflict between foregoing provisions and the State Implementation Policy (SIP), the provisions stated in the SIP (Section 2.4) shall prevail.

K. If the Discharger samples and performs analyses (other than for process/operational control, startup, research, or equipment testing) on any influent, effluent, or receiving water constituent more frequently than required by this Program using approved analytical methods, the results of those analyses shall be included in the report. These results shall be reflected in the calculation of the average used in demonstrating compliance with average effluent, receiving water, etc., limitations.

L. The Discharger shall develop and maintain a record of all spills or bypasses of raw or partially treated sewage from its collection system or treatment plant according to the requirements in the WDR section of this Order. This record shall be made available to the Regional Water Board upon request and a spill summary shall be included in the annual summary report.

M. For all bacteriological analyses, sample dilutions should be performed so the expected range of values is bracketed (for example, with multiple tube fermentation method or membrane filtration method, 2 to 16,000 per 100 ml for total and fecal coliform, at a minimum, and 1 to 1000 per 100 ml for enterococcus). The detection methods used for each analysis shall be reported with the results of the analyses.

a. Detection methods used for coliforms (total and fecal) shall be those presented in Table 1A of 40 CFR, Part 136 (revised March 12, 2007), unless alternate methods

have been approved in advance by the United State Environmental Protection Agency (USEPA) pursuant to 40 CFR Part 136.

b. Detection methods used for enterococcus shall be those presented in the USEPA publication EPA 600/4-85/076, *Test Methods for Escherichia coli and Enterococci in Water By Membrane Filter Procedure* or any improved method determined by the Regional Water Board to be appropriate.

N. Since compliance monitoring focuses on the effects of a point source discharge, it is not designed to assess impacts from other sources of pollution (e.g., non-point source run-off, aerial fallout) or to evaluate the current status of important ecological resources on a regional basis.

A watershed-wide Monitoring Program will be developed within two years from the effective date of this Order and permit for the Santa Clara River Watershed, under the leadership of the Regional Water Board and the stakeholder groups developing salt and nutrient TMDLs that the Santa Clara River Watershed and in compliance with those TMDLs. The goals of the watershed-wide monitoring program will include evaluating or assessing: compliance with receiving water objectives, trends in surface water quality, impacts to beneficial uses, the health of the biological community, data needs for modeling contaminants of concern, and attaining the goals of the TMDLs under implementation in the Santa Clara River. The Discharger shall participate in the development and implementation of the watershed-wide monitoring program, and submit a copy of the proposed program to the Regional Water Board,

Changes to the compliance monitoring program may be required to fulfill the goals of the watershed-wide monitoring program, while retaining the compliance monitoring component required to evaluate compliance with the NPDES permit. Revisions to the Discharger's program will be made under the direction of the Regional Water Board, as necessary, to accomplish the goal, and may include a reduction or increase in the number of parameters to be monitored, the frequency of monitoring, and/or the number of samples collected.

Until such time when a watershed-wide monitoring program is developed, Newhall Land shall implement the monitoring program in the following sections.

II. MONITORING LOCATIONS

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order:

Table 1. Monitoring Station Locations

Discharge Point Name	Monitoring Location Name	Monitoring Location Description (include Latitude and Longitude when available)
--	INF-001	Sampling stations shall be established at each point of inflow to the sewage treatment plant and shall be located upstream of any in-plant return flows and where representative samples of the influent can be obtained.
001	EFF-001	The effluent sampling station shall be located downstream of any inplant return flows and after the final disinfection process, where representative samples of the effluent can be obtained. Latitude 34°0.403166' and Longitude 118°0.689667'
--	RSW-001U	Santa Clara River, approximately 100 feet upstream of the discharge point
--	RSW-001D	Santa Clara River, approximately 100 feet downstream of the discharge point
--	RSW-002D*	Santa Clara River, approximately 300 feet downstream of the discharge point
--	RGW-001	Groundwater aquifer, upgradient of discharge point
--	RGW-002	Groundwater aquifer, downgradient of discharge point
--	RGW-003	Groundwater aquifer, downgradient of discharge point

* The location of this receiving water station may vary depending upon the meander of the river. The Discharger shall endeavor to take a sample representative of actual downstream receiving water conditions, after flows are commingled. However, if flows do not commingle, the receiving water sample shall still be collected. The monitoring report shall specify whether or not there was commingling.

III. INFLUENT MONITORING REQUIREMENTS

Influent monitoring is required to:

- Determine compliance with NPDES permit conditions.
- Assess treatment plant performance.
- Assess effectiveness of the Pretreatment Program

A. Monitoring Location INF-001

1. The Discharger shall monitor influent to the facility at INF-001 as follows:

Table 2. Influent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow	mgd	recorder	continuous[1]	[2]
pH	pH unit	grab	daily	[2]

[1] Total daily flow and instantaneous peak daily flow (24-hr basis). Actual monitored flow shall be reported (not the maximum flow, i.e., design capacity).

[2] Pollutants shall be analyzed using the analytical methods described in 40 CFR 136; where no methods are specified for a given pollutant, by methods approved by this Regional Water Board or State Water Resources Control Board. For any pollutant whose effluent limitation is lower than all the minimum levels (MLs) specified in Attachment 4 of the SIP, the analytical method with the lowest ML must be selected.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Total suspended solids	mg/L	24-hour composite	daily	[2]
BOD_5 20°C	mg/L	24-hour composite	daily	[2]
Nitrite nitrogen	mg/L	24-hour composite	weekly	[2]
Nitrate nitrogen	mg/L	24-hour composite	weekly	[2]
Ammonia nitrogen	mg/L	24-hour composite	weekly	[2]
Total Nitrogen	mg/L	24-hour composite	weekly	[2]
Total phosphorus	mg/L	24-hour composite	weekly	[2]
Orthophosphate-P	mg/L	24-hour composite	weekly	[2]
Chloride	mg/L	24-hour composite	monthly	[2]
Antimony	µg/L	24-hour composite	monthly	[2]
Arsenic	µg/L	24-hour composite	monthly	[2]
Cadmium	µg/L	24-hour composite	quarterly	[2]
Chromium III	µg/L	grab	quarterly	[2]
Chromium VI	µg/L	grab	quarterly	[2]
Copper	µg/L	24-hour composite	monthly	[2]
Lead	µg/L	24-hour composite	monthly	[2]
Mercury	µg/L	24-hour composite	monthly	[2]
Selenium	µg/L	24-hour composite	quarterly	[2]
Silver	µg/L	24-hour composite	quarterly	[2]
Thallium	µg/L	24-hour composite	quarterly	[2]
Zinc	µg/L	24-hour composite	quarterly	[2]
Cyanide	µg/L	grab	quarterly	[2]
Acrylonitrile	µg/L	grab	quarterly	[2]
Tetrachloroethylene	µg/L	grab	quarterly	[2]
Bis(2-ethylhexyl)phthalate	µg/L	grab	quarterly	[2]
p-Dichlorobenzene	µg/L	grab	quarterly	[2]
Lindane	µg/L	grab	quarterly	[2]
4,4-DDE	µg/L	grab	quarterly	[2]
Iron	µg/L	24-hour composite	quarterly	[2]
Remaining EPA priority pollutants [3] excluding asbestos	µg/L	24-hour composite/grab for VOCs	semiannually	[2]

Influent monitoring must be performed at plant start-up.

IV. EFFLUENT MONITORING REQUIREMENTS

Effluent monitoring is required to:

- Determine compliance with NPDES permit conditions and water quality standards.

[3] Priority pollutants are those constituents referred to in 40 CFR 401.15; a list of these pollutants is provided as Appendix A to 40 CFR 423.

- , Assess plant performance, identify operational problems and improve plant performance.
- Provide information

A. Monitoring Location EFF-001

1. The Discharger shall monitor the discharge of tertiary-treated effluent at EFF-001 as follows. If more than one analytical test method is listed for a given parameter, the Discharger must select from the listed methods and corresponding Minimum Level:

Table 3. Effluent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method and (Minimum Level, units), respectively
Total waste flow	mgd	recorder	continuous[4]	4
Turbidity[7]	NTU	recorder	continuous	5
Total residual chlorine	mg/L	grab	daily[6]	5
Total coliform[7]	MPN/ 100mL	grab	daily	5
Fecal coliform[7]	MPN/ 100mL	grab	daily	5
E.coli	MPN/ 100mL	grab	daily[8]	5
Temperature	°F	grab	daily	5
pH	pH units	grab	daily	5
Settleable solids	mL/L	grab	daily	5
Suspended solids	mg/L	24-hour composite	weekly	5
BOD_5 20°C	mg/L	24-hour composite	weekly[9]	5
Oil and grease	mg/L	grab	monthly	5

4 Where continuous monitoring of a constituent is required, the following shall be reported:
Total waste flow – Total daily and peak daily flow (24-hr basis);
Turbidity – Maximum daily value, total amount of time each day the turbidity exceeded 0.2 turbidity units, flow-proportioned average daily value.

5 Pollutants shall be analyzed using the analytical methods described in 40 CFR 136; where no methods are specified for a given pollutant, by methods approved by this Regional Water Board or State Water Resources Control Board. For any pollutant whose effluent limitation is lower than all the minimum levels (MLs) specified in Attachment 4 of the SIP, the analytical method with the lowest ML must be selected.

6 Daily grab samples shall be collected at monitoring location EFF-001B, Monday through Friday only, except for holidays. Analytical results of daily grab samples will be used to determine compliance with total residual chlorine effluent limitation.

7 Coliform and turbidity samples shall be obtained at some point in the treatment process at a time when wastewater flow and characteristics are most demanding on the treatment facilities, filtration, and disinfection procedures. Fecal coliform testing shall be conducted only if total coliform test result is positive.

8 E. coli testing shall be conducted only if fecal coliform testing is positive. If the fecal coliform analysis results in no detection, a result of less than (<) the reporting limit for fecal coliform will be reported for E. coli.

9 If the result of the weekly BOD analysis yields a value greater than the 30-day average limit, the frequency of analysis shall be increased to daily within one week of knowledge of the test result for at least 30 days and until compliance with the 7-day and 30-day average BOD limits is demonstrated; after which the frequency shall revert to weekly.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method and (Minimum Level, units), respectively
Dissolved oxygen	mg/L	grab	weekly	5
Total dissolved solids	mg/L	24-hour composite	monthly	5
Chloride	mg/L	24-hour composite	monthly	5
Sulfate	mg/L	24-hour composite	monthly	5
Boron	mg/L	24-hour composite	monthly	5
Fluoride	mg/L	24-hour composite	monthly	5
Ammonia Nitrogen[10]	mg/L	24-hour composite	weekly	5
Nitrite nitrogen	mg/L	24-hour composite	weekly	5
Nitrate nitrogen	mg/L	24-hour composite	weekly	5
Organic nitrogen	mg/L	24-hour composite	weekly	5
Total nitrogen	mg/L	24-hour composite	weekly	5
Surfactants (MBAS)[11]	mg/L	24-hour composite	monthly	5
Surfactants (CTAS)	mg/L	24-hour composite	monthly	5
Total hardness ($CaCO_3$)	mg/L	24-hour composite	weekly	5
Chronic toxicity	TUc	24-hour composite	monthly	5
Acute toxicity	% Survival	24-hour composite	monthly	5
Perchlorate	µg/L	grab	semiannually	5
1,4-Dioxane	µg/L	grab	semiannually	5
1,2,3-Trichloropropane	µg/L	grab	semiannually	5
Methyl tert-butyl ether (MTBE)	µg/L	grab	semiannually	5
Antimony	µg/L	24-hour composite	monthly	5
Arsenic	µg/L	24-hour composite	monthly	5
Beryllium	µg/L	24-hour composite	monthly	5
Cadmium	µg/L	24-hour composite	monthly	5
Chromium III	µg/L	grab	monthly	5
Chromium VI	µg/L	grab	monthly	5
Copper	µg/L	24-hour composite	monthly	5
Lead	µg/L	24-hour composite	monthly	5
Mercury	µg/L	24-hour composite	monthly	5
Nickel	µg/L	24-hour composite	monthly	5
Selenium	µg/L	24-hour composite	monthly	5
Silver	µg/L	24-hour composite	monthly	5
Thallium	µg/L	24-hour composite	monthly	5

10 Nitrate nitrogen, nitrite nitrogen, ammonia nitrogen, organic nitrogen, pH, and temperature sampling shall be conducted concurrently.

11 MBAS is Methylene blue active substances and CTAS is cobalt thiocyanate active substances. Reaches of the Santa Clara River are unlined in several reaches downstream of the points of wastewater discharge and are designated with the beneficial use of groundwater recharge (GWR) in the Basin Plan. Monitoring is required to assess compliance with the Title 22-based limit prescribed to protect underlying groundwater quality with the MUN beneficial use.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method and (Minimum Level, units), respectively
Zinc	µg/L	24-hour composite	monthly	[5]
Cyanide	µg/L	grab	monthly	[5]
2,3,7,8-TCDD[12]	µg/L	24-hour composite	quarterly	[5]
Acrylonitrile	µg/L	grab	quarterly	[5]
Bromoform	µg/L	grab	quarterly	[5]
Dibromochloromethane	µg/L	grab	quarterly	[5]
Chloroform	µg/L	grab	quarterly	[5]
Bromodichlorormethane	µg/L	grab	quarterly	[5]
1,2-Dichloroethane	µg/L	grab	quarterly	[5]
Methyl bromide (Bromomethane)	µg/L	grab	quarterly	[5]
Methyl chloride (Chloromethane)	µg/L	grab	quarterly	[5]
Methylene chloride	µg/L	grab	quarterly	[5]
Tetrachloroethylene	µg/L	grab	quarterly	[5]
Benzidine	µg/L	24-hour composite	quarterly	[5]
Benzo(a)anthracene	µg/L	24-hour composite	quarterly	[5]
Bis(2-ethylhexyl)phthalate	µg/L	24-hour composite	quarterly	[5]
p-Dichlorobenzene (1,4-Dichlorobenzene)	µg/L	24-hour composite	quarterly	[5]
3,3-Dichlorobenzidine	µg/L	24-hour composite	quarterly	[5]
1,2-Diphenylhydrazine	µg/L	24-hour composite	quarterly	[5]
Hexachlorobenzene	µg/L	24-hour composite	quarterly	[5]
Aldrin	µg/L	24-hour composite	quarterly	[5]
Gamma-BHC(Lindane)	µg/L	24-hour composite	quarterly	[5]
Chlordane	µg/L	24-hour composite	quarterly	[5]
4,4-DDT	µg/L	24-hour composite	quarterly	[5]
4,4-DDE	µg/L	24-hour composite	quarterly	[5]
4,4-DDD	µg/L	24-hour composite	quarterly	[5]
Dieldrin	µg/L	24-hour composite	quarterly	[5]

[12] In accordance with the SIP, the Discharger shall conduct effluent monitoring for the seventeen 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD or dioxin) congeners in the effluent and in the receiving water Station RSW-002D, located downstream of the discharge point. The Discharger shall use the appropriate Toxicity Equivalence Factor (TEF) to determine Toxic Equivalence (TEQ). Where TEQ equals the product between each of the 17 individual congeners' (i) concentration analytical result (C_i) and their corresponding Toxicity Equivalence Factor (TEF_i)., (i.e., $TEQ_i = C_i \times TEF_i$). Compliance with the Dioxin limitation shall be determined by the summation of the seventeen individual TEQs, or the following equation:

$$\text{Dioxin concentration in effluent} = \sum_{1}^{17}(TEQ_i) = \sum_{1}^{17}(C_i)(TEF_i)$$

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method and (Minimum Level, units), respectively
Endrin	µg/L	24-hour composite	quarterly	[5]
Heptachlor	µg/L	24-hour composite	quarterly	[5]
Heptachlor epoxide	µg/L	24-hour composite	quarterly	[5]
PCBs	µg/L	24-hour composite	quarterly	[5]
Toxaphene	µg/L	24-hour composite	quarterly	[5]
Barium	µg/L	24-hour composite	quarterly	[5]
Iron	µg/L	24-hour composite	quarterly	[5]
Methoxychlor	µg/L	24-hour composite	quarterly	[5]
2,4-D	µg/L	24-hour composite	quarterly	[5]
2,4,5-TP (Silvex)	µg/L	24-hour composite	quarterly	[5]
Remaining EPA priority pollutants (except asbestos)	µg/L	24-hour composite; grab for VOCs	semiannually	[5]
Radioactivity (Including gross alpha, gross beta, combined radium-226 and radium-228, tritium, strontium-90 and uranium)	PCi/L	24-hour composite	quarterly	[13]

Effluent monitoring shall be performed at plant start-up.

B. Other Effluent Monitoring Location

1. Not Applicable. The Discharger only proposes to have one effluent discharge point.

Table 4. Other Effluent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method and (Minimum Level, units), respectively
N/A				

V. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS

A. Acute Toxicity

1. Definition of Acute Toxicity

[13] Analyze these radiochemicals by the following USEPA methods: method 900.0 for gross alpha and gross beta, method 903.0 or 903.1 for radium-226, method 904.0 for radium-228, method 906.0 for tritium, method 905.0 for strontium-90, and method 908.0 for uranium. Analysis for combined Radium-226 & 228 shall be conducted only if gross alpha results for the same sample exceed 15 pCi/L or beta greater than 50 pCi/L. If Radium-226 & 228 exceeds the stipulated criteria, analyze for Tritium, Strontium-90 and uranium.

Acute toxicity is a measure of primarily lethal effects that occur over a 96-hour period. Acute toxicity shall be measured in percent survival measured in undiluted (100%) effluent.

a. The average survival in the undiluted effluent for any three (3) consecutive 96-hour static or continuous flow bioassay tests shall be at least 90%, and

b. No single test shall produce less than 70% survival.

2. Acute Toxicity Effluent Monitoring Program

a. **Method.** The Discharger shall conduct acute toxicity tests on 100% effluent and receiving water grab samples by methods specified in 40 CFR Part 136, which cites USEPA's *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, October, 2002 (EPA-821-R-02-012) or a more recent edition to ensure compliance.

b. **Test Species.** The fathead minnow, *Pimephales promelas*, shall be used as the test species for fresh water discharges and the topsmelt, *Atherinops affinis*, shall be used as the test species for brackish discharges. However, if the salinity of the receiving water is between 1 to 32 parts per thousand (ppt), the Discharger may have the option of using the inland silverslide, *Menidia beryllina*, instead of the topsmelt. The method for topsmelt is found in USEPA's *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, October, 2002 (EPA-821-R-02-012).

c. **Alternate Reporting.** In lieu of conducting the standard acute toxicity testing with the fathead minnow, the Discharger may elect to report the results or endpoint from the first 96 hours of the chronic toxicity test as the results of the acute toxicity test, but only if the Discharger uses USEPA's October 2002 protocol (EPA-821-R-02-013) and fathead minnow is used to conduct the chronic toxicity test.

d. **Acute Toxicity Accelerated Monitoring.** If either of the effluent or receiving water toxicity requirements in Section IV.A.1.c.(i) and (ii), and Section V.A.17.c. respectively, of this Order is not met, the Discharger shall conduct six additional tests approximately every two weeks, over a six-week period. The Discharger shall ensure that results of a failing acute toxicity test are received by the Discharger within 24 hours of completion of the test and the additional tests shall begin within 5 business days of receipt of the result. If the additional tests indicate compliance with acute toxicity limitation, the Discharger may resume regular testing.

However, if the extent of the acute toxicity of the receiving water upstream of the discharge is greater than the downstream and the results of the effluent acute toxicity test comply with acute toxicity limitation, the accelerated monitoring need not be implemented for the receiving water.

e. **Toxicity Identification Evaluation (TIE).**

1. If the results of any two of the six accelerated tests are less than 90% survival, then the Discharger shall begin a Toxicity Identification Evaluation (TIE). The TIE shall include all reasonable steps to identify the sources of toxicity. Once the sources are identified, the Discharger shall take all reasonable steps to reduce toxicity to meet the objective.

2. If the initial test and any of the additional six acute toxicity bioassay tests results are less than 70% survival, the Discharger shall immediately implement Initial Investigation Toxicity Reduction Evaluation (TRE) Workplan. Once the sources are identified the Discharger shall take all reasonable steps to reduce toxicity to meet the requirements.

B. Chronic Toxicity Testing

1. Definition of Chronic Toxicity

Chronic toxicity is a measure of adverse sub-lethal effects in plants, animals, or invertebrates in a long-term test. The effects measured may include lethality or decreases in fertilization, growth, and reproduction.

2. Chronic Toxicity Effluent Monitoring Program

a. **Test Methods**. The Discharger shall conduct critical life stage chronic toxicity tests on 24-hour composite 100 % effluent samples or receiving water samples in accordance with EPA's *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, October 2002 (EPA-821-R-02-013) or EPA's *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, October 2002 (EPA-821-R-02-014), or current version.

b. **Frequency**

1. **Screening and Monitoring**. - The Discharger shall conduct the first chronic toxicity test screening for three consecutive months beginning from the date of initial discharge. The Discharger shall conduct short-term tests with the cladoceran, water flea (*Ceriodaphnia dubia* - survival and reproduction test), the fathead minnow (*Pimephales promelas* - larval survival and growth test), and the green alga (*Selenastrum capricornutum* - growth test) as an initial screening process for a minimum of three, but not to exceed, five suites of tests to account for potential variability of the effluent / receiving water. After this screening period, monitoring shall be conducted using the most sensitive species.

2. **Re-screening** Re-screening is required every 24 months. The Discharger shall re-screen with the three species listed above and continue to monitor with the most sensitive species. If the first suite of re-screening tests demonstrates that the same species is the most sensitive then the re-screening does not need to include more than one suite of tests. If a different species is the most sensitive or if there is ambiguity, then the Discharger shall proceed with suites of screening tests for a minimum of three, but not to exceed five suites.

3. Regular toxicity tests - After the screening period, monitoring shall be conducted monthly using the most sensitive species.

c. **Toxicity Units.** The chronic toxicity of the effluent shall be expressed and reported in Chronic Toxic Units, TUc, where,

$$TUc = \frac{100}{NOEC}$$

The No Observable Effect Concentration (NOEC) is expressed as the maximum percent effluent concentration that causes no observable effect on test organisms, as determined by the results of a critical life stage toxicity test.

3. Accelerated Monitoring

If the chronic toxicity of the effluent or the receiving water downstream the discharge exceeds the monthly trigger median of 1.0 TU_c, the Discharger shall conduct six additional tests, approximately every two weeks, over a 12-week period. The Discharger shall ensure that they receive results of a failing chronic toxicity test within 24 hours of the completion of the test and the additional tests shall begin within 5 business days of the receipt of the result. However, if the chronic toxicity of the receiving water upstream of the discharge is greater than the downstream and the TUc of the effluent chronic toxicity test is less than or equal to a monthly median of 1 TU_c trigger, then accelerated monitoring need not be implemented for the receiving water.

a. If any three out of the initial test and the six additional tests results exceed 1.0 TU_c the Discharger shall immediately implement the Initial Investigation TRE workplan.

b. If implementation of the initial investigation TRE workplan indicates the source of toxicity (e.g., a temporary plant upset, etc.), then the Discharger shall return to the normal sampling frequency required in Table 3 and Table 4 of this MRP.

c. If all of the six additional tests required above do not exceed 1 TUc, then the Discharger may return to the normal sampling frequency.

d. If a TRE/TIE is initiated prior to completion of the accelerated testing schedule required, then the accelerated testing schedule may be terminated, or used as necessary in performing the TRE/TIE, as determined by the Executive Officer.

C. Quality Assurance

1. Concurrent testing with a reference toxicant shall be conducted. Reference toxicant tests shall be conducted using the same test conditions as the effluent toxicity tests (e.g., same test duration, etc).

2. If either the reference toxicant test or effluent test does not meet all test acceptability criteria (TAC) as specified in the test methods manual (EPA-821-R-02-012 and/or EPA-821-R-02-013), then the Discharger must re-sample and re-test within 14 days.

3. Control and dilution water should be receiving water or laboratory water, as appropriate, as described in the manual. If the dilution water used is different from the culture water, a second control using culture water shall be used.

D. Preparation of an Initial Investigation TRE Workplan

The Discharger shall prepare and submit a copy of the Discharger's initial investigation Toxicity Reduction Evaluation (TRE) workplan to the Executive Officer of the Regional Water Board for approval within 90 days of the effective date of this permit. If the Executive Officer does not disapprove the workplan within 60 days, the workplan shall become effective. The Discharger shall use USEPA manual EPA/833B-99/002 (municipal) as guidance, or most current version. At a minimum, the TRE Workplan must contain the provisions in Attachment G. This workplan shall describe the steps the Discharger intends to follow if toxicity is detected, and should include, at a minimum:

1. A description of the investigation and evaluation techniques that will be used to identify potential causes and sources of toxicity, effluent variability, and treatment system efficiency.

2. A description of the facility's methods of maximizing in-house treatment efficiency and good housekeeping practices, and a list of all chemicals used in the operation of the facility; and,

3. If a toxicity identification evaluation (TIE) is necessary, an indication of the person who would conduct the TIEs (i.e., an in-house expert or an outside contractor). See MRP Section V.E.3 for guidance manuals.

E. Steps in Toxicity Reduction Evaluation (TRE) and Toxicity Identification Evaluation (TIE)

1. If results of the implementation of the facility's initial investigation TRE workplan indicate the need to continue the TRE/TIE, the Discharger shall expeditiously develop a more detailed TRE workplan for submittal to the Executive Officer within 15 days of completion of the initial investigation TRE. The detailed workplan shall include, but not be limited to:

   a. Further actions to investigate and identify the cause of toxicity;

   b. Actions the Discharger will take to mitigate the impact of the discharge and prevent the recurrence of toxicity; and

   c. A schedule for these actions.

2. The following section summarizes the stepwise approach used in conducting the TRE:

   a. Step 1 includes basic data collection.

   b. Step 2 evaluates optimization of the treatment system operation, facility housekeeping, and selection and use of in-plant process chemicals.

   c. If Steps 1 and 2 are unsuccessful, Step 3 implements a Toxicity Identification Evaluation (TIE) and employment of all reasonable efforts using currently available TIE methodologies. The objective of the TIE shall be to identify the substance or combination of substances causing the observed toxicity.

   d. Assuming successful identification or characterization of the toxicant(s), Step 4 evaluates final effluent treatment options.

   e. Step 5 evaluates in-plant treatment options.

   f. Step 6 consists of confirmation once a toxicity control method has been implemented.
   Many recommended TRE elements parallel source control, pollution prevention, and storm water control program best management practices (BMPs). To prevent duplication of efforts, evidence of compliance with those requirements may be sufficient to comply with TRE requirements. By requiring the first steps of a TRE to be accelerated testing and review of the facility's TRE workplan, a TRE may be ended in its early stages. All reasonable steps shall be taken to reduce toxicity to the required level. The TRE may be ended at any stage if monitoring indicates there are no longer toxicity violations.

3. The Discharger may initiate a TIE as part of the TRE process to identify the cause(s) of toxicity. The Discharger shall use the USEPA acute manual, chronic manual, EPA/600/R-96-054 (Phase I), EPA/600/R-92/080 (Phase II), and EPA-600/R-92/081 (Phase III), as guidance.

4. If a TRE/TIE is initiated prior to completion of the accelerated testing required in Section V.D. of this program, then the accelerated testing schedule may be terminated, or used as necessary in performing the TRE/TIE, as determined by the Executive Officer.

5. Toxicity tests conducted as part of a TRE/TIE may also be used for compliance, if appropriate.

6. The Regional Water Board recognizes that toxicity may be episodic and identification of causes of and reduction of sources of toxicity may not be successful in all cases. Consideration of enforcement action by the Board will be based, in part, on the Discharger's actions and efforts to identify and control or reduce sources of consistent toxicity.

   a. If all the results of the six additional tests are in compliance with the chronic toxicity limitation, the Discharger may resume regular monthly testing.

   b. If the results of any of the six accelerated tests exceeds the limitation, the Discharger shall continue to monitor bi-weekly until six consecutive weekly tests are in compliance. At that time, the Discharger may resume regular monthly testing.

   c. If the results of two of the six tests, or any two tests in a six-week period, exceed the limitation, the Discharger shall initiate a TRE.

   d. If implementation of the initial investigation TRE workplan (see item D.3, above) indicates the source of toxicity (e.g., a temporary plant upset, etc.), then the Discharger shall return to the regular testing frequency.

F. Ammonia Removal

1. Except with prior approval from the Executive Officer of the Regional Water Board, ammonia shall not be removed from bioassay samples. The Discharger must demonstrate the effluent toxicity is caused by ammonia *because of increasing test pH* when conducting the toxicity test. It is important to distinguish the potential toxic effects of ammonia from other pH sensitive chemicals, such as certain heavy metals, sulfide, and cyanide. The following may be steps to demonstrate that the toxicity is caused by ammonia and not other toxicants before the Executive Officer would allow for control of pH in the test.

a. There is consistent toxicity in the effluent and the maximum pH in the toxicity test is in the range to cause toxicity due to increased pH.

b. Chronic ammonia concentrations in the effluent are greater than 4 mg/L total ammonia.

c. Conduct graduated pH tests as specified in the toxicity identification evaluation methods. For example, mortality should be higher at pH 8 and lower at pH 6.

d. Treat the effluent with a zeolite column to remove ammonia. Mortality in the zeolite treated effluent should be lower than the non-zeolite treated effluent. Then add ammonia back to the zeolite-treated samples to confirm toxicity due to ammonia.

2. When it has been demonstrated that toxicity is due to ammonia because of increasing test pH, pH may be controlled using appropriate procedures which do not significantly alter the nature of the effluent, after submitting a written request to the Regional Water Board , and receiving written permission expressing approval from the Executive Officer of the Regional Water Board.

G. Reporting

The Discharger shall submit a full report of the toxicity test results, including any accelerated testing conducted during the month, as required by this permit. Test results shall be reported in percent Survival (% Survival) for Acute Toxicity and Chronic Toxicity Units (TUc) for chronic toxicity, as required, with the self-monitoring report (SMR) for the month in which the test is conducted. If an initial investigation indicates the source of toxicity and accelerated testing is unnecessary, pursuant to Section V.A.2.d and V.B.3, then those results also shall be submitted with the SMR for the period in which the Investigation occurred.

1. The full report shall be received by the Regional Water Board by the 15th day of the third month following sampling.

2. The full report shall consist of (1) the results; (2) the dates of sample collection and initiation of each toxicity test; (3) the toxicity trigger; and, (4) printout of the toxicity program (ToxCalc or CETIS).

3. Test results for toxicity tests also shall be reported according to the appropriate manual chapter on Report Preparation and shall be attached to the SMR. Routine reporting shall include, at a minimum, as applicable, for each test, as appropriate:

   a. sample date(s)

   b. test initiation date

c. test species

d. end point value(s) for each dilution (e.g. number of young, growth rate, percent survival)

e. NOEC values in percent effluent

f. TUc value(s), where $TU_c = \frac{100}{NOEC}$

g. Mean percent mortality (+standard deviation) after 96 hours in 100% effluent (if applicable)

h. NOEC and LOEC (Lowest Observable Effect Concentration) values for reference toxicant test(s)

i. Available water quality measurements for each test (e.g., pH, D.O., temperature, conductivity, hardness, salinity, ammonia).

4. The Discharger shall provide a compliance summary that includes a summary table of toxicity data from at least eleven of the most recent samples.

5. The Discharger shall notify this Regional Water Board immediately of any toxicity trigger exceedance and in writing 14 days after the receipt of the results of the exceedance. The notification will describe actions the Discharger has taken or will take to investigate and correct the cause(s) of toxicity. It may also include a status report on any actions required by the permit, with a schedule for actions not yet completed. If no actions have been taken, the reasons shall be given.

VI. LAND DISCHARGE MONITORING REQUIREMENTS

Not Applicable.

VII. RECLAMATION MONITORING REQUIREMENTS

Not applicable. Water Recycling Requirements (WRR) monitoring will be required in a separate Order.

VIII. RECEIVING WATER MONITORING REQUIREMENTS – SURFACE WATER AND GROUNDWATER

A. Monitoring Location RSW-001U and RSW-002D

1. The Discharger shall monitor The Santa Clara River at RSW-001U and RSW-002D as follows:

Table 7a.1. Receiving Water Monitoring Requirements

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Total waste flow	mgd	grab	weekly	[14]
Turbidity	NTU	grab	weekly	14
Total residual chlorine	mg/L	grab	weekly	14
Total coliform	MPN/ 100mL	grab	daily	14
Fecal coliform	MPN/ 100mL	grab	daily	14
E.coli	MPN/ 100mL	grab	daily[15]	14
Temperature[16]	°F	grab	daily	14
pH[16]	pH units	grab	daily	14
Settleable solids	mL/L	grab	daily	14
Suspended solids	mg/L	grab	weekly	14
BOD_5 20°C	mg/L	grab	weekly	14
Oil and grease	mg/L	grab	monthly	14
Dissolved oxygen	mg/L	grab	weekly	14
Total dissolved solids	mg/L	grab	monthly	14
Chloride	mg/L	grab	monthly	14
Sulfate	mg/L	grab	monthly	14
Boron	mg/L	grab	monthly	14
Fluoride	mg/L	grab	quarterly	14
Ammonia Nitrogen[16]	mg/L	grab	weekly	14
Nitrite nitrogen[16]	mg/L	grab	weekly	14
Nitrate nitrogen[16]	mg/L	grab	weekly	14
Organic nitrogen[16]	mg/L	grab	weekly	14
Total nitrogen	mg/L	grab	weekly	14
Total phosphorus	mg/L	grab	monthly	14
Orthophosphate-P	mg/L	grab	monthly	14
Algal biomass[17]	mg/L	grab	monthly	14

[14] Pollutants shall be analyzed using the analytical methods described in 40 CFR 136; where no methods are specified for a given pollutant, by methods approved by this Regional Water Board or State Water Resources Control Board. For any pollutant whose effluent limitation is lower than all the minimum levels (MLs) specified in Attachment 4 of the SIP, the analytical method with the lowest ML must be selected.

[15] E. coli testing shall be conducted only if fecal coliform testing is positive. If the fecal coliform analysis results in no detection, a result of less than (<) the reporting limit for fecal coliform will be reported for E. coli.

[16] Nitrate nitrogen, nitrite nitrogen, ammonia nitrogen, organic nitrogen, pH, and temperature sampling shall be conducted concurrently.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Surfactants (MBAS)[18]	mg/L	grab	monthly	14
Surfactants (CTAS)[18]	mg/L	grab	monthly	14
Total hardness ($CaCO_3$)	mg/L	grab	weekly	14
Chronic toxicity	TUc	grab	monthly	14
Acute toxicity	% Survival	grab	monthly	14
Perchlorate	µg/L	grab	semiannually	14
1,4-Dioxane	µg/L	grab	semiannually	14
1,2,3-Trichloropropane	µg/L	grab	semiannually	14
Methyl tert-butyl ether (MTBE)	µg/L	grab	semiannually	14
Antimony	µg/L	grab	monthly	14
Arsenic	µg/L	grab	monthly	14
Beryllium	µg/L	grab	semiannually	14
Cadmium	µg/L	grab	quarterly	14
Chromium III	µg/L	grab	quarterly	14
Chromium VI	µg/L	grab	quarterly	14
Copper	µg/L	grab	monthly	14
Lead	µg/L	grab	monthly	14
Mercury	µg/L	grab	monthly	14
Nickel	µg/L	grab	monthly	14
Selenium	µg/L	grab	monthly	14
Silver	µg/L	grab	quarterly	14
Thallium	µg/L	grab	quarterly	14
Zinc	µg/L	grab	monthly	14
Cyanide	µg/L	grab	monthly	14
2,3,7,8-TCDD[19]	µg/L	grab	semiannually	14

[17] Algal biomass or Chlorophyll A samples shall be collected by obtaining scrapings from the substrate. This will be a measure of benthic algae, rather than algae in the water column. Percent cover shall also be reported.

[18] MBAS is Methylene blue active substances and CTAS is cobalt thiocyanate active substances. Reaches of the Santa Clara River are unlined in several reaches downstream of the points of wastewater discharge and are designated with the beneficial use of groundwater recharge (GWR) in the Basin Plan. Monitoring is required to assess compliance with the Title 22-based limit prescribed to protect underlying groundwater quality with the MUN beneficial use.

[19] In accordance with the SIP, the Discharger shall conduct effluent monitoring for the seventeen 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD or dioxin) congeners in the effluent and in the receiving water Station RSW-002D, located downstream of the discharge point. The Discharger shall use the appropriate Toxicity Equivalence Factor (TEF) to determine Toxic Equivalence (TEQ). Where TEQ equals the product between each of the 17 individual congeners' (i) concentration analytical result (C_i) and their corresponding Toxicity Equivalence Factor (TEF_i)., (i.e., $TEQ_i = C_i \times TEF_i$). Compliance with the Dioxin limitation shall be determined by the summation of the seventeen individual TEQs, or the following equation:

$$\text{Dioxin concentration in effluent} = \sum_{1}^{17}(TEQ_i) = \sum_{1}^{17}(C_i)(TEF_i)$$

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Acrylonitrile	µg/L	grab	monthly	14
Bromoform	µg/L	grab	quarterly	14
Dibromochloromethane	µg/L	grab	quarterly	14
Chloroform	µg/L	grab	quarterly	14
Bromodichloromethane	µg/L	grab	quarterly	14
1,2-Dichloroethane	µg/L	grab	semiannually	14
Methyl bromide (Bromomethane)	µg/L	grab	semiannually	14
Methyl chloride (Chloromethane)	µg/L	grab	semiannually	14
Methylene chloride	µg/L	grab	semiannually	14
Tetrachloroethylene	µg/L	grab	monthly	14
Benzidine	µg/L	grab	semiannually	14
Benzo(a)anthracine	µg/L	grab	semiannually	14
Bis(2-ethylhexyl)phthalate	µg/L	grab	quarterly	14
p-Dichlorobenzene (1,4-Dichlorobenzene)	µg/L	grab	quarterly	14
3,3-Dichlorobenzidine	µg/L	grab	semiannually	14
1,2-Diphenylhydrazine	µg/L	grab	semiannually	14
Hexachlorobenzene	µg/L	grab	semiannually	14
Aldrin	µg/L	grab	semiannually	14
Gamma-BHC(Lindane)	µg/L	grab	semiannually	14
Chlordane	µg/L	grab	semiannually	14
4,4-DDT	µg/L	grab	semiannually	14
4,4-DDE	µg/L	grab	semiannually	14
4,4-DDD	µg/L	grab	semiannually	14
Dieldrin	µg/L	grab	semiannually	14
Endrin	µg/L	grab	semiannually	14
Heptachlor	µg/L	grab	semiannually	14
Heptachlor epoxide	µg/L	grab	semiannually	14
Diazinon[20]	µg/L	grab	semiannually	14
PCBs	µg/L	grab	semiannually	14
Toxaphene	µg/L	grab	semiannually	14
Barium	µg/L	grab	semiannually	14
Iron	µg/L	grab	monthly	14
Methoxychlor	µg/L	grab	semiannually	14
2,4-D	µg/L	grab	semiannually	14
2,4,5-TP (Silvex)	µg/L	grab	semiannually	14
Remaining EPA priority pollutants (except for asbestos)	µg/L	grab	semiannually	14

[20] Diazinon sampling shall be conducted concurrently with the receiving water chronic toxicity sampling.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Radioactivity(Including gross alpha, gross beta, combined radium-226 and radium-228, tritium, strontium-90 and uranium)[21]	PCi/L	grab	semiannually	14

Receiving water samples need not be collected during months in which there is no discharge to the Santa Clara River. However, a minimum of two samples per year, for each constituent, are required to be collected.

2. The Discharger shall monitor the Santa Clara River at a receiving water station RSW-001D located 100 feet downstream of the discharge as follows:

Table 7.a.2. Ammonia Receiving Water Monitoring Requirements

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Temperature	°F	grab	monthly	14
pH	pH units	grab	monthly	14
Ammonia Nitrogen	mg/L	grab	monthly	14
Acute Toxicity	% Survival	grab	monthly	14
Chronic Toxicity	TUc	grab	monthly	14

a. Toxicity Testing Requirement

i. Acute Toxicity – For this particular testing, only Fathead Minnow shall be used as the test species.

ii. Chronic Toxicity testing procedures shall follow the requirements described in Section V.B. of the MRP.

b. Ambient Receiving Water Requirements

The Discharger shall delineate the pH and temperature of the ambient receiving water conditions within 100 feet downstream from the point of discharge. A workplan describing the pH and temperature fluctuation study shall be submitted to the Executive Officer for Approval within 60 days from the date of adoption of this permit.

[21] Analyze these radiochemicals by the following USEPA methods: method 900.0 for gross alpha and gross beta, method 903.0 or 903.1 for radium-226, method 904.0 for radium-228, method 906.0 for tritium, method 905.0 for strontium-90, and method 908.0 for uranium. Analysis for combined Radium-226 & 228 shall be conducted only if gross alpha results for the same sample exceed 15 pCi/L or beta greater than 50 pCi/L. If Radium-226 & 228 exceeds the stipulated criteria, analyze for Tritium, Strontium-90 and uranium.

3. Receiving water samples shall not be taken during or within 48 hours following the flow of rainwater runoff into the Santa Clara River system. Sampling may be rescheduled at receiving water stations if weather and/or flow conditions would endanger personnel collecting receiving water samples. The monthly monitoring report shall note such occasions.

B. Monitoring Location RGW-001, RGW-002, and RGW-003

1. The Discharger shall monitor the groundwater aquifer at RGW-001 (Upgradient well), RGW-002 (Downgradient well) and RGW-003 (Downgradient well) as follows:

Table 7b. Receiving Ground Water Monitoring Requirements

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Nitrite nitrogen	mg/L	grab	quarterly	1
Nitrate nitrogen	mg/L	grab	quarterly	1
Organic nitrogen	mg/L	grab	quarterly	1
Total nitrogen	mg/L	grab	quarterly	1
Total phosphorus	mg/L	grab	quarterly	1
Orthophosphate-P	mg/L	grab	quarterly	1
Total Dissolved Solids	mg/L	grab	quarterly	1
Chloride	mg/L	grab	quarterly	1
Sulfate	mg/L	grab	quarterly	1
Boron	mg/L	grab	quarterly	1
Methyl tert-butyl ether (MTBE)	µg/L	grab	semiannually	USEPA 8260B (2 µg/L detection limit)
Perchlorate	µg/L	grab	semiannually	USEPA 314 (2 µg/L detection limit)
1,4-Dioxane	µg/L	grab	semiannually	USEPA 8270c (2 µg/L detection limit)
1,2,3-Trichloropropane	µg/L	grab	semiannually	USEPA 504.1 (0.005 µg/L detection limit)

1 Pollutants shall be analyzed using the analytical methods described in 40 CFR 136; where no methods are specified for a given pollutant, by methods approved by this Regional Water Board or State Water Resources Control Board. For any pollutant whose effluent limitation is lower than all the minimum levels (MLs) specified in Attachment 4 of the SIP, the analytical method with the lowest ML must be selected.

A workplan for a groundwater monitoring network capable of detecting any impact to the groundwater as a result of Newhall Ranch WRP's discharge, is due to the Regional Water Board 180 days upon the adoption of this Order. Groundwater monitoring shall commence no later than six months before the Newhall Ranch WRP's start-up date.

IX. OTHER MONITORING REQUIREMENTS

A. Watershed Monitoring

The goals of the Watershed-wide Monitoring Program for the Santa Clara River Watershed are to:

- Determine compliance with receiving water limits;
- Monitor trends in surface water quality;
- Ensure protection of beneficial uses;
- Provide data for modeling contaminants of concern;
- Characterize water quality including seasonal variation of surface waters within the watershed;
- Assess the health of the biological community; and
- Determine mixing dynamics of effluent and receiving waters in the estuary.

1. The Discharger shall participate in the implementation of the Watershed-wide Monitoring Program. The District's responsibilities under the Watershed-wide Monitoring Program are described in the Receiving Water Monitoring Requirements section. To achieve the goals of the Watershed-wide Monitoring Program, revisions to the Receiving Water Monitoring Requirements will be made under the direction of USEPA and the Regional Board. The District shall participate with the Santa Clara River Enhancement and Management Plan Steering Committee, and other stakeholders, in the development and implementation of a watershed-wide monitoring program. The Discharger shall submit a draft Watershed-wide Monitoring Program by October 15, 2009, to the Regional Board. In the interim, the Discharger shall submit quarterly progress reports detailing ongoing efforts towards the development of a Watershed-wide Monitoring Program. The first report should be received in the Regional Board office by April 15, 2008.

2. In coordination with interested stakeholders in the Santa Clara River Watershed, the Discharger shall conduct instream bioassessment monitoring once a year, during the spring/summer period (unless an alternate sampling period is approved by the Executive Officer). Over time, bioassessment monitoring will provide a measure of the physical condition of the waterbody and the integrity of its biological communities.

   A. The bioassessment program shall include an analysis of the community structure of the instream macroinvertebrate assemblages and physical habitat assessment at the monitoring stations RSW-001U and RSW-002D.

      This program shall be implemented by appropriately trained staff. Alternatively, a professional subcontractor qualified to conduct bioassessments may be selected to perform the bioassessment work for the Discharger. Analyses of the results of the bioassessment monitoring program, along with photographs of the monitoring site locations taken during sample collection, shall be submitted in the corresponding annual report. If another stakeholder, or interested party in the watershed subcontracts a

qualified professional to conduct bioassessment monitoring during the same season and at the same location as specified in the MRP, then the Discharger may, in lieu of duplicative sampling, submit the data, a report interpreting the data, photographs of the site, and related QA/QC documentation in the corresponding annual report.

B. The Discharger must provide a copy of their Standard Operation Procedures (SOPs) for the Bioassessment Monitoring Program to the Regional Board upon request. The document must contain step-by-step field, laboratory and data entry procedures, as well as, related QA/QC procedures. The SOP must also include specific information about each bioassessment program including: assessment program description, its organization and the responsibilities of all its personnel; assessment project description and objectives; qualifications of all personnel; and the type of training each member has received.

C. Field sampling must conform to the SOP established for the California Stream Bioassessment Procedure (CSBP) or more recently established sampling protocols, such as used by the Surface Water Ambient Monitoring Program (SWAMP). Field crews shall be trained on aspects of the protocol and appropriate safety issues. All field data and sample Chain of Custody (COC) forms must be examined for completion and gross errors. Field inspections shall be planned with random visits and shall be performed by the Discharger or an independent auditor. These visits shall report on all aspects of the field procedure with corrective action occurring immediately.

D. A taxonomic identification laboratory shall process the biological samples that usually consist of subsampling organisms, enumerating and identifying taxonomic groups and entering the information into an electronic format. The Regional Board may require QA/QC documents from the taxonomic laboratories and examine their records regularly. Intra-laboratory QA/QC for subsampling, taxonomic validation and corrective actions shall be conducted and documented. Biological laboratories shall also maintain reference collections, vouchered specimens (the Discharger may request the return of their sample voucher collections) and remnant collections. The laboratory should participate in an (external) laboratory taxonomic validation program at a recommended level of 10% or 20%. External QA/QC may be arranged through the California Department of Fish and Game's Aquatic Bioassessment Laboratory located in Rancho Cordova, California.

3. The Executive Officer of the Regional Water Board may modify Monitoring and Reporting Program to accommodate the watershed-wide monitoring.

X. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

1. The Discharger shall comply with all Standard Provisions (Attachment D) related to monitoring, reporting, and recordkeeping.

2. If there is no discharge during any reporting period, the report shall so state.

3. Each monitoring report shall contain a separate section titled "Summary of Non-Compliance" which discusses the compliance record and the corrective actions taken or planned that may be needed to bring the discharge into full compliance with waste discharge requirements. This section shall clearly list all non-compliance with discharge requirements, as well as all excursions of effluent limitations.

4. The Discharger shall inform the Regional Board well in advance of any proposed construction activity that could potentially affect compliance with applicable requirements.

5. Each monthly monitoring report shall include a determination of compliance with receiving water ammonia water quality objectives at RSW-001D. Any exceedances of an ammonia water quality objective shall be noted in the "Summary of Non-Compliance" section of the monitoring report.

B. Self Monitoring Reports (SMRs)

1. At any time during the term of this permit, the State or Regional Water Board may notify the Discharger to electronically submit Self-Monitoring Reports (SMRs) using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site (http://www.waterboards.ca.gov/ciwqs/index.html). Until such notification is given, the Discharger shall submit hard copy SMRs. The CIWQS Web site will provide additional directions for SMR submittal in the event there will be service interruption for electronic submittal.

2. The Discharger shall report in the SMR the results for all monitoring specified in this MRP under sections III through IX. Additionally, the Discharger shall report in the SMR the results of any special studies, acute and chronic toxicity testing, TRE/TIE, PMP, and Pollution Prevention Plan required by Special Provisions of this Order. The Discharger shall submit monthly and annual SMRs including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this Order. If the Discharger monitors any pollutant more frequently than required by this Order, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR.

3. Monitoring periods and reporting for all required monitoring shall be completed according to the following schedule:

Table 8. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On...	Monitoring Period	SMR Due Date
Continuous	Permit effective date	All	Submit with monthly SMR
Daily	Permit effective date	(Midnight through 11:59 PM) or any 24-hour period that reasonably represents a calendar day for purposes of sampling.	Submit with monthly SMR
Weekly	Sunday following permit effective date or on permit effective date if on a Sunday	Sunday through Saturday	Submit with monthly SMR
Monthly	First day of calendar month following permit effective date or on permit effective date if that date is first day of the month	1st day of calendar month through last day of calendar month	By the 15th day of the third month after the month of sampling
Quarterly	Closest of January 1, April 1, July 1, or October 1 following (or on) permit effective date	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31	June15 September 15 December 15 March 15
Semiannually	Closest of January 1 or July 1 following (or on) permit effective date	January 1 through June 30 July 1 through December 31	September15 March15
Annually	January 1 following (or on) permit effective date	January 1 through December 31	April 15

4. Reporting Protocols. The Discharger shall report with each sample result the applicable Reporting Level (RL) and the current Method Detection Limit (MDL), as determined by the procedure in 40 CFR Part 136.

   The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

   a. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

   b. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The *estimated chemical concentration of the sample shall also be reported.

      For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the

reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

c. Sample results less than the laboratory's MDL shall be reported as "Not Detected," or ND.

d. Dischargers are to instruct laboratories to establish calibration standards so that the ML value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from *extrapolation* beyond the lowest point of the calibration curve.

5. The Discharger shall submit SMRs in accordance with the following requirements:

a. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the facility is operating in compliance with interim and/or final effluent limitations. The Discharger is not required to duplicate the submittal of data that is entered in a tabular format within CIWQS. When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format within the system, the Discharger shall electronically submit the data in a tabular format as an attachment.

b. The Discharger shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify violations of the WDRs; discuss corrective actions taken or planned; and the proposed time schedule for corrective actions. Identified violations must include a description of the requirement that was violated and a description of the violation.

c. SMRs must be submitted to the Regional Water Board, signed and certified as required by the Standard Provisions (Attachment D), to the address listed below: (Reference the reports to Compliance File No. YYYY to facilitate routing to the appropriate staff and file.)

California Regional Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, CA 90013
Attention: Information Technology Unit

C. Discharge Monitoring Reports (DMRs)

1. As described in Section X.B.1 above, at any time during the term of this permit, the State or Regional Water Board may notify the Discharger to electronically submit SMRs that will satisfy federal requirements for submittal of Discharge Monitoring Reports (DMRs). Until such notification is given, the Discharger shall submit DMRs in accordance with the requirements described below.

2. DMRs must be signed and certified as required by the standard provisions (Attachment D). The Discharge shall submit the original DMR and one copy of the DMR to the address listed below:

STANDARD MAIL	FEDEX/UPS/ OTHER PRIVATE CARRIERS
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO Box 100 Sacramento, CA 95812-1000	State Water Resources Control Board Division of Water Quality c/o DMR Processing Center 1001 I Street, 15th Floor Sacramento, CA 95814

3. All discharge monitoring results must be reported on the official USEPA pre-printed DMR forms (EPA Form 3320-1). Forms that are self-generated will not be accepted unless they follow the exact same format of EPA Form 3320-1.

D. Other Reports

1. Annual Summary Report

By April 15 of each year, the Discharger shall submit an annual report containing a discussion of the previous year's influent/effluent analytical results and receiving water bacterial monitoring data. The annual report shall contain graphical and tabular summaries of the monitoring analytical data. The annual report shall also contain an overview of any plans for upgrades to the treatment plant's collection system, the treatment processes, or the outfall system. The Discharger shall submit a hard copy annual report to the Regional Water Board in accordance with the requirements described in subsection B.5 above.

Each annual monitoring report shall contain a separate section titled "Reasonable Potential Analysis" which discusses whether or not reasonable potential was triggered for pollutants which do not have a final effluent limitation in the NPDES permit. This section shall contain the following statement:" The analytical results for this sampling period did/ did not trigger reasonable potential." If reasonable potential was triggered, then the following information should also be provided:

a. A list of the pollutant(s) that triggered reasonable potential;
b. The Basin Plan or CTR criteria that was exceeded for each given pollutant;
c. The concentration of the pollutant(s);
d. The test method used to analyze the sample; and,
e. The date and time of sample collection.

2. The Discharger shall submit to the Regional Water Board, together with the first monitoring report required by this permit, a list of all chemicals and proprietary additives which could affect this waste discharge, including quantities of each. Any subsequent changes in types and/or quantities shall be reported promptly.

3. The Regional Board requires the Discharger to file with the Regional Board, within 90 days after the effective date of this Order, a technical report on his preventive (failsafe) and contingency (cleanup) plans for controlling accidental discharges, and for minimizing the effect of such events. The technical report should:

   a. Identify the possible sources of accidental loss, untreated waste bypass, and contaminated drainage. Loading and storage areas, power outage, waste treatment unit outage, and failure of process equipment, tanks, and pipes should be considered.

   b. Evaluate the effectiveness of present facilities and procedures and state when they become operational.

   c. Describe facilities and procedures needed for effective preventive and contingency plans.
   d. Predict the effectiveness of the proposed facilities and procedures and provide an implementation schedule contingent interim and final dates when they will be constructed, implemented, or operational.

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ATTACHMENT F – FACT SHEET

As described in section II of this Order, this Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for Dischargers in California. Only those sections or subsections of this Order that are specifically identified as "not applicable" have been determined not to apply to this Discharger. Sections or subsections of this Order not specifically identified as "not applicable" are fully applicable to this Discharger.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the facility.

Table 1. Facility Information

WDID	
Discharger	Newhall Ranch Sanitation District
Name of Facility	Newhall Ranch Water Reclamation Plant
Facility Address	Hwy 126 at Los Angeles/Ventura County Line
	Newhall, California, 91355
	Los Angeles County
Facility Contact, Title and Phone	Steve Sheridan, Principal Engineer (626) 458-7151
Authorized Person to Sign and Submit Reports	Steve Sheridan, Principal Engineer (626) 458-7151
Mailing Address	900 South Fremont, Alhambra, CA 91803
Billing Address	900 South Fremont, Alhambra, CA 91803
Type of Facility	POTW
Major or Minor Facility	Major
Threat to Water Quality	1
Complexity	A
Pretreatment Program	N
Reclamation Requirements	Future producer, applied for new water recycling requirements under separate Order
Facility Permitted Flow	2 million gallons per day (MGD)
Facility Design Flow	2 MGD
Watershed	Santa Clara River
Receiving Water	Santa Clara River
Receiving Water Type	Inland surface water

A. Ownership.

Newhall Land and Farming Company (Newhall Land) is planning on transferring ownership of the land to Newhall Ranch Sanitation District (Newhall Ranch SD) in September 2007. Newhall Ranch SD will make a formal application to the existing twenty-four County Sanitation Districts to become signatory to the amended Joint Administration Agreement (JAA), dated July 1, 1980, of the County Sanitation Districts of Los Angeles County. Newhall Ranch SD will also make a formal application to the Santa Clarita Valley Sanitation District to enter into an agreement regarding the ownership and operation of the Newhall Ranch WRP. These agreements will allow the County Sanitation Districts of Los Angeles County to be the operator of the Newhall Ranch WRP, and to provide engineering and administrative staff at the Newhall Ranch WRP. However, the Los Angeles County Department of Public Works will staff the Newhall Ranch SD until such time as Newhall Ranch SD joins the JAA. Newhall Ranch SD will retain ownership of the Newhall Ranch WRP.

For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

B. Proposed Discharge.

The Discharger proposes to discharge tertiary-treated wastewater to the Santa Clara River, a water of the United States. The Newhall Ranch Water Reclamation Plant will be a new discharger and is currently not regulated by any other Order. Although Newhall Land has obtained coverage under the General Order No. R4-2003-0111, National Pollutant Discharge Elimination System (NPDES) permit No. CAG994004, to discharge groundwater associated with dewatering and construction activities. Discharge of tertiary-treated effluent, as proposed in the Report of Waste Discharge (ROWD), should commence several months after the effective date of this NPDES Order.

C. ROWD.

The Discharger filed a report of waste discharge and submitted an application for new Waste Discharge Requirements (WDRs) and NPDES permit on April 23, 2004, years in advance of the anticipated discharge date and prior to the formation of the new Newhall Ranch Sanitation District. Supplemental information, including the analytical results of receiving water sampling, was submitted between September 27, 2004 and March 30, 2007. The required signatory requirements for the ROWD were received on May 4, 2007 and May 23, 2007. A site visit was conducted on May 23, 2007, to observe the site where the new POTW would be constructed.

II. FACILITY DESCRIPTION

A. Description of Wastewater and Biosolids Treatment or Controls

Treatment at the Newhall Ranch WRP, a publicly owned treatment works (POTW), will consist of screening, activated sludge secondary treatment with membrane bioreactors, nitrification/denitrification, ultraviolet disinfection, and partial reverse osmosis. There will

be no solids handling facilities in the near term. Waste activated sludge will be hauled away to the Valencia Water Reclamation Plant for further treatment and disposal. Brine from the RO system will be disposed of through deep well injection, under a separate USEPA permit. Treated wastewater will be discharged from Discharge Point 001 (see Table on Cover Page) to the Santa Clara River, a water of the United States, tributary to the Santa Clara River Estuary, within the Santa Clara River Watershed.

B. Discharge Points and Receiving Waters

The Newhall Ranch WRP will discharge tertiary-treated wastewater to an unlined section of the Santa Clara River, a water of the United States, through Discharge Serial No. 001(Latitude 34° 0.403166'N, Longitude 118° 0.6896667'W), within the Santa Clara River Watershed. The Newhall Ranch WRP will be located downstream of the Los Angeles County Sanitation District's Saugus and Valencia WRPs It will have an initial design capacity of 2 MGD, and incrementally increase its design capacity to 6.8 MGD [2.0 MGD in Phase I; 4.0 MGD in Phase II; and 6.8 MGD in Phase III], to accommodate the sewage generated by new inhabitants, as additional tracts of the Landmark Village development project are completed.

The Santa Clara River is one of the largest river systems in southern California. The River originates in the northern slope of the San Gabriel Mountains in Los Angeles County, traverses Ventura County, and flows into the Pacific Ocean, halfway between the cities of San Buenaventura and Oxnard.

Extensive patches of riparian habitat are present along the length of the River and its tributaries. The endangered fish, the unarmored stickleback, is resident in the river. One of the largest of the Santa Clara River's tributaries, Sespe Creek, is designated as a wild trout stream by the state of California and supports significant spawning and rearing habitat. The Sespe Creek is also designated a wild and scenic river. Piru and Santa Paula Creeks, which are tributaries to the Santa Clara River, support habitat for steelhead. In addition, the river serves as an important wildlife corridor. A lagoon exists at the mouth of the river and supports a large variety of wildlife.

C. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

Not applicable. Newhall Ranch WRP does not have any existing requirements.

Table 2. Historic Effluent Limitations and Monitoring Data

Parameter	Units	Effluent Limitation			Monitoring Data (From <Date> – To <Date>)		
		Average Monthly	Average Weekly	Maximum Daily	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge

D. Compliance Summary

Not applicable. Newhall Ranch WRP does not have any existing requirements.

E. Planned Changes

The Newhall Ranch WRP would have an initial design capacity of 2 MGD, and incrementally increase its design capacity to 6.8 MGD [2.0 MGD in Phase I; 4.0 MGD in Phase II; and 6.8 MGD in Phase III], to accommodate the sewage generated by new inhabitants, as additional tracts of the Landmark Village development project are completed.

- In January 2008 grading activities are scheduled to begin.
- In June 2008 Newhall Ranch SD is scheduled to approve the plans for the plant design.
- In September 2008, construction of the Newhall Ranch WRP is scheduled to begin.
- By August 2009, the Newhall Ranch WRP (2 MGD capacity) should be constructed.

Pending the outcome of TMDL-based studies being conducted in the Santa Clara River Watershed, the plant may be modified in the future to provide reverse osmosis treatment to a portion of the treated effluent, in an effort to reduce the chloride concentrations discharged.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in the proposed Order are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. Environmental Protection Agency (USEPA) and chapter 5.5, division 7 of the California Water Code (commencing with section 13370). It shall serve as an NPDES permit for point source discharges from this facility to surface waters. This Order also serves as WDRs pursuant to article 4, chapter 4, division 7 of the Water Code (commencing with section 13260).

B. California Environmental Quality Act (CEQA)

The discharger is not a new source, as defined in the CWA. (See 40 CFR part 122.2.) Therefore, the approval of this permit is not subject to the California Environmental Quality Act (CEQA), as stated in section 13389 of the CWC.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plans.** The Regional Water Board adopted a Water Quality Control Plan for the Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (hereinafter Basin Plan) on June 13, 1994 that designates beneficial uses, establishes water quality objectives, and contains

implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, State Water Resources Control Board (State Water Board) Resolution No. 88-63 requires that, with certain exceptions, the Regional Water Board assign the municipal and domestic water supply use to water bodies that do not have beneficial uses listed in the Basin Plan. Beneficial uses applicable to the Santa Clara River are as follows:

Table 3. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	Santa Clara River (Hydro Unit 403.51)	Existing: Industrial Service Supply (IND); Industrial Process Supply (PROC); Agricultural Supply (AGR); Ground Water Recharge (GWR); Freshwater Replenishment (FRSH);Water Contact Recreation (REC-1); Non-contact Water Recreation (REC-2); Warm Freshwater Habitat (WARM); Wildlife Habitat (WILD); preservation or rare, threatened or endangered species (RARE); and, Wetland Habitat (WET). Potential*: Municipal and domestic water supply (MUN).
	Santa Clara River (Hydro Unit 403.41)	Existing: IND; PROC; AGR; GWR; FRSH; REC-1; REC-2; WARM; WILD; RARE; Migration of Aquatic Organisms (MIGR) and, WET. Potential*: MUN
	Santa Clara River (Hydro Unit 403.31)	Existing: IND; PROC; AGR; GWR; FRSH; REC-1; REC-2; WARM; WILD; RARE; MIGR and, WET. Potential*: MUN
	Santa Clara River (Hydro Unit 403.21)	Existing: IND; PROC; AGR; GWR; FRSH; REC-1; REC-2; WARM; WILD; RARE; MIGR and, WET. Potential*: MUN.
	Santa Clara River (Hydro Unit 403.11)	Existing: IND; PROC; AGR; GWR; FRSH; REC-1; REC-2; WARM; Cold Water Habitat (COLD); WILD; RARE; MIGR and, WET. Potential*: MUN.
	Santa Clara River Estuary (Hydro Unit 403.11)	Existing: Navigation (NAV); REC-1; REC-2; Commercial and Sport Fishing (COMM); Estuarine Habitat (EST); Marine Habitat (MAR); WILD; RARE; MIGR; Spawning, Reproduction, and/or Early Development (SPWN); and, WET.

Requirements of this Order implement the Basin Plan and subsequent amendments.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995 and November 9, 1999. About forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants.

3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The SIP became effective on April 28, 2000 with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Board in the Basin Plan. The SIP became effective on May 18, 2000 with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005 that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

4. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards (WQS) become effective for CWA purposes (40 C.F.R. § 131.21, 65 Fed. Reg. 24641 (April 27, 2000)). Under the revised regulation (also known as the Alaska rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

5. **Antidegradation Policy.** Section 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. The permitted discharge must be consistent with the antidegradation provision of section 131.12 and State Water Board Resolution No. 68-16.

6. **Anti-Backsliding Requirements.** Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at title 40, Code of Federal Regulations[1] section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require

[1] All further statutory references are to title 40 of the Code of Federal Regulations unless otherwise indicated.

that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed. Since this is a new discharge, all effluent limitations and requirements contained in this Order are new. Therefore, there is no relaxation of effluent limitations. The WDR is consistent with the anti-backsliding requirements of the CWA and federal regulations.

D. Impaired Water Bodies on CWA 303(d) List

On November 30, 2006, USEPA approved the State's 2004-2006 303(d) list of impaired waterbodies. The list (hereinafter referred to as the 303(d) list) was prepared in accordance with section 303(d) of the Federal Clean Water Act to identify specific impaired waterbodies where water quality standards are not expected to be met after the implementation of technology-based effluent limitations on point sources.

Santa Clara River, Santa Clara River Estuary, and their tributaries are on the 2006 303(d) List. The following pollutants/stressors, from point and non-point sources, were identified as impacting the receiving waters:

7. Santa Clara River Estuary: Chem A, and Coliform Bacteria;

8. Santa Clara River Reach 1 (Estuary to Hwy 101 Bridge): Toxicity:

9. Santa Clara River Reach 3 (Freeman Diversion to A Street): Total Dissolved Solids;

10. Santa Clara River Reach 5 [formerly Reach 7 in 2002 303d list] (Blue Cut to West Pier Hwy 99 Bridge): Coliform Bacteria;

11. Santa Clara River Reach 6 [formerly Reach 8 in 2002 303d list] (W. Pier Hwy 99 to Bouquet Canyon Rd. Bridge) -- Hydrologic Unit 403.51: Chlorpyrifos, Coliform Bacteria, Diazinon, and Toxicity; and,

12. Santa Clara River Reach 7 [formerly Reach 9 in 2002 303d list] (Bouquet Canyon Rd to above Lang Gaging) -- Hydrologic Unit 403.51: Coliform Bacteria.

E. Other Plans, Polices and Regulations

1. **Sources of Drinking Water Policy**. On May 19, 1988, the State Water Board adopted Resolution No. 88-63, *Sources of Drinking Water (SODW) Policy*, which established a policy that all surface and ground waters, with limited exemptions, are suitable or potentially suitable for municipal and domestic supply. To be consistent with State Water Board's SODW policy, on March 27, 1989, the Regional Water Board adopted Resolution No. 89-03, *Incorporation of Sources of Drinking Water Policy into the Water Quality Control Plans (Basin Plans)– Santa Clara River Basin (4A)/ Los Angeles River Basin (4B).*

Consistent with Regional Water Board Resolution No. 89-03 and State Water Board Resolution No. 88-63, in 1994 the Regional Water Board conditionally designated all inland surface waters in Table 2-1 of the 1994 Basin Plan as existing, intermittent, or potential for Municipal and Domestic Supply (MUN). However, the conditional designation in the 1994 Basin Plan included the following implementation provision: "no new effluent limitations will be placed in Waste Discharge Requirements as a result of these [potential MUN designations made pursuant to the SODW policy and the Regional Water Board's enabling resolution] until the Regional Water Board adopts [a special Basin Plan Amendment that incorporates a detailed review of the waters in the Region that should be exempted from the potential MUN designations arising from SODW policy and the Regional Water Board's enabling resolution]." On February 15, 2002, the USEPA clarified its partial approval (May 26, 2000) of the 1994 Basin Plan amendments and acknowledged that the conditional designations do not currently have a legal effect, do not reflect new water quality standards subject to USEPA review, and do not support new effluent limitations based on the conditional designations stemming from the SODW Policy until a subsequent review by the Regional Water Board finalizes the designations for these waters. This permit is designed to be consistent with the existing Basin Plan.

2. **Secondary Treatment Regulations**. Section 133 of 40 CFR establishes the minimum levels of effluent quality to be achieved by secondary treatment. These limitations, established by USEPA, are incorporated into this Order, except where more stringent limitations are required by other applicable plans, policies, or regulations.

3. **Storm Water**. CWA section 402(p), as amended by the Water Quality Act of 1987, requires NPDES permits for storm water discharges. Pursuant to this requirement, in 1990, USEPA promulgated 40 CFR, Section 122.26 that established requirements for storm water discharges under an NPDES program. To facilitate compliance with federal regulations, on November 1991, the State Water Board issued a statewide general permit, *General NPDES Permit No. CAS000001 and Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities.* This permit was amended in September 1992 and reissued on April 17, 1997 in State Water Board Order No. 97-03-DWQ to regulate storm water discharges associated with industrial activity.

   General NPDES permit No. CAS000001 is applicable to storm water discharges from the Newhall Ranch WRP's premises. Newhall Ranch SD will file a Notice of Intent to comply with the requirements of the general permit. Newhall Ranch SD will develop and implement a Storm Water Pollution Prevention Plan (SWPPP), to comply with the State Water Board's (Order No. 97-03-DWQ). Newhall Ranch SD will capture and treat a percentage of the first flush runoff that falls on the Newhall Ranch WRP.

4. **Sanitary Sewer Overflows.** The Clean Water Act prohibits the discharge of pollutants from point sources to surface waters of the United States unless authorized under an NPDES permit. (33 U.S.C. §§1311, 1342). The State Water Board adopted Statewide General Waste Discharge Requirements (WDRs) for

Sanitary Sewer Systems, Water Quality Order No. 2006-0003 on May 2, 2006, to provide a consistent, statewide regulatory framework to address Sanitary Sewer Overflows (SSOs). The WDR requires public agencies that own or operate sanitary sewer systems to develop and implement sewer system management plans and report all SSOs to the State Water Board's online SSO database.

The requirements contained in this Order in Sections VI.C.3.b, VI.C.4, and VI.C.5.c.6. are intended to be consistent with the requirements in the SSO WDR. The Regional Water Board recognizes that there are areas of overlapping interest between the NPDES permit conditions and the SSO WDR requirements. The requirements of the SSO WDR are considered the minimum thresholds (see Finding 11 of WQ Order N0. 2006-0003). The Regional Water Board will accept the documentation prepared by the Permittee under the SSO WDR for compliance purposes, as satisfying the requirements in Sections VI.C.3.b, VI.C.4, and VI.C.5.c.6, provided for any more specific or stringent provisions enumerated in this Order, have also been addressed.

5. **Watershed Management** - This Regional Water Board has been implementing a Watershed Management Approach (WMA), to address water quality protection in the Los Angeles Region, as detailed in the Watershed Management Initiative (WMI). The WMI is designed to integrate various surface and ground water regulatory programs while promoting cooperative, collaborative efforts within a watershed. It is also designed to focus limited resources on key issues and use sound science. Information about the Santa Clara River Watershed and other watersheds in the region can be obtained from the Regional Water Board's web site at *http://www.swrcb.ca.gov/rwqcb4/* and clicking on the word "Watersheds".

6. **Relevant Total Maximum Daily Loads** - A Total Maximum Daily Load (TMDL) is a determination of the amount of a pollutant, from point, non-point, and natural background sources, including a margin of safety that may be discharged to a water quality-limited water body. Section 303(d) of the CWA established the TMDL process. The statutory requirements are codified at 40 CFR, Part 130.7. TMDLs must be developed for the pollutants of concern, which impact the water quality of water bodies on the 303(d) list. The Regional Water Board has developed a TMDL that assesses the extent and sources of the ammonia and algae (nutrient/nitrogen) problems in the Santa Clara River. According to the TMDL schedule, under the amended concent decree, *Heal the Bay, Santa Monica Bay Keeper, et al. v. Browner, et al.* (March 23, 1999), the nitrogen and chloride TMDLs for the Santa Clara River must be completed by 2004 and 2003, respectively. The coliform TMDL was scheduled for completion by 2006.

   a. **Chloride TMDL.**
      i. On October 24, 2002, the Regional Water Board adopted Resolution No. 2002-018, *Amendment to the Basin Plan for the Los Angeles Region to Incorporate a Total Maximum Daily Load to Reduce Chloride Loading in the Upper Santa Clara River*. Soon after, the Regional Water Board submitted the TMDL to the State Water Board for approval. On February 19, 2003, the

State Water Board adopted Resolution No. 2003-0014, the "Remand Resolution," finding that the Regional Water Board staff prepared the documents and followed procedures satisfying environmental documentation requirements in accordance with the California Environmental Quality Act, scientific peer review, and other State laws and regulations to develop a TMDL. However, the Remand Resolution directed the Regional Water Board to consider revising the implementation provisions of the chloride TMDL. On July 10, 2003, the Regional Water Board reconsidered Resolution No. 2002-018, in light of the Remand Resolution, and adopted Resolution No. 2003-008 which modified the chloride TMDL implementation provisions by:

(1) Expanding the phased-TMDL approach to allow CSDLAC to complete the implementation tasks sequentially and within 13 years;
(2) Extending the interim limits beyond the proposed two and a half years but not to exceed 13 years, so that the interim limits may remain in effect during the planning, construction, and execution portions of the TMDL's implementation tasks; and,
(3) Modifying the TMDL analysis task list to include an assessment/ evaluation of alternative water supplies for agricultural beneficial uses.

On May 6, 2004, the Regional Water Board adopted Resolution No. 2004-004, amending the Upper Santa Clara River Chloride TMDL. State Water Board, OAL, and USEPA approval occurred on July 22, 2004, November 15, 2004, and April 28, 2005, respectively. The Chloride TMDL became effective on May 4, 2005.

On August 3, 2006, the Regional Water Board adopted Resolution No. R4-2006-016, Amendment to the Water Quality Control Plan for the Los Angeles Region through revision of the Implementation Plan for the Upper Santa Clara River Chloride TMDL, which shortened the compliance schedule from thirteen to eleven years. State Water Board approved the resolution on May 22, 2007. OAL, and USEPA approval is pending.

ii. On March 26, 2007, TMDL staff wrote a technical memo regarding the waste load allocation for chloride for Newhall Ranch WRP. The memo included the following background information and conclusions

(1) <u>Background</u>.

a. The Newhall Ranch WRP, currently in the planning stages, is part of the Newhall Ranch Specific Plan which guides the long-term development of the 11963-acre Newhall Ranch Community. Based on information provided by the Newhall Ranch Company on November 22, 2006, the Newhall Ranch WRP treatment capacity will be 6.8 MGD of municipal and commercial wastewater that will be generated by the prospective Newhall Ranch community. The treated wastewater will be reclaimed for landscape irrigation during dry weather conditions. During wet weather, when irrigation demands are lower, unused reclaimed water will be

discharged to Reach 5 of the Santa Clara River. A new sanitation district will be formed to maintain and operate the Newhall Ranch WRP.

b. The existing water quality objective (WQO) for chloride in Reaches 5 and 6 of the Santa Clara River is 100 milligrams per liter (mg/L). The most sensitive beneficial uses for chloride is agricultural supply (AGR). Because chloride levels in the Upper Santa Clara River (USCR) exceeded the water quality objective WQO, the USCR was listed on the 1998 303(d) list and a total maximum daily load (TMDL) for chloride in the USCR was adopted by the Regional Water Board. The USCR Chloride TMDL became effective on May 4, 2005, and the chloride wasteload allocation for existing major Publicly-Owned Treatment Works (POTWs) discharging to the USCR is also 100 mg/L. The TMDL found that the nonpoint sources of chloride were not significant relative to the point sources and that concentration based wasteload allocations were effective in protecting beneficial uses. The TMDL identified wastewater discharges from the Los Angeles County Sanitation Districts (Districts) Saugus and Valencia Water Reclamation Plants (WRPs) as the primary source of chloride and assigns waste load allocations (WLAs) of 100 mg/L chloride to the Districts WRPs. Other NPDES discharges contribute a minor chloride load and the chloride WLAs for these point sources is 100 mg/L.

c. The USCR chloride WLAs are expressed on a concentration basis derived from and equivalent to the existing WQO, thereby providing direct protection of the most sensitive beneficial use, , agricultural supply (AGR). Under the TMDL Implementation Plan, a special study was conducted to confirm that the concentration-based WLA of 100 mg/L chloride is protective of AGR. That study has been completed and confirms that the concentration-based WLA of 100 mg/L is protective of salt sensitive AGR. A concentration-based WLA also accommodates future growth and provides beneficial uses protection from chloride loads that were in place at the time of the TMDL development. Protection of beneficial uses from additional chloride loads that were not assigned wasteload allocations is provided by using the WLAs as effluent limits in permits for new and future sources such as Newhall Ranch WRP.

d. The Staff Report for the TMDL, dated August 21, 2002, states "A concentration-based target accommodates future growth by allowing increased mass as long as it is accompanied by additional flow. This analysis is based on existing discharge locations in the Upper Santa Clara River. Regional Water Board staff understands that an additional water reclamation plant is planned to accommodate future growth in the Santa Clarita Valley and that this plant will discharge only during rain events. Permitting of additional discharges may compromise the success of the TMDL without additional studies." Although the Staff Report implies that permitting of additional discharges may require

additional studies, it is a general statement that does not define the types of studies needed. Staff finds that additional studies are not needed in order to conclude that water quality will not be degraded if concentration-based wasteload allocations that are equivalent to the WQO are assigned to new facilities. If the WLAs and effluent limits for new facilities in the Upper Santa Clara River watershed are set at the end-of pipe and are equivalent to the TMDL WLA and WQO staff finds that these WLAs will not cause degradation of water quality. Studies regarding the effect of additional chloride load on groundwater basins underlying the USCR River are underway and scheduled for completion by November 2007. Initial results from these studies show that discharges at effluent limits of 100 mg/L chloride will not degrade groundwater quality. Staff finds that results from these studies may be used to revise the effluent limits for all dischargers discharging at 100 mg/L if necessary. If this occurs, the NPDES permit for Newhall Ranch WRP will be reopened.

e. The majority of effluent from the Newhall Ranch WRP will be used for reclaimed water purposes. Discharge to the Santa Clara River (SCR) will primarily occur during periods when the effluent supply exceeds the reclaimed demand, such as during the peak wet months of the November through March. During years 1 and 2 of the WRP operation, the WRP will operate at a maximum of 2 mgd, with an estimated average discharge flow rate of 0.2 mgd during the 5 month wet period. No sooner than year 3 will the WRP be expanded to 6.8 mgd, with an approximate average discharge flowrate of 0.6 mgd during this 5 month wet period. Therefore, discharge periods will coincide with peak wet months when dilution capacity is maximal (i.e., instream flows are highest). The average November-March instream flowrate at USGS station 11109000 (Newhall Bridge, approximately 2.5 miles downstream of the County line) is 188 cfs (121 mgd) based on measured average daily flow data for water years 1977-2006. Newhall WRP effluent will represent less than 1% of this average volume. Consequently, TMDL staff finds that the proposed discharge will not add appreciable chloride loads to the surface water or underlying groundwater.

(2) Conclusion.

The Upper Santa Clara River Chloride TMDL WLAs for discharges from the Saugus and Valencia WRPs into Reach 5 and 6 of the Santa Clara River are concentration-based which protects sensitive AGR uses in the River while accommodating future growth. The TMDL does not prohibit future growth or increased loads. Use of concentration-based WLAs requires that increased chloride loads are concurrent with increased discharge flow to the USCR. The increased flow increases the capacity of the receiving water to assimilate chloride. Because the Newhall Ranch WRP will increase flow in the WRP, the discharge of the NRWRP would not contribute to further impairment of surface water in Reaches 5 and 6 of

the Santa Clara River if the chloride concentration in discharge is equal to or less than the WQO and TMDL WLA of 100 mg/L. An NPDES discharge permit with an effluent limit of 100 mg/L chloride would be consistent with the TMDL. Additional studies are not needed at this time if the effluent limit for chloride is concentration-based and set at, or is less than the WQO the of 100 mg/L.

b. **Nitrogen Compounds TMDL**. On August 7, 2003, the Regional Water Board adopted Resolution No. 2003-11, the *Santa Clara River Nitrogen Compounds TMDL (Nitrogen Compounds TMDL)*. State Water Board, OAL, and USEPA approval occurred on November 19, 2003, February 27, 2004, and March 18, 2004, respectively. The Nitrogen Compounds TMDL became effective on March 23, 2004. Although the Nitrogen Compounds TMDL does not specify an individual WLA for the Newhall Ranch WRP, the Nitrogen Compounds TMDL staff report does discuss future growth. The staff report states that "the numeric targets for POTWs with increasing capacity or new POTWs will be set on a concentration basis...."

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the Code of Federal Regulations: section 122.44(a) requires that permits include applicable technology-based limitations and standards; and section 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water.

A. Discharge Prohibitions

Effluent and receiving water limitations in this Board Order are based on the Federal Clean Water Act, Basin Plan, State Water Board 's plans and policies, USEPA guidance and regulations, and best practicable waste treatment technology. This order authorizes the discharge of tertiary-treated wastewater through Discharge Serial No. 001 only. It does not authorize any other types of discharges.

B. Technology-Based Effluent Limitations

1. Scope and Authority

Technology-based effluent limits require a minimum level of treatment for industrial/municipal point sources based on currently available treatment technologies while allowing the discharger to use any available control techniques to meet the effluent limits. The 1972 CWA required POTWs to meet performance requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level--referred to as "secondary

treatment"--that all POTWs were required to meet by July 1, 1977. More specifically, Section 301(b)(1)(B) of the CWA required that EPA develop secondary treatment standards for POTWs as defined in Section 304(d)(1). Based on this statutory requirement, EPA developed national secondary treatment regulations which are specified in 40 CFR 133. These technology- based regulations apply to all POTWs and identify the minimum level of effluent quality to be attained by secondary treatment in terms of five-day biochemical oxygen demand, total suspended solids, and pH.

Section 301(b) of the CWA and implementing USEPA permit regulations at section 122.44, title 40 of the Code of Federal Regulations, require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at Part 133 and Best Professional Judgment (BPJ) in accordance with Part 125, section 125.3.

2. Applicable Technology-Based Effluent Limitations

This facility is subject to the technology-based regulations for the minimum level of effluent quality attainable by secondary treatment in terms of $BOD_5 20°C$, TSS, and pH. The following Table summarizes the technology-based effluent limitations applicable to the Facility:

Summary of Technology-based Effluent Limitations
Discharge Point 001

Table 4. Summary of Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
$BOD_5 20°C$	mg/L	20	30	45	--	--
	lbs/day *	330	500	750	--	--
Total Suspended solids (TSS)	mg/L	15	40	45	--	--
	lbs/day	250	670	750	--	--
pH	standard units	--	--	--	6.5	8.5
Removal Efficiency for BOD and TSS	%	85	--	--	--	--

* The mass emission rates are based on the plant design flow rate of 2.0 mgd, and are calculated as follows: Flow(MGD) x Concentration (mg/L) x 8.34 (conversion factor) = lbs/day. However, the design capacity will incrementally increase to 6.8 MGD, as the phased plant upgrades approach completion. The mass-based effluent limitation will accordingly be modified following an Anti-degradation analysis demonstration conducted by the Discharger, and upon certification and approval of increased treatment plant capacity. During wet-weather storm events in which the flow exceeds the design capacity, the mass discharge rate limitations shall not apply, and concentration limitations will provide the only applicable effluent limitations.

However, this facility is also subject to technology-based effluent limitations contained in similar NPDES permits, for similar facilities, based on the treatment level achievable by tertiary-treated wastewater treatment systems. These effluent limitations are consistent with the State Water Board precedential decision, State Water Board Order No. WQ 2004-0010 for the City of Woodland. Further, mass-based effluent limitations are based on a design flow rate of 2.0 MGD for Phase I, and ultimately on a 6.8 MGD flow rate for Phase III.

C. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

Section 301(b) of the CWA and section 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. This Order contains requirements, expressed as a technology equivalence requirement, more stringent than secondary treatment requirements that are necessary to meet applicable water quality standards. The rationale for these requirements, which consist of tertiary treatment or equivalent requirements or other provisions, is discussed starting from Section IV.C.2.b.

Section 122.44(d)(1)(i) mandates that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, water quality-based effluent limitations (WQBELs) must be established using: (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in section 122.44(d)(1)(vi).

The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the CTR and NTR. Table R1 contains the RP analysis.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

a. The Basin Plan establishes the beneficial uses for surface water bodies in the Los Angeles region. The beneficial uses of the Santa Clara River affected by the

discharge have been described previously in this Fact Sheet and in the WDR findings.

b. The Basin Plan also specifies narrative and numeric water quality objectives applicable to surface water as shown in the following discussions.

i. Table 5 summarizes the applicable water quality criteria/objective for priority pollutants reported in detectable concentrations in the effluent or receiving water. These criteria were used in conducting the Reasonable Potential Analysis for this Order.

ii. **Biochemical Oxygen Demand (BOD) and Suspended solids**

Biochemical oxygen demand (BOD) is a measure of the quantity of the organic matter in the water and, therefore, the water's potential for becoming depleted in dissolved oxygen. As organic degradation takes place, bacteria and other decomposers use the oxygen in the water for respiration.

Unless there is a steady resupply of oxygen to the system, the water will quickly become depleted of oxygen. Adequate dissolved oxygen levels are required to support aquatic life. Depressions of dissolved oxygen can lead to anaerobic conditions resulting in odors, or, in extreme cases, in fish kills.

40 CFR, Part 133 describes the minimum level of effluent quality attainable by secondary treatment, for BOD and suspended solids, as:

a. the monthly average shall not exceed 30 mg/L; and,
b. the 7-day average shall not exceed 45 mg/L.

The Newhall Ranch WRP will provide tertiary treatment, as such, the limits in the permit are more stringent than secondary treatment requirements. The Plant will achieve solids removal rates that are better than secondary-treated wastewater by adding a polymer/coagulant to enhance the precipitation of solids, and by filtering the effluent.

In addition to having mass-based and concentration-based effluent limitations for BOD and suspended solids, the Newhall Ranch WRP also has a percent removal requirement for these two constituents. In accordance with 40 CFR, Sections 133.102(a)(3) and 133.102(b)(3), the 30-day average percent removal shall not be less than 85 percent. Percent removal is defined as a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent pollutant concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

iii. **pH**

The hydrogen ion activity of water (pH) is measured on a logarithmic scale, ranging from 0 to 14. While the pH of "pure" water at 25°C is 7.0, the pH of natural waters is usually slightly basic due to the solubility of carbon dioxide from the atmosphere. Minor changes from natural conditions can harm aquatic life. The effluent limitation for pH which reads, "the wastes discharged shall at all times be within the range of 6.5 to 8.5," is taken from the Basin Plan (page 3-15) which reads" the pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharge.

iv. **Settleable solids**

Excessive deposition of sediments can destroy spawning habitat, blanket benthic (bottom dwelling) organisms, and abrade the gills of larval fish. The limits for settleable solids are based on the Basin Plan (page 3-16) narrative, "Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses." The numeric limits are empirically based on results obtained from the settleable solids 1-hour test, using an Imhoff cone.

It is impracticable to use a 7-day average limitation, because short term spikes of settleable solid levels that would be permissible under a 7-day average scheme would not be adequately protective of all beneficial uses.

v. **Oil and Grease**

Oil and grease are not readily soluble in water and form a film on the water surface. Oily films can coat birds and aquatic organisms, impacting respiration and thermal regulation, and causing death. Oil and grease can also cause nuisance conditions (odors and taste), are aesthetically unpleasant, and can restrict a wide variety of beneficial uses. The limits for oil and grease are based on the Basin Plan (page 3-11) narrative, "Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses."

The numeric limits are empirically based on concentrations at which an oily sheen becomes visible in water. It is impracticable to use a 7-day average limitation, because spikes that occur under a 7-day average scheme could cause visible oil sheen. A 7-day average scheme would not be sufficiently protective of beneficial uses.

vi. Residual chlorine

Disinfection of wastewaters with chlorine produces chlorine residual. Chlorine and its reaction products are toxic to aquatic life. The limit for residual chlorine is based on the Basin Plan (page 3-9) narrative, "Chlorine residual shall not be present in surface water discharges at concentrations that exceed 0.1 mg/L and shall not persist in receiving waters at any concentration that causes impairment of beneficial uses."

It is impracticable to use a 7-day average or a 30-day average limitation, because it is not as protective as of beneficial uses as a daily maximum limitation is. Chlorine is very toxic to aquatic life and short-term exposures of chlorine may cause fish kills.

Although the Newhall Ranch WRP proposes to use UV light as its primary means of disinfection, similar facilities have had to use small concentrations of residual chlorine to supplement UV disinfection, in order to kill certain virus present in wastewater or for maintenance purposes to clean the UV lamps. The facility has reasonable potential for residual chlorine because it proposes to use sodium hypochlorite to clean and wash the UV lamps. In addition, all potable water has traces of residual chlorine. In addition, the facility may choose to add residual chlorine to their effluent at a later date, similar to what other POTWs with UV have done.

vii. Total Dissolved Solids, Chloride, Sulfate, and Boron

The limits for total dissolved solids, sulfate, chloride, and boron are based on Basin Plan Table 3-8 (page 3-12), for the Santa Clara River watershed (between West Pier Highway 99 and Blue Cut Gauging Station). TDS = 1000 mg/L; Sulfate = 400 mg/L; Chloride = 100 mg/L; and Boron = 1.5 mg/L. It is practicable to express these limits as monthly averages, since they are not expected to cause acute effects on beneficial uses. These limits will protect waters of the US and prevent degradation.

viii. Methylene Blue Activated Substances (MBAS)

The MBAS procedure tests for the presence of anionic surfactants (detergents) in surface and ground waters. Surfactants disturb the water surface tension, which affects insects and can affect gills in aquatic life. The MBAS can also impart an unpleasant soapy taste to water, as well as cause scum and foaming in waters, which impact the aesthetic quality of both surface and ground waters.

Given the nature of the facility (a POTW) which accepts domestic washwater into the sewer system and treatment plant, and the characteristics of the wastes discharged, the discharge has reasonable potential to exceed both the numeric MBAS water quality objective (WQO) and the narrative WQO for prohibition of floating material such as foams and scums. Therefore an effluent limitation is required.

The Discharger has collected receiving water samples and has reported detectable quantities of MBAS concentrations in the Santa Clara River in the vicinity of the proposed discharge. The discharge from the Newhall Ranch WRP may have reasonable potential to contribute to an exceedance of the 0.5 mg/L WQO. The 0.5 mg/L concentration (which has been determined to be protective of beneficial uses and the aesthetic quality of waters), is based on the Department of Health Services' secondary drinking water standard, and on the Basin Plan WQO (p.3-11) which reads, "Waters shall not have MBAS concentrations greater than 0.5 mg/L in waters designated MUN." While the wastewater from this POTW is not directly discharged into a MUN designated surface water body, it will percolate into unlined reaches of the Santa Clara River [via ground water recharge designated beneficial use (GWR)] to ground water designated for MUN beneficial use. In addition, the Basin Plan states that "Ground water shall not contain taste or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses." Therefore, the secondary MCL should be the MBAS limit for this discharge to protect ground water recharge and the MUN use of the underlying ground water, while also protecting surface waters from exhibiting scum or foaming.

Since the Basin Plan objective is based on a secondary drinking water standard, it is practicable to have a monthly average limitation in the permit, rather than a daily maximum.

ix. **Total Inorganic Nitrogen**

Total inorganic nitrogen is the sum of Nitrate-nitrogen and Nitrite-nitrogen. High nitrate levels in drinking water can cause health problems in humans. Infants are particularly sensitive and can develop methemoglobinemia (blue-baby syndrome). Nitrogen is also considered a nutrient. Excessive amounts of nutrients can lead to other water quality impairments, ex. algae.

(1) **Concentration-based Limit -** The effluent limit for total inorganic nitrogen (NO_2-N + NO_3-N) of 5 mg/L is based on Basin Plan Table 3-8 (page 3-12), for the Santa Clara River watershed (between West Pier Highway 99 and Blue Cut Gaging Station).

(2) **Mass-based Limit** - The mass bases limits are based on the Phase I initial plant design flow rate of 2.0 mgd, and are calculated as follows: Flow(MDG) x Concentration (mg/L) x 8.34 (conversion factor) = lbs/day. However, the design capacity will incrementally increase to 6.8 MGD, as the phased plant expansion approaches completion. The mass-based effluent limitation will accordingly be modified upon certification and approval of increased treatment plant capacity. During wet-weather storm events in which the flow exceeds the design capacity, the mass discharge rate limitations shall not apply, and concentration limitations will provide the only applicable effluent limitations.

x. <u>Nitrite as Nitrogen</u>

Chapter 3 of the Basin Plan (page 3-11) contains the following water quality objective, "Waters shall not exceed the 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen (NO_3-N + NO_2-N), 45 mg/L as nitrate (NO_3), 10 mg/L as nitrate-nitrogen (NO_3-N), or 1 mg/L as nitrite-nitrogen (NO_2-N) or as otherwise designated in Table 3-8."

However, the TMDL for Nitrogen Compounds in the Santa Clara River *(Nitrogen Compounds* TMDL), Resolution No. 2003-011, adopted by the Regional Water Board on August 7, 2003, contains a 0.9 mg/L concentration-based WLA for POTWs in the Santa Clara River Watershed. The 0.9 mg/L WLA is based upon the Basin Plan WQO, with a 10% margin of safety. The TMDL supercedes the generic Basin Plan WQO. Given the nature of the facility, the Discharger has reasonable potential to cause or contribute to an exceedance based on best professional judgment, and therefore needs a limit for Nitrite-N. The 0.9 mg/L limit will have to be met at the end-of-pipe, because dilution is not an option at the present time.

xi. <u>Ammonia Nitrogen</u>

Ammonia is a pollutant routinely found in the wastewater effluent of Publicly Owned Treatment Works (POTWs), in landfill-leachate, as well as in run-off from agricultural fields where commercial fertilizers and animal manure are applied. Ammonia exists in two forms – un-ionized ammonia (NH_3) and the ammonium ion (NH_4^+). They are both toxic, but the neutral, un-ionized ammonia species (NH_3) is much more toxic, because it is able to diffuse across the epithelial membranes of aquatic organisms much more readily than the charged ammonium ion. The form of ammonia is primarily a function of pH, but it is also affected by temperature and other factors. Additional impacts can also occur as the oxidation of ammonia lowers the dissolved oxygen content of the water, further stressing aquatic organisms. Oxidation of ammonia to nitrate may lead to groundwater impacts in areas of recharge. [There is groundwater recharge in these reaches]. Ammonia also combines

with chlorine (often both are present in POTW treated effluent discharges) to form chloramines – persistent toxic compounds that extend the effects of ammonia and chlorine downstream.

Ammonia was 303(d) listed in Reach 3 of the Santa Clara River, downstream of the discharge, in the 2002 303(d) list. Due to the nature of the facility, ammonia has reasonable potential to cause or contribute to an excursion of a water quality objective. Therefore, a water quality-based effluent limitation for total ammonia is required in order to be protective of the water quality objective.

The 1994 Basin Plan contained water quality objectives for ammonia to protect aquatic life, in Tables 3-1 through Tables 3-4. However, those ammonia objectives were revised on April 25, 2002, by the Regional Water Board, with the adoption of Resolution No. 2002-011, *Amendment to the Water Quality Control Plan for the Los Angeles Region to Update the Ammonia Objectives for Inland Surface Waters (including enclosed bays, estuaries and wetlands) with Beneficial Use designations for protection of Aquatic Life*. This Resolution also modified the Basin Plan to include an implementation provision which specifies the procedure for translating the ammonia WQO into final effluent limitations. Resolution No. 2002-011 was approved by the State Water Board, the Office of Administrative Law, and USEPA on April 30, 2003, June 5, 2003, and June 19, 2003, respectively.

On August 7, 2003, the Regional Water Board adopted Resolution No. 2003-011, *Amendment to the Basin Plan for the Los Angeles Region to Include a TMDL for Nitrogen Compounds in the Santa Clara River (Nitrogen Compounds* TMDL). The TMDL does not contain an ammonia nitrogen Waste Load Allocations (WLA) for the Newhall Ranch WRP. However, the TMDL staff report contains the following statement: "The numeric targets for POTWs with increasing capacity or new POTWs will be set on a concentration basis...". The final effluent limitations for ammonia prescribed in this Order are based on the Nitrogen Compounds TMDL numeric target for TMDL-Reach 7 at the County Line, and apply at the end of pipe.

On December 1, 2005, the Regional Water Board adopted Resolution No. 2005-014, *Amendment to the Water Quality Control Plan for the Los Angeles Region Revise the Early Life Stage Implementation Provision of the Freshwater Ammonia Objectives for Inland Surface Waters (including enclosed bays, estuaries and wetlands) for Protection of Aquatic Life.* Resolution No. 2005-014 was approved by the State Water Board, the Office of Administrative Law, and USEPA on July 19, 2006, August 31, 2006, and April 5, 2007, respectively. This amendment contains ammonia objectives to protect Early Life Stages (ELS) of fish in inland surface water supporting aquatic life. It revised the implementation provision included as part of the

freshwater ammonia objectives relative to the protection of ELS of fish in inland surface waters. ELS of fish has been determined to be present in the Santa Clara River, because the receiving water is not included in the list of waterbodies where ELS is absent.

The limitations for ammonia prescribed in this Order are based on the ammonia criteria as revised by Resolution 2002-011 and Resolution No. R4-2005-014. Consistent with methods used to develop ammonia waste load allocation for TMDLs in the Los Angeles region (such as the Los Angeles River Nutrient TMDL and the Malibu Creek Nutrient TMDL), the 50th percentile of receiving water pH and temperature data (7.8 pH units and 15.6°C, respectively), as measured at what would be the immediate downstream receiving water location, were used to calculate the monthly average ammonia limitation that resulted to 1.93 mg-N/L. The 90th percentile of pH data (8.4 pH units), as measured at what would be the immediate downstream receiving water location, was used to calculate the daily maximum ammonia effluent limitation that resulted to 3.87 mg-N/L.

Use of 50th percentile receiving water data to set monthly average limitations and 90th percentile data to set daily maximum limitations is protective of downstream receiving water bodies. Although there are no available ammonia effluent data points with which to determine seasonal or other long-term trends, for this newly proposed POTW,bsed on other POTWs with NDN systems ammonia concentrations are expected to fluctuate around the 50th percentile value over the course of a month. Use of a 50th percentile value is more representative of average conditions in the receiving water body that one or only a few grab samples taken over the course of a month. Note that half the time the limit would be expected to be overly protective. Use of a 90th percentile value to set a daily maximum limit is also protective. Ninety percent of the time the limit will be overly protective, and the limit will only be under protective ten percent of the time.

Table 3, Basin Plan Beneficial Uses of this Fact Sheet summarizes the applicable beneficial uses for the receiving water body. This Table indicates that Santa Clara River does not have a "COLD" or "MIGR" beneficial use designation.

a. One-Hour Average Objective (Maximum Daily Effluent Limit, MDEL)

The Facility discharges into a receiving waterbody that does not have a "COLD" or "MIGR" beneficial use designation. It is assumed that salmonids may be absent. The one-hour average objective is dependent upon pH and the presence of coldwater fish species, such as salmonids, but it is independent of temperature.

For freshwater, the one-hour average concentration of total ammonia as nitrogen (in mg N/L) shall not exceed the values in Table 3-1 (amended on April 25, 2002) of the Basin Plan or as described in the equation below:

$$\text{One-hour Average Concentration} = \frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}}$$

The 90th percentile of pH is 8.4, measured at the immediate downstream receiving water (Station R-A). Using the pH value of 8.4 in the formula above, the resulting MDEL is equal to 3.87 mg/L.

b. 30-Day Average Objective (Average Monthly Effluent Limit, AMEL)

Early life stage of fish is presumptively present and must be protected at all times of the year unless the water body is listed in Table 3-X of the Basin Plan (in Resolution No. 2005-014) or unless a site-specific study is conducted, which justifies applying the ELS absent condition or a seasonal ELS present condition. The Santa Clara River is not included in Table 3-X. Therefore, the above-mentioned receiving waters are considered "ELS Present". For freshwaters subject to the "Early Life Stage Present" condition, the thirty-day average concentration of total ammonia as nitrogen (in mg N/L) shall not exceed the values in Table 3-2 of the Basin Plan or as described in the equation below:

$$\text{30-day Average Concentration} = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) * \text{MIN}(2.85, 1.45 * 10^{0.028*(25-(T))})$$

Where T = temperature expressed in °C.

The 30-day average objective[1] is dependent on pH, temperature, and the presence or absence of early life stages of fish. The 50th percentile of pH and temperature at the immediate downstream receiving water is 7.8 pH and 15.6°C, respectively. Using the Discharger's monitoring data in the formula above, the resulting AMEL is equal to 1.93 mg/L.

[1] This is the current Basin Plan definition of the 30-day average objective, according to the Ammonia Basin Plan Amendment, Resolution No. 2002-011, *Amendment to the Water Quality Control Plan for the Los Angeles Region to Update the Ammonia Objectives for Inland Surface Waters (including enclosed bays, estuaries and wetlands) with Beneficial Use designations for protection of "Aquatic Life,"* adopted by the Los Angeles Regional Water Quality Control Board on April 25, 2002. It was amended by Resolution No. 2005-014, adopted by the Regional Board on December 1, 2005 and was approved by the USEPA on April 5, 2007. This new Resolution implements ELS Provision as described under "implementation", subparagraph 3. In this Resolution, the Discharger's receiving waterbody is designated as ELS absent.

c. Site Specific Objective (SSO)

On June 7, 2007, the Regional Water Board adopted Amendments to the Water Quality Control Plan-Los Angeles Region-To Incorporate Site-Specific Objectives for Select Inland Surface Waters in the San Gabriel River, Los Angeles River, and Santa Clara River Watersheds. This amendment to the Basin Plan will incorporate site-specific 30-day average objectives for ammonia along with corresponding site-specific early life stage implementation provisions for select waterbody reaches and tributaries in Santa Clara, Los Angeles, and San Gabriel River watersheds. Once the amendment is approved by USEPA, this permit will be opened to incorporate the SSO-derived 30-day objective. The application of the SSO is not considered backsliding under Exemption (2) of Section 402(0)(2) of the Clean Water Actand 40 CFR 122.44. At this time any calculation of SSO derived effluent limitations will not be included in this permit. However, the ammonia chronic SSO will not impact the final effluent limits for ammonia, because it is the acute ammonia criteria that drives the more stringent ammonia final effluent limits. The dischargers may wish to embark on a SSO study that would lead to a Basin Plan amendment to modify the acute ammonia criteria. This permit contains a reopener which would allow the Regional Water Board to open up the permit and insert applicable new provisions resulting from future TMDLs or other Basin Plan Amendments, such as a new SSO.

This permit includes final effluent ammonia-nitrogen effluent limitations based on receiving water pH and temperature, because there is no effluent pH and temperature available at this time. Conditions in the effluent may be significantly different than the receiving water conditions. The Basin Plan's water quality objective for ammonia shall be met at the receiving water at all times. In this permit, the Discharger has to meet the ammonia water quality objective within the first 100 feet downstream of the discharge outfall. In order to determine the variability and changing conditions in the receiving water, additional receiving water monitoring and compliance determinations will be required in addition to the effluent limits, to ensure that ammonia water quality objectives are met in the receiving water at all times.

This permit requires the Discharger to submit an approvable workplan to determine the pH and temperature fluctuations in the first 100 feet downstream of the discharge outfall. This workplan shall be submitted to this Regional Water Board for approval by the Executive Officer within 60 days from the date of adoption of this permit.

xii. <u>Coliform Bacteria</u>

Total and fecal coliform bacteria are used to indicate the likelihood of pathogenic bacteria in surface waters. Given the nature of the facility, a

wastewater treatment plant, pathogens are likely to be present in the effluent in cases where the disinfection process is not operating adequately. As such, the permit contains the following:

i. Effluent Limitations:

- The 7 day median number of coliform organisms at some point in the treatment process must not exceed a Most Probable Number (MPN) or Colony Forming Unit (CFU) of 2.2 per 100 milliliters, and

- The number of coliform organisms must not exceed an MPN or CFU of 23 per 100 milliliters in more than one sample within any 30-day period.

These disinfection-based effluent limitations for coliform are for human health protection and are consistent with requirements established by the Department of Health Services. These limits for coliform must be met at the point of the treatment train immediately following disinfection, as a measure of the effectiveness of the disinfection process.

ii. Receiving Water Limitation

- Geometric Mean Limits
  - E.coli density shall not exceed 126/100 mL.
  - Fecal coliform density shall not exceed 200/100 mL.

- Single Sample Limits
  - E.coli density shall not exceed 235/100 mL.
  - Fecal coliform density shall not exceed 400/100 mL.

These receiving water limitations are based on Resolution No. 01-018, Amendment to the Water Quality Control Plan for the Los Angeles Region to Update the Bacteria Objectives for Water Bodies Designated for Water Contact Recreation, adopted by the Regional Water Board on October 25, 2001. The Resolution was approved by State Water Board, OAL, and USEPA, on July 18, 2002, September 19, 2002, and September 25, 2002, respectively.

xiii. <u>Temperature</u>

USEPA document, *Quality Criteria for Water 1986* [EPA 440/5-86-001, May 1, 1986], also referred to as the *Gold Book*, discusses temperature and its effects on beneficial uses, such as recreation and aquatic life.

- The Federal Water Pollution Control Administration in 1967 called temperature "a catalyst, a depressant, an activator, a restrictor, a

stimulator, a controller, a killer, and one of the most important water quality characteristics to life in water." The suitability of water for total body immersion is greatly affected by temperature. Depending on the amount of activity by the swimmer, comfortable temperatures range from 20°C to 30°C (68 °F to 86 °F).

- Temperature also affects the self-purification phenomenon in water bodies and therefore the aesthetic and sanitary qualities that exist. Increased temperatures accelerate the biodegradation of organic material both in the overlying water and in bottom deposits which makes increased demands on the dissolved oxygen resources of a given system. The typical situation is exacerbated by the fact that oxygen becomes less soluble as water temperature increases. Thus, greater demands are exerted on an increasingly scarce resource which may lead to total oxygen depletion and obnoxious septic conditions. Increased temperature may increase the odor of water because of the increased volatility of odor-causing compounds. Odor problems associated with plankton may also be aggravated.

- Temperature changes in water bodies can alter the existing aquatic community. Coutant (1972) has reviewed the effects of temperature on aquatic life reproduction and development. Reproductive elements are noted as perhaps the most thermally restricted of all life phases, assuming other factors are at or near optimum levels. Natural short-term temperature fluctuations appear to cause reduced reproduction of fish and invertebrates.

The Basin Plan lists temperature requirements for the receiving waters. Based on the requirements of the Basin Plan and a white paper developed by Regional Water Board staff entitled *Temperature and Dissolved Oxygen Impacts on Biota in Tidal Estuaries and Enclosed Bays in the Los Angeles Region*, a maximum effluent temperature limitation of 86 °F is included in the Order. The white paper evaluated the optimum temperatures for steelhead, topsmelt, ghost shrimp, brown rock crab, jackknife clam, and blue mussel. The new temperature effluent limitation is reflective of new information available that indicates that the 100°F temperature which was formerly used in permits was not protective of aquatic organisms. A survey was completed for several kinds of fish and the 86°F temperature was found to be protective. It is impracticable to use a 7-day average or a 30-day average limitation for temperature, because it is not as protective as of beneficial uses as a daily maximum limitation is. A daily maximum limit is necessary to protect aquatic life and is consistent with the fishable/swimmable goals of the CWA.

xiv. <u>Turbidity</u>

Turbidity is an expression of the optical property that causes light to be scattered in water due to particulate matter such as clay, silt, organic matter, and microscopic organisms. Turbidity can result in a variety of water quality impairments. The effluent limitation for turbidity which reads, "For the protection of the water contact recreation beneficial use, the wastes discharged to water courses shall have received adequate treatment, so that the turbidity of the wastewater does not exceed: (a) a daily average of 0.2 Nephelometric turbidity units (NTUs) more than 5 percent of the time (72 minutes) during any 24 hour period; and (b) 0.5 NTUs at any time," is based on the Basin Plan's incorporation by reference of Title 22 and the definition of filtered wastewater. In comparison to other POTWs in this region, the turbidity limit for the Newhall Ranch WRP is more stringent than the typical turbidity requirement for other POTWs because the Newhall POTW proposes, according to their ROWD, to have microfiltration, rather than the conventional soils or bed of media filter which is typical in most other tertiary-level POTWs. The limitation, therefore reflects what the technology of choice by the Discharger is designed to achieve.

xv. <u>Radioactivity</u>

Radioactive substances are generally present in natural waters in extremely low concentrations. Mining or industrial activities increase the amount of radioactive substances in waters to levels that are harmful to aquatic life, wildlife, or humans. Section 301 (f) of the CWA contains the following statement with respect to effluent limitations for radioactive substances: "Notwithstanding any other provisions of this Act it shall be unlawful to discharge any radiological, chemical, or biological warfare agent, any high-level radioactive waste, or any medical waste, into the navigable waters." Chapter 5.5 of the Water Code contains a similar prohibition under Section 13375, which reads as follows: "The discharge of any radiological, chemical, or biological warfare agent into the waters of the state is hereby prohibited." However, rather than give a hard and fast absolute prohibition on radioactive substances, Regional Water Board staff have set the following effluent limit for radioactivity: "Radioactivity of the wastes discharged shall not exceed the limits specified in Title 22, Chapter 15, Article 5, Section 64443, of the California Code of Regulations, or subsequent revisions." The limit is based on the Basin Plan incorporation of Title 22, *Drinking Water Standards,* by reference, to protect beneficial uses. Therefore, the accompanying Order will retain the limit for radioactivity.

xvi. <u>Iron</u>

The effluent limitation of 300 mg/l for iron was developed based on the USEPA document, *Quality Criteria for Water 1986* [EPA 440/5-86-001, May 1, 1986], also referred to as the *Gold Book*, for the protection of GWR beneficial use.

300 µg/L is the secondary MCL for iron, however iron is not a priority pollutant. Some POTWs have a final effluent limitation for iron. Using the receiving water sample resultsand the TSD methodology, the discharge currently has reasonable potential to contribute to an exceedance of the Gold Book criteria; the secondary Federal MCL; and, the secondary California MCL for iron. The limit was expressed as a monthly average rather than a daily maximum, because it was assumed that the groundwater basins have assimilative capacity for iron. A WQBEL is now proposed which has to be met at the end of pipe, for protection of the GWR beneficial use in the surface water, since the discharge has reasonable potential to cause or contribute to an exceedance.

The California Toxic Rule (CTR) and State Implementation Policy (SIP) specify numeric objectives for toxic substances and the procedures whereby these objectives are to be implemented. The procedures include those used to conduct reasonable potential analysis to determine the need for effluent limitations for priority and non-priority pollutants.

3. Determining the Need for WQBELs

The Regional Water Board developed WQBELs for ammonia-nitrogen, nitrite-nitrogen, nitrite plus nitrite as nitrogen, and chloride based upon Total Maximum Daily Loads (TMDLs). The effluent limitations for these pollutants were established regardless of whether or not there is reasonable potential for the pollutants to be present in the discharge at levels that would cause or contribute to a violation of water quality standards. The Regional Water Board developed water quality-based effluent limitations for these pollutants pursuant to section 122.44(d)(1)(vii), which does not require or contemplate a reasonable potential analysis. The Regional Water Board has determined that the WQBEL is consistent with the assumptions of the TMDL. Similarly, compliance with the effluent limitation will satisfy the requirements of the TMDL. Similarly, the SIP at Section 1.3 recognizes that reasonable potential analysis is not appropriate if a TMDL has been developed.

In accordance with Section 1.3 of the SIP, the Regional Water Board conducted a reasonable potential analysis for each priority pollutant with an applicable criterion or objective to determine if a WQBEL is required in the permit. The Regional Water Board analyzed effluent data to determine if a pollutant in a discharge has a reasonable potential to cause or contribute to an excursion above a state water quality standard. For all parameters that demonstrate reasonable potential, numeric WQBELs are required. The RPA considers water quality criteria from the CTR and NTR, and when applicable, water quality objectives specified in the Basin Plan. To conduct the RPA, the Regional Water Board staff would normally identified the maximum effluent concentration (MEC) and maximum background concentration in the receiving water for each constituent, based on data provided by the Discharger.

Section 1.3 of the SIP provides the procedures for determining reasonable potential to exceed applicable water quality criteria and objectives. The SIP specifies three triggers to complete a RPA:

Trigger 1 – If the MEC is greater than or equal to the CTR water quality criteria or applicable objective (C), a limitation is needed.

Trigger 2 – If background water quality (B) > C and the pollutant is detected in the effluent, a limitation is needed.

Trigger 3 – If other related information such as CWA 303(d) listing for a pollutant, discharge type, compliance history, then best professional judgment is used to determine that a limit is needed.

Sufficient effluent and ambient data are needed to conduct a complete RPA. If data are not sufficient, the Discharger will be required to gather the appropriate data for the Regional Water Board to conduct the RPA. Upon review of the data, and if the Regional Water Board determines that WQBELs are needed to protect the beneficial uses, the permit will be reopened for appropriate modification.

However, since the Newhall Ranch WRP has yet to be constructed, there is no effluent data available from which to select the MEC. Although, there is ample receiving water data available. This receiving water data provides information to be able to determine that the discharge could contribute to an exceedance. In the absence of final effluent data, Reasonable potential analysis was also conducted using the procedure in section 3.2 of the Technical Support Document, where other information and best professional judgement was used to prescribe effluent limits based on similar facilities with similar processes.

The RPA was performed for the priority pollutants regulated in the CTR for which data are available. Based on the RPA, there was reasonable potential for the Discharge to contribute to an exceedance of the following pollutants: antimony, arsenic, copper, lead, mercury, nickel, selenium, zinc, cyanide, acrylonitrile, iron, tetrachloroethylene, bis(2-ethylhexyl)phthalate, 1,4-dichlorobenzene, lindane, and 4,4-DDE.

4. WQBEL Calculations

a. **Calculation Options.** Once RPA has been conducted using either the TSD or the SIP methodologies, WQBELs are calculated. Alternative procedures for calculating WQBELs include:

1. Use WLA from applicable TMDL
2. Use a steady-state model to derive Maximum Daily Effluent Limits and Average Monthly Effluent Limits.
3. Where sufficient data exist, use a dynamic model which has been approved by the State Water Board.

b. **SIP Calculation Procedure.** Section 1.4 of the SIP requires the step-by-step procedure to "adjust" or convert CTR numeric criteria into Average Monthly Effluent Limitations (AMELs) and Maximum Daily Effluent Limitations (MDELs), for toxics.

Step 3 of Section 1.4 of the SIP (page 8) lists the statistical equations that adjust CTR criteria for effluent variability.

Step 5 of Section 1.4 of the SIP (page 10) lists the statistical equations that adjust CTR criteria for averaging periods and exceedance frequencies of the criteria/objectives. This section also reads, "For this method only, maximum daily effluent limitations shall be used for publicly-owned treatment works (POTWs) in place of average weekly limitations.

Sample calculation for 4,4'-DDE:

Step 1: Identify applicable water quality criteria.

From California Toxics Rule (CTR), we can obtain the Criterion Maximum Concentration (CMC) and the Criterion Continuous Concentration (CCC).

Freshwater Aquatic Life Criteria:
CMC = NA µg/L (CTR page 31715, column B1) and
CCC = NA µg/L (CTR page 31715, column B2); and
Human Health Criteria for Organisms only = 0.00059 µg/L (CTR page 31715, column D2).

Step 2: Calculate effluent concentration allowance (ECA)

ECA = Criteria in CTR, since no dilution is allowed.

Step 3: Determine long-term average (LTA) discharge condition

i. Calculate CV:

CV = Standard Deviation/Mean
= 0.6 (By default because data was > 80% nondetect, SIP page 6)

ii. Find the ECA Multipliers from SIP Table 1 (page 7), or by calculating them using equations on SIP page 6. When CV = 0.6, then:

ECA Multiplier acute = 0.321 and
ECA Multiplier chronic = 0.527

iii. LTA acute = ECA acute x ECA Multiplier acute
= NA µg/L x 0.321 = NA µg/L

iv. LTA chronic = ECA chronic x ECA Multiplier chronic
= NA µg/L x 0.527 = NA µg/L

Step 4: Select the lowest LTA

In this case, the lowest LTA is not applicable.

Step 5: Calculate the Average Monthly Effluent Limitation (AMEL) & Maximum Daily Effluent Limitation (MDEL) for AQUATIC LIFE

i. Find the multipliers. You need to know CV and n (frequency of sample collection per month). If effluent samples are collected 4 times a month or less, then n = 4. CV was determined to be 0.6 in a previous step.

AMEL Multiplier = 1.552
MDEL Multiplier = 3.114

ii. AMEL aquatic life = lowest LTA (from Step4) x AMEL Multiplier
= NA µg/L x 1.552 = NA µg/L

iii. MDEL aquatic life = lowest LTA (from Step4) x AMEL Multiplier
= NA µg/L x 3.114 = NA µg/L

Step 6: Find the Average Monthly Effluent Limitation (AMEL) & Maximum Daily Effluent Limitation (MDEL) for HUMAN HEALTH

i. Find factors. Given CV = 0.6 and n = 4.

For AMEL human health limit, there is no factor.
The MDEL/AMEL human health factor = 2.006

ii. AMEL human health = ECA = 0.00059 µg/L

iii. MDEL human health = ECA x MDEL/AMEL factor
= 0.00059 µg/L x 2.006 = 0.001184 µg/L

Step 7: Compare the AMELs for Aquatic life and Human health and select the lowest. Compare the MDELs for Aquatic life and Human health and select the lowest

i. Lowest AMEL = 0.00059 µg/L (Based on Human Health protection)

ii. Lowest MDEL = 0.001184 µg/L (Based on Human Health protection)

c. **Mass based limits.** 40 CFR section 122.45(f)(1) requires that except under certain conditions, all permit limits, standards, or prohibitions be expressed in terms of mass units. 40 CFR section 122.45(f)(2) allows the permit writer, at its discretion, to express limits in additional units (e.g., concentration units). The regulations mandate that, where limits are expressed in more than one unit, the permittee must comply with both.

Generally, mass-based limits ensure that proper treatment, and not dilution, is employed to comply with the final effluent concentration limits. Concentration-based effluent limits, on the other hand, discourage the reduction in treatment efficiency during low-flow periods and require proper operation of the treatment units at all times. In the absence of concentration-based effluent limits, a permittee would be able to increase its effluent concentration (i.e., reduce its level of treatment) during low-flow periods and still meet its mass-based limits. To account for this, this permit includes mass and concentration limits for some constituents

d. **Mixing Zones and Dilution Credits -** Mixing zones, dilution credits, and attenuation factors are not allowed in the accompanying Order. Allowance of a mixing zone is in the Regional Water Board's discretion under Section 1.4.2 of the SIP and under the Basin Plan (Basin Plan Chapter 4, page 30). If the Discharger subsequently conducts appropriate mixing zone and dilution credit studies, the Regional Water Board can evaluate the propriety of granting a mixing zone or establishing dilution credits. The Regional Water Board has concluded mixing zones and dilution credits would be inappropriate to grant, at this time, in light of the following factors:

1. Several reaches of the Santa Clara River [including those subject to this Order] are 303(d) listed (i.e., impaired) for certain constituents;

2. Impaired waters do not have the capacity to assimilate pollutants of concern at concentrations greater than the applicable objective;

3. For the protection of the beneficial uses is listed in the Order;

4. Consistent with Antidegradation Policies;

5. Because a mixing zone study has not been conducted; and,

6. Because hydrologic models of the discharge and the receiving waters have not been conducted.

On July 16, 2003, the State Water Board adopted Order No. WQO 2003-0009, directing Regional Water Board staff to work with CSDLAC, once data was provided, to determine whether dilution and attenuation are appropriate factors to consider in developing effluent limits to protect the GWR beneficial use, in the Whittier Narrows WRP NPDES permit. However, this does not apply to the Newhall Ranch WRP because Newhall has not provided the necessary site-specific data or studies regarding the ground water basins in the Newhall area.

e. **Interim Monitoring Requirements** - In accordance with the SIP, the Regional Water Board may impose interim monitoring requirements upon the Discharger, so that the Discharger obtains adequate ambient, background water data for priority pollutants upstream of the discharge point as well as suitable effluent data. The Executive Officer directed major Dischargers to begin an interim monitoring program for the duration of 18 months, beginning July 2001. The monitoring results that will be obtained when Newhall Ranch WRP implements the monitoring requirements contained in Attachment E will be used by Regional Water Board staff to conduct RPA once again, to determine if additional numeric limitations are necessary. Section 1.3, Step 8, of the SIP authorizes the Regional Water Board to use the gathered data to conduct RPA, as outlined in Steps 1 through 7, and determine if a water quality-based effluent limitation is required.

A reopener provision is included in this Order that allows the permit to be reopened to allow the inclusion of new numeric limitations for any constituent that exhibits reasonable potential to cause or contribute to exceedance of applicable water quality objectives.

Summary of Water Quality-based Effluent Limitations
Discharge Point 001

Table 5. Summary of Water Quality-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Total ammonia (NH_3 as N)	mg/L	1.93[2]	--	3.87[3]	--	--
	lbs/day[1]	25	--	65	--	--
Nitrate-N + Nitrite-N	mg/L	5	--	--	--	--
	lbs/day[1]	80	--	--	--	--
Nitrite-N	mg/L	0.9	--	--	--	--
	lbs/day[1]	15	--	--	--	--
Detergents (as MBAS)	mg/L	0.5	--	--	--	--
	lbs/day[1]	8	--	--	--	--
Total residual chlorine	mg/L	--	--	0.1	--	--
Antimony	µg/L	6	--	--	--	--
	lbs/day[1]	0.1	--	--	--	--
Arsenic	µg/L	10	--	--	--	--
	lbs/day[1]	0.2	--	--	--	--
Copper	µg/L	22	--	44	--	--
	lbs/day[1]	0.37	--	0.73	--	--
Lead	µg/L	13	--	26	--	--
	lbs/day[1]	0.22	--	0.43	--	--
Mercury	µg/L	0.051	--	0.10	--	--
	lbs/day[1]	0.00085	--	0.0017	--	--
Nickel	µg/L	100	--	--	--	--
	lbs/day[1]	1.7	--	--	--	--
Selenium	µg/L	4.1	--	8.2	--	--

1 The mass emission rates are based on the plant design flow rate of 2.0 mgd, and are calculated as follows: Flow(MGD) x Concentration (mg/L) x 8.34 (conversion factor) = lbs/day. However, the design capacity will incrementally increase to 6.8 MGD, as the phased plant upgrades approach completion. The mass-based effluent limitation will accordingly be modified following an Anti-degradation analysis demonstration conducted by the Discharger, and upon certification and approval of increased treatment plant capacity. During wet-weather storm events in which the flow exceeds the design capacity, the mass discharge rate limitations shall not apply, and concentration limitations will provide the only applicable effluent limitations.

2 This is the monthly average effluent limit calculated according to the Implementation Plan for ammonia in the Basin Plan, which specifies how to translate the Ammonia WQO into a final effluent limit, consistent with the assumptions of the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011.

3 This is the daily maximum effluent limit calculated according to the Implementation Plan for ammonia in the Basin Plan, which specifies how to translate the Ammonia WQO into a final effluent limit, consistent with the assumptions of the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011.

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
	lbs/day	0.068	--	0.14	--	--
Zinc	µg/L	5000	--	--	--	--
	lbs/day[1]	83	--	--	--	--
Cyanide	µg/L	4.2	--	8.5	--	--
	lbs/day[1]	0.07	--	0.14	--	--
Acrylonitrile	µg/L	0.66	--	1.3	--	--
	lbs/day[1]	0.011	--	0.022	--	--
Tetrachloroethylene	µg/L	5	--	--	--	--
	lbs/day[1]	0.08	--	--	--	--
Bis(2-ethylhexyl)phthalate	µg/L	4	--	--	--	--
	lbs/day[1]	0.07	--	--	--	--
p-Dischlorobenzene (1,4-Dichlorobenzene)	µg/L	5	--	--	--	--
	lbs/day[1]	0.08	--	--	--	--
Lindane	µg/L	0.2	--	--	--	--
	lbs/day	0.003	--	--	--	--
4,4-DDE	µg/L	0.00059	--	0.0012	--	--
	lbs/day	0.0000098	--	0.00002	--	--
Iron	µg/L	300	--	--	--	--
	lbs/day	5	--	--	--	--

5. Whole Effluent Toxicity (WET)

Ambient monitoring data indicates that the background concentration in the lower Santa Clara is toxic to aquatic organisms, and therefore exceeds water quality standards. Final effluent water quality data for the Newhall WRP is not available. However, effluent data contained in monitoring reports for other POTWs in the watershed, shows that chronic toxicity in the effluent has sometimes exceeded 1TUc (monthly median). Therefore, pursuant to the TSD, reasonable potential exists for toxicity. As such, the permit should contain a numeric effluent limitation for toxicity.

The toxicity numeric effluent limitations are based on:

a. CFR 122.44(d)(v) – limits on whole effluent toxicity are necessary when chemical-specific limits are not sufficient to attain and maintain applicable numeric or narrative water quality standards;

b. 40 CFR 122.44(d)(vi)(A) – where a State has not developed a water quality criterion for a specific pollutant that is present in the effluent and has reasonable potential, the permitting authority can establish effluent limits using numeric water quality criterion;

c. Basin Plan objectives and implementation provisions for toxicity;

d. Regions 9 & 10 Guidance for Implementing Whole Effluent Toxicity Programs Final May 31, 1996;

e. Whole Effluent Toxicity (WET) Control Policy July 1994; and,

f. Technical Support Document (several chapters and Appendix B).

However, the circumstances warranting a numeric chronic toxicity effluent limitation when there is reasonable potential were under review by the State Water Resources Control Board (State Water Board) in SWRCB/OCC Files A-1496 & A-1496(a) [Los Coyotes/Long Beach Petitions]. On September 16, 2003, at a public hearing, the State Water Board adopted Order No. 2003-0012 deferring the issue of numeric chronic toxicity effluent limitations until Phase II of the SIP is adopted. In the mean time, the State Water Board replaced the numeric chronic toxicity limit with a narrative effluent limitation and a 1 TUc trigger, in the Long Beach and Los Coyotes WRP NPDES permits. This permit contains a similar narrative chronic toxicity effluent limitation, with a numeric trigger for accelerated monitoring.

Phase II of the SIP has been adopted, however, the toxicity control provisions were not revised.

On January 17, 2006, the State Water Board Division of Water Quality held a California Environmental Quality Act (CEQA) scoping meeting to seek input on the scope and content of the environmental information that should be considered in the planned revisions of the Toxicity Control Provisions of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). However, the Toxicity Control Provisions of the SIP continue unchanged.

This Order contains a reopener to allow the Regional Water Board to modify the permit, if necessary, consistent with any new policy, law, or regulation. Until such time, this Order will have toxicity limitations that are consistent with the State Water Board's precedential decision.

Acute Toxicity Limitation:

The Dischargers may test for Acute toxicity by using USEPA's *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, October 2002 (EPA-821-R-02-012). Acute toxicity provisions in the accompanying Order are derived from the Basin Plan's toxicity standards (Basin Plan 3-16 and 3-17). The provisions require the Discharger to accelerate acute toxicity monitoring and take further actions to identify the source of toxicity and to reduce acute toxicity.

Chronic Toxicity Limitation and Requirements:

Chronic toxicity provisions in the accompanying Order are derived from the Basin Plan's toxicity standards (Basin Plan 3-16 and 3-17). The provisions require the Discharger to accelerate chronic toxicity monitoring and take further actions to identify the source of toxicity and to reduce chronic toxicity. The monthly median trigger of 1.0 TU_c for chronic toxicity is based on *USEPA Regions 9 & 10 Guidance for Implementing Whole Effluent Toxicity (WET) Programs* Final May 31, 1996 (Chapter 2 – Developing WET Permitting Conditions, page 2-8). In cases where effluent receives no dilution or where mixing zones are not allowed, the 1.0 TU_c chronic criterion should be expressed as a monthly median. The "median" is defined as the middle value in a distribution, above which and below which lie an equal number of values. For example, if the results of the WET testing for a month were 1.5, 1.0, and 1.0 TU_c, the median would be 1.0 TU_c.

The *USEPA Regions 9 & 10 Guidance for Implementing Whole Effluent Toxicity (WET) Programs* Final May 31, 1996 (Chapter 2 – Developing WET Permitting Conditions, page 2-8) recommends two alternatives: using 2.0 TUc as the maximum daily limit; or using a statistical approach to develop a maximum daily effluent limitation.

D. Final Effluent Limitations

Section 402(o) of the CWA and 40 CFR 122.44 require that effluent limitations or conditions in reissued Orders be at least as stringent as those in the existing Orders based on the submitted sampling data. However, since this is a new discharge, there is no existing Order. The final effluent limitations established in this Order, for the discharge of tertiary-treated effluent through Discharge Serial No.EFF-001, as proposed in the ROWD, are listed below in Table 7:

1. Satisfaction of Anti-Backsliding Requirements

Since this is a new discharge, all proposed effluent limitations and requirements contained in the accompanying Order are new. Therefore, there is no relaxation of effluent limitations. Furthermore, the proposed effluent limitations are at least as stringent as the effluent limitations contained in a similar Order for a nearby facility, the Valencia Water Reclamation Plant. The proposed Order is consistent with the anti-backsliding requirements of the CWA and federal regulations.

2. Satisfaction of Antidegradation Policy

The Discharger proposes to use microfiltration and reverse osmosis in their treatment process. These are state-of-the art treatment facilities which are expected to produce high quality tertiary-treated effluent. Because modeling for chloride indicates no adverse impact or degradation of existing water quality, there should be no impact from other less conservative pollutants. In addition, groundwater monitoring will ensure that no degradation to groundwater resources occurs. The proposed discharge is consistent with the antidegradation provision of 40 CFR 131.12 and State Water Board Resolution No. 68-16.

3. Stringency of Requirements for Individual Pollutants

This Order contains restrictions on individual pollutants that are no more stringent than required by the federal CWA. Individual pollutant restrictions consist of technology-based restrictions and water quality-based effluent limitations. The technology-based effluent limitations consist of restrictions on biochemical oxygen demand (BOD), total suspended solids (TSS), and hydrogen ion concentration (pH). Restrictions on BOD, TSS, and pH are specified in federal regulations as discussed in Finding F, and the permit's technology-based pollutant restrictions are no more stringent than required by the CWA. Water quality-based effluent limitations have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant water quality-based effluent limitations were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The scientific procedures for calculating the individual water quality-based effluent limitations are based on the CTR-SIP, which was approved by USEPA on

May 18, 2000. Most beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA" pursuant to 40 CFR 131.21(c)(1). For the most part, this Order's restrictions on individual pollutants are no more stringent than required to implement the technology-based requirements of the CWA and the applicable water quality standards for purposes of the CWA.

This Order contains pollutant restrictions that are more stringent than applicable federal requirements and standards. Specifically, this Order includes effluent limitations for bis(2-ethylhexyl)phthalate that are more stringent than applicable federal standards, but that are nonetheless necessary to meet numeric objectives or protect beneficial uses. The rationale for including these limitations is explained in this Fact Sheet. In addition, the Regional Water Board has considered the factors in Water Code section 13241.

The California MCLs are the same as the USEPA MCL for iron and tetrachloroethylene, therefore the limits for iron and tetrachloroethylene, based on the MCLs, are not more stringent than federal requirements. The California MCL for Arsenic is less stringent than the USEPA MCL, therefore the limit for Arsenic is not more stringent than the federal requirement. The California MCL for Bis(2-ethylhexyl)phthalate is more stringent than the USEPA MCL and more stringent than the CTR criteria, therefore the monthly average effluent limitation for Bis(2-ethylhexyl)phthalate is the only limit more stringent than the federal requirements. Therefore, an economic analysis should be done for Bis(2-ethylhexyl)phthalate.

According to Section 13241 of the CWC, the factors to be considered by a regional board in establishing water quality objectives include, but are not necessarily be limited to, all of the following:

(a) Past, present, and probable future beneficial uses of water.
(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.
(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.
(d) Economic considerations.
(e) The need for developing housing within the region.
(f) The need to develop and use recycled water.

Regional Board staff have considered all of the above factors.

The proposed Order is protective of all beneficial uses of surface waters (using CWA) and ground water (using CWC);

The environmental characteristics of the discharge and of the watershed in which the facility is located have been taken into consideration and provisions of the applicable TMDLs have been incorporated into the Order, in an attempt to restore waters under section 303(d) of the CWA;

Limitations which could reasonably be achieved have been placed in the Order to protect the water quality of the immediate receiving waters and those located downstream of the discharge point;

Economic considerations have also been considered

1. **DHS' Economic Analysis**. The technical and economic feasibility of regulating MCLs is evaluated as part of the MCL development and adoption process by the California Department of Health Services, a sister agency. The technical feasibility includes an evaluation of commercial laboratories' ability to analyze for and detect the chemical in drinking water, the costs of monitoring, and the costs of treatment required to remove it.

2. **Requirements under future WDR,WRR Order for Recycling** Newhall Ranch Sanitation District will apply for water recycling requirements. They will be required to comply with the Maximum Contaminant Levels of the current California Drinking Water Standards for inorganic and organic chemicals, under a separate order ahich serves as waste discharge requirements for water recycling. Since the Newhall Ranch WRP will have advanced treatment technology, the discharge is expected to meet the MCLs, and no additional treatment units are believed to be necessary in order to meet the limitations in the accompanying NPDES permit.

3. **Similar Facilities**. Other POTWs in Region 4 have similar NPDES permit requirements. When Regional Board staff was preparing the first set of permits that would implement the SIP and the CTR, they asked the State Board, Division of Water Quality's Standard Development Section to prepare an economic analysis of the cost of complying with the California Toxics Rule for the five Los Angeles County Sanitation District (LACSD) inland POTWs in the San Gabriel River Watershed. The State Board contracted Sciences Applications International Corporation (SAIC) to prepare the economic analysis. Their report titled, *Potential Costs of Complying with the California Toxics Rule for Five Los Angeles County Sanitation District Facilities* (March 21, 2001), presented a worst case scenario and a most likely control scenario for all five facilities. Of the five LACSD POTWs, the smallest is the Pomona WRP, with a 15 MGD capacity. For the Pomona WRP, the worst case control scenario would require the use of Granular Activated Carbon (GAC), with a construction cost of about

$12 Million, and an operation costs of $387,000 per year. The most likely control scenario required implementation of a source control or pollutant minimization program, a plant study for process optimization, and an improved coagulant chemical addition process, at a cost of $141,000 per year. Although the focus of the study was to consider CTR-based limits, the study did include consideration of the 4 µg/L MCL-based limit for Bis(2-ethylhexyl)phthalate. The LACSD plants have focused on source control and pollution prevention, process optimization, and cleaner laboratory analytical techniques to achieve compliance with their permit limitations. In the case of Bis(2-ethylhexyl)phthalate, using cleaner sampling techniques has made a big difference in eliminating the amounts of detects (or false positives) obtained. The clean hands technique involved using gloves and bottles that were free of phthalates, for example using teflon and glassware. In no case did any of the LACSD POTWs have to install costly treatment systems for the removal of CTR-based or MCL-based pollutants.

Regional Board staff conclude that additional treatment units would not be required to meet the new limitations contained in the accompanying Order. Newhall Ranch Sanitation District may conduct an economic analysis and submit it to the Regional Board for consideration, during the public comment period, if so desired.

We are aware that Newhall Land anticipates building additional housing projects, aside from the Landmark Village project. The Newhall Ranch WRP is designed in such a way that it will be able to expand its treatment capacity in phases, to accommodate the additional sewage generated by the new housing developments.

The Discharger has not submitted any economic information to indicate what the cost of complying with this Order would be. As discussed in other sections of the Fact Sheet, the individual pollutant restrictions are reasonably necessary to protect beneficial uses identified in the Basin Plan, and the economic information related to costs of compliance are not sufficient, in the Regional Water Board's determination, to justify failing to protect beneficial uses. Since this is a new discharge, it is not appropriate to issue a Time Schedule Order.

Summary of Final Effluent Limitations
Discharge Point 001

Table 6. Summary of Final Effluent Limitations

Parameter	Units	Effluent Limitations					Basis
		Average Monthly	Average Weekly	Maximum Daily	Instant-aneous Minimum	Instant-aneous Maximum	
$BOD_5$20°C	mg/L	20	30	45	--	--	Technology
	lbs/day	330	500	750	--	--	Calculated
Total Suspended solids (TSS)	mg/L	15	40	45	--	--	Technology
	lbs/day	250	670	750	--	--	Calculated
pH	standard units	--	--	--	6.5	8.5	Basin Plan
Total ammonia (NH_3 as N)	mg/L	1.93[4]	--	3.87[5]	--	--	TMDL/Basin Plan WQO
	lbs/day[1]	25	--	65	--	--	Calculated
Nitrate-N + Nitrite-N	mg/L	5	--	--	--	--	TMDL/Basin Plan WQO
	lbs/day[1]	80	--	--	--	--	Calculated
Nitrite-N	mg/L	0.9	--	--	--	--	Basin Plan WQO
	lbs/day[1]	15	--	--	--	--	Calculated
Detergents (as MBAS)	mg/L	0.5	--	--	--	--	Basin Plan WQO
	lbs/day[1]	8	--	--	--	--	Calculated
Total residual chlorine	mg/L	--	--	0.1	--	--	Basin Plan WQO
Antimony	µg/L	6	--	--	--	--	TSD Chap.3.2
	lbs/day[1]	0.1	--	--	--	--	Calculated
Arsenic	µg/L	10	--	--	--	--	TSD Chap.3.2
	lbs/day[1]	0.2	--	--	--	--	Calculated
Copper	µg/L	22	--	44	--	--	CTR Aquatic Life
	lbs/day[1]	0.37	--	0.73	--	--	Calculated

[4] This is the thirty-day Ammonia-N (NH_3-N) numeric target for Reach 7 of the Santa Clara River at the County Line, according to the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011, applied as the average monthly effluent limitation.

[5] This is the one-hour Ammonia-N (NH_3-N) numeric target for Reach 7 of the Santa Clara River at the County Line, according to the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011, applied as the daily maximum effluent limitation.

Parameter	Units	Effluent Limitations					Basis
		Average Monthly	Average Weekly	Maximum Daily	Instant-aneous Minimum	Instantan-eous Maximum	
Lead	µg/L	13	--	26	--	--	CTR Aquatic Life
	lbs/day[1]	0.22	--	0.43	--	--	Calculated
Mercury	µg/L	0.051	--	0.10	--	--	CTR Human health
	lbs/day[1]	0.00085	--	0.0017	--	--	Calculated
Nickel	µg/L	100	--	--	--	--	TDS Chap.3.2
	lbs/day[1]	1.7	--	--	--	--	Calculated
Selenium	µg/L	4.1	--	8.2	--	--	CTR Aquatic Life
	lbs/day	0.068	--	0.14	--	--	Calculated
Zinc	µg/L	5000	--	--	--	--	TSD Chap.3.2
	lbs/day[1]	83	--	--	--	--	Calculated
Cyanide	µg/L	4.2	--	8.5	--	--	TSD Chap.3.2
	lbs/day[1]	0.07	--	0.14	--	--	Calculated
Acrylonitrile	µg/L	0.66	--	1.3	--	--	TSD Chap.3.2
	lbs/day[1]	0.011	--	0.022	--	--	Calculated
Tetrachloroethy-lene	µg/L	5	--	--	--	--	TSD Chap.3.2
	lbs/day[1]	0.08	--	--	--	--	Calculated
Bis(2-ethylhexyl) phthalate	µg/L	4	--	--	--	--	TSD Chap.3.2
	lbs/day[1]	0.07	--	--	--	--	Calculated
p-Dichlorobenzene (1,4-Dichlorobenzene)	µg/L	5	--	--			TSD Chap.3.2--
	lbs/day[1]	0.08	--	--			Calculated
Lindane	µg/L	0.2	--	--			TSD Chap.3.2
	lbs/day	0.003	--	--			Calculated
4,4-DDE	µg/L	0.00059	--	0.0012			CTR Human health
	lbs/day	0.0000098	--	0.00002			Calculated
Iron	µg/L	300	--	--			Basin Plan/ MCL
	lbs/day	5	--	--			Calculated

E. Interim Effluent Limitations

Not Applicable. This is a new discharge.

F. Land Discharge Specifications

Not Applicable. Holding ponds at the Newhall Ranch WRP will be concrete-lined and are not designed for purposeful groundwater recharge.

G. Reclamation Specifications

Not Applicable. Water recycling requirements will be regulated under a separate order. Newhall intends on recycling almost 100% of its treated effluent during dry weather.

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

A. Surface Water

The Basin Plan contains numeric and narrative water quality objectives applicable to all surface waters within the Los Angeles Region. Water quality objectives include an objective to maintain the high quality waters pursuant to federal regulations (40 CFR § 131.12) and State Water Board Resolution No. 68-16. Receiving water limitations in the Order are included to ensure protection of beneficial uses of the receiving water and are based on the water quality objectives contained in the Basin Plan.

B. Groundwater

The Basin Plan contains numeric and narrative water quality objectives applicable to all groundwaters within the Los Angeles Region. Water quality objectives include incorporation by reference to Title 22 drinking water standards, bacteria objectives, and others. Limitations are included in this Order to ensure protection of beneficial uses of the groundwater receiving water.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

Section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code sections 13267 and 13383 authorizes the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (MRP), Attachment E of this Order, establishes monitoring and reporting requirements to implement federal and state requirements. The following provides the rationale for the monitoring and reporting requirements contained in the MRP for this facility.

A. Influent Monitoring

Influent monitoring is required:

- To determine compliance with the permit conditions for BOD_5 20°C and suspended solids removal rates;
- To assess treatment plant performance;
- To assess the effectiveness of the Pretreatment Program (once a pretreatment program is in place); and,
- As a requirement of the Pollution Minimization Program

B. Effluent Monitoring

The Discharger is required to conduct monitoring of the permitted discharges in order to evaluate compliance with permit conditions. Monitoring requirements are given in the proposed Monitoring and Reporting Program (Attachment E). This provision requires compliance with the Monitoring and Reporting Program, and is based on 40 CFR 122.44(i), 122.62,122.63, and 124.5. The Monitoring and Reporting Program is a standard requirement in almost all NPDES permits (including the proposed Order) issued by the Regional Water Board. In addition to containing definition of terms, it specifies general sampling/analytical protocols and the requirements of reporting spills, violation, and routine monitoring data in accordance with NPDES regulations, the California Water Code, and Regional Water Board policies. The Monitoring and Reporting Program also contains sampling program specific for the Discharger's wastewater treatment plant. It defines the sampling stations and frequency, pollutants to be monitored, and additional reporting requirements. Pollutants to be monitored include all pollutants for which effluent limitations are specified. Further, in accordance with Section 1.3 of the SIP, a periodic monitoring is required for all priority pollutants defined by the CTR, for which criteria apply and for which no effluent limitations have been established, to evaluate reasonable potential to cause or contribute to an excursion above a water quality standard.

Monitoring for those pollutants expected to be present in the discharge from the facility, will be required as shown on the proposed Monitoring and Reporting Program (Attachment E) and as required in the SIP. Monitoring requirements are similar to those found in the near-by Valencia WRP's Monitoring and Reporting Program. Annual monitoring for priority pollutants in the effluent is required in accordance with the SIP.

Since this is a new discharge, the effluent monitoring requirements are new.

C. Whole Effluent Toxicity Testing Requirements

Whole effluent toxicity (WET) protects the receiving water quality from the aggregate toxic effect of a mixture of pollutants in the effluent. An acute toxicity test is conducted over a short time period and measures mortality. A chronic toxicity test is conducted over a longer period of time and may measure mortality, reproduction, and growth.

This requirement establishes conditions and protocol by which compliance with the Basin Plan narrative water quality objective for toxicity will be demonstrated and in accordance with Section 4.0 of the SIP. Conditions include required monitoring and evaluation of the effluent for acute and chronic toxicity and numerical values for chronic toxicity evaluation to be used as 'triggers' for initiating accelerated monitoring and toxicity reduction evaluation(s).

D. Receiving Water Monitoring

1. Surface Water

Receiving water monitoring is required to determine compliance with receiving water limitations and to characterize the water quality of the receiving water.

2. Groundwater

Groundwater monitoring is required to determine compliance with groundwater limitations and to track impacts to the groundwater basins.

E. Other Monitoring Requirements

1. Watershed Monitoring and Bioassessment Monitoring

The goals of the Watershed-wide Monitoring Program including the bioassessment monitoring for the San Gabriel River Watershed are to:

- Determine compliance with receiving water limits;
- Monitor trends in surface water quality;
- Ensure protection of beneficial uses;
- Provide data for modeling contaminants of concern;
- Characterize water quality including seasonal variation of surface waters within the watershed;
- Assess the health of the biological community; and
- Determine mixing dynamics of effluent and receiving waters in the estuary.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions

Standard Provisions, which apply to all NPDES permits in accordance with section 122.41, and additional conditions applicable to specified categories of permits in accordance with section 122.42, are provided in Attachment D. The discharger must comply with all standard provisions and with those additional conditions that are applicable under section 122.42.

Section 122.41(a)(1) and (b) through (n) establish conditions that apply to all State-issued NPDES permits. These conditions must be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to the regulations must be included in the Order. Section 123.25(a)(12) allows the state to omit or modify conditions to impose more stringent requirements. In accordance with section 123.25, this Order omits federal conditions that address enforcement authority specified in sections 122.41(j)(5) and (k)(2) because the enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates by reference Water Code section 13387(e).

B. Special Provisions

1. Reopener Provisions

This provision is based on 40 CFR Part 123. The Regional Water Board may reopen the permit to modify permit conditions and requirements. Causes for modifications include the promulgation of new regulations, modification in sludge use or disposal practices, or adoption of new regulations by the State Water Board or Regional Water Board, including revisions to the Basin Plan.

2. Special Studies and Additional Monitoring Requirements

a. **Antidegredation Analysis and Engineering Report for Proposed Plant Expansion.** This provision is based on the State Water Resources Control Board Resolution No. 68-16, which requires the Regional Water Board in regulation the discharge of waste to maintain high quality waters of the State, the Discharger must demonstrate that it has implemented adequate controls (e.g., adequate treatment capacity) to ensure that high quality waters will be maintained. This provision requires the Discharger to clarify it has increase plant capacity through the addition of new treatment system(s) to obtain alternative effluent limitations for the discharge from the treatment system(s). This provision requires the Discharger to report specific time schedules for the plants projects. This provision requires the Discharger to submit report to the Regional Water Board for approval.

b. **Operations Plan for Proposed Expansion.** This provision is based on Section 13385(j)(1)(D) of the CWC and allows a time period not to exceed 90 days in which the Discharger may adjust and test the treatment system(s). This provision requires the Discharger to submit an Operations Plan describing the actions the Discharger will take during the period of adjusting and testing to prevent violations.

c. **Treatment Plant Capacity.** The treatment plant capacity study required by this Order shall serve as an indicator for the Regional Water Board regarding Facility's increasing hydraulic capacity and growth in the service area.

3. Best Management Practices and Pollution Prevention

a. **Pollutant Minimization Program.** This provision is based on the requirements of Section 2.4.5 of the SIP.

4. Construction, Operation, and Maintenance Specifications

This provision is based on the requirements of 40 CFR 122.41(e) and similar requirements for similar facilities.

5. Special Provisions for Municipal Facilities (POTWs Only)

a. **Biosolids Requirements.** To implement CWA Section 405(d), on February 19, 1993, USEPA promulgated 40 CFR 503 to regulate the use and disposal of municipal sewage sludge. This regulation was amended on September 3, 1999. The regulation requires that producers of sewage sludge meet certain reporting, handling, and disposal requirements. It is the responsibility of the Discharger to comply with said regulations that are enforceable by USEPA, because California has not been delegated the authority to implement this program. The Discharger is also responsible for compliance with WDRs and NPDES permits for the generation, transport and application of biosolids issued by the State Water Board, other Regional Water Boards, Arizona Department of Environmental Quality or USEPA, to whose jurisdiction the Facility's biosolids will be transported and applied.

b. **Pretreatment Requirements.** This Order does not include any requirements for a Pretreatment Program because the discharge is less than 2.0 MGD and because the POTW does not have any significant industrial users (SIUs). In the future, once the design flow approaches 5.0 MGD, the Discharger will be required to develop a Pretreatment Program; and implement and enforce the pretreatment program in its entire service area. At that time, the permit will contain pretreatment requirements consistent with applicable effluent limitations, national standards of performance, and toxic and performance effluent standards established pursuant to Sections 208(b), 301, 302, 303(d), 304, 306, 307, 403,

404, 405, and 501 of the CWA, and amendments thereto. The permit would also contain requirements for the implementation of an effective pretreatment program pursuant to Section 307 of the CWA; 40 CFR 35 and 403; and/or Section 2233, Title 23, California Code of Regulations.

c. **Spill Reporting Requirements.** This Order established a reporting protocol for how different types of spills, overflow or bypasses of raw or partially treated sewage from its collection system or treatment plant covered by this Order shall be reported to regulatory agencies.

The State Water Board issued General Waste Discharge Requirements for Sanitary Sewer Systems, Water Quality Order No. 2006-0003-DWQ (General Order) on May 2, 2006. The General Order requires public agencies that own or operate sanitary sewer systems with greater than one mile of pipes or sewer lines to enroll for coverage under the General Order. The General Order requires agencies to develop sanitary sewer management plans (SSMPs) and report all sanitary sewer overflows (SSOs), among other requirements and prohibitions.

Furthermore, the General Order contains requirements for operation and maintenance of collection systems and for reporting and mitigating sanitary sewer overflows. The Discharger must comply with both the General Order and this Order.

6. Other Special Provisions

Not applicable.

7. Compliance Schedules

Not applicable because this is a new disharge.

VIII. PUBLIC PARTICIPATION

The California Regional Water Quality Control Board, Los Angeles Region (Regional Water Board) is considering the issuance of waste discharge requirements (WDRs) that will serve as a National Pollutant Discharge Elimination System (NPDES) permit for the Newhall Ranch Sanitation District's Newhall Ranch Water Reclamation Plant. As a step in the WDR adoption process, the Regional Water Board staff has developed tentative WDRs. The Regional Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for the discharge and

has provided them with an opportunity to submit their written comments and recommendations. Notification was provided through the following: publication in local newspapers.

B. Written Comments

The staff determinations are tentative. Interested persons are invited to submit written comments concerning these tentative WDRs. Comments must be submitted either in person or by mail to the Executive Office at the Regional Water Board at the address above on the cover page of this Order.

To be fully responded to by staff and considered by the Regional Water Board, written comments must be received at the Regional Water Board offices by 5:00 p.m. on July 6, 2007. However, the comment period was extended by a few days. Comments were due by the close of business on July 18, 2007. Comments on the strikeout & underline sections of the Revised Tentative were due by close of business on August 20, 2007.

C. Public Hearing Date and Location

The Regional Water Board will hold a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date: September 6, 2007
Time: 9:00 AM
Location: Metropolitan Water District of Southern California Board Room
700 North Alameda Street
Los Angeles, California

Interested persons are invited to attend. At the public hearing, the Regional Water Board will hear testimony, if any, pertinent to the discharge, WDRs, and permit. Oral testimony will be heard; however, for accuracy of the record, important testimony should be in writing.

Please be aware that dates and venues may change. Our Web address is http://www.waterboards.ca.gov/losangeles/ where you can access the current agenda for changes in dates and locations.

D. Scope of Hearing

The validity of the TMDL for Chloride in the Upper Santa Clara River, the TMDL for Nitrogen Compounds in the Upper Santa Clara River, nor the EIR for the Newhall Land development are at issue before the Regional Water Board in this proceeding. Evidence or argument that challenges the validity of those TMDLs or the EIR, or any aspects of them will not be permitted. The only matter before the Board is the adoption of new Waste Discharge Requirements and permit under the National Pollutant

Discharge Elimination System (NPDES) to incorporate applicable water quality objectives associated with discharges to the waters of the United States.

E. Availability of Documents

The Report of Waste Discharge (ROWD), other documents relied upon, tentative effluent limitations and special provisions, comments received, and other information are on file are available for inspection and copying between the hours of 8:00 a.m. and 4:30 p.m. by appointment at the following address:

Los Angeles Regional Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Arrangements for file review and/or obtaining copies of the documents may be made by calling the Los Angeles Regional Water Board at (213) 576-6600. Additionally, the agenda, the fact sheet, the draft order will be available online at:

http://www.waterboards.ca.gov/losangeles/

under the "Tentative Permits" heading in the left hand margin.

The entire file will become a part of the administrative record of this proceeding, irrespective of whether individual documents are specifically referenced during the hearing or contained in the agenda packet. The entire file will not be present in the hearing room. In addition to the materials generated for this proceeding, the file includes the administrative records for Resolution 2002-011 (relating to the Ammonia Criteria Implementation Plan) and other applicable Basin Plan amendments. Should any interested persons desire staff to bring to the hearing any particular documents that are not included in the agenda packet, they must submit a written or electronic request to staff during business hours, not later than five business days before the hearing. The request must identify the documents with enough specificity for staff to locate them.

F. Public Comments and Submittal of Evidence

Persons wishing to comment on, or object to, the tentative waste discharge requirements, or submit evidence for the Board to consider, are invited to submit them in writing to Veronica Cuevas at the above address, or send them electronically to vcuevas@waterboards.ca.gov. To be evaluated and responded to by Regional Water Board staff, included in the Board's agenda folder, and fully considered by the Board, written comments or testimony regarding the tentative must be received no later than close of business July 18, 2007. Failure to comply with these requirements is grounds for the Regional Water Board to refuse to admit the proposed written comment or exhibit into evidence pursuant to section 648.4, title 23 of the California Code of Regulations.

G. Nature of Hearing

This proceeding will be a formal adjudicatory proceeding. For such proceedings, the Regional Water Board follows procedures established by the State Water Resources Control Board. These procedures are set forth in regulations commencing with section 647 of title 23 of the California Code of Regulations, in particular, Article 2, commencing with section 648.

H. Parties to the Hearing

The following are the parties to this proceeding:

1. The applicant/permittee (Newhall Ranch Sanitation District)
2. Regional Water Board Staff

Any other persons requesting party status must submit a written or electronic request to staff not later than 20 business days before the hearing. All parties will be notified if other persons are so designated.

I. Hearing Procedure

The board meeting, of which this hearing is a part, will start at 9:00 a.m. Interested persons are invited to attend. When the agenda item is called, staff will present the matter under consideration, after which oral statements from parties or interested persons will be heard. For accuracy of the record, all important testimony should be in writing. The Board will include in the administrative record written transcriptions of oral testimony that is actually presented at the hearing. Oral testimony may be limited to five minutes or less for each interested person, depending on the number of interested persons wishing to be heard.

Parties or interested persons with similar concerns or opinions are encouraged to choose one representative to speak, and are encouraged to coordinate their presentations with each other. Parties will be advised after the receipt of public comments, but prior to the date of the hearing, of the amount of time each is allocated for presentations. That decision will be based upon the complexity and number of issues under consideration, the extent to which the parties have coordinated, the number of parties and interested persons anticipated, and the time available for the hearing. The parties are invited to contact staff not later than July 26, 2007 (two weeks prior to the hearing) to discuss how much time they believe is necessary for their presentations, and staff will endeavor to accommodate reasonable requests.
At the conclusion of testimony, the Board will deliberate in open or close session, and render a decision.

The Board does not generally require the prior identification of witnesses or the cross examination of witnesses, or other procedures not specified in this notice. Parties or persons with special procedural requests or requests for alternative hearing procedures should contact staff, who will endeavor to accommodate reasonable requests. Objections to any procedure to be used during this hearing must be submitted in writing no later than close of business 15 business days prior to the date of the hearing. (Any objections related to the amount of time allocated for parties' presentations much be submitted within two business days of notice thereof, if that date is less than 15 business before the hearing.) Absent such objections, any procedure not specified in this hearing notice will be waived pursuant to section 648(d) of title 23 of the California Code of Regulations. Procedural objections will not be entertained at the hearing.

If there should not be a quorum on the scheduled date of this meeting, all cases will be automatically continued to the next scheduled meeting on October 4, 2007. A continuance will not extend any time set forth herein.

J. Staff Contacts

If you have any question regarding this proposed action, please contact Veronica Cuevas at (213) 576-6662 or via email at vcuevas@waterboards.ca.gov or her supervisor, Blythe Ponek-Bacharowski at (213) 576-6720 or via email at bponek@waterboards.ca.gov .

K. Petitions

Any aggrieved person may petition the State Water Resources Control Board to review the decision of the Regional Water Board regarding the final WDRs. The petition must be submitted within 30 days of the Regional Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

TABLE R1
Reasonable Potential Analysis and Limit Derivation

Newhall Ranch Sanitation District - Newhall Ranch WRP
(Receiving Water Data only, No POTW Data Avail.)
(CA0064556, CI#9322)

					CTR CRITERIA					REASONABLE POTENTIAL ANALYSIS (RPA)								HUMAN HEALTH CALCULATIONS		
					Freshwater		Human Health		Basin Plan									Organisns Only		
CTR#	DATE	Units	CV	MEC	C acute = CMC tot	C chronic = CCC tot	Not applicable C hh W&O	C hh O	Title 22 GWR	Lowest C	MEC >= Lowest C	Tier 1 - Need limit?	B at NR1	B at NR3	Tier 2 - Need limit?	Tier 3 - other info. ?	Tier 3 - need limit?	AMELhh = ECA = C hh O	MDEL/ AMEL multiplier	MDEL hh
1	Antimony	µg/L		Not available	NONE	NONE	14	4300	6	6	Not available	Go to Tier 2	1.4	1.3	Go to tier 3	YES	Similar facility		2.01	
2	Arsenic	µg/L		Not available	340	150	NONE	NONE	10 (Federal MCL)	10	Not available	Go to Tier 2	3.6	4.5	NO	YES	Similar Facility		2.01	
3	Beryllium	µg/L		Not available	NONE	NONE	Narrative	Narrative	4	4	Not available	Go to Tier 2	0.4	0.5	Go to tier 3	NO	NO			
4	Cadmium*	µg/L		Not available	18.6	6.6	Narrative	Narrative	5	5	Not available	Go to Tier 2	0.69	1.73	Go to tier 3	NO	NO	NA		NA
5a	Chromium III*	µg/L		Not available	4844	577	Narrative	Narrative		577	Not available	Go to Tier 2			Go to tier 3	NO	NO			
5b	**Chromium VI**	**µg/L**		**Not available**	**16.3**	**11.4**	**Narrative**	**Narrative**	**50**	**11**	**Not available**	**Go to Tier 2**	**7.6**	**9.6**	**NO**	**NO**	**NO**	**N/A**	**2.01**	**N/A**
6	Copper*	µg/L	0.6	Not available	45	27	1300	NONE		27	Not available	Go to Tier 2	11	15	No	Yes, may contri-bute to exceed ance	Yes	N/A	2.01	N/A
7	Lead*	µg/L	0.6	Not available	402	16	Narrative	Narrative		16	Not available	Go to Tier 2	4.6	5.8	No	Yes, may contrib ute to exceed ance	YES			
8	Mercury	µg/L	0.6	Not available	Reserved	Reserved	0.05	0.051	2	0.051	Not available	Go to Tier 2	0.31	<0.01	YES			0.051	2.01	0.10251
9	Nickel*	µg/L		Not available	1353	150	610	4600	100	100	Not available	Go to Tier 2	12	17	Go to tier 3	YES	Similar Facility			
10	Selenium	µg/L	0.6	Not available	Reserved	5	Narrative	Narrative	50	5	Not available	Go to Tier 2	4.4	6.2	YES			NA	2.01	NA
11	Silver*	µg/L		Not available	35	none	NONE	NONE		35	Not available	Go to Tier 2	0.8	0.5	Go to tier 3	NO	NO			
12	Thallium	µg/L		Not available	NONE	NONE	1.7	6.3	2	2	Not available	Go to Tier 2	0.5	<0.2	Go to tier 3	NO	NO			
13	Zinc*	µg/L	0.6	Not available	346	346	none	NONE		346	Not available	Go to Tier 2	30	51	NO	YES	Similar facility		2.01	NA
14	Cyanide	µg/L	0.6	Not available	22	5.2	700	220,000	200	5.2	Not available	Go to Tier 2	<5	<5	NO	YES	Similar facility			
18	Acrylonitrile	µg/L	0.6	Not available	NONE	NONE	0.059	0.66		0.66	Not available	Go to Tier 2	<10	<10	Go to tier 3	YES	Similar facility	0.66	2.01	1.3266
38	Tetrachloroethylene	µg/L	0.6	Not available	NONE	NONE	0.8	8.85	5	5	Not available	Go to Tier 2	<0.5	<0.5	NO	YES	Similar facility			
68	Bis(2-Ethylhexyl) Phthalate	µg/L	0.6	Not available	NONE	NONE	1.8	5.9	4	4	Not available	Go to Tier 2	<2	<2	NO	YES	Similar facility	5.9	2.83	17

TABLE R1
Reasonable Potential Analysis and Limit Derivation

Newhall Ranch Sanitation District - Newhall Ranch WRP
(Receiving Water Data only, No POTW Data Avail.)
(CA0064556, CI#9322)

			AQUATIC LIFE CALCULATIONS					AQUATIC LIFE CALCULATIONS				PROPOSED LIMITS		
			Freshwater					Freshwater						
CTR#	DATE	Units	ECA acute multiplier (p.7)	LTA acute	ECA chronic multiplier	LTA chronic	Lowest LTA	AMEL multiplier (n=4)	AMEL aq.life	MDEL multiplier (n=4)	MDEL aqlife	Lowest AMEL	Lowest MDEL	Recommendation
1	Antimony	µg/L										6	--	Need Limit Tier 3 - Similar facility
2	Arsenic	µg/L	0.321	109.14	0.527	79.05	79.05	1.55	122.528	3.11	245.85	10	--	Need Limit Tier 3 - Similar facility
3	Beryllium	µg/L										--	--	Interim Monitoring - No CTR-based Limit
4	Cadmium*	µg/L										--	--	Interim Monitoring - No CTR-based Limit
5a	Chromium III*	µg/L										--	--	Interim Monitoring - No CTR-based Limit
5b	**Chromium VI**	µg/L										--	--	Interim Monitoring - No CTR-based Limit
6	Copper*	µg/L	0.321	14.445	0.527	14.229	14.229	1.55	22.055	3.11	44.252	22	44	Need Limit. RP to exceed the CTR Freshwater Aquatic life criteria.
7	Lead*	µg/L	0.321	129.042	0.527	8.432	8.432	1.55	13.0696	3.11	26.224	13	26	Need limit. RP to exceed the CTR Freshwater Aquatic life criteria.
8	Mercury	µg/L	0.321	NA	0.527	NA	NA	1.55	NA	3.11	NA	0.051	0.1	Need Limit. RP to exceed the CTR Human Health Organims only criteria.
9	Nickel*	µg/L										100	--	Need Limit Tier 3 - Similar facility
10	Selenium	µg/L	0.321	#VALUE!	0.527	2.635	2.635	1.55	4.08425	3.11	8.1949	4.1	8.2	Need Limit. RP to exceed the CTR Freshwater Aquatic Life Criteria.
11	Silver*	µg/L										--	--	No new limit, because there was no RP to exceed the CTR criteria.
12	Thallium	µg/L										--	--	No new limit, because there was no RP to exceed the CTR criteria.
13	Zinc*	µg/L										5000.0	--	Need Limit Tier 3 - Similar facility
14	Cyanide	µg/L	0.321	7.062	0.527	2.7404	2.7404	1.55	4.24762	3.11	8.5226	4.2	8.5	Need Limit Tier 3 - Similar facility
18	Acrylonitrile	µg/L										0.66	1.3	Need Limit Tier 3 - Similar facility
38	Tetrachloroethylene	µg/L										5.0	--	Need Limit Tier 3 - Similar facility
68	Bis(2-Ethylhexyl) Phthalate	µg/L										4.0	--	Need Limit Tier 3 - Similar facility

TABLE R1
Reasonable Potential Analysis and Limit Derivation

Newhall Ranch Sanitation District - Newhall Ranch WRP
(Receiving Water Data only, No POTW Data Avail.)
(CA0064556, CI#9322)

					CTR CRITERIA					REASONABLE POTENTIAL ANALYSIS (RPA)								HUMAN HEALTH CALCULATIONS		
					Freshwater		Human Health		Basin Plan									Organisns Only		
CTR#	DATE	Units	CV	MEC	C acute = CMC tot	C chronic = CCC tot	Not applicable C hh W&O	C hh O	Title 22 GWR	Lowest C	MEC >= Lowest C	Tier 1 - Need limit?	B at NR1	B at NR3	Tier 2 - Need limit?	Tier 3 - other info. ?	Tier 3 - need limit?	AMELhh = ECA = C hh O	MDEL/ AMEL multiplier	MDEL hh
77	1,4-Dichlorobenzene	µg/L	0.6	Not available	NONE	NONE	400	2,600	5	5	Not available	Go to Tier 2	<2	<2	Go to tier 3	YES	Similar facility			
105	gamma-BHC (aka Lindane)	µg/L	0.6	Not available	0.95	NONE	0.019	0.063	0.2	0.063	Not available	Go to Tier 2	<0.001	<0.001	NO	YES	Similar facility			
109	4,4'-DDE	µg/L	0.6	Not available	NONE	NONE	0.00059	0.00059		0.00059	Not available	Go to Tier 2	<0.001	0.011	YES			0.00059	2.01	0.0012
126	Toxaphene	µg/L	0.6	Not available	0.73	0.0002	0.0073	0.00075	3	0.00075	Not available	Go to Tier 2	<0.2		Go to tier 3	NO	NO			
	Iron	µg/L	0.6						300	300			10,000	13,800						
FOOTNOTE:																				
*	These metals are hardness dependent. CTR criteria was calculated using a minimum receiving water hardness of 350 mg/L at station NR1. Individual hardness values were capped at 400 mg/L, pursuant to CTR.																			

TABLE R1
Reasonable Potential Analysis and Limit Derivation

Newhall Ranch Sanitation District - Newhall Ranch WRP
(Receiving Water Data only, No POTW Data Avail.)
(CA0064556, CI#9322)

			AQUATIC LIFE CALCULATIONS					AQUATIC LIFE CALCULATIONS						
			Freshwater					Freshwater				PROPOSED LIMITS		
CTR#	DATE	Units	ECA acute multiplier (p.7)	LTA acute	ECA chronic multiplier	LTA chronic	Lowest LTA	AMEL multiplier (n=4)	AMEL aq.life	MDEL multiplier (n=4)	MDEL aqlife	Lowest AMEL	Lowest MDEL	Recommendation
77	1,4-Dichlorobenzene	µg/L										5	--	Need Limit Tier 3 - Similar facility
105	gamma-BHC (aka Lindane)	µg/L										0.2	--	Need Limit Tier 3 - Similar facility
109	4,4'-DDE	µg/L										0.00059	0.0012	Need Limit - RP to exceed CTR Human Health criteria
126	Toxaphene	µg/L										--	--	Interim Monitoring - No Limit
	Iron	µg/L										300	--	Need Limit RP to exceed MCL Basin Plan WQO
FOOTNOTE:														
*	These metals are hardness dependent. CTR criteria was calculated using a minimum receiving water hardness of 350 mg/L at station NR1. Individual hardness values were capped at 400 mg/L, pursuant to CTR.													

ATTACHMENT G

GENERIC TOXICITY REDUCTION EVALUATION (TRE) WORKPLAN POTW

1. **Information and Data Acquisition**
   a. **Operations and performance review**
      i. NPDES permit requirements
         (1) Effluent limitations
         (2) Special conditions
         (3) Monitoring data and compliance history
      ii. POTW design criteria
         (1) Hydraulic loading capacities
         (2) Pollutant loading capacities
         (3) Biodegradation kinetics calculations/assumptions
      iii. Influent and effluent conventional pollutant data
         (1) Biochemical oxygen demand (BOD_5)
         (2) Chemical oxygen demand (COD)
         (3) Suspended solids (SS)
         (4) Ammonia
         (5) Residual chlorine
         (6) pH
      iv. Process control data
         (1) Primary sedimentation - hydraulic loading capacity and BOD and SS removal
         (2) Activated sludge - Food-to-microorganism (F/M) ratio, mean cell residence time (MCRT), mixed liquor suspended solids (MLSS), sludge yield, and BOD and COD removal
         (3) Secondary clarification - hydraulic and solids loading capacity, sludge volume index and sludge blanket depth
      v. Operations information
         (1) Operating logs
         (2) Standard operating procedures
         (3) Operations and maintenance practices
      vi. Process sidestream characterization data
         (1) Sludge processing sidestreams
         (2) Tertiary filter backwash
         (3) Cooling water
      vii. Combined sewer overflow (CSO) bypass data
         (1) Frequency
         (2) Volume
      viii. Chemical coagulant usage for wastewater treatment and sludge processing
         (1) Polymer
         (2) Ferric chloride
         (3) Alum

b. POTW influent and effluent characterization data

i. Toxicity

ii. Priority pollutants

iii. Hazardous pollutants

iv. SARA 313 pollutants,

v. Other chemical-specific monitoring results

c. Sewage residuals (raw, digested, thickened and dewatered sludge and incinerator ash) characterization data

i. EP toxicity

ii. Toxicity Characteristic Leaching Procedure (TCLP)

iii. Chemical analysis

d. Industrial waste survey (IWS)

i. Information on IUs with categorical standards or local limits and other significant non-categorical IUs

ii. Number of IUs

iii. Discharge flow

iv. Standard Industrial Classification (SIC) code

v. Wastewater flow
   (1) Types and concentrations of pollutants in the discharge
   (2) Products manufactured

vi. Description of pretreatment facilities and operating practices

vii. Annual pretreatment report

viii. Schematic of sewer collection system

ix. POTW monitoring data
   (1) Discharge characterization data
   (2) Spill prevention and control procedures
   (3) Hazardous waste generation

x. IU self-monitoring data
   (1) Description of operations
   (2) Flow measurements
   (3) Discharge characterization data
   (4) Notice of sludge loading
   (5) Compliance schedule (if out of compliance)

xi. Technically based local limits compliance reports

xii. Waste hauler monitoring data manifests

xiii. Evidence of POTW treatment interferences (i.e., biological process inhibition

ATTACHMENT H

SECTION A: STORM WATER POLLUTION PREVENTION PLAN REQUIREMENTS[1]

1. Implementation Schedule

A storm water pollution prevention plan (SWPPP) shall be developed and implemented for this facility in accordance with the following schedule.

a. Facility operators beginning industrial activities before October 1, 1992 shall develop and implement the SWPPP no later than October 1, 1992. Facility operators beginning industrial activities after October 1, 1992 shall develop and implement the SWPPP when industrial activities begin.

b. Existing facility operators that submitted a Notice of Intent (NOI), pursuant to State Water Resources Control Board (State Water Board) Order No. 91-013-DWQ (as amended by Order No. 92-12) or San Francisco Bay Regional Water Quality Control Board (Regional Water Board) Order No. 92-11 (as amended by Order No. 92-116), shall continue to implement their existing SWPPP and shall implement any necessary revisions to their SWPPP in a timely manner, but in no case later than August 1, 1997.

2. Objectives

The SWPPP has two major objectives: (a) to identify and evaluate sources of pollutants associated with industrial activities that may affect the quality of storm water discharges and authorized non-storm water discharges from the facility; and (b) to identify and implement site- specific best management practices (BMPs) to reduce or prevent pollutants associated with industrial activities in storm water discharges and authorized non-storm water discharges. BMPs may include a variety of pollution prevention measures or other low-cost and pollution control measures. They are generally categorized as non-structural BMPs (activity schedules, prohibitions of practices, maintenance procedures, and other low-cost measures) and as structural BMPs (treatment measures, run-off controls, over-head coverage.) To achieve these objectives, facility operators should consider the five phase process for SWPPP development and implementation as shown in Table A.

The SWPPP requirements are designed to be sufficiently flexible to meet the needs of various facilities. SWPPP requirements that are not applicable to a facility should not be included in the SWPPP.

A facility's SWPPP is a written document that shall contain a compliance activity schedule, a description of industrial activities and pollutant sources, descriptions of BMPs, drawings, maps, and relevant copies or references of parts of other plans.

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[1] From State Water Board's Water Quality Order No. 97-03-DWQ (NPDES General Permit No. CAS000001), *Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities.*

The SWPPP shall be revised whenever appropriate and shall be readily available for review by facility employees or Regional Water Board inspectors.

3. Planning and Organization

a. Pollution Prevention Team

The SWPPP shall identify a specific individual or individuals and their positions within the facility organization as members of a storm water pollution prevention team responsible for developing the SWPPP, assisting the facility manager in SWPPP implementation and revision, and conducting all monitoring program activities required in Section B of this General Permit. The SWPPP shall clearly identify the General Permit related responsibilities, duties, and activities of each team member. For small facilities, storm water pollution prevention teams may consist of one individual where appropriate.

b. Review Other Requirements and Existing Facility Plans

The SWPPP may incorporate or reference the appropriate elements of other regulatory requirements. Facility operators should review all local, State, and Federal requirements that impact, complement, or are consistent with the requirements of this General Permit. Facility operators should identify any existing facility plans that contain storm water pollutant control measures or relate to the requirements of this General Permit. As examples, facility operators whose facilities are subject to Federal Spill Prevention Control and Countermeasures' requirements should already have instituted a plan to control spills of certain hazardous materials. Similarly, facility operators whose facilities are subject to air quality related permits and regulations may already have evaluated industrial activities that generate dust or particulates.

4. Site Map

The SWPPP shall include a site map. The site map shall be provided on an 8-½ x 11 inch or larger sheet and include notes, legends, and other data as appropriate to ensure that the site map is clear and understandable. If necessary, facility operators may provide the required information on multiple site maps.

TABLE A
FIVE PHASES FOR DEVELOPING AND IMPLEMENTING INDUSTRIAL STORM WATER POLLUTION PREVENTION PLANS

PLANNING AND ORGANIZATION

Form Pollution Prevention Team
Review other plans

ASSESSMENT PHASE

Develop a site map
Identify potential pollutant sources
Inventory of materials and chemicals
List significant spills and leaks
Identify non-storm water discharges
Assess pollutant Risks

BEST MANAGEMENT PRACTICES IDENTIFICATION PHASE

Non-structural BMPs
Structural BMPs
Select activity and site-specific BMPs

IMPLEMENTATION PHASE

Train employees
Implement BMPs
Conduct recordkeeping and reporting

EVALUATION / MONITORING

Conduct annual site evaluation
Review monitoring information
Evaluate BMPs
Review and revise SWPPP

The following information shall be included on the site map:

a. The facility boundaries; the outline of all storm water drainage areas within the facility boundaries; portions of the drainage area impacted by run-on from surrounding areas; and direction of flow of each drainage area, on-site surface water bodies, and areas of soil erosion. The map shall also identify nearby water bodies (such as rivers, lakes, and ponds) and municipal storm drain inlets where the facility's storm water discharges and authorized non-storm water discharges may be received.

b. The location of the storm water collection and conveyance system, associated points of discharge, and direction of flow. Include any structural control measures that affect storm water discharges, authorized non-storm water discharges, and run-on. Examples of structural control measures are catch basins, berms, detention ponds, secondary containment, oil/water separators, diversion barriers, etc.

c. An outline of all impervious areas of the facility, including paved areas, buildings, covered storage areas, or other roofed structures.

d. Locations where materials are directly exposed to precipitation and the locations where significant spills or leaks identified in Section A.6.a.iv. below have occurred.

e. Areas of industrial activity. This shall include the locations of all storage areas and storage tanks, shipping and receiving areas, fueling areas, vehicle and equipment storage/maintenance areas, material handling and processing areas, waste treatment and disposal areas, dust or particulate generating areas, cleaning and rinsing areas, and other areas of industrial activity which are potential pollutant sources.

5. <u>List of Significant Materials</u>

The SWPPP shall include a list of significant materials handled and stored at the site. For each material on the list, describe the locations where the material is being stored, received, shipped, and handled, as well as the typical quantities and frequency. Materials shall include raw materials, intermediate products, final or finished products, recycled materials, and waste or disposed materials.

6. <u>Description of Potential Pollutant Sources</u>

a. The SWPPP shall include a narrative description of the facility's industrial activities, as identified in Section A.4.e above, associated potential pollutant sources, and potential pollutants that could be discharged in storm water discharges or authorized non-storm water discharges. At a minimum, the following items related to a facility's industrial activities shall be considered:

i. Industrial Processes

Describe each industrial process, the type, characteristics, and quantity of significant materials used in or resulting from the process, and a description of the manufacturing, cleaning, rinsing, recycling, disposal, or other activities related to the process. Where applicable, areas protected by containment structures and the corresponding containment capacity shall be described.

ii. Material Handling and Storage Areas

Describe each handling and storage area, type, characteristics, and quantity of significant materials handled or stored, description of the shipping, receiving, and loading procedures, and the spill or leak prevention and response procedures. Where applicable, areas protected by containment structures and the corresponding containment capacity shall be described.

iii. Dust and Particulate Generating Activities

Describe all industrial activities that generate dust or particulates that may be deposited within the facility's boundaries and identify their discharge locations; the characteristics of dust and particulate pollutants; the approximate quantity of dust and particulate pollutants that may be deposited within the facility boundaries; and a description of the primary areas of the facility where dust and particulate pollutants would settle.

iv. Significant Spills and Leaks

Describe materials that have spilled or leaked in significant quantities in storm water discharges or non-storm water discharges since April 17, 1994. Include toxic chemicals (listed in 40 CFR, Part 302) that have been discharged to storm water as reported on U.S. Environmental Protection Agency (U.S. EPA) Form R, and oil and hazardous substances in excess of reportable quantities (see 40 Code of Federal Regulations [CFR], Parts 110, 117, and 302).

The description shall include the type, characteristics, and approximate quantity of the material spilled or leaked, the cleanup or remedial actions that have occurred or are planned, the approximate remaining quantity of materials that may be exposed to storm water or non-storm water discharges, and the preventative measures taken to ensure spill or leaks do not reoccur. Such list shall be updated as appropriate during the term of this General Permit.

v. Non-Storm Water Discharges

Facility operators shall investigate the facility to identify all non-storm water discharges and their sources. As part of this investigation, all drains (inlets and outlets) shall be evaluated to identify whether they connect to the storm drain system.

All non-storm water discharges shall be described. This shall include the source, quantity, frequency, and characteristics of the non-storm water discharges and associated drainage area.

Non-storm water discharges that contain significant quantities of pollutants or that do not meet the conditions provided in Special Conditions D. are prohibited by this General Permit (Examples of prohibited non-storm water discharges are contact and non-contact cooling water, boiler blowdown, rinse water, wash water, etc.). Non-storm water discharges that meet the conditions provided in Special Condition D. are authorized by this General Permit. The SWPPP must include BMPs to prevent or reduce contact of non-storm water discharges with significant materials or equipment.

vi. Soil Erosion

Describe the facility locations where soil erosion may occur as a result of industrial activity, storm water discharges associated with industrial activity, or authorized non-storm water discharges.

b. The SWPPP shall include a summary of all areas of industrial activities, potential pollutant sources, and potential pollutants. This information should be summarized similar to Table B. The last column of Table B, "Control Practices", should be completed in accordance with Section A.8. below.

7. <u>Assessment of Potential Pollutant Sources</u>

a. The SWPPP shall include a narrative assessment of all industrial activities and potential pollutant sources as described in A.6. above to determine:

i. Which areas of the facility are likely sources of pollutants in storm water discharges and authorized non-storm water discharges, and

ii. Which pollutants are likely to be present in storm water discharges and authorized non-storm water discharges. Facility operators shall consider and evaluate various factors when performing this assessment such as current storm water BMPs; quantities of significant materials handled, produced, stored, or disposed of; likelihood of exposure to storm water or authorized non-storm water discharges; history of spill or leaks; and run-on from outside sources.

b. Facility operators shall summarize the areas of the facility that are likely sources of pollutants and the corresponding pollutants that are likely to be

present in storm water discharges and authorized non-storm water discharges.

Facility operators are required to develop and implement additional BMPs as appropriate and necessary to prevent or reduce pollutants associated with each pollutant source. The BMPs will be narratively described in Section 8 below.

8. Storm Water Best Management Practices

The SWPPP shall include a narrative description of the storm water BMPs to be implemented at the facility for each potential pollutant and its source identified in the site assessment phase (Sections A.6. and 7. above). The BMPs shall be developed and implemented to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. Each pollutant and its source may require one or more BMPs. Some BMPs may be implemented for multiple pollutants and their sources, while other BMPs will be implemented for a very specific pollutant and its source.

TABLE B
EXAMPLE

ASSESSMENT OF POTENTIAL POLLUTION SOURCES AND CORRESPONDING BEST MANAGEMENT PRACTICES SUMMARY

Area	Activity	Pollutant Source	Pollutant	Best Management Practices
Vehicle & Equipment Fueling	Fueling	Spills and leaks during delivery. Spills caused by topping off fuel tanks. Hosing or washing down fuel oil fuel area. Leaking storage tanks. Rainfall running off fuel oil, and rainfall running onto and off fueling area.	fuel oil	Use spill and overflow protection. Minimize run-on of storm water into the fueling area. Cover fueling area. Use dry cleanup methods rather than hosing down area. Implement proper spill prevention control program. Implement adequate preventative maintenance program to preventive tank and line leaks. Inspect fueling areas regularly to detect problems before they occur. Train employees on proper fueling, cleanup, and spill response techniques.

The description of the BMPs shall identify the BMPs as (1) existing BMPs, (2) existing BMPs to be revised and implemented, or (3) new BMPs to be implemented. The description shall also include a discussion on the effectiveness

of each BMP to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. The SWPPP shall provide a summary of all BMPs implemented for each pollutant source. This information should be summarized similar to Table B.

Facility operators shall consider the following BMPs for implementation at the facility:

a. Non-Structural BMPs

Non-structural BMPs generally consist of processes, prohibitions, procedures, schedule of activities, etc., that prevent pollutants associated with industrial activity from contacting with storm water discharges and authorized non-storm water discharges. They are considered low technology, cost-effective measures. Facility operators should consider all possible non-structural BMPs options before considering additional structural BMPs (see Section A.8.b. below). Below is a list of non-structural BMPs that should be considered:

i. Good Housekeeping

Good housekeeping generally consist of practical procedures to maintain a clean and orderly facility.

ii. Preventive Maintenance

Preventive maintenance includes the regular inspection and maintenance of structural storm water controls (catch basins, oil/water separators, etc.) as well as other facility equipment and systems.

iii. Spill Response

This includes spill clean-up procedures and necessary clean-up equipment based upon the quantities and locations of significant materials that may spill or leak.

iv. Material Handling and Storage

This includes all procedures to minimize the potential for spills and leaks and to minimize exposure of significant materials to storm water and authorized non-storm water discharges.

v. Employee Training

This includes training of personnel who are responsible for (1) implementing activities identified in the SWPPP, (2) conducting inspections, sampling, and visual observations, and (3) managing storm water. Training should address topics such as spill response, good housekeeping, and material handling procedures, and actions necessary to implement all BMPs identified in the SWPPP. The

SWPPP shall identify periodic dates for such training. Records shall be maintained of all training sessions held.

vi. Waste Handling/Recycling

This includes the procedures or processes to handle, store, or dispose of waste materials or recyclable materials.

vii. Recordkeeping and Internal Reporting

This includes the procedures to ensure that all records of inspections, spills, maintenance activities, corrective actions, visual observations, etc., are developed, retained, and provided, as necessary, to the appropriate facility personnel.

viii. Erosion Control and Site Stabilization

This includes a description of all sediment and erosion control activities. This may include the planting and maintenance of vegetation, diversion of run-on and runoff, placement of sandbags, silt screens, or other sediment control devices, etc.

ix. Inspections

This includes, in addition to the preventative maintenance inspections identified above, an inspection schedule of all potential pollutant sources. Tracking and follow-up procedures shall be described to ensure adequate corrective actions are taken and SWPPPs are made.

x. Quality Assurance

This includes the procedures to ensure that all elements of the SWPPP and Monitoring Program are adequately conducted.

b. Structural BMPs

Where non-structural BMPs as identified in Section A.8.a. above are not effective, structural BMPs shall be considered. Structural BMPs generally consist of structural devices that reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. Below is a list of structural BMPs that should be considered:

i. Overhead Coverage

This includes structures that provide horizontal coverage of materials, chemicals, and pollutant sources from contact with storm water and authorized non-storm water discharges.

ii. Retention Ponds

This includes basins, ponds, surface impoundments, bermed areas, etc. that do not allow storm water to discharge from the facility.

iii. Control Devices

This includes berms or other devices that channel or route run-on and runoff away from pollutant sources.

iv. Secondary Containment Structures

This generally includes containment structures around storage tanks and other areas for the purpose of collecting any leaks or spills.

v. Treatment

This includes inlet controls, infiltration devices, oil/water separators, detention ponds, vegetative swales, etc. that reduce the pollutants in storm water discharges and authorized non-storm water discharges.

9. Annual Comprehensive Site Compliance Evaluation

The facility operator shall conduct one comprehensive site compliance evaluation (evaluation) in each reporting period (July 1-June 30). Evaluations shall be conducted within 8-16 months of each other. The SWPPP shall be revised, as appropriate, and the revisions implemented within 90 days of the evaluation. Evaluations shall include the following:

a. A review of all visual observation records, inspection records, and sampling and analysis results.

b. A visual inspection of all potential pollutant sources for evidence of, or the potential for, pollutants entering the drainage system.

c. A review and evaluation of all BMPs (both structural and non-structural) to determine whether the BMPs are adequate, properly implemented and maintained, or whether additional BMPs are needed. A visual inspection of equipment needed to implement the SWPPP, such as spill response equipment, shall be included.

d. An evaluation report that includes, (i) identification of personnel performing the evaluation, (ii) the date(s) of the evaluation, (iii) necessary SWPPP revisions, (iv) schedule, as required in Section A.10.e, for implementing SWPPP revisions, (v) any incidents of non-compliance and the corrective actions taken, and (vi) a certification that the facility operator is in compliance with this General Permit. If the above certification cannot be provided, explain in the evaluation report why the facility operator is not in compliance with this General Permit. The evaluation report shall be submitted as part of the annual report, retained for at least five years, and signed and certified in accordance with Standard Provisions 9. and 10. of Section C. of this General Permit.

10. SWPPP General Requirements

a. The SWPPP shall be retained on site and made available upon request of a representative of the Regional Water Board and/or local storm water management agency (local agency) which receives the storm water discharges.

b. The Regional Water Board and/or local agency may notify the facility operator when the SWPPP does not meet one or more of the minimum requirements of this Section. As requested by the Regional Water Board and/or local agency, the facility operator shall submit an SWPPP revision and implementation schedule that meets the minimum requirements of this section to the Regional Water Board and/or local agency that requested the SWPPP revisions. Within 14 days after implementing the required SWPPP revisions, the facility operator shall provide written certification to the Regional Water Board and/or local agency that the revisions have been implemented.

c. The SWPPP shall be revised, as appropriate, and implemented prior to changes in industrial activities which (i) may significantly increase the quantities of pollutants in storm water discharge, (ii) cause a new area of industrial activity at the facility to be exposed to storm water, or (iii) begin an industrial activity which would introduce a new pollutant source at the facility.

d. Other than as provided in Provisions B.11, B.12, and E.2 of the General Permit, the SWPPP shall be revised and implemented in a timely manner, but in no case more than 90 days after a facility operator determines that the SWPPP is in violation of any requirement(s) of this General Permit.

e. When any part of the SWPPP is infeasible to implement by the deadlines specified in Provision E.2 or Sections A.1, A.9, A.10.c, and A.10.d of this General Permit due to proposed significant structural changes, the facility operator shall submit a report to the Regional Water Board prior to the applicable deadline that (i) describes the portion of the SWPPP that is infeasible to implement by the deadline, (ii) provides justification for a time extension, (iii) provides a schedule for completing and implementing that portion of the SWPPP, and (iv) describes the BMPs that will be implemented in the interim period to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. Such reports are subject to Regional Water Board approval and/or modifications. Facility operators shall provide written notification to the Regional Water Board within 14 days after the SWPPP revisions are implemented.

f. The SWPPP shall be provided, upon request, to the Regional Water Board. The SWPPP is considered a report that shall be available to the public by the Regional Water Board under Section 308(b) of the Clean Water Act.

ATTACHMENT I
BIOSOLIDS USE AND DISPOSAL REQUIREMENTS

1. All biosolids generated by the Discharger shall be reused or disposed of in compliance with the applicable portions of:

   a. 40 CFR 503: for biosolids that are land applied, placed in surface disposal sites (dedicated land disposal sites or monofills), or incinerated; 40 CFR 503 Subpart B (land application) applies to biosolids placed on the land for the purpose of providing nutrients or conditioning the soil for crops or vegetation. 40 CFR 503 Subpart C (surface disposal) applies to biosolids placed on the land for the purpose of disposal.

   b. 40 CFR 258: for biosolids disposed of in Municipal Solid Waste landfills.

   c. 40 CFR 257: for all biosolids disposal practices not covered under 40 CFR 258 or 503.

2. The Discharger is responsible for assuring that all biosolids from its facility are used or disposed of in accordance with 40 CFR 503, whether the Discharger reuses or disposes of the biosolids itself or transfers them to another party for further treatment, reuse, or disposal. The Discharger is responsible for informing subsequent preparers, appliers, or disposers of the requirements they must meet under 40 CFR 503.

3. Duty to mitigate: The Discharger shall take all reasonable steps to prevent or minimize any biosolids use or disposal which may adversely impact human health or the environment.

4. No biosolids shall be allowed to enter wetland or other waters of the United States.

5. Biosolids treatment, storage, and use or disposal shall not contaminate groundwater.

6. Biosolids treatment, storage, and use or disposal shall not create a nuisance such as objectionable odors or flies.

7. The Discharger shall assure that haulers who transport biosolids off site for further treatment, storage, reuse, or disposal take all necessary measures to keep the biosolids contained.

8. If biosolids are stored for over two years from the time they are generated, the Discharger must ensure compliance with all the requirements for surface disposal under 40 CFR 503 Subpart C, or must submit a written request to EPA with the information in 503.20 (b), requesting permission for longer temporary storage.

9. Sewage sludge containing more than 50 mg/kg PCB's shall be disposed of in accordance with 40 CFR 761.

10. Any off-site biosolids treatment, storage, use or disposal site operated by the Discharger within Region 4 (Los Angeles Region of RWQCB) that is not subject to its own Waste Discharge Requirements shall have facilities adequate to divert surface runoff from the adjacent area, to protect the site boundaries from erosion, and to prevent any conditions that would cause drainage from the materials in the disposal site to escape from the site. Adequate protection is defined as protected from at least a 100-year storm and from the highest tidal stage that may occur.

11. Inspection and Entry: The Regional Board, USEPA or an authorized representative thereof, upon the presentation of credentials, shall be allowed by the Discharger, directly or through contractual arrangements with their biosolids management contractors, to:

    a. enter upon all premises where biosolids are produced by the Discharger and all premises where Discharger biosolids are further treated, stored, used, or disposed, either by the Discharger or by another party to whom the Discharger transfers the biosolids for further treatment, storage, use, or disposal;

    b. have access to and copy any records that must be kept under the conditions of this permit or of 40 CFR 503, by the Discharger or by another party to whom the Discharger transfers the biosolids for further treatment, storage, use, or disposal; and

    c. inspect any facilities, equipment (including monitoring and control equipment), practices, or operations used in the production of biosolids and further treatment, storage, use, or disposal by the Discharger or by another party to whom the Discharger transfers the biosolids for further treatment, storage, use, or disposal.

12. Monitoring shall be conducted as follows:

    a. Biosolids shall be tested for the metals required in section 503.16 (for land application) or 503.26 (for surface disposal), using the methods in "Test Methods for Evaluating Solids Waste, Physical/Chemical Methods" (SW-:846), as required in 503.8(b}(4}, at the following minimum frequencies:

Volume (dry metric tons/year)	Frequency
0 – 290	once per year
290 – 1500	once per quarter
1500 – 15000	once per 60 days
> 15000	once per month

For accumulated, previously untested biosolids, the Discharge~ shall develop a

representative sampling plan, which addresses the number and location of sampling points, and collect representative samples.

Test results shall be expressed in mg pollutant per kg biosolids on a 100% dry weight basis.

Biosolids to be land applied shall be tested for Organic-N, ammonium-N, and nitrate-N at the frequencies required above.

b. Prior to land application, the Discharger shall demonstrate that the biosolids meet Class A or Class B pathogen reduction levels by one of the methods listed in 503.32. Prior to disposal in a surface disposal site, the Discharger shall demonstrate that the biosolids meet Class B levels or shall ensure that the site is covered at the end of each operating day.

c. For biosolids that are land applied or placed in a surface disposal site, the Discharger shall track and keep records of the operational parameters used to achieve Vector Attraction Reduction requirements in 503.33 (b).

d. Class 1 facilities (facilities with pretreatment programs or others designated as Class 1 by the Regional Administrator) and Federal facilities with> 5 mgd influent flow shall sample biosolids for pollutants listed under Section 307 (a) of the Act (as required in the pretreatment section of the permit for POTWs with pretreatment programs.) Class 1 facilities and Federal Facilities with> 5 mgd influent flow shall test dioxins/dibenzofurans using a detection limit of < 1 pg/g during their next sampling period if they have not done so within the past 5 years and once per 5 years thereafter.

e. The biosolids shall be tested annually, or more frequently if necessary to determine hazardousness in accordance with California Law.

f. If biosolids are placed in a surface disposal site (dedicated land disposal site or monofill), a qualified groundwater scientist shall develop a groundwater monitoring program for the site, or shall certify that the placement of biosolids on the site will not contaminate an aquifer.

g. Biosolids placed in a municipal landfill shall be tested semi-annually by the Paint Filter Test (SW-846, Method 9095) to demonstrate that there are no free liquids.

13. The Discharger either directly or through contractual arrangements with their biosolids management contractors shall comply with the following 40 CFR 503 notification requirements:

a. A reuse/disposal plan shall be submitted to EPA Region IX Coordinator and, in the absence of other state or regional reporting requirements, to the state permitting

agency, prior to the use or disposal of any biosolids from this facility to a new or previously unreported site. The plan shall be submitted by the land applier of the biosolids and shall include, a description and a topographic map of the proposed site(s) for reuse or disposal, names and addresses of the applier(s) and site owner(s), and a list of any state or local permits which must be obtained. For land application sites, the plan shall include a description of the crops or vegetation to be grown, proposed nitrogen loadings to be used for the crops, and a groundwater monitoring plan if one exists.

b. If the Discharger biosolids do not meet 503.13 Table 3 metals concentration limits, the Discharger must require their land applier to contact the state permitting authority to determine whether bulk biosolids subject to the cumulative pollutant loading rates in 503.12(b)(2) have been applied to the site since July 20, 1993, and, if so, the cumulative amount of pollutants applied to date, and background concentration, if known. The Discharger shall then notify EPA Region IX Coordinator of this information.

c. For biosolids that are land applied, the Discharger shall notify the applier in writing of the nitrogen content of the biosolids, and the applier's requirements under 503, including the requirements that the applier certify that the requirement to obtain information in Subpart A, and that the management practices, site restrictions, and any applicable vector attraction reduction requirements Subpart D have been met. The Discharger shall require the applier to certify at the end of 38 months following application of Class B biosolids that those harvesting restrictions in effect for up to 38 months have been met.

d. If bulk biosolids are shipped to another State or to Indian Lands, the Discharger must send written notice prior to the initial application of bulk biosolids to the permitting authorities in the receiving State or Indian Land (the EPA Regional Office for the area and the State/Indian authorities).

e. Notification of 503 non-compliance: The Discharger shall require appliers of their biosolids to notify EPA Region 9 and their state permitting agency of any noncompliance within 24 hours if the non-compliance may seriously endanger health or the environment. For other instances of non-compliance, the Discharger shall require appliers of their biosolids to notify EPA Region 9 and their state permitting agency of the non-compliance in writing within 10working days of becoming aware of the non-compliance.

14. The Discharger shall submit an annual biosolids report to EPA Region IX Biosolids Coordinator and the Los Angeles Regional Water Quality Control Board by February 19 of each year for the period covering the previous calendar year. The report shall include:

a. The amount of biosolids generated that year, in dry metric tons, and the amount

accumulated from previous years.

b. Results of all pollutant monitoring required in the Monitoring Section above.

c. Descriptions of pathogen reduction methods, and vector attraction reduction methods, as required in 503.17 and 503.27.

d. Results of any groundwater monitoring or certification by groundwater scientist that the placement of biosolids in a surface disposal site will not contaminate an aquifer.

e. Names and addresses of land appliers and surface disposal site operators, and volumes applied (dry metric tons).

f. Names and addresses of persons who received biosolids for storage, further treatment, disposal in a municipal waste landfill, or for other reuse/disposal methods not covered in 14.c, above, and volumes delivered to each.

15. The Discharger shall require all parties contracted to manage their biosolids to submit an annual biosolids report to EPA Region IX Biosolids Coordinator by February 19 of each year for the period covering the previous calendar year. The report shall include:

a. Names and addresses of land appliers and surface disposal site operators, name, location (latitude/longitude), and size (hectares) of site(s), volumes applied/disposed (dry metric tons) and for land application, biosolids loading rates (metric tons per hectare), nitrogen loading rates (kg/ha), dates of applications, crops grown, dates of seeding and harvesting and certifications that the requirement to obtain information in 503.12(e)(2), management practices in 503.14 and site restrictions in 503.32(b)(5) have been met.

Court of Appeal Decision in West Creek, September 25, 2007

SANTA CLARITA ORGANIZATION FOR PLANNING THE ENVIRONMENT et al., Plaintiffs and Appellants, v. COUNTY OF LOS ANGELES, Defendant and Respondent;
Cal.App. 2 Dist.,2007.

SANTA CLARITA ORGANIZATION FOR PLANNING THE ENVIRONMENT et al., Plaintiffs and Appellants,
v.
COUNTY OF LOS ANGELES, Defendant and Respondent;
2d Civil No. B189116

Filed 9/25/07

(Super.Ct. No. 104385) (Santa Barbara County)
NEWHALL LAND AND FARMING COMPANY et al.,
Real Parties in Interest and Respondents.

In *Santa Clarita Organization for Planning the Environment v. County of Los Angeles* (2003) 106 Cal.App.4th 715 (*Scope I*), we held that the water service portion of an environmental impact report (EIR) must analyze the actual amount of water that will be available for a project. In *Scope I*, the EIR for the West Creek residential subdivision did not comply with the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.). [FN1] It relied on contractual entitlements to water. Because this water is not of the " wet" variety, it has been called " paper water."

1. All statutory references are to the Public Resources Code unless otherwise stated.

After remand, the County of Los Angeles (County) revised and recertified the West Creek EIR. Santa Clarita Organization for Planning the Environment (SCOPE) again challenges the water services portion of the EIR. This time, SCOPE focuses on the EIR's analysis of a water transfer agreement and remediation costs for perchlorate contamination of water wells. The trial court denied SCOPE's petition for writ of administrative mandate.

After the trial court denied SCOPE's petition, our Supreme Court decided *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412(*Vineyard*). *Vineyard* states four principles governing the analysis of the water services portion of an EIR. Arguably under principle four, a current source of water could be uncertain in the future. But that uncertainty is more chimerical than actual. We conclude the West Creek EIR satisfies all four principles.

FACTS*Background*

In the 1950s, the Legislature and the voters approved the State Water Project (SWP). It was designed to deliver 4.23 million acre-feet of water annually. It is managed by the Department of Water Resources (DWR).

The DWR contracted to deliver water to water agencies throughout the state. The contracts entitle the agencies to specified amounts of water calculated on the designed capacity of the SWP. Only half of the SWP was constructed. The completion of the SWP was an expectation that has not grown beyond a hope. There is no reasonable expectation that it will ever be completed. This leaves a vast difference between the amount of water to which the local agencies are entitled, and the amount of water the SWP can actually deliver.

A drought in the 1990s highlighted the disparity between water entitlements and actual water. Agricultural and urban agencies disputed how shortfalls in water delivery would be allocated. The interested parties met in Monterey, and produced the Monterey Agreement.

Under the Monterey Agreement, the DWR and the contracting water agencies agreed to a statement of 14 principles. One principle provided for the permanent sale of water among agencies. The Castaic Lake Water Agency (Castaic) purchased 41,000 acre-feet per year (afy) from the Kern County Water Agency. Castaic serves the Santa Clarita Valley area, and the 41,000 afy constitutes over 40 percent of the 95,200 afy available to Castaic.

The Monterey Agreement scuttled the term " entitlement" to describe the amount of water the SWP has contracted to deliver to local water agencies. Instead, the agreement uses the term " Table A Amount." Table A of the agreement lists the contracting agencies and the amount of water the SWP has contracted to deliver. The change is not substantive.

In *Planning & Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892 (*PCL*), the court ordered the EIR for the Monterey Agreement decertified. The court determined that the

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EIR was prepared by the wrong lead agency, a water agency instead of the DWR, and failed to consider the " no project" alternative. Because the EIR for the Kern-Castaic 41,000 afy transfer was " tiered" on the Monterey Agreement EIR, the EIR for the Kern-Castaic transfer was also ordered decertified. (*Friends of Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, 1387(*Friends*).) Although the EIRs for the Monterey Agreement and the Kern-Castaic transfer were decertified, the projects were not enjoined. The agreements remain in effect to this day.

On July 22, 2002, the parties to the *PCL* litigation that decertified the Monterey Agreement EIR entered into a settlement agreement approved by the Sacramento County Superior Court. The settlement agreement requires the DWR as the lead agency to prepare a new EIR for the Monterey Agreement. The settlement agreement acknowledges that certain water transfers listed in Attachment E to the settlement agreement are final, and the parties agree not to challenge those transfers. The Kern-Castaic transfer is not listed in Attachment E. Instead, the settlement agreement provides:

" *Acknowledgement and Agreement Regarding Kern-Castaic Transfer*. With respect to ... the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the Second District Court of Appeal (See *Friends of the Santa Clara River v. Castaic Lake Water Agency*, 95 Cal.App.4th 1373, 116 Cal.Rptr.2d 54 (2002); *review denied* April 17, 2002). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

In 2004, Castaic certified a revised EIR for the Kern-Castaic transfer. This EIR is not tiered on the Monterey Agreement EIR. Castaic's EIR is currently under challenge in Los Angeles County Superior Court by environmental groups.

West Creek

West Creek is a proposed mixed residential and commercial development in the Santa Clarita Valley area of northern Los Angeles County. The project includes 2,545 housing units, 180,000 square feet of commercial retail space and 46 acres of community facilities. The County served as the lead agency in preparing the EIR for the project. The project developers are The Newhall Land and Farming Company and Valencia Corporation (hereafter collectively Newhall).

SCOPE challenges the County's certification of the West Creek EIR. The trial court denied SCOPE's petition for a writ of administrative mandate. We reversed on the ground that the EIR's evaluation of the availability of the water supply was inadequate. (*Scope I, supra*, 106 Cal.App.4th 715.) The EIR relied on water entitlements instead of actual water in analyzing water availability. (*Ibid.*)

The County revised the water supply analysis, and recertified the EIR. SCOPE challenges the water supply analysis in the recertified EIR. This time it opposes the 41,000 afy Kern-Castaic water transfer.

The recertified EIR states that Castaic's total maximum SWP water allocation is 95,200 afy. The Kern-Castaic transfer accounts for 41,000 afy of that. The EIR acknowledges that the EIR for the Monterey Agreement and the original EIR for the Kern-Castaic transfer were decertified.

With regard to the status of the Kern-Castaic transfer, the EIR states:

" The [Kern-Castaic] transfer of SWP Table A Amount was the type of water transfer that fell within the provisions of the Monterey Agreement. As stated above, under the Monterey Agreement, certain SWP agricultural contractors agreed that 130,000 AF of their Table A Amount could be transferred to urban contractors. The [Castaic] 41,000-AF acquisition was a part of the 130,000 AF of SWP Table A Amount, which has been transferred under the Monterey Agreement.

" ... The Monterey Agreement provides ... for those transfers by the participating SWP contractors, thus facilitating transfers of Table A Amounts from agricultural to urban SWP contractors. As stated above, the environmental documentation for the Monterey Agreement has been decertified. However, the ... legal proceedings (*Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892 [PCL litigation]) did not invalidate ... the Monterey Agreement or enjoin[ ] either the Monterey Agreement or further implementation of the Monterey Agreement.

" In addition, the subsequent Settlement Agreement in the PCL litigation did not invalidate or otherwise enjoin the Monterey Agreement.

" Even in the absence of the Monterey Agreement, [Castaic's] permanent acquisition of an additional 41,000 AF of SWP Table A Amount could occur under existing SWP water supply contract provisions, subject to appropriate environmental review.

" Nothing in the existing SWP water supply

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contracts, or applicable law, prohibit such water transfers with or without the Monterey Agreement. The Monterey Agreement simply provides a specific vehicle for accomplishing transfers of SWP Table A Amounts from agricultural to urban SWP contractors; the amendments under the Monterey Agreement are not the exclusive means by which that Amount may be transferred. In support of that fact, in 1981 (almost 15 years before the Monterey Agreement), the entire SWP Table A Amount of the Hacienda Water District was permanently transferred to the Tulare Lake Basin Water Storage District, pursuant to an agreement approved by DWR.

" The acquisition could proceed as a water transfer under existing law. See, e.g., Water Code §§ 382, 383 (authority for transferring surplus water) and Water Code §§ 1745, et seq. (authority for transferring non-surplus water). The Kern County Water Agency has reaffirmed its willingness to allow transfers of up to 130,000 AF of SWP table A Amounts under pre-Monterey Agreement conditions and/or under the terms of the Settlement Agreement....

" Finally, [Castaic] is not a party to the pending Monterey Agreement litigation (*Planning Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892). Although not a party, an adverse final judgment invalidating the Monterey Agreement could affect [Castaic's] completed acquisition of the 41,000 AF, which could in turn impair [Castaic's] supply of SWP water through its contracts with DWR and other SWP contractors. Nevertheless, [Castaic] believes that an adverse outcome in the Monterey Agreement litigation is not likely to adversely affect [Castaic's] water supplies over the long-term because (a) [Castaic] believes that such a result is unlikely to ' unwind' executed and completed agreements with respect to the permanent transfer of SWP water amounts; (b) existing SWP water supply contract provisions allow such transfers (without the need for the Monterey Agreement); and (c) existing law enables [Castaic] to enter into contracts outside the context of the Monterey Agreement."

The EIR also discloses that there is perchlorate contamination in six water wells that will comprise part of the water service for West Creek. The EIR identifies remediation measures, but does not identify any source of funding for those measures.

DISCUSSIONI

Newhall contends the doctrine of law of the case bars SCOPE's Kern-Castaic transfer arguments.

Where an appellate court states in its opinion a principle or rule of law necessary to its decision, that principle or rule becomes the law of the case. (*Clemente v. State of California* (1985) 40 Cal.3d 202, 211.) The law of the case must be adhered to both in the lower court and upon subsequent appeal. (*Ibid.*) This is true even if the court that issued the opinion becomes convinced in a subsequent consideration that the former opinion is erroneous. (*Ibid.*)

But our former opinion in this case (*Scope I*) stated no principle or rule of law bearing on the adequacy of the West Creek EIR's discussion of the Kern-Castaic transfer. Newhall attempts to turn silence into positive effect by citing section 21005, subdivision (c). The subdivision requires that our opinion discuss all the alleged grounds for noncompliance with CEQA. Newhall concludes that because we did not discuss the Kern-Castaic transfer in *Scope I,* we approved the transfer.

Newhall cites no authority, however, for the proposition that not discussing an issue as required by section 21005, subdivision (c), transforms that issue into law of the case. In *Friends, supra,* 95 Cal.App.4th at page 1387, on which Newhall relies, after finding one of appellant's contentions meritorious, the court expressly stated it considered all of appellant's other contentions and found them without merit. (*Ibid.*) *Friends* does not discuss the effect of a failure to consider an issue, and does not even mention the doctrine of law of the case. If Newhall believed we failed to discuss an issue raised in *Scope I,* its remedy was a timely petition for rehearing. (Cal. Rules of Court, rule 8.268 (formerly cited as rule 25).) The time for such a petition has long since passed.

Moreover, we discussed all issues raised in *Scope I.* SCOPE mentioned the Kern-Castaic transfer in its opening brief, but SCOPE did not raise the transfer as an issue. In fact, Newhall argued that we could not consider *Friends,* the decision that decertified the Kern-Castaic transfer EIR, because it occurred after the County approved the West Creek project. Newhall pointed out that once a project is approved, new information does not require reopening the approval. (*Scope I, supra,* 106 Cal.App.4th at p. 723.) SCOPE replied that it cited *Friends* only to show that SWP entitlements cannot be taken at face value. (*Ibid.*) Thus, at Newhall's urging, we did not consider in *Scope I* the issues SCOPE now raises. They arose after the County's initial approval of the project. Newhall cites no authority that prevents us from considering issues that arose prior to the recertification of the EIR. FN2

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2. SCOPE contends the EIR's failure to properly analyze the Kern-Castaic transfer violated the terms of the remittitur in *Scope I.* It follows from what we have said that the contention has no merit. We did not consider the Kern-Castaic transfer in *Scope I*, and it was not within the terms of our remittitur in that case.II

Newhall contends SCOPE waived its perchlorate contamination arguments by failing to appeal them. Newhall argues SCOPE's claim is waived because it is essentially identical to that denied by the trial court in the first challenge to the project's EIR.

But SCOPE's first challenge to the project's EIR concerned disclosure of the extent of perchlorate contamination of local water wells. SCOPE did not appeal the trial court's denial of that challenge. Here SCOPE is not challenging the EIR's disclosure of the extent of perchlorate contamination. Instead, it is challenging the mitigation measures suggested by the EIR. That issue is not substantially identical to the issue raised in the first challenge. There has been no waiver.

III

We now consider SCOPE's challenge to the West Creek EIR. An EIR approved by the appropriate governmental agency is presumed adequate, and the party challenging the EIR has the burden of showing otherwise. (*Barthelemy v. Chino Basin Mun. Water Dist.* (1995) 38 Cal.App.4th 1609, 1617(*Barthelemy*).) A party may challenge an EIR by showing the agency has abused its discretion either by reaching factual conclusions unsupported by substantial evidence or by failing to proceed in the manner CEQA provides. (*Vineyard, supra*, 40 Cal.4th at p. 435.)

In evaluating an EIR for CEQA compliance, we must adjust our scrutiny to the nature of the alleged defect. (*Vineyard, supra*, 40 Cal.4th at p. 435.) Where the alleged defect is that the agency's conclusions are not supported by substantial evidence, we must accord deference to the agency's factual conclusions. (*Ibid.*) We may not weigh conflicting evidence to determine who has the better argument. (*Ibid.*) Thus we may not set aside an agency's approval of an EIR on the ground that an opposite conclusion would have been equally or more reasonable. (*Ibid.*)

Where the alleged defect is that the agency has failed to proceed in a manner provided by CEQA, our review is de novo. (*Vineyard, supra*, 40 Cal.4th at p. 435.) An agency that fails to require an applicant to disclose information mandated by CEQA and to include that information in the EIR, fails to proceed in a manner prescribed by CEQA. (*Ibid.*) Where a party challenges an EIR because it fails to disclose evidence that conflicts with its conclusions, the party must show that the failure to disclose the conflicting evidence precludes informed decision making or informed public participation. (*Barthelemy, supra*, 38 Cal.App.4th at p. 1617.)

IV

SCOPE challenges the adequacy of the EIR's water supply analysis as it relates to the Kern-Castaic transfer.

Recently, our Supreme Court in *Vineyard* articulated four principles for analysis of future water supplies under CEQA:

" First, CEQA's informational purposes are not satisfied by an EIR that simply ignores or assumes a solution to the problem of supplying water to a proposed land use project. Decision makers must, under the law, be presented with sufficient facts to ' evaluate the pros and cons of supplying the amount of water that the [project] will need.' [Citation.]" (Vineyard, *supra*, 40 Cal.4th at pp. 430-431.)

" Second, an adequate environmental impact analysis for a large project, to be built and occupied over a number of years, cannot be limited to the water supply for the first stage or the first few years. While proper tiering of environmental review allows an agency to defer analysis of certain details of later phases of long-term linked or complex projects until those phases are up for approval, CEQA's demand for meaningful information ' is not satisfied by simply stating information will be provided in the future.' [Citation.]" (*Vineyard, supra*, 40 Cal.4th at p. 431.)

" Third, the future water supplies identified and analyzed must bear a likelihood of actually proving available; speculative sources and unrealistic allocations (' paper water') are insufficient bases for decisionmaking under CEQA. [Citation.] An EIR for a land use project must address the impacts of *likely* future water sources, and the EIR's discussion must include a reasoned analysis of the circumstances affecting the likelihood of the water's availability. [Citation.]" (*Vineyard, supra*, 40 Cal.4th at p. 432.

" Finally, where [even a full discussion leaves some uncertainty regarding actual availability of the] anticipated future water sources, ... CEQA requires some discussion of possible replacement sources or alternatives to use of the anticipated water, and of the environmental consequences of those contingencies.

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[Citation.] The law's informational demands may not be met, in this context, simply by providing that future development will not proceed if the anticipated water supply fails to materialize. But when an EIR makes a sincere and reasoned attempt to analyze the water sources the project is likely to use, but acknowledges the remaining uncertainty, a measure for curtailing development if the intended sources fail to materialize may play a role in the impact analysis. [Citation.]" (*Vineyard, supra,* 40 Cal.4th at p. 432.)

The West Creek EIR does not simply ignore or assume a solution to the problem of supplying water to the project. It identifies specific water sources, including the Kern-Castaic transfer. Nor is the EIR's water supply analysis limited to the first stage or the first few years of the project. The EIR analyzes the Kern-Castaic transfer as part of the permanent supply for the entire project.

SCOPE's concerns center on the third principle articulated in *Vineyard*, that " the future water supplies identified and analyzed must bear a likelihood of actually proving available...." (*Vineyard, supra,* 40 Cal.4th at p. 432.)

SCOPE challenges the EIR's conclusion that an adverse outcome in the Monterey Agreement litigation is unlikely to affect Castaic's water supplies over the long term. The EIR supports this conclusion by stating that an adverse outcome in the Monterey Agreement litigation is unlikely to " unwind" existing agreements for permanent transfer of SWP water amounts, and that existing law and contracts allow transfers without the need for the Monterey Agreement.

SCOPE argues the EIR fails to disclose that the Kern-Castaic transfer is not final and permanent. SCOPE points out that the Kern-Castaic transfer is not included among the water transfers listed as final and permanent in the Monterey Settlement Agreement.

But the Monterey Settlement Agreement makes it clear that the Kern-Castaic transfer is not listed among the final transfer agreements because its EIR is subject to pending litigation in the Los Angeles Superior Court. (Citing *Friends, supra,* 95 Cal.App.4th 1373.) SCOPE points to no evidence that the parties to the Monterey Settlement Agreement consider the transfer as anything other than permanent now that the revised EIR for the transfer has been certified. The Monterey Settlement Agreement did not make the Kern-Castaic transfer temporary. A disclosure that the Monterey Settlement Agreement does not include the Kern-Castaic transfer on its list of final transfer agreements adds nothing substantial to an understanding of water availability.

In *California Oak Foundation v. City of Santa Clarita* (2005) 133 Cal.App.4th 1219, 1237-1238, the court reviewed the adequacy of the discussion of the Kern-Castaic transfer contained in an EIR for an unrelated project. The court determined the EIR was inadequate because it failed to discuss the legal uncertainty of the Kern-Castaic transfer; specifically, the uncertainty created by the decertification of the transfer's original EIR.

In contrast, here the EIR discloses that the Monterey Agreement litigation makes the Kern-Castaic transfer legally uncertain. The EIR states that a judgment invalidating the Monterey Agreement could affect Castaic's acquisition of the 41,000 acre feet of water. The EIR concludes, however, that as a practical matter an adverse outcome in the Monterey Agreement litigation is unlikely to " unwind" the transfer agreement. Contrary to SCOPE's argument, this conclusion is supported by reasoned analysis. The EIR points out that the Kern-Castaic transfer is intended to be permanent, and that the transfer can be valid even without the Monterey Agreement.

SCOPE argues the Monterey Agreement is necessary to validate the Kern-Castaic transfer because all transfers of SWP water require the DWR's consent. SCOPE cites no authority that expressly requires the DWR's consent for water transfers. Instead, SCOPE reasons the DWR's consent is required because it controls the SWP facilities necessary for delivery of the water. Assuming DWR's consent is necessary, SCOPE cites no authority that the consent must come through the Monterey Agreement. In fact, the EIR discloses that the transfer of surplus and nonsurplus water is authorized by statute. (Water Code, §§ 382, 383, 1745 et seq.) The EIR also notes that at least one Table A Amount of water was permanently transferred with the DWR's consent almost 15 years prior to the Monterey Agreement.

Quite aside from the Monterey Agreement, the legislative policy of this state is to facilitate water transfers. (See Water Code, §§ 475, 480 et seq.) SCOPE points to no evidence whatsoever that the DWR has any inclination to disapprove the Kern-Castaic transfer even if the Monterey Agreement is ultimately invalidated.

SCOPE points to a letter from the DWR to Castaic dated July 30, 2004. The letter is in an appendix to the West Creek EIR. The letter states that the DWR staff has reviewed the draft EIR for the Kern-Castaic transfer and found that the document " adequately and thoroughly discusses the proposed project and its impacts," and provides a good discussion of the relationship between the Kern-Castaic transfer and

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the current Monterey Agreement process. The letter also states that the DWR is using a new model to assess the potential impacts of Table A transfers in preparing the revised Monterey Agreement EIR. It acknowledges that Castaic used an earlier model to analyze the effect of the Kern-Castaic transfer. It states that the use of the new model " may cause slight changes in results, which may lead DWR to different conclusions than the conclusions made by [Castaic] in the current EIR." Nevertheless, the letter states Castaic's draft EIR adequately discusses SWP reliability and pre- and post-Monterey Agreement conditions.

SCOPE argues the West Creek EIR is deficient in that it fails to include or discuss information that a new water model may lead the DWR to different conclusions than those made by Castaic and its draft EIR. But the letter describes any possible change in result as " slight." The letter does not state that the slight change in results will probably lead to different conclusions; it says only that it " may" lead to unspecified different conclusions. It is highly improbable that a slight change in results will lead to radically different conclusions. In fact, the letter praises the draft EIR's discussion of the proposed project and its impacts. The information contained in the letter adds nothing substantial to West Creek's EIR.

SCOPE argues the EIR is devoid of any factual discussion of the impacts of the *PCL* decision on the West Creek project. But the EIR discloses that a final judgment invalidating the Monterey Agreement could impair Castaic's supply of SWP water. The EIR goes on to state that such a result is unlikely because the Kern-Castaic transfer can be validated outside the Monterey Agreement. SCOPE cites no authority for the proposition that the West Creek EIR must discuss the factors the DWR will be required to consider in preparing a revised Monterey Agreement EIR. The Kern-Castaic transfer is not dependent on the Monterey Agreement. Such a discussion is not necessary for informed decision making or public participation.

SCOPE cites *Vineyard, supra,* 40 Cal.4th at p. 440, for the proposition that it is improper for an EIR to tier from an environmental document that will be completed in the future. SCOPE points out that West Creek's EIR was certified without waiting for the DWR to complete its revised EIR for the Monterey Agreement. But West Creek's EIR was not tiered on future Monterey Agreement environmental documents. In fact, West Creek's water supply analysis is based on the premise that the Monterey Agreement litigation is unlikely to affect the Kern-Castaic transfer.

West Creek's EIR satisfies the third principle of analysis stated in *Vineyard.* The record contains substantial evidence demonstrating a reasonable likelihood that water from the Kern-Castaic transfer will be available for the project's near- and long-term needs. (See *Vineyard, supra,* 40 Cal.4th at p. 437.) The record also shows the County proceeded in a manner required by CEQA. The EIR neither improperly used tiering to defer all analysis of supplies to future stages of the project, nor relied upon demonstrably illusory supplies. (*Ibid.*)

SCOPE argues that West Creek's EIR is deficient in because it fails to analyze the project's water supply in the absence of the 41,000 afy Kern-Castaic transfer. The fourth principle of water supply analysis stated in *Vineyard* is that where " [a full discussion leaves some uncertainty regarding actual availability of the] anticipated future water sources, ... CEQA requires some discussion of possible replacement sources or alternatives to use of the anticipated water, and of the environmental consequences of those contingencies. [Citation.]" (*Vineyard, supra,* 40 Cal.4th at p. 432.)

Here West Creek's EIR acknowledges there is at least some legal uncertainty about the Kern-Castaic transfer. The EIR states in part: " An adverse final judgment invalidating the Monterey Agreement could affect [Castaic's] completed acquisition of the 41,000 AF, which could in turn impair [Castaic's] supply of SWP water through its contracts with DWR and other SWP contractors."

Newhall argues the EIR concludes the Kern-Castaic transfer water is available, it has been contracted and paid for, and is flowing. Newhall claims that uncertainty arising from litigation challenging an EIR is not the type of uncertainty the court addressed in *Vineyard.*

It is true that the facts in *Vineyard* did not require the court to specifically discuss a legal uncertainty. But nothing in *Vineyard* limits the type of uncertainty that triggers the requirement to discuss replacement sources should anticipated sources of water become unavailable. It is the fact of uncertainty, not its source, that requires analysis. And what we can say with certainty is that the outcome of litigation is seldom certain. But whatever the outcome of the PCL litigation, it is highly unlikely it will affect the Kern-Castaic water transfer.

The water is available, and for years has been available for the project under executed agreements. The recertified EIR notes that the Kern-Castaic

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transfer can legally occur without the Monterey Agreement. Suffice it to say, it is certain enough that however the Monterey Agreement litigation is eventually decided, the Kern-Castaic transfer will likely not be affected. Unlike the degree of uncertainty in *Vineyard*, here the degree of uncertainty is insubstantial. " Some uncertainty" is not the same as any conceivable certainty.

V

SCOPE contends West Creek's EIR is deficient in that it fails to discuss the impact of the lack of funding to remediate perchlorate contamination of local water wells. SCOPE has no quarrel with the EIR's discussion of perchlorate contamination of local wells. Its contention is limited to the lack of funding for remediation measures.

In addition to SWP water, two local aquifers will serve as part of the project's water supply, the Alluvial Aquifer and the Saugus Aquifer. SCOPE argues there are 67 wells owned by water companies in these aquifers and an undisclosed number of private wells. SCOPE points to evidence that the estimated cost of remediation is $500,000 per well. No source of funding is identified in the EIR to pay for the equipment necessary for remediation.

SCOPE relies on *Federation of Hillside & Canyon Associations v. City of Los Angeles* (2000) 83 Cal.App.4th 1252, 1261-1262(*Federation*). There the city adopted a general plan framework (GPF) as part of its general plan. The GPF identified mitigation measures, including a transportation plan designed to mitigate the transportation impacts of the GPF's growth policies. The transportation plan acknowledged that to implement the mitigation measures would require the cooperation of various public agencies, that the city's portion of the costs would exceed its revenues, and that there is " great uncertainty" whether the mitigation measures would ever be funded or implemented. Although the city adopted the mitigation measures, it made no effort to ensure they will actually be implemented or enforceable. The court determined that the city's approval of the GPF must be vacated for failing to ensure that feasible mitigation measures will actually be implemented. (*Id.* at p. 1261, citing §§ 21002.1, subd. (b); 21081.)

Here, although water agencies may have 67 wells, only six of them have been identified as being contaminated with perchlorate. Unlike the city in *Federation,* here the County did not acknowledge there is great uncertainty that mitigation measures would ever be funded or implemented. To the contrary, the EIR states in part: " Due to the high value of this local water resource, the purveyors have placed a high priority on replacing the impacted groundwater capacity by installing wellhead treatment and the construction of new wells." Here, unlike *Federation,* there is nothing to suggest the mitigation measures will not be implemented. Finally, SCOPE points to nothing in *Federation* or any other case that requires the EIR to discuss funding for mitigation measures.

DISPOSITION

The judgment is affirmed. Costs on appeal are awarded to respondents and real parties in interest.

CERTIFIED FOR PUBLICATION.

GILBERT, P.J.

We concur:

COFFEE, J.

PERREN, J.

James W. Brown, Judge

Superior Court County of Santa Barbara

Law Office of Alyse M. Lazar and Alyse M. Lazar for Plaintiffs and Appellants.

Rossmann & Moore, Antonio Rossmann, Roger Brannon Moore ad David Rowen for amicus curiae The Planning & Conservation League in support of Plaintiffs and Appellants.

Raymond Fortner, County Counsel, Tracy Swann and Lawrence Hafetz, Deputy County Counsel for Defendant and Respondent County of Los Angeles.

Paul, Hastings, Janofsky & Walker, Robert I. McMurry, Ann Catherine Norian and Edgar Kalatian for Real Parties in Interest and Respondents Newhall Land and Farming Company and Valencia Corporation.

Cal.App. 2 Dist.,2007.

Santa Clarita Organization for Planning Environment v. County of Los Angeles

--- Cal.Rptr.3d ----, 2007 WL 2773399 (Cal.App. 2 Dist.)

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Natural Resources Defense Council v. Kempthorne
E.D.Cal.,2007.
Only the Westlaw citation is currently available.
United States District Court,E.D. California.
NATURAL RESOURCES DEFENSE COUNCIL, et al., Plaintiffs,
v.
Dirk KEMPTHORNE, in his official capacity as Secretary of the Interior, et al., Defendants,
California Department of Water Resources, Defendant-Intervenor,
State Water Contractors, Defendant-Intervenor,
San Luis & Delta-Mendota Water Authority, et al., Defendant-Intervenors.
No. 1:05-CV-01207 OWW (TAG).

May 25, 2007.

Andrea Arnold Treece, Deborah S. Reames, Michael Ramsey Sherwood, Earthjustice Legal Defense Fund Incorporated, Oakland, CA, Hamilton Candee, Katherine Scott Poole, Natural Resources Defense Council, Trent William Orr, Law Office of Trent W. Orr, San Francisco, CA, for Plaintiffs.
James A. Maysonett, Keith W. Rizzardi, Department of Justice, Wildlife and Marine Resources Section, Washington, DC, for Defendants.
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OLIVER W. WANGER, United States District Judge.

***1** This case concerns the effect on a threatened species of fish, the Delta smelt (*Hypomesus transpacificus*) FN1, of the coordinated operation of the federally-managed Central Valley Project (" CVP") and the State of California's State Water Project (" SWP"), among the world's largest water diversion projects. Both projects divert large volumes of water from the California Bay (Sacramento-San Joaquin) Delta (" Delta") and use the Delta to store water.

For over thirty years, the projects have been operated pursuant to a series of cooperation agreements. In addition, the projects are subject to ever-evolving statutory, regulatory, contractual, and judicially-imposed requirements. The Long-Term Central Valley Project and State Water Project Operations Criteria and Plan (" 2004 OCAP" or " OCAP") surveys how the projects are currently managed in light of these evolving circumstances. At issue in this case is a 2005 FN2 biological opinion (" BiOp"), issued by the United States Fish and Wildlife Service (" FWS" or " Service") pursuant to the Endangered Species Act (" ESA"), which concludes that current project operations described in the OCAP and certain planned future actions will not jeopardize the continued existence of the Delta smelt or adversely modify its critical habitat.

The Delta smelt is a small, slender-bodied fish endemic to the Delta. Historically, Delta smelt could be found throughout the Delta. Although abundance data on the smelt indicates that the population has fluctuated wildly in the past, it is undisputed that, overall, the population has declined significantly in recent years, to its lowest reported volume in fall 2004.

In this case, Plaintiffs, a coalition of environmental and sportfishing organizations, challenge the 2005 BiOp's no jeopardy and no adverse modification findings as arbitrary, capricious, and contrary to law under the Administrative Procedure Act, 5 U.S.C. §§ 702 et seq. Before the court for decision is Plaintiffs' motion for summary judgment. Among other things, Plaintiffs allege that the BiOp fails to consider the best available science, relies upon uncertain (and allegedly inadequate) adaptive management processes to monitor and mitigate the potential impacts of the OCAP, fails to meaningfully analyze whether the 2004 OCAP will jeopardize the continued existence of the Delta smelt, fails to consider the OCAP's impact upon previously designated critical habitat, and fails to address the impacts of the entire project.

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Separate opposition briefs were filed by the Federal Defendants (Doc. 242), the Department of Water Resources (" DWR") (Doc. 246), and the State Water Contractors (" SWC") (Doc. 241), along with a final brief filed collectively by San Luis & Delta-Mendota Water Authority, Westlands Water District, and the California Farm Bureau Federation (" the San Luis Parties") (Doc. 247).

A recent Ninth Circuit opinion in *National Wildlife Federation v. National Marine Fisheries Service,* 481 F.3d 1224 (9th Cir.2007) [hereinafter " *NWF v. NMFS*"], succinctly summarizes the relevant provisions of the ESA:

***2** The ESA requires federal agencies to " insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [designated critical] habitat...." 15 U.S.C. § 1536(a)(2). The ESA imposes a procedural consultation duty whenever a federal action may affect an ESA-listed species.*Thomas v. Peterson,* 753 F.2d 754, 763 (9th Cir.1985). To that end, the agency planning the action, usually known as the " action agency," must consult with the consulting agency. This process is known as a " Section 7" consultation. The process is usually initiated by a formal written request by the action agency to the consulting agency. After consultation, investigation, and analysis, the consulting agency then prepares a biological opinion. *See generally Ariz. Cattle Growers' Ass'n v. U.S. Fish & Wildlife Serv.,* 273 F.3d 1229, 1239 (9th Cir.2001). In this case, the action agencies are the U.S. Army Corps of Engineers and the Bureau of Reclamation, while the consulting agency is NMFS.

The consulting agency evaluates the effects of the proposed action on the survival of species and any potential destruction or adverse modification of critical habitat in a biological opinion, 16 U.S.C. § 1536(b), based on " the best scientific and commercial data available," *id.* § 1536(a)(2). The biological opinion includes a summary of the information upon which the opinion is based, a discussion of the effects of the action on listed species or critical habitat, and the consulting agency's opinion on " whether the action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat...." 50 C.F.R. § 402.14(h)(3). In making its jeopardy determination, the consulting agency evaluates " the current status of the listed species or critical habitat," the " effects of the action," and " cumulative effects." *Id.* § 402.14(g)(2)-(3). " Effects of the action" include both direct and indirect effects of an action " that will be added to the environmental baseline." *Id.* § 402.02. The environmental baseline includes " the past and present impacts of all Federal, State or private actions and other human activities in the action area" and " the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation." *Id.* If the biological opinion concludes that jeopardy is not likely and that there will not be adverse modification of critical habitat, or that there is a " reasonable and prudent alternative[ ]" to the agency action that avoids jeopardy and adverse modification and that the incidental taking of endangered or threatened species will not violate section 7(a)(2), the consulting agency can issue an " Incidental Take Statement" which, if followed, exempts the action agency from the prohibition on takings found in Section 9 of the ESA. 16 U.S.C. § 1536(b)(4); *ALCOA v. BPA,* 175 F.3d 1156, 1159 (9th Cir.1999).

* * *

***3** The issuance of a biological opinion is considered a final agency action, and therefore subject to judicial review. *Bennett v. Spear,* 520 U.S. 154, 178, 117 S.Ct. 1154, 137 L.Ed.2d 281 (1997); *Ariz. Cattle Growers' Ass'n,* 273 F.3d at 1235.

Id. at *2-*3.

For over thirty years the state and federal agencies charged with management of the CVP and SWP have operated the projects in an increasingly coordinated manner pursuant to a Coordinated Operating Agreement (" COA"). The COA, which dates to 1986, has evolved over time to reflect, among other things, changing facilities, delivery requirements, and regulatory restrictions. The most recent document surveying how the COA is implemented in light of these evolving circumstances is the 2004 Operating Criteria and Plan (" 2004 OCAP" or " OCAP") issued June 30, 2004. (AR 489-728.) [FN3]

A. *Overview of the 2004 OCAP.*

The OCAP begins with a " Purpose of Document" section which states:

This document has been prepared to serve as a baseline description of the facilities and operating environment of the Central Valley Project (CVP) and State Water Project (SWP). The Central Valley Project-Operations and

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Criteria Plan (CVP-OCAP) identifies the many factors influencing the physical and institutional conditions and decision-making process under which the project currently operates. Regulatory and legal instruments are explained, alternative operating models and strategies described.
The immediate objective is to provide operations information for the Endangered Species Act, Section 7, consultation. The long range objective is to integrate CVP-OCAP into the proposed Central Valley document. It is envisioned that CVP-OCAP will be used as a reference by technical specialists and policymakers in and outside the Bureau of Reclamation (Reclamation) in understanding how the CVP is operated. The CVP-OCAP includes numeric and nonnumeric criteria and operating strategies. Emphasis is given to explaining the analyses used to develop typical operating plans for simulated hydrologic conditions.
All divisions of CVP are covered by this document, including the Trinity River Division, Shasta and Sacramento Divisions, American River Division and Friant Division.

(AR 506.) FN4

The introductory chapter provides an overview of all of the physical components of the CVP and SWP (AR 507-520), as well as all of the relevant legal authorities affecting CVP operations (508-512).

Chapter 2, explains, among other things, that water needs assessments have been performed for each CVP water contractor, to confirm each contractor's past beneficial use in order to anticipate future demands. (AR 521.) Chapter 2 also reviews the 1986 COA and how it is implemented on a daily basis by Reclamation and DWR. (AR 523-25.) Also provided is a detailed overview of the " changes in [the] operations coordination environment since 1986," which include:
***4** Changes due to temperature control operations on the Sacramento River;
Increases in the minimum release requirements on the Trinity River;
Implementation of CVPIA 3406(b)(2) and Refuge Water Supply contracts;
Commitments made by the CVP and SWP pursuant to the Bay-Delta Accord and the subsequent implementation of State Water Resources Control Board (" SWRCB") Decision-1641;
The Monterey Agreement;
The Operation of the North Bay Aqueduct (which was not included in the 1986 COA).
The SWP's commitment to make up for 195,000 acre-feet of pumping lost to the CVP due to SWRCB Decision 1485;
Implementation of the Environmental Water Account; and Constraints imposed by various endangered species act listings, including that of the Sacramento River Winter-Run Chinook Salmon, the Sacramento River Spring-Run Chinook Salmon, the Steelhead Trout, and the Delta Smelt (which resulted in the issuance of biological opinions in 1993, 1994, and 1995 concerning CVP/SWP operations and the South Delta Temporary Barriers Biological Opinion in 2001)

(AR 525-28.) The OCAP also reviews the regulatory standards imposed by SWRCB D-1641, which include water quality standards based on the geographic position of the 2-parts-per-thousand isohale (otherwise known as " X2"), a Delta export restriction standard known as the export/inflow (E/I) ratio, minimum Delta outflow requirements, and Sacramento River and San Joaquin River flow standards. (AR 530-537.) In addition to imposing requirements, D-1641 granted the Bureau and DWR permission to use each project's capabilities in a coordinated manner. (AR 537-38.)

This is not a complete overview of the projects' operations covered in the OCAP. Numerous regulatory and operational changes have taken place in recent years. As the OCAP's " Purpose of Document" section explains, the immediate objective of the OCAP is to lay out all such regulatory and other operational information so that ESA Section 7 consultation can proceed to evaluate how project operations will effect the Delta smelt under various projected future conditions.

B. *Applying the ESA to Project Operations.*

Because endangered and/or threatened species, including the Delta smelt, reside in the area affected by the CVP and SWP, the 2004 OCAP, administered on behalf of the federal government by the Bureau of Reclamation (" Bureau"), must comply with various provisions of the ESA. Specifically, prior to authorizing, funding, or carrying out any action, the acting federal agency (in this case, the Bureau) must first consult with FWS and/or NMFS to " insure that [the] action ... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined ... to be critical...." 16 U.S.C. § 1536(a)(2) [ESA § 7(a)(2)]. This form of consultation is called " formal consultation," and concludes with the issuance of a biological opinion. 50 C.F.R. § 402.02.

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***5** Alternatively, under certain circumstances, a federal agency may pursue " early consultation," on behalf of an agency or private party (referred to as a " prospective applicant") who will require formal approval or authorization to undertake a project. *Id*. Early consultation may be requested when the prospective applicant " has reason to believe that an endangered species or a threatened species may be present in the area affected by this project and that implementation of such action will likely affect such species." 50 C.F.R. § 402.11(b). The result of early consultation is a " preliminary biological opinion," the contents of which are " the same as for a biological opinion issued after formal consultation except that the incidental take statement provided with a preliminary biological opinion does not constitute authority to take listed species." § 402.11(e). Subsequently, the preliminary biological opinion may be " confirmed" after the prospective applicant applies to the federal agency for a permit or licence. Once a request for confirmation is received, the FWS must either confirm that the preliminary biological opinion stands as the final biological opinion or must request that the federal agency initiate formal consultation. § 402.11(f).

In this case, the 2004 OCAP BiOp [FN5] contemplates increases in water diversions and the construction of new facilities in the Delta. (AR 256-271.) The maximum daily diversion rate in Clifton Court Forebay will increase from 6,680 cubic feet per second (CFS) to 8,500 CFS (27% increase in pumping) and eventually to 10,300 CFS (54% increase). Permanent barriers within the south Delta will be constructed and operated. An intertie between the California Aqueduct and the Delta-Mendota Canal will be constructed and operated. Water deliveries from the American River will be doubled. New deliveries of CVP water to the Freeport Regional Water Project will be made. Water transfers resulting in an annual 200,000 to 600,000 acre-feet increase in Delta exports will result. (AR 256, 339-40, 357-59, 371, 382-83, 465.)

The Bureau submitted some of these operational changes for formal consultation with FWS concerning their impact on the Delta smelt, while other changes were subject only to early consultation:

This biological opinion covers formal and early consultation for the operations of the CVP and SWP. The formal consultation effects described in this biological opinion cover the proposed 2020 operations of the CVP including the Trinity River Mainstem ROD (Trinity ROD) flows on the Trinity River, the increased water demands on the American River, the delivery of CVP water to the proposed Freeport Regional Water Project (FRWP), water transfers, the long term Environmental Water Account (EWA), the operation of the Tracy Fish Facility, and the operation of the SWP-CVP intertie. The effects of operations of the SWP are also included in this opinion and include the operations of the North Bay Aqueduct, the Suisun Marsh Salinity Control Gates, the Skinner Fish Facility and water transfers.

***6** Early consultation effects include the effects of operations of components of the South Delta Improvement Program (SDIP). These operations include pumping of 8500 cubic feet per second (cfs) at the SWP and Banks Pumping Plant (hereafter referred to as 8500 Banks), permanent barrier operations in the South Delta, the long term EWA, water transfers, and CVP and SWP operational integration. There are two separate effects sections in this biological opinion, one for Formal Consultation and one for Early Consultation. In addition, there is an incidental take for formal consultation and a preliminary incidental take for early consultation.

(AR 2, 248.) [FN6]

C. *History of This Lawsuit.*

On July 30, 2004, FWS issued a Biological Opinion (the " 2004 OCAP BiOp"), addressing both formal and early consultation for the above-described OCAP actions. (AR 1.) [FN7]

On August 4, 2004, the Ninth Circuit decided *Gifford Pinchot Task Force v. United States Fish & Wildlife Serv.*, 378 F.3d 1059, 1069 (9th Cir.2004), which held that the FWS's definition of " adverse modification" to critical habitat is an impermissible interpretation of the ESA because it focuses on whether critical habitat modifications would impact the *survival* of a species, effectively ignoring the statutorily-mandated goal of " *recovery.*" On November 4, 2004, in response to this ruling, the Bureau requested reinitiation of consultation to address critical habitat issues.

Plaintiffs in this case, a coalition of non-profit conservation organizations, filed suit on February 15, 2005, alleging that the 2004 OCAP BiOp was legally inadequate in light of *Gifford Pinchot* and should be invalidated. (Doc. 1.) Plaintiffs named as defendants the Department of the Interior and the FWS. (*Id.*)

On February 16, 2005, FWS issued an amended BiOp (the " 2005 OCAP BiOp," " OCAP BiOp," or " BiOp"), which superceded the 2004 OCAP BiOp. (AR 247.) The 2005 OCAP BiOp concludes that the coordinated operation of the SWP and CVP, including the proposed future actions, will not jeopardize the Delta smelt's

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continued existence. (AR at 469.) Although the BiOp recognizes that *existing* protective measures may be inadequate, the FWS concluded that certain *proposed* protective measures, including the EWA and a proposed " adaptive management" protocol would provide adequate protection. (*Id.*)

Since the filing of this complaint, Federal Defendants have reinitiated § 7 consultation and contend this case should be dismissed as moot, or stayed for a voluntary remand of the 2005 BiOp without vacatur.

Plaintiffs filed a supplemental complaint on May 20, 2005, challenging the amended BiOp on various grounds. (Doc. 128 pt. 8.)

D. *Delta Smelt Abundance.*

Smelt once were one of the most common pelagic [FN8] fish in the Delta, having previously occupied the waters from " Suisun Bay and Montezuma Slough, upstream to at least Verona on the Sacramento River, and Mossdale on the San Joaquin River." (AR 365.) Smelt abundance has " declined irregularly" for at least the past 20 years. (AR 365-67.) FWS relies primarily upon two indices to monitor Delta smelt abundance, calculated from the Summer Tow Net Survey (" TNS") and the Fall Midwater Trawl (" FMWT"). (AR 366-67, 1022.) The TNS index, which measures the abundance and distribution of juvenile Delta smelt, constitutes " one of the more representative indices because the data have been collected over a wide geographic area (from San Pablo Bay upstream through most of the Delta) for the longest period of time (since 1959)." (AR 370.) Since 1983, except for three years (1986, 1993, and 1994), the TNS has remained consistently lower than ever previously recorded. (*Id.*)

***7** The FMWT index, which measures the abundance and distribution of late juveniles and adult Delta smelt from San Pablo Bay to Rio Vista on the Sacramento River and Stockton on the San Joaquin River, is the second longest running survey (since 1967). The BiOp reviewed the FMWT trends as follows:

Although this index has fluctuated widely (AR 9201-02, 9222), it has " declined irregularly over the past 20 years." (AR 370-71.) Since 1983, the FMWT has registered more low indices for more consecutive years than previously recorded. Until recently, except for 1991, this index has declined irregularly over the past 20 years. Since 1983, the delta smelt population has exhibited more low fall midwater trawl abundance indices, for more consecutive years, than previously recorded. The 1994 FMWT index of 101.7 is a continuation of this trend. This occurred despite the high 1994 summer townet index for reasons unknown. The 1995 summer townet was a low index value of 319 but resulted in a high FMWT index of 898.7 reflecting the benefits of large transport and habitat maintenance flows with the Bay-Delta Accord in place and a wet year. The abundance index of 128.3 for 1996 represented the fourth lowest on record. The abundance index of 305.6 for 1997 demonstrated that the relative abundance of delta smelt almost tripled over last years results, and delta smelt abundance continued to rise, peaking in 1999 to an abundance index of 863, only to fall back down to the low abundance indexes of 139 for 2002 and 213 for 2003.

(AR at 371.)

The 2004 FMWT index, which was not discussed in the BiOp, was calculated to be 74, the lowest ever recorded. (AR 9202.) (This omission forms the basis of one of Plaintiffs' challenges to the BiOp.) The survey was apparently released in December 2004, and was specifically cited to FWS in February 2005.

At the hearing on the summary judgment motions, Federal Defendants in substance argued that despite years of study, the abundance data for the annual Delta smelt population is fraught with uncertainties and " not enough is known about the species" to accurately and finitely measure with certainty the project's effects on Delta smelt. FWS maintains the one to two year life expectancy of the smelt also contribute to this lack of certainty.

E. *Relationship Between Abundance and Project Operations.*

The BiOp cites several reasons for the smelt's decline. First, since the mid 1800s, mining, agricultural use, and levee construction caused the loss of a large portion of smelt habitat. (AR at 365.) Second, recreational boating in the Delta has resulted in the presence and propagation of " predatory non-native fish" and an increase in the rate of smelt erosion resulting from boat wakes.(*Id.*) Third, reduced water quality " from agricultural runoff, effluent discharge and boat effluent has the potential to harm the pelagic larvae and reduce the availability of the planctonic food source." (*Id.* at 366.)Finally, the BiOp acknowledges that " delta smelt have been increasingly subject to entrainment, upstream or reverse flows of waters in the Delta and San Joaquin River, and constriction of low salinity habitat to deep-water river channels of the interior Delta." (*Id.*) The BiOp acknowledges that these final adverse effects are " *primarily a result of the steadily*

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increasing proportion of river flow being diverted from the Delta by the Projects, and occasional droughts." (*Id.* (emphasis added).) The BiOp in no way quantifies the contribution of each of these factors to the smelt's decline. The parties dispute the extent to which project operations jeopardize the smelt.

F. *Relationship Between Smelt and " X2."*

***8** Smelt are euryhaline (tolerant of a wide range of salinities), but generally occur in water with less than 10-12 parts per thousand (ppt) salinity. (AR at 362.) For a large part of its life span, Delta smelt are thought to be associated with the " freshwater edge of the mixing zone," where the salinity is approximately 2 parts per thousand (often referred to as " X2"). (AR at 366.) The summer TNS index increases dramatically whenever X2 is located between Chipps and Roe islands. (*Id.*) Whenever the location of X2 shifts upstream of the confluence of the Sacramento and San Joaquin, either as a result of water diversions or natural conditions, smelt abundance decreases.(*Id.* at 371.)

G. *The Concept of " Salvage."*

The BiOp's " no jeopardy" conclusion relies on the concept of " salvage," which refers generally to the process of using mechanical devices to screen fish that would otherwise be entrained in project facilities (e.g., pumps) into holding tanks for transport to other parts of the Delta. (*See e.g.,* AR 321.) Unlike many other fish species in the Delta, Delta smelt do not survive the salvage process, " either due to stress and injury from handling, trucking and release, or from predation in or near the salvage facilities, the release sites, or in Clifton Court Forebay." (AR at 413.) As a result, for Delta smelt, FWS uses the terms salvage and entrainment essentially interchangeably. (*See id.*(" To simplify predictions of the difference in salvage (and by extension entrainment) between model scenarios....") FN9

Previous BiOps regarding CVP and SWP operations used salvage to set take limits. For example, the 1995 BiOp's incidental take statement set take exceedence levels for Delta smelt based on " [m]onthly average delta smelt salvage at the Federal and State Fish Facilities from 1980 to 1992 by water year type." (AR at 11765.) Essentially, take limits were set according to how much salvage had occurred in the past.

More recently, project managers, fisheries officials, and other experts came to the consensus that the salvage approach was insufficient on its own. For example, one DWR biologist noted that the singular focus on historic salvage had problems:

Higher levels of take are allowed in below normal years merely because this is what the projects " took" historically. However, the population is more condensed in below normal years and possibly more vulnerable to entrainment.

(AR 5532.) Experts advocated (a) further research into the relationship between the position of the Delta smelt and environmental conditions (AR 4881); and (b) the adoption of a flexible management approach, which would allow new information to be " folded back into the operation and conservation strategies." (AR 4870.) The result was a " layered" approach to managing the smelt, made up of more protective take limits than previously imposed along with the implementation of an adaptive management protocol.

I. *Revised Take Exceedence Levels Used In the BiOp.*

***9** The BiOp includes " hard" take limits,FN10 based on historic " salvage density estimates," adjusted to account for operational constraints under the 2004 OCAP and presumed increased environmental water flows. Separate take limits were established for formal and early consultation purposes.

The revision of the take limits began with historic catch data from periodic samples of salvaged fish. (*See* AR 413.) Data about the volume of water diverted during the collection period is then used to estimate the fish per volume of water diverted. This is referred to as the " salvage density." FN11(*Id.*) Historically, salvage density varied greatly depending on whether the year was wet (above normal), dry (below normal, dry, or critical) year. Wet and dry year data were analyzed separately. (*Id.*) The estimates were then inputted into a computer modeling system, CALSIM II, to estimate take under varying assumptions about future project operations, including programs designed to improve environmental conditions, such as the Environmental Water Account. (AR 413-14.)

Several different scenarios or " Studies" were run through CALSIM II and included in the BiOp. For example, Study No. 1 reflects the 1995 regulatory base case, without any changes in project operations and without the addition of any environmental water programs. Study No. 4a estimates a take level for flow conditions planned under the operations subject to final consultation (changes to flows in the Trinity River, future development levels, and the operation of the Freeport Regional Water Project and the Intertie). Study 4a

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included flow adjustments required by D-1641 and VAMP, along with projected CVPIA (b)(2) flows, but *did not include* operation of the EWA. Study No. 5a was similar to 4a, except that it added projected EWA flows. Separately, in Study No. 5, CALSIM II simulated flow modifications projected to occur as a result of " those projects subject to early consultation," specifically the increased pumping and permanent barriers called for in the planned South Delta Improvement Project (" SDIP"). (AR 374, 414-19; Sommer Decl. ¶ 5.) Each modeling scenario was run separately for various water year types (Wet, Above Normal, Below Normal, Dry, and Critically Dry) and independently estimated take at CVP and SWP facilities.

The BiOp based its conclusions for formal consultation on the results of the Study No. 5a, and for early consultation on the results of Study No. 5. The results of the modeling scenarios for Study No. 5a are set forth in several tables at pages 414 through 419 of the AR. The following table summarizes the changes in estimated take for Study No. 5a, for each type of water year, relative to the 1995 base case. In other words, the positive figures represent the number of additional smelt that will be taken per month under formal consultation relative to the 1995 base case (Study No. 1) while negative numbers represent how many fewer smelt will be taken per month relative to the 1995 base case.[FN12]

Table 1:

Summary of Results for CVP Salvage Under Study No. 5a

Month	Wet Year	Above Normal Year	Below Normal Year	Dry Year	Critically Dry Year
Adults					
December	-1	-1	-3	-3	-41
January	-13	-13	-12	-10	-98
February	-33	-36	+63	-60	+9
March	+29	-40	-83	-19	+1
Largely Juveniles					
April	0	0	-16	+5	0
May	0	0	-9017	-14469	-11652
June	0	0	0	-2910	0
July	0	+11	+7	-74	0
Net: December-March	-17	-89	-35	+28	-130
Net: April-July	0	+11	-9025	-17448	-1165

Table 2:

Summary of Results for SWP Salvage Under Study No. 5a

Month	Wet Year	Above Normal Year	Below Normal Year	Dry Year	Critically Dry Year
Adults					
December	-6	-6	-16	-15	-11

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January	-76	-87	-82	-87	-104
February	+86	-94	0	0	+51
March	+98	+91	+63	0	+2
Largely Juveniles					
April	-60	-77	-365	-144	0
May	-27188	-25933	-31122	-32083	-7269
June	-1096	-129	-53	1267	0
July	0	+282	+318	+493	+175
Net: December-March	+102	-95	-35	-102	-62
Net: April-July	-28346	-25857	-31213	-33000	-7095

***10** For the CVP, CALSIM II predicts significant reductions in smelt salvage during the months of December through July in below normal and dry years, when compared to the regulatory base case.[FN13] However, under certain scenarios, CVP salvage increases during other months of the year relative to the regulatory base case, because pumping is predicted to increase during these months to make up for water released from storage for fish protection purposes. For the SWP, salvage stays relatively level for the months of December through March. However, salvage decreases for the months of April through July relative to the regulatory base case.

Based on CALSIM II Study 5a, FWS calculated the amount of " combined salvage" (i.e., for both projects) estimated under the formal consultation scenario, for each month, according to water year type. The BiOp rounded the numbers up to the nearest 100 and used those figures to set incidental take limits by water year type. (AR 471-472.)

Table 3: Incidental Take Limits by Water Year Type (For Both CVP and SWP)

	Water Year Type		
	Month	Wet or Above Normal	Below Normal, Dry, or Critical
	October	100	100
	November	100	100
	December	700	400
Monthly	January	3000	1900
Incidental	February	2300	1700
Take	March	1300	1300
	April	1000	1100
	May	37800	30500
	June	45300	31700

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July	3500	2500
August	100	100
September	100	100

Because these incidental take levels are based on predictions produced by CALSIM II Study 5a, they do *not* assume any smelt protection actions under the DSRAM, but do assume continued availability of the EWA water. (AR 374, 471.)

FWS determined that the level of anticipated take " is not likely to result in jeopardy to the smelt because this level of take is at or below historical levels of take." (AR 474.)

However, the BiOp also acknowledges that " the operations of the Projects under formal consultation as described in the Project Description *will result in adverse effects to delta smelt* through entrainment at the CVP and SWP and by drawing delta smelt into poorer quality habitat in the south delta." (AR 422 (emphasis added).) The BiOp concludes that " with the inclusion of [certain] conservation measures described [in the BiOp] *and* the implementation of the [Delta Smelt Risk Assessment Matrix], these adverse effects would be avoided or minimized." (*Id.* (emphasis added).) " [W]ith these conservation measures in place, the re-operation of the Trinity River, the increased level of development on the American River, the Freeport Diversion, the Suisun Marsh Salinity Control Gates, the Barker Slough Diversion, or due to changes to X2 ... are not expected to result in adverse effects to delta smelt." (AR 423.)

FWS' conclusions admit project operations will result in adverse effects to delta smelt, which are unquantified, and can only be avoided by conservation measures and implementation of the DSRAM.

H. *" Conservation Measures."*

***11** The " conservation measures" contemplated are listed in the Summary of Effects section of the BiOp and include: (1) the Environmental Water Account (" EWA"); (2) Central Valley Project Improvement Act (b)(2) water; (3) State Water Resource Control Board's Water Rights Decision 1641; (4) the Vernalis Adaptive Management Plan (" VAMP"); and (5) the DSRAM adaptive management plan. (AR 466-68.)

1. CVPIA (b)(2) Water.

According to the 1992 Central Valley Project Improvement Act, the CVP must " dedicate and manage annually 800,000 acre-feet of Central Valley Project yield for the primary purpose of implementing the fish, wildlife, and habitat restoration purposes and measures authorized by this title; to assist the State of California in its efforts to protect the waters of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; and to help to meet such obligations as may be legally imposed upon the Central Valley Project under State or Federal law following the date of enactment of this title, including but not limited to additional obligations under the Federal Endangered Species Act." Title XXXXIV of the Reclamation Projects Authorization and Adjustment Act of 1992, Pub.L. 102-575, 106 Stat. 4600, 4706 (1992). (*See* AR 372.)

FWS, in consultation with the Bureau and other agencies, may use this " (b)(2) water" to meet Water Quality Control Plan (WQCP) obligations and any other requirements imposed by law after 1992. " For example, (b)(2) water has been used to maintain flows on Clear Creek to provide adequate spawning and rearing habitat for Chinook salmon. Water exports at the CVP have also been reduced using (b)(2) water to reduce entrainment of salmon or delta smelt at the salvage facilities. This ongoing action provides a benefit to delta smelt in most years." (AR 372.)

The base CVP yield committed to fish restoration is fixed by statute and is mandatory. This fixed supply is subject to reduction up to 25% in critically dry years under CVPIA § 3406(b)(2)(C).

2. Environmental Water Account.

The Environmental Water Account (" EWA") is " an adaptive management tool that aims to protect both fish and water users as it modifies water project operations in the Bay-Delta." (AR 373.)
The EWA provides water for the protection and recovery of fish beyond that which would be available through the existing baseline of regulatory protection related to project operations. The EWA buys water from willing sellers or diverts surplus water when safe for fish, then banks, stores, transfers and releases it as needed to protect fish and compensate water users for deferred diversions.

(*Id.*)

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The EWA has been used to benefit smelt by allowing for the curtailment of project export pumping during critical time periods. (*Id.*) The EWA could also be used to increase in-stream flows or increase outflows in the Delta, both of which would benefit the smelt. (*Id.*) The EWA is not fixed by statute nor is annual funding assured, and the water supply it provides, though reasonably anticipated, is not immutable.

3. Water Rights Decision 1641.

***12** State Water Resource Control Board Decision 1641 (D-1641) imposes certain minimum flow and water quality objectives upon the projects:
D-1641 includes specific outflow requirements throughout the year, specific export restraints in the spring, and export limits based on a percentage of estuary inflow throughout the year. D-1641 obligates the SWP and CVP to comply with the objectives in the 1995 Bay-Delta Plan. The Service issued a biological opinion on the Bay-Delta plan to the Environmental Protection Agency on November 2, 1994. The water quality objectives in the 1995 Bay-Delta Plan and in D-1641 are designed to protect in-Delta agricultural, municipal and industrial, and fishery uses and vary throughout the year and by water year type.... D-1641 will also protect delta smelt by providing transport, habitat and attraction flows.

(AR 373 (citations omitted).)

The D-1641 requirements are mandatory under the projects' operating permits. The water to satisfy D-1641 comes from 3406(b) (2) yield and supplemental sources the Bureau utilizes.

4. Vernalis Adaptive Management Plan (VAMP).

The Vernalis Adaptive Management Plan (VAMP) is an experimental program that had its origin in D-1641. (AR 373.) It provides for flows on the lower San Joaquin River and export curtailments at the projects. (*Id.*) VAMP's purpose is to " provide pulse flows on the San Joaquin River and improve habitat conditions in the Delta by reducing exports at the CVP and SWP" over a 31 day period in April and May for the benefit of Chinook salmon and Delta smelt.(*Id.*) Currently, water used to reduce exports at the CVP under VAMP is accounted for as CVPIA (b)(2) water. (*Id.*) If export reductions are taken, the EWA is used to supply contractors to make up for the transfers. VAMP flows " allow larval and juvenile smelt to avoid becoming entrained at the export facilities and to move downstream to Suisun Bay." (*Id.*)

The VAMP water supply is not irrevocably fixed or assured.

I. *Delta Smelt Risk Assessment Matrix (DSRAM).*

The BiOp's other, primary protection for the smelt is the implementation of a new adaptive management protocol, known as the Delta Smelt Risk Assessment Matrix (" DSRAM"). The DSRAM utilizes a list of trigger criteria to precipitate responses. (AR at 344.) The criteria are:

(1) the previous year's FMWT index;

(2) the risk of smelt entrainment based upon the location of X2;

(3) the estimated duration of the smelt spawning period, based on water temperature;

(4) the presence of spawning female smelt;

(5) the proximity of the smelt to project pumping facilities; and

(6) a salvage trigger for adult and juvenile smelt. (AR 346.)

1. The DSRAM Process.

If any trigger criteria is met or exceeded, a Delta Smelt Working Group (" DSWG") is convened. The DSWG consists of representatives from FWS, the California Department of Fish and Game, DWR, the United States Environmental Protection Agency, the Bureau, and the California Bay-Delta Authority. (*See* AR 344-45.) The DSWG then recommends corrective actions to a Water Operations Management Team (" WOMT").(*Id.*) The OCAP BiOp identifies four specific actions that the DSWG and WOMT must consider taking if one or more trigger criteria occur: (1) export reductions at one or both of the projects; (2) changes in the south Delta barrier operations; (3) changes in San Joaquin River flows; and (4) changes in the operation of the Delta cross channel.[FN14]The DSRAM does not contain defined action criteria, but instead leaves any response wholly to the discretion of the two groups who administer the DSRAM (DSWG and WOMT).

2. DSRAM Implementation.

***13** The BiOp acknowledges although FWS is " confident that use of the DSRAM will reduce the frequency with

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which actual salvage exceeds the median predicted salvage, the exceedence frequency could be as high as 50%." (AR 471.) There is no analysis of the duration or consequences from such exceedence. The DSRAM provides no operating criteria or action schedule, specifying when mitigation actions must be taken. It is not possible to predict what, how and when DSRAM measures will be implemented.

J. *Recent Experience with DSRAM.*

DWR offered post-record evidence regarding the manner in which DSRAM has actually been implemented since its inception. This post-record activity could not have been considered by the agency. A motion to strike the proffered evidence was sustained. The offer of proof includes two " fish actions" that were taken in 2005 in response to " triggers" and a third that was planned but avoided when project water increased in early 2006, a wet year. DWR's offer of proof is to show positive experience in operation of the DSRAM.

K. *Recent Procedural History.*

The Federal Defendants acknowledge that " [s]hortly before the 2005 OCAP BiOP was completed, a fall midwater trawl survey of delta smelt revealed a substantial decline in the population index for the species" to the lowest ever. (Doc. 242-1, at 4.) The Federal Defendants do not concede that the existence of this data renders the BiOp arbitrary and capricious, because " limited analysis of this data existed, and the Service relied on the raw data, and its own professional judgments as the best available scientific and commercial data available." (*Id.*) Nevertheless, " the CALFED agencies have continued to assemble and analyze new data and information." (*Id.*) For example, scientists from CALFED agencies " recently" developed a document based upon the new data: the Interagency Ecological Program Synthesis of 2005 Work to Evaluate the Pelagic Organism Decline (POD) in the Upper San Francisco Estuary (the " IEP POD Synthesis"). This document led the Federal Defendants to conclude that the OCAP for the CVP and SWP may affect Delta smelt in a manner or to an extent not previously considered. (IEP POD Synthesis, Doc. 240, Attachment 1.)

On July 6, 2006, the Bureau requested that the FWS re-initiate consultation concerning the impact of the OCAP on the Delta smelt. (Doc. 240.) In a July 6, 2006 letter to the FWS, the Bureau acknowledged that " emerging data indicates an apparent substantial decline in the Delta smelt population index." (Doc. 240-2.)

1. *No Dismissal or Stay.*

In light of the second re-initiation of consultation, federal defendants sought dismissal on prudential mootness grounds, a voluntarily remand without vacatur, or a stay pending the completion of reconsultation. (*See* Docs. 242-1, 273.) The motion for stay was joined by the DWR (Doc. 277), and various Defendant-Intervenors (Doc. 274). Plaintiffs opposed because Federal Defendants refused to withdraw the challenged BiOp and stated their intent to continue CVP and SWP operations under the disputed BiOp and its incidental take statements during the time period necessary to complete re-consultation, now projected to be July 2008, more than two and one-half water years following the effective date of the disputed BiOp. (*See* Doc. 279.)

***14** Defendants' motion to dismiss on prudential mootness grounds was denied:

Plaintiffs' concerns have not been fully addressed by the reinitation of consultation. Federal Defendants are relying in part on the challenged BiOps in operating the CVP and intend to continue to do so. The controversy over whether the BiOps and OCAP should have continued viability is real and substantial. and this court could provide relief, in the form of a decision invalidating the BiOps followed by hearings on interim remedies. Under these circumstances, it is not appropriate to deem this case prudentially moot.

(Doc. 301 at 18 (footnotes omitted).)

The motion for voluntary remand without vacatur was denied based on the general standard for vacatur set forth in *Natural Resources Defense Council v. U.S. Dept. of the Interior*, 275 F.Supp.2d 1136, 1143 (C.D.Cal.2002), which considers " the seriousness of the order's deficiencies" and " the disruptive consequences of an interim change that may itself be changed." No evidence or argument was presented regarding the nature of the prejudice that might result from invalidating the BiOp (*id.* at 20), and numerous factual and legal disputes exist regarding the seriousness of the order's deficiencies (*see id.* at 27). The court was left to speculate what consequences to the species would result if injunctive relief were ordered against continued implementation of the disputed BiOp.

The stay motion, based on the primary jurisdiction doctrine, was denied on the authority of *Lockyer v. Mirant Corp.*, 398 F.3d 1098, 1109 (9th Cir.2005) (a party seeking a stay " must make out a clear case of hardship or inequity in being required to go forward, if there is even a

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fair possibility that the stay for which he prays will work damage to someone else."). The order held: " Plaintiffs are entitled to have their complaint decided on the merits, particularly given the fact that Defendants continue to rely on the challenged BiOps as if they were lawfully enacted." (Doc. 301 at 33.) The apparent increasing jeopardy to the smelt by and after February of 2005 militates against further delay while FWS continue " to study" the issue of jeopardy, an exercise that has continued for almost a decade.

A. *Objections to Declaration of Ted Sommer.*

DWR offers the post-record declaration of Ted Sommer, Ph.D, to explain (1) the concept of salvage and its relationship to the take exceedence levels in the BiOp; (2) the operation of DSRAM; (3) and the manner in which DSRAM has been implemented since its inception.

Generally, " the focal point for judicial review should be the administrative record already in existence, not some new record made initially in the reviewing court." *Camp v. Pitts*, 411 U.S. 138, 142, 93 S.Ct. 1241, 36 L.Ed.2d 106 (1973). However, the Ninth Circuit recognizes three main exceptions to this rule, allowing courts to consider extra-record evidence:
(1) if necessary to determine " whether the agency has considered all relevant factors and has explained its decision," (2) " when the agency has relied on documents not in the record," or (3) " when supplementing the record is necessary to explain technical terms or complex subject matter."

***15** *Southwest Ctr. for Biological Diversity v. U.S. Forest Service*, 100 F.3d 1443, 1450 (9th Cir.1996). A court may also consider extra-record evidence " when plaintiffs make a showing of agency bad faith." *Nat'l Audubon Soc. v. U.S. Forest Serv.*, 46 F.3d 1437, 1447 n. 9 (9th Cir.1993).

DWR maintains that the Sommer declaration explains " technical or complex subject matters" admissible under the exception for evidence " necessary to explain technical or complex subject matters." (Doc. 246-1 at 5-6 n. 5.) Plaintiffs move to strike the declaration on the ground that subject matters covered by Mr. Sommer are " neither technical nor complex." (Doc. 305 at 4 n. 1.) Rather, Plaintiffs contend that the declaration is offered to explain the agency's post-BiOp experience with DSRAM in an effort to counter the Plaintiffs' argument that the DSRAM is wholly discretionary and contains no defined standards or enforceable requirements.

Generally, " post hoc rationalizations of the agency ... cannot serve as a sufficient predicate for agency action." *Am. Textile Manuf. Inst. v. Donovan*, 452 U.S. 490, 539, 101 S.Ct. 2478, 69 L.Ed.2d 185 (1981); *see also* *Sierra Club v. Bosworth*, 199 F.Supp.2d 971, 986 (N.D.Cal.2002) (refusing to consider post hoc explanations that were " neither addressed nor supported by the record"). DWR does not disagree with this general principle, but instead insists that the declaration is offered only to explain complex and technical aspects of the incidental take exceedence levels and the DSRAM.

Paragraphs 11 through 15 of the Sommer Declaration concern the implementation measures taken under the DSRAM after the BiOp issued. There is no basis in the law for the admission of this post-record evidence. DWR does not assert otherwise. Plaintiffs' motion to strike is **GRANTED** as to paragraphs 11 through 15.

The information contained in the remainder of the Sommers declaration is drawn directly from the BiOp itself, explaining in plain language how the incidental take limits were set and how DSRAM operates. Although, much of the same information can be found in the BiOp, the subject matters covered are technical and complex and Dr. Sommer's declaration clarifies or explains them. This exception saves the remaining paragraphs of the Sommers declaration to explain the incidental take limits.

The motion to strike is **DENIED IN PART** as to the past record evidence paragraphs only.[FN15]

B. *Federal Defendants' Renewed Objections to Previously Admitted Extra-Record Documents.*

The May 13, 2006 memorandum decision admitted certain extra-record documents, for limited purposes (Doc. 219), including Document 10 (a Powerpoint presentation by Michael Dettinger given to the Bay-Delta Authority on December 8, 2004 entitled " Uncertainties & CALFED Planning What Are Current Observations and Models Saying?") for two purposes. First, " for the limited purpose[ ] of determining whether [ ]FWS failed to adequately consider the climate change issue and the scientific significance of any such failure....;" but not legal opinions. (Doc. 219 at 25.) Second, to the extent appropriate, all twenty two extra record documents presented by Plaintiffs, including Document 10, may be referenced to aid the court's understanding of various technical concepts under the " technical terms and complex subject matter exception." (*Id.* at 32.)

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***16** In the footnote to their opposition brief, Federal Defendants renew their objection to consideration of any of the documents under the technical terms and complex subject matter exception. (Doc. 242-1 at 22 n. 12.) The May 13, 2006 memorandum decision notes: " Defendants and Defendant Intervenors suggest that Plaintiff has failed to establish that the existing record is inadequate to explain the technical terms, but point to no authority requiring such a showing." (Doc. 219 at 30.) Federal Defendants now assert: " numerous courts, including the Supreme Court and district courts in this Ninth Circuit, have held that a record may not be supplemented for explanatory purposes unless the existing record has been demonstrated inadequate." (Doc. 242-1 at 22 n. 12.), citing an unpublished district court decision, City of *Santa Clarita v. United Stats Dept. Of Interior*, 2005 WL 2972987 at *2 n. 3 (C.D.Cal.2005):

... Plaintiffs bear the burden of making an initial showing that the administrative record is inadequate for effective judicial review and that one of the exceptions to record review applies. Animal Defense Council v. Hodel, 840 F.2d at 1436-38 (affirming district court order limiting review to administrative record and prohibiting discovery because plaintiffs did not show record presented was insufficient for review or that any of the exceptions to record review were applicable)....

(emphasis added).

A district court decision not cited by Defendants, *Karuk Tribe of Cal. v. U.S. Forest Serv.*, 379 F.Supp.2d 1071, 1087 (N.D.Cal.2005), reiterated this holding:

The Ninth Circuit allows a reviewing court to consider extra-record materials in an APA case only under four narrow exceptions: (1) when it needs to determine whether the agency has considered all relevant factors and has explained its decision; (2) when the agency has relied upon documents or materials not included in the record; (3) when it is necessary to explain technical terms or complex matters; and (4) when a plaintiff makes a showing of agency bad faith. *Southwest Center for Biological Diversity v. United States Forest Service*, 100 F.3d 1443, 1450 (9th Cir.1996).*For extra-record material to be considered, a plaintiff must first make a showing that the record is inadequate.* *Animal Defense Council v. Hodel*, 840 F.2d 1432, 1437 (9th Cir.1988) (" The [plaintiff] makes no showing that the district court needed to go outside the administrative record to determine whether the [agency] ignored information"). At the *1088 same time, " [a] satisfactory explanation of agency action is essential for adequate judicial review, because the focus of judicial review is not on the wisdom of the agency's decision, but on whether the process employed by the agency to reach its decision took into consideration all the relevant facts." *Asarco, Inc. v. U.S. Environmental Protection Agency*, 616 F.2d 1153, 1160 (9th Cir.1980).

(emphasis added).[FN16] *Karuk Tribe,* and *Animal Defense Council v. Hodel*, 840 F.2d 1432, 1437 (9th Cir.1988), on which it relies, do stand for the proposition that, before admitting documents under any exception to the general rule against extra-record evidence, a court should require that a plaintiff make an initial showing that the existing record is insufficient. Here, defendants maintain that those documents plaintiffs have referenced to explain complex or technical matters, are " the cart before the horse," because Plaintiffs have not shown the existing record is inadequate.

***17** First, Federal Defendants objection is arguably untimely. They did not cite cases requiring a preliminary showing of insufficiency when the motion to augment was briefed and heard. Nor did Federal Defendants timely move for reconsideration of the May 13, 2006 ruling on the motion to augment. Striking the challenged documents now, would cause prejudice to Plaintiffs, who relied upon these rulings to prepare their dispositive motions.

Even assuming a timely and specific objection, on the merits, Plaintiffs' extra-record documents were properly admitted. Of these twenty-two documents, Plaintiffs' papers only referenced eight: Docs. 9, 10, 11, 12, 13, 20, 21 & 22. With the exception of Documents 12 and 22, all were admitted on multiple grounds. (Documents 12 and 22 were admitted for the limited purpose of explaining technical materials.) The documents and the bases for their admission are as follows:

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Document 9:	Summary of Annual Joint Meeting of California Bay-Delta Authority and Bay-Delta Public Advisory Committee (December 8-9, 2004). Admitted " for the limited purpose of determining whether USFWS failed to adequately consider the EWA/CVPIA(b)(2) issue," " for the limited purposes of determining whether USFWS failed to adequately consider the climate change issue and the scientific significance of any such failure ...," and, as appropriate, to explain complex and technical matters.
Document 10:	Climate Change Uncertainties & CALFED Planning: What Are Current Observations and Models Saying? Powerpoint presentation by Michael Dettinger, U.S. Geological Survey at the Scripps Institute for Oceanography, et al. to Bay-Delta Authority (December 8, 2004). Admitted " for the limited purposes of determining whether USFWS failed to adequately consider the climate change issue and the scientific significance of any such failure," and as appropriate, to explain complex and technical matters.
Document 11:	Summary of Annual Joint Meeting of California Bay-Delta Authority and Bay-Delta Public Advisory Committee (February 9-10, 2005). Admitted for the limited purpose of showing that USFWS failed to consider relevant Delta smelt population data and its scientific significance," and, as appropriate, to explain complex and technical matters.
Document 12:	Letter from H. Candee and K. Poole, NRDC, to S. Thompson re Consultation on OCAP: Significant New Delta Smelt Information, Service (Feb. 14, 2005). Admitted only to explain, as appropriate, complex and technical matters.
Document 13:	Delta smelt abundance trends, Powerpoint presentation by Chuck Armor, DFG, to Bay-Delta Authority Admitted for the limited purpose of showing that USFWS failed to consider relevant Delta smelt population data and its scientific significance," and, as appropriate, to explain complex and technical matters.
Document 20:	Supplemental Biological Opinion on CVP and SWP Operations, April 1, 2004 through March 31, 2006 (Feb. 27, 2004). Admitted " for the limited purpose of determining whether USFWS failed to adequately consider the EWA/CVPIA(b)(2) issue," and, as appropriate, to explain complex and technical matters.
Document 21:	Future Water Availability in the West: Will there be enough? Powerpoint presentation by M. Dettinger to 24th Annual Conference on Water, Climate and Uncertainty: Implications for Western Water Law, Policy, and Management (June 11-13, 2003). Admitted " for the limited purposes of determining whether USFWS failed to adequately consider the climate change issue and the scientific significance of any such failure ...," and, as appropriate, to explain complex and technical matters.
Document 22:	Letter from John W. Keys, Bureau, to Hon. George Miller, House of Representatives re Bureau's renewal of CVP water contracts (Dec. 23, 2004). Admitted only to explain, as appropriate, complex and technical matters.

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***18** With the exception of Documents 12 and 22, Plaintiffs were permitted to reference these documents to show whether FWS adequately considered included subject matter to support the BiOp. Although Plaintiffs did not expressly demonstrate that the record was insufficient, a finding of insufficiency can be implied from the rulings admitting the documents. For example, Document 10, the powerpoint presentation regarding " Climate Change Uncertainties & CALFED Planning" presented to the Bay-Delta Authority on December 8, 2004, references climatological information and issues not otherwise discussed in the administrative record, bearing on whether FWS failed to adequately consider the climate change issue. The same reasoning applies to Documents 9, 10, 11, 13, 20 & 21. As for Documents 12 and 22, were which were only admitted under the complex and technical matters exception, no prior showing of insufficiency was made. However, Documents 12 and 22 were only referenced as secondary citations or for context. Even if, any document was admitted in error, no prejudice has resulted.

Summary judgment is appropriate where there are no genuine issues of material fact and the moving party is entitled to judgment as a matter of law. Fed. R. Civ. Pro. 56(c). This is a challenge to the lawfulness of a biological opinion brought under the ESA and the Administrative Procedure Act (" APA"). Agency decisions made under the ESA are governed by the APA, which requires that the agency action be upheld unless it is found to be " arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law," or " without observance of procedure required by law." 5 U.S.C. § 706(2)(A), (D). The inquiry is designed to " ensure that the agency considered all of the relevant factors and that its decision contained no clear error of judgment." *Pacific Coast Fed'n of Fishermen's Ass'ns v. NMFS,* 265 F.3d 1028, 1034 (9th Cir.2001). Agency action should only be overturned if the agency has " relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." *Id.* In sum, a court must ask " whether the agency considered the relevant factors and articulated a rational connection between the facts found and the choice made." *Id.*" A biological opinion is arbitrary and capricious and will be set aside when it has failed to articulate a satisfactory explanation for its conclusions or when it has entirely failed to consider an important aspect of the problem." *Greenpeace v. NMFS,* 80 F.Supp.2d 1137, 1147 (W.D.Wash.2000). Alternatively, a biological opinion may also be invalid if it fails to use the best available scientific information as required by 16 U.S.C. § 1536(a)(2).*Id.* at 1150.

***19** As a general rule, a court must defer to the agency on matters within its expertise. *See National Wildlife Federation v. National Marine Fisheries Service,* 422 F.3d 782, 798 (9th Cir.2005). However, " [t]he deference accorded an agency's scientific or technical expertise is not unlimited." *Id.*" Deference is not owed when the agency has completely failed to address some factor consideration of which was essential to [making an] informed decision." *Id.* (internal citations and quotations omitted).

A final BiOp is final agency action for judicial review purposes. *American Rivers, infra,* 126 F.3d at 1124-25.

Plaintiffs move for summary judgment on the following grounds:

(1) First, the BiOp did not utilize the Best Available Science by: (a) failing to reference the " most recent Delta Smelt abundance data," namely the 2004 Fall Midwater Trawl Data; and (b) failing to consider the possible effects that climate change might have on the smelt's habitat.

(2) Second, the BiOp unlawfully relies upon the DSRAM as a mitigation measure because the DSRAM process is " entirely discretionary, uncertain, and unenforceable." In addition, Plaintiffs allege that Federal Defendants acted arbitrarily and capriciously by relying upon the EWA, CVPIA(b)(2), and/or VAMP programs as water sources necessary to implement the DSRAM. Plaintiffs allege that Federal Defendants have (a) failed to demonstrate that EWA, CVPIA and/or VAMP will continue to be available over the 20-year term of the BiOp and (b) failed to demonstrate that DSRAM can reliably operate without water assets from those programs.

(3) Third, there is no rational connection between the evidence in the record and the BiOp's " no jeopardy" conclusion. Specifically, Plaintiffs allege (a) that the BiOp's focus on salvage as the measure of harm to the species underestimates project impacts and results in a meaningless take limit; and (b) that the BiOp fails to explain how its no jeopardy conclusion can be justified in light of the identified adverse effects of the project, along with indirect and cumulative effects.

(4) Fourth, the BiOp failed to adequately analyze whether

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the OCAP's impacts on the Delta smelt's critical habitat are consistent with the smelt's recovery. In addition, the Federal Defendants failed to adequately take into account smelt habitat areas other than defined by X2.

(5) Finally, the BiOp is unlawfully narrow in its scope because it (a) fails to provide a comprehensive analysis of the effects of constructing facilities required to carry out long term CVP and SWP operations and (b) fails to analyze the impacts of the projects delivering the full amount of water authorized under CVP and SWP water service contracts.

A. *Threshold Issues.*

1. ESA 60-day notice requirement.

The San Luis Parties argue that Plaintiffs have not complied with the ESA's citizen suit notice requirement, 16 U.S.C. § 1540(g)(2) (A)(I), that written notice be given to " the Secretary, and to any alleged violator" at least sixty days in advance of filing suit. Failure to give this notice is a bar to bringing suit under the ESA. *Southwest Ctr. for Biological Diversity v. U.S. Bureau of Reclamation*, 143 F.3d 515, 520 (9th Cir.1998).

***20** In *American Rivers v. National Marine Fisheries Serv.*, 126 F.3d 1118, 1124-25 (9th Cir.1997), the Ninth Circuit held that issuance of a biological opinion is a final agency action that is properly pled as a challenge under the APA, rather than as a citizen suit claim under the ESA. Failure to comply with the 60-day notice requirement does not deprive the court of jurisdiction. *Id.*

The San Luis Parties advocate an approach that ignores *American Rivers,*[FN17] taken in an unpublished district court opinion, *Pacific Coast Fed' of Fishermen's Ass'ns v. U.S. Bureau of Reclamation*, 2006 WL 1469390 at 27 n. 8 (N.D.Cal.2006).*Pacific Coast Federation* declined to apply *American Rivers'* general rule because the injunctive relief the Plaintiffs sought went beyond simply having the biological opinion invalidated. The *Pacific Coast Federation* Plaintiffs sought to have any new biological opinion first reviewed by the court. This requested *relief,* fell outside the scope of the APA but was " within the scope of the ESA and thus trigger[ed] the notice period requirement." *Id.* Here, the requested relief is invalidation of the BiOp, a remedy undeniably available under the APA. *American Rivers* controls. There was no need to comply with the ESA 60-day notice requirement. The district court has jurisdiction over APA review of the BiOp.

2. Jurisdiction to Review Challenges to Early Consultation and Preliminary Biological Opinion.

Defendants contend the case is not ripe for decision. The BiOp covers not only current operations, but also a variety of future actions, some subject to formal consultation, others to early consultation:

This biological opinion covers formal and early consultation for the operations of the CVP and SWP. The formal consultation effects described in this biological opinion cover the proposed 2020 operations of the CVP including the Trinity River Mainstem ROD (Trinity ROD) flows on the Trinity River, the increased water demands on the American River, the delivery of CVP water to the proposed Freeport Regional Water Project (FRWP), water transfers, the long term Environmental Water Account (EWA), the operation of the Tracy Fish Facility, and the operation of the SWP-CVP intertie. The effects of operations of the SWP are also included in this opinion and include the operations of the North Bay Aqueduct, the Suisun Marsh Salinity Control Gates, the Skinner Fish Facility and water transfers.

Early consultation [issues address] the effects of operations of components of the South Delta Improvement Program (SDIP). These operations include pumping of 8500 cubic feet per second (cfs) at the SWP and Banks Pumping Plant (hereafter referred to as 8500 Banks), permanent barrier operations in the South Delta, the long term EWA, water transfers, and CVP and SWP operational integration. There are two separate effects sections in this biological opinion, one for Formal Consultation and one for Early Consultation. In addition, there is an incidental take for formal consultation and a preliminary incidental take for early consultation.

***21** (AR 2, 248.)

The San Luis Parties object that the early consultation portions of the BiOp are not final agency action and any challenges to the early consultation process are not subject to judicial review. Early consultation, by definition, results in only a " preliminary opinion" and in a preliminary incidental take statement that " does not constitute authority to take listed species." 50 C.F.R. § 402.11(e). Upon request for " confirmation" of a preliminary biological opinion, FWS will review the proposed action to determine if there have been " significant changes in the action as planned or in the information used during early consultation." § 402.11(f). Within 45 days of such request, FWS must either confirm the preliminary biological opinion or request formal

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consultation. *Id.*

Plaintiffs concede that they " are not challenging the validity of FWS's early consultation or its preliminary biological opinion regarding certain segregated components of the 2004 OCAP." (Doc. 306 at 37.) Rather, Plaintiffs argue that the portion of the BiOp covering formal consultation is flawed because it fails to examine the full impacts of all aspects of the 2004 OCAP. (Doc. 306 at 37.) Plaintiffs maintain the formal consultation should have covered certain planned actions included in the early consultation that are interdependent with other planned actions not included in either consultation. This claim is cognizable, as it challenges the scope of the formal consultation and the completeness of evaluation of overall OCAP operations on jeopardy to the smelt, not the lawfulness of the early consultation on future actions.

B. *The Biological Opinion Unlawfully Relies Upon Uncertain, Unenforceable Mitigation Measures.*

The BiOp concludes that the " operations of the Projects under formal consultation ... will result in adverse effects to the delta smelt through entrainment at the CVP and SWP facilities and by drawing delta smelt into poorer quality habitat in the south delta. However with the inclusion of the *conservation measures* described above *and the implementation of the DSRAM*, these adverse effects would be avoided or minimized." (AR 467 (emphasis added).) The " conservation measures" mentioned in the BiOp's conclusion are various regulatory mechanisms already in place to " provide protection to delta smelt and/or their habitats," including D-1641, the EWA, CVPIA (b)(2) water, and VAMP. (AR 421-22, 466-67.)

1. Law Governing Mitigation Measures.

Mitigation measures must be " reasonably specific, certain to occur, and capable of implementation; they must be subject to deadlines or otherwise-enforceable obligations; and most important, they must address the threats to the species in a way that satisfies the jeopardy and adverse modification standards." *Ctr. for Biological Diversity v. Rumsfeld*, 198 F.Supp.2d 1139, 1152 (D.Ariz.2002) (citing *Sierra Club v. Marsh*, 816 F.2d 1376 (9th Cir.1987)); *see also NWF v. NMFS*, 481 F.3d 1224 at *12 & n. 16 (" Although the record does reflect a general desire to install structural improvements [to benefit fish] where feasible, it does not show a clear, definite commitment of resources for future improvements.").

***22** Plaintiffs allege that, in depending on the DSRAM and the other " conservation measures" to support its no jeopardy conclusion, the BiOp unlawfully relies upon uncertain, unenforceable mitigation measures which do not constitute a clear, definite commitment of resources. Specifically, Plaintiffs argue: (a) the DSRAM process is " entirely discretionary, uncertain, and unenforceable and (b) the biological opinion unjustifiably assumes that the other, currently operational " conservation measures" (e.g., the EWA and CVPIA(b) (2) water) will continue to be available for use by DSRAM in the future.

2. The DSRAM is Unlawfully Uncertain and Unenforceable.

All Defendants argue that the DSRAM is an effective adaptive management program that provides the agency the necessary remedial flexibility that makes the BiOp lawful. The BiOp describes the DSRAM as follows:

The delta smelt risk assessment matrix (DSRAM) consists of month by month criteria which, when exceeded will trigger a meeting of the Delta Smelt Working Group (Working Group). The purpose of the DSRAM is to take actions to protect delta smelt in a proactive manner prior to salvage events....The DSRAM is an adaptive management tool which may be further modified by the Working Group/WOMT as new information becomes available, without undergoing formal reconsultation....Data will be updated at least weekly to determine the need for a meeting.

Should a triggering criterion be met or exceeded, Reclamation and/or DWR will inform the members of the Working Group and the Working Group will determine the need to meet. Any member of the Working Group may set up a meeting of the Working Group at any time. A meeting of the Working Group may consist of an in-person meeting, a conference call, or a discussion by email. If needed, the Working Group will meet prior to the weekly meetings of the DAT and the WOMT and information will be shared with these groups.

Should a meeting of the Working Group prove necessary, the group will decide whether to recommend a change in exports, change in south delta barrier operations, San Joaquin River flows, or a change in delta cross channel operations, and the extent and duration of the potential action. These *potential actions* are listed in the DSRAM by the months wherein each of these tools generally become available. *The group will recommend actions which will be shared with the DAT and forwarded to the WOMT for discussion and potential implementation.*This recommendation will include a discussion of the level of concern for delta smelt and will include who participated

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in the working group discussions. All dissenting opinions and/or discussion points will also be forwarded to the WOMT. The Working Group will meet at least weekly throughout the period in which the triggering criteria are met or exceeded, to determine the need to provide further recommendations to the WOMT.
Notes and findings of Working Group meeting will be submitted to the Service and members of the WOMT for their records. *The WOMT will respond to the Working Group's recommendations and the actions taken by the WOMT will be summarized by Reclamation and/or DWR annually and submitted to all WOMT agencies.*
***23** *If an action is taken, the Working Group will follow up on the action to attempt to ascertain its effectiveness.* An assessment of effectiveness will be attached to the notes from the Working Group's discussion concerning the action.

(AR 344-45 (emphasis added).)

The trigger criteria, which vary slightly from month to month, are set forth in a table (or matrix) at page 100 of the BiOp. (AR 346.) The criteria include: (1) the previous year's fall midwater trawl recovery index; (2) the risk of smelt entrainment based upon the location of X2; (3) the estimated duration of the smelt spawning period based upon water temperature; (4) the presence of spawning female smelt; (5) the proximity of the smelt to the Project pumping facilities; and, (6) a salvage trigger for adult smelt (calculated as the ratio of adult smelt salvage to the FMWT index) and juvenile smelt (set at zero for May and June, the months of the year during which salvage of smelt is highest). (AR 346-49.)

Plaintiffs argue that the DSRAM is not " reasonably specific, certain to occur, and capable of implementation" because: (1) the DSWG has complete discretion over whether to meet and whether to recommend mitigation measures; (2) even if the DSWG meets and recommends mitigation measures, the WOMT group is free to reject any recommendations; (3) there are no standards to measure the effectiveness of actions taken; (4) reconsultation is not required should mitigation measures prove ineffective; and (5) ultimately, no action is ever required.

DWR responds that implementation of the DSRAM *process* is " mandatory." For example, the incidental take statement requires that the projects shall be implemented " as described" in the BiOp. (AR 475.) Because the BiOp " describes" operation of the DSRAM, DWR asserts that its implementation is made mandatory by the incidental take statement's command that the project shall be implemented " as described;" if a DSRAM triggering criteria is met, the DSWG " *will* determine the need to meet." (AR 344 (emphasis added).) If circumstances warrant action, the DSWG will recommend fish protection actions and forward those recommendations to the WOMT. (*Id.*) The BiOp provides that the DSWG " *will* meet at least weekly throughout the period in which the triggering criteria are met or exceeded, to determine the need to provide further recommendations to the WOMT." (*Id.* at 345 (emphasis added).) The WOMT must then " respond" to DSWG's recommendations. (*Id.*) If actions are taken, the DSWG will monitor the action to determine its effectiveness. (*Id.*)

DWR correctly asserts that the DSRAM *process* must be followed; this does not address Plaintiffs' argument: that the DSRAM process itself does not *require* any mitigation *actions* be taken. Nothing in DSRAM requires the DSWG to make action recommendations, whatever the circumstances, and no criteria prescribe when the WOMT must act to effect DSWG's recommendations.

***24** DWR responds that as adaptive management, " DSRAM is intentionally flexible, taking into consideration the uncertainties surrounding delta smelt population abundance and dynamics ... [D]elta smelt abundance has fluctuated widely, without a clear explanation why. While experts can monitor trends in delta smelt populations, estimating overall population abundance presently is ' not possible,' nor are the sources of year-to-year variability in abundance well understood." (Doc. 246-1 at 12.) DWR suggests that " hard-wiring" the DSRAM to require specific actions be taken when triggering criteria occur would impair the DSRAM's flexibility. For example, the trigger for salvage of juvenile smelt is set at zero. This trigger was designed not to precipitate a meeting every time that standard is exceeded, but to cause heightened awareness of conditions that might require protective action. (Doc. 246-1, at 12, citing AR at 8217-18.)

The conflict between Defendants' choice of a flexible management approach and Plaintiffs' concern to ensure enforceable protective actions are taken when necessary, highlights the extent to which overly flexible adaptive management may be incompatible with the requirements of the ESA. Commentators recognize that adaptive management schemes do not fit neatly within the ESA's existing regulatory structure. *See J.B. Ruhl,* Taking Adaptive Management Seriously: A Case Study of the Endangered Species Act, 52 U. Kan. L.Rev. 1249, 1284 (2004) (" The [ESA] as a whole lacks a cohesive adaptive management architecture...."). H. Doremus,

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Adaptive Management, The Endangered Species Act, and the Institutional Challenges of " New Age" Environmental Protection, 41 Washburn. L.J. 50, 52 (2000) (" Adaptive Management ... runs counter to human nature and the current structure of our management institutions."); (" One key institutional challenge is to combine the flexibility required by adaptive management with the long-term certainty we often seek through our legal and political institutions.") 41 Washburn L.J. at 55.

The case law sheds little light on how to harmonize these competing objectives. The parties cite no cases applying the " reasonably specific, certain to occur, and capable of implementation" concept (or any closely related doctrine) to mitigation measures employed under an adaptive management protocol. Most cases the parties cite are either wholly inapplicable or factually distinguishable.

For example, mitigation measures have been found unlawfully uncertain because their implementation was not within the control of the relevant federal agencies. *National Wildlife Federation v. NMFS*, 254 F.Supp.2d 1196, 1213 (D.Or.2003), invalidated a 2000 biological opinion addressing the effects of the operation of the Federal Columbia River Power System (" FCRPS") on several listed fish species. A 2000 biological opinion concluded that continued operation of the FCRPS would jeopardize several of the species and adversely modify their critical habitat and adapted mitigation measures to avoid jeopardy. The mitigation measures included a variety of short- and long-term state, regional, tribal, and private off-site mitigation actions. The plaintiffs argued that reliance on such " uncertain and vaguely defined actions of third parties to protect and restore salmon habitat," violated the " reasonably certain to occur" standard. *Id.* at 1209.The district court agreed, concluding that the no jeopardy determination unlawfully relied on " non-federal off-site mitigation actions that are not reasonably certain to occur." *Id.* at 1214.*See also* *Sierra Club v. Marsh*, 816 F.2d 1376, 1385 (9th Cir.1987) (invalidating biological opinion that relied on mitigation measure involving the transfer of 188 acres of marshland from private ownership to a publicly owned wildlife refuge; land remained under private control and subject to easements that rendered the land valueless for mitigation purposes, and private owners and local government indicated intent to increase use of one of the easements); *Oregon Natural Desert Ass'n v. Lohn*, 485 F.Supp.2d 1190, 2007 WL 1170629 (D.Or.2007) (setting aside biological opinion in part because it overly relied on the actions of private individuals who had a poor past record of compliance with standards); *Florida Key Deer v. Brown*, 364 F.Supp.2d 1345, 1355-56 (S.D.Fla.2005) (setting aside biological opinion that relied on mitigation measures to be implemented by private landowners; nothing compelled the landowners to act and " the record indicate[d] that some landowners entirely disregarded [prior mitigation measures]").

***25** Here, the BiOp's mitigation measures *are* largely under the control of the action agency (the Bureau), which, operating in concert with the DWR, directly regulates water pumping and releases from upstream reservoirs.*Natural Resources Defense Council v. Rodgers*, 381 F.Supp.2d 1212, 1241 (E.D.Cal.2004), does not provide guidance. In that case, plaintiffs contended a BiOp's mitigation measures were not reasonably certain to occur because the action agency had a poor track record of following through on prior commitments. The acknowledging that the agency's track record was " discouraging" district court recognized that the agency had made some progress toward implementing its prior commitments, *id.*, and declined to find that the new commitments were not certain to occur. *Id.* However, the *Rogers* plaintiffs did not attack the efficacy of the mitigation measures themselves, only the likelihood that the agency would not satisfy its commitment to implement them. Here, Plaintiffs challenge the inherent uncertainty and unenforceability of the DSRAM and the other conservation measures.

Plaintiffs cite *American Rivers v. U.S. Army Corps of Engineers*, 271 F.Supp.2d 230, 252 (D.D.C.2003), where, despite the fact that a prior biological opinion required the Corps to implement flow restrictions to mitigate impacts to listed species, the Corps " made it perfectly clear" to the district court " that it ha[d] no intention of ensuring that its future operations will be consistent" with the mitigation requirements. *Id.* at 253.A motion for preliminary injunction was granted: " Plaintiffs will be likely to prove that the 2003 Supplemental BiOp violated the ESA and APA by improperly and unreasonably relying on future actions by the Corps that are *virtually certain not to occur." Id.* at 254 (emphasis added). Here, in contrast, there is no such " smoking gun" evidence of the agency's intent to disregard its mitigation responsibilities, just no definite, certain, or enforceable measures.

Center for Biological Diversity v. Rumsfeld, 198 F.Supp.2d 1139, 1151-53 (D.Ariz.2002) addressed a biological opinion that concluded the Army's continued operations at Fort Huachuca, Arizona would not cause jeopardy to listed species that relied on flows from the Upper San Pedro River, even though rapid development in the area and uncontrolled groundwater pumping at the

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Fort posed threats to the species. The " no jeopardy" finding was premised on several required mitigation measures.

First, the Army had to develop and implement an on-base plan to protect and maintain populations of listed species and habitats; *id.* at 1148, even though the on-base plan was not designed to address the underlying problem of diminishing flows in the San Pedro River, *see id.* at 1153.Second, the Army had to develop a regional water resources plan, sufficient to maintain flows in the San Pedro River to sustain the protected species and their habitats. *Id.* at 1148.The biological opinion acknowledged, that the Army had no authority over the implementation of the regional plan and was only required to participate along with other stakeholders. *Id.* at 1153.Third, the Army had to monitor progress and report on the implementation of the various projects.*Id.* at 1149.Fourth, the biological opinion assumed the operation of a water recharge facility designed to temporarily delay the impact of groundwater overdraft, which the *Rumsfeld* court acknowledged was " subject to substantial uncertainty." *Id.* at 1145.

***26** Leaving it to the Army and other interested parties to develop a regional water management plan " enables the Army to sidestep any direct responsibility for addressing deficit groundwater pumping," and was " an admission that what is currently on the table as far as mitigation measures is inadequate to support the [ ] ' no jeopardy' decision." 198 F.Supp.2d at 1153-54.[FN18]

DWR distinguishes *Rumsfeld,* claiming it is like *NWF v. NMFS,* 254 F.Supp.2d 1196, where mitigation measures were unlawful because they depended upon third parties without any guarantee that those parties would implement the measures. Here, the DSRAM does not depend on actions by outsiders. *Rumsfeld* further found that the Army's on-base mitigation measures were insufficient because they did not require any measurable goals or an implementation schedule:

*There are no requirements in the Final BO to reduce reliance on groundwater pumping by any particular amount or to achieve any measurable goals with respect to water recharge. There is no date certain implementation requirement.*The MOA includes a laundry list of possible mitigation measures related to water conservation and recharge that the Army may implement, but it does not establish which projects have to be undertaken, when, nor what the conservation objectives are for the respective projects. Without such specificity, the mitigation measures in the Final BO are merely suggestions.

Id. at 1153 (emphasis added).*Rumsfeld* stands for the proposition that, at a minimum, a mitigation strategy must have some form of measurable goals, action measures, and a certain implementation schedule; i.e., that mitigation measures must incorporate *some* definite and certain requirements that ensure needed mitigation measures will be implemented.

Here, the agency's BiOp admits that mitigation measures are essential. The no jeopardy finding is conditioned on conservation measures *and the DSRAM.*(*See* AR 422.)

DWR's protestations that hard-wiring the DSRAM would cripple its effectiveness ignore the ESA's requirements of reasonable certainty, timetables, and enforceability standards for mitigation measures. The existing DSRAM process provides *absolutely no* certainty that any needed smelt protection *actions* will be taken at any time by DSWG or WOMT. The DSRAM is in substance an organizational flow chart that prescribes that certain administrative processes (meetings) will be held whenever a trigger criteria is met or exceeded. Although mitigation measures are identified, no defined mitigation goals are required, nor is any time for implementation prescribed. Incorporating *some* ascertainable mitigation standards and enforceable mitigation measures is not inconsistent with avoiding unduly restrictive " hard-wiring" of the DSRAM.

National Wildlife Federation v. Babbit, 128 F.Supp.2d 1274 (E.D.Cal.2000)(" *NWF v. Babbit*"), addresses an adaptive management approach that accommodated uncertainty by allowing regulators to apply new information gathered through monitoring to *adjust and employ well-defined* mitigation measures. There, a Habitat Conservation Plan (" HCP") called for a development fee to be collected on all acreage developed in the Natomas Basin, north of Sacramento, home to a number of endangered species. The HCP also incorporated adaptive management provisions designed to allow the mitigation fee to be modified if new information justified an adjustment:

***27** The [HCP] recognizes that the current state of knowledge as to the conservation needs of protected species is imperfect, and that its assumptions as to the amount, location, and pace of development in the Basin and as to the adequacy of the mitigation fee to accommodate increased expenses may prove inaccurate. The Plan addresses these uncertainties through its " adaptive management" provisions, which permit the Plan's conservation strategy to be adjusted based on new information. The HCP's conservation program can be

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modified under the adaptive management provisions if: (1) new information results from ongoing research on the GGS or other covered species; (2) recovery strategies under Fish and Wildlife Service recovery plans for the GGS or the Swainson's hawk differ from the measures contemplated by the HCP; (3) certain of the HCP's mitigation measures are shown through monitoring to require modification; or (4) the HCP's required minimum block sizes for reserve lands are shown to require revision. The Plan anticipates that the NBC will make discretionary decisions in future years based upon new information. The NBC will decide, for example, which lands to purchase, depending on a variety of future considerations difficult now to predict, and whether to change the mix of in and out of Basin reserve lands and agricultural as opposed to marsh reserve lands.

Id. at 1281-82.[FN19]

Here, the adaptive management process has no quantified objectives or required mitigation measures. Although the *process* must be implemented by holding meetings and making recommendations, nothing requires that any *actions* ever be taken.[FN20]The BiOp asks the court to trust the agency to protect the species and its habitat. Notwithstanding any required deference to expertise, the ESA requires more.

All parties agree that adaptive management can be beneficial and that flexibility is a necessary incident of adaptive management. The law requires that a balance be struck between the dual needs of flexibility and certainty. The DSRAM, as currently structured, does not provide the required reasonable certainty to assure appropriate and necessary mitigation measures will be implemented. The DSRAM does not provide reasonable assurance admitted adverse impacts of the 2004 OCAP will be mitigated. This aspect of the BiOp is arbitrary and capricious and contrary to law. Plaintiffs' motion for summary adjudication as to this claim is **GRANTED.**The agency has not provided a reasonable explanation showing the DSRAM will satisfy ESA requirements to assure survival and recovery of the Delta smelt.

The Ninth Circuit's *recent NWF v. NMFS* decision suggests that mitigation measures that are not reasonably certain to occur should be excluded from the agency's no jeopardy analysis. *See*481 F.3d 1224 at *12 n. 16.[FN21]Because mitigation is insufficiently certain to occur under the DSRAM, the DSRAM cannot cure other shortcomings of the BiOp.

3. Plaintiffs' Alternative Argument that the BiOp is Arbitrary and Capricious Because DSRAM Depends Upon EWA, VAMP, CVPIA(b)(2) Water, Programs that are Uncertain in Terms of Funding and Effectiveness.

***28** Plaintiffs maintain that the DSRAM cannot feasibly be implemented without adequate water assets from the EWA, CVPIA(b)(2), and VAMP programs. Plaintiffs allege that Defendants have not demonstrated that adequate assets from these programs will be available during the 20 year term of the BiOp. (*See* Doc. 306 at 17.)

Plaintiffs correctly observe that the BiOp does not assure that adequate water assets from these programs will be available for future use under DSRAM. The BiOp itself acknowledges that " [a]lthough VAMP and [EWA] have helped to ameliorate these threats, it is unclear how effective these will continue to be over time based on available funding and future demands for water." (AR 367-68.) The BiOp recognizes that the " EWA Agencies envision implementation of a long-term EWA as part of the operation of the Project." (AR 335.) However, the BiOp cannot and does not commit to implement the EWA in the long run. (*Id.*)

The record reveals that the loss of EWA assets will " reduce the ability of the EWA agencies to provide [ ] fish protections...." (SAR 20.) Plaintiffs refer to statements made by FWS's D. Harlow during an annual joint meeting of CALFED and the Bay-Delta Public Advisory Committee, that a proposal to change CVPIA(b)(2) policy would " change fish protection envisioned in the Record of Decision (ROD)." (Doc. 9 at 4.) At the same time, Mr. Harlow also noted that this would " not necessarily diminish fish protection." (*Id.*) However, he opined that such a change would " necessitate an increase in the size of the EWA." (*Id.*) National Oceanic and Atmospheric Administration (" NOAA") staff questioned FWS's reliance on the EWA in the BiOp, noting that EWA assets would likely be used up for protective actions during the winter, before the peak months for Delta smelt salvage (May and June). (AR 8574.)

Plaintiffs' claim rests in part on the assumption that the EWA, CVPIA(b)(2), and VAMP programs are the *only* mechanisms by which DSRAM may be implemented. The record does not support this assumption. Under the BiOp, the DSWG is tasked to make recommendations regarding fish protection actions by selecting from a list of " tools for change," which include: (1) " export reduction[s] at one or both facilities" ; (2) " change[s] in barrier operations" ; (3) " change[s] in San Joaquin River flows" ; and (4) " change[s] [in the] position of cross channel

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gates." (AR 346 and 348 n. 7.) No mention is made of the EWA, CVPIA(b)(2), or VAMP in the DSRAM or its description of the " tools for change." DWR rejoins that, regardless of whether these programs are fully funded and/or remain functional mechanisms to provide water to the Delta, " the burden....falls on the Projects, not the smelt." (Doc. 246 at 10.)

The EWA is simply a means by which the SWP and CVP can obtain water by purchasing it from willing sellers. (AR 373.) EWA water may be used either to protect fish or to compensate project water users for reduced exports at the project pumps. (*Id.*) If money is unavailable to fund the EWA, Defendants are nonetheless required to prevent smelt take from exceeding permissible take limits.

***29** The BiOp sets forth a three-tier process to supply water to protect the smelt:
Tier 1 (Regulatory Baseline). Tier 1 is baseline water and consists of currently existing BOs, water right decisions and orders, CVPIA Section 3406(b)(2) water, and other regulatory actions affecting operations of the CVP and SWP. Also included in Tier 1 are other environmental statutory requirements such as Level 2 refuge water supplies.
Tier 2(EWA). Tier 2 is the EWA and provides fish protection actions supplemental to the baseline level of protection (Tier 1). Tier 2 consists of EWA assets, which combined with the benefits of CALFED's ERP, will allow water to be provided for fish actions when needed without reducing deliveries to water users. EWA assets will include purchased (fixed) assets, operational (variable) assets, and other water management tools and agreements to provide for specified level of fish protection. Fixed assets are those water supplies that are purchased by the EWA Agencies. These purchased quantities are approximations and subject to some variability. Operational assets are those water supplies made available through CVP and SWP operational flexibility. Some examples include the flexing of the export-to-inflow ratio standard required [ ] for meeting Delta water quality and flows, and ERP water resulting from upstream releases pumped at the SWP Banks Pumping Plant. Water management tools provide the ability to convey, store, and manage water that has been secured through other means. Examples include dedicated pumping capacity, borrowing, banking, and entering into exchange agreements with water contractors. Chapter 8 of this BA contains a more detailed description of EWA operations, as characterized in the CALSIM II modeling for the CVP OCAP.
Tier 3 (Additional Assets). In the event the EWA Agencies deem Tiers 1 and 2 levels of protection insufficient to protect at-risk fish species in accordance with the Act, Tier 3 would be initiated. Tier 3 sets in motion a process based upon the commitment and ability of the EWA Agencies to make additional water available, should it be needed. *This Tier may consist of additional purchased or operational assets, funding to secure additional assets if needed, or project water if funding or assets are unavailable.*It is unlikely that protection beyond those described in Tiers 1 and 2 will be needed to meet requirements of the Act.

(*Id.* at 336-37.)DWR emphasizes that, if all else fails, Tier 3 assets may be brought to bear, which include " additional purchased or operational assets, funding to secure additional assets if needed, or *project water* if funding or assets are unavailable." (*Id.* (emphasis added).)

There is a difference between the DSRAM's failure to require mitigation actions in response to trigger events, designed to assure the commitment of necessary resources to smelt protection, and the duty to have available or acquire those necessary resources. A court must leave to the agency the application of its expertise and authority to manage the complex hydrologic, legal, financial, physical, and logistical aspects of protecting the delta smelt. Plaintiffs motion for summary adjudication is **DENIED** as to the issue of the insufficiency of the EWA, VAMP, and CVPIA (b)(2) programs.

C. *Best Available Science.*

***30** The § 7 formal consultation process is designed to " insure" that any agency action " is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined ... to be critical...." 16 U.S.C. § 1536(a)(2)." In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available." *Id.*

An agency has wide discretion to determine what is " the best scientific and commercial data available." *San Luis v. Badgley*, 136 F.Supp.2d 1136, 1151 (E.D.Cal.2000). Yet, an agency must make its decision about jeopardy based on the best science available at the time of the decision, and may not defer that jeopardy analysis by promising future studies to assess whether jeopardy is occurring. *Rumsfeld*, 198 F.Supp.2d at 1156. While uncertainty is not necessarily fatal to an agency decision, *e.g.*, *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1337 (9th Cir.1992) (" *Greenpeace I*") (upholding agency decision even though there was uncertainty about the effectiveness

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of management measures because agency premised its decision on a reasonable evaluation of all available data), an agency may not entirely fail to develop appropriate projections where data " was available but [was] simply not analyzed," *Greenpeace v. NMFS*, 80 F.Supp.2d 1137, 1149-50 (W.D.Wash.2000) (" *Greenpeace II*") (where agency totally failed to develop any projections regarding population viability, it could not use as an excuse the fact that relevant data had not been analyzed). Here, EWS maintains the necessary data cannot be obtained.

1. Does a " Benefit of the Doubt to the Species" Presumption Apply?

The parties debate at length whether the best available scientific information principle includes a requirement that the agency " give the benefit of the doubt to the species." This language has its origins in the legislative history of the ESA, H.R. Conf. Rep. No. 96-697, 96th Cong., 1st Sess. 12, reprinted in 1979 U.S.C.C.A.N. 2572, 2576:

Section 7(b) of the act requires the fish and wildlife service and the national marine fisheries service to render biological opinions which advise whether or not proposed agency actions would violate section 7(a)(2). Courts have given substantial weight to these biological opinions as evidence of an agency's compliance with section 7(a). The amendment would not alter this state of the law or lessen in any way an agency's obligation under section 7(a)(2).

As currently written, however, the law could be interpreted to force the fish and wildlife service and the national marine fisheries service to issue negative biological opinions whenever the action agency cannot guarantee with certainty that the agency action will not jeopardize the continued existence of the listed species or adversely modify its critical habitat. The amendment will permit the wildlife agencies to frame their section 7(b) opinions on the best evidence that is available or can be developed during consultation. If the biological opinion is rendered on the basis of inadequate information then the federal agency has a continuing obligation to make a reasonable effort to develop that information.

***31** *This language continues to give the benefit of the doubt to the species*, and it would continue to place the burden on the action agency to demonstrate to the consulting agency that its action will not violate section 7(a)(2). Furthermore, the language will not absolve federal agencies from the responsibility of cooperating with the wildlife agencies in developing adequate information upon which to base a biological opinion. If a federal agency proceeds with the action in the face of inadequate knowledge or information, the agency does so with the risk that it has not satisfied the standard of section 7(a)(2) and that new information might reveal that the agency has not satisfied the standard of section 7(a)(2).

(emphasis added).

In *Conner v. Burford*, 848 F.2d 1441, 1454 (9th Cir.1988), the Ninth Circuit applied this " benefit of the doubt" language to hold that FWS violated the ESA by " failing to use the best information available to prepare comprehensive biological opinions considering all stages of the agency action...." At dispute in *Conner* was a biological opinion reviewing the proposed sale of oil and gas leases on National Forest land. The biological opinion analyzed the impact of the " initial lease phase," but failed to address the potential impact of post leasing activities, such as oil and gas development. FWS reasoned that there was " insufficient information available to render a comprehensive biological opinion beyond the initial lease phase," relying instead on " incremental-step consultation." *Id.* at 1452.The Ninth Circuit recognized that " the precise location and extent of future oil and gas activities were unknown at the time," but, " extensive information about the behavior and habitat of the species in the areas covered by the leases was available." *Id.* at 1453.With this information, " FWS could have determined whether post-leasing activities in particular areas were fundamentally incompatible with the continued existence of the species." *Id.* at 1454.

In light of the ESA requirement that the agencies use the best scientific and commercial data available to insure that protected species are not jeopardized, 16 U.S.C. § 1536(a)(2), the FWS cannot ignore available biological information or fail to develop projections of oil and gas activities which may indicate potential conflicts between development and the preservation of protected species. We hold that the FWS violated the ESA by failing to use the best information available to prepare comprehensive biological opinions considering all stages of the agency action, and thus failing to adequately assess whether the agency action was likely to jeopardize the continued existence of any threatened or endangered species, as required by section 7(a)(2).*To hold otherwise would eviscerate Congress' intent to " give the benefit of the doubt to the species."*

Id. (emphasis added).*Conner* does not directly support the broader interpretation urged by Plaintiffs, that the agency should err on the side of the species when evaluating uncertain evidence. *Conner* stands for the proposition that an agency cannot abdicate its responsibility to evaluate the impacts of an action on a species by labeling available information " uncertain," because doing so violates

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Congress' intent that the agencies " give the benefit of the doubt to the species."

***32** *Center for Biological Diversity v. Lohn*, 296 F.Supp.2d 1223, 1239 (W.D.Wash.2003) (rev'd on other grounds, 483 F.3d 984, 2007 WL 1217738 (9th Cir.)), applied the Conner holding in conformity with Plaintiffs' interpretation. *Lohn* addressed the listing under the ESA of a population of orca whales. Despite considerable record evidence suggesting the Orca whales should be considered a separate species, the Orca population had not yet been identified as a separate *taxon.* NMFS decided not to list the species based on the scientific uncertainty that existed in the field of taxonomy, relying on the fact that the new taxon had not yet been designated. The district court ruled this decision was arbitrary and capricious:

Given the considerable morphological, behavioral, and genetic evidence that the global Orcinus orca taxon is inaccurate and that residents and transients do not belong to the same taxon, the decision not to list the Southern Residents cannot be based upon a lack of consensus in the field of taxonomy regarding the precise, formal taxonomic redefinition of killer whales, particularly when that lack of agreement is compounded by the extreme difficulty in gathering evidence to achieve consensus. *The best available science standard gives " the benefit of the doubt to the species."* *Conner v. Burford*, 848 F.2d 1441, 1454 (9th Cir.1988) (observing one of the purposes of the best available science standard in review of whether agency action may result in destruction or adverse modification of listed species' habitat pursuant to 16 U.S.C. § 1536(a)(2)). *To deny listing of a species simply because one scientific field has not caught up with the knowledge in other fields does not give the benefit of the doubt to the species and fails to meet the best available science requirement.*

Id. at 1239 (emphasis added).[FN22]

In response, Defendant Intervenors cite *Oceana, Inc. v. Evans*, 384 F.Supp.2d 203 (D.D.C.2003), a challenge to NMFS's choice between two estimates of how much take a particular type of fishing gear would cause. The agency chose the lower estimate, reasoning that it was the " best estimate possible." The plaintiff argued that this estimate failed to give the " benefit of the doubt" to the species. *Id.* at 228. Although the lower estimate was uncertain, the district court reasoned that " the ESA does not require the agency to reject the ' best estimate possible' in favor of a more ' conservative' estimate that, according to the scientists, would be lacking in support." *Id.*

Lohn and *Oceana* appear irreconcilable, but, they can be harmonized. *Lohn* rejected an agency's decision to follow the taxonomy in the face of significant and compelling scientific evidence favoring a different conclusion. To side with the agency under such circumstances would " not give the benefit of the doubt to the species...." *Id.* at 1239. In contrast, *Oceana*, concerned an agency's choice of the " best estimate possible" over a more " conservative" estimate that lacked scientific support. The *Oceana* court refused to ignore the general rule that an agency must choose the best available science, simply because the ESA commands that the agency give the " benefit of the doubt" to the species. *Both* cases stand for the proposition that the agency must carefully examine the available scientific data and models and rationally choose the most reliable.

2. The BiOp's Failure to Address the 2004 Fall Midwater Trawl Data.

***33** Plaintiffs assert that " one of the most egregious errors in the [BiOp] is its failure to consider available fall 2004 Delta smelt abundance data, which evoked grave concern among agencies involved in smelt management." [FN23] (Doc. 232 at 5.) On February 9, 2005, FWS and other CALFED members met to discuss Delta smelt abundance. Among other things, participants discussed data from the 2004 fall midwater trawl (" FMWT") survey, which revealed that " estimates of Delta smelt appear to be their lowest since 1964." (Doc. 11 at 5; AR 9199-9200, 9202; Doc. 12.) The February 16, 2005, BiOp, contained no mention of the 2004 FMWT data.

Plaintiffs assert that FWS acted arbitrarily, capriciously and unlawfully by " ignoring" the 2004 FMWT data and relying instead on the more favorable abundance data from earlier abundance surveys. (AR 366-67 (noting that the 2003 FMWT results were more favorable than those from 2002, while simultaneously acknowledging that the 2003 summer townet index (1.6) was " well below the pre-decline average of 20.4 in (1959).").) Despite the receipt of the new, even less favorable 2004 FMWT data, FWS made no substantive changes to its jeopardy analysis in the biological opinion and did not use or address the new data in any way, not even to explain why the data was not discussed. At oral argument, the agency maintained that ESA analysis cannot go on forever, that there must be a cutoff.

Plaintiffs note that the low population numbers revealed by the FMWT data were " not unexpected," as smelt abundance had been on a downward trend for at least two years prior. (AR 370-71; 9199-9200, 9202.) One prominent smelt biologist warned at a June 2003 OCAP

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symposium that managers should expect very low smelt abundance data in the near future and that water exports were a key factor in the population decline, noting that the " cumulative proportion of the population lost to exports relative to abundance" could be as high as 30 percent. (AR 5069.)

Federal Defendants suggest that Plaintiffs' entire argument should be rejected as internally inconsistent. (Doc. 242 at 26-27.) Plaintiffs contend that FWS should have revised the BiOp in light of the 2004 FMWT data and that additional evidence of a downward trend was " not unexpected." These contentions are consistent with the central premise of Plaintiffs' position-that the 2004 FMWT data reflected a *record* low abundance (the data showed " estimates of Delta smelt appear to be at their lowest since 1964" (Doc. 11 at 5)); so low that the data should have been addressed in the BiOp, even if the agency already knew that smelt abundance was trending downward.

The State Water Contractors suggest that Plaintiffs' acknowledgment that the downward trend was " not unexpected," establishes that the BiOp fully recognizes the dire situation of the smelt. (Doc. 241 at 4.) The BiOp reflects that FWS had knowledge that smelt population levels were at extremely low levels, " [s]ince 1983, the delta smelt population has exhibited more low FMWT abundance indices, for more consecutive years, than previously recorded." (AR 367.)
***34** The results of seven surveys conducted by the Interagency Ecological Program (IEP) corroborate the dramatic decline in delta smelt....According to seven abundance indices designed to record trends in the status of the delta smelt, this species was consistently at low population levels during the last ten years (Stevens et al.1990). These same indices also show a pronounced decline from historical levels of abundance (Stevens et al.1990).

(AR at 370.) The State Water Contractors' argument ignores that the 2004 FMWT data evidences *record* low (the lowest) smelt abundance. Plaintiffs maintain that FWS' acknowledgment of a downward trend is inadequate as it does not address or analyze in survival and recovery terms, that smelt abundance levels had reached the lowest ever recorded.

The State Water Contractors argue that, although the BiOp admits the *fact* of the smelt's declining population, it does not and cannot explain the *cause* of the decline, because there is no scientific consensus as to causation. (Doc. 241 at 5.) " Contributing to [this] uncertainty," " is the fact that SWP and CVP operations have been ongoing for decades-a period during which Delta smelt abundance has increased as well as declined." (*Id.* at 6.) The State Water Contractors assert that the DSRAM was adopted in part to protect the smelt while further monitoring and research is carried out to resolve these uncertainties. They conclude that even if the 2004 FMWT data had been addressed in the BiOp, the ultimate opinion reached would not have differed; i.e., that operation of the projects under the 2004 OCAP BiOp would not jeopardize the smelt because, among other things, take will remain at or below historic levels and the DSRAM will protect smelt from salvage at project facilities.[FN24] But, this is post hoc argument; neither the agency or the biological opinion addressed the 2004 FMWT data and available scientific information opined that Project operations contributed to the decline of the smelt.

The cases the parties cite do not answer whether FWS did not have to analyze most recent data because it would not have altered the ultimate conclusion. Some cases suggest that FWS must use all available information to ensure that a biological opinion analyzes the threats to a species in a comprehensive manner. Plaintiffs refer to *Greenpeace II*, 80 F.Supp.2d at 1149-50, for the proposition that failure to analyze and incorporate available data is fatal to a biological opinion. In that case, NMFS concluded in a biological opinion that the total groundfish catch authorized in the Bering Sea and Gulf of Alaska in a single fishing season (1999) would not jeopardize the endangered Stellar sea lion. NMFS limited the scope of the biological opinion to that single year of fisheries management activities. The district court ruled that the agency should have broadened the scope of the biological opinion to consider the overall fishery management regime, including relevant regulations and specifications. *Id.* at 1146-47. This failure to produce a comprehensive biological opinion permeated all other aspects of the agency's decision. The district court found fault with the BiOp's superficial analysis, emphasizing the agency's failure to address the overall effects of the fisheries upon the sea lion:
***35** As far as the Court can ascertain, the focus of BiOp2 is limited to analyzing whether the fisheries compete with the sea lion for prey. In particular, BiOp2 focuses on the potential for localized depletions of prey caused by the fisheries. BiOp2 at 90, 112. *Even with respect to this limited topic of discussion, meaningful analysis is virtually non-existent. NMFS itself repeatedly concludes in BiOp2 that it simply lacks the information to make any determination one way or the other.* See BiOp2 at 111-118. Thus, NMFS's analysis is admittedly incomplete and its conclusions inconclusive. Although inconclusive data

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does not necessarily render a particular scientific conclusion invalid, the limited scope and quality of analysis that is contained in BiOp2 serves to highlight its overall inadequacy. For example, NMFS relies substantially on its conclusion that many of the target groundfish species are not important sea lion prey, despite uncertain evidence. BiOp2 at 114. That many of the target species may not individually constitute a major prey source, however, does not mean the cumulative impact of these fisheries is insignificant. *In other words, limited analysis which suggests the fisheries do not jeopardize the sea lion does not obviate the requirement that NMFS address the full scope of the FMPs in order to ascertain their overall effects.*

In sum, BiOp2 is limited in scope, heavy on general background information, and deficient in focused and meaningful discussion and analysis of how these large fisheries, and the complex management measures which regulate them, affect endangered Steller sea lions. That NMFS now finds it necessary to undertake yet another " comprehensive consultation" is a final indication to this Court that BiOp2 is not the broad and in-depth consultation it was purported to be by NMFS, much less coextensive in scope with the FMPs as required under the ESA.

A biological opinion which is not coextensive in scope with the identified agency action necessarily fails to consider important aspects of the problem and is, therefore, arbitrary and capricious. Here, BiOp2 not only fails to consider important aspects of the problem, the analysis it does contain is simply not adequate. Although an agency need not rely on conclusive scientific proof in a biological opinion, its conclusions must be based on " the best scientific and commercial data available." 16 U.S.C. § 1536(a)(2). Thus, an agency " *cannot ignore available biological information or fail to develop projections" which may indicate potential conflicts between the proposed action and the preservation of endangered species.*Conner, 848 F.2d at 1454.

Id. at 1149-50 (emphasis added).

In *Greenpeace II*, NMFS admitted that the information it needed to perform a more comprehensive review was available, but argued that it " could not have been analyzed in the time allowed." *Id.* at 1150.The district court rejected this argument:

***36** A federal agency ... is not " excused from [fulfilling the dictates of the ESA] if, in its judgment, there is insufficient information available to complete a comprehensive opinion and it takes upon itself [a more limited analysis]." Conner, 848 F.2d at 1455. This is not a situation where NMFS fully addressed the problem based on uncertain scientific data. *See Greenpeace Action v. Franklin,* 14 F.3d 1324, 1337 (9th Cir.1992).*Rather, NMFS entirely ignored relevant factors and admittedly failed to analyze and develop projections based on information that was available.*

Id. at 1150 (emphasis added); *see also Conner,* 848 F.2d at 1454 (biological opinion invalidated because agency failed to " use best information available to prepare comprehensive biological opinions considering all stages of agency action").

Plaintiffs analogize this case to *Greenpeace II*, because the agency has ignored available biological information. Here, Plaintiffs complain that FWS failed to incorporate into *existing* models and analyses that already reflected concern over an overall declining trend in smelt, the *most recent* survey information, evidencing a more pronounced decline in smelt populations than ever before recorded. In *Greenpeace II*, the agency entirely failed to perform a comprehensive review of threats to the sea lion. The difference in degree is not significant.

Federal Defendants cite *Oceana,* 384 F.Supp.2d 203, where NMFS concluded that an amendment to the Atlantic Sea Scallop Fishery Management Plan would not jeopardize the protected loggerhead sea turtle, based on a population model that involved a degree of uncertainty, but that the agency determined was the " most reliable method." *Id.* at 215.The *Oceana* plaintiffs did not dispute that the model represented the " best available science," instead arguing that the model was " so ill-suited to the purpose for which it was used, and so fraught with uncertainties," that the agency could not rationally reach its no jeopardy conclusion. *Id.* at 218.The district court upheld the agency's use of the model, reasoning " [t]ime and again courts have upheld agency action based on the ' best available' science, recognizing that some degree of speculation and uncertainty is inherent in agency decisionmaking, even in the precautionary context of the ESA." *Id.* at 219.Though the ESA should not be implemented " haphazardly, on the basis of speculation, *id.* at 219, the model " bears a rational relationship to the reality it purports to represent" and no other alternative model was available, *id.* at 221.

The circumstances here are not analogous to those in *Oceana*, where the plaintiffs *admitted* that the challenged model was the best, albeit uncertain, available science. Here, Plaintiffs maintain the agency's failure to analyze the most recent smelt population information prevented consideration of the best available, consequential scientific information.

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***37** Federal Defendants also rely on *Greenpeace I,* 14 F.3d at 1337, an earlier challenge to a Stellar sea lion biological opinion. The *Greenpeace I* plaintiffs argued that the agency acted arbitrarily and capriciously by approving certain fishery management measures despite uncertainty about the effects of the measures on the sea lion. The Ninth Circuit concluded that the presence of some uncertainty did not violate the best available science requirement in part because that BiOp analyzed *all* the available data:

We hold that the Service has fulfilled its substantive duties as well. Despite Greenpeace's assertions to the contrary, the Service supported its conclusions with ample data and analysis. The June biological opinion indicates that the Service, the Alaska Fisheries Science Center, and the National Marine Mammal Laboratory *" analyzed all the available data on the pollock fishery and Steller sea lions"* in the Gulf of Alaska. The Service also sought the recommendations of the Steller Sea Lion Recovery Team. The opinion demonstrates that the Service evaluated the spatial and temporal distribution of commercial fishing across the Gulf of Alaska. It then addressed not only the total biomass of pollock in the Gulf and the effects of fishery removals on that biomass, but also the spatial and temporal distribution of pollock across the Gulf. And despite Greenpeace's claims to the contrary, the Service did not ignore hydroacoustic surveys of pollock biomass, but considered and compared them to bottom trawl surveys. *Finally, while the Service has repeatedly conceded that it was uncertain about the effectiveness of its management measures, it premised these measures on a reasonable evaluation of available data, not on pure speculation.*

The biological opinions indicate that the Service, an expert agency, consulted with other teams of experts to consider all relevant factors pertaining to the effects of the Gulf fishery on the Steller sea lion. And they indicate that the Service did not ignore data, as Greenpeace suggests. The Service's decision to go ahead with the 1991 fishery under the proposed restrictions, despite some uncertainty about the effects of commercial pollock fishing on the Steller sea lion, was not a clear error of judgment.

(Emphasis added.) *Id.* at 1337.Here, unlike *Greenpeace I,* FWS failed to analyze all of the available data on the Delta smelt, as the 2004 FMWT data is not mentioned in the BiOp. Nor has FWS resolved uncertainties about the identified causes of the serious decline in Delta smelt abundance by adopting unenforceable management measures.

" Although a decision of less than ideal clarity may be upheld if the agency's path may reasonably be discerned, [a court] cannot infer an agency's reasoning from mere silence. Rather, an agency's action must be upheld, if at all, on the basis articulated by the agency itself." *Pacific Coast Fed'n of Fishermen's Ass'ns v. United States Bureau of Reclamation,* 426 F.3d 1082, 1091 (9th Cir.2005) (internal citations and quotations omitted)." [W]hen reviewing a biological opinion, [a court may] rely only ' on what the agency actually said' ...." *Id.*(quoting *Gifford Pinchot Task Force,* 378 F.3d at 1072 & n. 9). Had FWS examined the FMWT 2004 data in the BiOp, the weight it gave to that data would have been entitled to deference. The agency's silence cannot be afforded deference.

a. *The timing of the 2004 FMWT Data relative to the issuance of the BiOp.*

***38** Federal Defendants complain the timing of the release of the 2004 FMWT data did not leave enough time to address the data before issuance of the biological opinion. The record shows at the very latest, the 2004 FMWT data was presented to FWS and other CALFED members on February 9, 2005, less than a week before the February 16, 2005, issuance of the biological opinion. Federal Defendants assert they were not required to rewrite the BiOp at the " eleventh hour." (Doc. 242 at 27).

Although the record shows the 2004 FMWT data was presented at the February 9, 2005 CALFED meeting, it is unclear when FWS *first* saw this data. Plaintiffs' claim that the data was available in December 2004, is not supported.[FN25] However, even assuming FWS was not aware of the 2004 FMWT data until February 9, 2005, the agency was not operating under a deadline. As in *Greenpeace II,* where the agency's statutory duty was not excused because the data could not be " analyzed in the time allowed," 80 F.Supp.2d at 1150, here, FWS could have delayed releasing the biological opinion until it had reviewed and analyzed the new abundance data, which was especially significant as it showed Delta smelt abundance at its nadir.

Defendants and Defendant-Intervenors rejoin that the failure of the BiOp to *directly* address the 2004 FMWT is harmless, because one of the DSRAM's trigger criteria is an index based upon the previous years' FMWT results, calling for any new abundance data to be incorporated into the adaptive management process. However, even if the data were considered later in the DSRAM process, no designated protective actions are required to be taken in response to any of the triggering criteria.[FN26]

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Federal Defendants raise a legitimate concern about having to prolong completion of the BiOp on the eve of its release. In theory, new scientific information could arrive on FWS's doorstep on a daily basis. If FWS was required to consider and address every new piece of information it received prior to publication of its decision, it would be effectively impossible for the agency to complete a biological opinion. But, this is not such a case. The FMWT is a credible and reliable Delta smelt population abundance survey, regularly compiled on an annual basis, and relied upon by the agency in the past. There is no rational reason to ignore such important data. The BiOp places great weight on the FMWT as " the second longest running survey." (AR 366, 370). The agency does not suggest the time of receipt of the 2004 FMWT data was unexpected. The agency's failure to acknowledge and analyze the record low abundance levels revealed by the 2004 FMWT is unreasonable and violated its duty to use the best available scientific information. 16 U.S.C. § 1536(a)(2).

Plaintiffs' motion for summary adjudication is **GRANTED** as to this claim.

3. Global Climate Change Evidence.

Plaintiffs next argue that the BiOp ignored data about Global Climate Change that will adversely affect the Delta smelt and its habitat. (Doc. 232 at 7.) This is potentially significant because the BiOp's conclusions are based in part on the assumption that the hydrology of the water bodies affected by the OCAP will follow historical patterns for the next 20 years. (AR 375 (explaining that CALSIM II modeling involved making " adjustments to historic water supplies ... by imposing future level land use on historical meteorological and hydrologic conditions").)

***39** In a July 28, 2004 comment letter, Plaintiff NRDC directed FWS's attention to several studies on the potential effects of climate change on water supply reliability, urging that the issue be considered in the BiOp. (AR 8552-56.) The comment letter stated:

The best scientific data available today establishes that global climate change is occurring and will affect western hydrology. At least half a dozen models predict warming in the western United States of several degrees Celsius over the next 100 years (Redmond, 2003). Such sophisticated regional climate models must be considered as part of the FWS' consideration of the best available scientific data.8:43 AM 6/5/2007

Unfortunately, the Biological Assessment provided by the Bureau to FWS entirely ignores global climate change and existing climate change models. Instead, the BA projects future project impacts in explicit reliance on seventy-two years of historical records. In effect, the Biological Assessment assumes that neither climate nor hydrology will change. This assumption is not supportable.

In California, a significant percentage of annual precipitation falls as snow in the high Sierra Nevada mountains. Snowpack acts as a form of water storage by melting to release water later in the spring and early summer months (Minton, 2001). The effects of global climate change are expected to have a profound effect on this dynamic. *Among other things, more precipitation will occur as rain rather than snow, less water will be released slowly from snowpack " storage" during spring and summer months, and flooding is expected to increase* (Wilkinson, 2002; Dettinger, 2003).*These developments will make it more difficult to fill the large reservoirs in most years, reducing reservoir yields and will magnify the effect of CVP operations on downstream fishes* (Roos, 2001). These developments will also dramatically increase the cost of surface storage relative to other water supply options, such as conservation.

While the precise magnitude of these changes remains uncertain, judgments about the likely range of impacts can and have been made. *See e.g.,*U.S. Global Climate Action Report-2002; Third National Communication of the United States Under the United Nations Framework Convention on Climate Change at 82, 101 (2002). [FN3]. The Service can and must evaluate how that range of likely impacts would affect CVP operations and impacts, including the Bureau's ability to provide water to contractors while complying with environmental standards. We therefore request that the Service review and consider the work cited above, as well as the background and Dettinger presentation at a recent climate change conference held in Sacramento, June 9-11, 2004 [citation omitted] and climate change reports [citation omitted].

(AR at 8554-55 (emphasis added).)

A second presentation by Michael Dettinger at a December 8-9, 2004 CALFED meeting, attended by FWS staff, concluded that " warming is already underway ..." ; that this would result in earlier flows, more floods, and drier summers; and that " California water supplies/ecosystems are likely to experience [ ] changes earliest and most intensely." (Doc. 10 at 18.) Following Dettinger's presentation, members of CALFED noted " the need to reevaluate water storage policies and ERP

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[Ecosystem Recovery Program] recovery strategies, all of which would be affected by projected climate changes." (Doc. 9 at 3.) The record reflects that extreme water temperatures can have dramatic impacts upon smelt abundance. (AR 8979-80.)

***40** In addition to the specific studies and data cited by NRDC, FWS scientists recognized the issue of climate change warranted further consideration. At a June 2003 symposium entitled " Framing the issues for Environmental and Ecological Effects of Proposed Changes in Water Operations: Science Symposium on the State of Knowledge," a number of questions regarding climate change were raised, including: " How does the proposed operations plan account for the potential effects of climate change (e.g., El Nino or La Nina, long term changes in precipitation and runoff patters, or increases in water temperature)?" (AR at 4839.)

Plaintiffs argue that, despite this evidence that climate change could seriously impact the smelt by changing Delta hydrology and temperature, the BiOp " did not so much as mention the probable effects of climate change on the delta smelt, its habitat, or the magnitude of impacts that could be expected from the 2004 OCAP operations, much less analyze those effects." (Doc. 232 at 8.) Defendants and Defendant-Intervenors respond by arguing (1) that the evidence before FWS at the time the BiOp was issued was inconclusive about the impacts of climate change; and (2) that, far from ignoring climate change, the issue is built into the BiOp's analysis through the use of X2 as a proxy for the location and distribution of Delta smelt.

a. *Inconclusive Nature of Available Information Regarding the Impacts of Global Climate Change on Precipitation.*

Federal Defendants and the State Water Contractors characterize Mr. Dettinger's presentation, as reflecting " a great deal of uncertainty that climate change will impact future precipitation." The presentation is entitled " Climate Change Uncertainties and CALFED Planning." (Doc. 10 at 1.) Dettinger acknowledges that, although current climate models " yield consistent warming scenarios for California" (*id.* at 6), there is no similar consensus regarding the impact of warming on future precipitation (*id.* at 7). Federal Defendants suggest that FWS " responsibly refused to engage in sheer guesswork, and properly declined to speculate as to how global warming might affect delta smelt." (Doc. 242 at 23.) But, the NRDC letter cited a number of studies in addition to Mr. Dettinger's presentations, all of which predict that anticipated climate change will adversely impact future water availability in the Western United States.

At the very least, these studies suggest that climate change will be an " important aspect of the problem" meriting analysis in the BiOp. *Pacific Coast Fed'n,* 265 F.3d at 1034. However, as with the 2004 FMWT data, the climate change issue was not meaningfully discussed in the biological opinion, making it impossible to determine whether the information was rationally discounted because of its inconclusive nature, or arbitrarily ignored.[FN27]

b. *X2 as a Proxy for Climate Change.*

The State Water Contractors argue that the approaches taken in the DSRAM are " more than adequate to deal with the projected impacts of climate change-assuming they occur." (Doc. 241 at 8.) For example, Plaintiffs' suggestion that climate change will produce earlier flows, more floods, and drier summers is addressed by the DSRAM's X2 trigger. Flow level changes will be reflected in the position of X2. If climate change alters water temperatures, DSRAM also includes a temperature trigger, that monitors the temperature range within which successful Delta smelt spawning occurs.

***41** The DSRAM offers no assurance that any mitigating fish protection actions will be implemented if the X2 criteria is triggered. That X2 indirectly monitors climate change does not assuage Plaintiffs' concerns that the BiOp has not adequately analyzed the potential impact of climate change on the smelt.

The BiOp does not gauge the potential effect of various climate change scenarios on Delta hydrology. Assuming, *arguendo,* a lawful adaptive management approach, there is no discussion when and how climate change impacts will be addressed, whether existing take limits will remain, and the probable impacts on CVP-SWP operations.

FWS acted arbitrarily and capriciously by failing to address the issue of climate change in the BiOp. This absence of *any* discussion in the BiOp of how to deal with any climate change is a failure to analyze a potentially " important aspect of the problem." [FN28]

Plaintiffs' motion for summary adjudication is **GRANTED** as to this claim.

D. *There is No Rational Connection Between the No Jeopardy Finding and the Status of the Species.*

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Plaintiffs next allege that there is no rational connection between the record evidence and the BiOp's " no jeopardy" conclusion. Plaintiffs first argue that the BiOp's approach to setting take limits is arbitrary and capricious because FWS failed to consider defined take limits in the context of current smelt abundance. Plaintiffs complain that the BiOp does not explain how its no jeopardy conclusion can be justified in light of the admitted adverse effects of the project, along with indirect and cumulative effects on the species.

In a formal consultation, the ESA requires FWS to " [f]ormulate its biological opinion as to whether the action, taken together with cumulative effects, is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat." 50 C.F.R. § 402.14; *see also*16 U.S.C. § 1536(a)(2). The phrase " jeopardize the continued existence of" means " to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 C.F.R. § 402.02.

Agency action may be overturned if the agency has " relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." *Pacific Coast Fed'n,* 265 F.3d at 1034. A court must ask " whether the agency considered the relevant factors and articulated a rational connection between the facts found and the choice made." *Id.* The agency must " examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made." *Motor Vehicle Mfrs. Ass'n v. State Farm Mutual Ins.,* 463 U.S. 29, 43, 103 S.Ct. 2856, 77 L.Ed.2d 443 (1983).

1. Plaintiffs' Argument that Salvage Underestimates Project Impacts on the Smelt.

***42** Plaintiffs assert that the BiOp's reliance on salvage is arbitrary and capricious because salvage is not a reliable basis for setting Project take limits. Plaintiffs cite record evidence, including statements made by smelt biologists and FWS employees, that salvage does not accurately estimate incidental take of young Delta smelt. (*See* AR 8403, 7578.) The BiOp admits that salvages does not fully account for all smelt losses. (AR 419 (" It should be noted that although salvage is used to index delta smelt take, it does not reliably index delta smelt entrainment. Furthermore, delta smelt salvage is highly variable at all time scales....).") Plaintiffs have not shown that a better measure of smelt take could have been generated from available data. The agency is entitled to rely on this approach as it appears to be the " best estimate possible," no party has suggested an alternative. *See Oceana,* 384 F.Supp.2d at 228.

This objection standing alone is insufficient to justify summary adjudication.

2. The BiOp's Approach to Estimating Future Take Without Considering the Smelt's Current Abundance Is Arbitrary and Capricious.

The take limits are based on historic sampling from " salvage density" (number of fish taken per unit of water), which data is adjusted using CALSIM II modeling to reflect water flows anticipated under the circumstances of the final consultation. FWS's no jeopardy determination is based in part on flow modeling for the final consultation scenario that predicted *lower* than historic salvage levels during critical times. (AR 474 (finding that the level of anticipated take " is not likely to result in jeopardy to the smelt because this level of take is at or below historical levels of take.")

A close examination of the administrative record reveals that this conclusion relies upon an unsupported irrational assumption not justified by the record, i.e., that maintaining salvage at or below historic salvage levels will ensure that the 2004 OCAP is not likely to jeopardize the continued existence of the Delta smelt. First, by focusing only on how proposed operations will either increase or decrease smelt take, FWS effectively limited its analysis to determining whether the magnitude of the OCAP's impact upon the smelt would be different from the Projects' impact under the regulatory historical baseline. FWS did not analyze how the absolute number of smelt taken during any given period of Project operations will impact overall smelt abundance at the time of the 2005 BiOp or in the future. Nor does the finding the smelt " still persists," even at the lowest recorded abundance levels, have any meaning if the smelt's " persistence" is at a level at or near extinction. Evaluating " persistence" instead of smelt population abundance is irrational, arbitrary, and runs counter to the evidence before the agency.

The Ninth Circuit, in *NWF v. NMFS,* 481 F.3d 1224 at *8,

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invalidated a biological opinion in part because it failed to view the agency action " in the present and future human and natural contexts." Here, the BiOp similarly fails to provide a scientific explanation for why it is appropriate to set incidental take without considering the most current smelt population data. This methodology fails to take most recent available natural conditions (i.e., the smelt's current and/or future population abundance) into consideration. For example, if the smelt's population is currently 600,000, it might be justifiable to permit a monthly take of over 30,000. However, if the smelt's current population is only 60,000, allowing 30,000 to be entrained in the pumps in a single month would represent a 50% reduction in smelt population. Even if the 30,000 figure was significantly lower than historic take, Defendant-Intervenors agree " that salvage impacts cannot be accurately identified without a population estimate." (Doc. 247 at 9 n. 13.)

***43** DWR asserts that, in setting the take limits, the BiOp took into consideration concerns expressed by experts that using historic information alone would not create an appropriate take limit. (*See* AR 4880, 5532, 5543). The first of the citations offered by DWR, an email sent by FWS's Wim Kimmerer to several individuals at DWR, EPA and elsewhere, states that there was some discussion at FWS about " getting away from take as the principle criterion governing management and recovery of delta smelt." (AR 4880.) The next page of this email goes on to admit that " determining what level of mortality is acceptable or ' safe' is going to be difficult ...*Ultimately ... this should be done through some sort of population model or viability analysis."* (AR 4881 (emphasis added).) The other cited communications express similar concerns. (*See* AR 5532, 5543.) It is time to do it, yet FWS continues to profess the smelt population cannot be reliably measured.

DWR argues that, together, the take limits *and* the DSRAM address these concerns by moving the focus of management away from salvage. However, there is no way to know when or what measures will be taken under the DSRAM, which leaves the existing take limits as the only enforceable measures in the BiOp, [FN29] while the species heads toward extinction. Using flawed take limits and refusing to quantify smelt population and recent viability trends create substantial doubt about the reliability of the BiOp.

Defendants and Defendant-Intervenors suggest that sufficient information was simply not available to accurately determine smelt abundance.[FN30] Plaintiffs rejoin by referring to an email sent by Zachary Hymanson to Ryan Olah at FWS, with copies to others at concerned federal and state agencies. Mr. Hymanson opined: " I think we are at the point where we should report and use quantified estimates of the total number of individuals at the various life stages monitories. Quantified population and life stage estimates of fishes around the world are routinely made with A LOT less data than we have for delta smelt." (AR 7542 (emphasis in original).)

The viability of Delta smelt has been under scrutiny for over ten years. No party has shown that producing a reliable population estimate is scientifically unfeasible. Information does not have to be perfect or infallible for the agency to be required to use it to create a population estimate. *See Greenpeace II,* 80 F.Supp.2d at 1149-50 (finding it unlawful for agency to entirely ignore relevant factor and fail to analyze and develop projections regarding that factor based on information that was available); *see also Conner,* 848 F.2d at 1454 (biological opinion invalidated because agency failed to " use best information available to prepare comprehensive biological opinions considering all stages of agency action."). Without population estimates, it is arbitrary for the agency to conclude that project operations will not result in jeopardy simply because the projects will take relatively fewer smelt than they did in the past, in the face of the undisputed fact that the smelt population has been declining steadily in recent years. Failing to incorporate any information about smelt population abundance into the setting of the take limits is a fundamental failure rendering the BiOp arbitrary and capricious.

***44** The San Luis Parties' rationalization of FWS's approach, setting the incidental take limits using a model that does not take current abundance data into consideration, is that historic records reveal " either no, or perhaps a very weak relationship, between juvenile abundance measured by the TNS and adult abundance measured by the FMWT." (Doc. 247 at 5.) This " lack of [a] linear relationship between the two indices, shows that events after the TNS, in late summer and early fall, are probably affecting the number of juveniles that mature into spawners." (Doc. 247 at 6.) From the lack of a linear relationship, San Luis infers that something other than salvage (i.e. entrainment in the pumps) is causing the smelt's decline.[FN31]

The BiOp interprets the data differently:
In a near-annual fish like delta smelt, a strong relationship would be expected between number of spawners present in one year and number of recruits to the population the following year. Instead, the stock-recruit relationship for delta smelt is weak, accounting for about a quarter of the

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variability in recruitment (Sweetnam and Stevens 1993).*This relationship does indicate, however, that factors affecting numbers of spawning adults* (e.g., *entrainment,* toxics, and predation) *can have an effect on delta smelt numbers the following year.*

(AR at 364 (emphasis added).) [FN32] Plaintiffs refer to other record evidence creating doubt that salvage is not a statistically reliable indicator of smelt abundance, including high entrainment events in the early 1980s and other " extreme events," including the El Niño of 1982-83, which caused significant declines in smelt abundance. (AR 8979.)

The BiOp acknowledges that salvage can have an impact on smelt abundance (although the statistical relationship is non-linear). It is arbitrary and capricious for FWS to base take limits on a projection of future salvage calculated without considering the most current or future smelt abundance and without reliable smelt population estimate.

Plaintiffs' motion for summary adjudication is **GRANTED** as to this issue. The BiOp's approach to setting incidental take limits is arbitrary and capricious because it fails to incorporate reliable smelt population data and the most recent information regarding smelt abundance.

3. Plaintiffs' Argument That the Biop Fails to Explain How its No Jeopardy Conclusion Can Be Justified in Light of the Identified Adverse Effects of the Project, along with Indirect and Cumulative Effects.

In formulating a biological opinion, the ESA requires FWS to determine " whether the action, *taken together with cumulative effects,* is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat." 50 C.F.R. § 402.14 (emphasis added). " Jeopardize the continued existence of" means " to engage in an action that reasonably would be expected, *directly or indirectly,* to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 C.F.R. § 402.02 (emphasis added).

***45** The BiOp concludes that the 2004 OCAP will have numerous direct and indirect impacts apart from salvage, including habitat loss, increased vulnerability of Delta smelt to predation, and increased vulnerability to adverse temperature effects. (*See* AR 399, 443-44.) Plaintiffs allege that, although the BiOp lists indirect impacts, it fails to explain how they relate to the potential for jeopardy.

Federal Defendants respond to this allegation with a single paragraph, asserting generally that " the biological opinion considers the effects of dozens of project components, each with a multi-layered analysis," and indicating how many times the topics of predation (18), temperature changes (180 references), life cycle impacts (75 references to the term " juveniles") are discussed in the BiOp. (Doc. 242 at 30.) What Federal Defendants do not do is point to those portions of the BiOp which analyze these issues in *a way that demonstrates why these indirect impacts will not cause jeopardy or how they relate to survival and recovery of the smelt.*A review of the BiOp does not reveal such an analysis.

The State Water Contractors suggest that the DSRAM trigger criteria were designed to address all of the potential impacts identified in the BiOp. (Doc. 241 at 8.) This leaves for future consideration and speculation the impacts events activating DSRAM triggers will have.

a. *Cumulative Impacts.*

Plaintiffs also argue that the BiOp fails to meaningfully address cumulative impacts, " those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." 50 C.F.R. § 402.02. The BiOp highlights a number of predicted cumulative effects:

Any continuing or future non-Federal diversions of water that may entrain adult or larval fish would have cumulative effects to the smelt. Water diversions through intakes serving numerous small, private agricultural lands contribute to these cumulative effects. These diversions also include municipal and industrial uses. State or local levee maintenance may also destroy or adversely modify spawning or rearing habitat and interfere with natural long term habitat-maintaining processes.

Additional cumulative effects result from the impacts of point and non-point source chemical contaminant discharges. These contaminants include but are not limited to selenium and numerous pesticides and herbicides as well as oil and gasoline products associated with discharges related to agricultural and urban activities. Implicated as potential sources of mortality for smelt, these contaminants may adversely affect fish reproductive success and survival rates. Spawning habitat may also be affected if submersed aquatic plants, used a[s] substrates for adhesive egg attachment, are lost due to toxic substances.

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Other cumulative effects could include: the dumping of domestic and industrial garbage may present hazards to the fish because they could become trapped in the debris, injure themselves, or ingest the debris; golf courses reduce habitat and introduce pesticides and herbicides into the environment; oil and gas development and production remove habitat and may introduce pollutants into the water; agricultural uses on levees reduce riparian and wetland habitats; and grazing activities may degrade or reduce suitable habitat, which could reduce vegetation in or near waterways.

***46** (AR 468.) There is no quantitative and qualitative analysis of the potential impact of these cumulative effects on the smelt and its habitat, except to identify the causes, the BiOp concludes without explanation, " [t]he cumulative effects of the proposed action [are] not expected to alter the magnitude of cumulative effects on the above described actions upon the critical habitat's conservation function for the smelt." (*Id.*)

The San Luis Parties argue that FWS's no jeopardy conclusion and impacts analysis is " rationally based on its determination that the proposed future changes will not significantly increase the magnitude of the ongoing Project's potential impacts." (Doc. 247 at 9.) This conclusion is the kind of analysis recently rejected by the Ninth Circuit in *NWF v. NMFS:*

To " jeopardize the continued existence of" means " to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 CFR § 402.02; 16 U.S.C. § 1536(a)(2). NMFS argues that, under this definition, it may satisfy the ESA by comparing the effects of proposed FCRPS operations on listed species to the risk posed by baseline conditions. Only if those effects are " appreciably" worse than baseline conditions must a full jeopardy analysis be made. Under this approach, a listed species could be gradually destroyed, so long as each step on the path to destruction is sufficiently modest. This type of slow slide into oblivion is one of the very ills the ESA seeks to prevent.

Requiring NMFS to consider the proposed FCRPS operations in their actual context does not, as NMFS argues, effectively expand the " agency action" at issue to include all independent or baseline harms to listed species. Nor does it have the effect of preventing any federal action once background conditions place a species in jeopardy. To " jeopardize" -the action ESA prohibits- means to " expose to loss or injury" or to " imperil." Either of these implies causation, and thus some new risk of harm. Likewise, the suffix " -ize" in " jeopardize" indicates some active change of status: an agency may not " cause [a species] to be or to become" in a state of jeopardy or " subject [a species] to" jeopardy. American Heritage Dictionary of the English Language (4th ed.). Agency action can only " jeopardize" a species' existence if that agency action causes some deterioration in the species' pre-action condition.

Even under the so-called aggregation approach NMFS challenges, then, an agency only " jeopardize[s]" a species if it causes some new jeopardy. An agency may still take action that removes a species from jeopardy entirely, or that lessens the degree of jeopardy. *However, an agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm.*

***47** Our approach does not require NMFS to include the entire environmental baseline in the " agency action" subject to review. It simply requires that NMFS appropriately consider the effects of its actions " within the context of other existing human activities that impact the listed species." *ALCOA,* 175 F.3d at 1162 n. 6 (citing 50 C.F.R. § 402.02's definition of the environmental baseline).*This approach is consistent with our instruction (which NMFS does not challenge) that " [t]he proper baseline analysis is not the proportional share of responsibility the federal agency bears for the decline in the species, but what jeopardy might result from the agency's proposed actions in the present and future human and natural contexts."* *Pac. Coast Fed'n,* 426 F.3d at 1093 (emphasis added).

481 F.3d 1224 at *7-8 (emphasis added) (footnote omitted).

Here, the BiOp does not consider the cumulative effects of any future DSRAM actions, which it relies on to avoid jeopardy, nor does it meaningfully relate the most current abundance of the species to future OCAP operations to assess jeopardy. The BiOp unlawfully fails to adequately analyze indirect and cumulative impacts of the 2004 OCAP. Summary adjudication on this issue is appropriate.

E. *Did the BiOp Fail to Adequately Consider Impacts to Critical Habitat?*

Plaintiffs allege that the BiOp fails to adequately consider critical habitat in two respects. First, by failing to analyze the impacts of the 2004 OCAP on the value of critical

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habitat for *the recovery* as opposed to just the survival of the smelt. Second, failure to consider impacts to all of the Delta smelt's critical habitat because it focuses only on X2.

1. Did the BiOp Fail to Consider Whether 2004 OCAP Would Diminish Value of Critical Habitat for Recovery?

The ESA requires FWS to determine whether the 2004 OCAP will destroy or adversely affect Delta smelt critical habitat. 16 U.S.C. § 1536(a)(2).“ Destruction or adverse modification of critical habitat” means “ a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.” 50 C.F.R. § 402.02

Initially, the critical habitat analysis was conducted pursuant to agency regulations that defined adverse modification as:

[A] direct or indirect alteration that appreciably diminishes the value of critical habitat for **both survival *and* recovery** of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.

50 C.F.R. § 402.02 (emphasis added).

Following the issuance of the 2004 BiOp, the Ninth Circuit invalidated the adverse modification regulation, based on its own interpretation of the regulation's language, “ alteration that appreciably diminish the value of critical habitat for both the survival *and* recovery of a listed species,” “ reads the ‘ recovery’ goal out of the adverse modification inquiry.” *Gifford Pinchot,* 378 F.3d at 1069-70.

***48** The Bureau requested that FWS reinitiate consultation on the 2004 OCAP to ensure compliance with *Gifford Pinchot.*The result was the disputed 2005 BiOp, which expressly states that it does not rely on the invalidated regulation. (AR 248.) Rather, the BiOp “ relied on the statutory provisions of the ESA to complete the analysis with respect to critical habitat.” (*Id.*) The ESA defines critical habitat as including “ the specific areas ... occupied by the species ... which are ... essential to the *conservation* of the species” and the “ specific areas outside the geographical area occupied by the species ... that ... are essential for the *conservation* of the species....” 16 U.S.C. § 1532(5)(A). This statutory reference to “ conservation” was the premise for the Ninth Circuit's *Gifford Pinchot* reasoning:

“ Conservation” is a much broader concept than mere survival. The ESA's definition of “ conservation” speaks to the recovery of a threatened or endangered species. Indeed, in a different section of the ESA, the statute distinguishes between “ conservation” and “ survival.” Requiring consultation only where an action affects the value of critical habitat to both the recovery and survival of a species imposes a higher threshold than the statutory language permits

378 F.3d at 1070 (internal citation omitted).

The 2005 BiOp uses the term “ conservation,” rather than “ survival” and/or “ recovery,” several times in connection with its critical habitat analysis. In the “ Critical Habitat Effects” section, the BiOp states that the “ primary constituent elements essential to conservation of the species will not be affected by the proposed project.” (AR 423.) In addition, after discussing critical habitat, including those areas essential to spawning, transport, rearing and migration, the BiOp acknowledges impacts, but explains that after the proposed diversions in the OCAP are implemented “ the primary constituent elements [of critical habitat] essential to the conservation of the species still function.” (*Id.* at 371.)[FN33]What specific effects any DSRAM measures will have on the smelt are not described, nor is there discussion of how the survival and recovery of the smelt will be accomplished.

The Ninth circuit explained in *NWF v. NFMS*, that the agency must conduct a “ full analysis” of risks to recovery.

*The question before us is not whether, on the merits, recovery risks in fact require a jeopardy finding here, but whether, as part of the consultation process, NMFS must conduct a**full analysis**of those risks and their impacts on the listed species' continued existence.*Although recovery impacts alone may not often prompt a jeopardy finding, NMFS's analytical omission here may not be dismissed as harmless: the highly precarious status of the listed fishes at issue raises a substantial possibility that considering recovery impacts could change the jeopardy analysis. The only reasonable interpretation of the jeopardy regulation requires NMFS to consider recovery impacts as well as survival.

***49** 481 F.3d 1224 at *9-*10 (emphasis added).[FN34]

Plaintiffs claim that although the BiOp includes generic promises to consider recovery of the smelt, it does not

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competently analyze nor provide for recovery. Federal Defendants and Defendant Intervenors respond that the BiOp's discussion of critical habitat effects, in conjunction with the BiOp's conclusion that " the smelt's primary constituent elements essential to the conservation of the species [will] still function" (AR 371) under the 2004 OCAP, is a sufficient analysis of the impacts on recovery.

The BiOp's overarching conclusion is that " the smelt's primary constituent elements essential to the conservation of the species [will] still function." In designating critical habitat for a listed species, FWS must " consider those physical and biological features that are essential to the conservation of [the] species and that may require special management considerations or protection." 50 C.F.R. § 424.12. The features that must be considered include, but are not limited to, the following:
1. Space for individual and population growth, and for normal behavior;
2. Food, water, air, light, minerals, or other nutritional or physiological requirements;
3. Cover or shelter;
4. Sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and
5. Habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

Id. The BiOp explained that, in designating critical habitat for the Delta smelt, FWS identified the following primary constituent elements " essential to the conservation of the species" :Physical habitat, water, river flow, and salinity concentrations required to maintain delta smelt habitat for spawning, larval and juvenile transport, rearing, and adult migration.

* * *
Specific areas that have been identified as important delta smelt spawning habitat include Barker, Lindsey, Cache, Prospect, Georgiana, Beaver, Hog, and Sycamore sloughs and the Sacramento River in the Delta, and tributaries of northern Suisun Bay.
Larval and juvenile transport. Adequate river flow is necessary to allow larvae from upstream spawning areas to move to rearing habitat in Suisun Bay and to ensure that rearing habitat is maintained in Suisun Bay. To ensure this, X2 must be located westward of the confluence of the Sacramento-San Joaquin Rivers, located near Collinsville (Confluence), during the period when larvae or juveniles are being transported, according to historical salinity conditions. X2 is important because the " entrapment zone" or zone where particles, nutrients, and plankton are " trapped," leading to an area of high productivity, is associated with its location. Habitat conditions suitable for transport of larvae and juveniles may be needed by the species as early as February 1 and as late as August 31, because the spawning season varies from year to year and may start as early as December and extend until July.
***50** Rearing habitat. An area extending eastward from Carquinez Strait, including Suisun, Grizzly, and Honker bays, Montezuma Slough and its tributary sloughs, up the Sacramento River to its confluence with Three Mile Slough, and south along the San Joaquin River including Big Break, defines the specific geographic area critical to the maintenance of suitable rearing habitat. Three Mile Slough represents the approximate location of the most upstream extent of historical tidal incursion. Rearing habitat is vulnerable to impacts of export pumping and salinity intrusion from the beginning of February to the end of August.
Adult migration. Adequate flow and suitable water quality is needed to attract migrating adults in the Sacramento and San Joaquin river channels and their associated tributaries, including Cache and Montezuma sloughs and their tributaries. These areas are vulnerable to physical disturbance and flow disruption during migratory periods.

(AR 368-69.)

The BiOp acknowledges that this Delta smelt critical habitat has been adversely affected by numerous activities, but indicates that the 1994 and 1995 OCAP BiOps " provide a substantial part of the necessary riverine flows and estuarine outflows that allow smelt larvae to move downstream to suitable rearing habitat ... outside the influence of marinas, agricultural diversions, and Federal and State pumping plant." (AR 371.) The BiOp also explains that increasing demands for surface water " would likely result in lower delta outflows and increased entrainment," but that the impacts of these demands " have not altered critical habitat's conservation function for the delta smelt, and *the smelt's primary constituent elements essential to the conservation of the species still function."* (*Id.*) Finally, the BiOp concludes:
In evaluating the Status of the Species for critical habitat and the Environmental Baseline, while there are current actions that result in adverse effects to delta smelt critical habitat, the primary constituent elements continue to remain functional for the smelt. In the effects section, the Service determined that the primary constituent elements of delta smelt critical habitat would not be affected by the proposed project since there will not be a loss of physical habitat in the delta, river flows will continue to provide habitat, salinity will not be affected by the proposed project, and no breeding habitat will be affected and the

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sustainability of the food base will not be affected. In the cumulative effects section, we determined that the cumulative effects of the proposed action are not expected to alter the magnitude of future actions' effects on critical habitat's conservation function for the smelt. Based on the analysis in these four areas, it is our conclusion that Critical habitat is not likely to be adversely modified or destroyed as a result of implementing the proposed project.

(AR 469 (emphasis added).)

These conclusions are not supported by most recent smelt data to corroborate that the primary constituent elements of Delta smelt habitat will still function in a manner consistent with conservation (i.e.recovery). The functions and their locations are identified, but impacts upon breeding habitat are not analyzed. Second, although " there will still be water in the Delta....whether the water will be of adequate quality and quantity to allow the delta smelt to recover is an entirely different question." (Doc. 306 at 25.) The BiOp does not *analyze* the water supply, temperature, and quality under variable conditions with results that demonstrate the impact on smelt, nor is such an analysis found elsewhere in the administrative record.[FN35]

***51** The analysis of the predicted movement of X2 is more specific. When X2 is located upstream of Chipps Island, smelt are vulnerable to entrainment and are located in an area that is not ideal for feeding or protection. (*See* AR 424.) FWS opines that smelt reproduce better when X2 remains in a specific area, west of the confluence of the Sacramento and San Joaquin Rivers. That smelt reproduction is increased and the fish may be located where there are better sources of food does not assure that the smelt are on a path to *recovery*.The DSRAM is to provide the means by which FWS will maintain X2 in the most beneficial location. As the DSRAM is uncertain, speculative, and lacking enforceable action measures, there is no reasonable assurance that X2 will be maintained in the necessary protective location.

DSRAM utilizes other trigger criteria, arguably aimed at the recovery of the smelt. (Doc. 241 at 13-14.) One criteria is the " recovery index trigger," derived from the September and October FMWT sampling. (AR 347; Sommer Decl. at ¶ 9a.) The number used to trigger the DSWG is 74, the median value of the recovery index for the 1980-2002 period. Whenever the recovery index falls below this median, the DSWG convenes to decide whether to recommend actions. (AR 346-47.) Use of the term " recovery" in the title of the trigger index, suggests that this index will serve to monitor the potential for the smelt population to recover. This title is inaccurate. All that this trigger criteria monitors is whether the abundance of smelt drops below the 1980-2002 median abundance. As smelt have been in decline throughout the period to February 2005, the opinion that maintaining abundance slightly above this median leads to recovery of the smelt is unjustified.

The temperature trigger criterion of 12-18°C, the range within which the *most* smelt spawning occurs, is more arguably focused on recovery. (AR 347.) If the number of days falling within the temperature range is 39 days or less by April 15, or 50 days or less by May 1, DSWG is triggered. This trigger is arguably related to the recovery of smelt, because it focuses on spawning. However, no action except a group meeting is required in response to the trigger. Moreover, maximizing the potential for smelt to spawn is only one aspect of recovery. If Project operations and/or other impacts kill more smelt than are produced during spawning, recovery does not occur. The existence of this trigger, alone, does not establish that recovery of smelt was adequately considered or addressed.[FN36]

2. *The Biop Does Not Adequately Assess Impacts to All Areas of Critical Habitat.*

Plaintiffs also allege that the BiOp arbitrarily ignores impacts to certain areas of critical habitat because it focuses on X2 as a proxy for Delta smelt habitat. Plaintiffs argue that the focus on X2 ignores other areas of designated critical habitat.

The BiOp focuses on the impact project operations have had and will have on the position of X2. Defendants and Defendant-Intervenors argue that critical habitat will be protected, because any impacts to the position of X2 will be addressed by the DSRAM. The State Water Contractors contend that protecting critical habitat outside X2 " makes no sense if they are not the areas in which the fish resides." (Doc. 241 at 17.)

***52** Plaintiffs do not dispute the notion that X2 directly relates to where most smelt are located. Rather, Plaintiffs maintain that critical habitat is not coextensive with X2. The BiOp identifies numerous areas in which smelt occur (AR 362) and acknowledges that X2 " does not necessarily regulate smelt distribution in all years." (*Id.*) Delta smelt critical habitat is defined by physical boundaries:
California-Areas of all water and all submerged lands

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below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the contiguous Grizzly and Honker Bays); the length of Montezuma Slough; and the existing contiguous waters contained within the Delta, as defined by section 12220, of the State of California's Water Code of 1969 (a complex of bays, dead-end sloughs, channels typically less than 4 meters deep, marshlands, etc.) as follows:
Bounded by a line beginning at the Carquinez Bridge which crosses the Carquinez Strait; thence, northeasterly along the western and northern shoreline of Suisun Bay, including Goodyear, Suisun, Cutoff, First Mallard (Spring Branch), and Montezuma Sloughs; thence, upstream to the intersection of Montezuma Slough with the western boundary of the Delta as delineated in section 12220 of the State of California's Water Code of 1969; thence, following the boundary and including all contiguous water bodies contained within the statutory definition of the Delta, to its intersection with the San Joaquin River at its confluence with Suisun Bay; thence, westerly along the south shore of Suisun Bay to the Carquinez Bridge.

59 Fed.Reg. 65,256, 65,277 (Dec. 19, 1994).

Federal Defendants respond that " the agencies have developed an operating and adaptive management system that adequately protects the existing critical habitat, that reasonably uses X2 as an evaluation tool, and that also ensures that ' additional measures' will be taken in accordance with the DSRAM to affirmatively and proactively manage habitat, as needed." (Doc. 242 at 26.) But, apart from the X2 analyses, Federal Defendants identify no other record evidence that reflects the agency *analyzed* impacts to critical habitat or that any " additional measures" will be required under DSRAM, as the DSRAM does not require any measure be implemented.

Defendant Intervenors assert that it is unnecessarily costly to accommodate impacts to all of the geographically designated critical habitats because the smelt are not located in the entirety of their critical habitat range all of the time. They argue the focus must be on protecting the habitat occupied by the smelt. Even if more sensible, the law requires that the agency analyze whether project operations will directly or indirectly alter critical habitat in a way that " appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species." 50 C.F.R. § 402.02. " Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical." *Id.* The statute defines critical habitat to include both " the specific areas within the geographical area occupied by the species ... on which are found those physical or biological features ... essential to the conservation of the species" *and*" specific areas outside the geographical area occupied by the species ... upon a determination by the Secretary that such areas are essential for the conservation of the species." 16 U.S.C. § 1532(5)(A). The definition of critical habitat is broader than the specific areas of occupation.

***53** Here, the agency defined critical habitat to have a geographic scope. Absent any alterations to the critical habitat designation, the agency must address in the BiOp the full extent of impacts to the currently designated critical habitat,[FN37] which excluded " already degraded areas." Alternatively, the Delta smelt's critical habitat should be redefined to reflect the actual location of the smelt, if such redesignation would be consistent with law.

This has not been done. Plaintiffs motion for summary adjudication is **GRANTED** as to this issue.

F. *Did the BiOp Fail to Address the Impacts of the Whole Project?*

1. Plaintiffs' Argument That the Biop Should Have Analyzed the Effects of Constructing the SDIP, Intertie, and FRWP.

Plaintiffs complain that the BiOp's scope is unlawfully narrow because it fails to consider all planned actions. The BiOp includes within its formal consultation, " delivery of CVP water to the proposed Freeport Regional Water Project (FRWP)" as well as the " operation of the SWP-CVP intertie." The BiOp designates as an early consultation issue " operations of components of the South Delta Improvement Program (SDIP)," which include " permanent barrier operations in the South Delta." (AR 248.) The effects of constructing the FRWP, the Intertie, and the permanent barriers are to be covered in separate formal consultations. (AR 256, 339, 341, 421.)

The ESA requires FWS to address impacts associated with the entire agency action. *See* *Conner*, 848 F.2d at 1453-54 (holding that agency violated ESA by choosing not to analyze the effects of all stages of oil and gas activity on federal lands). According to ESA regulations, the effects of an agency action include " direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline." 50 C.F.R. § 402.02. " The meaning of ' agency action' is determined as a

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matter of law by the Court, not by the agency." *Greenpeace II*, 80 F.Supp.2d at 1146 (citing *Pacific Rivers Council v. Thomas*, 30 F.3d 1050, 1054 (9th Cir.1994).)

The BiOp explains its approach to scope as follows:
The proposed action is to continue to operate the CVP and SWP in a coordinated manner. In addition to current day operations, several future actions are to be included in this consultation. These actions are: (1) increased flows in the Trinity River, (2) 8500 Banks, (3) permanent barriers operated in the South Delta, (4) an intertie between the California Aqueduct (CA) and the Delta-Mendota Canal (DMC), (5) a long-term EWA, (6) delivery of CVP water to the FRWP, and (7) various operational changes that are identified in this project description. Some of these items will be part of early consultation including 8500 Banks, permanent barriers and the long-term EWA. These proposed actions will come online at various times in the future. Thus, the proposed action is continued operation of the Project without these actions, and operations as they come online.
***54** The actions listed in the preceding paragraph are not being implemented at present; however, they are part of the future proposed action on which Reclamation is consulting. Only the operations associated with the proposed activities are addressed in this consultation; i.e., the activities do not include construction of any facilities *to implement* the actions. All site specific/localized activities of the actions such as construction/screening and any other site specific effects will be addressed in separate action specific section 7 consultations.

(AR at 256 (emphasis added).) In sum, only those aspects of the 2004 OCAP that will be implemented without further approval were the subject of formal consultation. However, certain other changes that will be effectuated in the future were the subject of early consultation. With respect to future operational changes, including some subject to formal consultation, full implementation will require the construction of specified facilities. The impact of the construction activities themselves will be the subject of separate § 7 consultation.

Plaintiffs argue that the BiOp should have addressed the full impacts of construction of the Intertie, Freport diversion, and the SDIP because those projects are within the scope of the agency action as a whole and are " interrelated and interdependent" with the 2004 OCAP.FN38

In response, Federal Defendants cite the Endangered Species Consultation Handbook, which explains, in a hypothetical example, that operation of an existing dam project need not be considered an interrelated or interdependent activity, where the agency action being evaluated in a biological opinion was the addition of a new turbine to an existing dam.[FN39](Handbook at 4-25 to 4-29.) Although not cited by the Federal Defendants for this purpose, the Handbook also describes a general approach FWS should use when determining whether certain actions are " interrelated or interdependent," so as to be considered part of the action:
Interrelated and interdependent actions: Effects of the action under consultation are analyzed together with the effects of other activities that are interrelated to, or interdependent with, that action. An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. (Note: the regulations refer to the action under consultation as the " larger action" [50 CFR § 402.02]) ....
As a practical matter, the analysis of whether other activities are interrelated to, or interdependent with, the proposed action under consultation should be conducted by applying a " but for" test. *The biologist should ask whether another activity in question would occur " but for" the proposed action under consultation.*If the answer is " no," that the activity in question would not occur but for the proposed action, then the activity is interrelated or interdependent and should be analyzed with the effects of the action. If the answer is " yes," that the activity in question would occur regardless of the proposed action under consultation, then the activity is not interdependent or interrelated and would not be analyzed with the effects of the action under consultation. There will be times when the answer to this question will not be apparent on its face. The biologist should ask follow-up questions to the relevant parties to determine the relationship of the activity to the proposed action under consultation. It is important to remember that interrelated or interdependent activities are measured against the proposed action. That is, the relevant inquiry is whether the activity in question should be analyzed with the effects of the action under consultation because it is interrelated to, or interdependent with, the proposed action. Be careful not to reverse the analysis by analyzing the relationship of the proposed action against the other activity. For example, as cited below, if the proposed action is the addition of a second turbine to an existing dam, the question is whether the dam (the other activity) is interrelated to or interdependent with the proposed action (the addition of the turbine), not the reverse.

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***55** Section 7 Handbook at 4-26.

Here, applying the Handbook test, the question is whether the other activities (construction and operation of SDIP, Freeport, and the Intertie) are interrelated to or interdependent with the proposed actions subject to formal consultation? The formal consultation, as described in the BiOp, covers

... the proposed 2020 operations of the CVP including the Trinity River Mainstem ROD (Trinity ROD) flows on the Trinity River, the increased water demands on the American River, the *delivery of CVP water to the proposed Freeport Regional Water Project (FRWP),* water transfers, the long term Environmental Water Account (EWA), the operation of the Tracy Fish Facility, and *the operation of the SWP-CVP intertie.* The effects of operations of the SWP are also included in this opinion and include the operations of the North Bay Aqueduct, the Suisun Marsh Salinity Control Gates, the Skinner Fish Facility and water transfers.

(AR 248 (emphasis added).) The formal consultation admittedly covers *delivery* of CVP water to the proposed FRWP and operation of the Intertie. But, the BiOp expressly excludes the impacts of construction associated with FRWP or the Intertie:The actions listed in the preceding paragraph [including permanent barriers in the South Delta, an intertie, and the FRWP] are not being implemented at present; however, they are part of the future proposed action on which Reclamation is consulting. *Only the operations associated with the proposed activities are addressed in this consultation; i.e., the activities do not include construction of any facilities to implement the actions.* All site specific/localized activities of the actions such as construction/screening and any other site specific effects will be addressed in separate action specific section 7 consultations.

(AR 256 (emphasis added).)

Is there a " but-for" relationship between the 2004 OCAP and the new projects? The FRWP and the Intertie are designed to more effectively distribute CVP and SWP waters. There is no evidence in the record indicating that construction of either project is tied in any way to the pre-approval of delivery of water to the projects. Flow operations could be approved *after* or simultaneously with the approval of new construction. Under the Handbook test, the construction projects are not considered interdependent and interrelated. These projects may be consulted upon separately. By approving a flow regime before the construction, the Bureau may plann for the *possibility* that the FRWP will be constructed in the future. The entire OCAP BiOp would not need to be revised should the projects be constructed. This is a reasonable approach.

With respect to the SDIP, the BiOp currently excludes *both* its operation and related construction coverage under the formal consultation. Plaintiffs allege that *both* should have been covered by the BiOp because they are interrelated with or interdependent on the agency action. Applying the Handbook analysis, the operation and construction of the SDIP (which includes increased pumping at Banks and operation of permanent barriers) will not occur " but for" the approval of the 2004 OCAP for CVP-SWP operations? Each action is independent of the 2004 OCAP. The SDIP is a separate addition that may or may not be constructed. Project operations under the 2004 OCAP in no way depend upon the SDIP. There is no prohibition to addressing the future operation, if and when the construction of the SDIP will occur, in a separate consultation.

***56** Plaintiffs' motion for summary adjudication is **DENIED** as to the future projects issue.

2. Plaintiffs' Argument that the BiOp Failed to Analyze the Impact of Full Contract Deliveries.

A biological opinion must consider the effects of the entire agency action, meaning " all activities or programs of any kind authorized, funded, or carried out," including " the granting of ... contracts." 50 C.F.R. § 402.02. One of the primary purposes of the 2004 OCAP is to " deliver water supplies to affected water rights holders as well as project contractors." (AR 259.) The Bureau delivers water to numerous parties pursuant to long-term contracts (" CVP Contracts"), some of which were renewed shortly after the BiOp was issued. (AR 4732, 4796, 4855.)

The CALSIM II model incorporated water deliveries into its various flow scenarios, but only performed its analysis based on the effects of delivering between 11 and 89 percent of the full CVP Contract allocations. (*See* AR 1067; see also Doc. 242 at 31 (acknowledging that the agency " did not evaluate the impacts of 100% percent delivery of all contracted waters").) This range of delivery scenarios is based on historic average water deliveries.

Plaintiffs allege that, by failing to evaluate the impact of delivering full amount (100%) of contracted water, the BiOp violates the requirement that the it evaluate the entire agency action. Plaintiffs cite *Rodgers,* 381

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F.Supp.2d at 1237-40, which examined a biological opinion approving long term water contracts in the Friant, Buchanan, and Hidden water units of the CVP. The BiOp only examined the impacts of the amount of historical water deliveries, which amounted to less than half of the water deliveries authorized under the long term water service contracts. *Id.* at 1237-28.
The Friant long-term contracts cumulatively authorized the Bureau to deliver more than 2.1 million acre-feet of water per year, for twenty-five years. Rather than analyzing the effects of 2.1 million acre-feet of water delivery, FWS explained that its " effects analysis is conducted under the expectation that water will be delivered to CVP service contractors in quantities that approximate historic deliveries (1988 through 1997), as given in Appendix D of the November 21, 2000 programmatic long-term CVP contracts consultation." This assumption was made, the BiOp explained, because " delivery of full contract quantities is unrealistic."

Id. at 1238. *Rodgers* rejected FWS's approach, reasoning that the " ESA requires that all impacts of agency action-both present and future effects-be addressed in the consultation's jeopardy analysis." The fact that it was thought by FWS that " delivery of full contract quantities is unrealistic" and that " deliveries continue to be impacted by existing climate, hydrology, actions and statutes, ... socio-economic factors" does not excuse consulting on the " entire agency action," which was the authorized delivery of over 2.1 million acre-feet of water, and nothing less than that.

***57** *Id.* at 1239.

Federal defendants assert that the *Rodgers* decision was wrong, arguing that " [a]bsent alternative information that the agency failed to consider, and given the fact that the agency did use the best available information, the *Rodgers* court should have deferred to the agency." (Doc. 242 at 32.) It is not the province of another district court to decide whether *Rodgers* is " wrong." *Rodgers* is distinguishable as it specifically addressed the government authorization of CVP water users' long-term water service contracts. Those contracts authorized 2.1 MAF of water deliveries in total. *Rodgers* found unlawful the biological opinion's limitation in its scope to approximate historic deliveries, instead of the full contract allocations. Here, however, the agency action subject to consultation is not the authorization or merits of the water service contracts, rather, it is the *operation* of the CVP and SWP under the OCAP and whether those projected operations will cause jeopardy to the survival and recovery of smelt or smelt habitat. The government is entitled to make *reasonable* assumptions about the operational volume of water flows, water levels, temperature, and quality based on the historical and projected data in the administrative record. The BiOp explains that the delivery of full water service contract entitlements is expected only when excess water conditions exist, i.e., in a wet water year when sufficient water is available to meet all beneficial needs. (AR 259.) Plaintiffs do not suggest that this assumption is factually impossible. (Nor would it be unreasonable for FWS to model a full (100%) water contract delivery scenario, even if it has not happened in the past fifteen years.) The agency model for the worst case scenario is indispensable. Analysis of a " best of the best" case in a wet water year is not indispensable, as such " wet" water year conditions do not present any reasonable likelihood of jeopardy, absent an additional showing. However, because such a scenario could eventuate, it is not unlawful for the agency to analyze the effects on the smelt of 100% water contract deliveries. However, the 100% delivery analysis is not required. This is a matter committed to the agency's expertise and discretion.

Plaintiffs motion for summary adjudication is **DENIED** as to this issue.

As the history of the many CVP water cases decided in this court evidences, the duty to defer to the agency's expertise is well recognized and honored, when the agency has acted reasonably and lawfully to discharge its statutory responsibilities. The disputed BiOp depends in material measure for its no jeopardy finding on the DSRAM, which is legally insufficient. The agency's recognition the Delta smelt is increasingly in jeopardy; that its operative BiOp is inadequate, as evidenced by its second initiation of reconsultation for the 2004 OCAP, now pending, and its insistence that it will nonetheless operate the Projects under the challenged BiOp is unreasonable. The agency could have, but did not, offer a viable protective alternative. Adaptive management is within the agency's discretion to choose and employ, however, the absence of any definite, certain, or enforceable criteria or standards make its use arbitrary and capricious under the totality of the circumstances.

***58** The agency's failure to reasonably estimate the Delta smelt population and to analyze most recent smelt abundance data make the take limits based on historical data unreliable and unreasonable. The Delta smelt is undisputedly in jeopardy as to its survival and recovery. The 2005 BiOp's no jeopardy finding is arbitrary, capricious, and contrary to law.

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For all the reasons set forth above, the 2005 OCAP BiOp is unlawful and inadequate on the following grounds:
(1) The DSRAM, as currently structured, does not provide a reasonable degree of certainty that mitigation actions will take place, even if the agency retains the discretion to draw upon numerous sources of water, not just the EWA, CVPIA(b)(2), and VAMP programs, to support fish protection.
(2) The agency failed to utilize the best available scientific information by not addressing the 2004 FMWT data and the issue of climate change.
(3) The BiOp's historical approach to setting take limits fails to consider take in the context of most recent overall species abundance and jeopardy.
(4) The BiOp did not adequately consider impacts to critical habitat by (a) failing to analyze how project operations will impact the value of critical habitat for the recovery of the smelt and (b) failing to consider impacts upon the entire extent of known smelt critical habitat.

The Plaintiffs' motions for summary judgment are GRANTED IN PART AND DENIED IN PART, as delineated above.

Based on the legally flawed BiOp, an appropriate interim remedy must be implemented. All parties agree that it is not prudent to impose a remedy without further input from the parties. A separate remedies hearing will be scheduled within thirty days at the parties' mutual convenience.[FN40]During oral argument, Federal Defendants and Defendant-Intervenors jointly requested a stay of any order finding the BiOp unlawful to avoid the draconian consequences of operating the CVP-SWP without a lawful take limit. Affording all parties the opportunity to participate in a remedies hearing will not jeopardize the species or the public interest during interim operation of the projects. Plaintiffs did not object to such an approach.

A Scheduling Conference is set for May 30, 2007, at 8:45 a.m. in Courtroom 3 to afford the parties time for discussions to set a remedies hearing, and to consider the entry of a stay, if necessary.

Plaintiffs shall submit a form of order on the motions for summary judgment consistent with this decision within five (5) days following service of this decision.

IT IS SO ORDERED.

FN1. The Delta smelt was listed as a threatened species under the ESA, March 5, 1992, 58 Fed.Reg. 12863.

FN2. The biological opinion was first issued in July 2004. Then, after reconsultation, was reissued in February 2005.

FN3. All " AR" references are to the administrative record provided by the U.S. Fish and Wildlife Service..

FN4. Whether the 2004 OCAP is a " final agency action" for the purposes of the National Environmental Policy Act is at issue in a related lawsuit, *Pacific Coast Federation of Fishermen's Associations v. Gutierrez*, 1:06-cv-00245 OWW (TAG) (" *PCFFA*"). This overview of the OCAP does not prejudge the merits of the pending motion to dismiss in *PCFFA*.

FN5. The OCAP itself does not plan for increased pumping or the construction or operation of any new facilities, nor does it describe or model flow regimes under any of these future plans. These planned operational changes are set forth in the BA and the BiOp. (*See* AR 381-423 (describing the effects of those actions included in formal consultation, including re-operation of the Trinity River, increased demands on the American River, operation of the Freeport Regional Water Project (" FRWP"), and operation of an intertie between the Delta-Mendota Canal and the California Aqueduct); AR 357-61 (describing the " items for early consultation," including operation of components of the South Delta Improvement Project, which calls for pumping at Banks to increase to 8500 cfs, operation of permanent barriers in various places within the Delta, the operation of a long term EWA, the use of CVP/SWP capacity to facilitate expanded water transfers, and further integration of CVP/SWP operations.)

FN6. The first step in the consultation process is usually the preparation of a Biological Assessment (" BA") by the action agency (in this case, the Bureau), the purpose of which is to " evaluate the potential effects of the action on listed [ ] species and designated [ ] critical habitat and determine whether any such species or habitat are likely to be adversely affected by the action...." 50 C.F.R. § 402.12(a). In this case, the Bureau issued its BA regarding the " Long-

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Term Central Valley Project and State Water Project Operations and Criteria Plan" on June 30, 2004. (AR 729.) The BA describes the project on which consultation is being held, both early and formal, in much the same terms as are used in the BiOp.

FN7. Prior to 2004, the OCAP operated under Biological Opinions issued in 1993 and 1995.

FN8. Pelagic fish live in open water, generally away from vegetation or the bottom. (AR 365.) A significant amount of the smelt's habitat are the Delta waters and waters of surrounding areas.

FN9. The BiOp contradictorily acknowledges that " although salvage is used to index delta smelt take, it does not reliably index delta smelt entrainment." (AR 419.)

FN10. These " hard" take limits, as the Defendants and Defendant Intervenors referred to them during oral argument are different from a separate take trigger that is part of the DSRAM process described below.

FN11. DWR insisted during oral argument that the data used to run the CALSIM II models was not " salvage" data but was rather " density data." The BiOp is explicit that the models were run using a " salvage density" estimate generated from periodic samplings of salvaged fish.

FN12. The information contained in these tables was derived by the court from the BiOp but was not presented in this form in the BiOp.

FN13. The tables at pages 414 and 419 of the AR do not list the absolute number of smelt estimated to be taken in any given month under the 1995 regulatory base case (Study No. 1). However, the incidental take limits (set forth in the Table 3 below) were based on the absolute numbers of smelt that are projected to be taken under Study No. 5a. For example, the take limit for the month of May in a Critically Dry year, set at 30,500, under the CALSIM II results in a reduction of the 30,500 to 18,921 (representing 11,652 reduction in CVP salvage plus 7,269 reduction in SWP salvage) *lower* than the 1995 regulatory base case.

FN14. The DSRAM also includes a chart illustrating when during the year each of these actions will be available. (AR 346.)

FN15. In a footnote at the end of Plaintiffs' motion to strike the Sommer Declaration, Plaintiffs also challenge Federal Defendants' reliance on the declaration of Ann Lubas-Williams, which Federal Defendants filed with their response to Plaintiffs' motion for summary judgment/cross motion to dismiss. (*See* Doc. 242-4.) The Lubas-Williams declaration concerns the implementation of DSRAM and the sources from which DWR plans to obtain water to protect Delta smelt in the near future. Federal defendants relied on her declaration primarily to support their motion to dismiss or for voluntary remand. No party has relied upon this declaration in the context of the pending motions; it was not considered by the court. It is unnecessary to rule on this motion to strike.

FN16. Federal Defendants also cite *Pension Benefit Guar. Corp. v. LTV Corp.*, 496 U.S. 633, 654-655, 110 S.Ct. 2668, 110 L.Ed.2d 579 (1990), in which the Supreme Court reasoned: " Here, unlike in *Overton Park*, the Court of Appeals did not suggest that the administrative record was inadequate to enable the court to fulfill its duties under § 706."
Federal Defendants quote *Pension Benefit* entirely out of context. The quoted language is drawn from a part of the opinion addressing the Second Circuit's ruling about the adequacy of *procedures* used by the defendant agency. Specifically, that court ruled that the agency acted arbitrarily and capriciously because it failed to apprise the plaintiff of the material on which it was to base its decision, never gave plaintiff an adequate opportunity to offer contrary evidence, failed to proceed according to ascertainable standards, and failed to provide plaintiff a statement showing its reasoning. *Id.* at 653.One party claimed that *Overton Park* validated a court's order that an agency undertakes additional procedures.*Id.* The Supreme Court rejected this argument, reasoning that, at most, *Overton Park*" imposes a general ' procedural' requirement of sorts by mandating that an agency take whatever steps it needs to provide an explanation that will enable the court to evaluate the agency's rationale at the time of decision." *Id.* at 654.The Supreme Court then

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distinguished *Overton Park*, reasoning that " [h]ere, unlike in *Overton Park*, the Court of Appeals did not suggest that the administrative record was inadequate to enable the court to fulfill its duties under § 706." *Id.* at 655.This was a specific reference to language in *Overton Park* which criticized the lower courts for relying only on the litigation affidavits, rather than the whole administrative record. *Pension Benefit* sheds absolutely no light on the admissibility of extra-record evidence.

FN17. At least one district court has followed the holding in *American Rivers.See NRDC v. Rodgers,* 381 F.Supp.2d 1212, 1230 (E.D.Cal.2005).

FN18.*Rumsfeld* also found fault with the biological opinion's monitoring plan, characterizing it as a means of delaying the implementation of necessary mitigation measures:
The Army may not delay identifying the measures necessary to mitigate the effects of its ten-year plan based on the monitoring provisions in the Final BO....
The Final BO's monitoring requirements do not measure the success or failure of the on-base and/or regional mitigation measures to reduce the groundwater deficit. It only requires the Army to develop " a monitoring program designed to assess progress," and requires an annual review of the AWRMP, as to which projects have been implemented the past year and which are to be implemented in the coming year. Especially since the Final BO and the AWRMP fail to quantify the remedial value of the proposed projects, simply reporting project implementation is not a meaningful assessment of the success or failure of the mitigation measures in protecting the water umbel, willow flycatcher, and critical habitat from adverse impact. Such an assessment would require systematic monitoring of either San Pedro baseflows or the groundwater aquifer.
198 F.Supp.2d at 1154 (internal record citations omitted). No such failure is alleged here. Plaintiffs do not suggest that the monitoring called for by the DSRAM is flawed.

FN19. In *NWF v. Babbit,* the district court expressly approved the design of the HCP as a whole, but invalidated the permit issued in connection with the plan on grounds wholly independent from the design of the HCP and/or the adaptive management plan. *See 128 F.Supp.2d* at 1298-99.

FN20. The only clearly enforceable standard or benchmark in the BiOp is compliance with the BiOp's " hard" take exceedence limits. But, the existence of enforceable take limits does not shield the DSRAM from scrutiny. There is no provision to allow the " hard" take exceedence limits to be adjusted to reflect new information about the species. Moreover, the BiOp expressly recognizes that the take limits alone are not enough to prevent jeopardy, requiring, among other things, implementation of the DSRAM as a reasonable and prudent measure. (*See* AR 475 (" The Project shall be implemented as described.") This is exactly the reason why the DSRAM must be made more certain and enforceable.

FN21. As of the date of oral argument, the mandate has not yet issued in *NWF v. NMFS.*

FN22. Plaintiffs cite another district court decision that applied the benefit of the doubt language: " To the extent that there is any uncertainty as to what constitutes the best scientific information, Congress intended for the agency to ' give the benefit of the doubt to the species.' " *Ctr. for Biological Diversity v. Bureau of Land Mgmt.,* 422 F.Supp.2d 1115, 1127 (N.D.Cal.2006) (citing *Conner,* 848 F.2d at 1454). However, that district court did not apply the " benefit of the doubt" concept in its analysis in any way, let alone as a presumption governing the agency's analysis of scientific information.
Another case Plaintiffs cite, *Rock Creek Alliance v. U.S. Fish & Wildlife Service,* 390 F.Supp.2d 993, 1003 (D.Mont.2005), does not support imposing a " benefit of the doubt" presumption to uncertain scientific evidence:
Though the agency has discretion to make decisions based in its expertise, the ESA expresses a legislative mandate " to require agencies to afford first priority to the declared national policy of saving endangered species.... Congress has spoken in the plainest of words, making it abundantly clear that the balance has been struck in favor of affording endangered species the highest of priorities, thereby adopting a policy which it described as ' institutionalized

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caution.' "
Id. (quoting *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 185, 98 S.Ct. 2279, 57 L.Ed.2d 117 (1978)). However, as in *Center for Biological Diversity*, this language was part of a general discussion of the legal framework; the *Rock Creek* court never applied a benefit of the doubt presumption in the manner Plaintiffs suggest it should be applied here.

FN23. Defendants and Defendant-Intervenors dispute whether the data " evoked grave concern." The degree of concern is irrelevant to the inquiry, as it is undisputed that the 2004 FMWT data showed the lowest smelt abundance on record.

FN24. The State Water Contractors maintain that CVP/SWP operations have been on-going for decades, during which time Delta smelt abundance has fluctuated greatly.

FN25. Plaintiffs' record citations, AR 9199-9202, are print-outs of the FMWT data which post date the issuance of the BiOp.

FN26. Abundance data is relevant to aspects of the BiOp that are independent of the DSRAM process. For example, the agency's conclusion that the level of anticipated take " is not likely to result in jeopardy to the smelt because this level of take is at or below historical levels of take" (AR 474), is irrational because no consideration is given to the current decline in smelt abundance nor any explanation provided how the further decline of the smelt does not exacerbate jeopardy to the species' survival and recovery.

FN27. Plaintiffs argue that " [r]egardless of the uncertainty involved in predicting the consequences of climate change, FWS had an obligation under the ESA to address the probable effects on Delta smelt." (Doc. 232 at 7.) In response, the State Water Contractors quote the following passage from *Bennett v. Spear*, 520 U.S. 154, 176-177, 117 S.Ct. 1154, 137 L.Ed.2d 281 (1997), in support of the proposition that the ESA intended to preclude exactly this kind of argument:
The obvious purpose of the requirement that each agency " use the best scientific and commercial data available" is to ensure that the ESA not be implemented haphazardly, on the basis of speculation or surmise. While this no doubt serves to advance the ESA's overall goal of species preservation, we think it readily apparent that another objective (if not indeed the primary one) is to avoid needless economic dislocation produced by agency officials zealously but unintelligently pursuing their environmental objectives.
But, this passage from *Bennet* was part of a broader discussion holding that persons who are economically burdened by a decision made under the ESA fall within the zone of interests the statute protects for the purposes of standing. *Bennet* sheds little light on the current inquiry-whether and to what extent the data that was before the FWS regarding climate change should have been considered and addressed in the BiOp.

FN28. There is no basis to determine what weight FWS should ultimately give the climate change issue in its analysis.

FN29. There is no recognized mechanism for introducing any population viability data, collected through the adaptive management process, into the setting of the take limits.

FN30. The San Luis Parties mischaracterize Plaintiffs argument as a request for FWS to undertake additional research projects. (Doc. 247.) Defendant Intervenors are correct that FWS is not required to undertake new research, *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1335 (9th Cir.1992) (agency may proceed despite uncertainty about accuracy of modeling effort); Southwest Ctr for Biological Diversity, 215 F.3d 58, 60 (D.C.Cir.2000) (agency could rely on inconclusive data to make decision; not obligated to conduct new independent studies). Plaintiffs do point out that FWS acknowledges in the AR that an accurate determination of non-jeopardy would require knowledge of how many smelt existed, what proportion would be lost due to the projects, and what level of loss would be sustainable. (Doc. 232 at 23 (citing AR 8221).) However, the crux of Plaintiffs' concern is that FWS has not developed such population data and ignored important existing data on abundance in setting the take limits.

FN31. The Administrative Record reflects various explanations for the lack of a linear relationship between the TNS and the FMWT.

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(AR 1025-26.) One possible explanation for why the number of spawning age smelt (indexed by the FMWT) seems to be a poor predictor of subsequent offspring (indexed by the TNS) is that there is some environmental factor (not directly related to entrainment at the projects) limiting survivability, inferring that there is a carrying capacity for the population. (*Id.*) Alternatively, some scientists question whether it is proper to try to draw statistical conclusions from the entire 1969-2002 data pool, given that the smelt experienced a precipitous decline in 1981. These scientists have postulated that the data " may reflect two different relationships from two time periods with different delta smelt carrying capacities." (*Id.* at 1026.)One study cited in the AR indicates that food supply may be the limiting factor during this time period. (AR 8976.)

FN32. The San Luis Parties raise numerous questions regarding FWS's conclusion that there is a statistical relationship between the numbers of spawning adults and Delta smelt abundance the following year, criticizing the statistical analyses referenced in the BiOp. (Doc. 247 at 5.) It is unnecessary to adjudicate these issues, as the San Luis Parties have not separately challenged the conclusions reached in the BiOp on this ground nor have they moved for summary judgment on any issue in this case.

FN33. Defendant-Intervenors argue that, because of these mentions of " conservation," FWS is entitled to a " presumption of regularity," and the court must *assume* that agency considered recovery. (Doc. 247 at 12.) In *Gifford Pinchot,* after invalidating the destruction and adverse modification regulation, the Ninth Circuit considered whether it should presume that the agency followed its own regulation that was valid at the time the biological opinion was issued. The Ninth Circuit concluded that, because the agencies must be afforded a " presumption of regularity," a court must assume that the agency followed the then applicable regulation.*Id.* at 1072.Applying this presumption here, given that the agency specifically applied the statute, not the invalid regulation, there is no evidence the agency applied an invalid regulation. However, Defendant-Intervenors' suggestion that the presumption should be applied to validate the BiOp's *analysis* of recovery is misplaced. The agency still has an obligation to thoroughly consider the issue of recovery and to reach a reasoned conclusion based on the evidence in the administrative record.

FN34. Although this portion of *NWF v. NMFS* concerned analysis of recovery in the context of the " no jeopardy" determination, as opposed to the " destruction or adverse modification of critical habitat" analysis, the holding is equally applicable to habitat jeopardy.

FN35. There is also merit to Plaintiffs' argument that " [g]iven that the very same sorts of impacts to critical habitat have contributed to the species decline, one might expect FWS to examine carefully how the continuance and magnification of these kinds of impacts could allow for the survival of the species, much less its recovery." (Doc. 306 at 5.)

FN36. The San Luis Parties correctly note that the CALSIM II models indicate that increased pumping capacity and operational flexibility may actually *increase* the smelt's prospects vis-a-vis the regulatory baseline. However, that the species will fare better than in the past does not assure that the totality of OCAP operations are consistent with the smelt's recovery.

FN37. Plaintiffs raise an additional contention why the critical habitat analysis is insufficient; i.e., that the BiOp unlawfully " writes off" areas of critical habitat because they have already been degraded. For example, the BiOp concludes that " [a]n upstream movement of X2 of 0.5 km would not be significant when [X2] is located upstream of the [Sacramento-San Joaquin River] confluence because *smelt habitat is already poor* and the upstream movement does not result in any substantial additional loss of habitat or increase in adverse effects." (AR 443.) This issue need not be reached, as the critical habitat analysis is insufficient on other grounds. Federal Defendants are already revising the BiOp to reflect new information and new law.

FN38. The San Luis Parties cite *Gifford Pinchot* in support of the proposition that this is a properly " tiered" biological opinion. *In Gifford Pinchot,* the Ninth Circuit approved for the the tiering of a biological opinion for timber harvests

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in specified forest areas. The no jeopardy conclusion contained in that biological opinion relied on compliance with a very thorough, overarching forest management plan that was previously approved by the court. 378 F.3d at 1067-68. *Gifford Pinchot* allowed the agency to tier its BiOp of a timber harvest with a programmatic forest management plan that provided guidelines regarding the harvesting of timber. *Rodgers,* 381 F.Supp.2d at 1228 n. 27, interpreted the holding narrowly to apply tiering only to cases in which the programmatic opinion was particularly thorough. Tiering of future construction projects is not appropriate here, because the BiOp provides no programmatic guidelines regarding construction activities. However, just because the later projects cannot be " tiered" off the current BiOp does not mean they must be included in the current BiOp. The relevant inquiry is whether the construction projects are interrelated to and/or interdependent upon the BiOp and the 2004 OCAP.

FN39. Federal Defendants correctly point out that the FWS uses as a guidance document the ESA Section 7 Consultation Handbook (March 1998), available at " http:/ / www.fws.gov/endangered/consultations/s7hndbk /s7hndbk.htm" (last visited Apr. 27, 2006).*See e.g.*, *Oregon Natural Res. Council v. Allen,* 476 F.3d 1031, 1039 n. 7 (9th Cir.2007); *Ariz. Cattle Growers' Ass'n v. U.S. Fish & Wildlife Serv.,* 273 F.3d 1229 (9th Cir.2001).

FN40. The parties stated that they may be able to reach an agreement as to interim remedies, avoiding the need for a remedies hearing.

E.D.Cal.,2007.
Natural Resources Defense Council v. Kempthorne
--- F.Supp.2d ----, 2007 WL 1577896 (E.D.Cal.)

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APPENDIX C

Air Quality

Santa Clarita Subregional Analysis
November 2004

SANTA CLARITA SUBREGIONAL ANALYSIS

NOVEMBER 2004

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

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EXECUTIVE SUMMARY

Background on Subregional Analysis

The overall blueprint for attainment strategy in the greater South Coast basin is the Air Quality Management Plan (AQMP). The AQMP assesses and addresses regional air quality as a macrocosm. Since 2002, as part of SCAQMD's ongoing Environmental Justice program, the SCAQMD Governing Board has also asked staff to carry out one or more "subregional analyses" each year, as "mini-AQMP" microcosms.

A subregional analysis seeks to identify disproportionate air quality impacts in a specific geographic area, and if found, to address and mitigate these impacts. Thus far, the following subregional analyses have been requested by the Board, all involving potentially disproportionate exposure to unhealthful emissions: Mira Loma (concern: diesel exhaust from large clusters of truck warehouse facilities); the Alameda Corridor (concern: diesel exhaust from port operations, the freight rail expressway, associated rail yards, and on-road trucks); and in this report, the Santa Clarita Valley (concern: transported ozone and potential increases in fugitive dust and diesel exhaust emissions stemming from proposed aggregate mining and gravel hauling operations).

In 2003, SCAQMD's Santa Clarita Valley monitoring station recorded the highest official 1-hour ozone reading in Los Angeles county (a maximum concentration of 0.194 parts per million [ppm]). Ozone concentrations in Santa Clarita exceeded the federal 1- and 8-hour standards of 0.12 and 0.08 ppm on 35 and 69 days respectively.

In the spring of 2004, the SCAQMD Governing Board directed that the District provide an expanded analysis of subregional air quality, beyond that presented in the AQMP, to examine and assess several air quality issues confronting the Santa Clarita Valley. In response to this direction, an analysis has been conducted to discuss the observed air quality, the contributing factors to recent trends and to assess the roles of local emissions and pollution transport in relationship to the observations. In addition, the analysis attempts to characterize the potential impacts of development in both the residential sector and in the industrial sector as represented by the development of the Soledad Canyon Sand and Gravel Mining Project (Cemex/Transit Mixed Concrete, Inc. [Cemex/TMC]). The results of the analysis are grouped into three categories: observed ambient air quality (ozone and PM10/PM2.5), simulated ozone and PM10 impacts from future development of available land parcels in the valley, and potential toxic risk from diesel soot emissions associated with the in-situ mining and gravel hauling operations from the Cemex/TMC project.

Ozone and PM10 Air Quality (Sections 2 and 3):

- Santa Clarita does not meet the federal and California ozone air quality standards.

- The recent increase in the number of days exceeding the federal 1-hour ozone standard has been impacted mostly by weather and the movement of the monitoring station location (the old site was unsuitably impacted by local emissions);

- The city can experience a 50 part per billion (ppb) gradient of ozone concentrations from west to east on smoggy days;

- The highest PM10 concentrations in the Santa Clarita Valley are observed in the City of Santa Clarita near the Interstate 5 (I5) and State Route 14/Antelope Valley (SR-14) freeways;

- Transport from the San Fernando Valley and Los Angeles dominates both local ozone and particulate air quality;

- Santa Clarita emissions contribute about 2 percent to local ozone impact;

- Local particulate emissions contribute about 10 percent to the annual average observed PM10 concentration;

- Weekend ozone concentrations under average wind transport conditions are approximately 23 percent higher than weekdays; and

- Santa Clarita meets federal PM10 standards but exceeds the more restrictive California standard.

Impacts from Future Development (Sections 3, 4 and 5)

- Doubling of motor vehicle emissions in the city of Santa Clarita will have a nominal impact to local PM10 and no impact to local ozone;

- When simultaneous 25-year build-out of all recorded, pending and approved land parcels in the city and county portions of the valley is assumed, simulated annual PM10 concentrations are projected to increase up to 5 micrograms per cubic meter ($\mu g/m^3$);

- The maximum regional annual average PM10 impact is projected to occur near Newhall Ranch;

- The annual average regional impact due to the development of the Cemex/TMC facility is projected to result in an increase of up to 3 $\mu g/m^3$, in the immediate area surrounding the mine;

- A focus point source analysis of the Cemex/TMC mine projected an annual PM10 impact of up to 16 $\mu g/m^3$ (at the fence line of the facility); and

- Future development would not cause violations of the federal annual average PM10 standard but could cause possible violations of the state standard.

Toxic Risk Analyses (Section 6)

- The MATES II regional toxic risk study estimated an average risk of 500 in one million for the City of Santa Clarita;
- By comparison, the average toxic risk for the South Coast Air Basin (Basin) is approximately 1,400 in one million;
- In general, simulations using a Gaussian model in the Basin are conducted using the urban meteorological assumption. Due to its unique topography, the Santa Clarita Valley was simulated using both the urban and rural meteorological assumptions to bound the analysis;
- Model-simulated maximum risk to the city of Santa Clarita from diesel emissions associated with mining and hauling operations from the Cemex/TMC project ranges from 10 to 25 in one million, dependent upon the meteorological profile: urban or rural, respectively;
- The northeast portion of the city adjacent to the SR-14 and Soledad Canyon Road split would experience the greatest impact; and
- The maximum risk to a sensitive receptor (school) ranges from 7 to 20 in one million, dependent upon the meteorological profile: urban or rural, respectively.

The City of Santa Clarita through its air quality element has instituted many air pollution mitigation measures and is considering additional options. This analysis concludes by providing selected potential mitigation measures (**Section 7**) that address fugitive dust issues and emissions from diesel mobile sources.

1.0 INTRODUCTION

At its August 2003 meeting; the Governing Board of the South Coast Air Quality Management District (District) adopted the 2003 revision to the Air Quality Management Plan (AQMP) for the South Coast Air Basin (Basin). The 2003 AQMP, which has since been forwarded to the California Air Resources Board (CARB), and approved for inclusion in the California State Implementation Plan (SIP), is the region's blueprint towards clean air. The AQMP provides regional characterization of the air quality problem and proposes the development of specific emissions control measures and rule implementation schedules to meet clean air goals. While the AQMP details the road map to regional attainment of all air quality standards, it is not directly focused on the subregional or localized air quality impacts that affect individual communities.

The City of Santa Clarita has requested that the District conduct an expanded analysis of subregional air quality, beyond that presented in the AQMP, to exam and assess several air quality issues confronting both the city and its sphere of influence, the Santa Clarita Valley. The city and valley are both rapidly developing. The community is developing a subregional plan "One Valley, One Vision," which defines the goals of growth and development for the incorporated and unincorporated cities of the valley while maintaining a high quality of life. As part of this planning effort, the city has requested that the District provide answers to key issues that are intimate to the local area. These included:

- Characterizing and evaluating the observed ozone and particulate air quality

  - trends;
  - impact of local emissions; and
  - and what is termed the "weekend effect".

- Evaluating the impact of potential development growth on air quality

  - through increased mobile source emissions; and
  - by simulating the valley build-out .

- Evaluating the impact of proposed Cemex/TMC mining operations.

- Providing potential mitigation measures.

2.0 BACKGROUND

The city of Santa Clarita (Figure 2-1) is located approximately 35 miles northwest of central Los Angeles, with its southern boundary abutting the northern portion of the San Fernando Pass. The majority of the city resides between Interstate 5 and State Routes 126 and 14. The size of the city accounts for roughly 25 percent of the 200-square mile Santa Clarita Valley.

The estimated population of Santa Clarita in 2003 was approximately 163,000 with an estimated total population in the Santa Clarita Valley of 172,000. The population of the city has grown over 35 percent since 1990 with 75 percent of the population residing in single family dwellings. The population growth rate has been complemented with substantial growth in housing, within the incorporated boundaries of the city and on adjacent developed land in both Los Angeles and Ventura counties.

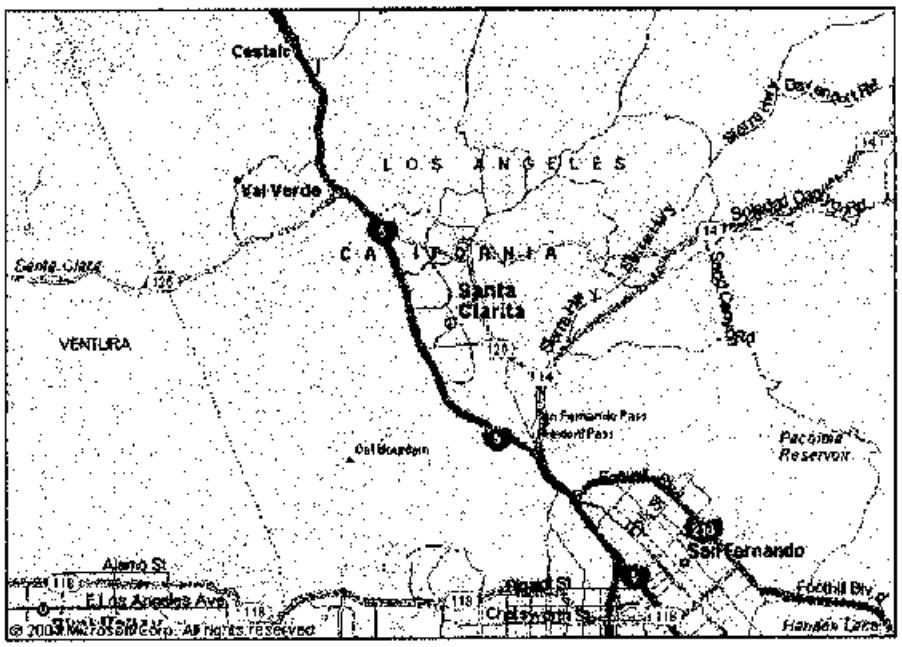


FIGURE 2-1

Santa Clarita and Neighboring Communities

While residents commuting to the San Fernando Valley and Central Los Angeles account for a large percentage of the work force, the Santa Clarita Valley retains more than 30,000 jobs. Commuting to the Santa Clarita Valley represents a growing contribution to traffic and emissions.

2.1 Meteorological Profile

During the 1997 Southern California Ozone Study (SCOS97, conducted by a partnership of air districts, CARB and U.S. EPA), extensive measurements of meteorological and air quality data were taken to help characterize the pollutant build-up and transport processes that take place in the Basin. The August 4-7, 1997 meteorological episode captured the build-up of an ozone episode and the development of a coastal eddy that resulted in transport of the polluted air mass to the Santa Clarita Valley over successive days. The episode was simulated as part of the Basin ozone attainment demonstration for the 2003 Air Quality Management Plan. In later sections of this report, these simulations are used to demonstrate the relative impact of transport to the Santa Clarita air quality problem due to emissions in the valley and in the upwind emissions source areas.

The following sections briefly describe the observed wind flow and inversion characteristics that uniquely impact the Santa Clarita Valley.

2.1.1 Wind Flow

The meteorological profile of the Santa Clarita Valley is dominated by the diurnal sea breeze wind circulation that is characteristic of Southern California. Daytime wind transport into the Santa Clarita Valley occurs along two primary routes: from the south through the Newhall pass, and from the west following the Santa Clara River (Figure 2-2). The thermally driven southwesterly wind flow exits the valley mainly through the eastern canyons on a traverse towards the Antelope Valley. A smaller percentage of the wind flow into the Santa Clarita Valley is channeled up the side canyons which are generally north-south in orientation. Average wind speeds during the afternoon range between 5 and 10 miles per hour. At night, weak drainage flow from the surrounding mountains collects along the Santa Clara River bed and is transported westward towards the coast.

Seasonally, the sea breeze is strongest during the spring and summer months. The typical flow pattern into the valley is augmented by region-wide southerly flow that accompanies the development of coastal eddies in the Southern California bight. The formation of coastal eddies occurs approximately 15 percent of the year. When the eddy is established, it promotes regional transport from the majority of the air pollution sources in the coastal plain. Less frequent, but well pronounced in the Santa Clarita Valley, are the periodic Santa Ana northerly winds which are routinely characterized by wind gusts in excess of 30 mph.

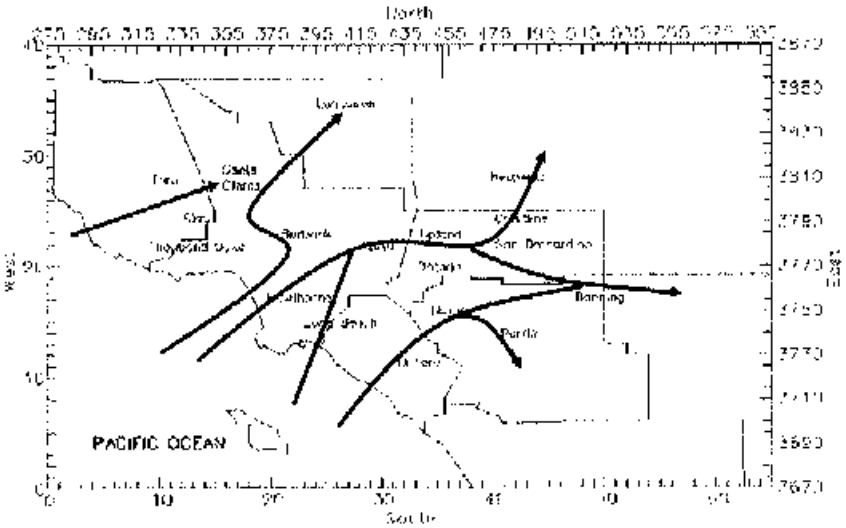


FIGURE 2-2

Prevailing Wind Transport to the Mojave Desert

The overwhelming contribution of pollution transport to the Santa Clarita Valley comes from the San Fernando Valley and metropolitan Los Angeles. Figure 2-3 depicts the seasonal-hourly wind frequency diagrams or "wind roses" for the Santa Clarita SCAQMD monitoring station for the period 1991-2000. Excluding periods of calm winds that occur as the sea breeze begins and ends (49.2 percent of all hours), the major daytime wind vectors are from the south and upwind emission source areas. This is particularly evident in the spring and summer months. In addition, several field studies have confirmed the prevalent transport route through the Newhall Pass by tracing the northward movement of inert tracer gases released in the Metropolitan Los Angeles areas.

Table 2-1 summarizes the frequency of occurrence of different daytime transport regimes to Santa Clarita. In general, average transport, which is characterized by a moderate-to-strong sea breeze through the Newhall Pass, occurs two-thirds of all days. In contrast, Santa Clarita is mostly impacted from local emissions under calm winds and weak offshore flow which occurs less than ten percent of all days.

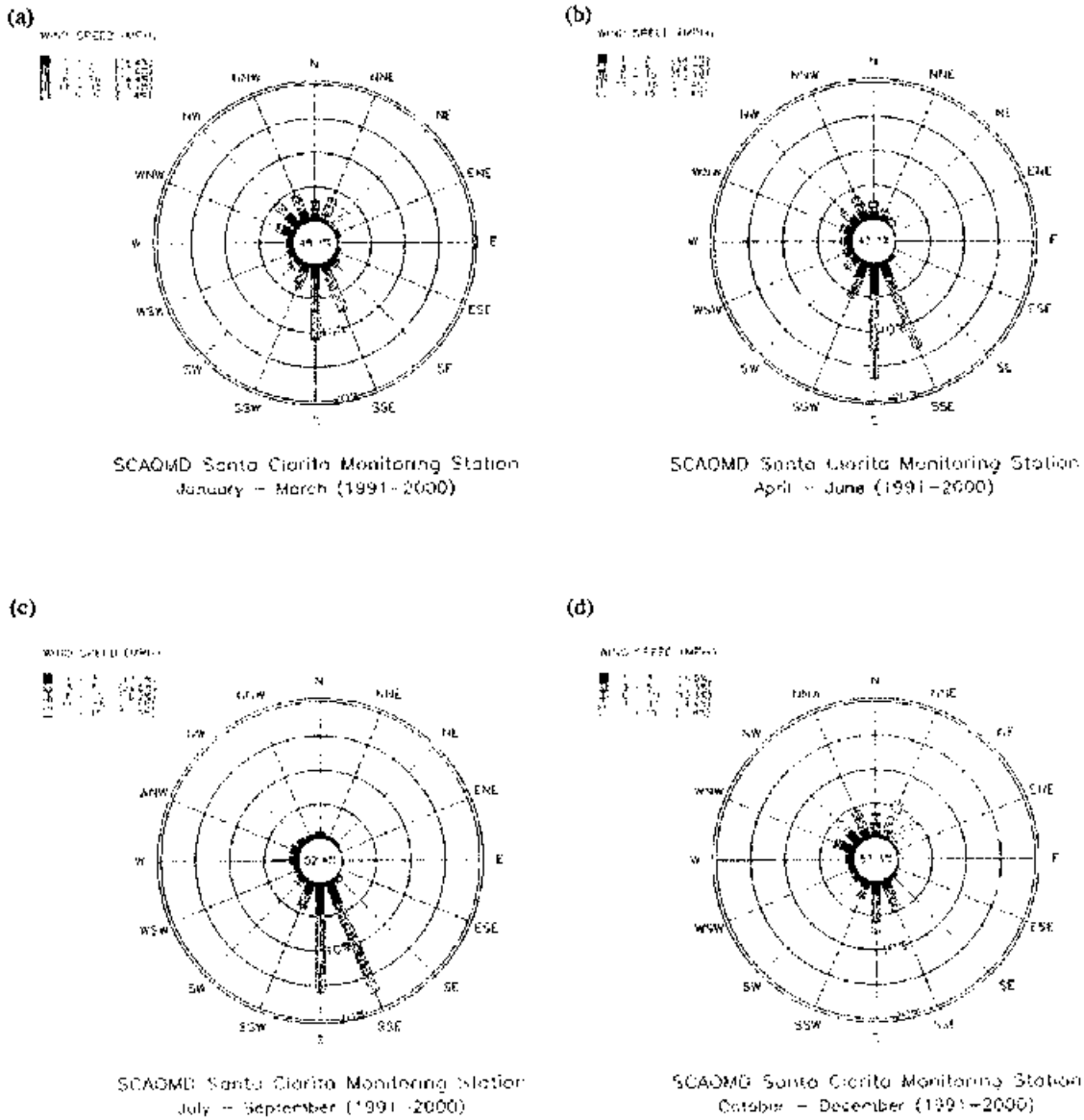


FIGURE 2-3

Hourly Wind Rose for Santa Clarita (1991-2000):
(a) Winter, (b) Spring, (c) Summer, (d) Fall

TABLE 2-1

Frequency and Strength of Daytime Wind Transport to Santa Clarita

Transport Regime	Frequency of Days	Characteristics
Local	6	Calm winds or weak offshore flow
Weak	20	Light winds onshore
Average	66	Moderate to strong sea breeze through Newhall pass and Santa Clara River Valley
Overwhelming	8	Strong Catalina eddy or an approaching storm system

2.1.2 Inversion Characteristics and Mixing

The elevation of the Santa Clarita Valley varies from just over 1000 feet to about 1700 feet above mean sea level (msl) in the eastern portion of the city. The base of the morning coastal inversion layer typically resides within a layer approximately 1000 and 3000 feet above msl with a median height of approximately 1200 feet msl. On many days, the coastal and San Fernando portions of the Basin reside in the marine layer while Santa Clarita is above the inversion base in the stable air within the inversion layer. When the inversion is lower than the elevation of the valley, Santa Clarita will take on the climatic characteristics of the high desert. These include limited cloud cover from the marine layer, low humidity and a rapid warming of daytime temperatures. Vertical mixing of the atmosphere under these conditions is limited in the pre-dawn and early morning hours due to the very stable atmosphere. Higher levels of tailpipe emissions are trapped close to the ground but the rapid heating of the atmosphere after dawn limits the amount of stagnation, acting to disperse morning pollution vertically.

On days when the height of the base of the inversion layer is approximately equal to or greater than the elevation of the valley, a modified marine air climatic profile is observed in Santa Clarita. This will often include clouds or fog, higher humidity and slower rise in daytime temperature. Vertical mixing of the atmosphere will readily disperse ground level emissions; however, the extent of mixing will be determined by the inversion base height above mean sea level relative to the terrain elevation. As a consequence, on days when the morning inversion is elevated over Santa Clarita, the mixed layer, or area of the atmosphere where pollutants readily disperse, can actually be shallower than over the San Fernando Valley and coastal plain. These conditions often accompany the development of a coastal eddy and enhanced wind transport into the valley.

As the air over Southern California heats during the day, vertical mixing in the coastal plain and San Fernando Valley will typically reach between 3000 and 5000

feet. Developing ozone and particulate air pollution caught in the mixed layer is transported with the winds towards the Santa Clarita Valley. The pollutant-laden air mass extends high enough in the atmosphere to easily move through the Newhall Pass into the valley proper. The transported pollutant air mass typically retains the marine or coastal climatic characteristics and is several degrees cooler in temperature than the air it is displacing in the Santa Clarita Valley. The cooler pollutant-laden air tends to hug the ground creating a temperature contrast between the pollutant air mass and the warmer air above in the mixed layer. As a result, the movement of the polluted air mass into Santa Clarita acts to regenerate a low-level inversion whereby the transported pollutants are concentrated in a shallow layer.

On days when Southern California experiences extreme heat, the inversion layer is broken and vertical mixing of the atmosphere becomes unlimited. Under this condition transport into the Santa Clarita Valley is limited and pollutant levels are characteristically low in the area.

2.2 Air Quality Profile

Any assessment of the Santa Clarita air quality profile must begin with an assessment of the trend of air pollution in the South Coast Air Basin. In general, the region is most greatly impacted by ground-level ozone. Particulate matter, separated into a fine mode (PM2.5 - aerodynamic diameter less than or equal to 2.5 microns) and a coarse mode (PM10 - aerodynamic diameter of 10 microns or smaller, including PM2.5), is the second major contributing pollutant to Basin air quality. To a lesser extent, and more restricted in geographical impact is carbon monoxide, a third pollutant of concern.

The federal air quality pollutant standard attainment designations characterize the Basin as a region. The Basin is classified non-attainment for ozone, PM10, and carbon monoxide. Each of these pollutants impacts the health of the Basin population through short-term acute exposure and long term chronic impacts. On a sub-regional scale, Santa Clarita exceeds only the federal standard for ozone.

Ozone is an oxidant that readily reacts with tissue in the respiratory tract; primarily the cilia in the bronchi and the alveoli in the lungs. Irritation, combined with inflammation caused by exposure leads to scarring of the alveoli cell walls and reduced pulmonary function with repeated exposure over time. Particulates, especially the fine portion, are easily inhaled and deeply penetrate the respiratory tract, causing irritation and inflammation. The particulates often serve as platforms for toxic materials and are associated with increases in mortality rates. Asthmatics, the, very young, the aged and people with pre-existing chronic respiratory ailments, are among the susceptible segments of the population who have been identified as being greatly impacted by exposure to either ozone or particulates.

Although not measured frequently in very high concentrations, carbon monoxide can cause impairment of consciousness and is especially harmful to people with emphysema or heart conditions. The Basin has met the criteria defining attainment

of the carbon monoxide since 2002. A petition to re-designate the Basin as attainment will be submitted to U.S. EPA in the near future.

2.2.1 Ozone Trend

Figure 2-4 depicts the long-term trend of days when the federal 1-hour ozone has been exceeded at one or more locations in the Basin. Also depicted in the figure is the regional peak concentration. As demonstrated by the trend, ozone air quality has significantly improved since the mid-1970's. The rate of improvement has slowed in the later 1990's and has shown a minor reversal over the past two years.

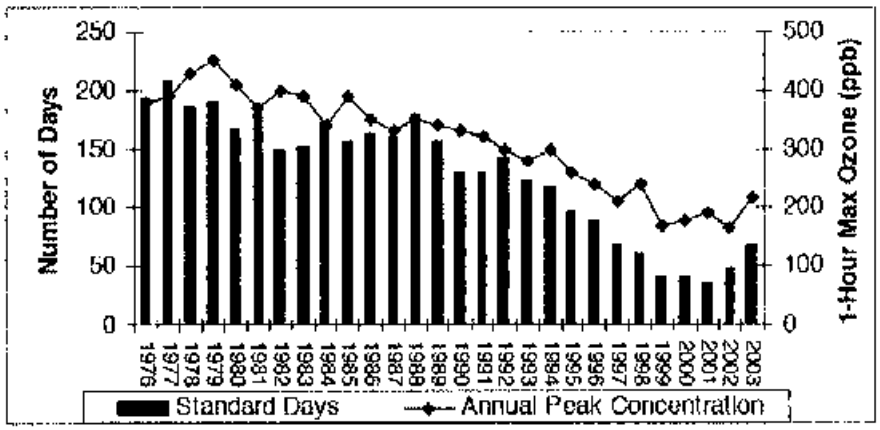


FIGURE 2-4

Trend of Days Exceeding the Federal 1-Hour Ozone Standard in the South Coast Air Basin and Annual Peak Concentration (ppb)

Figure 2-5 depicts the long-term trend of days when the federal 1-hour ozone standard was exceeded at Santa Clarita. When compared to the Basin totals, the trends are generally consistent with time. On average, Santa Clarita experiences violations of the 1-hour ozone standard on approximately fifty percent of the days each year that a basin-wide violation occurs.

Two features are very prominent in the recent ozone trend: First, no violations of the federal 1-hour average ozone standard were observed at the Santa Clarita monitoring site in 1999 and only one was observed the following year. The second characteristic of the recent trend has been the sharp increase in the number of violations observed in 2002 and 2003. A fundamental question arises when analyzing the recent trend: was the improvement in 1999-2000 real or is the 2002-2003 increase in violations a truer measure of ambient ozone in the area?

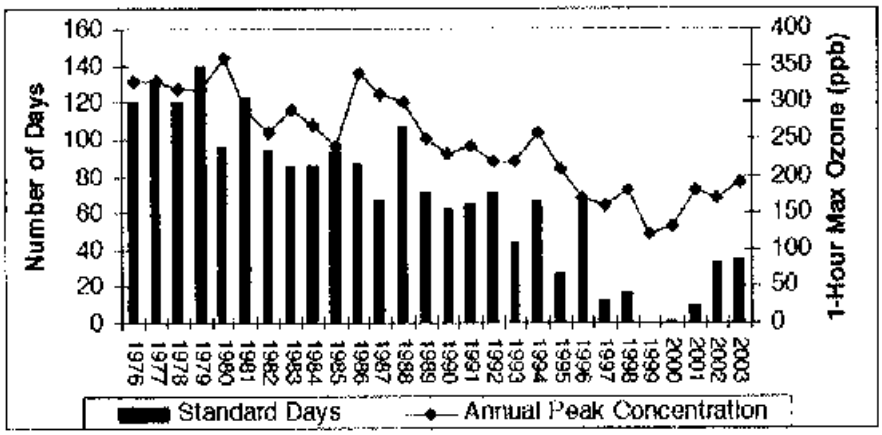


FIGURE 2-5
Trend of Days Exceeding the Federal 1-Hour Ozone Standard in Santa Clarita and Annual Peak Concentration (ppb)

2.2.1.1 Air Monitoring Station Relocation

In the spring of 2001, the Santa Clarita monitoring station was moved from its long-term location at L.A. County Fire Station #73 (24875 N. San Fernando Road, Newhall) to a site approximately one half mile to the east in a county maintenance yard. The fire station monitoring site on San Fernando Road was limited in space and had exposure interference from trees. The site was also adjacent to the fire department's diesel refueling station and was impacted from traffic emissions on San Fernando Road and from fire station activities. Diesel fire equipment, as well as routine traffic, emit high volumes of nitric oxide (NO). NO readily reacts with ambient ozone to titrate ozone concentrations nearby the NO emissions source. As a consequence, the fire station site may have been reading nominally lower ozone concentrations than the surrounding area. District staff determined that the new monitoring location receives better exposure and was less subjected to traffic influences than at the fire station.

At the time of the move, the ozone instrumentation was replaced and upgraded. The older equipment used at the fire station was found to have a problem with surface resistance on the intake manifold that scavenged ozone before reaching the analyzer. It is difficult to determine to what extent and when the equipment began to experience a loss in recorded ozone. The equipment is routinely calibrated and performance is determined to be acceptable if the results are within an acceptable range prescribed by both U.S. EPA and CARB. It is most likely that the instrument was operating at the lower bounds of acceptable performance at the fire station monitoring site during 1999 and 2000. This feature, together with favorable weather conditions, may have accounted for the unusually low number of days exceeding the

federal 1-hour average ozone standard. After the monitoring site relocation in the spring of 2001, higher ozone concentrations were observed by the new instrumentation. Concurrently, Santa Clarita experienced an upswing in the number of days exceeding the federal standard in 2001 and 2002 while leveling off in 2003. Other factors such as wildfire activity, regional changes in emissions levels and seasonal weather also may have contributed to the observed trend.

2.2.1.2 Wildfires

Due to drought conditions resulting from the record low rainfall measured over the past few years, much of the vegetation in the wildland interfacing the urban portion of the Basin has been stressed and has had dangerously low fuel moisture. Numerous wildfires have been ignited in Southern California. In particular the Santa Clarita area has been impacted each of the past three years (2002-2004). While the direct air quality impact caused by wildfires is due to fine particulates from the smoke, chemical reactions take place in the smoke plume that can elevate ozone concentrations. Experimental data captured from the Lodi Canyon controlled burns conducted in the Angeles National Forest during the late fall of 1986 indicated that on days having low ozone formation potential, a burn could generate concentrations of ozone exceeding 200 ppb with the smoke plume. The fires that occurred in the Santa Clarita valley during 2002 were very stubborn, lasting several days. Unlike the typical Santa Ana borne wildfires, the 2002 and 2004 fires fed upon the strong onshore sea breeze flow. Re-circulation of the smoke was observed throughout the Santa Clarita area and back into the San Fernando Valley. Several violations of the federal ozone standard occurred in both receptor areas as the fires burned and there existed a strong likelihood that the fires played a role in the enhanced ozone formation.

2.2.2 PM10 Trend

Figure 2-6 depicts the long-term trend of the peak annual average PM10 concentrations in the Basin. Also depicted in the figure is the regional peak 24- hour average concentration. The Basin exceeds the federal annual average PM10 standard (50 ug/m^3) and the 24-hour daily average standard (150 μg/m^3). The trend of annual average particulate has shown improvement since the late 1980's, however at a slower pace regionally than ozone. While the peak 24-hour average concentration continues to exceed the federal 24-hour average standard, it is important to note that since the mid 1990's the overwhelming number of days exceeding the standard were associated with high wind events (i.e. Santa Ana weather conditions and wildfires).

In the Santa Clarita Valley, annual average and 24-hour average concentrations of particulates are below the respective federal standards. Figure 2-7 shows the PM10 trends from 1989 through 2002. Over the last decade, the annual average concentration has been consistently about 70 percent of the federal annual standard. For the same period, the 24-hour maximum concentration has been on average less than 50 percent of the federal standard.

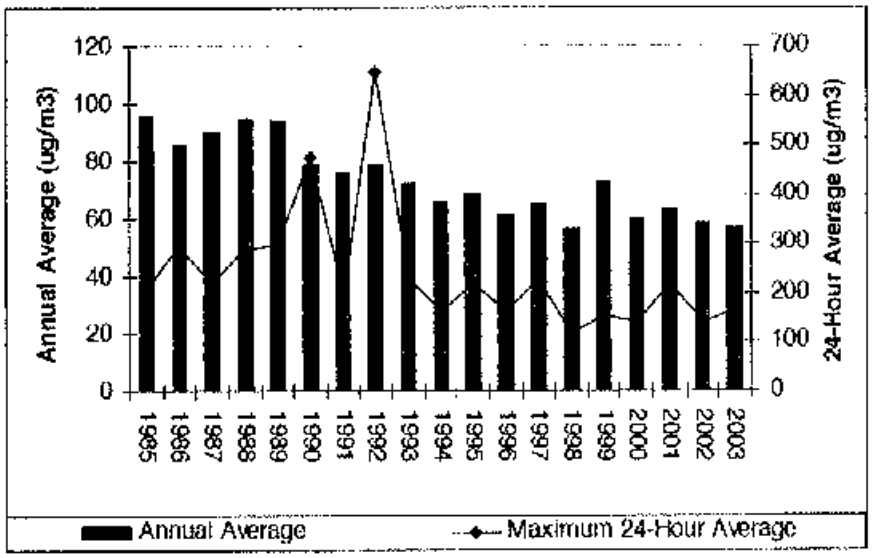


FIGURE 2-6

Basin Annual Average and Maximum 24-Hour Average PM10 Concentration

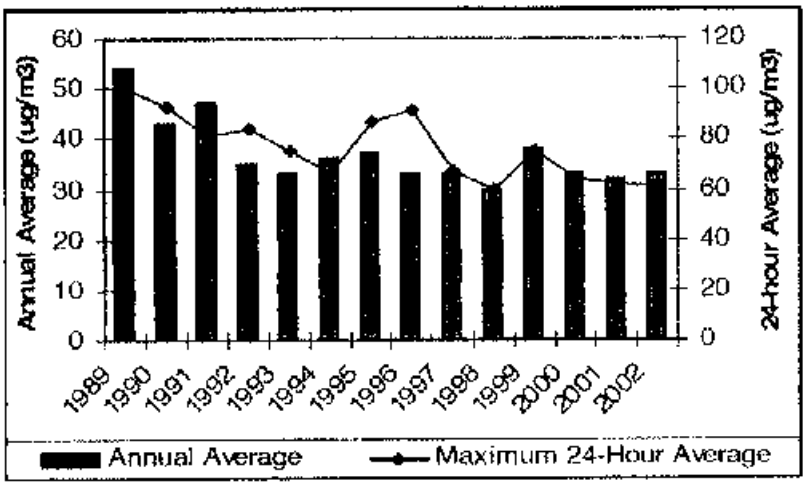


FIGURE 2-7

Santa Clarita Annual Average and Maximum 24-Hour Average PM10 Concentration

3.0 OZONE SIMULATIONS

Air quality modeling simulations were conducted to further examine the ozone impact to Santa Clarita. The modeling analyses were conducted to answer specific questions including:

- What is the subregional gradient of ozone in the Santa Clarita Valley?
- What is Santa Clarita's contribution to local smog formation?
- What is the "weekday effect" and how does it impact Santa Clarita?

3.1 Base and Future Year Simulations

The simulations were conducted for the 2003 AQMP modeling domain, using the SCOS97 meteorological episodes. The SCOS97 meteorological episode includes four days exhibiting increasing degrees of transport to the valley. August 4, 1997, the first day in the episode, was classified as a weak transport day, which occurs approximately 20 percent of the time. August 5, 1997, was classified as a local day, with little or minor transport into Santa Clarita. The local day occurs roughly 6 percent of the year. The final two days of the meteorological episode August 6, 1997, and August 7, 1997, were characteristic of the typical transport pattern which is observed on approximately 66 percent of all days.

Simulations were conducted for the full 2003 AQMP modeling domain. Figure 3-1 presents the Santa Clarita Valley subset of the full modeling domain (grids 15,25 [east-west] through 22,30 [north-south]). The hatched area includes the grids comprising the city of Santa Clarita. Interstates 5 and 210 and State Route 14 are drawn on the figure to provide reference landmarks. Each grid is 5 square kilometers in size.

3.1.3 Local vs. Regional Emissions

Ozone concentrations were simulated for three modeling inventories representing the estimated reactive emissions in the environment. The emissions inventories were developed for 2002 to reflect the conditions observed when ozone concentrations began to increase in the valley; 2007, a milestone year when the Antelope Valley must attain the federal standard; and 2010, the year the South Coast Air Basin must attain the federal 1-hour ozone standard. The emissions inventories include daily tonnages of directly emitted carbon monoxide (CO), oxides of nitrogen (NOx), volatile organic compounds (VOC) and particulate matter as PM10. VOC and NOx are the primary precursors "building blocks" of ozone. As is depicted in Table 3-1, Santa Clarita is a relatively small contributor to the total emissions of the key pollutants in both Los Angeles county and the Basin as a whole. Across the board, the emissions are typically less than three percent of the county total and two percent of the Basin total.

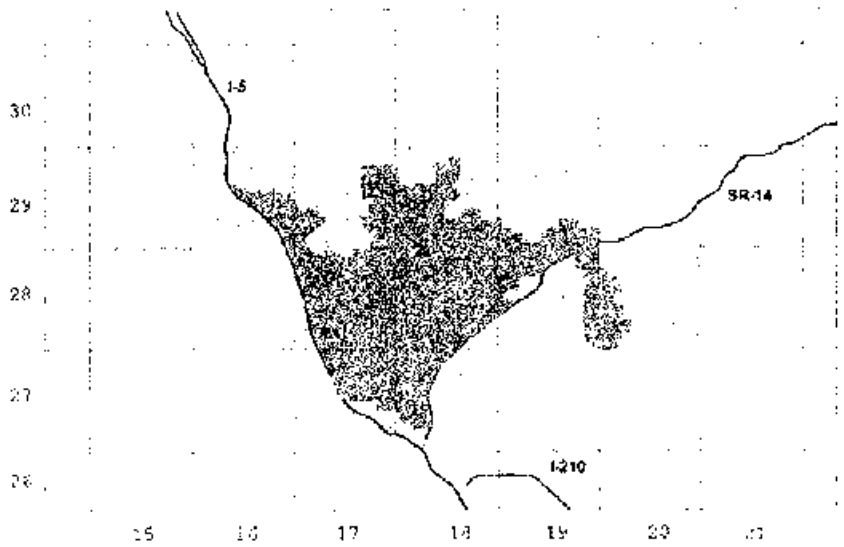


FIGURE 3-1

Santa Clarita Valley Portion of the 2003 AQMP Modeling Domain

TABLE 3-1

2002 Santa Clarita Emissions Profile

Emissions	CO	NOx	VOC	PM10
Santa Clarita (Tons Per Day)	63.9	19.3	11.2	3.4
Percentage of LA County	2.2	3.0	2.2	2.4
Percentage of Basin	1.4	1.8	1.4	1.2

3.1.2 2003 AQMP Ozone Model Simulations

The rate of progress towards achieving standard compliance is demonstrated in the 2003 AQMP ozone model simulations. Table 3-2 summarizes the results of the model simulations. In 2002, the highest observed 1-hour average ozone concentration at Santa Clarita reached 169 ppb. Model simulations for a day experiencing average transport but approximately the 95th percentile for ozone formation potential were projected to reach 146 ppb. While the weather conditions for the day simulated and the day having the observed peak are not exactly the same, the potential for ozone generation is roughly equivalent and the projection indicated that an ozone health advisory episode was likely to occur given the emissions present in the atmosphere in 2002. What is encouraging is that on weak or local transport days, Santa Clarita was simulated to attain the federal standard. Extending the analysis to 2007 predicts that Santa Clarita will marginally exceed the standard and by 2010 the city and valley will be in attainment.

TABLE 3-2

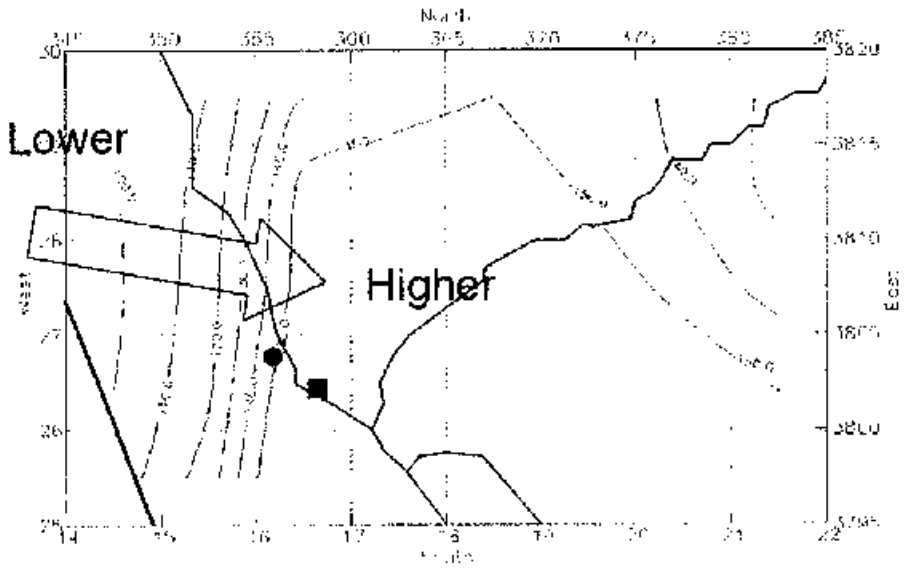
2003 AQMP Model-Predicted Santa Clarita Maximum 1-Hour Average Ozone Concentration (ppb)

Transport Regime	2002	2007	2010
Local	78	77	68
Weak	118	115	103
Average	146	135	109

3.2 Ozone Gradients

A closer grid-level examination of the model-simulated ozone concentrations for an average transport day using the 2002 emissions inventory is presented in Figure 3-2. Santa Clarita, like several communities in the Basin, experiences a gradient of ozone air pollution throughout the city. The northwestern portion of the city can be cleaner than the eastern and southeastern portions by as much as 50 ppb. While transport to Santa Clarita via the Santa Clara River valley is a factor, the bulk of the transport originates from the San Fernando Valley and the coastal plain of Los Angeles. The location of the old fire station monitoring site is in grid 17 [horizontal axis], 27 [vertical-axis]). The monitoring station relocation in 2001 shifted the analyzer location in the direction of the main pollution transport corridor and increasing ozone. Thus, on days when ozone concentrations measured at the fire station monitoring site were just below the federal standard (124 ppb) it is likely that the

projected concentration at the new location could be higher, causing the standard to be violated. Clearly, the move of the monitoring station and the equipment replacement has impacted the frequency of days reported exceeding the federal standard since 2001.



• Monitoring Site Pre-2001 ■ Monitoring Site Post-2000

FIGURE 3-2

2002 Simulated Ozone (ppb) Gradient in Santa Clarita Valley for the Average Transport Regime

3.3 Santa Clarita's Contribution to Observed Ozone

A principal question asked by residents and city officials of Santa Clarita was "what is our contribution to the ozone problem?" Table 3-3 summarizes a series of ozone sensitivity simulations where selected segments of the emissions were withdrawn from the analysis to assess the impact of different source regions to Santa Clarita's locally observed ozone. The first simulation withdrew all of the anthropogenic (man-made) emissions from Santa Clarita. A second simulation withdrew the emissions from upwind Santa Barbara and Ventura counties. An additional simulation doubled the Santa Clarita emissions to test the impact to the community.

In general, under average transport conditions, emissions from the Santa Clarita area do not contribute significantly to ozone formation in the city. In fact, the emissions of oxides of nitrogen act to scavenge some of the ozone that is transported to the area. (This is depicted by a negative value of the percentage contribution listed in Table 3-3). Under local and weak transport conditions, emissions from Santa Clarita

have a minor contribution to the observed ozone air quality profile. In contrast, the Ventura and Santa Barbara emissions, coupled contribute as much as 10 percent to the ozone problem under average transport conditions. Ozone transport and emissions from the San Fernando Valley and the Los Angeles coastal plain are responsible for the bulk of the observed ozone in Santa Clarita. Carryover, the process where yesterday's smog provides a platform for today's smog to develop, is also a factor.

TABLE 3-3

Percentage Emissions Contribution to Santa Clarita Ozone Air Quality

Transport Regime	Santa Clarita Emissions	Doubled Santa Clarita Emissions	Santa Barbara & Ventura Emissions	Carryover & Other Basin Emissions
Local	2.8	0.7	0.7	96.5
Weak	1.2	-0.2	6.0	92.8
Average	-2.9	-2.9	9.9	93.0

3.4 Weekend Effect

A final issue that was addressed through the ozone simulations was the "weekend effect" and its impact on Santa Clarita air quality. Ozone concentrations observed on weekend days are higher than that observed on weekdays. Figure 3-3 illustrates the day-of-week smog season average ozone concentrations for 1-hour and 8-hour averaging periods measured in Santa Clarita. Over the period 2001-2003, a disproportionate percentage of the days exceeding the standard occurred on weekend days (43 percent as opposed to the expected two days out of seven or 28 percent). In general, the weekend effect reflects the change in emissions levels and emissions sources that occur from weekdays (Monday-Thursday) and Friday, Saturday and Sunday. The primary cause of the weekend effect has been postulated in several analyses as the change in motor vehicle emissions patterns both in space and time as the weekend progresses. In general the postulation is as follows: Extended commuting on Friday night coupled with a later start to the morning commute on both Saturday and Sunday gives rise to a more reactive pollution cloud; the reactive pollutant cloud generates ozone concentrations earlier in the day, reaching peak concentrations at a faster pace. In addition, the weekend effect is most notable nearby the emissions source areas.

Three scenarios were simulated to test the impact of the weekend effect on transport of ozone to Santa Clarita. First, the August SCOS97 ozone meteorological episode was simulated assuming the August 4 through 7, 1997, episode took place on a Friday through Monday rather than a Monday through Thursday as it was observed. For this simulation, August 5 was assigned the Saturday emissions profile and August 6 the Sunday emissions profile. The analysis was repeated moving the start date (August 4) to a Thursday, placing August 6 as the Saturday and August 7 as Sunday. A third simulation was conducted placing August 4 on a Wednesday so that the August 7 was treated as a Saturday.

The reasoning for this rotation was to test the weekend effect when the Friday emissions were placed in different meteorological scenarios. In the first simulation, the Friday meteorology was classified as a weak transport day. The second simulation placed Friday as a local transport day. For the third simulation the Friday was classified as an average transport scenario.

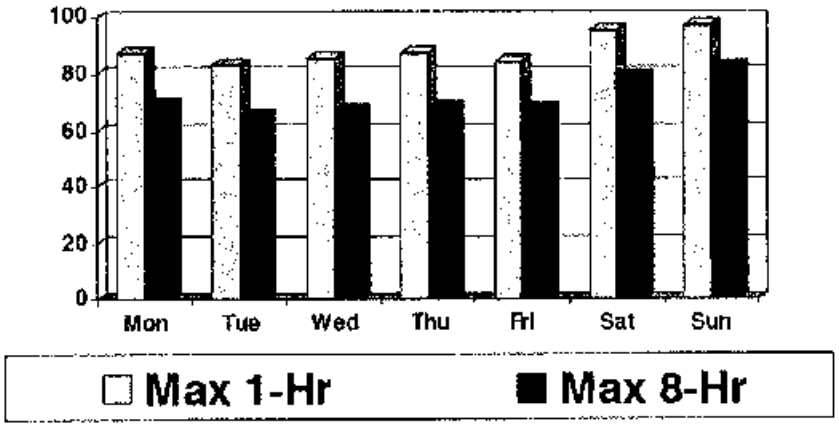


FIGURE 3-3

2001-2003 Average Santa Clarita Daily Maximum 1-Hour Average Ozone Concentration (ppb)

The results of the weekend simulations for the Santa Clarita modeling area are presented in Table 3-4. The analysis indicated that on weekend days experiencing average transport, ozone concentrations could increase by as much as 23 percent over weekdays. Under weak or local transport conditions, the weekend effect would be negated.

TABLE 3-4

Simulated Weekend Change in Ozone Concentration from Weekdays at Santa Clarita

Transport Regime	Percentage Change in Ozone Concentrations
Local	-6.5
Weak	-3.3
Average	+ 22.9

4.0 PARTICULATE SIMULATIONS: CURRENT IMPACTS

PM10 and PM2.5 are comprised of several components which are associated with a variety of sources. Sulfate, nitrate and organic particulate are mostly associated with urban smog that is transported to Santa Clarita and comprise the bulk of the fine particulate PM2.5 mass. Elemental carbon (including diesel soot) together with roadway and construction dust have local emissions source contributions as well as the urban signature. This is clearly observed in Santa Clarita where traffic generates re-entrained road dust and diesel soot and construction projects are widespread.

Air quality modeling simulations were conducted to examine the relative contributions of smog transport and local source emissions to the PM10 impact on Santa Clarita. The modeling analyses were conducted to answer specific questions including:

- What is Santa Clarita's contribution to local PM10 and PM2.5 levels?
- What will be the impact of valley growth on PM10 air quality?
- What will be the impact of the Cemex/TMC mining operations on PM10 air quality

4.1 PM10 Gradient

Figure 4-1 depicts the 2002 simulated annual average PM10 concentration for the Santa Clarita Valley. The peak particulate concentrations are well represented by the air monitoring site (grid 17,29) where the southern and central portions of the city experience the highest concentrations. The concentration drops significantly in the northern third and eastern portion of the city. The easternmost edge of the city is roughly 18 $\mu g/m^3$ cleaner than the central portion of the city. The highest PM10 concentrations occur nearby the traffic arteries where road dust is a major contributing factor. Localized hot-spots for particulate emissions are also observed and correspond to construction activities and mining in the valley. The valley, overall, is in compliance with the federal annual average PM10 standard.

4.2 Santa Clarita's Contribution to Observed PM10 and PM2.5

A series of annual air quality simulations was conducted to assess the local Santa Clarita emissions contribution to its observed PM10 air quality profile. The UAMAERO-LT regional particulate simulation model used in the 2003 AQMP annual PM10 modeling analyses was simulated for the 2002 modeling inventory (see Table 3-1) and the AQMP modeling domain. The Santa Clarita Valley subset of the 5 square kilometer modeling domain is evaluated for this portion of the analysis.

The UAMAERO-LT simulation model provides predictions of both PM10 and the PM2.5 fraction. While PM2.5 is not routinely measured in the Santa Clarita Valley, the model predictions are driven by the regional emissions and they afford a

perspective of the expected local impact. A first simulation removed all area source emissions from the city of Santa Clarita (but included the mobile source contribution). A second simulation doubled the mobile source emissions over the current level while leaving the area source emissions unchanged.

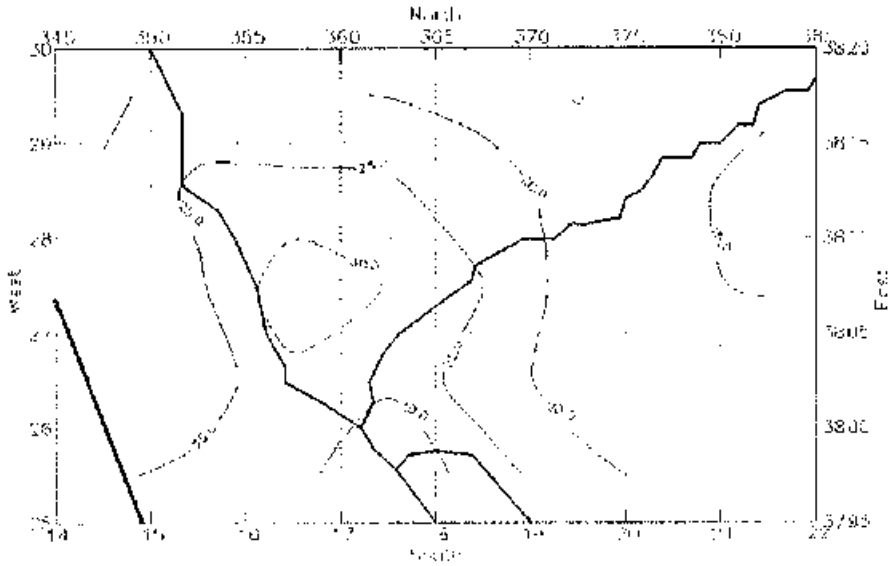


FIGURE 4-1

2002 Simulated Annual Average Santa Clarita PM10 (μg/m3)

While construction contributes to a portion of the mobile source emissions, its direct impact is in the area source category. By taking the area source emissions out of Santa Clarita, an estimate can be made of the impact of current (2002) construction to dust levels in the area. Doubling the mobile source emissions provides an estimate of the impact of growth on the community after the construction activities have stabilized. The impact of future construction emissions on Santa Clarita particulate air quality is addressed separately, and discussed in a later section of this document.

Table 4-1 summarizes the results of these sensitivity analyses. From the 2003 AQMP air quality simulations, PM2.5 accounts for roughly 57 percent of the PM10 total mass concentration in the city of Santa Clarita. When area source emissions were removed from the city of Santa Clarita, the PM10 concentrations were projected to decrease by an average of 10 percent. For the same emissions scenario, PM2.5 concentrations were predicted to decrease by approximately 7 percent. When mobile source emissions were doubled, only a nominal increase in PM10 and PM2.5 concentrations was predicted. What can be inferred from these analyses is that current construction activities are an identifiable contributor to particulate levels in the community; however, the overwhelming contribution is from upwind transport.

In addition, growth within the valley (excluding direct construction emissions or mining activities) will have a nominal impact on air quality.

TABLE 4-1

Annual Particulate Air Quality Simulation Sensitivity Analyses Summary:
Percentage Change in Concentration from 2002 Base Emissions

	No Area Sources	**Doubled Mobile Source Emissions**
PM10	-10 %	+1%
PM2.5	-7%	+2%

5.0 PARTICULATE SIMULATIONS: CONSTRUCTION AND DEVELOPMENT

A significant portion of the analysis was directed towards determining the impact of future construction on PM10 air quality in the Santa Clarita Valley. The AQMP 2006 and 2010 future year projections of air quality in the Santa Clarita Valley reflect the growth estimates provided by the Southern California Association of Governments (SCAG). Regardless, the Santa Clarita Valley is not expected to complete its build-out by 2010. City growth estimates expect place construction activities continuing over the next 25 to 30 years. Included in this estimate is the development of Newhall Ranch which will produce more than 21,000 homes before the project is completed. In the short term, mining activities from the Soledad Sand and Gravel Mining Project (Cemex/TMC) located to the east of the city are expected to commence mid-decade and expand operations at an accelerated rate thereafter. This will result in increased local particulate emissions.

Two sensitivity analyses were conducted to estimate the potential impacts of construction and mining to the air quality profile. These included simulating (1) the simultaneous build-out of all recorded, pending and approved land parcels in the valley over a 25-year period and (2) the phased development of the Cemex/TMC mining operations. The 25-year build-out of the valley was simulated to determine the additional annual impact on PM10 air quality that would be added to the current profile. It is noted that the simultaneous build-out of all parcels over the 25-year period is unlikely; however, this estimate places and upper bound on the estimated PM10 impact.

5.1 Emissions for the Twenty-five Year Build-Out

Residential construction growth and associated PM10 emissions were determined for each available land parcel by scaling development on an acreage basis to the profile of development determined for the Newhall Ranch project. PM10 emissions from multi-dwelling, commercial and industrial development were scaled on an acreage basis and then allocated based on required time estimated for building construction (e.g. a commercial dwelling requires 1 year to complete construction). Figure 5-1 depicts the distribution of parcel tracts in the study area with the modeling grid overlaid. CARB construction emissions factors were used to translate development into PM10 emissions. The phased and maximum allowable PM10 emissions for the Cemex/TMC mining operations were extracted from the project's Final Environmental Impact Statement (EIS) and the Consent Decree settlement document in the lawsuit Cemex v. County of Los Angeles (Case Number CV-02-747 DT).

Figure 5-2 depicts the daily PM10 emissions expected to result from the projected 25-year build-out of the Santa Clarita Valley overlaid on the modeling grid. The daily PM10 emissions total just over 3 tons per day in the Valley. As an example of the diversity of the development, Table 5-1 lists the tracts that contribute to the construction estimation and their status for development for grid 19,29. Fifteen tracts covering 1,567 acres of land in the 5 square kilometer grid are projected to contribute 337 lbs of PM10 emissions on a daily basis.

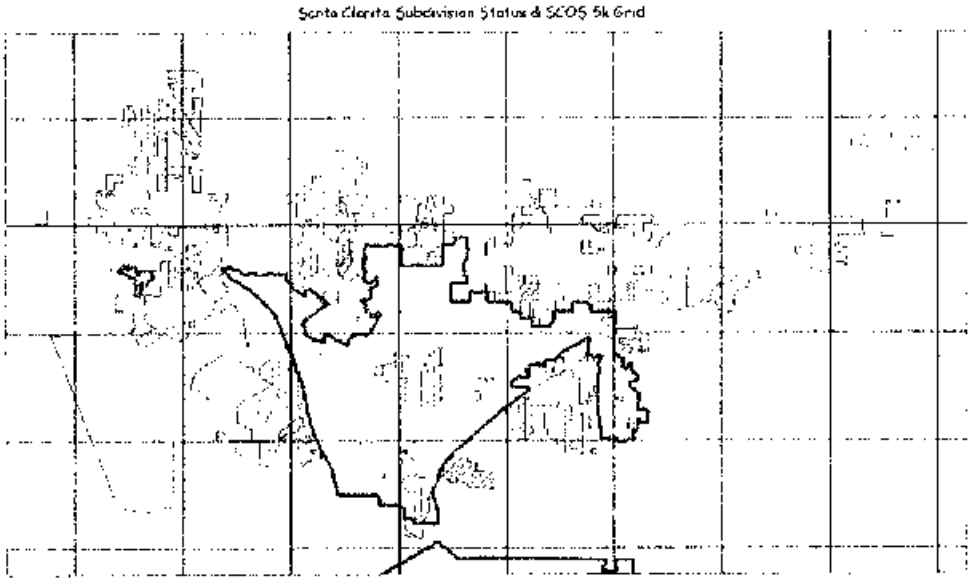


FIGURE 5-1

Santa Clarita Land Parcel Subdivisions

J \ I	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*
30	387	130	182	62	101	18	7	99
29	365	411	378	288	337	143	81	42
28	552	383	90	101	273	46	0	0
27	227	44	15	266	13	0	0	0
26	0	0	0	0	0	0	0	0

FIGURE 5-2

25-Year Build-Out Grid Level PM10 Emissions (lbs/day)
(Grid coordinates are listed as italics)

TABLE 5-1

Parcel Tracts Contributing PM10 Emissions in Grid 19,29 (Shaded in Figure 5-2)

TRACT	STATUS	ACRES
44967	RECORDED	338
45416	RECORDED	115
46353	APPROVED	65
46626	RECORDED	79
46716	APPROVED	30
49024	PENDING	37
49621	APPROVED	9
50467	PENDING	58
50846	PENDING	477
52194	PENDING	63
52355	APPROVED	33
52777	PENDING	79
52790	APPROVED	53
52990	PENDING	79
53074	APPROVED	52

5.2 PM10 Emissions from the Cemex/TMC Mining Site

As previously stated, PM10 emissions from the Cemex/TMC mining site reflect the projected routine operation and maximum allowable levels of production for two scheduled, phase-in periods. The emissions for the mining site (located in grid 21,29) were extracted from the Final EIS for the project. For all scenarios, the mining site was assumed to operate on a Monday through Friday schedule for 16 hours a day. Figure 5-3 depicts the topography of the Cemex/TMC mining site in reference to the surrounding area.

Mining operations were projected to occur in two phases: Phase I, years 1-10; and Phase II, years 11-20. The PM10 emissions for Phase I were estimated at 445 lbs/day. Phase II emissions were estimated at 641 lbs/day. As part of the Concent Decree settlement document, a maximum allowable PM10 emissions rate of 761 lbs/day was included in the finer scaled PM10 analysis. This rate reflected a maximum allowable production rate of five million tons of excavation per year. All mining emissions were allocated to grid 21,29 for the analysis.

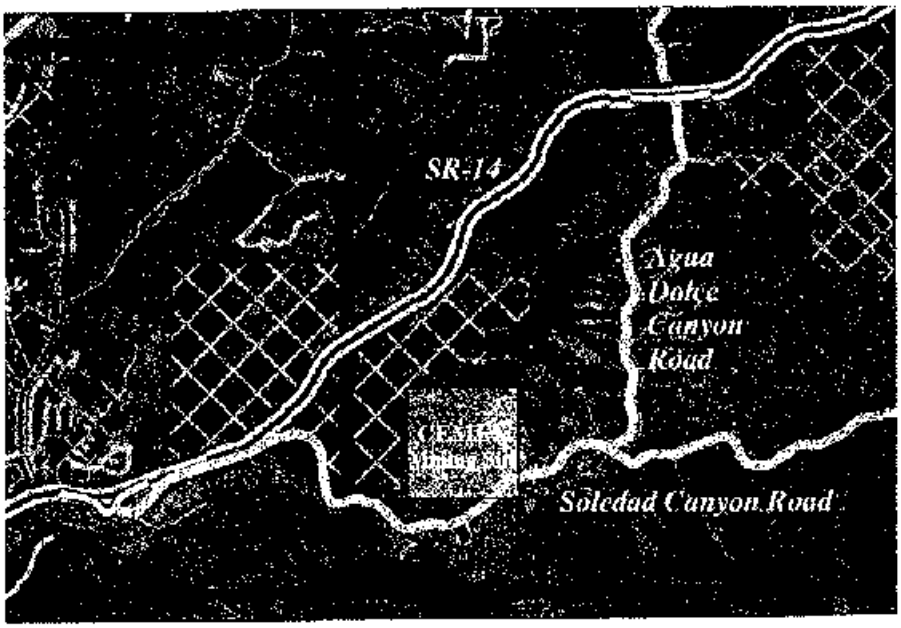


FIGURE 5-3

Cemex/TMC Mining Site in Soledad Canyon

5.3 Projected Future Year Impacts from Sensitivity Analyses

The projected PM10 impacts from the 25-year build-out and the two phases of mining operations were simulated to determine the upper bounds of additional PM10 that would be expected to impact the Santa Clarita Valley in the near term (1-10 years) and long term (10-20 years). The additional PM10 impacts from the 25-year build-out and the Phase I mining operation are presented in Figure 5-4. A maximum increase in annual PM10 concentration of 5 $\mu g/m^3$ is projected from the 25-year build-out. The predicted impact of the Cemex/TMC mining operation is approximately 2 $\mu g/m^3$, focused on the immediate area surrounding the mine. When the mining operation shift to Phase II, the impact will increase to 3 $\mu g/m^3$; however, there will be no net change in the impact caused by the 25-year build-out.

Figure 5-5 combines the projected 25-year annual build-out and Phase I mining operations PM10 impacts with the observed 2002 concentrations. Figure 5-6 repeats this process for the annual 25-year build-out impact and Phase II mining operations and the 2006 AQMP projected PM10 air quality. (While 2006 is within the Phase I time frame, future year modeling beyond 2006 shows little change in the spatial distribution and concentration levels in the Santa Clarita portion of the modeling domain; as a consequence 2006 is representative of the Phase-II projected PM10 baseline). As depicted, the federal PM10 standard would not be exceeded with the proposed build-out or development of the mining site in either the near-term or long-term analysis. PM10 air quality would exceed the more protective California standard in both scenarios.

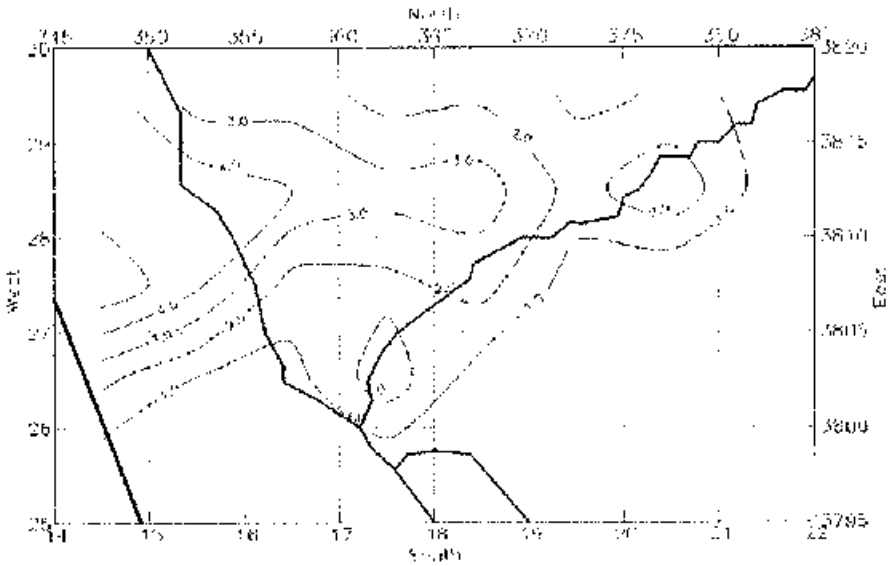


FIGURE 5-4

Simulated Annual PM10 Impact ($\mu g/m^3$): 25-Year Build-Out & Phase I Mining

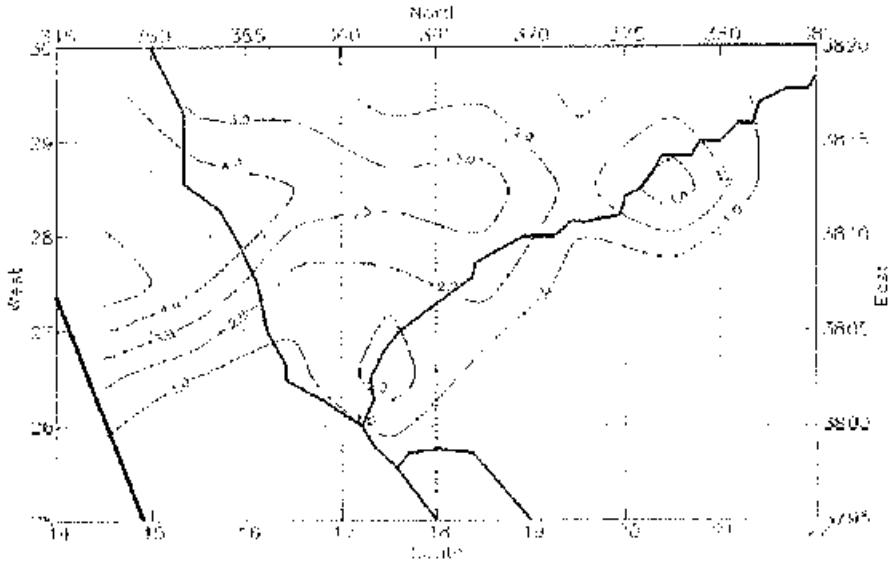


FIGURE 5-5

Simulated Annual PM10 Impact ($\mu g/m^3$): 25-Year Build-Out & Phase II Mining

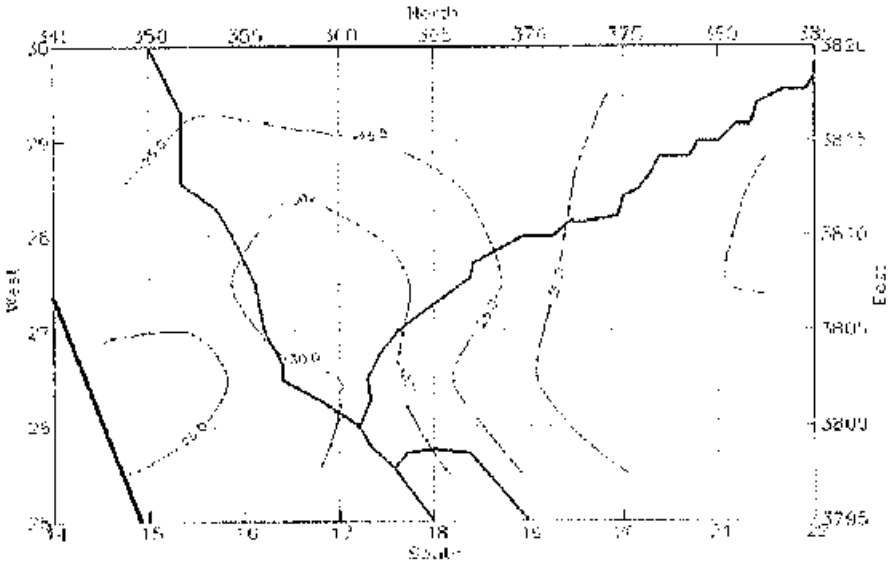


FIGURE 5-6

Simulated 2002 Annual PM10 ($\mu g/m^3$) With Build-Out and Phase I Cemex/TMC Mining

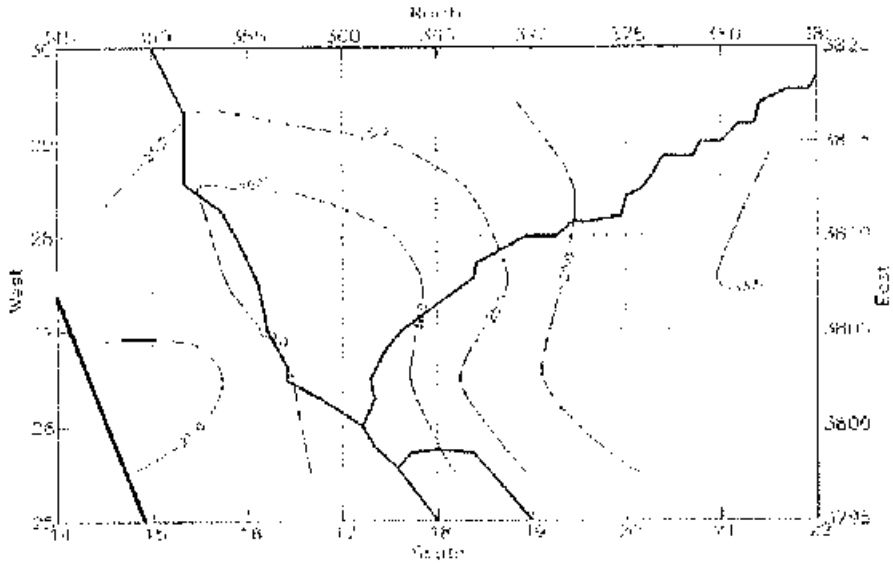


FIGURE 5-7

Simulated 2006 Annual PM10 ($\mu g/m^3$) With Build-Out and Phase II Cemex/TMC Mining

5.4 Simulating Cemex/TMC Emissions at a Finer Scale of Resolution

The preceding PM10 simulations provided the regional impacts due to growth and development of the Cemex/TMC mining site. However, the 5 square kilometer grid resolution does not lend itself to determining the local impacts from the mine operations to nearby sensitive receptors of PM10. A second sensitivity modeling simulation analysis was conducted to determine the finer scale gradient of projected PM10 impact. This analysis used the U.S. EPA ISCST3 point source model to simulate mining operations and determine the offsite impacts at a grid resolution of 500 meters. Annual average PM10 concentrations were calculated for each grid intersection or "flag pole" emanating from the mine boundary at 500 m intervals out to 5 km.

Figure 5-8 depicts the mining site with the 500 m and 5 km grid overlaid. The closest residential dwelling is located approximately 500 m to the south of the mining site and the nearest sensitive receptor (school) is located approximately 4,500 m to the west of the mining site.

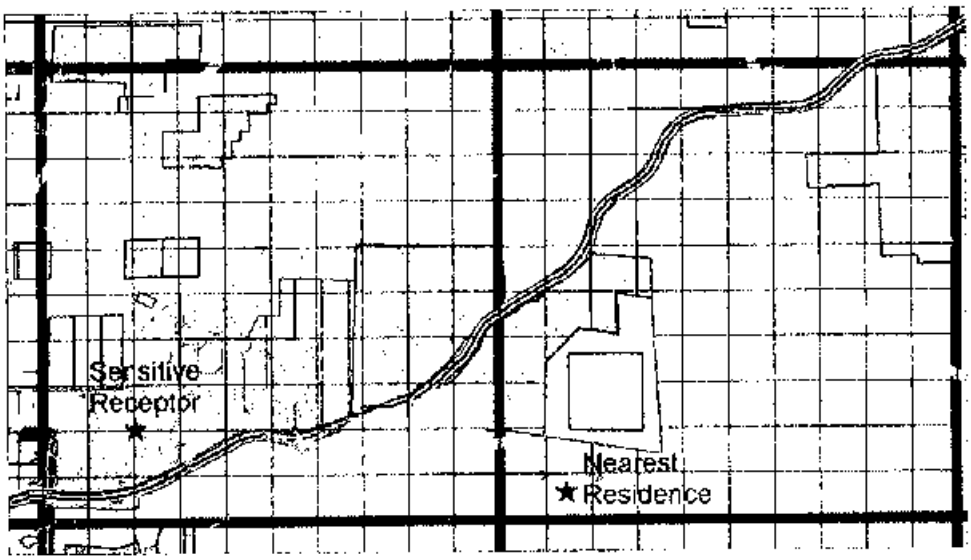


FIGURE 5-8

Cemex/TMC Mining Site With Flag Pole Grid

The simulation was conducted for a one-year period using both urban and rural meteorology developed for the mining site from the 1998-99 MATES-II meteorological modeling data. In general, simulations using a Gaussian model in the Basin are conducted using the urban meteorological assumption. Due to its unique

topography, the Santa Clarita Valley was simulated using both the urban and rural meteorological assumptions to bound the analysis.

Table 5-2 summarizes the results of the simulations. As expected, the modeling analysis using the rural meteorological option produced the highest impacts to the community with concentrations projected to reach approximately 18 $\mu g/m^3$ at the fence line. The maximum impacts to the nearest residence and nearest sensitive receptor (Phase II using the rural option) were calculated at 12.5 and 0.2 $\mu g/m^3$ respectively. When the flag pole concentrations were averaged over the 5 square km grid (21,29), the average impact was consistent with that simulated using the AQMP modeling platform. In all of the scenarios, including the rural maximum allowable case, the projected impact added tot he baseline PM10 would not result in a violation of the federal annual average standard.

TABLE 5-2

ISCST3 Simulated PM10 Impacts ($\mu g/m^3$) from Cemex/TMC Mining Site

Impacted Receptor	**Phase I**		**Phase II**		**Maximum Allowable**	
	Urban	Rural	Urban	Rural	Urban	Rural
5-Km^2 Grid Average	1.4	3.1	2.0	4.5	2.6	5.7
Fence Line	4.2	12.2	6.0	17.6	7.7	22.3
Nearest Residential	2.9	8.7	4.2	12.5	5.3	15.9
City Line - Canyon Country	0.3	0.7	0.4	1.0	0.5	1.3
Northeast Modeling Region	0.2	0.4	0.3	0.6	0.4	0.7
Nearest Sensitive Receptor	0.1	0.2	0.1	0.2	0.2	0.3

6.0 RISK FROM DIESEL PARTICULATES

The final phase of the analysis focused on the potential toxic impact or "risk" that could arise from the development of the Cemex/TMC mining site due to emissions of diesel particulate, both from in-situ operations and from gravel hauling offsite.

Risk is expressed as a probability of the development of excess cancer cases to the community based upon a lifetime (70 years) of exposure. The 1999 Multiple Air Toxics Exposure Study II (MATES II) analysis conducted for the South Coast Air Basin estimated that the Santa Clarita average community risk from all sources of toxic emissions was approximately 500 in million. (The basin-wide average estimated by MATES II exceeded 1,400 in one million). Exposure to diesel particulates was the major driver of risk to the community.

Diesel particulates have been shown to have a unit risk factor of 300 in one million for every 1.0 $\mu g/m^3$ of exposure. As a consequence, even comparatively small emissions can have a significant increased risk to the community. For comparison purposes, AB2588-Air Toxics "Hot Spots" Program notification and risk reduction levels are 10 and 25 in one million. Risk is presented in this analysis for both the urban and rural meteorological assumptions. In general, the SCAQMD uses the urban meteorological mode for hazardous risk assessments. Since the Santa Clarita Valley has a rural component, the simulations were conducted for the rural mode as well as the urban model. The assessment of risk using the two meteorological assumptions places an upper bound on the expected risk to the community.

6.1 In-Situ Mining Operations

Table 6-1 provides the Final EIS estimated annual diesel emissions rates for the various operations option and load considerations for the Cemex/TMC mine. Note: emissions for Phase II operations decrease compared with Phase I. This reflects the implementation of federal and California diesel control measures later in this decade. The diesel emissions were used to scale the ISCST3 predicted point source impacts to determine risk to the community neighboring the mining site. The results of the analysis are presented in Table 6-2.

TABLE 6-1

Diesel Particulate Emissions From Cemex/TMC Mine

Operation Option	Annual Emissions Rate
Phase I	1,528 lb/yr
Phase I Maximum Allowable	3,043 lb/yr
Phase II	1,431 lb/yr
Phase II Maximum Allowable	1,817 lb/yr

TABLE 6-2

ISCST3 Simulated Risk from Diesel Particulate from Cemex/TMC Mining
(Increased Probability of Excess Cancers Per Million People Exposed)

Impacted Receptor	Phase I				Phase II			
	Average Operations		Maximum Allowable		Average Operations		Maximum Allowable	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Fence Line	16	47	32	93	15	44	18	52
Nearest Residential	11	33	22	66	10	31	12	37
City Line - Canyon Country	1	3	2	6	1	2	1	3
Northeast Modeling Region	1	2	2	4	1	1	1	2
Nearest Sensitive Receptor	0	1	1	2	0	1	0	1

The maximum risk predicted by the model simulation occurs at the fence line of the mining site for the Phase I maximum allowable emissions scenario and the rural meteorology option. The maximum predicted risk to the nearest residence exceeds the 25 in one million criteria required for implementing risk reduction measures for the rural meteorology scenarios. However, when the impacts are estimated for the Santa Clarita city line and the nearest sensitive receptor (i.e. school), regardless of the emissions rate or meteorology, the risk falls below 10 in one million. Figure 6-1

depicts this tight gradient of impact for the rural meteorological mode, this time drawn over the two square kilometer grid used for the MATES II analysis. Impacts offsite quickly dissipate with distance from the Cemex/TMC Soledad Canyon facility.

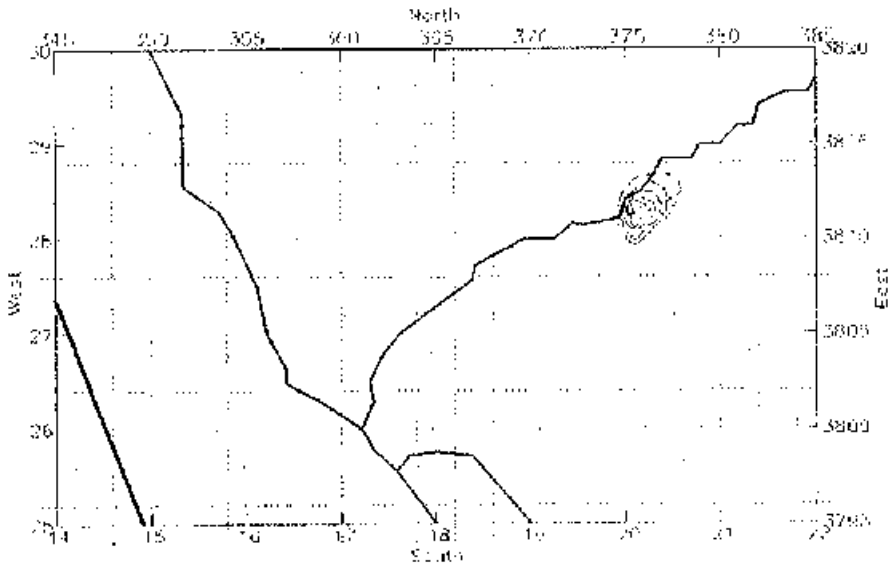


FIGURE 6-1

ISCST3 Phase I Simulated Diesel Risk From Cemex/TMC Mine Operations: Rural Mode
(Increased Probability of Excess Cancers Per Million People Exposed)

6.2 Gravel Hauling Operations

The simulation of risk due to diesel emissions was not limited to in-situ operations but extended beyond the mine due to gravel hauling through the Santa Clarita Valley to local end users and recipients in adjacent valleys. Based upon assumptions provided in the Final EIS, Phase I gravel hauling from the mine will result in 347 round trips by heavy-duty diesel trucks. Phase II will see an increase to 582 round trips. The truck hauling operations are expected to continue 24 hours a day with truck traveling at an average speed of 45 mph. Emission rates for heavy-duty diesels operating under these two travel scenarios (Phase I, 0.312 grams/mile; Phase II, 0.185) were extracted from the CARB EMFAC2002 emissions factor model.

Note again, the emissions rate for Phase II operations is lower than for Phase I reflecting the required introduction of cleaner vehicles and fuels. As a consequence, the daily emissions rate (truck trips multiplied by the appropriate diesel emissions factor) for Phase I and Phase II gravel hauling operations are essentially equal. Since

the difference between the estimated daily emissions rates is nominal, (Phase I being slightly higher), the projected Phase I risk from diesel truck hauling operations stands as a baseline for this analysis and is the only assessment presented.

If the option is exercised to expand gravel production to the maximum allowable rate provided in the Consent Decree, then hauling and the number of truck trips is expected to increase accordingly. Phase I projected risk due to diesel truck emissions under the maximum allowable production rate is estimated to increase by approximately 70 percent over the baseline while Phase II projected risk is estimated to increase by approximately 19 percent over the baseline.

The EIS provided some direct guidance on the direction of truck hauling with 95 percent of the transit moving west towards Santa Clarita and San Fernando Valleys and 5 percent routed east towards the Antelope Valley. However the truck routing through the Santa Clarita Valley was not explicitly provided. Based on estimates of population growth rates and estimates of future aggregate consumption (EIS Table 1.1-3), it was assumed that 54 percent of the westward-bound hauling would be earmarked for the San Fernando Valley traveling exclusively along SR 14. The remaining 46 percent of the westward-bound hauling would fill the needs of the Santa Clarita Valley and would be split between routes including SR 14 and Soledad Canyon Road. Gravel hauling was assumed to extend as far west as the Newhall Ranch development.

Meteorological data sets for four representative locations in the Santa Clarita Valley and the ISCST3 dispersion model were used to calculate diesel impacts to the Santa Clarita Valley for both urban and rural modes. The impacts were calculated for a one kilometer grid for each meteorological data set and the results were merged to provide a mapping of probable diesel impacts and risk to the Valley.

Figure 6-2 depicts the estimated baseline risk from truck hauling for the urban meteorological assumption. In isolated areas, risk exceeds 10 in one million with the maximum impact occurring along the SR 14 freeway. When the less dispersive rural meteorological assumption is used, the impacts increase along the SR 14 corridor and expand along Soledad Canyon Road. (See Figure 6-3). The highest estimated risk for both model simulations occurs near the SR 14 - Soledad Canyon Road separation with a maximum of 25 in one million for the rural meteorological option. In addition the maximum risk to a sensitive receptor occurs within one kilometer of the SR 14 freeway with values of 7 in one million for the urban meteorological mode and 20 in one million for the rural mode.

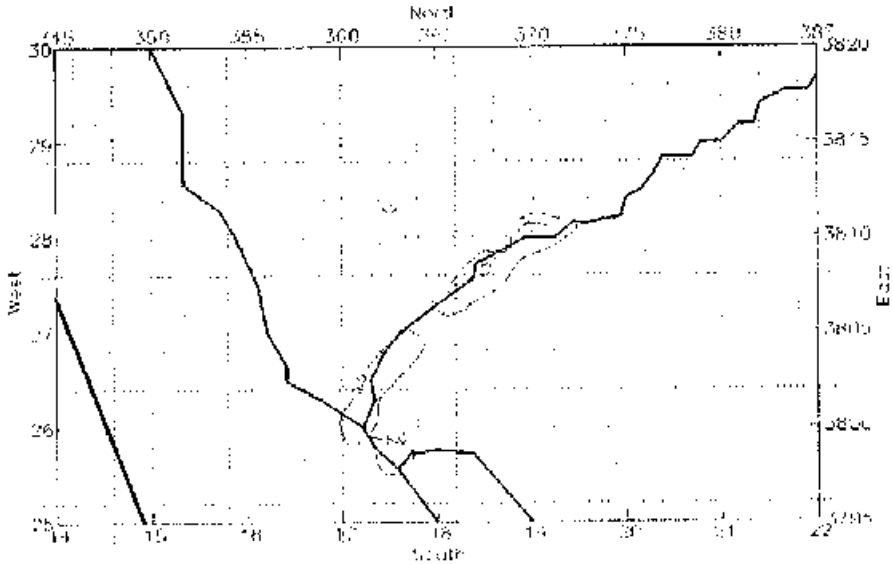


FIGURE 6-2

Simulated Baseline Diesel Risk from Cemex/TMC Gravel Hauling Operations: Urban Mode
(Increased Probability of Excess Cancers Per Million People Exposed)

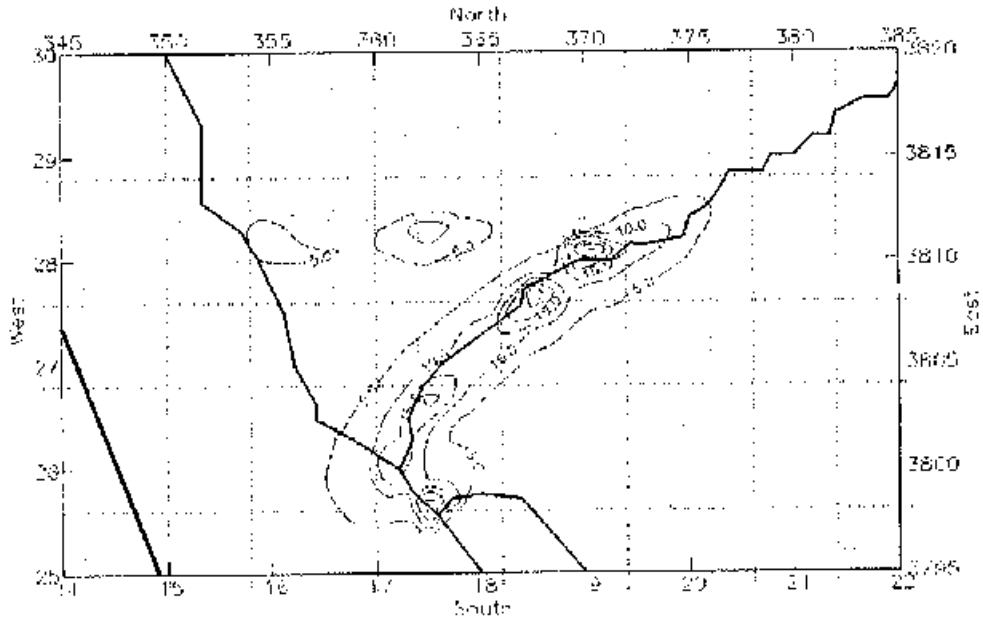


FIGURE 6-3

Simulated Baseline Diesel Risk From Cemex/TMC Gravel Hauling Operations: Rural Mode
(Increased Probability of Excess Cancers Per Million People Exposed)

6.3 Merged Diesel Risk: Mining and Gravel Hauling Operations

Figure 6-4 shows the simulated baseline risk when the mining and gravel hauling operations are merged (for the rural meteorological assumption). Because of the localized impact caused by the in-situ mining operations, there is very little overlapping risk caused by the hauling operations. As a consequence, the results of the risk assessment reported through the table and graphics in the two previous sections do not change significantly when the analyses are merged.

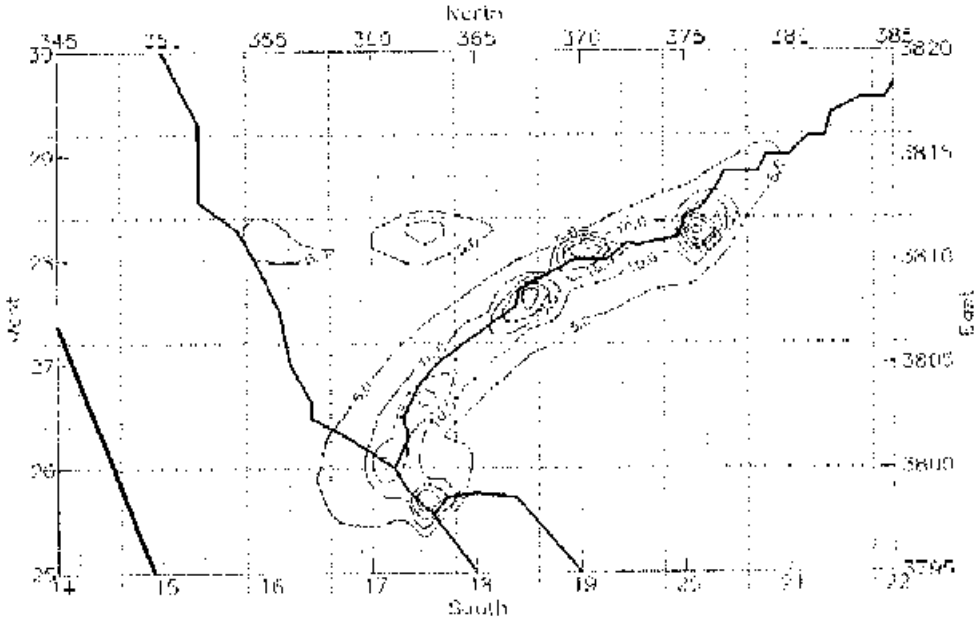


FIGURE 6-4

Merged Baseline Diesel Risk From Cemex/TMC Mining and Gravel Hauling Operations: Rural Mode
(Increased Probability of Excess Cancers Per Million People Exposed)

7.0 POTENTIAL MITIGATION ACTIONS

The City of Santa Clarita is drafting an aggressive air quality element to its General Plan that will contain many potential mitigation measures to offset the air quality impacts associated with growth and regional transport of smog. The draft element includes measures that address traffic flow through the Valley, the use of alternatively fueled city vehicles and refueling stations, and rideshare programs, among others that address the city's commitment to reducing regional smog. Two bullet lists follow which provide potential additional mitigation measures that specifically address impacts from the issues of PM10 fugitive dust associated with growth and diesel mobile source emissions from the development of the Soledad Canyon mining site.

7.1 Potential Mitigation Measures for PM10 Fugitive Dust

Rule 403-Fugitive Dust provides a comprehensive list of dust control measures. Required control measures and recommended guidance measures that go beyond the requirements of Rule 403 can be implemented to mitigate fugitive dust emissions during construction and operation of aggregate handling facilities. For example, where Rule 403 identifies an option for implementing several control measures, mitigation measures can include several or all of the control measures and recommended guidance. In addition, mitigation measures can also include increasing the frequency of measures, such as watering, to go beyond the recommended guidance under Rule 403.

- Installation of monitoring devices around perimeter of site to collect samples during the construction and operation of the project to ensure that the PM10 levels do not exceed 50 $\mu g/m^3$ pursuant to requirements under Rule 403.
- Signs posted with a phone number for the public to report dust problems.
- Apply water three times daily, or non-toxic soil stabilizers according to manufacturers' specifications, to all unpaved parking or staging areas or unpaved road surfaces (compared to watering twice daily as the minimum required by Rule 403).
- Pave construction roads that have a traffic volume of more than 50 daily trips by construction equipment, 150 total daily trips for all vehicles (compared to watering twice daily as the minimum required by Rule 403).
- Pave all construction access roads at least 100 feet onto the site from the main road (for sites $\leq$ 5 acres or $\leq$ 100 cubic yards daily import/export of bulk material).

- Pave construction roads that have a daily traffic volume of more than 50 vehicular trips (compared to watering twice daily as the minimum required by Rule 403).

7.2 Potential Mitigation from Diesel Mobile Sources

- Use of aftertreatment control technologies such as diesel oxidation catalysts.
- Use of alternative diesel fuels such as emulsified diesel fuel.
- Provide a minimum buffer zone of 300 meters between truck traffic and/or and sensitive receptors.
- Re-route truck traffic by adding direct off-ramps for the truck traffic or by restricting truck traffic on certain sensitive routes.
- Improve traffic flow by signal synchronization.
- Enforce truck parking restrictions.
- Develop park-and-ride programs.
- Restrict truck engine idling.
- Restrict operation to "clean" trucks.
- Provide electrical hook-ups for trucks that need to cool their load.
- Electrify auxiliary power units.
- Provide onsite services to minimize truck traffic in or near residential areas, including, but not limited to, the following services: meal or cafeteria service, automated teller machines, etc.
- Require or provide incentives to use low-sulfur diesel fuel with particulate traps.
- Conduct air quality monitoring at sensitive receptors.

Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures

NEWHALL RANCH SPECIFIC PLAN FINAL EIR
AIR QUALITY MITIGATION MEASURES

The following air quality mitigation measures are from the Newhall Ranch Specific Plan Final EIR. These measures, as appropriate, are intended to apply to all future development within Newhall Ranch. Not all of the following measure are appropriate for River Village and comments on the appropriateness of each measure to the River Village project is noted in *italics*.

4.10-1. The Specific Plan will provide Commercial and Service uses in close proximity to residential subdivisions.

4.10-2. The Specific Plan will locate residential uses in close proximity to Commercial uses, Mixed-Uses, and Business Parks.

4.10-3. Bus pull-ins will be constructed throughout the Specific Plan site.

4.10-4. Pedestrian facilities, such as sidewalks, and community regional, and local trails, will be provided throughout the Specific Plan site.

4.10-5. Roads with adjacent trails for pedestrian and bicycle use will be provided throughout the Specific Plan site connecting the individual Villages and community.

4.10-6. The applicant of future subdivisions shall implement all rules and regulations adopted by the Governing Board of the SCAQMD which are applicable to the development of the subdivision (such as Rule 402 - Nuisance, Rule 403 - Fugitive Dust, Rule 1113 - Architectural Coatings) and which are in effect at the time of development. The purpose of Rule 403 is to reduce the amount of particulate matter entrained in the ambient air as a result of man-made fugitive dust sources by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. Rule 403 applies to any activity or man-made condition capable of generating fugitive dust such as the mass and remedial grading associated with the project as well as weed abatement and stockpiling of construction materials (*i.e.*, rock, earth, gravel). Rule 403 requires that grading operations either (1) take actions specified in Tables 1 and 2 of the Rule for each applicable source of fugitive dust and take certain notification and record keeping actions; or (2) obtain an approved Fugitive Dust Control Plan. A complete copy of the SCAQMD's Rule 403 Implementation Handbook, which has been included in Appendix 4.10, provides guideline tables to demonstrate the typical mitigation program and record keeping required for grading operations (Tables 1 and 2 and sample record keeping chart). The record keeping is accomplished by on-site construction personnel, typically the construction superintendent.

Each future subdivision proposed in association with the Newhall Ranch Specific Plan shall implement the following if found applicable and feasible for that subdivision.

GRADING

a. Apply non-toxic soil stabilizers according to manufacturers' specification to all inactive construction areas (previously graded areas inactive for ten days or more).
b. Replace groundcover in disturbed areas as quickly as possible.
c. Enclose, cover, water twice daily, or apply non-toxic soil binders according to manufacturers' specifications, to exposed piles (*i.e.*, gravel, sand, dirt) with 5 percent or greater silt content.
d. Water active sites at least twice daily.
e. Suspend all excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 mph.
f. Monitor for particulate emissions according to District-specified procedures.
g. All trucks hauling dirt, sand, soil, or other loose materials are to be covered or should maintain at least two feet of freeboard (*i.e.*, minimum vertical distance between top of the load and the top of the trailer) in accordance with the requirements of CVC Section 23114.

The effectiveness of these measures at reducing PM10 emissions ranges from 7 to 74 percent.[1]

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[1] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-15 and p. A11-77.*

PAVED ROADS

h. Sweep streets at the end of the day if visible soil material is carried onto adjacent public paved roads (recommend water sweepers with reclaimed water).
i. Install wheel washers where vehicles enter and exit unpaved roads onto paved roads, or wash off trucks and any equipment leaving the site each trip.

The effectiveness of these measures at reducing PM10 emissions ranges from 25 to 70 percent.[2]

UNPAVED ROADS

j. Apply water three times daily, or non-toxic soil stabilizers according to manufacturers' specifications, to all unpaved parking or staging areas or unpaved road surfaces.
k. Reduce traffic speeds on all unpaved roads to 15 mph or less.
l. Pave construction roads that have a traffic volume of more than 50 daily trips by construction equipment, 150 total daily trips for all vehicles.
m. Pave all construction access roads at least 100 feet on to the site from the main road.
n. Pave construction roads that have a daily traffic volume of less than 50 vehicular trips.

The effectiveness of these measures at reducing PM10 emissions ranges from 40 to 92.5 percent.[3]

4.10-7. Prior to the approval of each future subdivision proposed in association with the Newhall Ranch Specific Plan, each of the construction emission reduction measures indicated below (and in Tables 11-2 and 11-3 of the SCAQMD's CEQA *Air Quality Handbook*, as amended) shall be implemented if found applicable and feasible for that subdivision.

ON-ROAD MOBILE SOURCE CONSTRUCTION EMISSIONS:

a. Configure construction parking to minimize traffic interference. *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[4]
b. Provide temporary traffic controls when construction activities have the potential to disrupt traffic to maintain traffic flow (e.g., signage, flag person, detours). *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[5]
c. Schedule construction activities that affect traffic flow to off-peak hours (*e.g.*, between 7:00 P.M. and 6:00 A.M. and between 10:00 A.M. and 3:00 P.M.). *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[6]
d. Develop a trip reduction plan to achieve a 1.5 average vehicle ridership (AVR) for construction employees. *Mitigation not suitable for River Village because SCAQMD Rule 2202 applies to all employers who meet certain criteria for implementing trip reduction measures. The requirement to achieve a specific AVR has been ruled unlawful by the federal government and is no longer recommended.*
e. Implement a shuttle service to and from retail services and food establishments during lunch hours. *Mitigation not suitable for River Village because construction workers typically take a half-hour lunch at various times of the day and eat on-site food that was either brought by the workers (brown bag) or purchased from mobile caterers who travel to the site.*
f. Develop a construction traffic management plan that includes the following measures to address construction traffic that has the potential to affect traffic on public streets:
   - Rerouting construction traffic off congested streets *Mitigation not suitable for River Village because the only access to the site is via SR-126 and there are no other roadways on which to reroute traffic.;*
   - Consolidating truck deliveries; and
   - Providing temporary dedicated turn lanes for movement of construction trucks and equipment on and off of the site. *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[7]

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[2] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-15 and pp. A11-77 to -78.*
[3] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-16 and p. A11-78.*
[4] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*
[5] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*
[6] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*

g. Prohibit truck idling in excess of two minutes. *Mitigation not suitable for River Village because the nature of diesel motors does not lend them to constant turning on and off. Premature wear, and increased air emissions from turning the engines on and off, are common results. It is also extremely difficult to effectively monitor the implementation of this measure on an approximately 700-acre site with contractors who would be concerned about maintaining their equipment. Furthermore, the effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[8]

OFF-ROAD MOBILE SOURCE CONSTRUCTION EMISSIONS:

h. Use methanol-fueled pile drivers. *Any equipment that utilizes an alternative fuel that reduces VOC, NOx, and/or PM10 emissions is advisable. This measure is replaced in the impact analysis with another measure that considers other alternative fuels for diesel-fueled construction equipment.*
i. Suspend use of all construction equipment operations during second stage smog alerts. *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[9]
j. Prevent trucks from idling longer than two minutes. *Mitigation not suitable for River Village because the nature of diesel motors does not lend them to constant turning on and off. Premature wear, and increased air emissions from turning the engines on and off, are common results. It is also extremely difficult to effectively monitor the implementation of this measure on an approximately 700-acre site with contractors who would be concerned about maintaining their equipment. Furthermore, the effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[10]
k. Use electricity from power poles rather than temporary diesel-powered generators.
l. Use electricity from power poles rather than temporary gasoline-powered generators.
m. Use methanol- or natural gas-powered mobile equipment instead of diesel. *Any equipment that utilizes an alternative fuel that reduces VOC, NOx, and/or PM10 emissions is advisable.*
n. Use propane- or butane-powered on-site mobile equipment instead of gasoline. *Any equipment that utilizes an alternative fuel that reduces VOC, NOx, and/or PM10 emissions is advisable.*

OPERATION IMPACTS

4.10-8. The applicant of future subdivisions shall implement all rules and regulations adopted by the Governing Board of the SCAQMD which are applicable to the development of the subdivision (such as Rule 402 - Nuisance, Rule 1102 - Petroleum Solvent Dry Cleaners, Rule 1111 - NOx Emissions from Natural Gas-Fired, Fan-Type Central Furnaces, Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters) and which are in effect at the time of occupancy permit issuance.

4.10-9. Prior to the approval of each future subdivision proposed in association with the Newhall Ranch Specific Plan, each of the operational emission reduction measures indicated below (and in Tables 11-6 and 11-7 of the SCAQMD's CEQA *Air Quality Handbook*, as amended) shall be implemented if found applicable and feasible for that subdivision.

ON-ROAD MOBILE SOURCE OPERATIONAL EMISSIONS:

RESIDENTIAL USES

a. Include satellite telecommunications centers in residential subdivisions. *Mitigation not suitable for River Village because satellite telecommunications centers have been superseded by other technology.*
b. Establish a shuttle service from residential subdivisions to commercial core areas. *Mitigation not suitable for River Village because residential uses are in close proximity and within walking distance to commercial uses proposed within River Village.*
c. Construct on-site or off-site bus stops (*e.g.*, bus turnouts, passenger benches, and shelters).

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7 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*

8 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*

9 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-14.*

10 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-14.*

d. Construct off-site pedestrian facility improvements, such as overpasses and wider sidewalks. *Mitigation not suitable for River Village because no uses adjacent to the River Village site exist within Newhall Ranch to which pedestrian access would be warranted.*
e. Include retail services within or adjacent to residential subdivisions. *The proposed project is in conformance with this measure.*
f. Provide shuttles to major rail transit centers or multi-modal stations.
g. Contribute to regional transit systems (*e.g.*, right-of-way, capital improvements, *etc.*). *This measure does not directly contribute to reduced air emissions, emission reductions have not been quantified by SCAQMD,*[11] *and it is not given emissions reduction credit in the impact analysis.*
h. Synchronize traffic lights on streets impacted by development.
i. Construct, contribute, or dedicate land for the provision of off-site bicycle trails linking the facility to designated bicycle commuting routes.

COMMERCIAL USES

j. Provide preferential parking spaces for carpools and vanpools and provide 7'2" minimum vertical clearance in parking facilities for vanpool access.
k. Implement on-site circulation plans in parking lots to reduce vehicle queuing. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[12]
l. Improve traffic flow at drive-thru's by designing separate windows for different functions and by providing temporary parking for orders not immediately available for pickup. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[13]
m. Provide video-conference facilities. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[14]
n. Set up resident worker training programs to improve job/housing balance. *Mitigation not suitable for River Village because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site. Furthermore, the effectiveness of this measure to reduce air emissions in the basin lies in actually achieving jobs/housing balance. The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[15]
o. Implement home dispatching system where employees receive routing schedule by phone instead of driving to work. *Mitigation not suitable for River Village because it is outside the purview of the project applicant/developer to set up such a system. Such systems are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*
p. Develop a program to minimize the use of fleet vehicles during smog alerts (for business not subject to Regulation XV (now Rule 2202) or XII). *Mitigation not suitable for River Village because no commercial retail or office use on the site is expected to use fleet vehicles.*
q. Use low-emissions fleet vehicles:
   - TLEV
   - ULEV
   - LEV
   - ZEV

   Mitigation not suitable for River Village because no commercial retail or office use on the site is expected to use fleet vehicles.
r. Reduce employee parking spaces for those businesses subject to Regulation XV (now Rule 2202). *Rule 2202 applies to any employer who employs 250 or more employees on a full or part-time basis at a work site for a consecutive six-month period. It is conceivable that an office use employing as*

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[11] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-18.*
[12] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*
[13] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-19.*
[14] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-19.*
[15] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-19.*

many as 250 people can locate on the site; therefore, this mitigation measure applies to the River Village project. The requirement to achieve a specific AVR has been ruled unlawful by the federal government and is no longer recommended.[16]

s. Implement a lunch shuttle service from a work site(s) to food establishments. Mitigation not suitable for River Village because *Lots within River Village designated for mixed use commercial are expected to have food establishments located within walking distance, thereby not necessitating lunch shuttle service.*

t. Implement compressed work-week schedules where weekly work hours are compressed into fewer than five days.
   - 9/80
   - 4/40
   - 3/36

   Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.

u. Develop a trip reduction plan to achieve 1.5 AVR for businesses with less than 100 employees or multi-tenant work sites. *Mitigation not suitable for River Village because SCAQMD Rule 2202 applies to all employers who meet certain criteria for implementing trip reduction measures. The requirement to achieve a specific AVR has been ruled unlawful by the federal government and is no longer recommended.*

v. Utilize satellite offices rather than regular work site to reduce VMT. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*

w. Establish a home-based telecommuting program. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*

x. Provide on-site child care and after-school facilities or contribute to off-site development within walking distance. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*

y. Require retail facilities or special event centers to offer travel incentives such as discounts on purchases for transit riders. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site. Such a program to reduce air emissions in the Basin is not quantified by the SCAQMD and it is not given emission reduction credit in this impact analysis.*[17]

z. Provide on-site employee services such as cafeterias, banks, *etc.*

aa. Establish a shuttle service from residential core areas to the work site. *Mitigation not suitable for River Village because residential uses are proposed in close proximity and within walking distance to commercial uses proposed within River Village.*

ab. Construct on-site or off-site bus stops (*e.g.*, bus turnouts, passenger benches, and shelters).

ac. Implement a pricing structure for single-occupancy employee parking and/or provide discounts to ridesharers.

ad. Include residential units within a commercial project.

ae. Utilize parking in excess of code requirements as on-site park-n-ride lots or contribute to construction of off-site lots.

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[16] *In 1988, the SCAQMD instituted Regulation XV that required enterprises with 100 or more employees to adopt trip reduction programs. The regulation required each employer to institute a trip reduction program that would achieve an Average Vehicle Ridership (AVR) of 1.75 in Downtown Los Angeles, 1.5 in the remainder of urbanized areas, and 1.3 in rural parts of the District. AVR measures the extent to which commuters use public transit, car pooling, and other multiple-occupant-vehicle modes of transportation. Regulation XV was repealed in December, 1995 and was replaced with Rule 2202 which provides options for employers to either continue trip reduction programs or reduce mobile source emissions through other strategies. As of January 1, 1997 Rule 2202 applies only to enterprises with 250 or more employees.*

[17] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-20.*

af. Any two of the following:
   - Construct off-site bicycle facility improvements, such as bicycle trails linking the facility to designated bicycle commuting routes, or on-site improvements, such as bicycle paths.
   - Include bicycle parking facilities, such as bicycle lockers and racks.
   - Include showers for bicycling employees' use.

ag. Any two of the following:
   - Construct off-site pedestrian facility improvements, such as overpasses, wider sidewalks.
   - Construct on-site pedestrian facility improvements, such as building access which is physically separated from street and parking lot traffic and walk paths.
   - Include showers for pedestrian employees' use.

ah. Provide shuttles to major rail transit stations and multi-modal centers.

ai. Contribute to regional transit systems (*e.g.*, right-of-way, capital improvements, *etc.*) . *This measure does not directly contribute to reduced air emissions, emission reductions have not been quantified,*[18] *and it is not given emissions reduction credit in the impact analysis.*[19]

aj. Charge visitors to park. *Mitigation not suitable for River Village because charging visitors to park at retail establishments would discourage patronage. Charging visitors to park at the office uses would encourage patrons to park in retail parking spaces or on the street. Charging visitors to pay for parking at the park site would encourage on-street parking.*

ak. Synchronize traffic lights on streets impacted by development.

al. Reschedule truck deliveries and pickups to off-peak hours. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[20]

am. Set up paid parking systems where drivers pay at walkup kiosk and exit via a stamped ticket to reduce emissions from queuing vehicles. *Mitigation not suitable for River Village because charging visitors to park at retail establishments would discourage patronage. Charging visitors to park at the office uses would encourage patrons to park in retail parking spaces or on the street. Charging visitors to pay for parking at the park site would encourage on-street parking. The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[21]

an. Require on-site truck loading zones. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[22]

ao. Implement or contribute to public outreach programs. *Mitigation not suitable for the River Village applicant/developer because it is unclear as to what type of outreach program this mitigation measure refers. Furthermore, it is outside the purview of the project applicant/developer to set up such programs. Such programs are more appropriately set up and maintained by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site. Furthermore, the effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[23]

ap. Require employers not subject to Regulation XV (now Rule 2202) to provide commuter information area.

BUSINESS PARK USES

No Business Park uses are proposed within the River Village project.

aq. Provide preferential parking spaces for carpools and vanpools and provide 7'2" minimum vertical clearance in parking facilities for vanpool access.

ar. Implement on-site circulation plans in parking lots to reduce vehicle queuing.

as. Set up resident worker training programs to improve job/housing balance.

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18 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-18.*

19 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

20 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

21 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

22 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

23 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

bx. Use energy-efficient low-sodium parking lot lights.

COMMERCIAL USES

by. Use lighting controls and energy-efficient lighting.
bz. Use fuel cells in residential subdivisions to produce heat and electricity.
ca. Orient buildings to the north for natural cooling and include passive solar design (*e.g.*, daylighting).
cb. Use light-colored roofing materials to reflect heat.
cc. Increase walls and attic insulation beyond Title 24 requirements.
cd. Use solar or low emission water heaters.
ce. Use central water heating systems.
cf. Provide shade trees to reduce building heating/ cooling needs.
cg. Use energy-efficient and automated controls for air conditioners.
ch. Use double-paned windows.
ci. Use energy-efficient low-sodium parking lot lights.
cj. Use lighting controls and energy-efficient lighting.
ck. Use light-colored roofing materials to reflect heat.
cl. Increase walls and attic insulation beyond Title 24 requirements.
cm. Orient buildings to the north for natural cooling and include passive solar design (*e.g.*, daylighting).

BUSINESS PARK USES

No Business Park uses are proposed within the River Village project.

cn. Provide shade trees to reduce building heating/ cooling needs.
co. Use energy-efficient and automated controls for air conditioning.
cp. Use double-paned windows.
cq. Use energy-efficient low-sodium parking lot lights.
cr. Use lighting controls and energy-efficient lighting.
cs. Use light-colored roofing materials to reflect heat.
ct. Orient buildings to the north for natural cooling and include passive solar design (*e.g.*, daylighting).
cu. Increase walls and attic insulation beyond Title 24 requirements.
cv. Improved storage and handling or source materials.
cw. Materials substitution (*e.g.*, use water-based paints, life-cycle analysis).
cx. Modify manufacturing processes (*e.g.*, reduce process stages, closed-loop systems, materials recycling).
cy. Resource recovery systems that redirect chemicals to new production processes.

4.10-10. All non-residential development of 25,000 gross square feet or more shall comply with the County's Transportation Demand Management (TDM) Ordinance (Ordinance No. 93-0028M) in effect at the time of subdivision. The sizes and configurations of the Specific Plan's non-residential uses are not known at this time and the Ordinance specifies different requirements based on the size of the project under review. All current provisions of the ordinance are summarized in Appendix 4.10.

4.10-11. Subdivisions and buildings shall comply with Title 24 of the California Code of Regulations which are current at the time of development.

4.10-12. Lighting for public streets, parking areas, and recreation areas shall utilize energy efficient light and mechanical, computerized or photo cell switching devices to reduce unnecessary energy usage.

4.10-13. Any on-site subterranean parking structures shall provide adequate ventilation systems to disperse pollutants and preclude the potential for a pollutant concentration to occur. *Mitigation not suitable for River Village because no subterranean parking structures are proposed within the project. Furthermore, this measure reduces indoor air pollutants, but does not effectively reduce air emissions within the Basin.*

4.10-14. The sellers of new residential units shall be required to distribute brochures and other relevant information published by the SCAQMD or similar organization to new homeowners regarding the importance of reducing vehicle miles traveled and related air quality impacts, as well as on local opportunities for public transit and ridesharing.

Nonattainment Areas

Nonattainment Areas
1-Hour Ozone
8-Hour Ozone
Carbon Monoxide
Nitrogen Dioxide
Sulfur Dioxide
PM-10
PM-2.5
Lead

1-Hour Ozone Nonattainment Area Map

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Nonattainment Areas
1-Hour Ozone
8-Hour Ozone
Carbon Monoxide
Nitrogen Dioxide
Sulfur Dioxide
Particulate Matter
Lead

8-Hour Ozone Areas Listed by Category/Classification

As of September 27, 2004

n = area has whole or part county or counties in a current 1-hr Ozone nonattainment area
m = area has whole or part county or counties in a current 1-hr Ozone maintenance area
* = area has whole or part county or counties in 1-hr Ozone, CO, or PM-10 NAA or maintenance area

Category/Classification (Attainment Date)

SEVERE 17 (June 2021)
Los Angeles South Coast Air Basin, CA [n*]
EXTREME (June 2013)
Riverside Co. (Coachella Valley), CA [n*]
Sacramento Metro, CA [n*]
San Joaquin Valley, CA [n*]
MODERATE (June 2010)
Baltimore, MD [n*]
Boston-Lawrence-Worcester (E. MA), MA [n*]
Boston-Manchester-Portsmouth(SE),NH [n*]
Cass Co, MI
Charlotte-Gastonia-Rock Hill, NC-SC [m*]
Chicago-Gary-Lake County, IL-IN [n*]
Cleveland-Akron-Lorain, OH [m*]
Dallas-Fort Worth, TX [n*]
Detroit-Ann Arbor, MI [m*]
Fredericksburg, VA [n*]
Greater Connecticut, CT [n*]
Houston-Galveston-Brazoria, TX [n*]
Jefferson Co, KY [n*]
Kent and Queen Anne's Cos, MD [n*]
La Porte, IN
Lancaster, PA [n*]
Los Angeles-San Bernardino Co(W Mojave),CA [n*]
Memphis, TN-AR [m*]
Milwaukee-Racine, WI [n*]
Muskegon, MI [m*]
New York-N. New Jersey-Long Island,NY-NJ-CT [n*]
Philadelphia-Wilmington-Atlantic Cl,PA-NJ-MD-DE [n*]
Poughkeepsie, NY [n*]
Providence (All RI), RI [n*]
Richmond-Petersburg, VA [m*]
Sheboygan, WI [m*]
Springfield (Western MA), MA [n*]
St Louis, MO-IL [m*]
Ventura Co, CA [n*]
Washington, DC-MD-VA [n*]
MARGINAL (June 2007)
Atlanta, GA [n*]
Baton Rouge, LA [n*]
Beaumont-Port Arthur, TX [n*]
Imperial Co, CA [n*]
Norfolk-Virginia Beach-Newport News (HR),VA [m*]
Portland, ME [n*]
San Francisco Bay Area, CA [n*]
SUBPART 1 (June 2009)
Albany-Schenectady-Troy, NY [n*]
Allegan Co, MI [m*]
Allentown-Bethlehem-Easton, PA [n*]
Altoona, PA [n*]
Amador and Calaveras Cos (Central Mtn), CA
Benton Harbor, MI
Berrie Co, MI
Birmingham, AL [n*]
Buffalo-Niagara Falls, NY [n*]
Canton-Massillon, OH [m*]
Charleston, WV [m*]
Chico, CA [n*]
Cincinnati-Hamilton, OH-KY-IN [nm*]
Clarksville-Hopkinsville, TN-KY
Clearfield and Indiana Cos, PA
Columbus, OH [m*]
Dayton-Springfield, OH [m*]
Door Co, WI [m*]
Erie, PA [n*]
Essex Co (Whiteface Mtn), NY [n*]
Evansville, IN [m*]
Flint, MI [m*]
Fort Wayne, IN
Franklin Co, PA [n*]
Grand Rapids, MI [m*]
Greene Co, IN
Greenb Co, PA [n*]
Hancock, Knox, Lincoln & Waldo Cos, ME [nm*]
Harrisburg-Lebanon-Carlisle, PA [n*]
Haywood and Swain Cos (Great Smoky NP), NC
Huntington-Ashland, WV-KY [m*]
Huron Co, MI
Indianapolis, IN [m*]
Jackson Co, IN
Jamestown, NY
Johnstown, PA [n*]
Kalamazoo-Battle Creek, MI
Kern Co (Eastern Kern), CA [n*]
Kewaunee Co, WI [m*]
Knoxville, TN [m*]
Lansing-East Lansing, MI
Las Vegas, NV [*]
Lima, OH
Louisville, KY-IN [m*]
Macon, GA
Madison and Page Cos (Shenandoah NP), VA
Manitowoc Co, WI [m*]
Mariposa and Tuolumne Cos (Southern Mtn),CA

Mason Co, MI
Muncie, IN
Murray Co (Chattahoochee Nat Forest), GA
Nevada Co (Western Part), CA
Parkersburg-Marietta, WV-OH [m*]
Phoenix-Mesa, AZ [m*]
Pittsburgh-Beaver Valley, PA [m*]
Raleigh-Durham-Chapel Hill, NC [m*]
Reading, PA [m*]
Rochester, NY
Rocky Mount, NC
San Diego, CA [m*]
Scranton-Wilkes-Barre, PA [m*]
South Bend-Elkhart, IN [m*]
State College, PA
Steubenville-Weirton, OH-WV [m*]
Sutter Co (Sutter Butte), CA [m*]
Terre Haute, IN
Tioga Co, PA
Toledo, OH [m*]
Wheeling, WV-OH
York, PA [m*]
Youngstown-Warren-Sharon, OH-PA [mm*]

MODERATE NAC (December 2007)

Greensboro-Winston Salem-High Point, NC [m*]

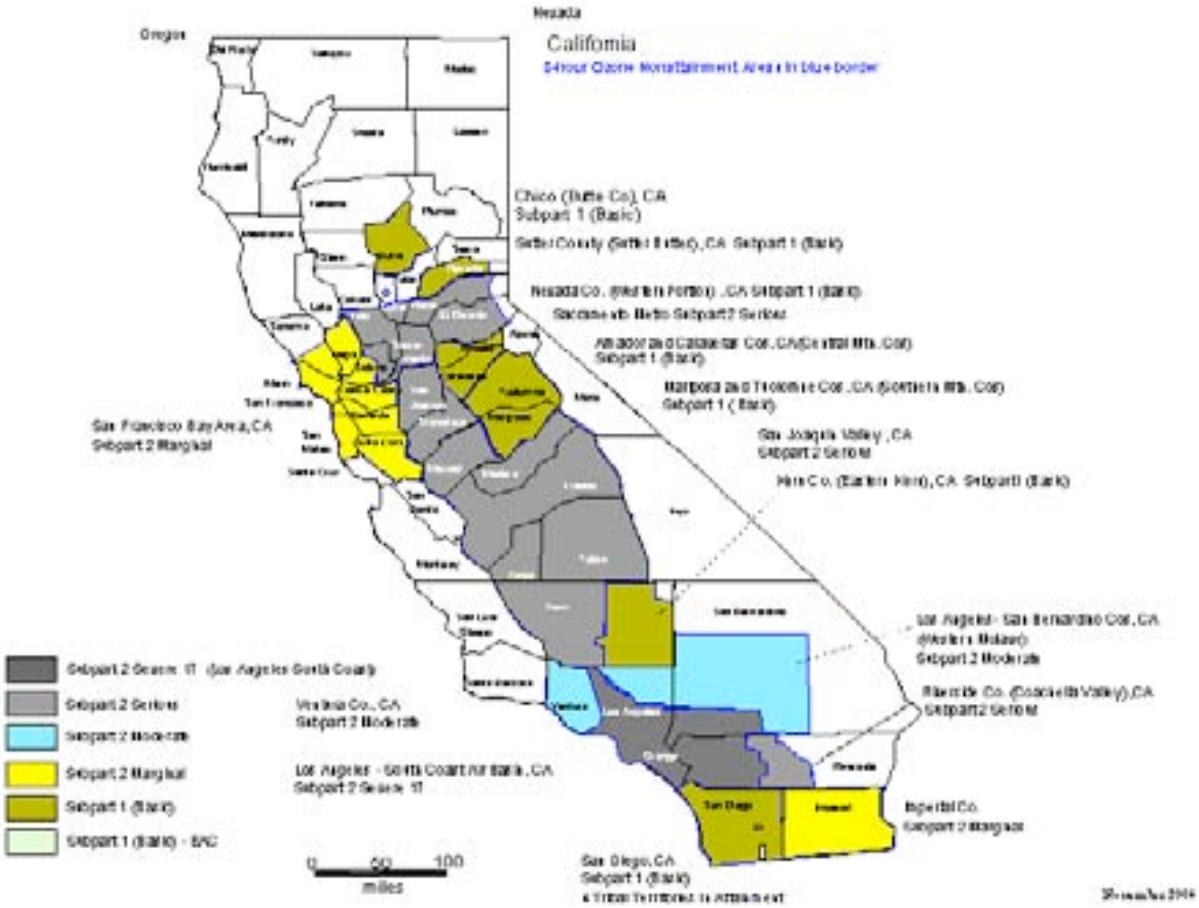
SUBPART 1 NAC (December 2007)

Berkeley and Jefferson Counties, WV
Chattanooga, TN-GA
Columbia, SC
Denver-Boulder-Greeley-Ft Collins-Love., CO [m*]
Fayetteville, NC
Frederick Co, VA
Greenville-Spartanburg-Anderson, SC
Hickory-Morganton-Lenoir, NC
Johnson City-Kingsport-Bristol, TN
Nashville, TN [m*]
Roanoke, VA
San Antonio, TX
Washington Co (Hagerstown), MD

Nonattainment Areas
1-Hour Ozone
8-Hour Ozone
Carbon Monoxide
Nitrogen Dioxide
Sulfur Dioxide
PM-10
PM-2.5
Lead

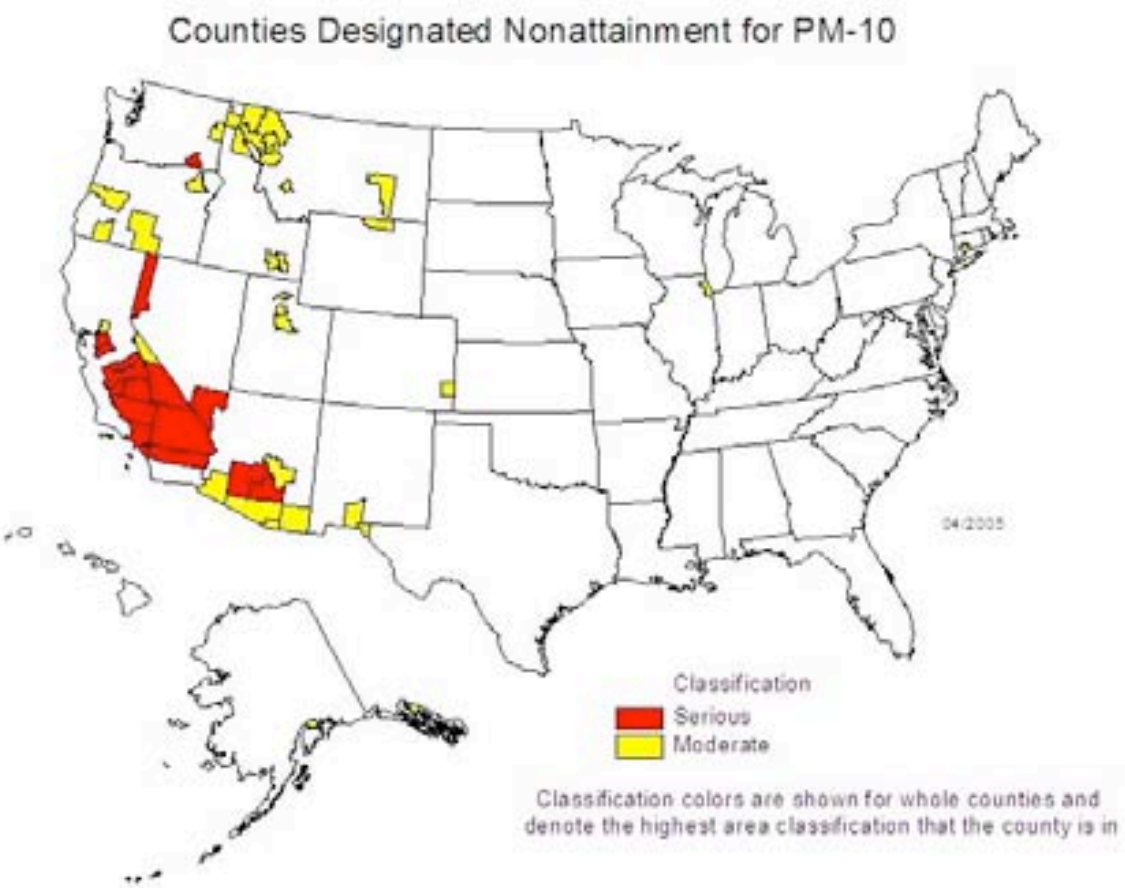
Carbon Monoxide Nonattainment Area Map

Nonattainment Areas
1-Hour Ozone
8-Hour Ozone
Carbon Monoxide
Nitrogen Dioxide
Sulfur Dioxide
PM-10
PM-2.5
Lead



Nonattainment Areas
1-Hour Ozone
8-Hour Ozone
Carbon Monoxide
Nitrogen Dioxide
Sulfur Dioxide
PM-10
PM-2.5
Lead

Particulate Matter Nonattainment Area Map



U.S. Environmental Protection Agency

Green Book

Particulate Matter Nonattainment Areas

As of September 27, 2004

Areas listed Alphabetically	Classification	No. Counties NAA	Pop (1,000)	EPA Region	State
Ajo (Pima County), AZ	Moderate	1	8	9	AZ
Anthony, NM	Moderate	1	3	6	NM
Bonner Co. (Sandpoint), ID	Moderate	1	37	10	ID
Butte, MT	Moderate	1	35	8	MT
Clark Co. NV	Serious	1	1376	9	NV
Coachella Valley, CA	Serious	1	182	9	CA
Columbia Falls, MT	Moderate	1	4	8	MT
Coso Junction, CA	Moderate	1	7	9	CA
Dowling (Yavapai County), AZ	Moderate	1	16	9	AZ
Eagle River, AK	Moderate	1	195	10	AK
El Paso Co. TX	Moderate	1	564	6	TX
Eugene-Springfield, OR	Moderate	1	179	10	OR
Flathead County/ Whitefish and vicinity, MT	Moderate	1	5	8	MT
Fort Hall Reservation, ID	Moderate	2	1	10	ID
Hayden/Miami, AZ	Moderate	2	4	9	AZ
Imperial Valley, CA	Serious	1	170	9	CA
Juneau, AK	Moderate	1	14	10	AK
Kalispell, MT	Moderate	1	15	8	MT
LaGrande, OR	Moderate	1	12	10	OR
Lake Co. OR	Moderate	1	7	10	OR
Lamar, CO	Moderate	1	9	8	CO
Lame Deer, MT	Moderate	1	1	8	MT
Lane Co. OR	Moderate	1	3	10	OR
Libby, MT	Moderate	1	3	8	MT
Los Angeles South Coast Air Basin, CA	Serious	4	14594	9	CA
Lyons Twp., IL	Moderate	1	109	5	IL
Medford-Ashland, OR	Moderate	1	78	10	OR
Missoula, MT	Moderate	1	52	8	MT
Mono Basin, CA	Moderate	1	0	9	CA
Mun. of Guayama, PR	Moderate	1	92	2	PR
New Haven Co. CT	Moderate	1	124	1	CT
New York Co. NY	Moderate	1	1537	2	NY
Nogales, AZ	Moderate	1	25	9	AZ
Ogden, UT	Moderate	1	17	8	UT
Owens Valley, CA	Serious	1	7	9	CA
Paul Spur, AZ	Moderate	1	1	9	AZ
Phoenix, AZ	Serious	2	3112	9	AZ
Pinehurst, ID	Moderate	1	2	10	ID
Polson, MT	Moderate	1	4	8	MT
Portneuf Valley, ID	Moderate	2	64	10	ID
Rillito, AZ	Moderate	1	1	9	AZ
Ronan, MT	Moderate	1	3	8	MT
Sacramento Co. CA	Moderate	1	1327	9	CA
Salt Lake Co. UT	Moderate	1	898	8	UT
San Bernardino Co. CA	Moderate	1	198	9	CA
San Joaquin Valley, CA	Serious	7	3080	9	CA
Sanders County (part)/Thompson Falls and vicinity, MT	Moderate	1	1	8	MT
Sheridan, WY	Moderate	1	16	8	WY
Shoshone Co. ID	Moderate	1	10	10	ID
Southeast Chicago, IL	Moderate	1	3	5	IL
Spokane Co. WA	Moderate	1	205	10	WA
Steamboat Springs	Moderate	1	10	8	CO
Trona, CA	Moderate	1	4	9	CA
Utah Co. UT	Moderate	1	369	8	UT
Wallula, WA	Serious	1	0	10	WA
Wasatch Co. UT	Serious	1	119	8	UT
Weirton, WV	Moderate	2	15	3	WV
Yakima Co. WA	Moderate	1	64	10	WA
Yuma, AZ	Moderate	1	82	9	AZ
59 Total Areas		58	29,190		

No. of Counties NAA reflects the number of counties in the NAA, while the total count accounts for more than one area being in a county.

Last updated on Friday, October 1st, 2004
URL: http://www.epa.gov/air/oaqps/greenbk/pnaa.html

U.S. Environmental Protection Agency. "1-Hour Ozone Nonattainment Area Map." [Online] 26 October 2004. <http://www.epa.gov/air/oaqps/greenbk/la-scabo.html>.

U.S. Environmental Protection Agency. "8-Hour Ozone Areas Listed by Category/Classification as of September 27, 2004." [Online] 26 October 2004. <http://www.epa.gov/air/oaqps/greenbk/gnc.html>.

U.S. Environmental Protection Agency. "Carbon Monoxide Nonattainment Area Map." [Online] 26 October 2004. <http://www.epa.gov/air/oaqps/greenbk/losangc.html>.

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Unmitigated Construction Emissions

Project Name	River Village	Unmitigated Emissions
Subphase	Weeks 1 thru 19	
Length of Subphase (weeks)	19.00	
Year	2006	
Total Acreage	120.28	

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust	–	–	–	–	19,407.42	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.65	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.35	–	65.65	
Worker Commute Trips	15.58	1.71	2.50	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	9,703.71	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	0.00	–	–	–	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	–	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	–	0.00	–	–	–	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,987.28	410.56	1,543.43	1.72	9,772.76	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	

Project Name	River Village	Unmitigated Emissions
Subphase	Weeks 20 thru 39	
Length of Subphase (weeks)	20.00	
Year	2006	
Total Acreage	126.61	

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust	–	–	–	–	19,368.70	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	–	65.65	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	9,696.85	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.91	–	–	–	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,126.34	–	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	23.98	2.86	12.29	0.11	0.28	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	–	0.00	–	–	–	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,368.20	582.35	2,688.18	1.88	9,813.02	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	

Project Name: River Village Unmitigated Emissions
Subphase: Weeks 40 thru 46
Length of Subphase (weeks): 7.00
Year: 2006
Total Acreage: 44.31

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust	–	–	–	–	19,407.42	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	236.13	1,521.56	–	65.65	
Worker Commute Trips	15.38	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	9,703.71	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,126.24	–	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	222.74	1,654.08	–	72.90	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	–	151.01	–	–	–	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	5,089.89	960.19	4,341.75	1.86	9,892.94	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	

Project Name River Village Unmitigated Emissions
Subphase Weeks 47 thru 91
Length of Subphase (weeks) 45.00
Year 2006
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	21.98	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	10.99	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,136.24	–	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	8.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	222.74	1,654.06	–	72.90	
Worker Commute Trips	25.51	2.80	4.25	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	–	151.01	–	–	–	
Worker Commute Trips	25.51	2.80	4.25	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,102.61	549.63	2,798.32	0.15	131.16	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Week 92
Length of Subphase (weeks) 1.00
Year 2007
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,373.05	167.28	1,085.87	–	41.95	
On-Road Diesel Exhaust Emissions	4.65	0.61	4.80	0.01	0.30	
Worker Commute Emissions	11.29	1.25	2.11	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	2,159.16	275.61	1,931.00	–	79.99	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Architectural Painting						
Off-Gas Emissions	–	151.50	–	–	–	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,693.81	603.46	3,035.29	0.06	122.52	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 93 thru 144
Length of Subphase (weeks) 52.00
Year 2007
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	0.02	–	–	–	
Off-Road Diesel Exhaust Emissions	1,373.05	167.28	1,085.87	–	41.98	
On-Road Diesel Exhaust Emissions	0.08	0.01	0.11	0.00	0.00	
Worker Commute Emissions	11.29	1.25	2.11	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,872.07	240.07	1,668.55	–	70.48	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Architectural Painting						
Off-Gas Emissions	–	141.73	–	–	–	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,306.30	555.86	2,790.95	0.05	112.86	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 145 thru 158
Length of Subphase (weeks) 14.00
Year 2008
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,385.56	167.28	1,658.35	–	38.46	
On-Road Diesel Exhaust Emissions	3.79	0.57	5.39	0.01	0.10	
Worker Commute Emissions	10.38	1.15	1.94	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,685.60	212.51	1,433.80	–	58.55	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	–	141.66	–	–	–	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,136.78	528.79	2,527.25	0.05	97.52	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 159 thru 178
Length of Subphase (weeks) 21.00
Year 2009
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	0.00	–	–	–	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	–	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,726.62	212.51	1,394.91	–	53.47	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	–	141.66	–	–	–	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,764.79	358.43	1,402.06	0.03	53.80	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 179 thru 196
Length of Subphase (weeks) 18.00
Year 2009
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	0.00	–	–	–	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	–	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,515.09	187.20	1,239.14	–	48.23	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Architectural Painting						
Off-Gas Emissions	–	141.24	–	–	–	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,549.35	332.26	1,245.55	0.03	48.53	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 197 thru 210
Length of Subphase (weeks) 13.00
Year 2009
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,041.33	128.61	850.48	--	33.06	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Architectural Painting						
Off-Gas Emissions	--	87.64	--	--	--	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,064.36	218.82	854.79	0.02	33.26	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name: River Village Unmitigated Emissions
Subphase: Weeks 211 thru 220
Length of Subphase (weeks): 10.00
Year: 2010
Total Acreage:

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	0.00	–	–	–	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	–	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	779.57	93.89	598.66	–	21.99	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Architectural Painting						
Off-Gas Emissions	–	39.26	–	–	–	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	794.57	134.83	596.44	0.01	22.03	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 221 thru 235
Length of Subphase (weeks) 15.00
Year 2010
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	0.00	–	–	–	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	–	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	491.65	59.17	372.96	–	13.64	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Architectural Painting						
Off-Gas Emissions	–	11.78	–	–	–	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	500.54	71.95	374.61	0.01	13.72	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	No	Yes	No	No	

River Village Office Construction Only Unmitigated Emissions

Weeks of Construction: 140

Year Constr. Begins: 2015

Calculated Emissions

Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	894.12	106.21	665.11	–	23.88	
Worker Commute Trips	10.90	1.20	2.05	0.02	0.08	
Architectural Painting						
Off-Gas Emissions	–	38.48	–	–	–	
Worker Commute Trips	10.90	1.20	2.03	0.02	0.08	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	905.93	147.09	669.17	0.03	24.03	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

2002 Annual Average Daily Truck Traffic on the California State Highway System

2002

Annual Average Daily Truck Traffic on the California State Highway System

Compiled by
Traffic and Vehicle Data Systems

State of California
Business, Transportation and Housing Agency
Department of Transportation

Prepared in cooperation with the
U.S. Department of Transportation
Federal Highway Administration

FEBRUARY 2004

RTE	DIST	CNTY	POST MILE	LEG	DESCRIPTION	VEHICLE AADT TOTAL	TRUCK AADT TOTAL	TRUCK % TOT VEH	TRUCK AADT TOTAL By Axle 2	3	4	5+	% TRUCK AADT By Axle 2	3	4	5+	EAL 1-WAY (1000)	YEAR VER/ EST
126	07	VEN	.001	A	JCT RTE 101	43500	1927	4.43	871	140	61	855	45.19	7.29	3.14	44.39	347	02E
126	07	VEN	1.448	A	VICTORIA AVENUE	44500	3204	7.2	1426	333	103	1342	44.5	10.4	3.2	41.9	559	92V
126	07	VEN	5.031	B	JCT. RTE. 118 EAST	36000	1944	5.4	878	142	61	863	45.19	7.29	3.14	44.39	350	02E
126	07	VEN	R5.031	A	JCT. RTE. 118 EAST	50000	2465	4.93	1114	180	77	1094	45.19	7.29	3.14	44.39	444	02E
126	07	VEN	R10.629	O	LAURIE LANE PED OC; E/O PECK RD	39500	2263	5.73	1023	165	71	1005	45.19	7.29	3.14	44.39	408	02V
126	07	VEN	R12.042	B	JCT. RTE. 150 NORTH	35000	2219	6.34	935	153	66	1066	42.13	6.89	2.96	48.02	424	02E
126	07	VEN	R12.042	A	JCT. RTE. 150 NORTH	28500	2551	8.95	997	166	71	1318	39.08	6.5	2.77	51.65	515	02E
126	07	VEN	21.237	B	FILLMORE, JCT. RTE. 23 SOUTH	29500	2859	9.69	1030	174	74	1580	36.03	6.1	2.59	55.28	608	02E
126	07	VEN	21.137	A	FILLMORE, JCT. RTE. 23 SOUTH	28500	2745	9.63	905	157	66	1617	32.97	5.71	2.41	58.91	614	02E
126	07	VEN	R30.8	O	PIRU	19600	2824	14.41	845	150	63	1766	29.92	5.31	2.23	62.54	662	02V
126	07	LA	R0	A	VENTURA/LOS ANGELES COUNTY LINE	19600	4296	21.92	644	1379	185	2088	14.99	32.1	4.31	48.6	897	90E
126	07	LA	R5.801	B	WEST OF NORTH JCT RTE 5	23700	2953	12.46	884	157	66	1847	29.92	5.31	2.23	62.54	692	02E

URBEMIS2002 Unmitigated Operational Emissions – Summertime

URBEMIS 2002 For Windows 7.5.0

File Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
Project Name: River Village Operational Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	78.83	31.65	21.52	0.17	0.08
TOTALS (lbs/day, mitigated)	77.29	26.13	10.61	0.00	0.05

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	342.42	391.84	4,155.89	2.47	377.33
TOTALS (lbs/day, mitigated)	342.41	391.82	4,155.68	2.47	377.31

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	421.25	423.49	4,177.40	2.65	377.40
TOTALS (lbs/day, mitigated)	419.69	417.94	4,166.29	2.47	377.36

URBEMIS 2002 For Windows 7.5.0

File Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
Project Name: River Village Operational Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	2.40	31.52	13.20	-	0.06
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.97	0.13	8.32	0.17	0.02
Consumer Prdcts	75.46	-	-	-	-
TOTALS(lbs/day,unmitigated)	78.83	31.65	21.52	0.17	0.08

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	56.31	60.90	669.83	0.39	59.43
Apartments low rise	32.54	32.68	359.42	0.21	31.89
Condo/townhouse general	31.93	33.14	364.51	0.21	32.34
Elementary school	20.51	10.98	116.55	0.07	10.66
City park	0.71	0.49	5.16	0.00	0.47
Comercial Center 10-30 ac	91.46	120.96	1,259.13	0.76	115.66
Commercial Center <10 ac.	42.72	57.47	598.28	0.36	54.96
Commercial Shops	2.41	3.13	32.54	0.02	2.99
Commercial Office	63.82	72.09	750.48	0.45	68.94
TOTAL EMISSIONS (lbs/day)	342.42	391.84	4,155.89	2.47	377.33

Does not include correction for passby trips.
Includes a double counting reduction for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2007 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	591.00	5,850.90
Apartments low rise	6.90 trips / dwelling units	455.00	3,139.50
Condo/townhouse general	8.00 trips / dwelling units	398.00	3,184.00
Elementary school	1.45 trips / students	750.00	1,087.50
City park	2.60 trips / acres	20.90	54.34
Comercial Center 10-30 ac	54.06 trips / 1000 sq. ft.	252.00	13,623.12
Commercial Center <10 ac.	85.06 trips / 1000 sq. ft.	76.10	6,473.07
Commercial Shops	37.06 trips / 1000 sq. ft.	9.50	352.07
Commercial Office	11.56 trips / 1000 sq. ft.	702.40	8,119.74

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.20	1.80	97.80	0.40
Light Truck < 3,750 lbs	15.10	3.30	94.00	2.70
Light Truck 3,751- 5,750	16.10	1.90	96.90	1.20
Med Truck 5,751- 8,500	7.10	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.10	0.00	0.00	100.00
Motorcycle	1.70	82.40	17.60	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			

% of Trips - Commercial (by land use)

Elementary school	20.0	10.0	70.0
City park	5.0	2.5	92.5
Comercial Center 10-30 ac.	2.0	1.0	97.0
Commercial Center <10 ac.	2.0	1.0	97.0
Commercial Shops	2.0	1.0	97.0
Commercial Office	2.0	1.0	97.0

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The area souce mitigation measure option switch changed from off to on.
The natural gas residential percentage changed from 60 to 100.
The percentage of wood stoves changed from 35 to 0.
The landscape length of the summer period (in days) changed from 180 to 365.
The landscape year changed from 2004 to 2007.
The consumer product persons per residential unit changed from 2.861 to 3.056.
Mitigation measure Orient Buildings North/South: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure All Electric Landscape Maintenance Equipment: Rsdntl Lndscp Maint.
has been changed from off to on.
Mitigation measure Central Water Heater: Cmrcl Space Heat.
has been changed from off to on.
Mitigation measure Orient Buildings North/South: Cmrcl Space Heat.
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Mitigation measure All Electric Landscape Maintenance Equipment: Cmrcl Lndscp Maint.
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Changes made to the default values for Operations

The operational emission year changed from 2004 to 2007.
The double counting internal work trip limit changed from to 791.577.
The double counting shopping trip limit changed from to 395.7885.
The double counting other trip limit changed from to 5234.992.
The travel mode environment settings changed from both to: both
Mitigation measure Mixed Use Project (Residential Oriented):3
has been changed from off to on.
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Furniture:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Mixed Use Project (Commercial Oriented):1
has been changed from off to on.
Mitigation measure Floor Area Ratio 0.75 or Greater:1
has been changed from off to on.
Mitigation measure Provide Wide Sidewalks and Onsite Pedestrian Facilities:1
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Project Provides Shade Trees to Shade Sidewalks:0.5
has been changed from off to on.
Mitigation measure Project Provides Street Art and/or Street Furniture:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety Designs/Infrastructure at Crossings:0.5
has been changed from off to on.
Mitigation measure Articulated Storefront(s) Display Windows with Visual Interest:0.25
has been changed from off to on.
Mitigation measure No Long Uninterrupted Walls Along Pedestrian Walkways:0.25
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.
Mitigation measure Provide Securre Bicycle Parking:1
has been changed from off to on.
Mitigation measure Provide Employee Lockers and Showers:1
has been changed from off to on.
Mitigation measure Shuttle Bus Service to Transit/Multi-Modal Center:2
has been changed from off to on.
Mitigation measure Preferential Carpool/Vanpool Parking:1.5
has been changed from off to on.
Mitigation measure Many Frequently Needed Services Provided:5

has been changed from off to on.
Mitigation measuremitop5: Park and Ride Lots
has been changed from on to off.

URBEMIS2002 Unmitigated Operational Emissions – Wintertime

URBEMIS 2002 For Windows 7.5.0

File Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
Project Name: River Village Operational Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,695.26	49.89	1,797.29	2.83	244.44
TOTALS (lbs/day, mitigated)	1,694.70	44.49	1,794.71	2.83	244.43

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	330.01	566.89	4,005.67	2.01	377.33
TOTALS (lbs/day, mitigated)	330.00	566.86	4,005.48	2.01	377.31

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	2,025.28	616.78	5,802.96	4.83	621.77
TOTALS (lbs/day, mitigated)	2,024.69	611.36	5,800.19	4.83	621.74

URBEMIS 2002 For Windows 7.5.0

ile Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
roject Name: River Village Operational Emissions
roject Location: South Coast Air Basin (Los Angeles area)
n-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Winter)

REA SOURCE EMISSION ESTIMATES (Winter Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	2.40	31.52	13.20	-	0.06
Wood Stoves	0.00	0.00	0.00	0.00	0.00
Fireplaces	1,617.41	18.36	1,784.09	2.83	244.38
Landscaping - No winter emissions					
Consumer Prdcts	75.46	-	-	-	-
TOTALS(lbs/day,unmitigated)	1,695.26	49.89	1,797.29	2.83	244.44

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
ingle family housing	52.80	88.27	633.57	0.32	59.43
partments low rise	28.40	47.36	339.97	0.17	31.89
ondo/townhouse general	28.77	48.03	344.78	0.18	32.34
lementary school	9.34	15.91	110.82	0.06	10.66
ity park	0.42	0.71	5.00	0.00	0.47
omercial Center 10-30 ac	100.15	174.82	1,226.28	0.61	115.66
ommercial Center <10 ac.	47.56	83.07	582.67	0.29	54.96
ommercial Shops	2.59	4.52	31.69	0.02	2.99
ommercial Office	59.98	104.20	730.89	0.36	68.94
OTAL EMISSIONS (lbs/day)	330.01	566.89	4,005.67	2.01	377.33

oes not include correction for passby trips.
ncludes a double counting reduction for internal trips.

PERATIONAL (Vehicle) EMISSION ESTIMATES

nalysis Year: 2007 Temperature (F): 50 Season: Winter

MFAC Version: EMFAC2002 (9/2002)

ummary of Land Uses:

Jnit Type	Trip Rate	Size	Total Trips
ingle family housing	9.90 trips / dwelling units	591.00	5,850.90
partments low rise	6.90 trips / dwelling units	455.00	3,139.50
ondo/townhouse general	8.00 trips / dwelling units	398.00	3,184.00
lementary school	1.45 trips / students	750.00	1,087.50
ity park	2.60 trips / acres	20.90	54.34
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Light Auto	55.20	1.80	97.80	0.40
Light Truck < 3,750 lbs	15.10	3.30	94.00	2.70
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ed Truck 5,751- 8,500	7.10	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
ed-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
eavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
rban Bus	0.10	0.00	0.00	100.00
otorcycle	1.70	82.40	17.60	0.00
School Bus	0.10	0.00	0.00	100.00
otor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			

% of Trips - Commercial (by land use)			
Elementary school	20.0	10.0	70.0
City park	5.0	2.5	92.5
Comercial Center 10-30 ac.	2.0	1.0	97.0
Commercial Center <10 ac.	2.0	1.0	97.0
Commercial Shops	2.0	1.0	97.0
Commercial Office	2.0	1.0	97.0

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has been changed from off to on.
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Mitigation measure Many Frequently Needed Services Provided:5

age: 6

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litigation measuremitop5: Park and Ride Lots
has been changed from on to off.

Construction Health Risk Assessment
for
Landmark Village

Prepared for:
The Newhall Land and Farming Company
Valencia, California

Prepared by:
Impact Sciences, Inc.
3256 Penryn Road, Suite # 220
Loomis, California 95650

May 2006

SUMMARY

This assessment evaluates the health impacts due to diesel exhaust particulate matter (DPM) emitted by diesel trucks and equipment associated with construction of the Landmark Village project (proposed project). The proposed project site is bounded by State Route 126 (SR-126) on the northern boundary and by the Santa Clara River on the southern boundary. The proposed project will consist of 308 single-family residential units; 685 condominiums; 451 apartments; 337,600 square feet (sq. ft.) of retail area; 695,400 sq. ft. of office space; 70,000 sq. ft. of school buildings; and 16.1 acres of park area. Total development is anticipated to occur over a 251-week period. Also, a utility corridor extending approximately 39,800 feet in length and 35 feet wide was considered as a part of the proposed project. The utility corridor includes the infrastructure components for potable water, sewer, reclaimed water, and natural gas. The sources of DPM include on-road trucks and diesel-powered construction equipment like front-end loaders, bulldozers, and scrappers.

The South Coast Air Quality Management District (SCAQMD) recommends the following significance criteria for health risk assessments:

- Criterion 1: a greater than 10 in 1 million (10×10^{-6}) lifetime probability of contracting cancer; and
- Criterion 2: a health hazard index of 1.0 for evaluating the non-carcinogenic effects of toxic air contaminants.

Using SCAQMD's thresholds of significance, the health risk assessment finds that the maximum anticipated cancer risks associated with the construction of the proposed project are 1.2, 1.7, and 0.3 in 1 million at workplace, residential, and sensitive receptors, respectively. The assessment also finds that the chronic hazard indices for non-cancer health impacts are well below 1.0 at the maximally exposed receptors under this construction scenario. The health impacts associated with the construction of the proposed project are below the significance criteria and are, therefore, less than significant.

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4.0	MODELING METHODOLOGY	6
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B ISCST3 Files
C Calculations of Chronic Hazard Indices

1.0 GENERAL

On August 27, 1998, the California Air Resources Board (CARB) designated particulate emissions from diesel-fueled engines or DPM as a toxic air contaminant. The proposed construction of the proposed project will involve diesel trucks and diesel-powered mobile equipment. This health risk assessment evaluates the risk from DPM to determine if it is significant under CEQA.

The SCAQMD *California Environmental Quality Act (CEQA) Air Quality Handbook*[1] recommends a lifetime probability of contracting cancer greater than 10 in 1 million (10×10^{-6}) as a significance threshold for evaluating health impacts from toxic air contaminants. The *CEQA Air Quality Handbook* further identifies a health hazard index of 1.0 as an additional significance threshold for evaluating non-carcinogenic effects of toxic air contaminants.

1.1 Project Description

The proposed development at Landmark Village is within the South Coast Air Basin, which is under the jurisdiction of SCAQMD. The proposed project consists of 308 single-family residential units; 685 condominiums; 451 apartments; 337,600 sq. ft. of retail area; 695,400 sq. ft. of office space; 70,000 sq. ft. of school buildings; and 16.1 acres of park area. The construction of the utility corridor that provides the infrastructure components such as potable water, reclaimed water, sewer, and natural gas is also considered part of the proposed project. Total development is anticipated to occur over a 251-week period. The construction schedule is mainly divided into three phases: grading, asphalt paving, and building construction. Grading and asphalt paving are anticipated to occur during the first 75 weeks, and the building construction phase is anticipated to occur from week 76 to week 251. The construction of the utility corridor will occur over 52-week period starting in week one along with grading and asphalt paving. The construction of the utility corridor is also divided in three different phases: grading, grading and water tanks construction, and grading and water tanks welding and coating. These three phases are anticipated to occur over the first 30 weeks, week 31 to week 48, and week 49 to week 52, respectively. Currently, the project site is either used for agricultural crop production or is vacant, and no demolition is required. The project site is bounded by SR-126 on the northern boundary and by the Santa Clara River on the southern boundary. Two soil borrow areas are proposed in the vicinity of the northern and southern boundary of the project site.

---

1 *CEQA Air Quality Handbook*, South Coast Air Quality Management District, April 1993.

2.0 SOURCE DESCRIPTION

Figure 1, Conceptual Site Plan, shows the site plan for the proposed project. For this analysis, the whole site is modeled as an area source consisting of DPM emissions from truck and construction equipment.

The on- and off-road vehicles and equipment that emit DPM and are associated with construction of the proposed project include:

- Diesel-fueled construction equipment (e.g., scrapers, tractors, backhoes, rollers);
- Heavy-duty diesel trucks (e.g., haul trucks and on-site water trucks)

These sources will travel through the proposed development area depending on the construction phases which include grading, building construction, application of architectural coatings, and asphalt paving. For modeling purposes, the whole site is divided into five parts. Every part is considered as a separate area source, and it is assumed that the diesel trucks and construction equipment will operate throughout the whole area. Similarly, the utility corridor is divided into 10 different parts to facilitate modeling. Also, every part of the utility corridor is considered as a separate area source, and it is assumed that the diesel trucks and construction equipment will operate throughout the utility corridor. **Table 1**, below, provides information about the area sources.

Table 1
Source Description

Area Source ID	No. of Vertices	Area in sq. m.
I	20	218,351.3
II	13	222,649.6
III	20	204,169.9
IV	13	286,594.2
V	18	286,522.8
UCHRA1	12	278,253.3
UCHRA2	20	289,227.3
UCHRA3	10	455,337.6
UCHRA4	11	95,374.2
UCHRA5	4	173,353.3
UCHRA6	4	311,792.2
UCHRA7	4	216,796.2
UCHRA8	8	89,050.6
UCHRA9	9	82,513.9
UCHRA10	10	74,962.8

Source: Impact Sciences, Inc., 2006.

In the site-grading phase, the trucks will haul earth material from the borrow site and will dump their loads on site. The typical on-site round-trip travel distance was estimated to be 4 miles. The typical workday was estimated to be 10 hours (i.e., from 8 AM to 6 PM).

3.0 CALCULATION OF EMISSIONS

Unmitigated construction emissions were estimated based on the information provided in the *Software Users' Guide: URBEMIS2002 for Windows with Enhanced Construction Module* (April 2005)[2] (Guide) (the assumptions are available for review in **Appendix 4.9** of the EIR). URBEMIS2002 is a land-use and transportation-based air quality model developed in cooperation with the CARB and designed to estimate air emissions from new development projects, including construction emissions. The model is designed to calculate emissions for specific air basins; for this project, the model was run using model inputs designed specifically for the South Coast Air Basin.

The information regarding different construction activities (site clearing, grading, asphalt paving, and application of architectural coatings) was provided by the project applicant. Also, the applicant provided details about the types and numbers of construction equipment that would be on the site during grading operations, the acreages graded, the amount of material that would be graded, and the timing and duration of the grading and construction operations. Additional details regarding these calculations are provided in **Section 4.9, Air Quality**, in the Landmark Village Draft Environmental Impact Report (DEIR). The number of working days in a particular phase was calculated assuming 5 working days each week, with a 10-hour working day (i.e., 8 AM to 6 PM). DPM emissions for each phase were calculated by multiplying total working days by the worst-case daily emissions. Finally, DPM emissions from all the phases were added to get total DPM emissions over the entire construction period. For the purpose of this assessment, the overall emissions during the six-year construction period were averaged to generate one annual average emission rate to be used as an input for the dispersion modeling. A similar approach is used to calculate the emissions from the construction of the utility corridor. DPM emissions from all the phases associated with the utility corridor construction were added to get the annual DPM emissions.

The estimated emissions for each phase and for the overall project are shown in **Table 2, Estimated Diesel Particulate Matter Emissions from Construction**. As shown in **Table 2**, the emissions vary from year to year depending on the area of development and the phase of the construction activity.

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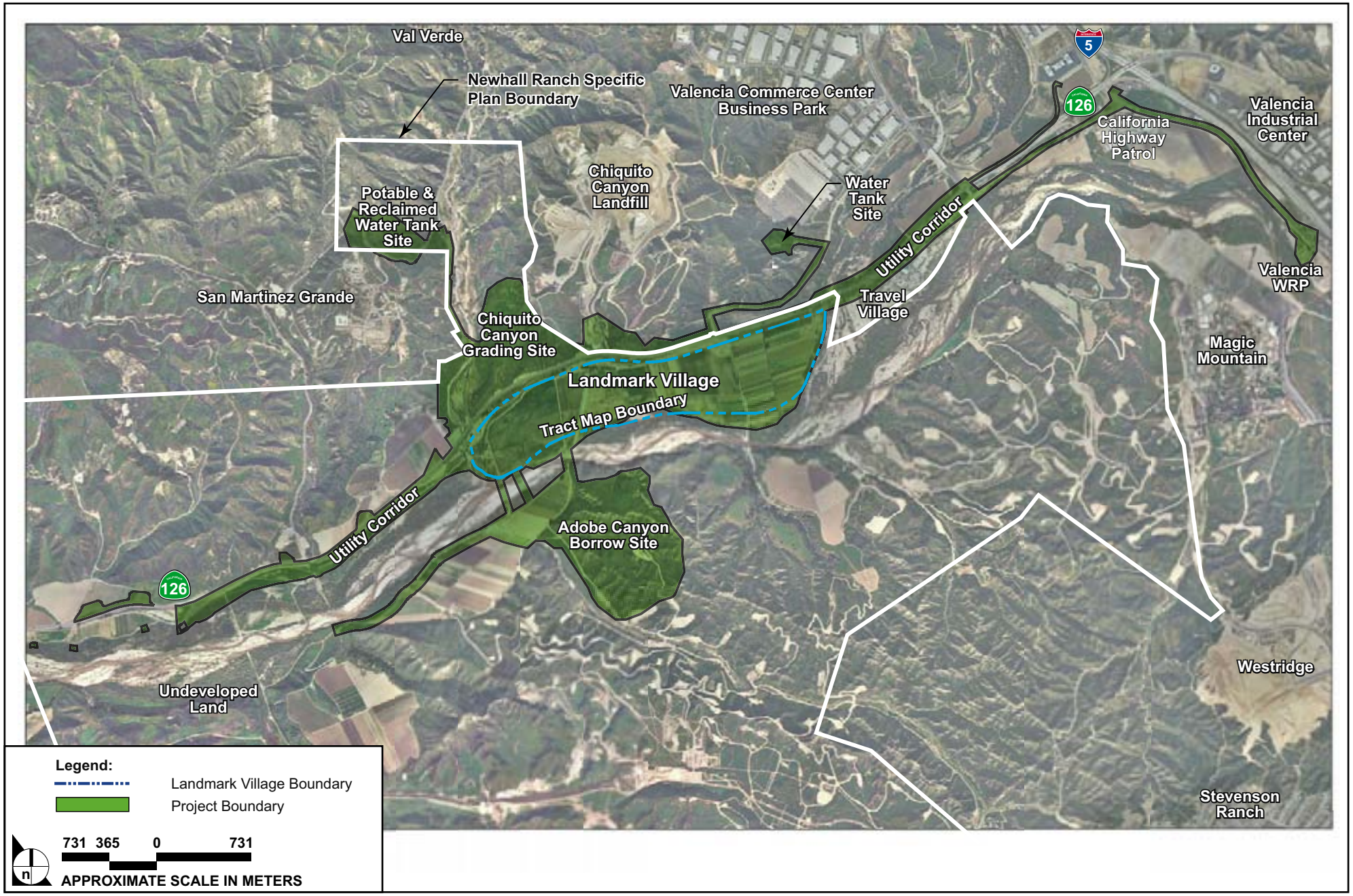
2 Jones and Stokes. *Software Users' Guide: URBEMIS2002 for Windows with Enhanced Construction Module* (Sacramento, California: Jones and Stokes, April 2005).



SOURCE: Impact Sciences, Inc. – May 2006

FIGURE **1**

Conceptual Site Plan

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Table 2
Estimated Diesel Particulate Matter Emissions
from Construction Operations

Phase	Source	Schedule (weeks)	Duration (weeks)	Emissions On Worst-Day (lbs/day)	Emissions Per Phase (lbs)
A	On-Road Diesel Exhaust	1 to 44	44	2.13	468.60
	Off-Road Diesel Exhaust			36.17	7,957.40
B	On-Road Diesel Exhaust	45 to 48	4	2.13	53.25
	Off-Road Diesel Exhaust			36.25	906.25
C	On-Road Diesel Exhaust	49 to 58	10	0	0
	Off-Road Diesel Exhaust			6.36	318.00
D	On-Road Diesel Exhaust	59 to 62	4	0.28	5.60
	Off-Road Diesel Exhaust			10.90	218.00
E	On-Road Diesel Exhaust	63 to 75	13	0.28	18.20
	Off-Road Diesel Exhaust			4.67	303.55
F	On-Road Diesel Exhaust	76 to 127	52	0	0
	Off-Road Diesel Exhaust			89.66	23,311.60
G	On-Road Diesel Exhaust	128	1	0	0
	Off-Road Diesel Exhaust			94.45	472.25
H	On-Road Diesel Exhaust	129 to 179	51	0	0
	Off-Road Diesel Exhaust			74.15	18,908.25
I	On-Road Diesel Exhaust	180 to 214	45	0	0
	Off-Road Diesel Exhaust			65.77	14,798.25
J	On-Road Diesel Exhaust	215 to 232	18	0	0
	Off-Road Diesel Exhaust			61.01	5,490.90
K	On-Road Diesel Exhaust	233 to 238	6	0	0
	Off-Road Diesel Exhaust			40.14	1,204.20
L	On-Road Diesel Exhaust	239 to 240	2	0	0
	Off-Road Diesel Exhaust			31.89	318.90
M	On-Road Diesel Exhaust	241 to 251	11	0	0
	Off-Road Diesel Exhaust			23.64	1,300.20
Total					76,053.40
UC1	On-Road Diesel Exhaust	1 to 30	30	0.02	0.60
	Off-Road Diesel Exhaust			2.18	65.40
UC2	On-Road Diesel Exhaust	31 to 48	18	0.02	0.36
	Off-Road Diesel Exhaust			2.80	50.40
UC3	On-Road Diesel Exhaust	49 to 52	4	0.02	0.08
	Off-Road Diesel Exhaust			5.94	23.76
Total					140.60

Source: Impact Sciences, Inc., 2006.

4.0 MODELING METHODOLOGY

4.1 Modeling Approach

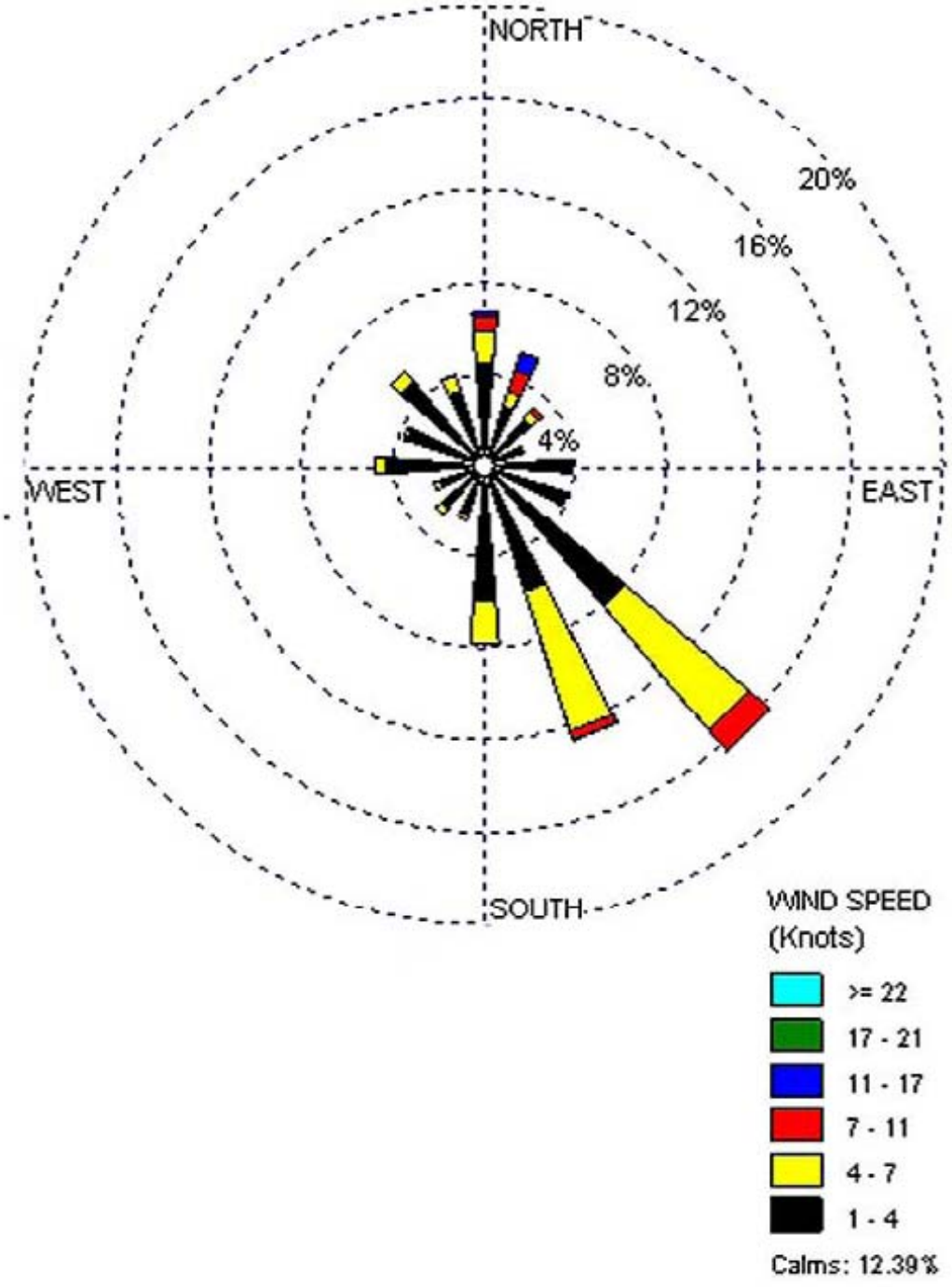
The U.S. Environmental Protection Agency (U.S. EPA) approved Industrial Source Complex model, ISCST3[3], was used to model the air quality impacts of DPM emissions during construction of the proposed project and construction of the utility corridor. This model can estimate the air quality impacts of single or multiple sources using actual meteorological conditions.

The model was configured with the following control parameters:

- Modeling switches: regulatory default (except calms processing was turned off per SCAQMD guidelines);
- Averaging period: annual; and
- Choice of dispersion coefficients based upon land-use type: urban (per SCAQMD health risk assessment guidelines).

The 1981 meteorological data used in the modeling analysis was obtained from the SCAQMD website for the Newhall monitoring station. The Newhall meteorological monitoring site is about 7.5 kilometers east-southeast of the project site and is the closest meteorological monitoring station to the proposed project site. A wind rose illustrating prevailing wind speeds and directions is shown in **Figure 2, Wind Rose for the Newhall Monitoring Station**.

Sources of emissions from trucks and construction equipment were modeled as five area sources over the proposed project site. (These five areas were selected for purposes of the Localized Significance Thresholds Analysis, which was also performed for this project, but they are not intended to represent phasing of the construction over the project site.) The annual emission rate over the six-year construction period was converted to grams per second (g/sec) by dividing the annual emission rate by the annual operating hours and 3,600 seconds per hour, and by multiplying the result by 453.6 grams per pound. The overall emissions were distributed over the five area sources proportional to their areas. The corresponding emission rate for each area source in g/sec was divided by the area of each of the area sources as measured in square meters to calculate the emission rate in grams per second per square meter (g/sec-m^2). Thus, the emissions from the trucks and construction equipment were assumed to be distributed equally throughout these areas, as is the convention for area source emissions. Similarly, the sources of emissions associated with construction of the utility corridor were modeled as 10 area sources distributed over the utility corridor site. (These area sources were selected to facilitate the model



SOURCE: Impact Sciences, Inc. – May 2006

FIGURE **2**

Wind Rose for the Newhall Monitoring Station

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simulation and are not intended to represent the phasing of the construction over the project site.) Also, the overall emissions associated with construction of the utility corridor were distributed over the utility corridor site, and the emission rate was calculated in g/sec-m^2 using the same method described earlier.

The emissions from the trucks and equipment were given an initial height of 4.15 meters to account for the height of the exhaust stack and initial plume rise of the heated exhaust. This value is used by the CARB to characterize the health impacts of a variety of scenarios involving diesel vehicles.

4.2 Receptors Used for Evaluating Modeled Impacts

The nearest residential community to the project site is the community of Val Verde located approximately 1.6 kilometers (1 mile) to the north, across SR-126. Other residences are scattered throughout the area, primarily to the north of the site across SR-126. A recreational vehicle park is located to the east of the project site; however, occupants are limited to a 30-day stay. The nearest potential off-site workplace receptors are located to the northeast in the Valencia Commerce Center.

The SCAQMD *CEQA Air Quality Handbook* recommends that sensitive receptors be evaluated in an air quality impact analysis. Sensitive receptors are generally considered to be facilities where children, the elderly, or ill people may reside. The *CEQA Air Quality Handbook* lists the following land uses that should be considered as sensitive receptors:

- Long-term health care facilities
- Rehabilitation centers
- Convalescent centers
- Retirement homes
- Residences
- Schools
- Playgrounds
- Child care centers
- Athletic facilities

For the purpose of this assessment, potential sensitive receptors included schools, childcare centers, and hospitals.

One elementary school is located within 2 kilometers (1.25 miles) of the project site. Its name, location, and distance from the project site are shown in **Table 3, Sensitive Receptors within Two Kilometers of**

the Landmark Village Project Site and its location is depicted in **Figure 3, Sensitive Receptors Near the Project Site**. No childcare centers or hospitals were identified within 2 kilometers of the project site. The school was treated as a discrete receptor in this analysis, and it was located within the modeled area within a Cartesian grid that was spaced at 100-meter intervals up to 2,000 meters (2.0 kilometers) from the project site boundary. The overall receptor grid was designed to cover areas of existing and future off-site residential exposure, areas of commercial/industrial development, to allow assessment of potential workplace exposure, and potential exposure to other sensitive receptors listed in the SCAQMD *CEQA Air Quality Handbook*.

Table 3
Sensitive Receptors within Two Kilometers of Landmark Village Project Site

Name of Receptor	Distance from Landmark Village (km)	Direction
Live Oak Elementary School	1.68	North

Source: Impact Sciences, 2006.

5.0 ESTIMATION OF EXPOSURE THROUGH INHALATION

This assessment considers exposure via inhalation only. The potential exposure through other pathways (e.g., ingestion) requires substance and site-specific data, and the specific parameters for DPM are not known for these pathways.[4] This assessment also assumes that a person is exposed continuously for 70 years. This approach is intended to result in conservative (i.e., health protective) estimates of health impacts. The SCAQMD follows the recommendation in the Office of Environmental Health Hazard Assessment (OEHHA) *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*[5] (OEHHA Guidance) with respect to the evaluation of cancer risk calculations for short-term exposures (i.e., less than a maximum theoretical project life of 70 years). The OEHHA Guidance states:

> *"[A]s the exposure duration decreases the uncertainties introduced by applying cancer potency factors derived from very long term studies increases. Short-term high exposures are not necessarily equivalent to longer-term lower exposures even when the total dose is the same. OEHHA therefore does not support the use of current cancer potency factor to evaluate cancer risk for exposures of less than 9 years. If such risk must be evaluated, we recommend assuming that average daily dose for short-term exposure is assumed to last for a minimum of 9 years."*

4 "Report to the Air Resources Board on the Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant, Part A Exposure Assessment," Approved by the Scientific Review Panel, April 1998.

5 "Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments,"California Environmental Protection Agency Office of Environmental Health Hazard Assessment, August 2003.

SOURCE: Impact Sciences, Inc. – May 2006

FIGURE 3

Sensitive Receptors Near the Project Site

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Exposure through inhalation is a function of the respiration rate and the concentration of a substance in the air and is calculated by using the following formulas:[6]

$$\text{Risk} = \text{Dose-inhalation} * \text{Inhalation cancer potency factor (Equation 1)}$$

where:

$$\text{Inhalation cancer potency factor (CPF)} = 1.1 \text{ (milligram per kilogram per day)}^{-1} \text{ (for DPM)}$$

$$\text{Dose Inhalation} = C_{air} * DBR * A * EF * ED * 10^{-6} / AT \text{ (Equation 2)}$$

where:

C_{air} = concentration in microgram per cubic meter
DBR = breathing rate in liter per kilogram of body weight per day
A = inhalation absorption factor (1 for DPM)
EF = exposure frequency in days per year
ED = exposure duration in years
AT = averaging time period over which exposure is averaged in days (25,550 days for 70 years)

For modeling purpose, the default values suggested by the manual were used for the dose inhalation calculation except for daily breathing rate. The default values used in the model are as follows:

EF = 350 days/year
ED = 9 years
AT = 25,550 days
A = 1

In accordance with CARB policy[7], a breathing rate equal to the 80th percentile should be used in single-point risk management decisions, such as those subject to a threshold or standard, for which the cancer risk is entirely associated with inhalation and residential cancer risk is being evaluated. These two criteria are met for this assessment. Thus, a breathing rate of 302 liter per kilogram of body weight per day was used for the residential cancer risk calculations.

The risk is calculated by multiplying the dose by the inhalation potency factor. The inhalation potency factor for DPM is 1.1.[8] In order to directly calculate risk as a modeling output, a multiplying factor was derived based on the information discussed above. This multiplying factor, when multiplied by the

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6 Ibid.

7 California Air Resources Board and Office of Environmental Health Hazard Assessment, *Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk*, October 9, 2003.

8 "Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments," California Environmental Protection Agency Office of Environmental Health Hazard Assessment, pp. 7-4, August 2003.

concentration that the dispersion model calculates, results in risk in 1 million at a particular receptor. The multiplying factor was calculated as follows:

$$\text{Multiplying factor} = CPF * (DBR * A * EF * ED * 10^{-6}/AT) * 10^{6}$$

$$= 1.1 * (302\ L/kg\ \text{body weight-day} * 1 * 350\ \text{day}/yr * 9\ yr * 10^{-6}/25{,}550\ \text{days}) * 10^{6} = 40.96\ (\mu g/m^{3})^{-1}$$

Table 4, Summary of Maximum Modeled Cancer Risks of Diesel Particulate Matter from Construction, provides the model output. **Figure 4, Modeled Impacts of Diesel Particulate Matter**, illustrates the potential risks due to DPM from the construction of the proposed development. **Figure 4** shows the isopleths (lines of constant modeled excess cancer risk) that represent estimated cancer risks of 5 and 10 in 1 million for residential and sensitive receptors. These isopleths reflect the cancer risk at residential receptors; no adjustment has been made to the isopleths for workplace exposures, which would be lower.

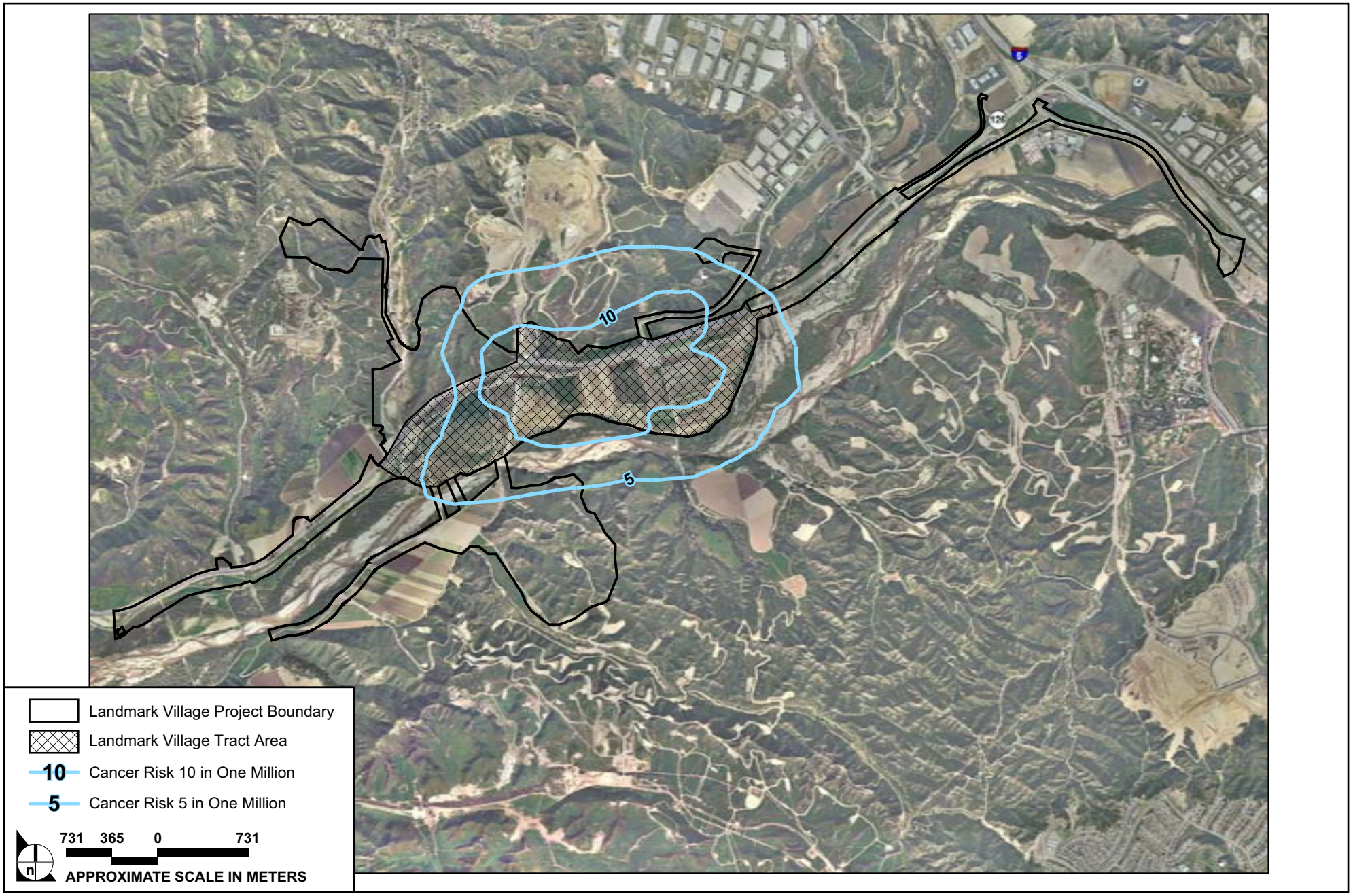
Table 4
Summary of Maximum Modeled
Cancer Risks of Diesel Particulate Matter
from Construction

Receptor	Cancer Risk
Residence[1]	1.7×10^{-6}
Sensitive[2]	0.3×10^{-6}
Workplace[3]	1.2×10^{-6}

Source: Impact Sciences, Inc., 2006.
[1] *Maximum impact occurred at Val Verde;*
[2] *Maximum impact occurred at Live Oak Elementary School;*
[3] *Maximum impact occurred at Commerce Center Commercial.*

In addition to the potential cancer risk, DPM has chronic (i.e., long-term) noncancer health impacts. The chronic noncancer inhalation hazard indices for the proposed project were calculated by dividing the modeled annual average concentrations of the DPM by the Reference Exposure Level (REL). The OEHHA has recommended an ambient concentration of 5 micrograms per cubic meter ($\mu g/m^3$) as the chronic inhalation REL for DPM. The REL is the concentration at or below which no adverse health effects are anticipated. No inhalation REL for acute (i.e., short-term) effects has been determined by the OEHHA.

While calculating cancer risks associated with DPM from construction, the multiplying factor was used to generate the results directly in terms of cancer risk in 1 million. Therefore, the model did not calculate



SOURCE: Impact Sciences, Inc. – May 2006

FIGURE **4**

Model Impacts of Diesel Particulate Matter

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the concentrations separately. However, the concentrations are required to calculate the chronic non-cancer inhalation hazard indices. Therefore, the concentrations were calculated by dividing the risk values by the multiplying factor. These concentrations were then further divided by RELs to calculate chronic non-cancer inhalation hazard indices.

The maximum chronic hazard indices at selected receptors are shown in **Table 5, Summary of Maximum Modeled Noncancer Health Impacts of Diesel Exhaust Particulate Matter from Construction**. The net chronic hazard indices at the points of maximum impact are much less than the SCAQMD significance threshold of 1.0 for noncancer health impacts. The areas of maximum non-cancer impact occurred in the same locations as those described above for the cancer risks.

Table 5
Summary of Maximum Modeled Noncancer Health Impacts of Diesel Particulate Matter from Construction

Receptor	Chronic Hazard Index
Residential[1]	0.0008
Sensitive[2]	0.0001
Workplace[3]	0.0006

Source: Impact Sciences, Inc., 2006.
[1] *Maximum impact occurred at Val Verde;*
[2] *Maximum impact occurred at Live Oak Elementary School;*
[3] *Maximum impact occurred at Commerce Center Commercial.*

6.0 CONCLUSIONS

Based on this analysis, construction of the proposed project would not exceed the SCAQMD significance threshold of a cancer risk of 10 in 1 million since the maximum net anticipated cancer risks are 1.2, 1.7, and 0.3 in 1 million at workplace, residential, and sensitive receptors, respectively. The chronic hazard indices for non-cancer health impacts are also well below the significance threshold of 1.0 at the maximally exposed receptors. It should be noted that these health impacts do not reflect the reductions in diesel emissions from trucks and mobile equipment that will occur during the construction period as a result of increasingly stringent emission standards, many of which will take effect in the next few years. Furthermore, the activity levels (e.g., types and numbers of construction equipment) used in this assessment represent the highest *daily* levels anticipated during each phase of the construction of the project; the actual levels are likely to be lower. Accordingly, the actual health impacts due to construction of the proposed project would be less than those presented in this assessment.

APPENDIX A

Landmark Village Construction Emissions

Estimated Unmitigated Utility Corridor Construction Emissions

Subphase/Emissions Source	Emissions (lbs/day)				
	CO	VOC	NO_x	SO_x	PM_{10}
Weeks 1 thru 30					
Unmitigated Emissions Total	85.90	11.38	62.83	0	296.80
SCAQMD Thresholds	550	75	100	150	150
Exceeds Thresholds?	NO	NO	NO	NO	**YES**
Notes: Grading of utility corridor					
Weeks 31 thru 48					
Unmitigated Emissions Total	110.80	14.30	80.34	0	297.42
SCAQMD Thresholds	550	75	100	150	150
Exceeds Thresholds?	NO	NO	NO	NO	**YES**
Notes: Grading of utility corridor and construction of water tanks					
Weeks 49 thru 52					
Unmitigated Emissions Total	184.25	58.96	152.37	0	300.57
SCAQMD Thresholds	550	75	100	150	150
Exceeds Thresholds?	NO	NO	**YES**	NO	**YES**
Notes: Grading of utility corridor and welding and coating of water tanks					

Source: Impact Sciences, Inc.

NEWHALL RANCH SPECIFIC PLAN FINAL EIR
AIR QUALITY MITIGATION MEASURES

The following air quality mitigation measures are from the Newhall Ranch Specific Plan Final EIR. These measures, as appropriate, are intended to apply to all future development within Newhall Ranch. Not all of the following measure are appropriate for River Village and comments on the appropriateness of each measure to the River Village project is noted in *italics*.

4.10-1. The Specific Plan will provide Commercial and Service uses in close proximity to residential subdivisions.

4.10-2. The Specific Plan will locate residential uses in close proximity to Commercial uses, Mixed-Uses, and Business Parks.

4.10-3. Bus pull-ins will be constructed throughout the Specific Plan site.

4.10-4. Pedestrian facilities, such as sidewalks, and community regional, and local trails, will be provided throughout the Specific Plan site.

4.10-5. Roads with adjacent trails for pedestrian and bicycle use will be provided throughout the Specific Plan site connecting the individual Villages and community.

4.10-6. The applicant of future subdivisions shall implement all rules and regulations adopted by the Governing Board of the SCAQMD which are applicable to the development of the subdivision (such as Rule 402 - Nuisance, Rule 403 - Fugitive Dust, Rule 1113 - Architectural Coatings) and which are in effect at the time of development. The purpose of Rule 403 is to reduce the amount of particulate matter entrained in the ambient air as a result of man-made fugitive dust sources by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. Rule 403 applies to any activity or man-made condition capable of generating fugitive dust such as the mass and remedial grading associated with the project as well as weed abatement and stockpiling of construction materials (*i.e.*, rock, earth, gravel). Rule 403 requires that grading operations either (1) take actions specified in Tables 1 and 2 of the Rule for each applicable source of fugitive dust and take certain notification and record keeping actions; or (2) obtain an approved Fugitive Dust Control Plan. A complete copy of the SCAQMD's Rule 403 Implementation Handbook, which has been included in Appendix 4.10, provides guideline tables to demonstrate the typical mitigation program and record keeping required for grading operations (Tables 1 and 2 and sample record keeping chart). The record keeping is accomplished by on-site construction personnel, typically the construction superintendent.

Each future subdivision proposed in association with the Newhall Ranch Specific Plan shall implement the following if found applicable and feasible for that subdivision.

GRADING

a. Apply non-toxic soil stabilizers according to manufacturers' specification to all inactive construction areas (previously graded areas inactive for ten days or more) .
b. Replace groundcover in disturbed areas as quickly as possible.
c. Enclose, cover, water twice daily, or apply non-toxic soil binders according to manufacturers' specifications, to exposed piles (*i.e.*, gravel, sand, dirt) with 5 percent or greater silt content.
d. Water active sites at least twice daily.
e. Suspend all excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 mph.
f. Monitor for particulate emissions according to District-specified procedures.
g. All trucks hauling dirt, sand, soil, or other loose materials are to be covered or should maintain at least two feet of freeboard (*i.e.*, minimum vertical distance between top of the load and the top of the trailer) in accordance with the requirements of CVC Section 23114.

The effectiveness of these measures at reducing PM10 emissions ranges from 7 to 74 percent.[1]

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[1] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-15 and p. A11-77.*

PAVED ROADS

h. Sweep streets at the end of the day if visible soil material is carried onto adjacent public paved roads (recommend water sweepers with reclaimed water).
i. Install wheel washers where vehicles enter and exit unpaved roads onto paved roads, or wash off trucks and any equipment leaving the site each trip.

The effectiveness of these measures at reducing PM10 emissions ranges from 25 to 70 percent.[2]

UNPAVED ROADS

j. Apply water three times daily, or non-toxic soil stabilizers according to manufacturers' specifications, to all unpaved parking or staging areas or unpaved road surfaces.
k. Reduce traffic speeds on all unpaved roads to 15 mph or less.
l. Pave construction roads that have a traffic volume of more than 50 daily trips by construction equipment, 150 total daily trips for all vehicles.
m. Pave all construction access roads at least 100 feet on to the site from the main road.
n. Pave construction roads that have a daily traffic volume of less than 50 vehicular trips.

The effectiveness of these measures at reducing PM10 emissions ranges from 40 to 92.5 percent.[3]

4.10-7. Prior to the approval of each future subdivision proposed in association with the Newhall Ranch Specific Plan, each of the construction emission reduction measures indicated below (and in Tables 11-2 and 11-3 of the SCAQMD's CEQA *Air Quality Handbook*, as amended) shall be implemented if found applicable and feasible for that subdivision.

ON-ROAD MOBILE SOURCE CONSTRUCTION EMISSIONS:

a. Configure construction parking to minimize traffic interference. *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[4]
b. Provide temporary traffic controls when construction activities have the potential to disrupt traffic to maintain traffic flow (e.g., signage, flag person, detours). *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[5]
c. Schedule construction activities that affect traffic flow to off-peak hours (*e.g.*, between 7:00 P.M. and 6:00 A.M. and between 10:00 A.M. and 3:00 P.M.). *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[6]
d. Develop a trip reduction plan to achieve a 1.5 average vehicle ridership (AVR) for construction employees. *Mitigation not suitable for River Village because SCAQMD Rule 2202 applies to all employers who meet certain criteria for implementing trip reduction measures. The requirement to achieve a specific AVR has been ruled unlawful by the federal government and is no longer recommended.*
e. Implement a shuttle service to and from retail services and food establishments during lunch hours. *Mitigation not suitable for River Village because construction workers typically take a half-hour lunch at various times of the day and eat on-site food that was either brought by the workers (brown bag) or purchased from mobile caterers who travel to the site.*
f. Develop a construction traffic management plan that includes the following measures to address construction traffic that has the potential to affect traffic on public streets:
   - Rerouting construction traffic off congested streets *Mitigation not suitable for River Village because the only access to the site is via SR-126 and there are no other roadways on which to reroute traffic.;*
   - Consolidating truck deliveries; and
   - Providing temporary dedicated turn lanes for movement of construction trucks and equipment on and off of the site. *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[7]

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[2] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-15 and pp. A11-77 to -78.*
[3] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-16 and p. A11-78.*
[4] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*
[5] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*
[6] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*

g. Prohibit truck idling in excess of two minutes. *Mitigation not suitable for River Village because the nature of diesel motors does not lend them to constant turning on and off. Premature wear, and increased air emissions from turning the engines on and off, are common results. It is also extremely difficult to effectively monitor the implementation of this measure on an approximately 700-acre site with contractors who would be concerned about maintaining their equipment. Furthermore, the effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[8]

OFF-ROAD MOBILE SOURCE CONSTRUCTION EMISSIONS:

h. Use methanol-fueled pile drivers. *Any equipment that utilizes an alternative fuel that reduces VOC, NOx, and/or PM10 emissions is advisable. This measure is replaced in the impact analysis with another measure that considers other alternative fuels for diesel-fueled construction equipment.*
i. Suspend use of all construction equipment operations during second stage smog alerts. *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[9]
j. Prevent trucks from idling longer than two minutes. *Mitigation not suitable for River Village because the nature of diesel motors does not lend them to constant turning on and off. Premature wear, and increased air emissions from turning the engines on and off, are common results. It is also extremely difficult to effectively monitor the implementation of this measure on an approximately 700-acre site with contractors who would be concerned about maintaining their equipment. Furthermore, the effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[10]
k. Use electricity from power poles rather than temporary diesel-powered generators.
l. Use electricity from power poles rather than temporary gasoline-powered generators.
m. Use methanol- or natural gas-powered mobile equipment instead of diesel. *Any equipment that utilizes an alternative fuel that reduces VOC, NOx, and/or PM10 emissions is advisable.*
n. Use propane- or butane-powered on-site mobile equipment instead of gasoline. *Any equipment that utilizes an alternative fuel that reduces VOC, NOx, and/or PM10 emissions is advisable.*

OPERATION IMPACTS

4.10-8. The applicant of future subdivisions shall implement all rules and regulations adopted by the Governing Board of the SCAQMD which are applicable to the development of the subdivision (such as Rule 402 - Nuisance, Rule 1102 - Petroleum Solvent Dry Cleaners, Rule 1111 - NOx Emissions from Natural Gas-Fired, Fan-Type Central Furnaces, Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters) and which are in effect at the time of occupancy permit issuance.

4.10-9. Prior to the approval of each future subdivision proposed in association with the Newhall Ranch Specific Plan, each of the operational emission reduction measures indicated below (and in Tables 11-6 and 11-7 of the SCAQMD's CEQA *Air Quality Handbook*, as amended) shall be implemented if found applicable and feasible for that subdivision.

ON-ROAD MOBILE SOURCE OPERATIONAL EMISSIONS:

RESIDENTIAL USES

a. Include satellite telecommunications centers in residential subdivisions. *Mitigation not suitable for River Village because satellite telecommunications centers have been superseded by other technology.*
b. Establish a shuttle service from residential subdivisions to commercial core areas. *Mitigation not suitable for River Village because residential uses are in close proximity and within walking distance to commercial uses proposed within River Village.*
c. Construct on-site or off-site bus stops (*e.g.*, bus turnouts, passenger benches, and shelters).

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7 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*

8 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*

9 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-14.*

10 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-14.*

d. Construct off-site pedestrian facility improvements, such as overpasses and wider sidewalks. *Mitigation not suitable for River Village because no uses adjacent to the River Village site exist within Newhall Ranch to which pedestrian access would be warranted.*
e. Include retail services within or adjacent to residential subdivisions. *The proposed project is in conformance with this measure.*
f. Provide shuttles to major rail transit centers or multi-modal stations.
g. Contribute to regional transit systems (*e.g.*, right-of-way, capital improvements, *etc.*). *This measure does not directly contribute to reduced air emissions, emission reductions have not been quantified by SCAQMD,*[11] *and it is not given emissions reduction credit in the impact analysis.*
h. Synchronize traffic lights on streets impacted by development.
i. Construct, contribute, or dedicate land for the provision of off-site bicycle trails linking the facility to designated bicycle commuting routes.

COMMERCIAL USES

j. Provide preferential parking spaces for carpools and vanpools and provide 7'2" minimum vertical clearance in parking facilities for vanpool access.
k. Implement on-site circulation plans in parking lots to reduce vehicle queuing. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[12]
l. Improve traffic flow at drive-thru's by designing separate windows for different functions and by providing temporary parking for orders not immediately available for pickup. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[13]
m. Provide video-conference facilities. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[14]
n. Set up resident worker training programs to improve job/housing balance. *Mitigation not suitable for River Village because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site. Furthermore, the effectiveness of this measure to reduce air emissions in the basin lies in actually achieving jobs/housing balance. The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[15]
o. Implement home dispatching system where employees receive routing schedule by phone instead of driving to work. *Mitigation not suitable for River Village because it is outside the purview of the project applicant/developer to set up such a system. Such systems are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*
p. Develop a program to minimize the use of fleet vehicles during smog alerts (for business not subject to Regulation XV (now Rule 2202) or XII). *Mitigation not suitable for River Village because no commercial retail or office use on the site is expected to use fleet vehicles.*
q. Use low-emissions fleet vehicles:
   - TLEV
   - ULEV
   - LEV
   - ZEV

   Mitigation not suitable for River Village because no commercial retail or office use on the site is expected to use fleet vehicles.
r. Reduce employee parking spaces for those businesses subject to Regulation XV (now Rule 2202). *Rule 2202 applies to any employer who employs 250 or more employees on a full or part-time basis at a work site for a consecutive six-month period. It is conceivable that an office use employing as*

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11 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-18.*
12 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*
13 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-19.*
14 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-19.*
15 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-19.*

many as 250 people can locate on the site; therefore, this mitigation measure applies to the River Village project. The requirement to achieve a specific AVR has been ruled unlawful by the federal government and is no longer recommended.[16]

s. Implement a lunch shuttle service from a work site(s) to food establishments. Mitigation not suitable for River Village because *Lots within River Village designated for mixed use commercial are expected to have food establishments located within walking distance, thereby not necessitating lunch shuttle service.*

t. Implement compressed work-week schedules where weekly work hours are compressed into fewer than five days.
   - 9/80
   - 4/40
   - 3/36

   Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.

u. Develop a trip reduction plan to achieve 1.5 AVR for businesses with less than 100 employees or multi-tenant work sites. *Mitigation not suitable for River Village because SCAQMD Rule 2202 applies to all employers who meet certain criteria for implementing trip reduction measures. The requirement to achieve a specific AVR has been ruled unlawful by the federal government and is no longer recommended.*

v. Utilize satellite offices rather than regular work site to reduce VMT. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*

w. Establish a home-based telecommuting program. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*

x. Provide on-site child care and after-school facilities or contribute to off-site development within walking distance. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*

y. Require retail facilities or special event centers to offer travel incentives such as discounts on purchases for transit riders. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site. Such a program to reduce air emissions in the Basin is not quantified by the SCAQMD and it is not given emission reduction credit in this impact analysis.*[17]

z. Provide on-site employee services such as cafeterias, banks, *etc.*

aa. Establish a shuttle service from residential core areas to the work site. *Mitigation not suitable for River Village because residential uses are proposed in close proximity and within walking distance to commercial uses proposed within River Village.*

ab. Construct on-site or off-site bus stops (*e.g.*, bus turnouts, passenger benches, and shelters).

ac. Implement a pricing structure for single-occupancy employee parking and/or provide discounts to ridesharers.

ad. Include residential units within a commercial project.

ae. Utilize parking in excess of code requirements as on-site park-n-ride lots or contribute to construction of off-site lots.

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[16] *In 1988, the SCAQMD instituted Regulation XV that required enterprises with 100 or more employees to adopt trip reduction programs. The regulation required each employer to institute a trip reduction program that would achieve an Average Vehicle Ridership (AVR) of 1.75 in Downtown Los Angeles, 1.5 in the remainder of urbanized areas, and 1.3 in rural parts of the District. AVR measures the extent to which commuters use public transit, car pooling, and other multiple-occupant-vehicle modes of transportation. Regulation XV was repealed in December, 1995 and was replaced with Rule 2202 which provides options for employers to either continue trip reduction programs or reduce mobile source emissions through other strategies. As of January 1, 1997 Rule 2202 applies only to enterprises with 250 or more employees.*

[17] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-20.*

af. Any two of the following:
   - Construct off-site bicycle facility improvements, such as bicycle trails linking the facility to designated bicycle commuting routes, or on-site improvements, such as bicycle paths.
   - Include bicycle parking facilities, such as bicycle lockers and racks.
   - Include showers for bicycling employees' use.

ag. Any two of the following:
   - Construct off-site pedestrian facility improvements, such as overpasses, wider sidewalks.
   - Construct on-site pedestrian facility improvements, such as building access which is physically separated from street and parking lot traffic and walk paths.
   - Include showers for pedestrian employees' use.

ah. Provide shuttles to major rail transit stations and multi-modal centers.

ai. Contribute to regional transit systems (*e.g.*, right-of-way, capital improvements, *etc.*) . *This measure does not directly contribute to reduced air emissions, emission reductions have not been quantified,*[18] *and it is not given emissions reduction credit in the impact analysis.*[19]

aj. Charge visitors to park. *Mitigation not suitable for River Village because charging visitors to park at retail establishments would discourage patronage. Charging visitors to park at the office uses would encourage patrons to park in retail parking spaces or on the street. Charging visitors to pay for parking at the park site would encourage on-street parking.*

ak. Synchronize traffic lights on streets impacted by development.

al. Reschedule truck deliveries and pickups to off-peak hours. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[20]

am. Set up paid parking systems where drivers pay at walkup kiosk and exit via a stamped ticket to reduce emissions from queuing vehicles. *Mitigation not suitable for River Village because charging visitors to park at retail establishments would discourage patronage. Charging visitors to park at the office uses would encourage patrons to park in retail parking spaces or on the street. Charging visitors to pay for parking at the park site would encourage on-street parking. The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[21]

an. Require on-site truck loading zones. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[22]

ao. Implement or contribute to public outreach programs. *Mitigation not suitable for the River Village applicant/developer because it is unclear as to what type of outreach program this mitigation measure refers. Furthermore, it is outside the purview of the project applicant/developer to set up such programs. Such programs are more appropriately set up and maintained by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site. Furthermore, the effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[23]

ap. Require employers not subject to Regulation XV (now Rule 2202) to provide commuter information area.

BUSINESS PARK USES

No Business Park uses are proposed within the River Village project.

aq. Provide preferential parking spaces for carpools and vanpools and provide 7'2" minimum vertical clearance in parking facilities for vanpool access.

ar. Implement on-site circulation plans in parking lots to reduce vehicle queuing.

as. Set up resident worker training programs to improve job/housing balance.

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18 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-18.*

19 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

20 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

21 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

22 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

23 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

bx. Use energy-efficient low-sodium parking lot lights.

COMMERCIAL USES

by. Use lighting controls and energy-efficient lighting.
bz. Use fuel cells in residential subdivisions to produce heat and electricity.
ca. Orient buildings to the north for natural cooling and include passive solar design (*e.g.*, daylighting).
cb. Use light-colored roofing materials to reflect heat.
cc. Increase walls and attic insulation beyond Title 24 requirements.
cd. Use solar or low emission water heaters.
ce. Use central water heating systems.
cf. Provide shade trees to reduce building heating/cooling needs.
cg. Use energy-efficient and automated controls for air conditioners.
ch. Use double-paned windows.
ci. Use energy-efficient low-sodium parking lot lights.
cj. Use lighting controls and energy-efficient lighting.
ck. Use light-colored roofing materials to reflect heat.
cl. Increase walls and attic insulation beyond Title 24 requirements.
cm. Orient buildings to the north for natural cooling and include passive solar design (*e.g.*, daylighting).

BUSINESS PARK USES

No Business Park uses are proposed within the River Village project.

cn. Provide shade trees to reduce building heating/cooling needs.
co. Use energy-efficient and automated controls for air conditioning.
cp. Use double-paned windows.
cq. Use energy-efficient low-sodium parking lot lights.
cr. Use lighting controls and energy-efficient lighting.
cs. Use light-colored roofing materials to reflect heat.
ct. Orient buildings to the north for natural cooling and include passive solar design (*e.g.*, daylighting).
cu. Increase walls and attic insulation beyond Title 24 requirements.
cv. Improved storage and handling or source materials.
cw. Materials substitution (*e.g.*, use water-based paints, life-cycle analysis).
cx. Modify manufacturing processes (*e.g.*, reduce process stages, closed-loop systems, materials recycling).
cy. Resource recovery systems that redirect chemicals to new production processes.

4.10-10. All non-residential development of 25,000 gross square feet or more shall comply with the County's Transportation Demand Management (TDM) Ordinance (Ordinance No. 93-0028M) in effect at the time of subdivision. The sizes and configurations of the Specific Plan's non-residential uses are not known at this time and the Ordinance specifies different requirements based on the size of the project under review. All current provisions of the ordinance are summarized in Appendix 4.10.

4.10-11. Subdivisions and buildings shall comply with Title 24 of the California Code of Regulations which are current at the time of development.

4.10-12. Lighting for public streets, parking areas, and recreation areas shall utilize energy efficient light and mechanical, computerized or photo cell switching devices to reduce unnecessary energy usage.

4.10-13. Any on-site subterranean parking structures shall provide adequate ventilation systems to disperse pollutants and preclude the potential for a pollutant concentration to occur. *Mitigation not suitable for River Village because no subterranean parking structures are proposed within the project. Furthermore, this measure reduces indoor air pollutants, but does not effectively reduce air emissions within the Basin.*

4.10-14. The sellers of new residential units shall be required to distribute brochures and other relevant information published by the SCAQMD or similar organization to new homeowners regarding the importance of reducing vehicle miles traveled and related air quality impacts, as well as on local opportunities for public transit and ridesharing.

UNMITIGATED CONSTRUCTION EMISSIONS

Project Name	**River Village**	**Unmitigated Emissions**
Subphase	**Weeks 1 thru 19**	
Length of Subphase (weeks)		19.00
Year	2006	
Total Acreage	120.28	

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	19,407.42	
On-Road Diesel Exhaust	130.62	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	--	65.65	
Worker Commute Trips	15.58	4.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,703.71	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,987.28	410.56	1,543.43	1.72	9,772.76	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	

Project Name	**River Village**	**Unmitigated Emissions**
Subphase	**Weeks 20 thru 39**	
Length of Subphase (weeks)		20.00
Year	2006	
Total Acreage	126.61	

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	19,393.76	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	–	65.65	
Worker Commute Trips	15.98	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	9,696.85	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,332.50	167.28	1,126.24	–	46.72	
On-Road Diesel Exhaust Emissions	8.44	0.65	0.21	0.06	0.11	
Worker Commute Emissions	23.98	2.86	12.29	0.11	0.28	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	–	0.00	–	–	–	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**3,368.20**	**582.35**	**2,688.18**	**1.88**	**9,813.02**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	

Project Name	**River Village**	**Unmitigated Emissions**
Subphase	**Weeks 40 thru 46**	
Length of Subphase (weeks)	**7.00**	
Year	**2006**	
Total Acreage	**44.31**	

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	19,407.42	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	--	65.65	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,703.71	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,126.24	--	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	222.74	1,654.08	--	72.90	
Worker Commute Trips	25.81	2.80	4.75	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	--	151.03	--	--	--	
Worker Commute Trips	25.81	2.80	4.75	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	5,089.89	960.19	4,341.75	1.86	9,892.94	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	

Project Name River Village **Unmitigated Emissions**
Subphase Weeks 47 thru 91
Length of Subphase (weeks) 45.00
Year 2006
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	21.98	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	10.99	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,426.24	–	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	222.74	1,654.08	–	72.90	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	–	151.01	–	–	–	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,102.61	549.63	2,798.32	0.15	131.16	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Week 92
Length of Subphase (weeks) 1.00
Year 2007
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.02	--	--	--	
Off-Road Diesel Exhaust Emissions	1,373.05	167.38	1,085.87	--	41.93	
On-Road Diesel Exhaust Emissions	4.05	0.61	5.80	0.01	0.10	
Worker Commute Emissions	11.39	1.15	2.11	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	2,159.16	275.61	1,931.00	--	79.99	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Architectural Painting						
Off-Gas Emissions	--	151.50	--	--	--	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,603.81	603.46	3,035.29	0.06	122.52	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 93 thru 144
Length of Subphase (weeks) 52.00
Year 2007
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.02	--	--	--	
Off-Road Diesel Exhaust Emissions	1,373.08	167.28	1,085.87	--	41.93	
On-Road Diesel Exhaust Emissions	0.08	0.01	0.11	0.00	0.00	
Worker Commute Emissions	11.29	1.25	2.11	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,872.07	240.07	1,693.55	--	70.48	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Architectural Painting						
Off-Gas Emissions	--	141.73	--	--	--	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,306.30	555.86	2,790.95	0.05	112.86	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 145 thru 158
Length of Subphase (weeks) 14.00
Year 2008
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,385.56	167.28	1,058.35	–	38.46	
On-Road Diesel Exhaust Emissions	3.70	0.57	5.39	0.01	0.10	
Worker Commute Emissions	10.38	1.15	1.94	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,685.60	212.51	1,433.80	–	58.55	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	–	141.66	–	–	–	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,126.78	528.79	2,527.25	0.05	97.52	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 159 thru 178
Length of Subphase (weeks) 21.00
Year 2009
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,726.62	212.51	1,394.91	--	53.47	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	--	141.66	--	--	--	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,764.79	358.43	1,402.06	0.03	53.80	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name **River Village** **Unmitigated Emissions**
Subphase **Weeks 179 thru 196**
Length of Subphase (weeks) **18.00**
Year **2009**
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Gradng During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,515.09	187.20	1,239.14	--	48.23	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Architectural Painting						
Off-Gas Emissions	--	141.24	--	--	--	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,549.32	332.26	1,245.55	0.03	48.53	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 197 thru 210
Length of Subphase (weeks) 13.00
Year 2009
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,041.33	128.61	850.48	--	33.06	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Architectural Painting						
Off-Gas Emissions	--	87.64	--	--	--	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,064.36	218.82	854.79	0.02	33.26	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name **River Village** **Unmitigated Emissions**
Subphase **Weeks 211 thru 220**
Length of Subphase (weeks) **10.00**
Year **2010**
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Gradng During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	779.57	95.89	593.66	--	21.89	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Architectural Painting						
Off-Gas Emissions	--	39.26	--	--	--	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	794.57	134.83	596.44	0.01	22.03	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name **River Village** **Unmitigated Emissions**
Subphase **Weeks 221 thru 235**
Length of Subphase (weeks) **15.00**
Year **2010**
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Gradng During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	491.65	59.47	372.96	--	13.64	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Architectural Painting						
Off-Gas Emissions	--	11.78	--	--	--	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**500.54**	**71.95**	**374.61**	**0.01**	**13.72**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	No	No	Yes	No	No	

River Village Office Construction Only Unmitigated Emissions

Weeks of Construction: 140

Year Constr. Begins: 2015

Calculated Emissions

Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	0.00	0.00	0.00	0.00	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	894.12	106.21	663.11	-	23.88	
Worker Commute Trips	10.90	1.20	2.03	0.02	0.08	
Architectural Painting						
Off-Gas Emissions	-	38.48		-	-	
Worker Commute Trips	10.90	1.20	2.03	0.02	0.08	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	905.93	147.09	669.17	0.03	24.03	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

MITIGATED CONSTRUCTION EMISSIONS

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 1 thru 19**
Length of Subphase (weeks) **19.00**
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	19,407.42	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	--	65.65	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,703.71	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	1.69	2.64	Assumes Use of Aqueous Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,656.91	203.50	821.64	n/a	97.16	Assumes Use of Aqueous Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	--	n/a	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**330.37**	**207.06**	**721.79**	**0.02**	**9,672.96**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**Yes**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 20 thru 39**
Length of Subphase (weeks) **20.00**
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	19,390.70	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	--	65.65	
Worker Commute Trips	13.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,696.85	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	1.69	2.64	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,656.91	203.50	821.64	n/a	97.16	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,126.24	--	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	23.98	2.86	12.29	0.11	0.28	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	4.00	0.58	3.35	0.06	0.09	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,217.25	150.55	608.17	n/a	69.15	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	--	n/a	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**490.05**	**227.72**	**1,255.02**	**0.13**	**9,643.99**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**Yes**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 40 thru 46**
Length of Subphase (weeks) **7.00**
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	19,403.42	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	--	65.65	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,703.71	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	1.69	2.64	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,656.91	203.50	821.64	n/a	97.16	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,126.24	--	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	4.00	0.58	3.35	0.06	0.09	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,217.25	150.55	608.17	n/a	69.15	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	222.74	1,654.08	--	72.90	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	--	151.01	--	--	--	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,514.14	200.47	893.20	0.00	107.89	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**697.59**	**405.10**	**2,015.39**	**0.11**	**9,616.01**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 47 thru 91**
Length of Subphase (weeks) **45.00**
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	21.98	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	10.99	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,126.24	--	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	4.00	0.58	3.35	0.06	0.09	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,217.25	150.55	608.17	n/a	69.15	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	222.74	1,654.08	--	72.90	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	--	151.01	--	--	--	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,514.14	200.47	893.20	0.00	107.89	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**367.22**	**198.03**	**1,293.59**	**0.09**	**-45.97**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Week 92**
Length of Subphase (weeks) **1.00**
Year **2007**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,373.05	167.28	1,085.87	--	41.93	
On-Road Diesel Exhaust Emissions	4.05	0.61	5.80	0.01	0.10	
Worker Commute Emissions	11.29	1.25	2.11	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	3.65	0.54	3.13	0.01	0.08	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,235.75	150.55	586.37	n/a	62.06	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	2,159.16	275.61	1,931.00	--	79.99	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Architectural Painting	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	--	151.50	--	--	--	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Mitigation/Reduction	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,943.24	248.05	1,042.74	0.00	118.39	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**421.17**	**204.32**	**1,403.05**	**0.05**	**-58.00**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 93 thru 144**
Length of Subphase (weeks) **52.00**
Year **2007**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.02	--	--	--	
Off-Road Diesel Exhaust Emissions	1,373.05	167.28	1,085.87	--	41.93	
On-Road Diesel Exhaust Emissions	0.08	0.01	0.11	0.00	0.00	
Worker Commute Emissions	11.29	1.25	2.41	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	0.07	0.01	0.06	0.00	0.00	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,235.75	150.55	586.37	n/a	62.06	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,872.07	230.07	1,693.53	--	70.48	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Architectural Painting						
Off-Gas Emissions	--	141.73	--	--	--	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,684.86	216.06	914.52	0.00	104.31	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**385.62**	**189.23**	**1,290.00**	**0.05**	**-53.50**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 145 thru 158**
Length of Subphase (weeks) **14.00**
Year **2008**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,385.56	167.28	1,058.35	--	38.46	
On-Road Diesel Exhaust Emissions	3.70	0.57	5.39	0.01	0.10	
Worker Commute Emissions	10.38	1.15	1.94	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	3.33	0.51	2.91	0.01	0.08	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,247.00	150.55	571.51	n/a	56.92	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,685.60	212.51	1,458.90	--	58.55	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	--	141.66	--	--	--	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,517.04	191.26	785.05	0.00	86.65	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**359.40**	**186.46**	**1,167.78**	**0.04**	**-46.13**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 159 thru 178**
Length of Subphase (weeks) **21.00**
Year **2009**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,726.62	212.51	1,394.91	--	53.47	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	--	141.66	--	--	--	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,553.96	191.26	753.25	0.00	79.14	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**210.84**	**167.17**	**648.81**	**0.03**	**-25.33**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 179 thru 196**
Length of Subphase (weeks) **18.00**
Year **2009**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Gradng During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,515.09	187.20	1,239.14	--	48.23	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Architectural Painting						
Off-Gas Emissions	--	141.24	--	--	--	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,363.58	168.48	669.14	0.00	71.38	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**185.74**	**163.78**	**576.42**	**0.03**	**-22.85**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 197 thru 210**
Length of Subphase (weeks) **13.00**
Year **2009**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Architectural Painting						
Off-Gas Emissions	--	87.64	--	--	--	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**23.03**	**90.21**	**4.31**	**0.02**	**0.20**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**No**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 211 thru 220**
Length of Subphase (weeks) **10.00**
Year **2010**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Architectural Painting						
Off-Gas Emissions	--	39.26	--	--	--	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**15.00**	**40.94**	**2.78**	**0.01**	**0.14**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**No**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 221 thru 235**
Length of Subphase (weeks) **15.00**
Year **2010**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	491.65	59.17	372.96	--	13.64	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Architectural Painting						
Off-Gas Emissions	--	11.78	--	--	--	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	442.49	53.25	201.40	0.00	20.19	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**58.05**	**18.70**	**173.21**	**0.01**	**-6.46**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**Yes**	**No**	**No**	

River Village Office Construction Only Mitigated Emissions

Weeks of Construction: 140

Year Constr. Begins: 2015

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	0.00	0.00	0.00	0.00	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	884.12	106.21	665.11	--	23.88	
Worker Commute Trips	10.90	1.20	2.03	0.02	0.08	
Architectural Painting						
Off-Gas Emissions	--	38.48	--	--	--	
Worker Commute Trips	10.90	1.20	2.03	0.02	0.08	
Mitigation/Reduction						
Off-Road Diesel Exhaust	795.71	95.59	359.16	0.00	35.34	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**110.22**	**51.50**	**310.01**	**0.03**	**-11.31**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**Yes**	**No**	**No**	

URBEMIS2002
UNMITIGATED OPERATIONAL EMISSIONS
SUMMERTIME

URBEMIS 2002 For Windows 7.5.0

File Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
Project Name: River Village Operational Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	78.83	31.65	21.52	0.17	0.08
TOTALS (lbs/day, mitigated)	77.29	26.13	10.61	0.00	0.05

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	342.42	391.84	4,155.89	2.47	377.33
TOTALS (lbs/day, mitigated)	342.41	391.82	4,155.68	2.47	377.31

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	421.25	423.49	4,177.40	2.65	377.40
TOTALS (lbs/day, mitigated)	419.69	417.94	4,166.29	2.47	377.36

URBEMIS 2002 For Windows 7.5.0

File Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
Project Name: River Village Operational Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	2.40	31.52	13.20	-	0.06
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.97	0.13	8.32	0.17	0.02
Consumer Prdcts	75.46	-	-	-	-
TOTALS(lbs/day,unmitigated)	78.83	31.65	21.52	0.17	0.08

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOX	CO	SO2	PM10
Single family housing	56.31	60.90	669.83	0.39	59.43
Apartments low rise	32.54	32.68	359.42	0.21	31.89
Condo/townhouse general	31.93	33.14	364.51	0.21	32.34
Elementary school	20.51	10.98	116.55	0.07	10.66
City park	0.71	0.49	5.16	0.00	0.47
Comercial Center 10-30 ac	91.46	120.96	1,259.13	0.76	115.66
Commercial Center <10 ac.	42.72	57.47	598.28	0.36	54.96
Commercial Shops	2.41	3.13	32.54	0.02	2.99
Commercial Office	63.82	72.09	750.48	0.45	68.94
TOTAL EMISSIONS (lbs/day)	342.42	391.84	4,155.89	2.47	377.33

Does not include correction for passby trips.
Includes a double counting reduction for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2007 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	591.00	5,850.90
Apartments low rise	6.90 trips / dwelling units	455.00	3,139.50
Condo/townhouse general	8.00 trips / dwelling units	398.00	3,184.00
Elementary school	1.45 trips / students	750.00	1,087.50
City park	2.60 trips / acres	20.90	54.34
Comercial Center 10-30 ac	54.06 trips / 1000 sq. ft.	252.00	13,623.12
Commercial Center <10 ac.	85.06 trips / 1000 sq. ft.	76.10	6,473.07
Commercial Shops	37.06 trips / 1000 sq. ft.	9.50	352.07
Commercial Office	11.56 trips / 1000 sq. ft.	702.40	8,119.74

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.20	1.80	97.80	0.40
Light Truck < 3,750 lbs	15.10	3.30	94.00	2.70
Light Truck 3,751- 5,750	16.10	1.90	96.90	1.20
Med Truck 5,751- 8,500	7.10	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.10	0.00	0.00	100.00
Motorcycle	1.70	82.40	17.60	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			

% of Trips - Commercial (by land use)

Elementary school	20.0	10.0	70.0
City park	5.0	2.5	92.5
Comercial Center 10-30 ac.	2.0	1.0	97.0
Commercial Center <10 ac.	2.0	1.0	97.0
Commercial Shops	2.0	1.0	97.0
Commercial Office	2.0	1.0	97.0

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The area souce mitigation measure option switch changed from off to on.
The natural gas residential percentage changed from 60 to 100.
The percentage of wood stoves changed from 35 to 0.
The landscape length of the summer period (in days) changed from 180 to 365.
The landscape year changed from 2004 to 2007.
The consumer product persons per residential unit changed from 2.861 to 3.056.
Mitigation measure Orient Buildings North/South: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure All Electric Landscape Maintenance Equipment: Rsdntl Lndscp Maint.
has been changed from off to on.
Mitigation measure Central Water Heater: Cmrcl Space Heat.
has been changed from off to on.
Mitigation measure Orient Buildings North/South: Cmrcl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Cmrcl Space Heat.
has been changed from off to on.
Mitigation measure All Electric Landscape Maintenance Equipment: Cmrcl Lndscp Maint.
has been changed from off to on.

Changes made to the default values for Operations

The operational emission year changed from 2004 to 2007.
The double counting internal work trip limit changed from to 791.577.
The double counting shopping trip limit changed from to 395.7885.
The double counting other trip limit changed from to 5234.992.
The travel mode environment settings changed from both to: both
Mitigation measure Mixed Use Project (Residential Oriented):3
has been changed from off to on.
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Furniture:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Mixed Use Project (Commercial Oriented):1
has been changed from off to on.
Mitigation measure Floor Area Ratio 0.75 or Greater:1
has been changed from off to on.
Mitigation measure Provide Wide Sidewalks and Onsite Pedestrian Facilities:1
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Project Provides Shade Trees to Shade Sidewalks:0.5
has been changed from off to on.
Mitigation measure Project Provides Street Art and/or Street Furniture:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety Designs/Infrastructure at Crossings:0.5
has been changed from off to on.
Mitigation measure Articulated Storefront(s) Display Windows with Visual Interest:0.25
has been changed from off to on.
Mitigation measure No Long Uninterrupted Walls Along Pedestrian Walkways:0.25
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.
Mitigation measure Provide Secure Bicycle Parking:1
has been changed from off to on.
Mitigation measure Provide Employee Lockers and Showers:1
has been changed from off to on.
Mitigation measure Shuttle Bus Service to Transit/Multi-Modal Center:2
has been changed from off to on.
Mitigation measure Preferential Carpool/Vanpool Parking:1.5
has been changed from off to on.
Mitigation measure Many Frequently Needed Services Provided:5

has been changed from off to on.
Mitigation measuremitop5: Park and Ride Lots
has been changed from on to off.

URBEMIS2002
UNMITIGATED OPERATIONAL EMISSIONS
WINTERTIME

URBEMIS 2002 For Windows 7.5.0

File Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
Project Name: River Village Operational Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,695.26	49.89	1,797.29	2.83	244.44
TOTALS (lbs/day, mitigated)	1,694.70	44.49	1,794.71	2.83	244.43

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	330.01	566.89	4,005.67	2.01	377.33
TOTALS (lbs/day, mitigated)	330.00	566.86	4,005.48	2.01	377.31

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	2,025.28	616.78	5,802.96	4.83	621.77
TOTALS (lbs/day, mitigated)	2,024.69	611.36	5,800.19	4.83	621.74

URBEMIS 2002 For Windows 7.5.0

ile Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
roject Name: River Village Operational Emissions
roject Location: South Coast Air Basin (Los Angeles area)
n-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Winter)

REA SOURCE EMISSION ESTIMATES (Winter Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	2.40	31.52	13.20	-	0.06
Wood Stoves	0.00	0.00	0.00	0.00	0.00
Fireplaces	1,617.41	18.36	1,784.09	2.83	244.38
Landscaping - No winter emissions					
Consumer Prdcts	75.46	-	-	-	-
TOTALS(lbs/day,unmitigated)	1,695.26	49.89	1,797.29	2.83	244.44

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
ingle family housing	52.80	88.27	633.57	0.32	59.43
partments low rise	28.40	47.36	339.97	0.17	31.89
ondo/townhouse general	28.77	48.03	344.78	0.18	32.34
lementary school	9.34	15.91	110.82	0.06	10.66
ity park	0.42	0.71	5.00	0.00	0.47
omercial Center 10-30 ac	100.15	174.82	1,226.28	0.61	115.66
ommercial Center <10 ac.	47.56	83.07	582.67	0.29	54.96
ommercial Shops	2.59	4.52	31.69	0.02	2.99
ommercial Office	59.98	104.20	730.89	0.36	68.94
OTAL EMISSIONS (lbs/day)	330.01	566.89	4,005.67	2.01	377.33

oes not include correction for passby trips.
ncludes a double counting reduction for internal trips.

PERATIONAL (Vehicle) EMISSION ESTIMATES

nalysis Year: 2007 Temperature (F): 50 Season: Winter

MFAC Version: EMFAC2002 (9/2002)

ummary of Land Uses:

nit Type	Trip Rate	Size	Total Trips
ingle family housing	9.90 trips / dwelling units	591.00	5,850.90
partments low rise	6.90 trips / dwelling units	455.00	3,139.50
ondo/townhouse general	8.00 trips / dwelling units	398.00	3,184.00
lementary school	1.45 trips / students	750.00	1,087.50
ity park	2.60 trips / acres	20.90	54.34
omercial Center 10-30 ac	54.06 trips / 1000 sq. ft.	252.00	13,623.12
ommercial Center <10 ac.	85.06 trips / 1000 sq. ft.	76.10	6,473.07
ommercial Shops	37.06 trips / 1000 sq. ft.	9.50	352.07
ommercial Office	11.56 trips / 1000 sq. ft.	702.40	8,119.74

ehicle Assumptions:

leet Mix:

ehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
ight Auto	55.20	1.80	97.80	0.40
ight Truck < 3,750 lbs	15.10	3.30	94.00	2.70
ight Truck 3,751- 5,750	16.10	1.90	96.90	1.20
ed Truck 5,751- 8,500	7.10	1.40	95.80	2.80
ite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
ite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
ed-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
eavy-Heavy 33,001-60,000	0.90	0.00	11.10	98.90
ine Haul > 60,000 lbs	0.00	0.00	0.00	100.00
rban Bus	0.10	0.00	0.00	100.00
otorcycle	1.70	82.40	17.60	0.00
chool Bus	0.10	0.00	0.00	100.00
otor Home	1.20	8.30	83.30	8.40

ravel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
rban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
ural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
rip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			

% of Trips - Commercial (by land use)

lementary school	20.0	10.0	70.0
ity park	5.0	2.5	92.5
omercial Center 10-30 ac.	2.0	1.0	97.0
ommercial Center <10 ac.	2.0	1.0	97.0
ommercial Shops	2.0	1.0	97.0
ommercial Office	2.0	1.0	97.0

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The area souce mitigation measure option switch changed from off to on.
The natural gas residential percentage changed from 60 to 100.
The percentage of wood stoves changed from 35 to 0.
The landscape length of the summer period (in days) changed from 180 to 365.
The landscape year changed from 2004 to 2007.
The consumer product persons per residential unit changed from 2.861 to 3.056.
Mitigation measure Orient Buildings North/South: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure All Electric Landscape Maintenance Equipment: Rsdntl Lndscp Maint.
has been changed from off to on.
Mitigation measure Central Water Heater: Cmrcl Space Heat.
has been changed from off to on.
Mitigation measure Orient Buildings North/South: Cmrcl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Cmrcl Space Heat.
has been changed from off to on.
Mitigation measure All Electric Landscape Maintenance Equipment: Cmrcl Lndscp Maint.
has been changed from off to on.

Changes made to the default values for Operations

The operational emission year changed from 2004 to 2007.
The double counting internal work trip limit changed from to 791.577.
The double counting shopping trip limit changed from to 395.7885.
The double counting other trip limit changed from to 5234.992.
The travel mode environment settings changed from both to: both
Mitigation measure Mixed Use Project (Residential Oriented):3
has been changed from off to on.
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Furniture:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Mixed Use Project (Commercial Oriented):1
has been changed from off to on.
Mitigation measure Floor Area Ratio 0.75 or Greater:1
has been changed from off to on.
Mitigation measure Provide Wide Sidewalks and Onsite Pedestrian Facilities:1
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Project Provides Shade Trees to Shade Sidewalks:0.5
has been changed from off to on.
Mitigation measure Project Provides Street Art and/or Street Furniture:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety Designs/Infrastructure at Crossings:0.5
has been changed from off to on.
Mitigation measure Articulated Storefront(s) Display Windows with Visual Interest:0.25
has been changed from off to on.
Mitigation measure No Long Uninterrupted Walls Along Pedestrian Walkways:0.25
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.
Mitigation measure Provide Securre Bicycle Parking:1
has been changed from off to on.
Mitigation measure Provide Employee Lockers and Showers:1
has been changed from off to on.
Mitigation measure Shuttle Bus Service to Transit/Multi-Modal Center:2
has been changed from off to on.
Mitigation measure Preferential Carpool/Vanpool Parking:1.5
has been changed from off to on.
Mitigation measure Many Frequently Needed Services Provided:5

has been changed from off to on.
Litigation measuremitop5: Park and Ride Lots
has been changed from on to off.

SUMMERTIME EMISSIONS REDUCTIONS

ESTIMATED SUMMERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Input Fields

LAND USE		Unmitigated Emissions in Pounds per Day CO	VOC	NO_x	PM_{10}
Single Family Residential Uses	Vehicular Sources	669.33	56.35	60.96	59.43
	Area Sources	9.36	39.22	13.67	0.04
Multi-Family Residential Uses	Vehicular Sources	783.90	64.47	68.82	64.23
	Area Sources	7.36	38.62	8.23	0.03
Commercial/Office/Institutional Uses	Vehicular Sources	2,762.13	221.64	265.15	253.67
	Area Sources	4.10	0.20	9.76	0.02
Wood-Burning Fire Place Emissions	Vehicular Sources	0.00	0.00	0.00	0.00
	Area Sources	0.00	0.00	0.00	0.00
Total Emissions	Vehicular Sources	4,155.39	342.42	391.84	377.33
	Area Sources	21.52	78.84	31.66	0.09
	Total Non-Reduced Emissions	4,177.41	421.26	423.48	377.42

Recommended (Measures already incorporated into Project are marked "No." Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	Emission Reduction Efficiency CO	VOC	NO_x	PM_{10}	Reduced Emissions in Pounds per Day CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Stationary Sources											
All Residential Uses											
X		Use solar or low emission water heaters	10.0%	11.0%	9.5%	4.5%	1.74	8.58	2.08	0.00	
X		Use built-in energy-efficient appliances	3.0%	2.5%	3.0%	6.5%	0.52	1.95	0.66	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use double-glass paned windows	4.5%	4.5%	4.0%	2.5%	0.78	3.51	0.88	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use fuel cells in residential subdivisions to produce heat and elec.	1.0%	0.0%	1.5%	7.0%	0.17	0.00	0.33	0.00	
X		Orient buildings to the north	13.5%	14.0%	13.0%	10.5%	2.35	10.93	2.85	0.01	
X		Use light-colored roof materials to reflect heat	1.5%	1.5%	1.5%	1.5%	0.26	1.17	0.33	0.00	
X		Comply with Title 24	13.0%	14.0%	13.0%	7.5%	2.26	10.93	2.85	0.01	
Multi-Family Residential Uses											
	X	Use central water heating systems	8.5%	9.0%	8.0%	4.0%	0.00	0.00	0.00	0.00	Central heating systems are not desired by the average multi-family resident.
Commercial, Office, Institutional Uses											
X		Use solar or low emission water heaters	0.5%	0.5%	0.5%	0.5%	0.02	0.00	0.05	0.00	
X		Use central water heating systems	0.5%	0.5%	0.5%	0.5%	0.02	0.00	0.05	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.5%	0.5%	0.5%	1.0%	0.02	0.00	0.05	0.00	
X		Use energy-efficient and automated controls for air conditioners	1.0%	1.0%	1.0%	1.5%	0.04	0.01	0.10	0.00	
X		Use double-glass paned windows	3.0%	3.5%	3.0%	2.5%	0.12	0.03	0.25	0.00	
X		Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	7.0%	3.0%	8.5%	19.5%	0.29	0.02	0.82	0.00	
X		Use light-colored roof materials to reflect heat	1.0%	1.0%	1.0%	0.5%	0.04	0.01	0.10	0.00	
X		Comply with Title 24	9.5%	10.0%	9.0%	7.0%	0.39	0.08	0.87	0.00	
X		Orient buildings to the north	12.5%	11.0%	13.5%	17.5%	0.51	0.09	1.31	0.00	
Industrial Uses											
	X	Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	1.0%	0.00	0.00	0.00	0.00	
	X	Use double-glass paned windows	0.0%	0.0%	0.5%	1.0%	0.00	0.00	0.00	0.00	
	X	Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
	X	Use lighting controls and energy efficient lighting	0.5%	0.0%	1.0%	2.5%	0.00	0.00	0.00	0.00	
	X	Use light-colored roof materials to reflect heat	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
	X	Orient buildings to the north	2.5%	2.0%	3.0%	5.5%	0.00	0.00	0.00	0.00	
	X	Comply with Title 24	0.5%	0.0%	1.0%	3.0%	0.00	0.00	0.00	0.00	
	X	Improved storage and handling of source materials	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Materials substitution (e.g., use water-based paints, life cycle analysis)	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Utilize efficient manufacturing processes	1.5%	0.5%	2.0%	6.0%	0.00	0.00	0.00	0.00	
	X	Resource recovery systems	3.0%	3.5%	3.0%	1.5%	0.00	0.00	0.00	0.00	

Impact Sciences, Inc.
Prepared by R. Mamaghani
2/12/04

Based on SCAQMD
CEQA Air Quality Handbook
Table 11-6

ESTIMATED SUMMERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Mobile Sources											
Residential Uses											
	X	Allow satellite telecommunications centers in residential subdivisions	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Satellite telecommunications centers are superseded by other technology.
	X	Shuttle service from res. subdivisions to commercial core areas	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residences are proposed in walking distance to proposed commercial areas.
X		Construct bus passenger benches and shelters	0.2%	0.2%	0.2%	0.2%	2.79	0.24	0.25	0.25	
X		Construct pedestrian facility improvements	0.1%	0.1%	0.1%	0.1%	1.39	0.12	0.13	0.12	
X		Retail services within or adjacent to residential subdivisions	1.3%	1.0%	1.3%	1.3%	18.12	1.21	1.65	1.61	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	1.39	0.12	0.13	0.12	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	55.75	4.83	5.07	4.95	
X		Construct bicycle trails	0.1%	0.1%	0.1%	0.1%	1.39	0.12	0.13	0.12	
Commercial, Office and Institutional Uses											
X		Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
X		Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide separate windows for fast-food restaurants	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide video-conference facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
	X	Lunch shuttle service from a worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	Mixed use lots are expected to have food establishments located within walking distance for employees.
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	The requirement to achieve a specific AVR has been ruled unlawful by the federal government.
	X	Utilize satellite offices rather than regular worksite to reduce VMT	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Establish a home-based telecommuting program	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
	X	Other travel incentives such as discounts on purchases for transit riders	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.2%	0.3%	8.29	0.44	0.80	0.76	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residential uses are in close proximity and within walking distance to proposed commercial uses.
X		Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		Residential units within or adjacent to commercial developments	4.0%	3.1%	4.0%	4.0%	110.49	6.87	10.60	10.15	
X		Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
X		Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	8.29	0.44	0.80	0.76	
X		Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	5.52	0.44	0.53	0.51	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Charge visitors to park	2.0%	1.5%	2.0%	2.0%	55.24	3.32	5.30	5.07	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	110.49	8.87	10.60	10.15	
X		Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Paid parking at walkup kiosks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide commuter information areas	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	Such programs are set up by and at the discretion of future occupants of the commercial uses.

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ESTIMATED SUMMERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Industrial Uses											
	X	Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide commuter information areas	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	
	X	Offer loans or other incentives to employees who move locally	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	
	X	Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	0.00	0.00	0.00	0.00	
	X	Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	0.00	0.00	0.00	0.00	
	X	Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Lunch shuttle system from worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	
	X	On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install aerodynamic add-on devices to heavy-duty trucks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce ship cruising speeds in the inner harbor	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	
	X	Use low-emission fuels or electrify airport ground service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Engine tuning for marine vessels	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce number of aircraft engines used during idling	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install monitoring system to control airport shuttles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use centralized ground power systems for airport service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
		Reduction in Stationary Sources Emissions (Pounds per day)					-9.56	-37.32	-13.62	-0.04	
		Reduction in Mobile Sources Emissions (Pounds per day)					-395.72	-28.36	-37.57	-36.09	
		Total Reduction in Emissions Based on Newhall Ranch FEIR Measures (Pounds per day)					-405.28	-65.68	-51.19	-36.13	
		Percentage Reduced Based on Newhall Ranch FEIR Measures					-9.70%	-15.59%	-12.09%	-9.57%	
		No Wood Burning Fire Places or Stoves in Residential Units					0.00	0.00	0.00	0.00	
		Total Percent Reduction Based on Implementation of All Recommended Measures					-9.70%	-15.59%	-12.09%	-9.57%	
		Total Reduced Stationary Source Emissions					**11.96**	**41.52**	**18.02**	**0.05**	
		Total Reduced Mobile Source Emissions					**3,760.17**	**314.06**	**354.27**	**341.24**	
		TOTAL REDUCED EMISSIONS					**3,772.13**	**355.58**	**372.29**	**341.29**	
		SCAQMD Thresholds					**550.00**	**55.00**	**55.00**	**150.00**	
		ProjectAir Quality Impacts Significant?					**YES**	**YES**	**YES**	**YES**	

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2/12/04

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Table 11-6

WINTERTIME EMISSIONS REDUCTIONS

ESTIMATED WINTERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Input Fields

LAND USE		Unmitigated Emissions in Pounds per Day CO	VOC	NO_x	PM_{10}
Single Family Residential Uses	Vehicular Sources	680.87	52.80	68.27	59.43
	Area Sources	9.86	39.22	13.67	0.04
Multi-Family Residential Uses	Vehicular Sources	584.75	37.19	95.26	84.23
	Area Sources	7.86	38.82	8.27	0.03
Commercial/Office/Institutional Uses	Vehicular Sources	1,627.39	226.04	388.23	253.67
	Area Sources	4.10	0.00	9.70	0.02
Wood-Burning Fire Place Emissions	Vehicular Sources	0.00	0.00	0.00	0.00
	Area Sources	1,794.08	1,617.31	18.86	244.38
Total Emissions	Vehicular Sources	4,005.67	330.01	566.89	377.33
	Area Sources	1,805.61	1,696.25	50.00	244.47
	Total Non-Reduced Emissions	5,811.28	2,026.26	616.89	621.80

Recommended (Measures already incorporated into Project are marked "No." Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	Emission Reduction Efficiency CO	VOC	NO_x	PM_{10}	Reduced Emissions in Pounds per Day CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Stationary Sources											
All Residential Uses											
X		Use solar or low emission water heaters	10.0%	11.0%	9.5%	4.5%	1.74	3.58	2.08	0.00	
X		Use built-in energy-efficient appliances	3.0%	2.5%	3.0%	6.5%	0.52	1.95	0.66	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use double-glass paned windows	4.5%	4.5%	4.0%	2.5%	0.78	3.51	0.85	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use fuel cells in residential subdivisions to produce heat and elec.	1.0%	0.0%	1.5%	7.0%	0.17	0.00	0.33	0.00	
X		Orient buildings to the north	13.5%	14.0%	13.0%	10.5%	2.35	10.93	2.85	0.01	
X		Use light-colored roof materials to reflect heat	1.5%	1.5%	1.5%	1.5%	0.26	1.17	0.33	0.00	
X		Comply with Title 24	13.0%	14.0%	13.0%	7.5%	2.26	10.93	2.85	0.01	
Multi-Family Residential Uses											
	X	Use central water heating systems	8.5%	9.0%	8.0%	4.0%	0.00	0.00	0.00	0.00	Central heating systems are not desired by the average multi-family resident.
Commercial, Office, Institutional Uses											
X		Use solar or low emission water heaters	0.5%	0.5%	0.5%	0.5%	0.02	0.00	0.05	0.00	
X		Use central water heating systems	0.5%	0.5%	0.5%	0.5%	0.02	0.00	0.05	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.5%	0.5%	0.5%	1.0%	0.02	0.00	0.05	0.00	
X		Use energy-efficient and automated controls for air conditioners	1.0%	1.0%	1.0%	1.5%	0.04	0.01	0.10	0.00	
X		Use double-glass paned windows	3.0%	3.5%	3.0%	2.5%	0.12	0.03	0.29	0.00	
X		Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	7.0%	3.0%	8.5%	19.5%	0.29	0.02	0.82	0.00	
X		Use light-colored roof materials to reflect heat	1.0%	1.0%	1.0%	0.5%	0.04	0.01	0.10	0.00	
X		Comply with Title 24	9.5%	10.0%	9.0%	7.0%	0.39	0.08	0.87	0.00	
X		Orient buildings to the north	12.5%	11.0%	13.5%	17.5%	0.51	0.09	1.31	0.00	
Industrial Uses											
	X	Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	1.0%	0.00	0.00	0.00	0.00	
	X	Use double-glass paned windows	0.0%	0.0%	0.5%	1.0%	0.00	0.00	0.00	0.00	
	X	Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use lighting controls and energy efficient lighting	0.5%	0.0%	1.0%	2.5%	0.00	0.00	0.00	0.00	
	X	Use light-colored roof materials to reflect heat	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
	X	Orient buildings to the north	2.5%	2.0%	3.0%	5.5%	0.00	0.00	0.00	0.00	
	X	Comply with Title 24	0.5%	0.0%	1.0%	3.0%	0.00	0.00	0.00	0.00	
	X	Improved storage and handling of source materials	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Materials substitution (e.g., use water-based paints, life cycle analysis)	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Utilize efficient manufacturing processes	1.5%	0.5%	2.0%	6.0%	0.00	0.00	0.00	0.00	
	X	Resource recovery systems	3.0%	3.5%	3.0%	1.5%	0.00	0.00	0.00	0.00	

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River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Mobile Sources											
Residential Uses											
	X	Allow satellite telecommunications centers in residential subdivisions	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Satellite telecommunications centers are superseded by other technology.
	X	Shuttle service from res. subdivisions to commercial core areas	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residences are proposed in walking distance to proposed commercial areas.
X		Construct bus passenger benches and shelters	0.2%	0.2%	0.2%	0.2%	2.64	0.22	0.37	0.25	
X		Construct pedestrian facility improvements	0.1%	0.1%	0.1%	0.1%	1.32	0.11	0.18	0.12	
X		Retail services within or adjacent to residential subdivisions	1.3%	1.0%	1.3%	1.3%	17.14	1.10	2.39	1.61	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	1.32	0.11	0.18	0.12	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	52.73	4.40	7.35	4.95	
X		Construct bicycle trails	0.1%	0.1%	0.1%	0.1%	1.32	0.11	0.18	0.12	
Commercial, Office and Institutional Uses											
X		Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
X		Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide separate windows for fast-food restaurants	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide video-conference facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
	X	Lunch shuttle service from a worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	Mixed use lots are expected to have food establishments located within walking distance for employees.
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	The requirement to achieve a specific AVR has been ruled unlawful by the federal government.
	X	Utilize satellite offices rather than regular worksite to reduce VMT	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Establish a home-based telecommuting program	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
	X	Offer travel incentives such as discounts on purchases for transit riders	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	8.06	0.44	1.15	0.76	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residential uses are in close proximity and within walking distance to proposed commercial uses.
X		Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		Residential units within or adjacent to commercial developments	4.0%	3.1%	4.0%	4.0%	107.49	6.82	15.33	10.15	
X		Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
X		Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	8.06	0.44	1.15	0.76	
X		Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	5.37	0.44	0.77	0.51	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Charge visitors to park	2.0%	1.5%	2.0%	2.0%	53.75	3.30	7.66	5.07	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	107.49	8.80	15.33	10.15	
X		Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Paid parking at walkup kiosks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide commuter information areas	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	Such programs are set up by and at the discretion of future occupants of the commercial uses.

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River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Industrial Uses											
	X	Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide commuter information areas	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	
	X	Offer loans or other incentives to employees who move locally	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	
	X	Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	0.00	0.00	0.00	0.00	
	X	Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	0.00	0.00	0.00	0.00	
	X	Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Lunch shuttle system from worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	
	X	On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install aerodynamic add-on devices to heavy-duty trucks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce ship cruising speeds in the inner harbor	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use low-emission fuels or electrify airport ground service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Engine tuning for marine vessels	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce number of aircraft engines used during idling	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install monitoring system to control airport shuttles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use centralized ground power systems for airport service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
		Reduction in Stationary Sources Emissions (Pounds per day)					-9.56	-37.32	-13.62	-0.04	
		Reduction in Mobile Sources Emissions (Pounds per day)					-382.82	-27.61	-54.34	-36.09	
		Total Reduction in Emissions Based on Newhall Ranch FEIR Measures (Pounds per day)					-392.38	-64.93	-67.96	-36.13	
		Percentage Reduced Based on Newhall Ranch FEIR Measures					-6.75%	-3.20%	-11.02%	-5.81%	
		No Wood Burning Fire Places or Stoves in Residential Units					-1,784.09	-1,617.41	-18.36	-244.38	
		Total Percent Reduction Based on Implementation of All Recommended Measures					-37.45%	-83.03%	-13.99%	-45.11%	
		Total Reduced Stationary Source Emissions					**11.96**	**41.52**	**18.02**	**0.05**	
		Total Reduced Mobile Source Emissions					**3,622.85**	**302.40**	**512.55**	**341.24**	
		TOTAL REDUCED EMISSIONS					3,634.81	343.92	530.57	341.29	
		SCAQMD Thresholds					550.00	55.00	55.00	150.00	
		ProjectAir Quality Impacts Significant?					YES	YES	YES	YES	

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APPENDIX B

ISCST3 Files

ISCST3 Files

APPENDIX C

Calculations of Chronic Hazard Indices

Landmark Village EIR
Chronic Hazard Indices Calculations

Multiplying factor used in Cancer Risk Calculations: 40.96

Receptor	Risk (in one million)	Concentration ($\mu g/m^3$)	REL for DPM ($\mu g/m^3$)	Chronic Hazard Index
Residential	1.7	0.042	5	0.008
Workplace	1.2	0.029	5	0.006
Sensitive	0.3	0.007	5	0.001

REL: Reference Exposure Limit
DPM: Diesel Particulate Matter

SCAQMD Rule 403, Fugitive Dust

(Adopted May 7, 1976) (Amended November 6, 1992)
(Amended July 9, 1993) (Amended February 14, 1997)
(Amended December 11, 1998)(Amended April 2, 2004)
(Amended June 3, 2005)

RULE 403. FUGITIVE DUST

(a) Purpose

The purpose of this Rule is to reduce the amount of particulate matter entrained in the ambient air as a result of anthropogenic (man-made) fugitive dust sources by requiring actions to prevent, reduce or mitigate fugitive dust emissions.

(b) Applicability

The provisions of this Rule shall apply to any activity or man-made condition capable of generating fugitive dust.

(c) Definitions

(1) ACTIVE OPERATIONS means any source capable of generating fugitive dust, including, but not limited to, earth-moving activities, construction/demolition activities, disturbed surface area, or heavy- and light-duty vehicular movement.

(2) AGGREGATE-RELATED PLANTS are defined as facilities that produce and / or mix sand and gravel and crushed stone.

(3) AGRICULTURAL HANDBOOK means the region-specific guidance document that has been approved by the Governing Board or hereafter approved by the Executive Officer and the U.S. EPA. For the South Coast Air Basin, the Board-approved region-specific guidance document is the Rule 403 Agricultural Handbook dated December 1998. For the Coachella Valley, the Board-approved region-specific guidance document is the Rule 403 Coachella Valley Agricultural Handbook dated April 2, 2004.

(4) ANEMOMETERS are devices used to measure wind speed and direction in accordance with the performance standards, and maintenance and calibration criteria as contained in the most recent Rule 403 Implementation Handbook.

(5) BEST AVAILABLE CONTROL MEASURES means fugitive dust control actions that are set forth in Table 1 of this Rule.

(6) BULK MATERIAL is sand, gravel, soil, aggregate material less than two inches in length or diameter, and other organic or inorganic particulate matter.

(7) CEMENT MANUFACTURING FACILITY is any facility that has a cement kiln at the facility.

(8) CHEMICAL STABILIZERS are any non-toxic chemical dust suppressant which must not be used if prohibited for use by the Regional Water Quality Control Boards, the California Air Resources Board, the U.S. Environmental Protection Agency (U.S. EPA), or any applicable law, rule or regulation. The chemical stabilizers shall meet any specifications, criteria, or tests required by any federal, state, or local water agency. Unless otherwise indicated, the use of a non-toxic chemical stabilizer shall be of sufficient concentration and application frequency to maintain a stabilized surface.

(9) COMMERCIAL POULTRY RANCH means any building, structure, enclosure, or premises where more than 100 fowl are kept or maintained for the primary purpose of producing eggs or meat for sale or other distribution.

(10) CONFINED ANIMAL FACILITY means a source or group of sources of air pollution at an agricultural source for the raising of 3,360 or more fowl or 50 or more animals, including but not limited to, any structure, building, installation, farm, corral, coop, feed storage area, milking parlor, or system for the collection, storage, or distribution of solid and liquid manure; if domesticated animals, including horses, sheep, goats, swine, beef cattle, rabbits, chickens, turkeys, or ducks are corralled, penned, or otherwise caused to remain in restricted areas for commercial agricultural purposes and feeding is by means other than grazing.

(11) CONSTRUCTION/DEMOLITION ACTIVITIES means any on-site mechanical activities conducted in preparation of, or related to, the building, alteration, rehabilitation, demolition or improvement of property, including, but not limited to the following activities: grading, excavation, loading, crushing, cutting, planing, shaping or ground breaking.

(12) CONTRACTOR means any person who has a contractual arrangement to conduct an active operation for another person.

(13) DAIRY FARM is an operation on a property, or set of properties that are contiguous or separated only by a public right-of-way, that raises cows or

produces milk from cows for the purpose of making a profit or for a livelihood. Heifer and calf farms are dairy farms.

(14) DISTURBED SURFACE AREA means a portion of the earth's surface which has been physically moved, uncovered, destabilized, or otherwise modified from its undisturbed natural soil condition, thereby increasing the potential for emission of fugitive dust. This definition excludes those areas which have:

(A) been restored to a natural state, such that the vegetative ground cover and soil characteristics are similar to adjacent or nearby natural conditions;

(B) been paved or otherwise covered by a permanent structure; or

(C) sustained a vegetative ground cover of at least 70 percent of the native cover for a particular area for at least 30 days.

(15) DUST SUPPRESSANTS are water, hygroscopic materials, or non-toxic chemical stabilizers used as a treatment material to reduce fugitive dust emissions.

(16) EARTH-MOVING ACTIVITIES means the use of any equipment for any activity where soil is being moved or uncovered, and shall include, but not be limited to the following: grading, earth cutting and filling operations, loading or unloading of dirt or bulk materials, adding to or removing from open storage piles of bulk materials, landfill operations, weed abatement through disking, and soil mulching.

(17) DUST CONTROL SUPERVISOR means a person with the authority to expeditiously employ sufficient dust mitigation measures to ensure compliance with all Rule 403 requirements at an active operation.

(18) FUGITIVE DUST means any solid particulate matter that becomes airborne, other than that emitted from an exhaust stack, directly or indirectly as a result of the activities of any person.

(19) HIGH WIND CONDITIONS means that instantaneous wind speeds exceed 25 miles per hour.

(20) INACTIVE DISTURBED SURFACE AREA means any disturbed surface area upon which active operations have not occurred or are not expected to occur for a period of 20 consecutive days.

(21) LARGE OPERATIONS means any active operations on property which contains 50 or more acres of disturbed surface area; or any earth-moving operation with a daily earth-moving or throughput volume of 3,850 cubic

meters (5,000 cubic yards) or more three times during the most recent 365-day period.

(22) OPEN STORAGE PILE is any accumulation of bulk material, which is not fully enclosed, covered or chemically stabilized, and which attains a height of three feet or more and a total surface area of 150 or more square feet.

(23) PARTICULATE MATTER means any material, except uncombined water, which exists in a finely divided form as a liquid or solid at standard conditions.

(24) PAVED ROAD means a public or private improved street, highway, alley, public way, or easement that is covered by typical roadway materials, but excluding access roadways that connect a facility with a public paved roadway and are not open to through traffic. Public paved roads are those open to public access and that are owned by any federal, state, county, municipal or any other governmental or quasi-governmental agencies. Private paved roads are any paved roads not defined as public.

(25) PM_{10} means particulate matter with an aerodynamic diameter smaller than or equal to 10 microns as measured by the applicable State and Federal reference test methods.

(26) PROPERTY LINE means the boundaries of an area in which either a person causing the emission or a person allowing the emission has the legal use or possession of the property. Where such property is divided into one or more sub-tenancies, the property line(s) shall refer to the boundaries dividing the areas of all sub-tenancies.

(27) RULE 403 IMPLEMENTATION HANDBOOK means a guidance document that has been approved by the Governing Board on April 2, 2004 or hereafter approved by the Executive Officer and the U.S. EPA.

(28) SERVICE ROADS are paved or unpaved roads that are used by one or more public agencies for inspection or maintenance of infrastructure and which are not typically used for construction-related activity.

(29) SIMULTANEOUS SAMPLING means the operation of two PM_{10} samplers in such a manner that one sampler is started within five minutes of the other, and each sampler is operated for a consecutive period which must be not less than 290 minutes and not more than 310 minutes.

(30) SOUTH COAST AIR BASIN means the non-desert portions of Los Angeles, Riverside, and San Bernardino counties and all of Orange

County as defined in California Code of Regulations, Title 17, Section 60104. The area is bounded on the west by the Pacific Ocean, on the north and east by the San Gabriel, San Bernardino, and San Jacinto Mountains, and on the south by the San Diego county line.

(31) STABILIZED SURFACE means any previously disturbed surface area or open storage pile which, through the application of dust suppressants, shows visual or other evidence of surface crusting and is resistant to wind-driven fugitive dust and is demonstrated to be stabilized. Stabilization can be demonstrated by one or more of the applicable test methods contained in the Rule 403 Implementation Handbook.

(32) TRACK-OUT means any bulk material that adheres to and agglomerates on the exterior surface of motor vehicles, haul trucks, and equipment (including tires) that have been released onto a paved road and can be removed by a vacuum sweeper or a broom sweeper under normal operating conditions.

(33) TYPICAL ROADWAY MATERIALS means concrete, asphaltic concrete, recycled asphalt, asphalt, or any other material of equivalent performance as determined by the Executive Officer, and the U.S. EPA.

(34) UNPAVED ROADS means any unsealed or unpaved roads, equipment paths, or travel ways that are not covered by typical roadway materials. Public unpaved roads are any unpaved roadway owned by federal, state, county, municipal or other governmental or quasi-governmental agencies. Private unpaved roads are all other unpaved roadways not defined as public.

(35) VISIBLE ROADWAY DUST means any sand, soil, dirt, or other solid particulate matter which is visible upon paved road surfaces and which can be removed by a vacuum sweeper or a broom sweeper under normal operating conditions.

(36) WIND-DRIVEN FUGITIVE DUST means visible emissions from any disturbed surface area which is generated by wind action alone.

(37) WIND GUST is the maximum instantaneous wind speed as measured by an anemometer.

(d) Requirements

(1) No person shall cause or allow the emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area such that:

(A) the dust remains visible in the atmosphere beyond the property line of the emission source; or

(B) the dust emission exceeds 20 percent opacity (as determined by the appropriate test method included in the Rule 403 Implementation Handbook), if the dust emission is the result of movement of a motorized vehicle.

(2) No person shall conduct active operations without utilizing the applicable best available control measures included in Table 1 of this Rule to minimize fugitive dust emissions from each fugitive dust source type within the active operation.

(3) No person shall cause or allow PM_{10} levels to exceed 50 micrograms per cubic meter when determined, by simultaneous sampling, as the difference between upwind and downwind samples collected on high-volume particulate matter samplers or other U.S. EPA-approved equivalent method for PM_{10} monitoring. If sampling is conducted, samplers shall be:

(A) Operated, maintained, and calibrated in accordance with 40 Code of Federal Regulations (CFR), Part 50, Appendix J, or appropriate U.S. EPA-published documents for U.S. EPA-approved equivalent method(s) for PM_{10}.

(B) Reasonably placed upwind and downwind of key activity areas and as close to the property line as feasible, such that other sources of fugitive dust between the sampler and the property line are minimized.

(4) No person shall allow track-out to extend 25 feet or more in cumulative length from the point of origin from an active operation. Notwithstanding the preceding, all track-out from an active operation shall be removed at the conclusion of each workday or evening shift.

(5) No person shall conduct an active operation with a disturbed surface area of five or more acres, or with a daily import or export of 100 cubic yards or more of bulk material without utilizing at least one of the measures listed in subparagraphs (d)(5)(A) through (d)(5)(E) at each vehicle egress from the site to a paved public road.

(A) Install a pad consisting of washed gravel (minimum-size: one inch) maintained in a clean condition to a depth of at least six inches and extending at least 30 feet wide and at least 50 feet long.

(B) Pave the surface extending at least 100 feet and at least 20 feet wide.

(C) Utilize a wheel shaker/wheel spreading device consisting of raised dividers (rails, pipe, or grates) at least 24 feet long and 10 feet wide to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.

(D) Install and utilize a wheel washing system to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.

(E) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the actions specified in subparagraphs (d)(5)(A) through (d)(5)(D).

(6) Beginning January 1, 2006, any person who operates or authorizes the operation of a confined animal facility subject to this Rule shall implement the applicable conservation management practices specified in Table 4 of this Rule.

(e) Additional Requirements for Large Operations

(1) Any person who conducts or authorizes the conducting of a large operation subject to this Rule shall implement the applicable actions specified in Table 2 of this Rule at all times and shall implement the applicable actions specified in Table 3 of this Rule when the applicable performance standards can not be met through use of Table 2 actions; and shall:

(A) submit a fully executed Large Operation Notification (Form 403 N) to the Executive Officer within 7 days of qualifying as a large operation;

(B) include, as part of the notification, the name(s), address(es), and phone number(s) of the person(s) responsible for the submittal, and a description of the operation(s), including a map depicting the location of the site;

(C) maintain daily records to document the specific dust control actions taken, maintain such records for a period of not less than three years; and make such records available to the Executive Officer upon request;

(D) install and maintain project signage with project contact signage that meets the minimum standards of the Rule 403 Implementation Handbook, prior to initiating any earthmoving activities;

(E) identify a dust control supervisor that:

(i) is employed by or contracted with the property owner or developer;

(ii) is on the site or available on-site within 30 minutes during working hours;

(iii) has the authority to expeditiously employ sufficient dust mitigation measures to ensure compliance with all Rule requirements;

(iv) has completed the AQMD Fugitive Dust Control Class and has been issued a valid Certificate of Completion for the class; and

(F) notify the Executive Officer in writing within 30 days after the site no longer qualifies as a large operation as defined by paragraph (c)(18).

(2) Any Large Operation Notification submitted to the Executive Officer or AQMD-approved dust control plan shall be valid for a period of one year from the date of written acceptance by the Executive Officer. Any Large Operation Notification accepted pursuant to paragraph (e)(1), excluding those submitted by aggregate-related plants and cement manufacturing facilities must be resubmitted annually by the person who conducts or authorizes the conducting of a large operation, at least 30 days prior to the expiration date, or the submittal shall no longer be valid as of the expiration date. If all fugitive dust sources and corresponding control measures or special circumstances remain identical to those identified in the previously accepted submittal or in an AQMD-approved dust control plan, the resubmittal may be a simple statement of no-change (Form 403NC).

(f) Compliance Schedule

The newly amended provisions of this Rule shall become effective upon adoption. Pursuant to subdivision (e), any existing site that qualifies as a large operation will have 60 days from the date of Rule adoption to comply with the notification and recordkeeping requirements for large operations. Any Large Operation

Notification or AQMD-approved dust control plan which has been accepted prior to the date of adoption of these amendments shall remain in effect and the Large Operation Notification or AQMD-approved dust control plan annual resubmittal date shall be one year from adoption of this Rule amendment.

(g) Exemptions

(1) The provisions of this Rule shall not apply to:

(A) Dairy farms.

(B) Confined animal facilities provided that the combined disturbed surface area within one continuous property line is one acre or less.

(C) Agricultural vegetative crop operations provided that the combined disturbed surface area within one continuous property line and not separated by a paved public road is 10 acres or less.

(D) Agricultural vegetative crop operations within the South Coast Air Basin, whose combined disturbed surface area includes more than 10 acres provided that the person responsible for such operations:

(i) voluntarily implements the conservation management practices contained in the Rule 403 Agricultural Handbook;

(ii) completes and maintains the self-monitoring form documenting sufficient conservation management practices, as described in the Rule 403 Agricultural Handbook; and

(iii) makes the completed self-monitoring form available to the Executive Officer upon request.

(E) Agricultural vegetative crop operations outside the South Coast Air Basin whose combined disturbed surface area includes more than 10 acres provided that the person responsible for such operations:

(i) voluntarily implements the conservation management practices contained in the Rule 403 Coachella Valley Agricultural Handbook; and

(ii) completes and maintains the self-monitoring form documenting sufficient conservation management practices, as described in the Rule 403 Coachella Valley Agricultural Handbook; and

(iii) makes the completed self-monitoring form available to the Executive Officer upon request.

(F) Active operations conducted during emergency life-threatening situations, or in conjunction with any officially declared disaster or state of emergency.

(G) Active operations conducted by essential service utilities to provide electricity, natural gas, telephone, water and sewer during periods of service outages and emergency disruptions.

(H) Any contractor subsequent to the time the contract ends, provided that such contractor implemented the required control measures during the contractual period.

(I) Any grading contractor, for a phase of active operations, subsequent to the contractual completion of that phase of earth-moving activities, provided that the required control measures have been implemented during the entire phase of earth-moving activities, through and including five days after the final grading inspection.

(J) Weed abatement operations ordered by a county agricultural commissioner or any state, county, or municipal fire department, provided that:

(i) mowing, cutting or other similar process is used which maintains weed stubble at least three inches above the soil; and

(ii) any discing or similar operation which cuts into and disturbs the soil, where watering is used prior to initiation of these activities, and a determination is made by the agency issuing the weed abatement order that, due to fire hazard conditions, rocks, or other physical obstructions, it is not practical to meet the conditions specified in clause (g)(1)(H)(i). The provisions this clause shall not exempt the owner of any property from stabilizing, in accordance with paragraph (d)(2), disturbed surface areas which have been created as a result of the weed abatement actions.

(K) sandblasting operations.

(2) The provisions of paragraphs (d)(1) and (d)(3) shall not apply:

(A) When wind gusts exceed 25 miles per hour, provided that:

(i) The required Table 3 contingency measures in this Rule are implemented for each applicable fugitive dust source type, and;

(ii) records are maintained in accordance with subparagraph (e)(1)(C).

(B) To unpaved roads, provided such roads:

(i) are used solely for the maintenance of wind-generating equipment; or

(ii) are unpaved public alleys as defined in Rule 1186; or

(iii) are service roads that meet all of the following criteria:

(a) are less than 50 feet in width at all points along the road;

(b) are within 25 feet of the property line; and

(c) have a traffic volume less than 20 vehicle-trips per day.

(C) To any active operation, open storage pile, or disturbed surface area for which necessary fugitive dust preventive or mitigative actions are in conflict with the federal Endangered Species Act, as determined in writing by the State or federal agency responsible for making such determinations.

(3) The provisions of (d)(2) shall not apply to any aggregate-related plant or cement manufacturing facility that implements the applicable actions specified in Table 2 of this Rule at all times and shall implement the applicable actions specified in Table 3 of this Rule when the applicable performance standards of paragraphs (d)(1) and (d)(3) can not be met through use of Table 2 actions.

(4) The provisions of paragraphs (d)(1), (d)(2), and (d)(3) shall not apply to:

(A) Blasting operations which have been permitted by the California Division of Industrial Safety; and

(B) Motion picture, television, and video production activities when dust emissions are required for visual effects. In order to obtain this exemption, the Executive Officer must receive notification in writing at least 72 hours in advance of any such activity and no nuisance results from such activity.

(5) The provisions of paragraph (d)(3) shall not apply if the dust control actions, as specified in Table 2, are implemented on a routine basis for

each applicable fugitive dust source type. To qualify for this exemption, a person must maintain records in accordance with subparagraph (e)(1)(C).

(6) The provisions of paragraph (d)(4) shall not apply to earth coverings of public paved roadways where such coverings are approved by a local government agency for the protection of the roadway, and where such coverings are used as roadway crossings for haul vehicles provided that such roadway is closed to through traffic and visible roadway dust is removed within one day following the cessation of activities.

(7) The provisions of subdivision (e) shall not apply to:

(A) officially-designated public parks and recreational areas, including national parks, national monuments, national forests, state parks, state recreational areas, and county regional parks.

(B) any large operation which is required to submit a dust control plan to any city or county government which has adopted a District-approved dust control ordinance.

(C) any large operation subject to Rule 1158, which has an approved dust control plan pursuant to Rule 1158, provided that all sources of fugitive dust are included in the Rule 1158 plan.

(8) The provisions of subparagraph (e)(1)(A) through (e)(1)(C) shall not apply to any large operation with an AQMD-approved fugitive dust control plan provided that there is no change to the sources and controls as identified in the AQMD-approved fugitive dust control plan.

(h) Fees

Any person conducting active operations for which the Executive Officer conducts upwind/downwind monitoring for PM_{10} pursuant to paragraph (d)(3) shall be assessed applicable Ambient Air Analysis Fees pursuant to Rule 304.1. Applicable fees shall be waived for any facility which is exempted from paragraph (d)(3) or meets the requirements of paragraph (d)(3).

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Backfilling	01-1 Stabilize backfill material when not actively handling; and 01-2 Stabilize backfill material during handling; and 01-3 Stabilize soil at completion of activity.	9 Mix backfill soil with water prior to moving 9 Dedicate water truck or high capacity hose to backfilling equipment 9 Empty loader bucket slowly so that no dust plumes are generated 9 Minimize drop height from loader bucket
Clearing and grubbing	02-1 Maintain stability of soil through pre-watering of site prior to clearing and grubbing: and 02-2 Stabilize soil during clearing and grubbing activities; and 02-3 Stabilize soil immediately after clearing and grubbing activities.	9 Maintain live perennial vegetation where possible 9 Apply water in sufficient quantity to prevent generation of dust plumes
Clearing forms	03-1 Use water spray to clear forms; or 03-2 Use sweeping and water spray to clear forms; or 03-3 Use vacuum system to clear forms.	9 Use of high pressure air to clear forms may cause exceedance of Rule requirements
Crushing	04-1 Stabilize surface soils prior to operation of support equipment; and 04-2 Stabilize material after crushing.	9 Follow permit conditions for crushing equipment 9 Pre-water material prior to loading into crusher 9 Monitor crusher emissions opacity 9 Apply water to crushed material to prevent dust plumes

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Cut and fill	05-1 Pre-water soils prior to cut and fill activities; and 05-2 Stabilize soil during and after cut and fill activities.	9 For large sites, pre-water with sprinklers or water trucks and allow time for penetration 9 Use water trucks/pulls to water soils to depth of cut prior to subsequent cuts
Demolition – mechanical/manual	06-1 Stabilize wind erodible surfaces to reduce dust; and 06-2 Stabilize surface soil where support equipment and vehicles will operate; and 06-3 Stabilize loose soil and demolition debris; and 06-4 Comply with AQMD Rule 1403.	9 Apply water in sufficient quantities to prevent the generation of visible dust plumes
Disturbed soil	07-1 Stabilize disturbed soil throughout the construction site; and 07-2 Stabilize disturbed soil between structures	9 Limit vehicular traffic and disturbances on soils where possible 9 If interior block walls are planned, install as early as possible 9 Apply water or a stabilizing agent in sufficient quantities to prevent the generation of visible dust plumes
Earth-moving activities	08-1 Pre-apply water to depth of proposed cuts; and 08-2 Re-apply water as necessary to maintain soils in a damp condition and to ensure that visible emissions do not exceed 100 feet in any direction; and 08-3 Stabilize soils once earth-moving activities are complete.	9 Grade each project phase separately, timed to coincide with construction phase 9 Upwind fencing can prevent material movement on site 9 Apply water or a stabilizing agent in sufficient quantities to prevent the generation of visible dust plumes

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Importing/exporting of bulk materials	09-1 Stabilize material while loading to reduce fugitive dust emissions; and 09-2 Maintain at least six inches of freeboard on haul vehicles; and 09-3 Stabilize material while transporting to reduce fugitive dust emissions; and 09-4 Stabilize material while unloading to reduce fugitive dust emissions; and 09-5 Comply with Vehicle Code Section 23114.	9 Use tarps or other suitable enclosures on haul trucks 9 Check belly-dump truck seals regularly and remove any trapped rocks to prevent spillage 9 Comply with track-out prevention/mitigation requirements 9 Provide water while loading and unloading to reduce visible dust plumes
Landscaping	10-1 Stabilize soils, materials, slopes	9 Apply water to materials to stabilize 9 Maintain materials in a crusted condition 9 Maintain effective cover over materials 9 Stabilize sloping surfaces using soil binders until vegetation or ground cover can effectively stabilize the slopes 9 Hydroseed prior to rain season
Road shoulder maintenance	11-1 Apply water to unpaved shoulders prior to clearing; and 11-2 Apply chemical dust suppressants and/or washed gravel to maintain a stabilized surface after completing road shoulder maintenance.	9 Installation of curbing and/or paving of road shoulders can reduce recurring maintenance costs 9 Use of chemical dust suppressants can inhibit vegetation growth and reduce future road shoulder maintenance costs

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Screening	12-1 Pre-water material prior to screening; and 12-2 Limit fugitive dust emissions to opacity and plume length standards; and 12-3 Stabilize material immediately after screening.	9 Dedicate water truck or high capacity hose to screening operation 9 Drop material through the screen slowly and minimize drop height 9 Install wind barrier with a porosity of no more than 50% upwind of screen to the height of the drop point
Staging areas	13-1 Stabilize staging areas during use; and 13-2 Stabilize staging area soils at project completion.	9 Limit size of staging area 9 Limit vehicle speeds to 15 miles per hour 9 Limit number and size of staging area entrances/exists
Stockpiles/ Bulk Material Handling	14-1 Stabilize stockpiled materials. 14-2 Stockpiles within 100 yards of off-site occupied buildings must not be greater than eight feet in height; or must have a road bladed to the top to allow water truck access or must have an operational water irrigation system that is capable of complete stockpile coverage.	9 Add or remove material from the downwind portion of the storage pile 9 Maintain storage piles to avoid steep sides or faces

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Traffic areas for construction activities	15-1 Stabilize all off-road traffic and parking areas; and 15-2 Stabilize all haul routes; and 15-3 Direct construction traffic over established haul routes.	9 Apply gravel/paving to all haul routes as soon as possible to all future roadway areas 9 Barriers can be used to ensure vehicles are only used on established parking areas/haul routes
Trenching	16-1 Stabilize surface soils where trencher or excavator and support equipment will operate; and 16-2 Stabilize soils at the completion of trenching activities.	9 Pre-watering of soils prior to trenching is an effective preventive measure. For deep trenching activities, pre-trench to 18 inches soak soils via the pre-trench and resuming trenching 9 Washing mud and soils from equipment at the conclusion of trenching activities can prevent crusting and drying of soil on equipment
Truck loading	17-1 Pre-water material prior to loading; and 17-2 Ensure that freeboard exceeds six inches (CVC 23114)	9 Empty loader bucket such that no visible dust plumes are created 9 Ensure that the loader bucket is close to the truck to minimize drop height while loading
Turf Overseeding	18-1 Apply sufficient water immediately prior to conducting turf vacuuming activities to meet opacity and plume length standards; and 18-2 Cover haul vehicles prior to exiting the site.	9 Haul waste material immediately off-site

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Unpaved roads/parking lots	19-1 Stabilize soils to meet the applicable performance standards; and 19-2 Limit vehicular travel to established unpaved roads (haul routes) and unpaved parking lots.	9 Restricting vehicular access to established unpaved travel paths and parking lots can reduce stabilization requirements
Vacant land	20-1 In instances where vacant lots are 0.10 acre or larger and have a cumulative area of 500 square feet or more that are driven over and/or used by motor vehicles and/or off-road vehicles, prevent motor vehicle and/or off-road vehicle trespassing, parking and/or access by installing barriers, curbs, fences, gates, posts, signs, shrubs, trees or other effective control measures.	

Table 2
DUST CONTROL MEASURES FOR LARGE OPERATIONS

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS	
Earth-moving (except construction cutting and filling areas, and mining operations)	(1a)	Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations each subsequent four-hour period of active operations; OR
	(1a-1)	For any earth-moving which is more than 100 feet from all property lines, conduct watering as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction.
Earth-moving: Construction fill areas:	(1b)	Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. For areas which have an optimum moisture content for compaction of less than 12 percent, as determined by ASTM Method 1557 or other equivalent method approved by the Executive Officer and the California Air Resources Board and the U.S. EPA, complete the compaction process as expeditiously as possible after achieving at least 70 percent of the optimum soil moisture content. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations during each subsequent four-hour period of active operations.

Table 2 (Continued)

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS	
Earth-moving: Construction cut areas and mining operations:	(1c)	Conduct watering as necessary to prevent visible emissions from extending more than 100 feet beyond the active cut or mining area unless the area is inaccessible to watering vehicles due to slope conditions or other safety factors.
Disturbed surface areas (except completed grading areas)	(2a/b)	Apply dust suppression in sufficient quantity and frequency to maintain a stabilized surface. Any areas which cannot be stabilized, as evidenced by wind driven fugitive dust must have an application of water at least twice per day to at least 80 percent of the unstabilized area.
Disturbed surface areas: Completed grading areas	(2c)	Apply chemical stabilizers within five working days of grading completion; OR
	(2d)	Take actions (3a) or (3c) specified for inactive disturbed surface areas.
Inactive disturbed surface areas	(3a)	Apply water to at least 80 percent of all inactive disturbed surface areas on a daily basis when there is evidence of wind driven fugitive dust, excluding any areas which are inaccessible to watering vehicles due to excessive slope or other safety conditions; OR
	(3b)	Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; OR
	(3c)	Establish a vegetative ground cover within 21 days after active operations have ceased. Ground cover must be of sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter; OR
	(3d)	Utilize any combination of control actions (3a), (3b), and (3c) such that, in total, these actions apply to all inactive disturbed surface areas.

Table 2 (Continued)

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS	
Unpaved Roads	(4a)	Water all roads used for any vehicular traffic at least once per every two hours of active operations [3 times per normal 8 hour work day]; OR
	(4b)	Water all roads used for any vehicular traffic once daily and restrict vehicle speeds to 15 miles per hour; OR
	(4c)	Apply a chemical stabilizer to all unpaved road surfaces in sufficient quantity and frequency to maintain a stabilized surface.
Open storage piles	(5a)	Apply chemical stabilizers; OR
	(5b)	Apply water to at least 80 percent of the surface area of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust; OR
	(5c)	Install temporary coverings; OR
	(5d)	Install a three-sided enclosure with walls with no more than 50 percent porosity which extend, at a minimum, to the top of the pile. This option may only be used at aggregate-related plants or at cement manufacturing facilities.
All Categories	(6a)	Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 2 may be used.

TABLE 3
CONTINGENCY CONTROL MEASURES FOR LARGE OPERATIONS

FUGITIVE DUST SOURCE CATEGORY	CONTROL MEASURES
Earth-moving	(1A) Cease all active operations; OR (2A) Apply water to soil not more than 15 minutes prior to moving such soil.
Disturbed surface areas	(0B) On the last day of active operations prior to a weekend, holiday, or any other period when active operations will not occur for not more than four consecutive days: apply water with a mixture of chemical stabilizer diluted to not less than 1/20 of the concentration required to maintain a stabilized surface for a period of six months; OR (1B) Apply chemical stabilizers prior to wind event; OR (2B) Apply water to all unstabilized disturbed areas 3 times per day. If there is any evidence of wind driven fugitive dust, watering frequency is increased to a minimum of four times per day; OR (3B) Take the actions specified in Table 2, Item (3c); OR (4B) Utilize any combination of control actions (1B), (2B), and (3B) such that, in total, these actions apply to all disturbed surface areas.
Unpaved roads	(1C) Apply chemical stabilizers prior to wind event; OR (2C) Apply water twice per hour during active operation; OR (3C) Stop all vehicular traffic.
Open storage piles	(1D) Apply water twice per hour; OR (2D) Install temporary coverings.
Paved road track-out	(1E) Cover all haul vehicles; OR (2E) Comply with the vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads.
All Categories	(1F) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 3 may be used.

Table 4
(Conservation Management Practices for Confined Animal Facilities)

SOURCE CATEGORY	CONSERVATION MANAGEMENT PRACTICES
Manure Handling **(Only applicable to Commercial Poultry Ranches)**	(1a) Cover manure prior to removing material off-site; AND (1b) Spread the manure before 11:00 AM and when wind conditions are less than 25 miles per hour; AND (1c) Utilize coning and drying manure management by removing manure at laying hen houses at least twice per year and maintain a base of no less than 6 inches of dry manure after clean out; or in lieu of complying with conservation management practice (1c), comply with conservation management practice (1d). (1d) Utilize frequent manure removal by removing the manure from laying hen houses at least every seven days and immediately thin bed dry the material.
Feedstock Handling	(2a) Utilize a sock or boot on the feed truck auger when filling feed storage bins.
Disturbed Surfaces	(3a) Maintain at least 70 percent vegetative cover on vacant portions of the facility; OR (3b) Utilize conservation tillage practices to manage the amount, orientation and distribution of crop and other plant residues on the soil surface year-round, while growing crops (if applicable) in narrow slots or tilled strips; OR (3c) Apply dust suppressants in sufficient concentrations and frequencies to maintain a stabilized surface.
Unpaved Roads	(4a) Restrict access to private unpaved roads either through signage or physical access restrictions and control vehicular speeds to no more than 15 miles per hour through worker notifications, signage, or any other necessary means; OR (4b) Cover frequently traveled unpaved roads with low silt content material (i.e., asphalt, concrete, recycled road base, or gravel to a minimum depth of four inches); OR (4c) Treat unpaved roads with water, mulch, chemical dust suppressants or other cover to maintain a stabilized surface.
Equipment Parking Areas	(5a) Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; OR (5b) Apply material with low silt content (i.e., asphalt, concrete, recycled road base, or gravel to a depth of four inches).

Mitigated Construction Emissions

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 1 thru 19**
Length of Subphase (weeks) 19.00
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust	--	--	--	--	19,407.42	
On-Road Diesel Exhaust	130.69	182.74	48.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	225.11	1,821.55	--	65.65	
Worker Commute Trips	15.88	1.71	2.50	0.01	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,703.71	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	1.69	2.64	Assumes Use of Aqueous Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,656.91	203.50	821.64	n/a	97.16	Assumes Use of Aqueous Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	--	n/a	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	330.37	207.06	721.79	9.02	9,672.96	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	Yes	Yes	No	Yes	

Project Name River Village **Mitigated Emissions**
Subphase Weeks 20 thru 39
Length of Subphase (weeks) 20.00
Year 2006

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust	--	--	--	--	19,393.70	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	--	65.65	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,696.85	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	1.69	2.64	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,656.91	203.50	821.64	n/a	97.16	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.91	--	--	--	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,126.24	--	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	23.98	2.86	12.25	0.11	0.28	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	4.00	0.58	3.35	0.06	0.09	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,217.25	150.55	608.17	n/a	69.15	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	--	n/a	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	490.05	227.72	1,255.02	0.13	9,643.99	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	Yes	Yes	No	Yes	

Project Name River Village **Mitigated Emissions**
Subphase Weeks 40 thru 46
Length of Subphase (weeks) 7.00
Year 2006

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	19,407.42	
On-Road Diesel Exhaust	130.69	482.78	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.91	226.11	1,521.55	--	65.65	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,703.71	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	1.69	2.64	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,656.91	203.50	821.64	n/a	97.16	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.91	--	--	--	
Off-Road Diesel Exhaust Emissions	1,337.50	167.28	1,126.24	--	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.90	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	4.00	0.58	3.35	0.06	0.09	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,217.25	150.55	608.17	n/a	69.15	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	232.74	1,654.08	--	72.90	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	--	151.03	--	--	--	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,514.14	209.47	893.20	0.00	107.89	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	697.59	405.10	2,015.39	0.11	9,616.01	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	

Project Name River Village **Mitigated Emissions**
Subphase Weeks 47 thru 91
Length of Subphase (weeks) 45.00
Year 2006

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	21.98	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	10.99	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,357.50	167.28	1,126.24	--	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	4.00	0.58	3.35	0.06	0.09	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,217.25	150.55	608.17	n/a	69.15	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	222.74	1,654.08	--	72.90	
Worker Commute Trips	25.51	2.90	4.75	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	--	151.08	--	--	--	
Worker Commute Trips	25.51	2.90	4.75	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,514.14	200.47	893.20	0.00	107.89	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	367.22	198.03	1,293.59	0.09	-45.97	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	Yes	Yes	No	No	

Project Name **River Village** **Mitigated Emissions**
Subphase **Week 92**
Length of Subphase (weeks) **1.00**
Year **2007**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust					0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,373.05	167.28	2,085.87	–	41.93	
On-Road Diesel Exhaust Emissions	4.05	0.61	4.80	0.01	0.10	
Worker Commute Emissions	11.29	1.25	7.11	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	3.65	0.54	3.13	0.01	0.08	Aqueous Diesel Fuel Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,235.75	150.55	586.37	n/a	62.96	Aqueous Diesel Fuel Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	2,159.16	275.61	1,931.00	–	79.99	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Architectural Painting	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	–	151.50			–	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Mitigation/Reduction	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,943.24	248.05	1,642.74	0.00	118.39	Aqueous Diesel Fuel Cooled Exhaust Gas Recirculation
Off-Gas Emissions	–	n/a	–	–	–	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**421.17**	**204.32**	**1,403.05**	**0.05**	**-58.00**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name River Village **Mitigated Emissions**
Subphase Weeks 93 thru 144
Length of Subphase (weeks) 52.00
Year 2007

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	0.02	–	–	–	
Off-Road Diesel Exhaust Emissions	1,373.05	167.28	1,085.87	–	41.93	
On-Road Diesel Exhaust Emissions	0.08	0.01	0.13	0.00	0.00	
Worker Commute Emissions	11.29	1.25	2.11	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	0.07	0.01	0.06	0.00	0.00	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,235.75	150.55	586.37	n/a	62.06	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,872.07	230.97	1,693.55	–	70.48	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Architectural Painting						
Off-Gas Emissions	–	141.73	–	–	–	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,684.86	216.06	914.52	0.00	104.31	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	–	n/a	–	–	–	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	385.62	189.23	1,290.00	0.05	-53.50	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	Yes	Yes	No	No	

Project Name River Village Mitigated Emissions
Subphase Weeks 145 thru 158
Length of Subphase (weeks) 14.00
Year 2008

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,385.56	167.28	1,098.33	–	38.46	
On-Road Diesel Exhaust Emissions	3.70	0.57	5.39	0.01	0.10	
Worker Commute Emissions	10.38	1.15	1.34	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	3.33	0.51	2.91	0.01	0.08	Aqueous Diesel Fuel. Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,247.00	150.55	571.51	n/a	56.92	Aqueous Diesel Fuel. Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,685.60	212.51	1,453.50	–	58.95	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	–	141.06	–	–	–	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,517.04	191.26	785.05	0.00	86.65	Aqueous Diesel Fuel. Cooled Exhaust Gas Recirculation
Off-Gas Emissions	–	n/a	–	–	–	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	359.40	186.46	1,167.78	0.04	-46.13	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	Yes	Yes	No	No	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 159 thru 178**
Length of Subphase (weeks) **21.00**
Year **2009**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,726.62	212.51	1,394.91	--	53.47	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	--	141.66	--	--	--	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,559.96	191.26	753.25	0.00	79.14	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	210.84	167.17	648.81	0.03	-25.33	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	Yes	Yes	No	No	

Project Name River Village Mitigated Emissions
Subphase Weeks 179 thru 196
Length of Subphase (weeks) 18.00
Year 2009

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,515.09	187.20	1,239.14	--	48.23	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Architectural Painting						
Off-Gas Emissions	--	141.24	--	--	--	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,363.58	168.48	669.14	0.00	71.38	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	186.74	163.78	576.42	0.03	-22.85	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	Yes	Yes	No	No	

Project Name River Village Mitigated Emissions
Subphase Weeks 197 thru 210
Length of Subphase (weeks) 13.00
Year 2009

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust					0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust					0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	0.00	–	–	–	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	–	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Architectural Painting						
Off-Gas Emissions	–	87.64	–	–	–	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	–	n/a	–	–	–	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	23.03	90.21	4.31	0.02	0.20	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	Yes	No	No	No	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 211 thru 220**
Length of Subphase (weeks) **10.00**
Year **2010**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Architectural Painting						
Off-Gas Emissions	--	39.26	--	--	--	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Mitigation Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	15.00	40.94	2.78	0.01	0.14	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	No	No	No	No	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 221 thru 235**
Length of Subphase (weeks) **15.00**
Year **2010**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	0.00	–	–	–	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	–	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	491.65	59.17	372.96	–	13.64	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Architectural Painting						
Off-Gas Emissions	–	11.78	–		–	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	442.49	53.25	201.40	0.00	20.19	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	–	n/a	–	–	–	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**58.05**	**18.70**	**173.21**	**0.01**	**-6.46**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**Yes**	**No**	**No**	

River Village Office Construction Only Mitigated Emissions

Weeks of Construction: 140

Year Constr. Begins: 2015

Calculated Emissions

Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	884.12	105.21	665.11	–	23.88	
Worker Commute Trips	10.90	1.20	2.03	0.02	0.08	
Architectural Painting						
Off-Gas Emissions	–	38.48	–	–	–	
Worker Commute Trips	10.90	1.20	2.03	0.02	0.08	
Mitigation Reduction						
Off-Road Diesel Exhaust	795.71	95.59	359.16	0.00	35.34	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	–	n/a	–	–	–	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	110.22	51.50	318.01	0.03	-11.31	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	No	No	Yes	No	No	

Summertime Operational Emissions Reductions

ESTIMATED SUMMERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

	Input Fields				
		Unmitigated Emissions in Pounds per Day			
LAND USE		CO	VOC	NO_x	PM_{10}
Single Family Residential Uses	Vehicular Sources	669.10	56.31	40.96	39.43
	Area Sources	9.86	39.23	13.66	0.04
Multi-Family Residential Uses	Vehicular Sources	721.90	61.67	45.36	44.23
	Area Sources	9.36	38.82	8.20	0.03
Commercial/Office/Institutional Uses	Vehicular Sources	2,362.15	221.64	365.21	253.87
	Area Sources	4.00	0.08	9.74	0.02
Wood-Burning Fire Place Emissions	Vehicular Sources	0.00	0.00	0.00	0.00
	Area Sources	0.00	0.00	0.00	0.00
Total Emissions	Vehicular Sources	4,155.39	342.42	391.6	337.53
	Area Sources	21.52	78.84	31.6	0.09
	Total Non-Reduced Emissions	4,177.31	421.26	423.4	337.42

Recommended (Measures already incorporated into Project are marked "No")			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Stationary Sources											
All Residential Uses											
X		Use solar or low emission water heaters	10.0%	11.0%	9.3%	4.3%	1.74	5.58	2.08	0.00	
X		Use built-in energy-efficient appliances	3.0%	2.5%	3.0%	6.3%	0.52	1.55	0.66	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	
X		Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	
X		Use double-glass paned windows	4.5%	4.5%	4.0%	2.5%	0.78	3.51	0.88	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.7%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	
X		Use fuel cells in residential subdivisions to produce heat and elec.	1.0%	0.0%	1.5%	7.0%	0.17	0.00	0.33	0.00	
X		Orient buildings to the north	13.5%	14.0%	13.0%	10.5%	2.35	10.95	2.88	0.01	
X		Use light-colored roof materials to reflect heat	1.5%	1.5%	1.5%	1.5%	0.26	1.17	0.32	0.00	
X		Comply with Title 24	13.0%	14.0%	13.0%	7.5%	2.26	10.95	2.88	0.01	
Multi-Family Residential Uses											
	X	Use central water heating systems	8.5%	9.0%	8.0%	4.8%	0.00	0.00	0.00	0.00	Central heating systems are not desired by the average multi-family resident.
Commercial, Office/Institutional Uses											
X		Use solar or low emission water heaters	0.5%	0.5%	0.5%	0.3%	0.12	0.60	0.05	0.00	
X		Use central water heating systems	0.5%	0.5%	0.5%	0.3%	0.12	0.60	0.05	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.5%	0.5%	0.5%	1.0%	0.12	0.60	0.05	0.00	
X		Use energy-efficient and automated controls for air conditioners	1.0%	1.0%	1.0%	1.7%	0.24	1.21	0.11	0.00	
X		Use double-glass paned windows	3.0%	3.5%	3.0%	2.5%	0.73	3.55	0.28	0.00	
X		Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	7.0%	8.0%	8.5%	19.5%	0.39	0.72	0.82	0.00	
X		Use light-colored roof materials to reflect heat	1.0%	1.0%	1.0%	0.3%	0.24	0.01	0.20	0.00	
X		Comply with Title 24	8.5%	13.0%	9.0%	7.0%	0.89	0.78	0.85	0.00	
X		Orient buildings to the north	12.5%	11.0%	13.5%	17.5%	0.15	0.09	1.33	0.00	
Industrial Uses											
	X	Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	1.3%	0.00	0.00	0.00	0.00	
	X	Use double-glass paned windows	0.0%	0.0%	0.5%	1.8%	0.00	0.00	0.00	0.00	
	X	Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	
	X	Use lighting controls and energy efficient lighting	0.5%	0.0%	1.0%	2.5%	0.00	0.00	0.00	0.00	
	X	Use light-colored roof materials to reflect heat	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	
	X	Orient buildings to the north	2.5%	2.0%	3.0%	5.3%	0.00	0.00	0.00	0.00	
	X	Comply with Title 24	0.5%	0.0%	1.0%	3.0%	0.00	0.00	0.00	0.00	
	X	Improved storage and handling of source materials	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	
	X	Materials substitution (e.g., use water-based paints, life cycle analysis)	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	
	X	Utilize efficient manufacturing processes	1.5%	0.5%	2.0%	6.3%	0.00	0.00	0.00	0.00	
	X	Resource recovery systems	3.0%	3.5%	3.0%	1.3%	0.00	0.00	0.00	0.00	

Impact Sciences, Inc.
Prepared by R. Managhan
2/12/04

Based on SCAQMD
CEQA Air Quality Handbook
Table 11-4

ESTIMATED SUMMERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No") Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	Emission Reduction Efficiency CO	VOC	NO_x	PM_{10}	Reduced Emissions in Pounds per Day CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Mobile Sources											
Residential Uses											
	X	Allow satellite telecommunications centers in residential subdivisions	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Satellite telecommunications centers are superseded by other technology.
	X	Shuttle service from res. subdivisions to commercial core areas	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residences are proposed in walking distance to proposed commercial areas.
X		Construct bus passenger benches and shelters	0.2%	0.2%	0.2%	0.2%	2.79	0.24	0.25	0.25	
X		Construct pedestrian facility improvements	0.1%	0.1%	0.1%	0.1%	1.39	0.12	0.13	0.12	
X		Retail services within or adjacent to residential subdivisions	1.3%	1.0%	1.3%	1.3%	18.12	1.21	1.65	1.61	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	1.39	0.12	0.13	0.12	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	55.75	4.83	5.07	4.95	
X		Construct bicycle trails	0.1%	0.1%	0.1%	0.1%	1.39	0.12	0.13	0.12	
Commercial, Office and Institutional Uses											
X		Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
X		Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide separate windows for fast-food restaurants	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide video-conference facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
	X	Launch shuttle service from a worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	Mixed use/Jobs are expected to have food establishments located within walking distance for employees.
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	The require ment to achieve a specific AVR has been ruled unlawful by the federal government.
	X	Utilize satellite offices rather than regular worksite to reduce VMT	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Establish a home-based telecommuting program	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
	X	Offer travel incentives such as discounts on purchases for transit riders	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	8.29	0.44	0.80	0.76	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residential uses are in close proximity and within walking distance to proposed commercial uses.
X		Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		Residential units within or adjacent to commercial developments	4.0%	3.1%	4.0%	4.0%	110.49	6.87	10.60	10.15	
X		Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
X		Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	8.29	0.44	0.80	0.76	
X		Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	5.52	0.44	0.53	0.51	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Charge visitors to park	2.0%	1.5%	2.0%	2.0%	55.24	3.22	5.30	5.07	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	110.49	8.87	10.60	10.15	
X		Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Fee for parking at walk-up kiosks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide commuter information areas	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	Such programs are set up by and at the discretion of future occupants of the commercial uses.

Impact Sciences, Inc.
Prepared by R. Managhan
2.12.04

Based on SCAQMD
CEQA Air Quality Handbook
Table 21-6

ESTIMATED SUMMERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No"			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Industrial Uses											
	X	Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Maximize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use low emission fleet vehicles	0.2%	0.0%	0.0%	0.2%	0.00	0.00	0.00	0.00	
	X	Provide commuter information areas	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	
	X	Offer loans or other incentives to employees who move locally	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	
	X	Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	0.00	0.00	0.00	0.00	
	X	Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	0.00	0.00	0.00	0.00	
	X	Re-schedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Lunch shuttle system from worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	
	X	On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install aerodynamic add-on devices to heavy-duty trucks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce ship cruising speeds in the inner harbor	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use low-emission fuels or electrify airport ground service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Engine tuning for marine vessels	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce number of aircraft engines used during idling	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install monitoring system to control airport shuttles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use centralized ground power systems for airport service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
		Reduction in Stationary Sources Emissions (Pounds per day)					-9.96	-37.32	-13.62	-0.04	
		Reduction in Mobile Sources Emissions (Pounds per day)					-395.72	-28.36	-37.57	-56.09	
		Total Reduction in Emissions Based on Newhall Ranch FEIR Measures (Pounds per day)					-405.68	-65.68	-51.19	-56.13	
		Percentage Reduced Based on Newhall Ranch FEIR Measures					-9.57%	-15.59%	-12.09%	-9.57%	
		No Wood Burning Fire Places or Stoves in Residential Units					0.00	0.00	0.00	0.00	
		Total Percent Reduction Based on Implementation of All Recommended Measures					-9.57%	-15.59%	-12.09%	-9.57%	
		Total Reduced Stationary Source Emissions					11.96	41.52	18.02	0.05	
		Total Reduced Mobile Source Emissions					3,760.17	314.06	354.27	341.24	
		TOTAL REDUCED EMISSIONS					3,772.13	355.58	372.29	341.29	
		SCAQMD Thresholds					550.00	55.00	55.00	150.00	
		Project Air Quality Impacts Significant?					YES	YES	YES	YES	

Impact Sciences, Inc
Prepared by R. Mamaghani
2/12/04

Based on SCAQMD
CEQA Air Quality Handbook,
Table 11-6

Wintertime Operational Emissions Reductions

ESTIMATED WINTERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

	Input Fields

LAND USE		Unmitigated Emissions in Pounds per Day			
		CO	VOC	NO_x	PM_{10}
Single Family Residential Uses	Vehicular Sources	[illegible]	[illegible]	[illegible]	[illegible]
	Area Sources	[illegible]	[illegible]	[illegible]	[illegible]
Multi-Family Residential Uses	Vehicular Sources	[illegible]	[illegible]	[illegible]	[illegible]
	Area Sources	[illegible]	[illegible]	[illegible]	[illegible]
Commercial/Office/Institutional Uses	Vehicular Sources	[illegible]	[illegible]	[illegible]	[illegible]
	Area Sources	[illegible]	[illegible]	[illegible]	[illegible]
Wood-Burning Fire Place Emissions	Vehicular Sources	[illegible]	[illegible]	[illegible]	[illegible]
	Area Sources	[illegible]	[illegible]	[illegible]	[illegible]
Total Emissions	Vehicular Sources	6,005.67	330.01	566.89	377.33
	Area Sources	1,805.61	1,696.25	50.00	144.47
	Total Non-Reduced Emissions	5,811.28	2,025.26	616.89	521.80

Recommended (Measures already incorporated into Project are marked "No.")			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Stationary Sources											
All Residential Uses											
X		Use solar or low emission water heaters	10.0%	11.0%	9.5%	4.5%	1.24	8.56	2.08	0.00	
X		Use built-in energy-efficient appliances	3.0%	2.5%	3.0%	6.5%	0.52	1.95	0.66	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use double-glass paned windows	4.5%	4.5%	4.0%	2.5%	0.78	3.51	0.88	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use fuel cells in residential subdivisions to produce heat and elec.	1.0%	0.0%	1.5%	7.0%	0.17	0.00	0.33	0.00	
X		Orient buildings to the north	13.5%	14.0%	13.0%	10.5%	2.35	10.93	2.85	0.01	
X		Use light-colored roof materials to reflect heat	1.5%	1.5%	1.5%	1.5%	0.26	1.17	0.33	0.00	
X		Comply with Title 24	13.0%	14.0%	13.0%	7.5%	2.26	10.93	2.85	0.01	
Multi-Family Residential Uses											
	X	Use central water heating systems	8.5%	9.0%	8.0%	4.0%	0.20	0.00	0.00	0.00	Central heating systems are not desired by the average multi-family resident.
Commercial, Office, Institutional Uses											
X		Use solar or low emission water heaters	0.5%	0.5%	0.5%	0.5%	0.02	0.00	0.05	0.00	
X		Use central water heating systems	0.5%	0.5%	0.5%	0.5%	0.02	0.00	0.05	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.5%	0.5%	0.5%	1.0%	0.02	0.00	0.05	0.00	
X		Use energy-efficient and automated controls for air conditioners	1.0%	1.0%	1.0%	1.5%	0.04	0.01	0.10	0.00	
X		Use double-glass paned windows	3.0%	3.5%	3.0%	2.5%	0.12	0.03	0.29	0.00	
X		Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	7.0%	3.0%	8.5%	19.5%	0.29	0.02	0.82	0.00	
X		Use light-colored roof materials to reflect heat	1.0%	1.0%	1.0%	0.5%	0.04	0.01	0.10	0.00	
X		Comply with Title 24	9.5%	10.0%	9.0%	7.0%	0.39	0.08	0.87	0.00	
X		Orient buildings to the north	12.5%	11.0%	13.5%	17.5%	0.51	0.09	1.31	0.00	
Industrial Uses											
	X	Provide shade trees to reduce heating/cooling needs	0.0%	0.5%	0.0%	0.5%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Use energy-efficient and automated controls for air conditioners	0.0%	0.5%	0.0%	1.0%	0.00	0.00	0.00	0.00	
	X	Use double-glass paned windows	0.0%	0.5%	0.5%	1.0%	0.00	0.00	0.00	0.00	
	X	Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use lighting controls and energy efficient lighting	0.5%	0.0%	1.0%	2.5%	0.00	0.00	0.00	0.00	
	X	Use light-colored roof materials to reflect heat	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
	X	Orient buildings to the north	2.5%	2.0%	3.0%	5.5%	0.00	0.00	0.00	0.00	
	X	Comply with Title 24	0.5%	0.0%	1.0%	3.0%	0.00	0.00	0.00	0.00	
	X	Improved storage and handling of source materials	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Materials substitution (e.g., use water-based paints, life cycle analysis)	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Utilize efficient manufacturing processes	1.5%	0.5%	2.0%	6.0%	0.00	0.00	0.00	0.00	
	X	Resource recovery systems	3.0%	3.5%	3.0%	1.5%	0.00	0.00	0.00	0.00	

Impact Sciences, Inc.
Prepared by R. Mazaghani
2-13-04

Based on SCAQMD
CEQA Air Quality Handbook
Table 11-4

ESTIMATED WINTERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "Yes"			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Mobile Sources											
Residential Uses											
	X	Allow satellite telecommunications centers in residential subdivisions	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Satellite telecommunications centers are superseded by other technology.
	X	Shuttle service from res. subdivisions to commercial core areas	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residences are proposed in walking distance to proposed commercial areas.
X		Construct bus passenger benches and shelters	0.2%	0.2%	0.2%	0.2%	2.64	0.22	0.37	0.25	
X		Construct pedestrian facility improvements	0.1%	0.1%	0.1%	0.1%	1.32	0.11	0.18	0.12	
X		Retail services within or adjacent to residential subdivisions	1.3%	1.0%	1.2%	1.2%	17.14	1.10	2.39	1.61	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	1.32	0.11	0.18	0.12	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	52.75	4.40	7.35	4.96	
X		Construct bicycle trails	0.1%	0.1%	0.1%	0.1%	1.32	0.11	0.18	0.12	
Commercial, Office and Institutional Uses											
X		Preferential parking spaces for carpools and vanpools	0.2%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
X		Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide separate windows for fast-food restaurants	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide video-conference facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
	X	Lunch shuttle service from a worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	Mixed use lots are expected to have food establishments located within walking distance for employees.
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	The requirement to achieve a specific AVR has been ruled unlawful by the federal government.
	X	Utilize satellite offices rather than regular worksite to reduce VMT	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Establish a home-based telecommuting program	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
	X	Offer travel incentives such as discounts or purchases for transit riders	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	8.06	0.44	1.15	0.76	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residential uses are in close proximity and within walking distance to proposed commercial uses.
X		Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		Residential units within or adjacent to commercial developments	4.0%	3.1%	4.0%	4.0%	107.49	6.82	15.33	10.15	
X		Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
X		Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	8.06	0.44	1.15	0.76	
X		Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	5.37	0.44	0.77	0.51	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Charge visitors to park	2.0%	1.5%	2.0%	2.0%	53.75	3.30	7.66	5.07	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	107.49	8.80	15.33	10.15	
X		Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Paid parking at walk-up kiosks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide commuter information areas	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	Such programs are set up by and at the discretion of future occupants of the commercial uses.

Impact Sciences, Inc.
Prepared by R. Mamaghani
2-13-04

Based on SCAQMD
CEQA Air Quality Handbook
Table 11-6

ESTIMATED WINTERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No")			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Industrial Uses											
	X	Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Maximize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use low-emission fleet vehicles	0.0%	0.0%	0.0%	0.2%	0.00	0.00	0.00	0.00	
	X	Provide commuter information areas	0.0%	0.0%	0.0%	0.1%	0.00	0.00	0.00	0.00	
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	
	X	Offer loans or other incentives to employees who move locally	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	
	X	Utilize excess parking as park-n-ride or contribute to park-n-ride	0.2%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	0.00	0.00	0.00	0.00	
	X	Shuttles to major rail transit centers or multi-modal stations	0.2%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.2%	0.00	0.00	0.00	0.00	
	X	Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Lunch shuttle system from worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	
	X	On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install aerodynamic add-on devices to heavy-duty trucks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce ship cruising speeds in the inner harbor	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use low-emission fuels or electric airport ground service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Engine tuning for marine vessels	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce number of aircraft engines used during idling	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install monitoring system to control airport shuttles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use centralized ground power systems for airport service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
		Reduction in Stationary Sources Emissions (Pounds per day)					-9.56	-37.32	-13.62	-0.04	
		Reduction in Mobile Sources Emissions (Pounds per day)					-382.82	-27.61	-54.34	-36.29	
		Total Reduction in Emissions Based on Newhall Ranch FEIR Measures (Pounds per day)					-392.38	-64.93	-67.96	-36.33	
		Percentage Reduced Based on Newhall Ranch FEIR Measures					-6.7%	-3.20%	-12.02%	-5.81%	
		No Wood Burning Fire Places or Stoves in Residential Units					-1,784.69	-1,617.41	-18.35	-244.35	
		Total Percent Reduction Based on Implementation of All Recommended Measures					-37.45%	-83.03%	-13.99%	-45.11%	
		Total Reduced Stationary Source Emissions					11.96	41.52	18.02	0.04	
		Total Reduced Mobile Source Emissions					3,622.86	302.40	312.58	341.24	
		TOTAL REDUCED EMISSIONS					3,634.81	343.92	330.57	341.29	
		SCAQMD Thresholds					550.00	55.00	55.00	150.00	
		Project Air Quality Impacts Significant?					YES	YES	YES	YES	

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Prepared by R. Macaughan
2-23-04

Based on SCAQMD
CEQA Air Quality Handbook
Table 11-6

Localized Significance Threshold Analysis

Localized Significance Threshold Analysis for Landmark Village

Prepared for:

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Prepared by:

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May 2006

SUMMARY

The Newhall Land and Farming Company has proposed to build single-family residences, apartment buildings, condominiums, commercial buildings, and recreational areas in the portion of Newhall Ranch called Landmark Village. The Landmark Village project (proposed project) would result in the generation of air pollutants during construction and operational activities. The construction of the utility corridor that provides the infrastructure components, such as potable water, reclaimed water, sewer, and natural gas, is also considered part of the proposed project. This study analyzes the impacts of the construction emissions (fugitive dust and motor vehicle and equipment exhaust) on ambient air quality concentrations in the vicinity of the construction site. The ambient air quality impacts are compared to thresholds established by the South Coast Air Quality Management District (SCAQMD). The significance threshold for respirable particulate matter (PM_{10}) represents compliance with Rule 403 (Fugitive Dust). The thresholds for nitrogen dioxide (NO_2) and carbon monoxide (CO) represent the allowable increase in concentrations above background levels in the vicinity of the project that would not cause or contribute to an exceedance of the relevant ambient air quality standards.

Localized significance threshold analysis shows that maximum 24-hour PM_{10} would exceed the threshold of significance established by SCAQMD at the nearest residential, workplace, and sensitive receptors to the project site. Also, 1-hour NO_2 concentrations would exceed the threshold of significance established by SCAQMD at the nearest workplace receptors to the project site.

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1.0 GENERAL

1.1 Project Description

The proposed development at Landmark Village is within the South Coast Air Basin (SCAB), which is under the jurisdiction of SCAQMD. The proposed Landmark Village project consists of 308 single-family residential units; 685 condominiums; 451 apartments; 337,600 square feet (sq. ft.) of retail area; 695,400 sq. ft. of office space; 70,000 sq. ft. of school buildings; and 16.1 acres of park area. The construction of the utility corridor that provides the infrastructure components, such as potable water, reclaimed water, sewer, and natural gas, is also considered part of the proposed project. Total development is anticipated to occur over a 251-week period. The construction schedule is mainly divided into three phases (1) grading, (2) asphalt paving, and (3) building construction. Grading and asphalt paving are anticipated to occur during first 75 weeks and the building construction phase is anticipated to occur from week 76 to week 251. The construction of the utility corridor will occur over 52-week period starting in week one along with grading and asphalt paving. The construction of the utility corridor is also divided in three different phases (1) grading, (2) grading and water tanks construction, and (3) grading and water tanks welding and coating. These three phases are anticipated to occur over the first 30 weeks, week 31 to week 48, and week 49 to week 52, respectively. Currently, the project site is either used for agricultural crop production or is vacant, and no demolition is required. The project site is bounded by State Route 126 (SR-126) on the northern boundary and by the Santa Clara River on the southern boundary. Two soil borrow areas are proposed in the vicinity of the northern and southern boundary of the project site.

1.2 Regional Air Quality

The project is located in the SCAB portion of Los Angeles County, which is a severe-17 nonattainment area for the federal 8-hour ozone standard and an extreme nonattainment area for the state 1-hour ozone standard. It has also been designated as a serious nonattainment area for federal 1-hour and 8-hour CO standards and as an attainment area for state 1-hour standard and 8-hour CO standards. Also, it has been designated as a serious nonattainment area for the federal 24-hour and annual PM_{10} standards and a nonattainment area for the state 24-hour PM_{10} standard and the state annual fine particulate matter ($PM_{2.5}$) standard.[1,2]

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1 California Air Resources Board. "Area Designations (Activities and Maps)." [Online] [February 3, 2006]. http://www.arb.ca.gov/desig/desig.htm.

2 U.S. Environmental Protection Agency. "Region 9: Air Programs, Air Quality Maps." [Online] [March 17, 2006]. http://www.epa.gov/region9/air/maps/maps_top.html.

1.3 Thresholds of Significance

Table 1, Peak Background Concentrations for SRA 13 for the Period of 2003 to 2005, shows the peak background concentrations of NO_2 and CO in Source Receptor Area (SRA) 13 (Santa Clarita Valley) in which the proposed project is located. These are the values on which LST criteria for NO_x and CO are based.

Table 1
Peak Background Concentrations for SRA 13 for the Period of 2003 to 2005

Pollutant	Averaging Period	Unit	2003	2004	2005	Peak Concentration
Nitrogen Dioxide (NO_2)	1 hour	ppm	0.12	0.09	0.08	0.12
Carbon Monoxide (CO)	1 hour	ppm	3	5	2	5
	8 hours	ppm	1.7	3.7	1.3	3.7

Source: 1.South Coast Air Quality Management District "Historical Data by Year." [Online] [March 30, 2005], http://www.aqmd.gov/smog/historicaldata.htm.
2. U.S. Environmental Protection Agency, AirData: Access to Air Pollution Data [Online] [March 2, 2006], http://www.epa.gov/air/data/index.html.

Table 2, Localized Significance Criteria, shows the threshold criteria recommended by the SCAQMD for determining whether the emissions resulting from construction of a development project have the potential to generate significant adverse local impacts on ambient air quality. The SCAQMD's concentration-based PM_{10} threshold from its *Localized Significance Threshold Methodology* (*LST Methodology*)[3] is a 24-hour average concentration of 10.4 micrograms per cubic meter ($\mu g/m^3$) based on compliance with Rule 403. The thresholds for NO_2 and CO were based on the maximum concentrations that occurred during the last three years (2003 to 2005) as shown in **Table 1**. These thresholds represent the allowable increase in NO_2 and CO ambient concentrations above current levels that could occur in SRA 13 without causing or contributing to exceedances of the California Ambient Air Quality Standards (CAAQS). For reference, the applicable CAAQS are also shown in **Table 2, Localized Significance Criteria**.

3 South Coast Air Quality Management District, *Final Localized Significance Threshold Methodology*, June 2003.

Table 2
Localized Significance Criteria

Pollutant	Averaging Period	CAAQS $\mu g/m^3$	CAAQS ppm	Peak Conc. in ppm	LST Criteria[1]	
Respirable Particulate Matter (PM_{10})	24 hours	50	NA	NA	10.4	NA
Nitrogen Dioxide (NO_2)	1 hour	470	0.25	0.12	244	0.13
Carbon Monoxide (CO)	1 hour	23,000	20	5	17,165	15
	8 hours	10,000	9.0	3.7	6,065	5.3

Source: *South Coast Air Quality Management District,* Final Localized Significance Threshold Methodology, *June 2003.*
[1] *LST Criteria is the difference between CAAQS and the Peak Concentration.*

2.0 EMISSION ESTIMATION METHODOLOGY

Unmitigated construction emissions were estimated based on the information provided in the Software Users' Guide: URBEMIS2002 for Windows with Enhanced Construction Module, Version 8.7.0 (April 2005). URBEMIS2002 is a land use and transportation based air quality model developed in cooperation with the Air Resource Board (ARB) and designed to estimate air emissions from new development projects, including construction emissions. The emissions are estimated based on the information provided by the client. The key emission estimation assumptions are as follows:

Landmark Village

- Anticipated starting year: 2007
- Anticipated development duration: 251 weeks
- Anticipated grading and asphalt paving schedule: week 1 to week 75
- Anticipated construction schedule: week 76 to week 251
- Total number of acres of land to be graded: 291 acres
- Maximum acres graded per day: 28 acres
- Dust control measures: As required by SCAQMD Rule 403

The Utility Corridor

- Anticipated starting year: 2007
- Anticipated development duration: 52 weeks
- Anticipated grading schedule: week 1 to week 30
- Anticipated grading and water tanks construction schedule: week 31 to week 48

- Anticipated grading and water tanks welding and coating schedule: week 49 to week 52
- Total number of acres of land to be graded: 32 acres
- Maximum acres graded per day: 0.12 acres
- Dust control measures: As required by SCAQMD Rule 403

The maximum daily emissions that could occur on the project site from any construction phase were selected for the Localized Significance Thresholds (LST) analysis. The maximum daily emissions for each pollutant may occur during a different subphase (e.g., grading, building construction). **Table 3, Estimated Construction Emissions Associated with the Proposed Project**, shows the estimated construction emissions associated with each proposed project that would occur on the project site.

Table 3
Estimated Construction Emissions Associated with the Proposed Project

Pollutant	Maximum Daily Emissions (pounds per day)	
	Fugitive Dust	Mobile Sources
PM_{10}[1]	1,253.84	41.20
NO_x[2]	—	2,524.30
CO[2]	—	3,184.13

Source: Construction emissions were estimated based on the information provided in the User's Guide [for] URBEMIS2002 for Windows with Enhanced Construction Module (May 2002). Emissions reflect the worst-case scenario (i.e., highest daily emissions associated with the project). The worst-case daily emissions may occur in different project subphases.
[1] Maximum daily PM_{10} emissions are expected to occur during week 45 to week 48.
[2] Maximum daily CO and NO_x emissions are expected to occur during week 128.

3.0 LOCALIZED SIGNIFICANCE THRESHOLD ANALYSIS

Per the recommendation of the SCAQMD, ambient PM_{10}, NO_2, and CO concentrations due to the construction of the proposed project were analyzed using methods described in its *LST Methodology*.[4] The United States Environmental Protection Agency (USEPA)-approved dispersion model Industrial Source Complex – Short Term, ISCST3[5], was used for the analysis to model the dispersion of the pollutants of concern.

4 South Coast Air Quality Management District, *Final Localized Significance Threshold Methodology*, June 2003.
5 Lakes Environmental Software, ISC-AERMOD View (Version 5.1).

3.1 Modeling Approach

The modeling approach is as follows:

- Sources: The proposed project site was divided into five, roughly equal-sized areas. This approach was based on the assumption that grading or construction activity would occur on a portion of the overall project site on the day with the worst-case emissions and that the grading or construction activity was equally likely to occur in any of these portions. In order to take maximum area to be graded in one day into account, subareas of 28 acres (the maximum daily acreage in which construction activities would occur, according to the applicant) were created inside each of the main areas in the maximum frequency wind direction (e.g., northwest direction in this case).[6] Similarly, in order to take construction emissions associated with the utility corridor into account, five areas of 0.12 acres representing the maximum daily emissions associated with the construction of the utility corridor were placed at the closest possible distance from the existing receptors (residential, workplace, or sensitive). Fugitive dust emissions were treated as area sources distributed over the project site. Per the LST methodology, the area sources were given a ground level release height and a 1 meter initial vertical dimension to represent the initial vertical spread of the emissions. Equipment and motor vehicle exhaust emissions of PM_{10}, NO_2, and CO were also modeled as area sources, as the project site is too large to model as a series of volume sources, with a 1 meter initial vertical dimension to represent the initial vertical spread of the emissions and a release height of 5 meters to represent the mid-range of the expected plume rise from frequently used construction equipment during daytime atmospheric conditions.[7] To simulate the exhaust emissions, elevated area sources with a 5 meter release height and one-meter initial vertical dimension were distributed throughout the five portions of Landmark Village project site.

- Receptors: The fenceline receptors were used to determine air quality impacts in the vicinity of the project site. The fenceline receptors were placed at 100 meter intervals from the construction site boundaries to 2000 meters. Also, intermediate receptors were placed at 100 meter intervals throughout the boundary.

- Meteorology: Newhall was identified as the nearest meteorological monitoring station for the proposed project. Data were obtained from SCAQMD website.[8]

- Model Options: SCAQMD model options were selected (NOCALM, URBAN).

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6 Maximum frequency wind direction is obtained from windrose diagram for Newhall monitoring station.

7 South Coast Air Quality Management District, *Final Localized Significance Threshold Methodology*, June 2003, p. 2-2.

8 Source: South Coast Air Quality Management District Meteorological Data for Dispersion Modeling http://www.aqmd.gov/smog/metdata/MetDataTable1.html.

3.2 Modeling Results

3.2.1 Adjustment of NO_2 Impacts

The SCAQMD's *LST Methodology* discusses an adjustment of the NO_2 impacts due to the fact that most of NO_x in the combustion exhaust will occur in the form of nitric oxide (NO), rather than as NO_2. Nitric oxide is converted in the atmosphere through chemical reactions to NO_2. The LST methodology discusses this adjustment as follows:

> *NO_X emissions are simulated in the air quality dispersion model and the NO_2 conversion rate is treated by a NO_2-to-NO_X ratio, which is a function of downwind distance. Initially, it is assumed that only 5 percent of the emitted NO_x is NO_2. At 5,000 meters downwind, 100 percent conversion of NO-to-NO_2 is assumed.*[9]

The following table from the *LST Methodology* demonstrates how the NO_2-to-NO_X ratio varies with distance from the source.

Table 4
NO_2-to-NO_X Ratio as a Function of Downwind Distance

Downwind Distance	NO_2/NO_x Ratio
20	0.053
50	0.059
70	0.064
100	0.074
200	0.114
500	0.258
1000	0.467
2000	0.75
3000	0.9
4000	0.978
5000	1.0

Source: *South Coast Air Quality Management District,* Final Localized Significance Threshold Methodology, *June 2003, Table 2-4, p. 2-9.*

For this analysis, the distance from the boundary of the project site to the receptor with the highest impact was determined. A NO_x-to-NO_2 ratio was determined from the values in Table 4. Ratios at distances between the values in **Table 4** were interpolated. For the proposed project site, the distances between the centers of the sources to the receptors, where the maximum NO_2 concentration was observed

9 South Coast Air Quality Management District, *Final Localized Significance Threshold Methodology*, June 2003, p. 2-8. The NO_2 conversion rates are adapted by the SCAQMD from Arellano, J.V., A.M. Talmon, and P.J.H. Builtjes, "A Chemically Reactive Plume Model for the NO-NO_2-O_3 System," Atmospheric Environment 24A, 2237-2246.

were approximately 450 meters, 1,800 meters, and 1,300 meters, respectively. Therefore, a NO_x-to-NO_2 ratio of 0.75, 0.341, and 0.665 (multiplying factor) were applied to the modeled results for the residential, the workplace, and the sensitive receptors, respectively.

3.2.2 Project-Specific Impacts

Table 5, Modeling Results – Maximum Impacts at Residential Receptors, **Table 6, Modeling Results – Maximum Impacts at Workplace Receptors**, **Table 7, Modeling Results – Maximum Impacts at Sensitive Receptors**, show the maximum PM_{10}, NO_2, and CO concentrations associated with the proposed project at residential, workplace, and sensitive receptors, respectively. The nearest residential community to the project site is the community of Val Verde located approximately 1.9 kilometers to the north, across SR-126. Other residences are scattered throughout the area, primarily to the north of the site across SR-126. A recreational vehicle park is located to the east of the project site; however, occupants are limited to a 30-day stay. The nearest potential off-site workplace receptors are located to the northeast in the Valencia Commerce Center located approximately 700 meters to the northeast. The nearest sensitive receptors are located approximately 1.7 kilometers to the northeast in the Live Oak Elementary School.

As stated in **Section 3.1**, the project site was divided into five areas. The values shown in these tables are the maximum results associated with the area producing the highest impacts because the activity could occur in any of the areas on any given day.

Table 5
Modeling Results
Maximum Impacts at Residential Receptors

Pollutant	Averaging Period	Modeling Results		LST Criteria[1]		Exceeds Threshold?
		$\mu g/m^3$	ppm	$\mu g/m^3$	ppm	
Respirable Particulate Matter (PM_{10})	24 hours	56.08	NA	10.4	NA	**YES**
Nitrogen Dioxide (NO_2)	1 hour	404.83	0.22	244	0.13	**YES**
Carbon Monoxide (CO)	1 hour	680.87	0.59	17,165	15	NO
	8 hours	97.31	0.09	6,065	5.3	NO

Source: *Impact Sciences, Inc.*
[1] *South Coast Air Quality Management District,* Final Localized Significance Threshold Methodology, *June 2003.*
The maximum impacts were observed at the community of Val Verde located approximately 1.9 kilometers to the north, across SR-126.

Table 6
Modeling Results
Maximum Impacts at Workplace Receptors

Pollutant	Averaging Period	Modeling Results $\mu g/m^3$	Modeling Results ppm	LST Criteria[1] $\mu g/m^3$	LST Criteria[1] ppm	Exceeds Threshold?
Respirable Particulate Matter (PM_{10})	24 hours	60.90	NA	10.4	NA	**YES**
Nitrogen Dioxide (NO_2)	1 hour	483.28	0.26	244	0.13	**YES**
Carbon Monoxide (CO)	1 hour	1787.23	1.56	17,165	15	NO
	8 hours	243.5	0.21	6,065	5.3	NO

Source: *Impact Sciences, Inc.*
[1] *South Coast Air Quality Management District,* Final Localized Significance Threshold Methodology, *June 2003.*
The maximum impacts were observed at the Valencia Commerce Center located approximately 700 meters to the northeast.

Table 7
Modeling Results
Maximum Impacts at Sensitive Receptors

Pollutant	Averaging Period	Modeling Results $\mu g/m^3$	Modeling Results ppm	LST Criteria[1] $\mu g/m^3$	LST Criteria[1] ppm	Exceeds Threshold?
Respirable Particulate Matter (PM_{10})	24 hours	14.82	NA	10.4	NA	**YES**
Nitrogen Dioxide (NO_2)	1 hour	223.90	0.12	244	0.13	NO
Carbon Monoxide (CO)	1 hour	424.65	0.37	17,165	15	NO
	8 hours	53.08	0.05	6,065	5.3	NO

Source: *Impact Sciences, Inc.*
[1] *South Coast Air Quality Management District,* Final Localized Significance Threshold Methodology, *June 2003.*
The maximum impacts were observed at the Live Oak Elementary School located approximately 1.7 kilometers to the northeast.

4.0 CONCLUSIONS

The LST analysis was conducted to estimate worst-case ambient air quality impacts during construction of the Landmark Village project. LST analysis shows that maximum 24-hour PM_{10} would exceed the threshold of significance established by SCAQMD at the nearest residential, workplace, and sensitive receptors to the project site. Also, 1-hour NO_2 concentrations would exceed the threshold of significance established by SCAQMD at the nearest residential and workplace receptors to the project site.

The impacts suggest that PM_{10} emissions could exceed the limitations in SCAQMD Rule 403. While the NO_2 concentrations exceed the LST thresholds, the CAAQS would be exceeded only if (1) the actual background concentrations were as high as those on which the LST thresholds are based during the worst-case construction day, (2) the amount of construction activity (e.g., number and types of equipment, hours of operation) assumed in this analysis actually occurred, and (3) the meteorological conditions in the data set used in the dispersion modeling analysis occurred in the vicinity of the project site on the worst-case construction day.

APPENDIX A

Landmark Village Construction Emissions

Estimated Unmitigated Utility Corridor Construction Emissions

Subphase/Emissions Source	Emissions (lbs/day)				
	CO	VOC	NO_x	SO_x	PM_{10}
Weeks 1 thru 30					
Unmitigated Emissions Total	85.90	11.38	62.83	0	296.80
SCAQMD Thresholds	550	75	100	150	150
Exceeds Thresholds?	NO	NO	NO	NO	**YES**
Notes: Grading of utility corridor					
Weeks 31 thru 48					
Unmitigated Emissions Total	110.80	14.30	80.34	0	297.42
SCAQMD Thresholds	550	75	100	150	150
Exceeds Thresholds?	NO	NO	NO	NO	**YES**
Notes: Grading of utility corridor and construction of water tanks					
Weeks 49 thru 52					
Unmitigated Emissions Total	184.25	58.96	152.37	0	300.57
SCAQMD Thresholds	550	75	100	150	150
Exceeds Thresholds?	NO	NO	**YES**	NO	**YES**
Notes: Grading of utility corridor and welding and coating of water tanks					

Source: Impact Sciences, Inc.

NEWHALL RANCH SPECIFIC PLAN FINAL EIR
AIR QUALITY MITIGATION MEASURES

The following air quality mitigation measures are from the Newhall Ranch Specific Plan Final EIR. These measures, as appropriate, are intended to apply to all future development within Newhall Ranch. Not all of the following measure are appropriate for River Village and comments on the appropriateness of each measure to the River Village project is noted in *italics*.

4.10-1. The Specific Plan will provide Commercial and Service uses in close proximity to residential subdivisions.

4.10-2. The Specific Plan will locate residential uses in close proximity to Commercial uses, Mixed-Uses, and Business Parks.

4.10-3. Bus pull-ins will be constructed throughout the Specific Plan site.

4.10-4. Pedestrian facilities, such as sidewalks, and community regional, and local trails, will be provided throughout the Specific Plan site.

4.10-5. Roads with adjacent trails for pedestrian and bicycle use will be provided throughout the Specific Plan site connecting the individual Villages and community.

4.10-6. The applicant of future subdivisions shall implement all rules and regulations adopted by the Governing Board of the SCAQMD which are applicable to the development of the subdivision (such as Rule 402 - Nuisance, Rule 403 - Fugitive Dust, Rule 1113 - Architectural Coatings) and which are in effect at the time of development. The purpose of Rule 403 is to reduce the amount of particulate matter entrained in the ambient air as a result of man-made fugitive dust sources by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. Rule 403 applies to any activity or man-made condition capable of generating fugitive dust such as the mass and remedial grading associated with the project as well as weed abatement and stockpiling of construction materials (*i.e.*, rock, earth, gravel). Rule 403 requires that grading operations either (1) take actions specified in Tables 1 and 2 of the Rule for each applicable source of fugitive dust and take certain notification and record keeping actions; or (2) obtain an approved Fugitive Dust Control Plan. A complete copy of the SCAQMD's Rule 403 Implementation Handbook, which has been included in Appendix 4.10, provides guideline tables to demonstrate the typical mitigation program and record keeping required for grading operations (Tables 1 and 2 and sample record keeping chart). The record keeping is accomplished by on-site construction personnel, typically the construction superintendent.

Each future subdivision proposed in association with the Newhall Ranch Specific Plan shall implement the following if found applicable and feasible for that subdivision.

GRADING

a. Apply non-toxic soil stabilizers according to manufacturers' specification to all inactive construction areas (previously graded areas inactive for ten days or more) .
b. Replace groundcover in disturbed areas as quickly as possible.
c. Enclose, cover, water twice daily, or apply non-toxic soil binders according to manufacturers' specifications, to exposed piles (*i.e.*, gravel, sand, dirt) with 5 percent or greater silt content.
d. Water active sites at least twice daily.
e. Suspend all excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 mph.
f. Monitor for particulate emissions according to District-specified procedures.
g. All trucks hauling dirt, sand, soil, or other loose materials are to be covered or should maintain at least two feet of freeboard (*i.e.*, minimum vertical distance between top of the load and the top of the trailer) in accordance with the requirements of CVC Section 23114.

The effectiveness of these measures at reducing PM10 emissions ranges from 7 to 74 percent.[1]

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[1] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-15 and p. A11-77.*

PAVED ROADS

h. Sweep streets at the end of the day if visible soil material is carried onto adjacent public paved roads (recommend water sweepers with reclaimed water).
i. Install wheel washers where vehicles enter and exit unpaved roads onto paved roads, or wash off trucks and any equipment leaving the site each trip.

The effectiveness of these measures at reducing PM10 emissions ranges from 25 to 70 percent.[2]

UNPAVED ROADS

j. Apply water three times daily, or non-toxic soil stabilizers according to manufacturers' specifications, to all unpaved parking or staging areas or unpaved road surfaces.
k. Reduce traffic speeds on all unpaved roads to 15 mph or less.
l. Pave construction roads that have a traffic volume of more than 50 daily trips by construction equipment, 150 total daily trips for all vehicles.
m. Pave all construction access roads at least 100 feet on to the site from the main road.
n. Pave construction roads that have a daily traffic volume of less than 50 vehicular trips.

The effectiveness of these measures at reducing PM10 emissions ranges from 40 to 92.5 percent.[3]

4.10-7. Prior to the approval of each future subdivision proposed in association with the Newhall Ranch Specific Plan, each of the construction emission reduction measures indicated below (and in Tables 11-2 and 11-3 of the SCAQMD's CEQA *Air Quality Handbook*, as amended) shall be implemented if found applicable and feasible for that subdivision.

ON-ROAD MOBILE SOURCE CONSTRUCTION EMISSIONS:

a. Configure construction parking to minimize traffic interference. *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[4]
b. Provide temporary traffic controls when construction activities have the potential to disrupt traffic to maintain traffic flow (e.g., signage, flag person, detours). *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[5]
c. Schedule construction activities that affect traffic flow to off-peak hours (*e.g.*, between 7:00 P.M. and 6:00 A.M. and between 10:00 A.M. and 3:00 P.M.). *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[6]
d. Develop a trip reduction plan to achieve a 1.5 average vehicle ridership (AVR) for construction employees. *Mitigation not suitable for River Village because SCAQMD Rule 2202 applies to all employers who meet certain criteria for implementing trip reduction measures. The requirement to achieve a specific AVR has been ruled unlawful by the federal government and is no longer recommended.*
e. Implement a shuttle service to and from retail services and food establishments during lunch hours. *Mitigation not suitable for River Village because construction workers typically take a half-hour lunch at various times of the day and eat on-site food that was either brought by the workers (brown bag) or purchased from mobile caterers who travel to the site.*
f. Develop a construction traffic management plan that includes the following measures to address construction traffic that has the potential to affect traffic on public streets:
   - Rerouting construction traffic off congested streets *Mitigation not suitable for River Village because the only access to the site is via SR-126 and there are no other roadways on which to reroute traffic.;*
   - Consolidating truck deliveries; and
   - Providing temporary dedicated turn lanes for movement of construction trucks and equipment on and off of the site. *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[7]

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[2] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-15 and pp. A11-77 to -78.*
[3] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-16 and p. A11-78.*
[4] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*
[5] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*
[6] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*

g. Prohibit truck idling in excess of two minutes. *Mitigation not suitable for River Village because the nature of diesel motors does not lend them to constant turning on and off. Premature wear, and increased air emissions from turning the engines on and off, are common results. It is also extremely difficult to effectively monitor the implementation of this measure on an approximately 700-acre site with contractors who would be concerned about maintaining their equipment. Furthermore, the effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[8]

OFF-ROAD MOBILE SOURCE CONSTRUCTION EMISSIONS:

h. Use methanol-fueled pile drivers. *Any equipment that utilizes an alternative fuel that reduces VOC, NOx, and/or PM10 emissions is advisable. This measure is replaced in the impact analysis with another measure that considers other alternative fuels for diesel-fueled construction equipment.*
i. Suspend use of all construction equipment operations during second stage smog alerts. *The effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[9]
j. Prevent trucks from idling longer than two minutes. *Mitigation not suitable for River Village because the nature of diesel motors does not lend them to constant turning on and off. Premature wear, and increased air emissions from turning the engines on and off, are common results. It is also extremely difficult to effectively monitor the implementation of this measure on an approximately 700-acre site with contractors who would be concerned about maintaining their equipment. Furthermore, the effectiveness of this measure to reduce VOC emissions is not quantified by SCAQMD.*[10]
k. Use electricity from power poles rather than temporary diesel-powered generators.
l. Use electricity from power poles rather than temporary gasoline-powered generators.
m. Use methanol- or natural gas-powered mobile equipment instead of diesel. *Any equipment that utilizes an alternative fuel that reduces VOC, NOx, and/or PM10 emissions is advisable.*
n. Use propane- or butane-powered on-site mobile equipment instead of gasoline. *Any equipment that utilizes an alternative fuel that reduces VOC, NOx, and/or PM10 emissions is advisable.*

OPERATION IMPACTS

4.10-8. The applicant of future subdivisions shall implement all rules and regulations adopted by the Governing Board of the SCAQMD which are applicable to the development of the subdivision (such as Rule 402 - Nuisance, Rule 1102 - Petroleum Solvent Dry Cleaners, Rule 1111 - NOx Emissions from Natural Gas-Fired, Fan-Type Central Furnaces, Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters) and which are in effect at the time of occupancy permit issuance.

4.10-9. Prior to the approval of each future subdivision proposed in association with the Newhall Ranch Specific Plan, each of the operational emission reduction measures indicated below (and in Tables 11-6 and 11-7 of the SCAQMD's CEQA *Air Quality Handbook*, as amended) shall be implemented if found applicable and feasible for that subdivision.

ON-ROAD MOBILE SOURCE OPERATIONAL EMISSIONS:

RESIDENTIAL USES

a. Include satellite telecommunications centers in residential subdivisions. *Mitigation not suitable for River Village because satellite telecommunications centers have been superseded by other technology.*
b. Establish a shuttle service from residential subdivisions to commercial core areas. *Mitigation not suitable for River Village because residential uses are in close proximity and within walking distance to commercial uses proposed within River Village.*
c. Construct on-site or off-site bus stops (*e.g.*, bus turnouts, passenger benches, and shelters).

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7 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*

8 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-13.*

9 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-14.*

10 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-14.*

d. Construct off-site pedestrian facility improvements, such as overpasses and wider sidewalks. *Mitigation not suitable for River Village because no uses adjacent to the River Village site exist within Newhall Ranch to which pedestrian access would be warranted.*
e. Include retail services within or adjacent to residential subdivisions. *The proposed project is in conformance with this measure.*
f. Provide shuttles to major rail transit centers or multi-modal stations.
g. Contribute to regional transit systems (*e.g.*, right-of-way, capital improvements, *etc.*). *This measure does not directly contribute to reduced air emissions, emission reductions have not been quantified by SCAQMD,*[11] *and it is not given emissions reduction credit in the impact analysis.*
h. Synchronize traffic lights on streets impacted by development.
i. Construct, contribute, or dedicate land for the provision of off-site bicycle trails linking the facility to designated bicycle commuting routes.

COMMERCIAL USES

j. Provide preferential parking spaces for carpools and vanpools and provide 7'2" minimum vertical clearance in parking facilities for vanpool access.
k. Implement on-site circulation plans in parking lots to reduce vehicle queuing. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[12]
l. Improve traffic flow at drive-thru's by designing separate windows for different functions and by providing temporary parking for orders not immediately available for pickup. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[13]
m. Provide video-conference facilities. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[14]
n. Set up resident worker training programs to improve job/housing balance. *Mitigation not suitable for River Village because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site. Furthermore, the effectiveness of this measure to reduce air emissions in the basin lies in actually achieving jobs/housing balance. The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[15]
o. Implement home dispatching system where employees receive routing schedule by phone instead of driving to work. *Mitigation not suitable for River Village because it is outside the purview of the project applicant/developer to set up such a system. Such systems are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*
p. Develop a program to minimize the use of fleet vehicles during smog alerts (for business not subject to Regulation XV (now Rule 2202) or XII). *Mitigation not suitable for River Village because no commercial retail or office use on the site is expected to use fleet vehicles.*
q. Use low-emissions fleet vehicles:
   - TLEV
   - ULEV
   - LEV
   - ZEV

   Mitigation not suitable for River Village because no commercial retail or office use on the site is expected to use fleet vehicles.
r. Reduce employee parking spaces for those businesses subject to Regulation XV (now Rule 2202). *Rule 2202 applies to any employer who employs 250 or more employees on a full or part-time basis at a work site for a consecutive six-month period. It is conceivable that an office use employing as*

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11 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-18.*
12 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*
13 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-19.*
14 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-19.*
15 *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-19.*

many as 250 people can locate on the site; therefore, this mitigation measure applies to the River Village project. The requirement to achieve a specific AVR has been ruled unlawful by the federal government and is no longer recommended.[16]

s. Implement a lunch shuttle service from a work site(s) to food establishments. Mitigation not suitable for River Village because *Lots within River Village designated for mixed use commercial are expected to have food establishments located within walking distance, thereby not necessitating lunch shuttle service.*

t. Implement compressed work-week schedules where weekly work hours are compressed into fewer than five days.
   - 9/80
   - 4/40
   - 3/36

   Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.

u. Develop a trip reduction plan to achieve 1.5 AVR for businesses with less than 100 employees or multi-tenant work sites. *Mitigation not suitable for River Village because SCAQMD Rule 2202 applies to all employers who meet certain criteria for implementing trip reduction measures. The requirement to achieve a specific AVR has been ruled unlawful by the federal government and is no longer recommended.*

v. Utilize satellite offices rather than regular work site to reduce VMT. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*

w. Establish a home-based telecommuting program. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*

x. Provide on-site child care and after-school facilities or contribute to off-site development within walking distance. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site.*

y. Require retail facilities or special event centers to offer travel incentives such as discounts on purchases for transit riders. *Mitigation not suitable for the River Village applicant/developer because it is outside the purview of the project applicant/developer to set up such a program. Such programs are more appropriately set up by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site. Such a program to reduce air emissions in the Basin is not quantified by the SCAQMD and it is not given emission reduction credit in this impact analysis.*[17]

z. Provide on-site employee services such as cafeterias, banks, *etc.*

aa. Establish a shuttle service from residential core areas to the work site. *Mitigation not suitable for River Village because residential uses are proposed in close proximity and within walking distance to commercial uses proposed within River Village.*

ab. Construct on-site or off-site bus stops (*e.g.*, bus turnouts, passenger benches, and shelters).

ac. Implement a pricing structure for single-occupancy employee parking and/or provide discounts to ridesharers.

ad. Include residential units within a commercial project.

ae. Utilize parking in excess of code requirements as on-site park-n-ride lots or contribute to construction of off-site lots.

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[16] *In 1988, the SCAQMD instituted Regulation XV that required enterprises with 100 or more employees to adopt trip reduction programs. The regulation required each employer to institute a trip reduction program that would achieve an Average Vehicle Ridership (AVR) of 1.75 in Downtown Los Angeles, 1.5 in the remainder of urbanized areas, and 1.3 in rural parts of the District. AVR measures the extent to which commuters use public transit, car pooling, and other multiple-occupant-vehicle modes of transportation. Regulation XV was repealed in December, 1995 and was replaced with Rule 2202 which provides options for employers to either continue trip reduction programs or reduce mobile source emissions through other strategies. As of January 1, 1997 Rule 2202 applies only to enterprises with 250 or more employees.*

[17] *South Coast Air Quality Management District, CEQA Air Quality Handbook (Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-20.*

af. Any two of the following:
   - Construct off-site bicycle facility improvements, such as bicycle trails linking the facility to designated bicycle commuting routes, or on-site improvements, such as bicycle paths.
   - Include bicycle parking facilities, such as bicycle lockers and racks.
   - Include showers for bicycling employees' use.

ag. Any two of the following:
   - Construct off-site pedestrian facility improvements, such as overpasses, wider sidewalks.
   - Construct on-site pedestrian facility improvements, such as building access which is physically separated from street and parking lot traffic and walk paths.
   - Include showers for pedestrian employees' use.

ah. Provide shuttles to major rail transit stations and multi-modal centers.

ai. Contribute to regional transit systems (*e.g.*, right-of-way, capital improvements, *etc.*) . *This measure does not directly contribute to reduced air emissions, emission reductions have not been quantified,*[18] *and it is not given emissions reduction credit in the impact analysis.*[19]

aj. Charge visitors to park. *Mitigation not suitable for River Village because charging visitors to park at retail establishments would discourage patronage. Charging visitors to park at the office uses would encourage patrons to park in retail parking spaces or on the street. Charging visitors to pay for parking at the park site would encourage on-street parking.*

ak. Synchronize traffic lights on streets impacted by development.

al. Reschedule truck deliveries and pickups to off-peak hours. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[20]

am. Set up paid parking systems where drivers pay at walkup kiosk and exit via a stamped ticket to reduce emissions from queuing vehicles. *Mitigation not suitable for River Village because charging visitors to park at retail establishments would discourage patronage. Charging visitors to park at the office uses would encourage patrons to park in retail parking spaces or on the street. Charging visitors to pay for parking at the park site would encourage on-street parking. The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[21]

an. Require on-site truck loading zones. *The effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[22]

ao. Implement or contribute to public outreach programs. *Mitigation not suitable for the River Village applicant/developer because it is unclear as to what type of outreach program this mitigation measure refers. Furthermore, it is outside the purview of the project applicant/developer to set up such programs. Such programs are more appropriately set up and maintained by and at the discretion of future occupants of the commercial retail and office uses that will locate on the site. Furthermore, the effectiveness of this measure is not quantified by SCAQMD and is not given emission reduction credit in the impact analysis.*[23]

ap. Require employers not subject to Regulation XV (now Rule 2202) to provide commuter information area.

BUSINESS PARK USES

No Business Park uses are proposed within the River Village project.

aq. Provide preferential parking spaces for carpools and vanpools and provide 7'2" minimum vertical clearance in parking facilities for vanpool access.

ar. Implement on-site circulation plans in parking lots to reduce vehicle queuing.

as. Set up resident worker training programs to improve job/housing balance.

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18 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-18.*

19 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

20 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

21 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

22 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

23 *South Coast Air Quality Management District, CEQA* Air Quality Handbook *(Diamond Bar, California: South Coast Air Quality Management District, April 1993), p. 11-22.*

bx. Use energy-efficient low-sodium parking lot lights.

COMMERCIAL USES

by. Use lighting controls and energy-efficient lighting.
bz. Use fuel cells in residential subdivisions to produce heat and electricity.
ca. Orient buildings to the north for natural cooling and include passive solar design (*e.g.*, daylighting).
cb. Use light-colored roofing materials to reflect heat.
cc. Increase walls and attic insulation beyond Title 24 requirements.
cd. Use solar or low emission water heaters.
ce. Use central water heating systems.
cf. Provide shade trees to reduce building heating/cooling needs.
cg. Use energy-efficient and automated controls for air conditioners.
ch. Use double-paned windows.
ci. Use energy-efficient low-sodium parking lot lights.
cj. Use lighting controls and energy-efficient lighting.
ck. Use light-colored roofing materials to reflect heat.
cl. Increase walls and attic insulation beyond Title 24 requirements.
cm. Orient buildings to the north for natural cooling and include passive solar design (*e.g.*, daylighting).

BUSINESS PARK USES

No Business Park uses are proposed within the River Village project.

cn. Provide shade trees to reduce building heating/cooling needs.
co. Use energy-efficient and automated controls for air conditioning.
cp. Use double-paned windows.
cq. Use energy-efficient low-sodium parking lot lights.
cr. Use lighting controls and energy-efficient lighting.
cs. Use light-colored roofing materials to reflect heat.
ct. Orient buildings to the north for natural cooling and include passive solar design (*e.g.*, daylighting).
cu. Increase walls and attic insulation beyond Title 24 requirements.
cv. Improved storage and handling or source materials.
cw. Materials substitution (*e.g.*, use water-based paints, life-cycle analysis).
cx. Modify manufacturing processes (*e.g.*, reduce process stages, closed-loop systems, materials recycling).
cy. Resource recovery systems that redirect chemicals to new production processes.

4.10-10. All non-residential development of 25,000 gross square feet or more shall comply with the County's Transportation Demand Management (TDM) Ordinance (Ordinance No. 93-0028M) in effect at the time of subdivision. The sizes and configurations of the Specific Plan's non-residential uses are not known at this time and the Ordinance specifies different requirements based on the size of the project under review. All current provisions of the ordinance are summarized in Appendix 4.10.

4.10-11. Subdivisions and buildings shall comply with Title 24 of the California Code of Regulations which are current at the time of development.

4.10-12. Lighting for public streets, parking areas, and recreation areas shall utilize energy efficient light and mechanical, computerized or photo cell switching devices to reduce unnecessary energy usage.

4.10-13. Any on-site subterranean parking structures shall provide adequate ventilation systems to disperse pollutants and preclude the potential for a pollutant concentration to occur. *Mitigation not suitable for River Village because no subterranean parking structures are proposed within the project. Furthermore, this measure reduces indoor air pollutants, but does not effectively reduce air emissions within the Basin.*

4.10-14. The sellers of new residential units shall be required to distribute brochures and other relevant information published by the SCAQMD or similar organization to new homeowners regarding the importance of reducing vehicle miles traveled and related air quality impacts, as well as on local opportunities for public transit and ridesharing.

UNMITIGATED CONSTRUCTION EMISSIONS

Project Name	**River Village**	**Unmitigated Emissions**
Subphase	**Weeks 1 thru 19**	
Length of Subphase (weeks)		19.00
Year	2006	
Total Acreage	120.28	

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	19,407.42	
On-Road Diesel Exhaust	130.62	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	--	65.65	
Worker Commute Trips	15.58	4.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,703.71	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,987.28	410.56	1,543.43	1.72	9,772.76	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	

Project Name	**River Village**	**Unmitigated Emissions**
Subphase	**Weeks 20 thru 39**	
Length of Subphase (weeks)		20.00
Year	2006	
Total Acreage	126.61	

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	19,393.76	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	–	65.65	
Worker Commute Trips	15.98	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	9,696.85	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,332.50	167.28	1,126.24	–	46.72	
On-Road Diesel Exhaust Emissions	8.44	0.65	0.21	0.06	0.11	
Worker Commute Emissions	23.98	2.86	12.29	0.11	0.28	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	–	0.00	–	–	–	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**3,368.20**	**582.35**	**2,688.18**	**1.88**	**9,813.02**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	

Project Name	**River Village**	**Unmitigated Emissions**
Subphase	**Weeks 40 thru 46**	
Length of Subphase (weeks)	**7.00**	
Year	**2006**	
Total Acreage	**44.31**	

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	19,407.42	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	--	65.65	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,703.71	Fugitive Dust Rule 403
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,126.24	--	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	222.74	1,654.08	--	72.90	
Worker Commute Trips	25.81	2.80	4.75	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	--	151.03	--	--	--	
Worker Commute Trips	25.81	2.80	4.75	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	5,089.89	960.19	4,341.75	1.86	9,892.94	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	

Project Name River Village **Unmitigated Emissions**
Subphase Weeks 47 thru 91
Length of Subphase (weeks) 45.00
Year 2006
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	21.98	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	10.99	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,426.24	–	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	222.74	1,654.08	–	72.90	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	–	151.01	–	–	–	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,102.61	549.63	2,798.32	0.15	131.16	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Week 92
Length of Subphase (weeks) 1.00
Year 2007
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.02	--	--	--	
Off-Road Diesel Exhaust Emissions	1,373.05	167.38	1,085.87	--	41.93	
On-Road Diesel Exhaust Emissions	4.05	0.61	5.80	0.01	0.10	
Worker Commute Emissions	11.39	1.15	2.11	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	2,159.16	275.61	1,931.00	--	79.99	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Architectural Painting						
Off-Gas Emissions	--	151.50	--	--	--	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,603.81	603.46	3,035.29	0.06	122.52	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 93 thru 144
Length of Subphase (weeks) 52.00
Year 2007
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.02	--	--	--	
Off-Road Diesel Exhaust Emissions	1,373.08	167.28	1,085.87	--	41.93	
On-Road Diesel Exhaust Emissions	0.08	0.01	0.11	0.00	0.00	
Worker Commute Emissions	11.29	1.25	2.11	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,872.07	240.07	1,693.55	--	70.48	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Architectural Painting						
Off-Gas Emissions	--	141.73	--	--	--	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,306.30	555.86	2,790.95	0.05	112.86	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 145 thru 158
Length of Subphase (weeks) 14.00
Year 2008
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	–	–	–	–	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	–	–	–	–	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	–	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	–	–	–	–	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	–	1.01	–	–	–	
Off-Road Diesel Exhaust Emissions	1,385.56	167.28	1,058.35	–	38.46	
On-Road Diesel Exhaust Emissions	3.70	0.57	5.39	0.01	0.10	
Worker Commute Emissions	10.38	1.15	1.94	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,685.60	212.51	1,433.80	–	58.55	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	–	141.66	–	–	–	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	3,126.78	528.79	2,527.25	0.05	97.52	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 159 thru 178
Length of Subphase (weeks) 21.00
Year 2009
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,726.62	212.51	1,394.91	--	53.47	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	--	141.66	--	--	--	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,764.79	358.43	1,402.06	0.03	53.80	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name **River Village** **Unmitigated Emissions**
Subphase **Weeks 179 thru 196**
Length of Subphase (weeks) **18.00**
Year **2009**
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Gradng During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,515.09	187.20	1,239.14	--	48.23	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Architectural Painting						
Off-Gas Emissions	--	141.24	--	--	--	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,549.32	332.26	1,245.55	0.03	48.53	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name River Village Unmitigated Emissions
Subphase Weeks 197 thru 210
Length of Subphase (weeks) 13.00
Year 2009
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,041.33	128.61	850.48	--	33.06	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Architectural Painting						
Off-Gas Emissions	--	87.64	--	--	--	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	1,064.36	218.82	854.79	0.02	33.26	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name **River Village** **Unmitigated Emissions**
Subphase **Weeks 211 thru 220**
Length of Subphase (weeks) **10.00**
Year **2010**
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Gradng During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	779.57	95.89	593.66	--	21.89	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Architectural Painting						
Off-Gas Emissions	--	39.26	--	--	--	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	794.57	134.83	596.44	0.01	22.03	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

Project Name **River Village** **Unmitigated Emissions**
Subphase **Weeks 221 thru 235**
Length of Subphase (weeks) **15.00**
Year **2010**
Total Acreage

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Gradng During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	491.65	59.47	372.96	--	13.64	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Architectural Painting						
Off-Gas Emissions	--	11.78	--	--	--	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**500.54**	**71.95**	**374.61**	**0.01**	**13.72**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	No	No	Yes	No	No	

River Village Office Construction Only Unmitigated Emissions

Weeks of Construction: 140

Year Constr. Begins: 2015

Calculated Emissions

Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	0.00	0.00	0.00	0.00	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	894.12	106.21	663.11	-	23.88	
Worker Commute Trips	10.90	1.20	2.03	0.02	0.08	
Architectural Painting						
Off-Gas Emissions	-	38.48		-	-	
Worker Commute Trips	10.90	1.20	2.03	0.02	0.08	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	905.93	147.09	669.17	0.03	24.03	
SCAQMD Threshold:	550.00	75.00	100.00	150.00	150.00	
Exceeds Threshold?	Yes	Yes	Yes	No	No	

MITIGATED CONSTRUCTION EMISSIONS

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 1 thru 19**
Length of Subphase (weeks) **19.00**
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	19,407.42	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	--	65.65	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,703.71	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	1.69	2.64	Assumes Use of Aqueous Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,656.91	203.50	821.64	n/a	97.16	Assumes Use of Aqueous Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	--	n/a	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**330.37**	**207.06**	**721.79**	**0.02**	**9,672.96**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**Yes**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 20 thru 39**
Length of Subphase (weeks) **20.00**
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	19,390.70	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	--	65.65	
Worker Commute Trips	13.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,696.85	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	1.69	2.64	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,656.91	203.50	821.64	n/a	97.16	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,126.24	--	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	23.98	2.86	12.29	0.11	0.28	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	4.00	0.58	3.35	0.06	0.09	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,217.25	150.55	608.17	n/a	69.15	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	No Building Construction During This Subphase
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Architectural Painting						
Off-Gas Emissions	--	0.00	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	--	n/a	--	--	--	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Net Emission Totals:	**490.05**	**227.72**	**1,255.02**	**0.13**	**9,643.99**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**Yes**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 40 thru 46**
Length of Subphase (weeks) **7.00**
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	19,403.42	
On-Road Diesel Exhaust	130.69	182.74	18.98	1.69	3.30	
Off-Road Diesel Exhaust	1,841.01	226.11	1,521.55	--	65.65	
Worker Commute Trips	15.58	1.71	2.90	0.02	0.11	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	9,703.71	Water Exposed Surfaces Three Times Daily
On-Road Diesel Exhaust	0.00	0.00	0.00	1.69	2.64	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,656.91	203.50	821.64	n/a	97.16	Aqueous Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,126.24	--	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	4.00	0.58	3.35	0.06	0.09	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,217.25	150.55	608.17	n/a	69.15	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	222.74	1,654.08	--	72.90	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	--	151.01	--	--	--	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,514.14	200.47	893.20	0.00	107.89	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**697.59**	**405.10**	**2,015.39**	**0.11**	**9,616.01**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 47 thru 91**
Length of Subphase (weeks) **45.00**
Year **2006**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	21.98	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	10.99	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,352.50	167.28	1,126.24	--	46.72	
On-Road Diesel Exhaust Emissions	4.44	0.65	6.21	0.06	0.11	
Worker Commute Emissions	12.27	1.35	2.28	0.02	0.09	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	4.00	0.58	3.35	0.06	0.09	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,217.25	150.55	608.17	n/a	69.15	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,682.38	222.74	1,654.08	--	72.90	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Architectural Painting						
Off-Gas Emissions	--	151.01	--	--	--	
Worker Commute Trips	25.51	2.80	4.75	0.04	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,514.14	200.47	893.20	0.00	107.89	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**367.22**	**198.03**	**1,293.59**	**0.09**	**-45.97**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Week 92**
Length of Subphase (weeks) **1.00**
Year **2007**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,373.05	167.28	1,085.87	--	41.93	
On-Road Diesel Exhaust Emissions	4.05	0.61	5.80	0.01	0.10	
Worker Commute Emissions	11.29	1.25	2.11	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	3.65	0.54	3.13	0.01	0.08	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,235.75	150.55	586.37	n/a	62.06	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	2,159.16	275.61	1,931.00	--	79.99	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Architectural Painting	0.00	0.00	0.00	0.00	0.00	
Off-Gas Emissions	--	151.50	--	--	--	
Worker Commute Trips	28.13	3.11	5.26	0.02	0.21	
Mitigation/Reduction	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	1,943.24	248.05	1,042.74	0.00	118.39	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**421.17**	**204.32**	**1,403.05**	**0.05**	**-58.00**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 93 thru 144**
Length of Subphase (weeks) **52.00**
Year **2007**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.02	--	--	--	
Off-Road Diesel Exhaust Emissions	1,373.05	167.28	1,085.87	--	41.93	
On-Road Diesel Exhaust Emissions	0.08	0.01	0.11	0.00	0.00	
Worker Commute Emissions	11.29	1.25	2.41	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	0.07	0.01	0.06	0.00	0.00	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,235.75	150.55	586.37	n/a	62.06	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,872.07	230.07	1,693.53	--	70.48	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Architectural Painting						
Off-Gas Emissions	--	141.73	--	--	--	
Worker Commute Trips	24.90	2.75	4.65	0.02	0.18	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,684.86	216.06	914.52	0.00	104.31	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**385.62**	**189.23**	**1,290.00**	**0.05**	**-53.50**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 145 thru 158**
Length of Subphase (weeks) **14.00**
Year **2008**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	1.01	--	--	--	
Off-Road Diesel Exhaust Emissions	1,385.56	167.28	1,058.35	--	38.46	
On-Road Diesel Exhaust Emissions	3.70	0.57	5.39	0.01	0.10	
Worker Commute Emissions	10.38	1.15	1.94	0.01	0.08	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	None Available
On-Road Diesel Exhaust	3.33	0.51	2.91	0.01	0.08	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Road Diesel Exhaust	1,247.00	150.55	571.51	n/a	56.92	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,685.60	212.51	1,458.90	--	58.55	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	--	141.66	--	--	--	
Worker Commute Trips	20.77	2.30	3.89	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,517.04	191.26	785.05	0.00	86.65	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**359.40**	**186.46**	**1,167.78**	**0.04**	**-46.13**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 159 thru 178**
Length of Subphase (weeks) **21.00**
Year **2009**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,726.62	212.51	1,394.91	--	53.47	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Architectural Painting						
Off-Gas Emissions	--	141.66	--	--	--	
Worker Commute Trips	19.09	2.13	3.58	0.02	0.17	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,553.96	191.26	753.25	0.00	79.14	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**210.84**	**167.17**	**648.81**	**0.03**	**-25.33**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 179 thru 196**
Length of Subphase (weeks) **18.00**
Year **2009**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Gradng During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	1,515.09	187.20	1,239.14	--	48.23	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Architectural Painting						
Off-Gas Emissions	--	141.24	--	--	--	
Worker Commute Trips	17.12	1.91	3.21	0.02	0.15	
Mitigation/Reduction						
Off-Road Diesel Exhaust	1,363.58	168.48	669.14	0.00	71.38	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**185.74**	**163.78**	**576.42**	**0.03**	**-22.85**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**Yes**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 197 thru 210**
Length of Subphase (weeks) **13.00**
Year **2009**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Architectural Painting						
Off-Gas Emissions	--	87.64	--	--	--	
Worker Commute Trips	11.51	1.29	2.16	0.01	0.10	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**23.03**	**90.21**	**4.31**	**0.02**	**0.20**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**Yes**	**No**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 211 thru 220**
Length of Subphase (weeks) **10.00**
Year **2010**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Architectural Painting						
Off-Gas Emissions	--	39.26	--	--	--	
Worker Commute Trips	7.50	0.84	1.39	0.01	0.07	
Mitigation/Reduction						
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**15.00**	**40.94**	**2.78**	**0.01**	**0.14**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**No**	**No**	**No**	

Project Name **River Village** **Mitigated Emissions**
Subphase **Weeks 221 thru 235**
Length of Subphase (weeks) **15.00**
Year **2010**

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	--	--	--	--	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	--	--	--	--	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	--	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	--	--	--	--	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	--	0.00	--	--	--	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	--	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	n/a	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	491.65	59.17	372.96	--	13.64	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Architectural Painting						
Off-Gas Emissions	--	11.78	--	--	--	
Worker Commute Trips	4.44	0.50	0.82	0.00	0.04	
Mitigation/Reduction						
Off-Road Diesel Exhaust	442.49	53.25	201.40	0.00	20.19	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**58.05**	**18.70**	**173.21**	**0.01**	**-6.46**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**Yes**	**No**	**No**	

River Village Office Construction Only Mitigated Emissions

Weeks of Construction: 140

Year Constr. Begins: 2015

Calculated Emissions
Mitigated Emissions

Emissions Source/Subphase	Emissions (Pounds per Day) CO	ROG	NOx	SOx	PM10	Mitigation
Demolition Subphase						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	No Demolition During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Demolition Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Grading Subphase						
FugitiveDust	0.00	0.00	0.00	0.00	0.00	No Grading During This Subphase
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Pavement and Asphalt Subphase						
Paving Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	No Pavement and Asphalt During This Subphase
Off-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust Emissions	0.00	0.00	0.00	0.00	0.00	
Worker Commute Emissions	0.00	0.00	0.00	0.00	0.00	
Mitigation/Reduction						
Off-Gas Emissions	0.00	0.00	0.00	0.00	0.00	
On-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Off-Road Diesel Exhaust	0.00	0.00	0.00	0.00	0.00	
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	
Building Construction and Architectural Coatings Subphase						
Building Construction						
Off-Road Diesel Exhaust	884.12	106.21	665.11	--	23.88	
Worker Commute Trips	10.90	1.20	2.03	0.02	0.08	
Architectural Painting						
Off-Gas Emissions	--	38.48	--	--	--	
Worker Commute Trips	10.90	1.20	2.03	0.02	0.08	
Mitigation/Reduction						
Off-Road Diesel Exhaust	795.71	95.59	359.16	0.00	35.34	Aqueous Diesel Fuel, Cooled Exhaust Gas Recirculation
Off-Gas Emissions	--	n/a	--	--	--	No Mitigation Available
Worker Commute Trips	0.00	0.00	0.00	0.00	0.00	No Feasible Mitigation Available
Net Emission Totals:	**110.22**	**51.50**	**310.01**	**0.03**	**-11.31**	
SCAQMD Threshold:	**550.00**	**75.00**	**100.00**	**150.00**	**150.00**	
Exceeds Threshold?	**No**	**No**	**Yes**	**No**	**No**	

URBEMIS2002
UNMITIGATED OPERATIONAL EMISSIONS
SUMMERTIME

URBEMIS 2002 For Windows 7.5.0

File Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
Project Name: River Village Operational Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	78.83	31.65	21.52	0.17	0.08
TOTALS (lbs/day, mitigated)	77.29	26.13	10.61	0.00	0.05

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	342.42	391.84	4,155.89	2.47	377.33
TOTALS (lbs/day, mitigated)	342.41	391.82	4,155.68	2.47	377.31

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	421.25	423.49	4,177.40	2.65	377.40
TOTALS (lbs/day, mitigated)	419.69	417.94	4,166.29	2.47	377.36

URBEMIS 2002 For Windows 7.5.0

File Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
Project Name: River Village Operational Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	2.40	31.52	13.20	-	0.06
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.97	0.13	8.32	0.17	0.02
Consumer Prdcts	75.46	-	-	-	-
TOTALS(lbs/day,unmitigated)	78.83	31.65	21.52	0.17	0.08

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOX	CO	SO2	PM10
Single family housing	56.31	60.90	669.83	0.39	59.43
Apartments low rise	32.54	32.68	359.42	0.21	31.89
Condo/townhouse general	31.93	33.14	364.51	0.21	32.34
Elementary school	20.51	10.98	116.55	0.07	10.66
City park	0.71	0.49	5.16	0.00	0.47
Comercial Center 10-30 ac	91.46	120.96	1,259.13	0.76	115.66
Commercial Center <10 ac.	42.72	57.47	598.28	0.36	54.96
Commercial Shops	2.41	3.13	32.54	0.02	2.99
Commercial Office	63.82	72.09	750.48	0.45	68.94
TOTAL EMISSIONS (lbs/day)	342.42	391.84	4,155.89	2.47	377.33

Does not include correction for passby trips.
Includes a double counting reduction for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2007 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Single family housing	9.90 trips / dwelling units	591.00	5,850.90
Apartments low rise	6.90 trips / dwelling units	455.00	3,139.50
Condo/townhouse general	8.00 trips / dwelling units	398.00	3,184.00
Elementary school	1.45 trips / students	750.00	1,087.50
City park	2.60 trips / acres	20.90	54.34
Comercial Center 10-30 ac	54.06 trips / 1000 sq. ft.	252.00	13,623.12
Commercial Center <10 ac.	85.06 trips / 1000 sq. ft.	76.10	6,473.07
Commercial Shops	37.06 trips / 1000 sq. ft.	9.50	352.07
Commercial Office	11.56 trips / 1000 sq. ft.	702.40	8,119.74

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.20	1.80	97.80	0.40
Light Truck < 3,750 lbs	15.10	3.30	94.00	2.70
Light Truck 3,751- 5,750	16.10	1.90	96.90	1.20
Med Truck 5,751- 8,500	7.10	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.10	0.00	0.00	100.00
Motorcycle	1.70	82.40	17.60	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			

% of Trips - Commercial (by land use)

Elementary school	20.0	10.0	70.0
City park	5.0	2.5	92.5
Comercial Center 10-30 ac.	2.0	1.0	97.0
Commercial Center <10 ac.	2.0	1.0	97.0
Commercial Shops	2.0	1.0	97.0
Commercial Office	2.0	1.0	97.0

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The area souce mitigation measure option switch changed from off to on.
The natural gas residential percentage changed from 60 to 100.
The percentage of wood stoves changed from 35 to 0.
The landscape length of the summer period (in days) changed from 180 to 365.
The landscape year changed from 2004 to 2007.
The consumer product persons per residential unit changed from 2.861 to 3.056.
Mitigation measure Orient Buildings North/South: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Rsdntl Space Heat.
has been changed from off to on.
Mitigation measure All Electric Landscape Maintenance Equipment: Rsdntl Lndscp Maint.
has been changed from off to on.
Mitigation measure Central Water Heater: Cmrcl Space Heat.
has been changed from off to on.
Mitigation measure Orient Buildings North/South: Cmrcl Space Heat.
has been changed from off to on.
Mitigation measure Increase Insulation Beyond Title 24: Cmrcl Space Heat.
has been changed from off to on.
Mitigation measure All Electric Landscape Maintenance Equipment: Cmrcl Lndscp Maint.
has been changed from off to on.

Changes made to the default values for Operations

The operational emission year changed from 2004 to 2007.
The double counting internal work trip limit changed from to 791.577.
The double counting shopping trip limit changed from to 395.7885.
The double counting other trip limit changed from to 5234.992.
The travel mode environment settings changed from both to: both
Mitigation measure Mixed Use Project (Residential Oriented):3
has been changed from off to on.
Mitigation measure Provide Sidewalks and/or Pedestrian Paths:1
has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Furniture:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Mixed Use Project (Commercial Oriented):1
has been changed from off to on.
Mitigation measure Floor Area Ratio 0.75 or Greater:1
has been changed from off to on.
Mitigation measure Provide Wide Sidewalks and Onsite Pedestrian Facilities:1
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Project Provides Shade Trees to Shade Sidewalks:0.5
has been changed from off to on.
Mitigation measure Project Provides Street Art and/or Street Furniture:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety Designs/Infrastructure at Crossings:0.5
has been changed from off to on.
Mitigation measure Articulated Storefront(s) Display Windows with Visual Interest:0.25
has been changed from off to on.
Mitigation measure No Long Uninterrupted Walls Along Pedestrian Walkways:0.25
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.
Mitigation measure Provide Bike Lanes/Paths Connecting to Bikeway System:2
has been changed from off to on.
Mitigation measure Provide Secure Bicycle Parking:1
has been changed from off to on.
Mitigation measure Provide Employee Lockers and Showers:1
has been changed from off to on.
Mitigation measure Shuttle Bus Service to Transit/Multi-Modal Center:2
has been changed from off to on.
Mitigation measure Preferential Carpool/Vanpool Parking:1.5
has been changed from off to on.
Mitigation measure Many Frequently Needed Services Provided:5

has been changed from off to on.
Mitigation measuremitop5: Park and Ride Lots
has been changed from on to off.

URBEMIS2002
UNMITIGATED OPERATIONAL EMISSIONS
WINTERTIME

URBEMIS 2002 For Windows 7.5.0

File Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
Project Name: River Village Operational Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Winter)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	1,695.26	49.89	1,797.29	2.83	244.44
TOTALS (lbs/day, mitigated)	1,694.70	44.49	1,794.71	2.83	244.43

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	330.01	566.89	4,005.67	2.01	377.33
TOTALS (lbs/day, mitigated)	330.00	566.86	4,005.48	2.01	377.31

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	2,025.28	616.78	5,802.96	4.83	621.77
TOTALS (lbs/day, mitigated)	2,024.69	611.36	5,800.19	4.83	621.74

URBEMIS 2002 For Windows 7.5.0

ile Name: C:\URBEMIS2002\URBEMIS River Village\River Village Operational Emissions.urb
roject Name: River Village Operational Emissions
roject Location: South Coast Air Basin (Los Angeles area)
n-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Winter)

REA SOURCE EMISSION ESTIMATES (Winter Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	2.40	31.52	13.20	-	0.06
Wood Stoves	0.00	0.00	0.00	0.00	0.00
Fireplaces	1,617.41	18.36	1,784.09	2.83	244.38
Landscaping - No winter emissions					
Consumer Prdcts	75.46	-	-	-	-
TOTALS(lbs/day,unmitigated)	1,695.26	49.89	1,797.29	2.83	244.44

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
ingle family housing	52.80	88.27	633.57	0.32	59.43
partments low rise	28.40	47.36	339.97	0.17	31.89
ondo/townhouse general	28.77	48.03	344.78	0.18	32.34
lementary school	9.34	15.91	110.82	0.06	10.66
ity park	0.42	0.71	5.00	0.00	0.47
omercial Center 10-30 ac	100.15	174.82	1,226.28	0.61	115.66
ommercial Center <10 ac.	47.56	83.07	582.67	0.29	54.96
ommercial Shops	2.59	4.52	31.69	0.02	2.99
ommercial Office	59.98	104.20	730.89	0.36	68.94
OTAL EMISSIONS (lbs/day)	330.01	566.89	4,005.67	2.01	377.33

oes not include correction for passby trips.
ncludes a double counting reduction for internal trips.

PERATIONAL (Vehicle) EMISSION ESTIMATES

nalysis Year: 2007 Temperature (F): 50 Season: Winter

MFAC Version: EMFAC2002 (9/2002)

ummary of Land Uses:

nit Type	Trip Rate	Size	Total Trips
ingle family housing	9.90 trips / dwelling units	591.00	5,850.90
partments low rise	6.90 trips / dwelling units	455.00	3,139.50
ondo/townhouse general	8.00 trips / dwelling units	398.00	3,184.00
lementary school	1.45 trips / students	750.00	1,087.50
ity park	2.60 trips / acres	20.90	54.34
omercial Center 10-30 ac	54.06 trips / 1000 sq. ft.	252.00	13,623.12
ommercial Center <10 ac.	85.06 trips / 1000 sq. ft.	76.10	6,473.07
ommercial Shops	37.06 trips / 1000 sq. ft.	9.50	352.07
ommercial Office	11.56 trips / 1000 sq. ft.	702.40	8,119.74

ehicle Assumptions:

leet Mix:

ehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
ight Auto	55.20	1.80	97.80	0.40
ight Truck < 3,750 lbs	15.10	3.30	94.00	2.70
ight Truck 3,751- 5,750	16.10	1.90	96.90	1.20
ed Truck 5,751- 8,500	7.10	1.40	95.80	2.80
ite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
ite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
ed-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
eavy-Heavy 33,001-60,000	0.90	0.00	11.10	98.90
ine Haul > 60,000 lbs	0.00	0.00	0.00	100.00
rban Bus	0.10	0.00	0.00	100.00
otorcycle	1.70	82.40	17.60	0.00
chool Bus	0.10	0.00	0.00	100.00
otor Home	1.20	8.30	83.30	8.40

ravel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
rban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
ural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
rip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			

% of Trips - Commercial (by land use)

lementary school	20.0	10.0	70.0
ity park	5.0	2.5	92.5
omercial Center 10-30 ac.	2.0	1.0	97.0
ommercial Center <10 ac.	2.0	1.0	97.0
ommercial Shops	2.0	1.0	97.0
ommercial Office	2.0	1.0	97.0

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has been changed from off to on.
Mitigation measure Provide Direct Pedestrian Connections:1
has been changed from off to on.
Mitigation measure Provide Pedestrian Safety:0.5
has been changed from off to on.
Mitigation measure Provide Street Furniture:0.5
has been changed from off to on.
Mitigation measure Provide Street Lighting:0.5
has been changed from off to on.
Mitigation measure Provide Pedestrian Signalization and Signage:0.5
has been changed from off to on.
Mitigation measure Mixed Use Project (Commercial Oriented):1
has been changed from off to on.
Mitigation measure Floor Area Ratio 0.75 or Greater:1
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Mitigation measure Provide Wide Sidewalks and Onsite Pedestrian Facilities:1
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has been changed from off to on.
Mitigation measure Provide Employee Lockers and Showers:1
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Mitigation measure Shuttle Bus Service to Transit/Multi-Modal Center:2
has been changed from off to on.
Mitigation measure Preferential Carpool/Vanpool Parking:1.5
has been changed from off to on.
Mitigation measure Many Frequently Needed Services Provided:5

has been changed from off to on.
Litigation measuremitop5: Park and Ride Lots
has been changed from on to off.

SUMMERTIME EMISSIONS REDUCTIONS

ESTIMATED SUMMERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Input Fields

LAND USE		Unmitigated Emissions in Pounds per Day CO	VOC	NO_x	PM_{10}
Single Family Residential Uses	Vehicular Sources	669.33	56.35	60.96	59.43
	Area Sources	9.36	39.22	13.67	0.04
Multi-Family Residential Uses	Vehicular Sources	783.90	64.47	68.82	64.23
	Area Sources	7.36	38.62	8.23	0.03
Commercial/Office/Institutional Uses	Vehicular Sources	2,762.13	221.64	265.15	253.67
	Area Sources	4.10	0.20	9.76	0.02
Wood-Burning Fire Place Emissions	Vehicular Sources	0.00	0.00	0.00	0.00
	Area Sources	0.00	0.00	0.00	0.00
Total Emissions	Vehicular Sources	4,155.39	342.42	391.84	377.33
	Area Sources	21.52	78.84	31.66	0.09
	Total Non-Reduced Emissions	4,177.41	421.26	423.48	377.42

Recommended (Measures already incorporated into Project are marked "No." Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	Emission Reduction Efficiency CO	VOC	NO_x	PM_{10}	Reduced Emissions in Pounds per Day CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Stationary Sources											
All Residential Uses											
X		Use solar or low emission water heaters	10.0%	11.0%	9.5%	4.5%	1.74	8.58	2.08	0.00	
X		Use built-in energy-efficient appliances	3.0%	2.5%	3.0%	6.5%	0.52	1.95	0.66	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use double-glass paned windows	4.5%	4.5%	4.0%	2.5%	0.78	3.51	0.88	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use fuel cells in residential subdivisions to produce heat and elec.	1.0%	0.0%	1.5%	7.0%	0.17	0.00	0.33	0.00	
X		Orient buildings to the north	13.5%	14.0%	13.0%	10.5%	2.35	10.93	2.85	0.01	
X		Use light-colored roof materials to reflect heat	1.5%	1.5%	1.5%	1.5%	0.26	1.17	0.33	0.00	
X		Comply with Title 24	13.0%	14.0%	13.0%	7.5%	2.26	10.93	2.85	0.01	
Multi-Family Residential Uses											
	X	Use central water heating systems	8.5%	9.0%	8.0%	4.0%	0.00	0.00	0.00	0.00	Central heating systems are not desired by the average multi-family resident.
Commercial, Office, Institutional Uses											
X		Use solar or low emission water heaters	0.5%	0.5%	0.5%	0.5%	0.02	0.00	0.05	0.00	
X		Use central water heating systems	0.5%	0.5%	0.5%	0.5%	0.02	0.00	0.05	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.5%	0.5%	0.5%	1.0%	0.02	0.00	0.05	0.00	
X		Use energy-efficient and automated controls for air conditioners	1.0%	1.0%	1.0%	1.5%	0.04	0.01	0.10	0.00	
X		Use double-glass paned windows	3.0%	3.5%	3.0%	2.5%	0.12	0.03	0.25	0.00	
X		Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	7.0%	3.0%	8.5%	19.5%	0.29	0.02	0.82	0.00	
X		Use light-colored roof materials to reflect heat	1.0%	1.0%	1.0%	0.5%	0.04	0.01	0.10	0.00	
X		Comply with Title 24	9.5%	10.0%	9.0%	7.0%	0.39	0.08	0.87	0.00	
X		Orient buildings to the north	12.5%	11.0%	13.5%	17.5%	0.51	0.09	1.31	0.00	
Industrial Uses											
	X	Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	1.0%	0.00	0.00	0.00	0.00	
	X	Use double-glass paned windows	0.0%	0.0%	0.5%	1.0%	0.00	0.00	0.00	0.00	
	X	Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
	X	Use lighting controls and energy efficient lighting	0.5%	0.0%	1.0%	2.5%	0.00	0.00	0.00	0.00	
	X	Use light-colored roof materials to reflect heat	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
	X	Orient buildings to the north	2.5%	2.0%	3.0%	5.5%	0.00	0.00	0.00	0.00	
	X	Comply with Title 24	0.5%	0.0%	1.0%	3.0%	0.00	0.00	0.00	0.00	
	X	Improved storage and handling of source materials	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Materials substitution (e.g., use water-based paints, life cycle analysis)	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Utilize efficient manufacturing processes	1.5%	0.5%	2.0%	6.0%	0.00	0.00	0.00	0.00	
	X	Resource recovery systems	3.0%	3.5%	3.0%	1.5%	0.00	0.00	0.00	0.00	

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Based on SCAQMD
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ESTIMATED SUMMERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Mobile Sources											
Residential Uses											
	X	Allow satellite telecommunications centers in residential subdivisions	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Satellite telecommunications centers are superseded by other technology.
	X	Shuttle service from res. subdivisions to commercial core areas	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residences are proposed in walking distance to proposed commercial areas.
X		Construct bus passenger benches and shelters	0.2%	0.2%	0.2%	0.2%	2.79	0.24	0.25	0.25	
X		Construct pedestrian facility improvements	0.1%	0.1%	0.1%	0.1%	1.39	0.12	0.13	0.12	
X		Retail services within or adjacent to residential subdivisions	1.3%	1.0%	1.3%	1.3%	18.12	1.21	1.65	1.61	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	1.39	0.12	0.13	0.12	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	55.75	4.83	5.07	4.95	
X		Construct bicycle trails	0.1%	0.1%	0.1%	0.1%	1.39	0.12	0.13	0.12	
Commercial, Office and Institutional Uses											
X		Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
X		Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide separate windows for fast-food restaurants	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide video-conference facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
	X	Lunch shuttle service from a worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	Mixed use lots are expected to have food establishments located within walking distance for employees.
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	The requirement to achieve a specific AVR has been ruled unlawful by the federal government.
	X	Utilize satellite offices rather than regular worksite to reduce VMT	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Establish a home-based telecommuting program	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
	X	Other travel incentives such as discounts on purchases for transit riders	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.2%	0.3%	8.29	0.44	0.80	0.76	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residential uses are in close proximity and within walking distance to proposed commercial uses.
X		Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		Residential units within or adjacent to commercial developments	4.0%	3.1%	4.0%	4.0%	110.49	6.87	10.60	10.15	
X		Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
X		Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	8.29	0.44	0.80	0.76	
X		Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	5.52	0.44	0.53	0.51	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Charge visitors to park	2.0%	1.5%	2.0%	2.0%	55.24	3.32	5.30	5.07	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	110.49	8.87	10.60	10.15	
X		Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Paid parking at walkup kiosks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide commuter information areas	0.1%	0.1%	0.1%	0.1%	2.76	0.22	0.27	0.25	Such programs are set up by and at the discretion of future occupants of the commercial uses.

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ESTIMATED SUMMERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Industrial Uses											
	X	Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide commuter information areas	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	
	X	Offer loans or other incentives to employees who move locally	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	
	X	Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	0.00	0.00	0.00	0.00	
	X	Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	0.00	0.00	0.00	0.00	
	X	Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Lunch shuttle system from worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	
	X	On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install aerodynamic add-on devices to heavy-duty trucks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce ship cruising speeds in the inner harbor	0.0%	0.0%	0.0%	0.3%	0.00	0.00	0.00	0.00	
	X	Use low-emission fuels or electrify airport ground service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Engine tuning for marine vessels	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce number of aircraft engines used during idling	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install monitoring system to control airport shuttles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use centralized ground power systems for airport service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
		Reduction in Stationary Sources Emissions (Pounds per day)					-9.56	-37.32	-13.62	-0.04	
		Reduction in Mobile Sources Emissions (Pounds per day)					-395.72	-28.36	-37.57	-36.09	
		Total Reduction in Emissions Based on Newhall Ranch FEIR Measures (Pounds per day)					-405.28	-65.68	-51.19	-36.13	
		Percentage Reduced Based on Newhall Ranch FEIR Measures					-9.70%	-15.59%	-12.09%	-9.57%	
		No Wood Burning Fire Places or Stoves in Residential Units					0.00	0.00	0.00	0.00	
		Total Percent Reduction Based on Implementation of All Recommended Measures					-9.70%	-15.59%	-12.09%	-9.57%	
		Total Reduced Stationary Source Emissions					**11.96**	**41.52**	**18.02**	**0.05**	
		Total Reduced Mobile Source Emissions					**3,760.17**	**314.06**	**354.27**	**341.24**	
		TOTAL REDUCED EMISSIONS					**3,772.13**	**355.58**	**372.29**	**341.29**	
		SCAQMD Thresholds					**550.00**	**55.00**	**55.00**	**150.00**	
		ProjectAir Quality Impacts Significant?					**YES**	**YES**	**YES**	**YES**	

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WINTERTIME EMISSIONS REDUCTIONS

ESTIMATED WINTERTIME EMISSIONS REDUCTIONS EFFICIENCIES
River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Input Fields

LAND USE		Unmitigated Emissions in Pounds per Day CO	VOC	NO_x	PM_{10}
Single Family Residential Uses	Vehicular Sources	680.87	52.80	68.27	59.43
	Area Sources	9.86	39.22	13.67	0.04
Multi-Family Residential Uses	Vehicular Sources	584.75	37.19	95.26	84.23
	Area Sources	7.86	38.82	8.27	0.03
Commercial/Office/Institutional Uses	Vehicular Sources	1,627.39	226.04	388.23	253.67
	Area Sources	4.10	0.00	9.70	0.02
Wood-Burning Fire Place Emissions	Vehicular Sources	0.00	0.00	0.00	0.00
	Area Sources	1,794.08	1,617.31	18.86	244.38
Total Emissions	Vehicular Sources	4,005.67	330.01	566.89	377.33
	Area Sources	1,805.61	1,696.25	50.00	244.47
	Total Non-Reduced Emissions	5,811.28	2,026.26	616.89	621.80

Recommended (Measures already incorporated into Project are marked "No." Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	Emission Reduction Efficiency CO	VOC	NO_x	PM_{10}	Reduced Emissions in Pounds per Day CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Stationary Sources											
All Residential Uses											
X		Use solar or low emission water heaters	10.0%	11.0%	9.5%	4.5%	1.74	3.58	2.08	0.00	
X		Use built-in energy-efficient appliances	3.0%	2.5%	3.0%	6.5%	0.52	1.95	0.66	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use double-glass paned windows	4.5%	4.5%	4.0%	2.5%	0.78	3.51	0.85	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
X		Use fuel cells in residential subdivisions to produce heat and elec.	1.0%	0.0%	1.5%	7.0%	0.17	0.00	0.33	0.00	
X		Orient buildings to the north	13.5%	14.0%	13.0%	10.5%	2.35	10.93	2.85	0.01	
X		Use light-colored roof materials to reflect heat	1.5%	1.5%	1.5%	1.5%	0.26	1.17	0.33	0.00	
X		Comply with Title 24	13.0%	14.0%	13.0%	7.5%	2.26	10.93	2.85	0.01	
Multi-Family Residential Uses											
	X	Use central water heating systems	8.5%	9.0%	8.0%	4.0%	0.00	0.00	0.00	0.00	Central heating systems are not desired by the average multi-family resident.
Commercial, Office, Institutional Uses											
X		Use solar or low emission water heaters	0.5%	0.5%	0.5%	0.5%	0.02	0.00	0.05	0.00	
X		Use central water heating systems	0.5%	0.5%	0.5%	0.5%	0.02	0.00	0.05	0.00	
X		Provide shade trees to reduce heating/cooling needs	0.5%	0.5%	0.5%	1.0%	0.02	0.00	0.05	0.00	
X		Use energy-efficient and automated controls for air conditioners	1.0%	1.0%	1.0%	1.5%	0.04	0.01	0.10	0.00	
X		Use double-glass paned windows	3.0%	3.5%	3.0%	2.5%	0.12	0.03	0.29	0.00	
X		Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	Parking structures are not proposed within the project.
X		Use lighting controls and energy efficient lighting	7.0%	3.0%	8.5%	19.5%	0.29	0.02	0.82	0.00	
X		Use light-colored roof materials to reflect heat	1.0%	1.0%	1.0%	0.5%	0.04	0.01	0.10	0.00	
X		Comply with Title 24	9.5%	10.0%	9.0%	7.0%	0.39	0.08	0.87	0.00	
X		Orient buildings to the north	12.5%	11.0%	13.5%	17.5%	0.51	0.09	1.31	0.00	
Industrial Uses											
	X	Provide shade trees to reduce heating/cooling needs	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Use energy-efficient and automated controls for air conditioners	0.0%	0.0%	0.0%	1.0%	0.00	0.00	0.00	0.00	
	X	Use double-glass paned windows	0.0%	0.0%	0.5%	1.0%	0.00	0.00	0.00	0.00	
	X	Use energy-efficient low-sodium parking lights	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide ventilation systems for enclosed parking facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use lighting controls and energy efficient lighting	0.5%	0.0%	1.0%	2.5%	0.00	0.00	0.00	0.00	
	X	Use light-colored roof materials to reflect heat	0.0%	0.0%	0.0%	0.5%	0.00	0.00	0.00	0.00	
	X	Orient buildings to the north	2.5%	2.0%	3.0%	5.5%	0.00	0.00	0.00	0.00	
	X	Comply with Title 24	0.5%	0.0%	1.0%	3.0%	0.00	0.00	0.00	0.00	
	X	Improved storage and handling of source materials	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Materials substitution (e.g., use water-based paints, life cycle analysis)	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Utilize efficient manufacturing processes	1.5%	0.5%	2.0%	6.0%	0.00	0.00	0.00	0.00	
	X	Resource recovery systems	3.0%	3.5%	3.0%	1.5%	0.00	0.00	0.00	0.00	

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River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Mobile Sources											
Residential Uses											
	X	Allow satellite telecommunications centers in residential subdivisions	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Satellite telecommunications centers are superseded by other technology.
	X	Shuttle service from res. subdivisions to commercial core areas	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residences are proposed in walking distance to proposed commercial areas.
X		Construct bus passenger benches and shelters	0.2%	0.2%	0.2%	0.2%	2.64	0.22	0.37	0.25	
X		Construct pedestrian facility improvements	0.1%	0.1%	0.1%	0.1%	1.32	0.11	0.18	0.12	
X		Retail services within or adjacent to residential subdivisions	1.3%	1.0%	1.3%	1.3%	17.14	1.10	2.39	1.61	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	1.32	0.11	0.18	0.12	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	52.73	4.40	7.35	4.95	
X		Construct bicycle trails	0.1%	0.1%	0.1%	0.1%	1.32	0.11	0.18	0.12	
Commercial, Office and Institutional Uses											
X		Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
X		Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide separate windows for fast-food restaurants	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide video-conference facilities	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	No commercial retail or office use on the site is expected to use fleet vehicles.
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
	X	Lunch shuttle service from a worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	Mixed use lots are expected to have food establishments located within walking distance for employees.
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	The requirement to achieve a specific AVR has been ruled unlawful by the federal government.
	X	Utilize satellite offices rather than regular worksite to reduce VMT	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
	X	Establish a home-based telecommuting program	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
	X	Offer travel incentives such as discounts on purchases for transit riders	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	Such programs are set up by and at the discretion of future occupants of the commercial uses.
X		Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	8.06	0.44	1.15	0.76	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	Residential uses are in close proximity and within walking distance to proposed commercial uses.
X		Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		Residential units within or adjacent to commercial developments	4.0%	3.1%	4.0%	4.0%	107.49	6.82	15.33	10.15	
X		Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
X		Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	8.06	0.44	1.15	0.76	
X		Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	5.37	0.44	0.77	0.51	
X		Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	
X		Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Charge visitors to park	2.0%	1.5%	2.0%	2.0%	53.75	3.30	7.66	5.07	
X		Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	107.49	8.80	15.33	10.15	
X		Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Paid parking at walkup kiosks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	There is potential for employees to park in areas designated for retail customers, thereby negating the intent of this measure.
X		On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
X		Provide commuter information areas	0.1%	0.1%	0.1%	0.1%	2.69	0.22	0.38	0.25	Such programs are set up by and at the discretion of future occupants of the commercial uses.

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River Village Emissions With Implementation of Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures and Without Wood Burning Stoves or Fire Places

Recommended (Measures already incorporated into Project are marked "No."			Emission Reduction Efficiency				Reduced Emissions in Pounds per Day				
Yes	No	MEASURES, EFFICIENCIES, AND REDUCTIONS	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}	REASONS FOR REJECTING MITIGATION MEASURES
Industrial Uses											
	X	Preferential parking spaces for carpools and vanpools	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	No industrial uses are proposed within the project.
	X	Implement on-site circulation plan in parking lots	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Set up resident worker training programs to improve job/housing balance	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement home dispatching system for employees	0.1%	0.0%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Minimize use of fleet vehicles during smog alerts	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use low emission fleet vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Provide commuter information areas	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce employee parking spaces for those business not under Rule 2202	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Implement compressed work-week schedules	1.0%	0.8%	1.0%	1.0%	0.00	0.00	0.00	0.00	
	X	Offer loans or other incentives to employees who move locally	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Trip reduction plan to achieve 1.5 AVR for businesses	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide or contribute to child care and after school facilities	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Provide on-site employee services such as cafeteria, banks, etc.	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Shuttle service from residential core area to the worksite	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bus passenger benches and shelters	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Pricing structure for single-occupancy employee parking	2.0%	1.5%	2.0%	2.0%	0.00	0.00	0.00	0.00	
	X	Utilize excess parking as park-n-ride or contribute to park-n-ride	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Construct bicycle facility improvements	0.3%	0.2%	0.3%	0.3%	0.00	0.00	0.00	0.00	
	X	Construct pedestrian facility improvements	0.2%	0.2%	0.2%	0.2%	0.00	0.00	0.00	0.00	
	X	Shuttles to major rail transit centers or multi-modal stations	0.1%	0.1%	0.1%	0.1%	0.00	0.00	0.00	0.00	
	X	Contribute to regional transit systems	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Synchronize traffic lights on streets impacted by development	4.0%	4.0%	4.0%	4.0%	0.00	0.00	0.00	0.00	
	X	Reschedule truck deliveries and pickups for off-peak hours	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Lunch shuttle system from worksite to food establishments	0.5%	0.4%	0.5%	0.5%	0.00	0.00	0.00	0.00	
	X	On-site truck loading zones	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install aerodynamic add-on devices to heavy-duty trucks	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Implement or contribute to public outreach programs	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce ship cruising speeds in the inner harbor	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use low-emission fuels or electrify airport ground service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Engine tuning for marine vessels	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Reduce number of aircraft engines used during idling	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Install monitoring system to control airport shuttles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
	X	Use centralized ground power systems for airport service vehicles	0.0%	0.0%	0.0%	0.0%	0.00	0.00	0.00	0.00	
		Reduction in Stationary Sources Emissions (Pounds per day)					-9.56	-37.32	-13.62	-0.04	
		Reduction in Mobile Sources Emissions (Pounds per day)					-382.82	-27.61	-54.34	-36.09	
		Total Reduction in Emissions Based on Newhall Ranch FEIR Measures (Pounds per day)					-392.38	-64.93	-67.96	-36.13	
		Percentage Reduced Based on Newhall Ranch FEIR Measures					-6.75%	-3.20%	-11.02%	-5.81%	
		No Wood Burning Fire Places or Stoves in Residential Units					-1,784.09	-1,617.41	-18.36	-244.38	
		Total Percent Reduction Based on Implementation of All Recommended Measures					-37.45%	-83.03%	-13.99%	-45.11%	
		Total Reduced Stationary Source Emissions					**11.96**	**41.52**	**18.02**	**0.05**	
		Total Reduced Mobile Source Emissions					**3,622.85**	**302.40**	**512.55**	**341.24**	
		TOTAL REDUCED EMISSIONS					3,634.81	343.92	530.57	341.29	
		SCAQMD Thresholds					550.00	55.00	55.00	150.00	
		ProjectAir Quality Impacts Significant?					YES	YES	YES	YES	

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2/13/04

Based on SCAQMD
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APPENDIX B

Selected ISCST3 Modeling Output

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): AREA1 , AREA2 , MMAX4 , FDUST ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF PARMAT10 IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
347626.66	3811654.75	53.60405	(81112224)	347785.38	3811716.25	58.68578	(81112224)
347875.16	3811740.25	63.51659	(81121824)	347964.91	3811764.00	64.42241	(81121824)
347593.97	3811747.75	52.44645	(81112224)	347442.22	3811665.00	43.32656	(81112224)
347759.63	3811812.75	57.42127	(81121824)	347849.38	3811836.75	60.39397	(81121824)
347939.16	3811860.75	58.42091	(81121824)	347573.13	3811847.00	50.80134	(81112224)
347431.22	3811769.75	45.30037	(81112224)	347289.31	3811692.50	38.43340	(81011824)
347733.88	3811909.50	55.86644	(81121824)	347823.63	3811933.50	56.08175	(81121824)
347913.38	3811957.25	54.49918	(81120624)	347541.47	3811940.25	48.21144	(81112224)
347387.72	3811856.75	44.48390	(81112224)	347234.00	3811773.00	37.65595	(81011824)
347708.09	3812006.00	53.05607	(81121824)	347797.88	3812030.00	51.13541	(81121824)
347887.63	3812054.00	50.85184	(81120624)	347520.13	3812039.25	47.15760	(81121824)
347375.28	3811960.50	44.29606	(81112224)	347230.41	3811881.75	38.36937	(81112224)
347682.34	3812102.75	49.38742	(81121824)	347772.09	3812126.75	48.18049	(81120624)
347861.88	3812150.50	46.84777	(81120624)	347489.19	3812133.25	46.29985	(81121824)
347333.97	3812048.75	42.66306	(81112224)	347178.78	3811964.25	37.72142	(81112224)
347656.56	3812199.25	45.24806	(81121824)	347746.34	3812223.25	45.25813	(81120624)
347836.09	3812247.25	42.66294	(81120624)	347467.44	3812232.00	44.83062	(81121824)
347320.28	3812152.00	40.97287	(81112224)	347173.13	3812071.75	38.47504	(81112224)
347630.81	3812296.00	43.03686	(81120624)	347720.56	3812320.00	41.99494	(81120624)
347810.31	3812343.75	38.49388	(81120624)	347437.09	3812326.00	42.60232	(81121824)
347280.72	3812241.00	39.21150	(81121824)	347124.38	3812156.00	37.33471	(81112224)
347605.03	3812392.50	40.65857	(81120624)	347694.78	3812416.50	38.55555	(81120624)
347784.56	3812440.50	34.73270	(81050924)	347415.00	3812424.75	39.79543	(81121824)
347266.00	3812343.75	39.55707	(81121824)	347117.00	3812262.50	36.74624	(81112224)
347579.25	3812489.25	37.97455	(81120624)	347669.03	3812513.25	35.05600	(81120624)
347758.78	3812537.00	31.99891	(81050924)	347385.09	3812519.00	36.88037	(81121824)
347227.81	3812433.50	38.49865	(81121824)	347070.53	3812348.00	35.31704	(81112024)
346913.25	3812262.25	32.54592	(81112224)	346755.97	3812176.75	28.81101	(81011824)
346627.03	3812059.75	24.52489	(81011824)	347553.50	3812585.75	35.10942	(81120624)
347643.25	3812609.75	31.63450	(81120624)	347733.03	3812633.75	29.29911	(81050924)
347362.72	3812617.50	35.53994	(81120624)	347212.19	3812535.75	37.28145	(81121824)
347061.69	3812453.75	33.91905	(81121824)	346911.19	3812371.75	32.69254	(81112224)
346760.69	3812290.00	29.07115	(81112224)	346562.03	3812137.00	24.56384	(81011824)
346465.75	3811995.25	17.07502	(81011824)	346369.47	3811853.50	17.02971	(81011324)
346273.19	3811711.75	17.69606	(81122624)	347527.72	3812682.50	32.15587	(81120624)
347617.50	3812706.50	29.38421	(81050924)	347707.25	3812730.25	26.69842	(81050924)
348296.06	3810865.75	87.60471	(81011824)	348357.63	3810799.00	93.65473	(81011824)
348419.16	3810732.25	101.03284	(81011824)	348480.72	3810665.75	109.90335	(81011824)
348542.25	3810599.00	125.96651	(81120324)	348603.81	3810532.25	149.75354	(81120324)
348665.38	3810465.50	175.10747	(81120324)	348323.94	3810961.75	102.41319	(81112224)

CONC URBAN FLAT FLGPOL NOCALM

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): MMAX3 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF CO IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
347626.66	3811654.75	808.32837	(81121818)	347785.38	3811716.25	581.99390	(81121818)
347875.16	3811740.25	658.35077	(81102818)	347964.91	3811764.00	814.79193	(81102818)
347593.97	3811747.75	752.07849	(81121818)	347442.22	3811665.00	755.02588	(81122518)
347759.63	3811812.75	475.31009	(81102818)	347849.38	3811836.75	675.83588	(81102818)
347939.16	3811860.75	785.15045	(81102818)	347573.13	3811847.00	666.94531	(81121818)
347431.22	3811769.75	703.05566	(81122518)	347289.31	3811692.50	709.24420	(81102318)
347733.88	3811909.50	513.41754	(81102818)	347823.63	3811933.50	680.87543	(81102818)
347913.38	3811957.25	747.35675	(81092918)	347541.47	3811940.25	586.17554	(81121818)
347387.72	3811856.75	668.15302	(81121818)	347234.00	3811773.00	676.29230	(81102318)
347708.09	3812006.00	541.41748	(81102818)	347797.88	3812030.00	674.89441	(81102818)
347887.63	3812054.00	704.84613	(81092918)	347520.13	3812039.25	485.82324	(81121818)
347375.28	3811960.50	654.39392	(81121818)	347230.41	3811881.75	644.32751	(81122518)
347682.34	3812102.75	559.86823	(81102818)	347772.09	3812126.75	659.74762	(81102818)
347861.88	3812150.50	669.73975	(81123017)	347489.19	3812133.25	407.61212	(81121818)
347333.97	3812048.75	618.07056	(81121818)	347178.78	3811964.25	618.39600	(81122518)
347656.56	3812199.25	568.99744	(81102818)	347746.34	3812223.25	637.34680	(81102818)
347836.09	3812247.25	642.29883	(81123017)	347467.44	3812232.00	334.68301	(81091418)
347320.28	3812152.00	553.43719	(81121818)	347173.13	3812071.75	569.31421	(81122518)
347630.81	3812296.00	569.83221	(81102818)	347720.56	3812320.00	609.58148	(81092918)
347810.31	3812343.75	611.62738	(81123017)	347437.09	3812326.00	346.65747	(81102818)
347280.72	3812241.00	504.58502	(81121818)	347124.38	3812156.00	552.42657	(81121818)
347605.03	3812392.50	563.25238	(81102818)	347694.78	3812416.50	578.54663	(81092918)
347784.56	3812440.50	578.78516	(81123017)	347415.00	3812424.75	379.53522	(81102818)
347266.00	3812343.75	422.07892	(81121818)	347117.00	3812262.50	546.87970	(81121818)
347579.25	3812489.25	550.51605	(81102818)	347669.03	3812513.25	553.79919	(81123017)
347758.78	3812537.00	544.82910	(81123017)	347385.09	3812519.00	394.73944	(81102818)
347227.81	3812433.50	373.31073	(81121818)	347070.53	3812348.00	522.40344	(81121818)
346913.25	3812262.25	519.70337	(81122518)	346755.97	3812176.75	505.07880	(81102318)
346627.03	3812059.75	377.25546	(81010918)	347553.50	3812585.75	532.75238	(81102818)
347643.25	3812609.75	535.48071	(81123017)	347733.03	3812633.75	510.37131	(81123017)
347362.72	3812617.50	415.42752	(81102818)	347212.19	3812535.75	296.40744	(81121818)
347061.69	3812453.75	475.16074	(81121818)	346911.19	3812371.75	477.10440	(81121818)
346760.69	3812290.00	488.39807	(81102318)	346562.03	3812137.00	350.13171	(81102318)
346465.75	3811995.25	488.89725	(81010918)	346369.47	3811853.50	433.68945	(81010918)
346273.19	3811711.75	308.62662	(81011318)	347527.72	3812682.50	511.50516	(81092918)
347617.50	3812706.50	514.45856	(81123017)	347707.25	3812730.25	476.25677	(81123017)
348296.06	3810865.75	1774.54285	(81121818)	348357.63	3810799.00	1942.94189	(81121818)
348419.16	3810732.25	2136.71802	(81121818)	348480.72	3810665.75	2362.74341	(81121818)
348542.25	3810599.00	2638.12231	(81121818)	348603.81	3810532.25	2988.43115	(81121818)
348665.38	3810465.50	3469.03589	(81121818)	348323.94	3810961.75	1384.93542	(81121818)

CONC URBAN FLAT FLGPOL NOCALM

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): MMAX3 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF CO IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
347626.66	3811654.75	101.04105	(81121824)	347785.38	3811716.25	72.74924	(81121824)
347875.16	3811740.25	94.70206	(81102824)	347964.91	3811764.00	117.05524	(81102824)
347593.97	3811747.75	94.00981	(81121824)	347442.22	3811665.00	94.37823	(81122524)
347759.63	3811812.75	68.79130	(81102824)	347849.38	3811836.75	96.85225	(81102824)
347939.16	3811860.75	112.71533	(81102824)	347573.13	3811847.00	83.36816	(81121824)
347431.22	3811769.75	87.88196	(81122524)	347289.31	3811692.50	88.65553	(81102324)
347733.88	3811909.50	73.82770	(81102824)	347823.63	3811933.50	97.31720	(81102824)
347913.38	3811957.25	107.28569	(81102824)	347541.47	3811940.25	73.27194	(81121824)
347387.72	3811856.75	83.51913	(81121824)	347234.00	3811773.00	84.53654	(81102324)
347708.09	3812006.00	77.47472	(81102824)	347797.88	3812030.00	96.30384	(81102824)
347887.63	3812054.00	101.09027	(81102824)	347520.13	3812039.25	60.72791	(81121824)
347375.28	3811960.50	81.79924	(81121824)	347230.41	3811881.75	80.54094	(81122524)
347682.34	3812102.75	79.82590	(81102824)	347772.09	3812126.75	94.06554	(81102824)
347861.88	3812150.50	94.45025	(81102824)	347489.19	3812133.25	50.95152	(81121824)
347333.97	3812048.75	77.25882	(81121824)	347178.78	3811964.25	77.29950	(81122524)
347656.56	3812199.25	80.91814	(81102824)	347746.34	3812223.25	90.86413	(81102824)
347836.09	3812247.25	87.58324	(81102824)	347467.44	3812232.00	46.73273	(81120316)
347320.28	3812152.00	69.17965	(81121824)	347173.13	3812071.75	71.16428	(81122524)
347630.81	3812296.00	80.89837	(81102824)	347720.56	3812320.00	86.90910	(81102824)
347810.31	3812343.75	80.71815	(81102824)	347437.09	3812326.00	49.73038	(81102824)
347280.72	3812241.00	63.07313	(81121824)	347124.38	3812156.00	69.05332	(81121824)
347605.03	3812392.50	79.89156	(81102824)	347694.78	3812416.50	82.43983	(81102824)
347784.56	3812440.50	75.06859	(81123024)	347415.00	3812424.75	54.11604	(81102824)
347266.00	3812343.75	52.75986	(81121824)	347117.00	3812262.50	68.35996	(81121824)
347579.25	3812489.25	78.06677	(81102824)	347669.03	3812513.25	77.60870	(81102824)
347758.78	3812537.00	71.03560	(81123024)	347385.09	3812519.00	56.07526	(81102824)
347227.81	3812433.50	46.66384	(81121824)	347070.53	3812348.00	65.30043	(81121824)
346913.25	3812262.25	64.96292	(81122524)	346755.97	3812176.75	63.13485	(81102324)
346627.03	3812059.75	64.17401	(81120924)	347553.50	3812585.75	75.57715	(81102824)
347643.25	3812609.75	72.60713	(81102824)	347733.03	3812633.75	66.93452	(81123024)
347362.72	3812617.50	58.80449	(81102824)	347212.19	3812535.75	43.33515	(81120316)
347061.69	3812453.75	59.39509	(81121824)	346911.19	3812371.75	59.63805	(81121824)
346760.69	3812290.00	61.04976	(81102324)	346562.03	3812137.00	58.18017	(81120924)
346465.75	3811995.25	80.14063	(81120924)	346369.47	3811853.50	68.30914	(81120924)
346273.19	3811711.75	38.57833	(81011324)	347527.72	3812682.50	72.56000	(81102824)
347617.50	3812706.50	67.52472	(81102824)	347707.25	3812730.25	62.86865	(81123024)
348296.06	3810865.75	221.81786	(81121824)	348357.63	3810799.00	242.86774	(81121824)
348419.16	3810732.25	267.08975	(81121824)	348480.72	3810665.75	301.87183	(81060216)
348542.25	3810599.00	362.08951	(81060216)	348603.81	3810532.25	449.23532	(81102824)
348665.38	3810465.50	706.92236	(81123024)	348323.94	3810961.75	187.11827	(81102824)

CONC URBAN FLAT FLGPOL NOCALM

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): MMAX3 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF NOX IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
347626.66	3811654.75	640.82043	(81121818)	347785.38	3811716.25	461.38873	(81121818)
347875.16	3811740.25	521.92236	(81102818)	347964.91	3811764.00	645.94458	(81102818)
347593.97	3811747.75	596.22711	(81121818)	347442.22	3811665.00	598.56372	(81122518)
347759.63	3811812.75	376.81274	(81102818)	347849.38	3811836.75	535.78406	(81102818)
347939.16	3811860.75	622.44568	(81102818)	347573.13	3811847.00	528.73584	(81121818)
347431.22	3811769.75	557.36316	(81122518)	347289.31	3811692.50	562.26923	(81102318)
347733.88	3811909.50	407.02325	(81102818)	347823.63	3811933.50	539.77930	(81102818)
347913.38	3811957.25	592.48383	(81092918)	347541.47	3811940.25	464.70380	(81121818)
347387.72	3811856.75	529.69330	(81121818)	347234.00	3811773.00	536.14594	(81102318)
347708.09	3812006.00	429.22086	(81102818)	347797.88	3812030.00	535.03772	(81102818)
347887.63	3812054.00	558.78259	(81092918)	347520.13	3812039.25	385.14728	(81121818)
347375.28	3811960.50	518.78546	(81121818)	347230.41	3811881.75	510.80511	(81122518)
347682.34	3812102.75	443.84811	(81102818)	347772.09	3812126.75	523.02972	(81102818)
347861.88	3812150.50	530.95117	(81123017)	347489.19	3812133.25	323.14365	(81121818)
347333.97	3812048.75	489.98929	(81121818)	347178.78	3811964.25	490.24728	(81122518)
347656.56	3812199.25	451.08548	(81102818)	347746.34	3812223.25	505.27097	(81102818)
347836.09	3812247.25	509.19681	(81123017)	347467.44	3812232.00	265.32745	(81091418)
347320.28	3812152.00	438.74976	(81121818)	347173.13	3812071.75	451.33664	(81122518)
347630.81	3812296.00	451.74728	(81102818)	347720.56	3812320.00	483.25940	(81092918)
347810.31	3812343.75	484.88135	(81123017)	347437.09	3812326.00	274.82050	(81102818)
347280.72	3812241.00	400.02112	(81121818)	347124.38	3812156.00	437.94858	(81121818)
347605.03	3812392.50	446.53094	(81102818)	347694.78	3812416.50	458.65582	(81092918)
347784.56	3812440.50	458.84491	(81123017)	347415.00	3812424.75	300.88507	(81102818)
347266.00	3812343.75	334.61255	(81121818)	347117.00	3812262.50	433.55115	(81121818)
347579.25	3812489.25	436.43396	(81102818)	347669.03	3812513.25	439.03671	(81123017)
347758.78	3812537.00	431.92548	(81123017)	347385.09	3812519.00	312.93854	(81102818)
347227.81	3812433.50	295.95047	(81121818)	347070.53	3812348.00	414.14706	(81121818)
346913.25	3812262.25	412.00650	(81122518)	346755.97	3812176.75	400.41254	(81102318)
346627.03	3812059.75	299.07773	(81010918)	347553.50	3812585.75	422.35141	(81102818)
347643.25	3812609.75	424.51434	(81123017)	347733.03	3812633.75	404.60831	(81123017)
347362.72	3812617.50	329.33948	(81102818)	347212.19	3812535.75	234.98366	(81121818)
347061.69	3812453.75	376.69434	(81121818)	346911.19	3812371.75	378.23520	(81121818)
346760.69	3812290.00	387.18854	(81102318)	346562.03	3812137.00	277.57477	(81102318)
346465.75	3811995.25	387.58426	(81010918)	346369.47	3811853.50	343.81705	(81010918)
346273.19	3811711.75	244.67067	(81011318)	347527.72	3812682.50	405.50720	(81092918)
347617.50	3812706.50	407.84857	(81123017)	347707.25	3812730.25	377.56326	(81123017)
348296.06	3810865.75	1406.80872	(81121818)	348357.63	3810799.00	1540.31079	(81121818)
348419.16	3810732.25	1693.93127	(81121818)	348480.72	3810665.75	1873.11780	(81121818)
348542.25	3810599.00	2091.43066	(81121818)	348603.81	3810532.25	2369.14600	(81121818)
348665.38	3810465.50	2750.15601	(81121818)	348323.94	3810961.75	1097.93860	(81121818)

CONC URBAN ELEV FLGPOL NOCALM

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): AREA1 , AREA2 , MMAX4 , FDUST ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF PARMAT10 IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
350105.56	3811049.50	73.19915	(81052024)	350196.59	3811075.25	56.25045	(81052024)
349714.28	3811043.25	82.48074	(81110324)	349805.31	3811068.75	56.14944	(81100824)
349896.38	3811094.50	60.13795	(81052024)	349987.41	3811120.25	69.52186	(81052024)
350078.44	3811145.75	71.28237	(81052024)	350169.50	3811171.50	64.83031	(81052024)
349869.25	3811190.75	47.29948	(81100824)	349960.28	3811216.50	49.48959	(81052024)
350051.34	3811242.00	58.05243	(81052024)	350142.38	3811267.75	60.90403	(81052024)
349842.13	3811287.00	44.88306	(81040124)	349933.16	3811312.75	40.89391	(81100824)
350024.22	3811338.25	41.57552	(81052024)	350115.25	3811364.00	49.12851	(81052024)
349997.09	3811434.50	35.94719	(81100824)	350088.16	3811460.25	36.21637	(81100824)
349780.19	3812204.50	37.26223	(81110324)	349871.25	3812230.25	34.03411	(81110324)
349753.09	3812300.75	35.29784	(81110324)	349844.13	3812326.50	33.38798	(81110324)
349543.88	3812345.75	33.04190	(81110324)	349634.91	3812371.50	33.29230	(81110324)
349725.97	3812397.00	33.07277	(81110324)	349817.00	3812422.75	32.11946	(81110324)
349425.72	3812416.50	29.36454	(81110324)	349516.75	3812442.00	30.47916	(81110324)
349607.81	3812467.75	30.79165	(81110324)	349698.84	3812493.25	30.80611	(81110324)
349789.91	3812519.00	30.45559	(81110324)	349307.56	3812487.00	24.70627	(81110324)
349398.59	3812512.75	27.11057	(81110324)	349489.66	3812538.25	28.25809	(81110324)
349580.69	3812564.00	28.55874	(81110324)	349671.75	3812589.50	28.62547	(81110324)
349762.78	3812615.25	28.60136	(81110324)	350400.69	3810881.75	39.55521	(81121524)
350477.63	3810936.75	35.56195	(81121524)	350554.56	3810992.00	32.19162	(81121524)
350631.50	3811047.25	29.33380	(81121524)	350708.44	3811102.25	26.88220	(81121524)
350785.38	3811157.50	24.75102	(81121524)	350862.31	3811212.50	22.91977	(81022424)
350939.25	3811267.75	21.52954	(81022424)	351016.19	3811322.75	20.29826	(81022424)
351093.13	3811378.00	19.18467	(81022424)	351170.06	3811433.00	18.18595	(81022424)
351247.00	3811488.25	17.28269	(81022424)	351323.94	3811543.50	16.46073	(81022424)
350342.44	3810963.00	37.67170	(81040824)	350419.38	3811018.25	33.57656	(81040824)
350496.31	3811073.25	30.02429	(81040824)	350573.25	3811128.50	26.96075	(81040824)
350650.19	3811183.50	24.29241	(81040824)	350727.13	3811238.75	22.49215	(81121524)
350804.06	3811293.75	21.10041	(81121524)	350881.00	3811349.00	19.83674	(81121524)
350957.94	3811404.00	18.69555	(81121524)	351034.88	3811459.25	17.65428	(81121524)
351111.81	3811514.50	16.70120	(81121524)	351188.75	3811569.50	15.83048	(81121524)
351265.69	3811624.75	15.03088	(81121524)	350361.13	3811099.50	37.92879	(81091124)
350438.06	3811154.50	34.07727	(81091124)	350515.00	3811209.75	30.60025	(81091124)
350591.94	3811264.75	27.48832	(81091124)	350668.88	3811320.00	25.12169	(81040824)
350745.81	3811375.00	23.35481	(81040824)	350822.75	3811430.25	21.71552	(81040824)
350899.69	3811485.50	20.20191	(81040824)	350976.63	3811540.50	18.80738	(81040824)
351053.56	3811595.75	17.52861	(81040824)	351130.50	3811650.75	16.35262	(81040824)
351207.44	3811706.00	15.27787	(81040824)	350302.88	3811180.75	44.21440	(81052024)
350379.81	3811235.75	35.64573	(81052024)	350456.75	3811291.00	30.45369	(81091124)
350533.69	3811346.25	28.56319	(81091124)	350610.63	3811401.25	26.65526	(81091124)

CONC URBAN FLAT FLGPOL NOCALM

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): MMAX5 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF CO IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
350687.56	3811456.50	1367.22534	(81010817)	350764.50	3811511.50	1223.98291	(81110617)
350841.44	3811566.75	1221.18518	(81110617)	350918.38	3811621.75	1173.43823	(81110617)
350995.31	3811677.00	1092.06323	(81110617)	351072.25	3811732.00	1011.66119	(81111217)
351149.19	3811787.25	969.51654	(81111217)	350244.63	3811262.00	1787.23413	(81110418)
350321.56	3811317.25	1473.44080	(81110418)	350398.50	3811372.25	1225.33618	(81012818)
350475.44	3811427.50	1140.93750	(81010817)	350552.38	3811482.50	1278.15039	(81010817)
350629.31	3811537.75	1326.03552	(81010817)	350706.25	3811592.75	1283.90076	(81010817)
350783.19	3811648.00	1168.36182	(81010817)	350860.13	3811703.00	1008.04376	(81010817)
350937.06	3811758.25	964.06335	(81110617)	351014.00	3811813.50	967.21027	(81110617)
351090.94	3811868.50	940.93762	(81110617)	350263.31	3811398.50	1570.14453	(81110418)
350340.25	3811453.50	1335.80859	(81110418)	350417.19	3811508.75	1073.09863	(81010117)
350494.13	3811563.75	1014.68610	(81012818)	350571.06	3811619.00	930.33380	(81010817)
350648.00	3811674.00	1046.62744	(81010817)	350724.94	3811729.25	1097.80090	(81010817)
350801.88	3811784.50	1082.31091	(81010817)	350878.81	3811839.50	1011.10028	(81010817)
350955.75	3811894.75	901.01947	(81010817)	351032.69	3811949.75	771.10065	(81010817)
350205.06	3811479.75	1393.22119	(81110418)	350282.00	3811534.75	1394.91003	(81110418)
350358.91	3811590.00	1222.03870	(81110418)	350435.88	3811645.00	934.14532	(81010117)
350512.81	3811700.25	901.52496	(81012818)	350589.75	3811755.50	844.75116	(81012818)
350666.69	3811810.50	777.77820	(81010817)	350743.63	3811865.75	875.82159	(81010817)
350820.56	3811920.75	926.59192	(81010817)	350897.50	3811976.00	927.27893	(81010817)
350974.44	3812031.00	884.30731	(81010817)	350146.81	3811561.00	1342.13550	(81010109)
350223.72	3811616.00	1221.21008	(81110418)	350300.66	3811671.25	1247.92896	(81110418)
350377.63	3811726.50	1123.79114	(81110418)	350454.56	3811781.50	884.05243	(81110418)
350531.50	3811836.75	814.29761	(81010117)	350608.44	3811891.75	777.38092	(81012818)
350685.38	3811947.00	709.33527	(81012818)	350762.31	3812002.00	663.15424	(81010817)
350839.25	3812057.25	746.44739	(81010817)	350916.19	3812112.25	794.72375	(81010817)
350319.38	3811807.75	1122.09973	(81110418)	350396.31	3811862.75	1036.90247	(81110418)
350473.25	3811918.00	848.13971	(81110418)	350550.16	3811973.00	724.62286	(81010117)
350627.13	3812028.25	704.53070	(81010117)	350704.06	3812083.25	671.98431	(81012818)
350781.00	3812138.50	601.87750	(81012818)	350857.94	3812193.75	573.77454	(81010817)
350338.03	3811944.00	1013.17438	(81110418)	350414.97	3811999.25	958.56580	(81110418)
350491.91	3812054.25	810.86859	(81110418)	350568.88	3812109.50	636.31366	(81010117)
350645.81	3812164.75	646.41766	(81010117)	350722.75	3812219.75	620.07166	(81012818)
350799.69	3812275.00	583.78870	(81012818)	350279.78	3812025.50	871.63977	(81010109)
350356.72	3812080.50	918.08612	(81110418)	350433.66	3812135.75	887.49609	(81110418)
350510.63	3812190.75	773.26172	(81110418)	350587.56	3812246.00	609.65509	(81110418)
350664.50	3812301.00	584.34564	(81010117)	350741.41	3812356.25	572.76257	(81010117)
350221.53	3812106.75	909.80627	(81010109)	350298.47	3812161.75	797.10107	(81010109)
350375.41	3812217.00	834.58722	(81110418)	350452.38	3812272.00	822.73932	(81110418)
350529.28	3812327.25	735.63708	(81110418)	350606.22	3812382.25	599.58759	(81110418)

CONC URBAN FLAT FLGPOL NOCALM

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): MMAX5 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF CO IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
350687.56	3811456.50	170.90317	(81010824)	350764.50	3811511.50	152.99786	(81110624)
350841.44	3811566.75	152.64815	(81110624)	350918.38	3811621.75	146.67978	(81110624)
350995.31	3811677.00	136.50790	(81110624)	351072.25	3811732.00	126.90885	(81111224)
351149.19	3811787.25	121.76389	(81111224)	350244.63	3811262.00	243.49524	(81010116)
350321.56	3811317.25	185.08791	(81040116)	350398.50	3811372.25	182.03152	(81040116)
350475.44	3811427.50	168.59827	(81040116)	350552.38	3811482.50	159.76880	(81010824)
350629.31	3811537.75	165.75444	(81010824)	350706.25	3811592.75	160.48759	(81010824)
350783.19	3811648.00	146.04523	(81010824)	350860.13	3811703.00	126.00547	(81010824)
350937.06	3811758.25	120.50792	(81110624)	351014.00	3811813.50	120.90128	(81110624)
351090.94	3811868.50	117.61720	(81110624)	350263.31	3811398.50	205.92622	(81010116)
350340.25	3811453.50	166.97607	(81110424)	350417.19	3811508.75	142.98212	(81040116)
350494.13	3811563.75	137.74451	(81040116)	350571.06	3811619.00	127.30431	(81040116)
350648.00	3811674.00	130.82843	(81010824)	350724.94	3811729.25	137.22511	(81010824)
350801.88	3811784.50	135.28886	(81010824)	350878.81	3811839.50	126.38754	(81010824)
350955.75	3811894.75	112.62743	(81010824)	351032.69	3811949.75	96.38758	(81010824)
350205.06	3811479.75	232.80600	(81010116)	350282.00	3811534.75	178.61185	(81010116)
350358.91	3811590.00	152.75484	(81110424)	350435.88	3811645.00	116.76817	(81010124)
350512.81	3811700.25	112.95525	(81040116)	350589.75	3811755.50	107.74803	(81040116)
350666.69	3811810.50	99.83820	(81040116)	350743.63	3811865.75	109.47770	(81010824)
350820.56	3811920.75	115.82399	(81010824)	350897.50	3811976.00	115.90987	(81010824)
350974.44	3812031.00	110.53841	(81010824)	350146.81	3811561.00	225.99571	(81010116)
350223.72	3811616.00	203.88036	(81010116)	350300.66	3811671.25	158.02663	(81010116)
350377.63	3811726.50	140.47389	(81110424)	350454.56	3811781.50	110.50655	(81110424)
350531.50	3811836.75	101.78720	(81010124)	350608.44	3811891.75	97.18406	(81012824)
350685.38	3811947.00	88.68815	(81012824)	350762.31	3812002.00	82.89428	(81010824)
350839.25	3812057.25	93.30592	(81010824)	350916.19	3812112.25	99.34047	(81010824)
350319.38	3811807.75	142.03850	(81010116)	350396.31	3811862.75	129.61281	(81110424)
350473.25	3811918.00	106.01746	(81110424)	350550.16	3811973.00	90.57786	(81010124)
350627.13	3812028.25	88.06634	(81010124)	350704.06	3812083.25	84.00467	(81012824)
350781.00	3812138.50	75.24727	(81012824)	350857.94	3812193.75	71.72182	(81010824)
350338.03	3811944.00	129.38583	(81010116)	350414.97	3811999.25	119.82072	(81110424)
350491.91	3812054.25	101.35857	(81110424)	350568.88	3812109.50	79.53921	(81010124)
350645.81	3812164.75	80.80221	(81010124)	350722.75	3812219.75	77.51096	(81012824)
350799.69	3812275.00	72.97752	(81012824)	350279.78	3812025.50	148.19556	(81010116)
350356.72	3812080.50	119.10957	(81010116)	350433.66	3812135.75	110.93701	(81110424)
350510.63	3812190.75	96.65771	(81110424)	350587.56	3812246.00	76.20689	(81110424)
350664.50	3812301.00	73.04321	(81010124)	350741.41	3812356.25	71.59532	(81010124)
350221.53	3812106.75	150.49057	(81010116)	350298.47	3812161.75	136.00629	(81010116)
350375.41	3812217.00	110.59169	(81010116)	350452.38	3812272.00	102.84241	(81110424)
350529.28	3812327.25	91.95464	(81110424)	350606.22	3812382.25	74.94845	(81110424)

CONC URBAN FLAT FLGPOL NOCALM

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): MMAX5 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF NOX IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
350687.56	3811456.50	1084.20471	(81010817)	350764.50	3811511.50	970.61389	(81110617)
350841.44	3811566.75	968.39539	(81110617)	350918.38	3811621.75	930.53217	(81110617)
350995.31	3811677.00	866.00214	(81110617)	351072.25	3811732.00	802.24359	(81111217)
351149.19	3811787.25	768.82306	(81111217)	350244.63	3811262.00	1417.27014	(81110418)
350321.56	3811317.25	1168.43311	(81110418)	350398.50	3811372.25	971.68707	(81012818)
350475.44	3811427.50	904.75922	(81010817)	350552.38	3811482.50	1013.56860	(81010817)
350629.31	3811537.75	1051.54138	(81010817)	350706.25	3811592.75	1018.12854	(81010817)
350783.19	3811648.00	926.50665	(81010817)	350860.13	3811703.00	799.37500	(81010817)
350937.06	3811758.25	764.49866	(81110617)	351014.00	3811813.50	766.99414	(81110617)
351090.94	3811868.50	746.16010	(81110617)	350263.31	3811398.50	1245.11877	(81110418)
350340.25	3811453.50	1059.29126	(81110418)	350417.19	3811508.75	850.96326	(81010117)
350494.13	3811563.75	804.64233	(81012818)	350571.06	3811619.00	737.75128	(81010817)
350648.00	3811674.00	829.97168	(81010817)	350724.94	3811729.25	870.55212	(81010817)
350801.88	3811784.50	858.26855	(81010817)	350878.81	3811839.50	801.79877	(81010817)
350955.75	3811894.75	714.50513	(81010817)	351032.69	3811949.75	611.47998	(81010817)
350205.06	3811479.75	1104.81934	(81110418)	350282.00	3811534.75	1106.15857	(81110418)
350358.91	3811590.00	969.07227	(81110418)	350435.88	3811645.00	740.77380	(81010117)
350512.81	3811700.25	714.90594	(81012818)	350589.75	3811755.50	669.88458	(81012818)
350666.69	3811810.50	616.77527	(81010817)	350743.63	3811865.75	694.52332	(81010817)
350820.56	3811920.75	734.78400	(81010817)	350897.50	3811976.00	735.32880	(81010817)
350974.44	3812031.00	701.25244	(81010817)	350146.81	3811561.00	1064.30859	(81010109)
350223.72	3811616.00	968.41510	(81110418)	350300.66	3811671.25	989.60309	(81110418)
350377.63	3811726.50	891.16223	(81110418)	350454.56	3811781.50	701.05029	(81110418)
350531.50	3811836.75	645.73499	(81010117)	350608.44	3811891.75	616.46021	(81012818)
350685.38	3811947.00	562.50031	(81012818)	350762.31	3812002.00	525.87891	(81010817)
350839.25	3812057.25	591.93005	(81010817)	350916.19	3812112.25	630.21301	(81010817)
350319.38	3811807.75	889.82098	(81110418)	350396.31	3811862.75	822.25989	(81110418)
350473.25	3811918.00	672.57166	(81110418)	350550.16	3811973.00	574.62323	(81010117)
350627.13	3812028.25	558.69025	(81010117)	350704.06	3812083.25	532.88110	(81012818)
350781.00	3812138.50	477.28665	(81012818)	350857.94	3812193.75	455.00110	(81010817)
350338.03	3811944.00	803.44354	(81110418)	350414.97	3811999.25	760.13916	(81110418)
350491.91	3812054.25	643.01581	(81110418)	350568.88	3812109.50	504.59442	(81010117)
350645.81	3812164.75	512.60681	(81010117)	350722.75	3812219.75	491.71451	(81012818)
350799.69	3812275.00	462.94229	(81012818)	350279.78	3812025.50	691.20715	(81010109)
350356.72	3812080.50	728.03888	(81110418)	350433.66	3812135.75	703.78113	(81110418)
350510.63	3812190.75	613.19373	(81110418)	350587.56	3812246.00	483.45425	(81110418)
350664.50	3812301.00	463.38394	(81010117)	350741.41	3812356.25	454.19861	(81010117)
350221.53	3812106.75	721.47302	(81010109)	350298.47	3812161.75	632.09821	(81010109)
350375.41	3812217.00	661.82458	(81110418)	350452.38	3812272.00	652.42926	(81110418)
350529.28	3812327.25	583.35748	(81110418)	350606.22	3812382.25	475.47076	(81110418)

CONC URBAN ELEV FLGPOL NOCALM

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): AREA1 , AREA2 , MMAX4 , FDUST ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF PARMAT10 IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
351137.25	3812921.25	16.14313	(81052024)	351221.50	3812967.00	16.34660	(81052024)
351305.72	3813012.50	16.35024	(81052024)	351389.97	3813058.00	16.16867	(81052024)
351474.19	3813103.75	15.81066	(81052024)	351558.44	3813149.25	15.29916	(81052024)
351642.69	3813194.75	14.64612	(81052024)	351726.91	3813240.25	13.88247	(81052024)
351811.16	3813286.00	13.02132	(81052024)	350588.44	3812731.50	13.67566	(81100824)
350668.47	3812781.50	13.54616	(81100824)	350752.72	3812827.00	13.10821	(81100824)
350836.94	3812872.50	12.41710	(81100824)	350921.19	3812918.25	12.30259	(81052024)
351005.44	3812963.75	13.22211	(81052024)	351089.66	3813009.25	13.95037	(81052024)
351173.91	3813054.75	14.47810	(81052024)	351258.13	3813100.50	14.82160	(81052024)
351342.38	3813146.00	14.99209	(81052024)	351426.63	3813191.50	15.00355	(81052024)
351510.88	3813237.25	14.86106	(81052024)	351595.09	3813282.75	14.57701	(81052024)
351679.34	3813328.25	14.16154	(81052024)	351763.56	3813373.75	13.62739	(81052024)
350563.97	3812833.75	12.24389	(81100824)	350705.13	3812915.00	12.59879	(81100824)
350789.38	3812960.50	12.32517	(81100824)	350873.63	3813006.00	11.78564	(81100824)
350957.84	3813051.75	11.08601	(81100824)	351042.09	3813097.25	11.61481	(81052024)
351126.31	3813142.75	12.36989	(81052024)	351210.56	3813188.50	12.95627	(81052024)
351294.81	3813234.00	13.38850	(81052024)	351379.03	3813279.50	13.67218	(81052024)
351463.28	3813325.00	13.81575	(81052024)	351547.50	3813370.75	13.83074	(81052024)
351631.75	3813416.25	13.72072	(81052024)	351716.00	3813461.75	13.49699	(81052024)
350512.84	3812919.50	11.41281	(81091924)	350657.56	3813003.00	11.50303	(81100824)
350741.78	3813048.50	11.71999	(81100824)	350826.03	3813094.00	11.58576	(81100824)
350910.25	3813139.75	11.18084	(81100824)	350994.50	3813185.25	10.60059	(81100824)
351078.75	3813230.75	10.21298	(81052024)	351162.97	3813276.25	10.96671	(81052024)
351247.22	3813322.00	11.58457	(81052024)	351331.47	3813367.50	12.06911	(81052024)
351415.69	3813413.00	12.42342	(81052024)	351499.94	3813458.75	12.65887	(81052024)
351584.16	3813504.25	12.78368	(81052024)	351668.41	3813549.75	12.80352	(81052024)
350461.69	3813005.25	11.78056	(81012824)	350609.97	3813090.75	10.78012	(81091924)
350694.19	3813136.50	10.68447	(81091924)	350778.44	3813182.00	10.90687	(81100824)
350862.69	3813227.50	10.89114	(81100824)	350946.91	3813273.25	10.60623	(81100824)
351031.16	3813318.75	10.13522	(81100824)	351115.41	3813364.25	9.55598	(81100824)
351199.63	3813409.75	9.73474	(81052024)	351283.88	3813455.50	10.35720	(81052024)
351368.13	3813501.00	10.87235	(81052024)	351452.34	3813546.50	11.27095	(81052024)
351536.59	3813592.25	11.56583	(81052024)	351620.84	3813637.75	11.76579	(81052024)
350410.56	3813091.00	11.96780	(81102424)	350562.38	3813178.75	10.56862	(81012824)
350646.63	3813224.50	10.08630	(81091924)	350730.88	3813270.00	10.13109	(81091924)
350815.09	3813315.50	10.15265	(81100824)	350899.34	3813361.00	10.23567	(81100824)
350983.59	3813406.75	10.05719	(81100824)	351067.81	3813452.25	9.68692	(81100824)
351152.06	3813497.75	9.19163	(81100824)	351236.28	3813543.50	8.64065	(81052024)
351320.53	3813589.00	9.26912	(81052024)	351404.78	3813634.50	9.79267	(81052024)
351489.00	3813680.00	10.21904	(81052024)	351573.25	3813725.75	10.55204	(81052024)

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): MMAX4 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF CO IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
351137.25	3812921.25	423.62610	(81010817)	351221.50	3812967.00	373.24118	(81010817)
351305.72	3813012.50	342.15247	(81110617)	351389.97	3813058.00	367.84460	(81110617)
351474.19	3813103.75	384.63330	(81110617)	351558.44	3813149.25	392.42184	(81110617)
351642.69	3813194.75	391.28409	(81110617)	351726.91	3813240.25	381.95496	(81110617)
351811.16	3813286.00	365.64822	(81110617)	350588.44	3812731.50	347.02457	(81012818)
350668.47	3812781.50	341.88116	(81010817)	350752.72	3812827.00	397.03619	(81010817)
350836.94	3812872.50	438.14774	(81010817)	350921.19	3812918.25	461.65338	(81010817)
351005.44	3812963.75	466.31885	(81010817)	351089.66	3813009.25	453.05017	(81010817)
351173.91	3813054.75	424.64697	(81010817)	351258.13	3813100.50	385.15796	(81010817)
351342.38	3813146.00	338.87552	(81010817)	351426.63	3813191.50	315.96207	(81110617)
351510.88	3813237.25	339.52402	(81110617)	351595.09	3813282.75	355.82449	(81110617)
351679.34	3813328.25	364.29514	(81110617)	351763.56	3813373.75	364.96829	(81110617)
350563.97	3812833.75	373.37595	(81012818)	350705.13	3812915.00	291.54099	(81012818)
350789.38	3812960.50	343.49207	(81010817)	350873.63	3813006.00	388.37595	(81010817)
350957.84	3813051.75	419.64648	(81010817)	351042.09	3813097.25	434.91269	(81010817)
351126.31	3813142.75	433.75156	(81010817)	351210.56	3813188.50	417.53217	(81010817)
351294.81	3813234.00	388.95920	(81010817)	351379.03	3813279.50	351.58255	(81010817)
351463.28	3813325.00	309.02472	(81010817)	351547.50	3813370.75	292.92621	(81110617)
351631.75	3813416.25	314.86697	(81110617)	351716.00	3813461.75	330.52850	(81110617)
350512.84	3812919.50	380.39960	(81012818)	350657.56	3813003.00	336.30090	(81012818)
350741.78	3813048.50	290.92624	(81012818)	350826.03	3813094.00	295.19458	(81010817)
350910.25	3813139.75	341.16617	(81010817)	350994.50	3813185.25	377.34412	(81010817)
351078.75	3813230.75	400.51984	(81010817)	351162.97	3813276.25	409.29248	(81010817)
351247.22	3813322.00	403.82745	(81010817)	351331.47	3813367.50	385.78046	(81010817)
351415.69	3813413.00	357.52222	(81010817)	351499.94	3813458.75	322.30270	(81010817)
351584.16	3813504.25	283.12585	(81010817)	351668.41	3813549.75	272.76169	(81110617)
350461.69	3813005.25	370.49197	(81010117)	350609.97	3813090.75	352.05743	(81012818)
350694.19	3813136.50	327.22067	(81012818)	350778.44	3813182.00	288.67938	(81012818)
350862.69	3813227.50	252.34503	(81010817)	350946.91	3813273.25	297.64441	(81010817)
351031.16	3813318.75	336.25220	(81010817)	351115.41	3813364.25	364.87125	(81010817)
351199.63	3813409.75	381.35046	(81010817)	351283.88	3813455.50	384.98792	(81010817)
351368.13	3813501.00	376.41788	(81010817)	351452.34	3813546.50	357.16141	(81010817)
351536.59	3813592.25	329.66708	(81010817)	351620.84	3813637.75	296.51086	(81010817)
350410.56	3813091.00	343.21326	(81010117)	350562.38	3813178.75	342.06357	(81010117)
350646.63	3813224.50	335.93979	(81012818)	350730.88	3813270.00	317.30060	(81012818)
350815.09	3813315.50	285.03610	(81012818)	350899.34	3813361.00	244.31369	(81012818)
350983.59	3813406.75	258.16174	(81010817)	351067.81	3813452.25	297.40900	(81010817)
351152.06	3813497.75	329.31052	(81010817)	351236.28	3813543.50	351.38632	(81010817)
351320.53	3813589.00	362.47391	(81010817)	351404.78	3813634.50	362.21384	(81010817)
351489.00	3813680.00	351.34836	(81010817)	351573.25	3813725.75	331.52121	(81010817)

CONC URBAN FLAT FLGPOL NOCALM

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): MMAX4 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF CO IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
351137.25	3812921.25	52.95326	(81010824)	351221.50	3812967.00	46.65515	(81010824)
351305.72	3813012.50	42.76906	(81110624)	351389.97	3813058.00	45.98058	(81110624)
351474.19	3813103.75	48.07916	(81110624)	351558.44	3813149.25	49.05273	(81110624)
351642.69	3813194.75	48.91051	(81110624)	351726.91	3813240.25	47.74437	(81110624)
351811.16	3813286.00	45.70603	(81110624)	350588.44	3812731.50	43.37958	(81012824)
350668.47	3812781.50	42.73515	(81010824)	350752.72	3812827.00	49.62952	(81010824)
350836.94	3812872.50	54.76847	(81010824)	350921.19	3812918.25	57.70667	(81010824)
351005.44	3812963.75	58.28986	(81010824)	351089.66	3813009.25	56.63127	(81010824)
351173.91	3813054.75	53.08087	(81010824)	351258.13	3813100.50	48.14474	(81010824)
351342.38	3813146.00	42.35944	(81010824)	351426.63	3813191.50	39.49526	(81110624)
351510.88	3813237.25	42.44050	(81110624)	351595.09	3813282.75	44.47806	(81110624)
351679.34	3813328.25	45.53689	(81110624)	351763.56	3813373.75	45.62104	(81110624)
350563.97	3812833.75	46.67206	(81012824)	350705.13	3812915.00	36.44388	(81012824)
350789.38	3812960.50	42.93651	(81010824)	350873.63	3813006.00	48.54699	(81010824)
350957.84	3813051.75	52.45581	(81010824)	351042.09	3813097.25	54.36409	(81010824)
351126.31	3813142.75	54.21894	(81010824)	351210.56	3813188.50	52.19152	(81010824)
351294.81	3813234.00	48.61990	(81010824)	351379.03	3813279.50	43.94782	(81010824)
351463.28	3813325.00	38.62809	(81010824)	351547.50	3813370.75	36.61578	(81110624)
351631.75	3813416.25	39.35837	(81110624)	351716.00	3813461.75	41.31606	(81110624)
350512.84	3812919.50	47.54995	(81012824)	350657.56	3813003.00	42.03761	(81012824)
350741.78	3813048.50	36.36619	(81012824)	350826.03	3813094.00	36.89932	(81010824)
350910.25	3813139.75	42.64577	(81010824)	350994.50	3813185.25	47.16801	(81010824)
351078.75	3813230.75	50.06498	(81010824)	351162.97	3813276.25	51.16156	(81010824)
351247.22	3813322.00	50.47843	(81010824)	351331.47	3813367.50	48.22256	(81010824)
351415.69	3813413.00	44.69028	(81010824)	351499.94	3813458.75	40.28784	(81010824)
351584.16	3813504.25	35.39073	(81010824)	351668.41	3813549.75	34.09521	(81110624)
350461.69	3813005.25	46.31150	(81010124)	350609.97	3813090.75	44.00718	(81012824)
350694.19	3813136.50	40.90258	(81012824)	350778.44	3813182.00	36.08492	(81012824)
350862.69	3813227.50	31.54313	(81010824)	350946.91	3813273.25	37.20555	(81010824)
351031.16	3813318.75	42.03152	(81010824)	351115.41	3813364.25	45.60891	(81010824)
351199.63	3813409.75	47.66881	(81010824)	351283.88	3813455.50	48.12349	(81010824)
351368.13	3813501.00	47.05223	(81010824)	351452.34	3813546.50	44.64518	(81010824)
351536.59	3813592.25	41.20839	(81010824)	351620.84	3813637.75	37.06386	(81010824)
350410.56	3813091.00	42.90166	(81010124)	350562.38	3813178.75	42.75795	(81010124)
350646.63	3813224.50	41.99247	(81012824)	350730.88	3813270.00	39.66257	(81012824)
350815.09	3813315.50	35.62951	(81012824)	350899.34	3813361.00	30.53921	(81012824)
350983.59	3813406.75	32.27022	(81010824)	351067.81	3813452.25	37.17612	(81010824)
351152.06	3813497.75	41.16381	(81010824)	351236.28	3813543.50	43.92329	(81010824)
351320.53	3813589.00	45.30924	(81010824)	351404.78	3813634.50	45.27673	(81010824)
351489.00	3813680.00	43.91854	(81010824)	351573.25	3813725.75	41.44015	(81010824)

CONC URBAN FLAT FLGPOL NOCALM

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): MMAX4 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF NOX IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
351137.25	3812921.25	335.88861	(81010817)	351221.50	3812967.00	295.93896	(81010817)
351305.72	3813012.50	271.28906	(81110617)	351389.97	3813058.00	291.66010	(81110617)
351474.19	3813103.75	304.97165	(81110617)	351558.44	3813149.25	311.14709	(81110617)
351642.69	3813194.75	310.24503	(81110617)	351726.91	3813240.25	302.84802	(81110617)
351811.16	3813286.00	289.91861	(81110617)	350588.44	3812731.50	275.15210	(81012818)
350668.47	3812781.50	271.07394	(81010817)	350752.72	3812827.00	314.80579	(81010817)
350836.94	3812872.50	347.40268	(81010817)	350921.19	3812918.25	366.04007	(81010817)
351005.44	3812963.75	369.73926	(81010817)	351089.66	3813009.25	359.21869	(81010817)
351173.91	3813054.75	336.69806	(81010817)	351258.13	3813100.50	305.38766	(81010817)
351342.38	3813146.00	268.69080	(81010817)	351426.63	3813191.50	250.52296	(81110617)
351510.88	3813237.25	269.20499	(81110617)	351595.09	3813282.75	282.12946	(81110617)
351679.34	3813328.25	288.84573	(81110617)	351763.56	3813373.75	289.37949	(81110617)
350563.97	3812833.75	296.04584	(81012818)	350705.13	3812915.00	231.15974	(81012818)
350789.38	3812960.50	272.35123	(81010817)	350873.63	3813006.00	307.93915	(81010817)
350957.84	3813051.75	332.73325	(81010817)	351042.09	3813097.25	344.83768	(81010817)
351126.31	3813142.75	343.91702	(81010817)	351210.56	3813188.50	331.05682	(81010817)
351294.81	3813234.00	308.40164	(81010817)	351379.03	3813279.50	278.76608	(81010817)
351463.28	3813325.00	245.02242	(81010817)	351547.50	3813370.75	232.25809	(81110617)
351631.75	3813416.25	249.65468	(81110617)	351716.00	3813461.75	262.07254	(81110617)
350512.84	3812919.50	301.61481	(81012818)	350657.56	3813003.00	266.64941	(81012818)
350741.78	3813048.50	230.67233	(81012818)	350826.03	3813094.00	234.05666	(81010817)
350910.25	3813139.75	270.50702	(81010817)	350994.50	3813185.25	299.19214	(81010817)
351078.75	3813230.75	317.56793	(81010817)	351162.97	3813276.25	324.52365	(81010817)
351247.22	3813322.00	320.19052	(81010817)	351331.47	3813367.50	305.88123	(81010817)
351415.69	3813413.00	283.47556	(81010817)	351499.94	3813458.75	255.55038	(81010817)
351584.16	3813504.25	224.48749	(81010817)	351668.41	3813549.75	216.26985	(81110617)
350461.69	3813005.25	293.75916	(81010117)	350609.97	3813090.75	279.14261	(81012818)
350694.19	3813136.50	259.44980	(81012818)	350778.44	3813182.00	228.89082	(81012818)
350862.69	3813227.50	200.08170	(81010817)	350946.91	3813273.25	235.99908	(81010817)
351031.16	3813318.75	266.61081	(81010817)	351115.41	3813364.25	289.30255	(81010817)
351199.63	3813409.75	302.36874	(81010817)	351283.88	3813455.50	305.25284	(81010817)
351368.13	3813501.00	298.45773	(81010817)	351452.34	3813546.50	283.18951	(81010817)
351536.59	3813592.25	261.38953	(81010817)	351620.84	3813637.75	235.10031	(81010817)
350410.56	3813091.00	272.13016	(81010117)	350562.38	3813178.75	271.21857	(81010117)
350646.63	3813224.50	266.36310	(81012818)	350730.88	3813270.00	251.58429	(81012818)
350815.09	3813315.50	226.00211	(81012818)	350899.34	3813361.00	193.71373	(81012818)
350983.59	3813406.75	204.69371	(81010817)	351067.81	3813452.25	235.81244	(81010817)
351152.06	3813497.75	261.10681	(81010817)	351236.28	3813543.50	278.61047	(81010817)
351320.53	3813589.00	287.40170	(81010817)	351404.78	3813634.50	287.19550	(81010817)
351489.00	3813680.00	278.58038	(81010817)	351573.25	3813725.75	262.85965	(81010817)

Assessment of the Contribution of Local Emissions versus Transport to Ozone and Particulate Matter Air Quality in the Santa Clarita Valley

February 22, 2007 Staff Report

Final Report

Assessment of the Contributions of Local Emissions Versus Transport to Ozone and Particulate Matter (PM) Air Quality in the Santa Clarita Valley Area

Prepared for

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Novato, CA 94945

July 19, 2004

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Figure 1-5. Cities, terrain heights and 5-km grid cell definitions in the subregion of the ozone/PM modeling domains that includes Santa Clarita and definition of the 25 5-km grid cells (red box) proposed to be used to represent the Santa Clarita Valley area. 1-9

EXECUTIVE SUMMARY

ENVIRON International Corporation has evaluated whether significant amounts of ozone and particulate matter (PM) in the Santa Clarita Valley area (SC Valley) result from local emissions. For that evaluation, ENVIRON compared the ozone and PM pollution levels in the SC Valley with and without local SC Valley development, traffic or industrial emissions. ENVIRON's study shows that the great majority of ozone and PM pollution results from emissions from outside the SC Valley.

SCAQMD Santa Clarita Transport Study

The South Coast Air Quality Management District (SCAQMD) is also performing a study on the role of "transport" on air quality in the Valley ("SCAQMD Study"). Transport refers to pollution in the SC Valley that comes from outside SC Valley (e.g., the greater Los Angeles area). Preliminary results were presented in late June by SCAQMD staff.

The SCAQMD Study addresses the contributions of local emissions in the Valley on 1-hour ozone and PM_{10} concentrations. To assess the contributions of local emissions, the SCAQMD ran air quality models for ozone and PM with and without local man-made emissions. Preliminary results from the SCAQMD Study, presented in late June 2004, found that pollution from the San Fernando Valley and Los Angeles dominates local air quality in SC Valley and that local emissions contribute only about 2% to the local ozone levels. It also found that, even assuming full development in the Valley, the estimated maximum increase in annual PM_{10} concentrations would be 5 ug/m^3, or about 10% of the annual state limit for PM_{10}. PM_{10} consists of PM with a geometric mean diameter of 10 microns or less as compared to fine particulate, or $PM_{2.5}$, that includes PM with a mean diameter of 2.5 microns or less.

ENVIRON Santa Clarita Valley Study

ENVIRON conducted two analyses: one similar to the SCAQMD Study where emissions from the center of the SC Valley (where most emissions are located) were evaluated, and one where emissions from a larger area that incorporated the entire SC Valley were considered. The areas that comprise the smaller and larger definitions of the SC Valley are shown in Figures ES-1 and ES-2.

The SCAQMD and ENVIRON Santa Clarita Valley Studies both used similar air quality planning models to estimate the contribution of local emissions to local air quality in the SC Valley. The report contains a full explanation of the model used by ENVIRON.

Ozone Modeling Analysis

Ozone is formed in the atmosphere through a set of complex chemical reactions involving oxides of nitrogen (NO_x) and Volatile Organic Compounds (VOC) in the presence of sunlight. Sources of NO_x and VOC include mobile sources, other combustion sources, consumer products, solvents, and biogenics.

Looking at the smaller area approximating the center of the SC Valley, local emissions contribute from 1-3% of the estimated peak 1-hour ozone for the current year. For the future year case, local emissions contribute between 0.4% and 5% to the peak 1-hour ozone concentrations in the SC Valley. Looking at the larger SC Valley area, local pollution contributed 0.6% to 9% of the total ozone. These percentages are slightly higher than for the SC Valley center area because the emissions have a longer range to travel (and transform into ozone) in the larger SC Valley area than in the center or smaller SC Valley area.

Looking at the smaller center SC Valley area, local SC Valley emissions are estimated to range from having nearly no effect to contributing up to 2% of the peak 8-hour ozone levels in the Valley. Looking at future emissions in the center SC Valley area, local emissions contribute from between 0.1% and 1.7% of the total 8-hour ozone levels. When the larger definition of the SC Valley is used, local emissions are estimated to contribute between 0.7% and 6.1% using current emissions and 0.6% to 7.7% using future emissions.

In conclusion, a vast majority (> 90%) of the peak 1-hour and 8-hour ozone concentrations in the SC Valley are due to emissions from outside of the SC Valley. These results are consistent with the SCAQMD Santa Clarita Transport Study that has reported, "Santa Clarita emissions contribute about 2% to the local ozone impact" (Cassmassi, 2004).

PM Modeling Analysis

PM consists of primary emitted PM from sources such as road dust, agricultural dust, mining, combustion and other sources and secondary PM that is formed in the atmosphere from SO_2, NO_x and VOC emissions.

To assess the contributions of local SC Valley emissions to PM_{10} and $PM_{2.5}$ air quality in the SC Valley, ENVIRON used models and data that are similar to those used by the SCAQMD for air quality planning purposes.

Looking at the area approximating the center of the SC Valley, local emissions contribute approximately 15% and 16% to the maximum annual average PM_{10} and $PM_{2.5}$ concentrations in the SC Valley, respectively. Looking at the larger SC Valley area, the contribution of local emissions to the annual average PM_{10} and $PM_{2.5}$ concentrations in the SC Valley are approximately 16% and 19%, respectively.

The contributions of local emissions to the four highest 24-hour PM_{10} concentrations in the smaller central SC Valley area range from 5% to 14%. Local SC Valley emissions have a lower contribution to the four highest 24-hour $PM_{2.5}$ concentrations in this smaller SC Valley area, with local contributions ranging from 2% to 7%. Local emissions have a lower relative contribution to local $PM_{2.5}$ levels than to local PM_{10} concentrations because PM_{10} deposits out faster than $PM_{2.5}$. When the larger SC Valley area is studied, the contribution of local sources is even lower than for the smaller, central SC Valley area.

Summary

In summary, the ENVIRON study demonstrates that the impact of SC Valley emissions sources on SC Valley ozone and PM air quality is small. The great majority of ozone and PM pollution in the SC Valley is created by sources of emissions outside the SC Valley.

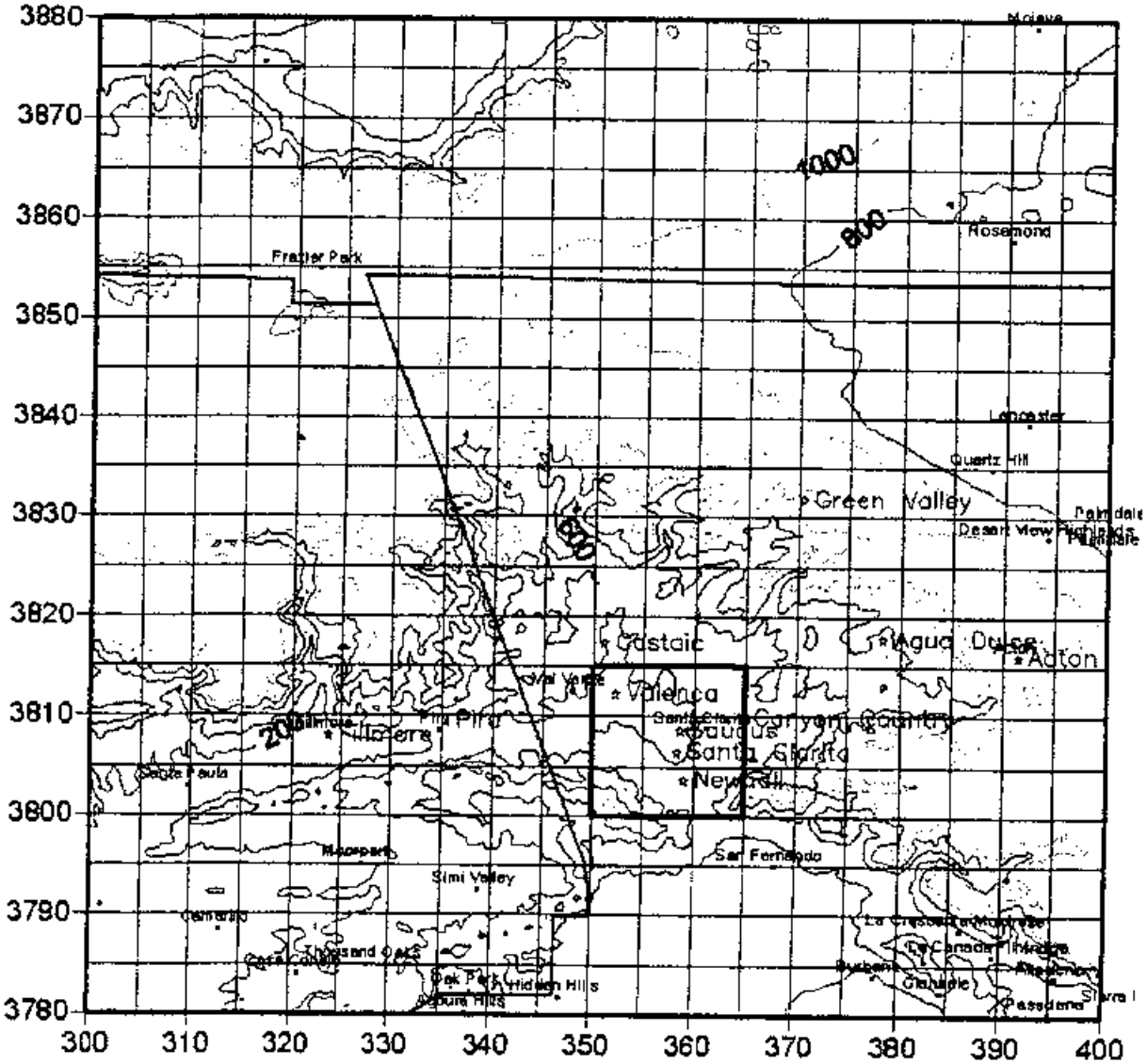

Figure ES-1. Cities, terrain heights and 5-km grid cell boundaries and the smaller (nine 5-km grid cells-red box) definition of the Santa Clarita Valley.

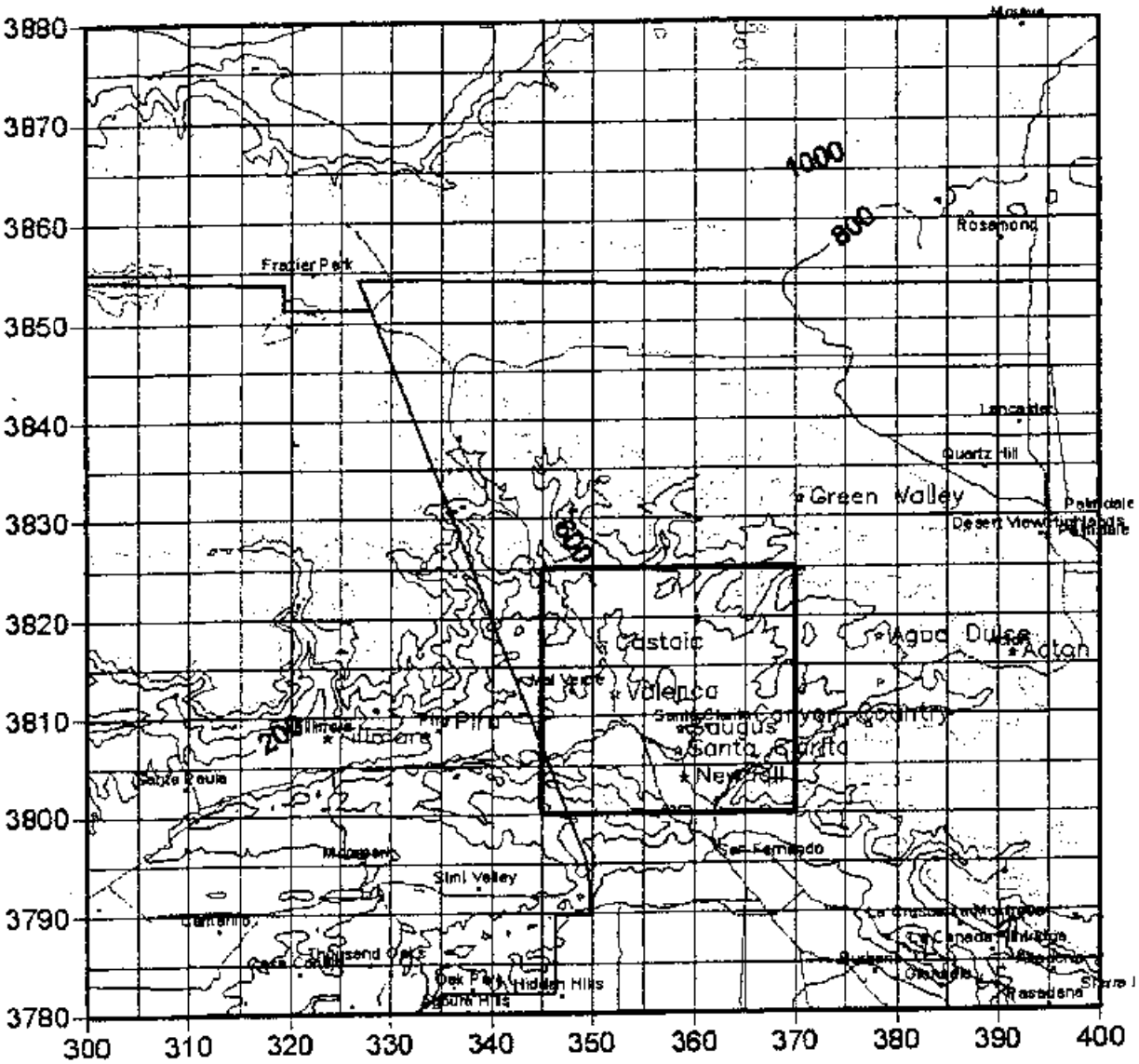

Figure ES-2. Cities, terrain heights and 5-km grid cell boundaries and the larger (25 - 5-km grid cells-red box) definition of the Santa Clarita Valley.

1.0 INTRODUCTION

ENVIRON International Corporation has been retained to evaluate whether significant amounts of ozone and particulate matter (PM) in the Santa Clarita Valley area are due to local emissions. In particular, ENVIRON has been asked to compare the ozone and PM pollution levels in the Santa Clarita Valley area with and without anthropogenic emissions in the Santa Clarita Valley area. The analysis needs to address the contribution of local emissions in the Santa Clarita Valley on both 1-hour and 8-hour ozone concentrations as well as on both 24-hour and annual $PM_{2.5}$ and PM_{10} concentrations. PM_{10} consists of PM with a geometric mean diameter of 10 microns or less as compared to fine particulate or $PM_{2.5}$ that includes PM with a mean diameter of 2.5 microns or less.

SCAQMD Santa Clarita Transport Study

ENVIRON has discussed this issue with the South Coast Air Quality Management District (SCAQMD) staff members, who have informed us that the SCAQMD is just completing a study on the role of "transport" on air quality in the Santa Clarita area (SCAQMD Santa Clarita Transport Study) (J. Cassmassi, 2004, personal communication). Transport is defined as the level of air pollutants in Santa Clarita due to sources from outside of Santa Clarita. A summary of the results of the SCAQMD Transport Study was presented to the SCAQMD Mobile Source Committee public meeting on June 25, 2004 (Cassmassi, 2004). The SCAQMD Santa Clarita Transport Study report is expected to be completed by the end of summer (Cassmassi, 2004). The SCAQMD Santa Clarita Transport Study performed ozone, PM and diesel air toxics risk modeling to assess the contributions of local emissions from the City of Santa Clarita versus transported emissions from outside of Santa Clarita on ozone and PM concentrations and risk due to diesel particles in the Santa Clarita area.

According to the June 25, 2004 presentation to the Mobile Source Committee, the SCAQMD Santa Clarita Transport Study had the following objectives (Cassmassi, 2004):

- Characterize and evaluate observed ozone and particulate air quality: (1) trends; (2) impact of local emissions; and (3) weekend effects.
- Evaluate the impact of potential growth on air quality through simulation of doubled mobile source emissions and simulating a 25-year valley build-out.
- Evaluate the impact of CEMEX mining operations.
- Provide potential mitigation measures.

To achieve these objectives the SCAQMD performed the following model sensitivity analysis to address ozone, PM_{10} and diesel risk:

- Ozone
  - Modeling and trend analysis
  - Zero and doubled emissions in Santa Clarita
  - Zero emissions in Santa Barbara and Ventura
  - Weekend emissions
- PM_{10}
  - Zero emissions in Santa Clarita

  - 25-year construction build-out
  - CEMEX mine operations
- Additional Risk From Diesel Particulates
  - Baseline MATES-II average risk
  - CEMEX mine operations
  - Heavy duty diesel truck gravel hauling

Based on the presentation to the SCAQMD Mobile Source Committee, the following were some of the key findings from the SCAQMD Santa Clarita Transport Study (Cassmassi, 2004):

Ozone

- Transport from San Fernando Valley and L.A. dominates local air quality in Santa Clarita
- Santa Clarita emissions contribute about 2% to local ozone impact
- Weekend ozone concentrations under average transport are ~23% higher than on weekdays

PM_{10}

- Santa Clarita meets federal standard but exceeds the more restrictive California standard
- Assumed simultaneous 25-year build-out in city and county portions of valley
- Annual impact up to 5 ug/m^3 due to build-out
- Maximum impact near Newhall Ranch due to build-out.

Diesel Particulate Risk

- Santa Clarita background average risk of 500 in one million (MATES II study)
- Average Basin risk 1400 in one million

The SCAQMD used ozone and PM models for both a Base Case (i.e., all emissions in the South Coast Air Basin) and for a "Santa Clarita Zero-Out Case" (i.e., the elimination of all anthropogenic emissions in the City of Santa Clarita). The difference in the Base Case and Santa Clarita Zero-Out Case provides an estimate of the contributions of local emissions to air quality, with the remainder contribution due to transport. The SCAQMD Santa Clarita Transport Study also enhanced emissions in the Santa Clarita area (i.e., doubled mobile source emissions for ozone and 25-year maximum build-out for PM_{10}) to examine the effects that increases in these emissions in Santa Clarita would have on air quality in Santa Clarita.

The SCAQMD "Santa Clarita Zero-Out Case" eliminated all anthropogenic emissions in the City of Santa Clarita. For this purpose, the SCAQMD reportedly defined the City of Santa Clarita area as an area comprised of 9 5-km grid cells that cover the City of Santa Clarita and geographically adjacent area (J. Cassmassi, 2004, personal communication).

ENVIRON Santa Clarita Valley Transport Study

ENVIRON has undertaken a Santa Clarita Valley Transport Study to assess the contributions of local emissions versus transport to ozone and PM concentrations in the Santa Clarita Valley area. In addition to trying to analyze the effects of local emissions on local air quality in Santa Clarita, as was done in the SCAQMD Santa Clarita Transport Study, the ENVIRON Santa Clarita Valley

Transport Study has expanded the study concept to a larger area that encompasses more of the geographical Santa Clarita Valley area and addresses both 1-hour and 8-hour ozone as well as both coarse (PM_{10}) and fine ($PM_{2.5}$) particulates. Thus, ENVIRON identified two geographical areas in the Santa Clarita Valley area where anthropogenic emissions were eliminated to examine the contributions from local emissions versus transport to air quality in the Santa Clarita Valley area: (1) a 9-grid cell area at 5-km resolution (i.e., 225 km^2 or 87 mi^2) encompassing the City of Santa Clarita and geographical nearby areas that is ENVIRON's best estimate of the 9-grid cell area reportedly used by the SCAQMD in the SCAQMD Santa Clarita Transport Study (J. Cassmassi, 2004, personal communication); and (2) an expanded area that encompasses a 25-grid cell area at 5-km resolution (i.e., 625 km^2 or 241 mi^2) that includes Cities of Santa Clarita, Newhall, Saugus, Valencia, Castaic, Val Verde and adjacent areas.

Definition of the Modeling Analysis

ENVIRON has performed ozone and PM modeling for a Base Case and Santa Clarita Valley Area Zero-Out Case to estimate the contributions of local emissions to 1-hour and 8-hour ozone and 24-hour and annual PM_{10} and $PM_{2.5}$ air quality in the Santa Clarita Valley area.

Ozone Modeling

For the ozone modeling, ENVIRON used the 2003 Air Quality Management Plan (AQMP) August 3-7, 1997 Southern California Ozone Study (SCOS) ozone modeling database (SCAQMD, 2003). This database is for the Urban Airshed Model (UAM) (Morris and Meyers, 1990) and covers southwestern California from San Diego in the south to San Luis Obispo in the north and the Pacific Ocean in the west to approximately the California/Arizona border in the east using a 110 by 74 5-km grid cell resolution (see "SCOS" domain in Figure 1-1). The effects of Santa Clarita Valley area emissions versus pollutant transport from upwind areas on local air quality was assessed for the current episode year (1997) and a future year (2007). The Santa Clarita Valley area violated the Federal 1-hour and 8-hour ozone standards in 1997. In 2007, the Santa Clarita Valley area is projected to attain the 1-hour ozone standard, but violate the 8-hour ozone standard. By examining both the 1997 episode year and 2007 1-hour attainment year we will be able to bound the contributions of local emissions versus transport on ozone air quality in the Santa Clarita Valley area for the years in between (1997-2007).

PM Modeling

To assess the contributions of local emissions to PM air quality in the Santa Clarita Valley area ENVIRON used an annual PM modeling database for a 1997/1998 annual period (April 1998-March 1998). This modeling period was used in the SCAQMD's Multiple Air Toxics Exposure Study and (MATES-II) (SCAQMD, 2000) and the Department of Energy (DOE) National Renewable Energy Laboratory (NREL) Biodiesel assessment study (Morris and Jia, 2002) to simulate air toxics and PM, respectively. The PM modeling was performed on a 65 by 40 5-km grid (see "AQMP" domain in Figure 1-1). Emissions in this PM modeling database are available for just the for the 1997/1998 year so the PM modeling analysis was performed for the episode (1997/1998) year.

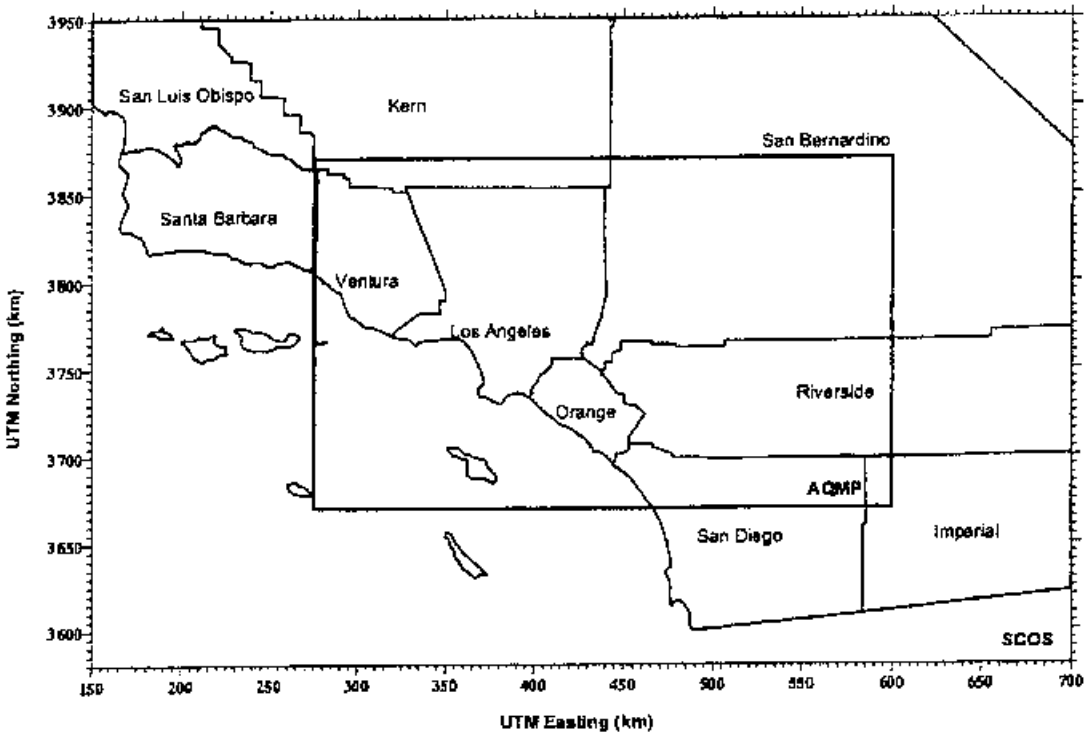

Figure 1-1. Definition of the 110 x 74 5-km SCOS and 65 x 40 5-km AQMP domains used in the ozone and PM modeling, respectively.

Definition of Santa Clarita Valley Area

For the Santa Clarita Valley Zero-Out Cases, the definition of the Santa Clarita Valley area where anthropogenic emissions will be eliminated must be defined. Two definitions were used in this modeling.

As discussed above, in the SCAQMD transport study the SCAAQMD reportedly used nine (3 x 3) 5-km grid cells (225 km^2 or 87 mi^2) to represent the Santa Clarita Valley area (J. Cassmassi, 2004, personal communication), thus ENVIRON has also used nine 5-km grid cells for its study to attempt to replicate the assumptions used in the SCAQMD Santa Clarita Transport Study as closely as possible. This area captures the majority of the ozone and PM precursor emissions in the Santa Clarita Valley area. Figure 1-2 displays a portion of the ozone/PM modeling domain that includes northern Los Angeles County focusing on the Santa Clarita Valley area. The 9 5-km grid cell area is centered on the City of Santa Clarita and is represented by the red box in Figure 1-2. This nine cell definition of the Santa Clarita Valley area for the zero-out run includes communities within and directly outside of the city of Santa Clarita, Newhall, Saugus, Valencia and Canyon County -- but not the communities of Castaic and Val Verde or Piru and Fillmore to the west in Ventura County, Agua Dulce and Acton to the east, Lebec and Gorman to the north, or Sylmar/San Fernando to the south that are further away from the City of Santa Clarita.

Figures 1-3 and 1-4 display the daily average VOC and NO_x emissions for the same subdomain as depicted in Figure 1-2, with the nine grid cells that are used to represent the Santa Clarita Valley area indicated by the red box. Although there are areas with higher emissions to the south

in the San Fernando Valley that are outside the Santa Clarita Valley, these nine grid cells appear to encompass the highest emitting grid cells within the Santa Clarita Valley area.

For the 25 (5 x 5) grid cell definition of the Santa Clarita Valley area, the 9 grid cell area was expanded to the west, north and east by two 5-km grid cells as shown in Figure 1-5; the area was not expanded to the south into the San Fernando Valley. The 25 grid cell definition of the Santa Clarita Valley area includes the 9 grid cell area discussed previously, as well as the cities of Castaic and Val Verde and unincorporated areas.

Note that after the ENVIRON ozone and PM modeling was completed, the SCAQMD released a presentation on their Santa Clarita Transport Study that indicated their Santa Clarita Zero-Out runs eliminated anthropogenic emissions in 10 5-km grid cells (Cassmassi, 2004), not 9-grid cells as originally reported (J. Cassmassi, 2004, personal communication). The SCAQMD's 10-grid cells were completely contained with the ENVIRON study enhanced 25-grid cell definition of the Santa Clarita Valley area.

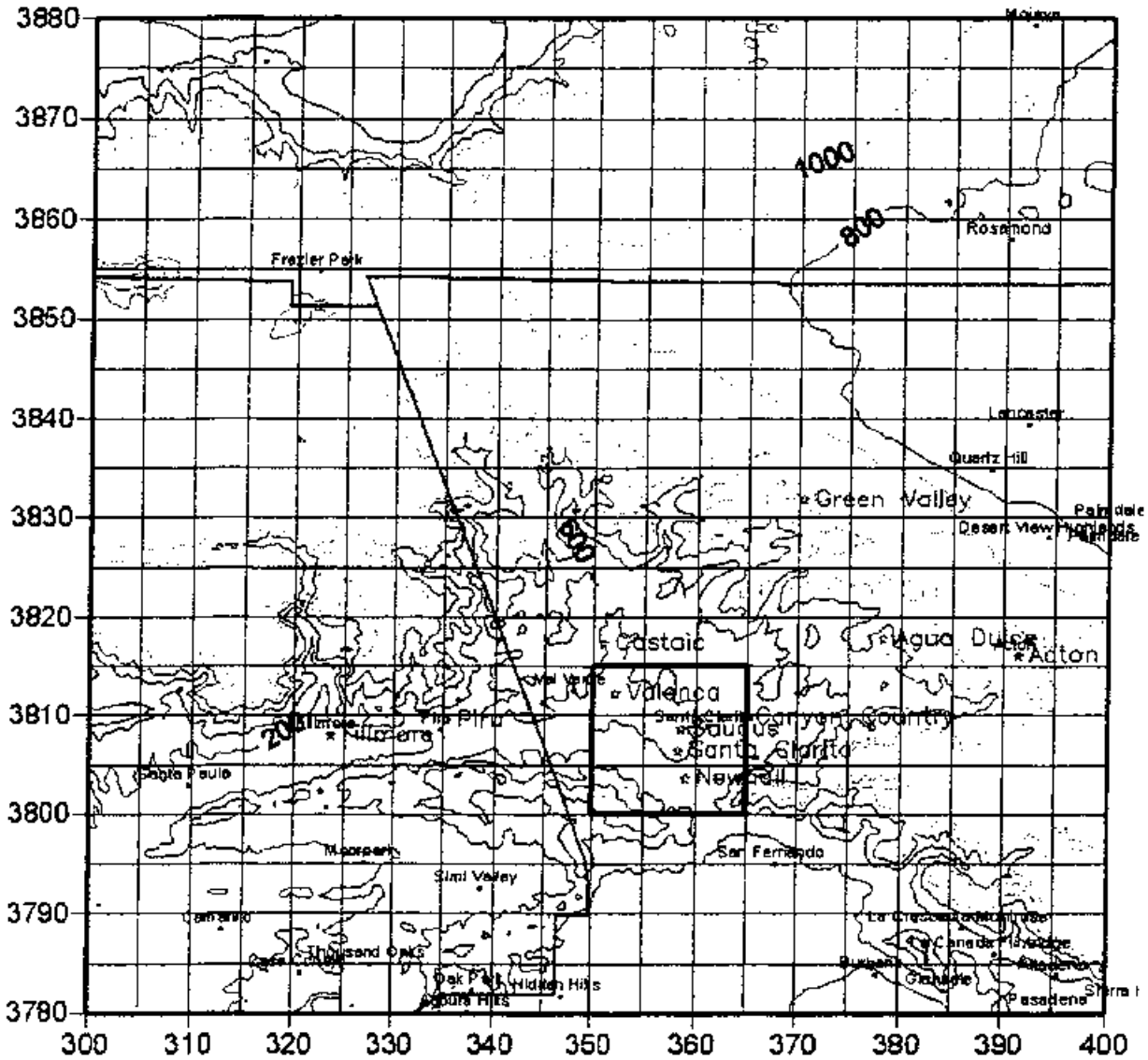

Figure 1-2. Cities, terrain heights and 5-km grid cell definitions in the subregion of the ozone/PM modeling domains that includes Santa Clarita and definition of the 9 5-km grid cells (red box) proposed to be used to represent the Santa Clarita Valley area.

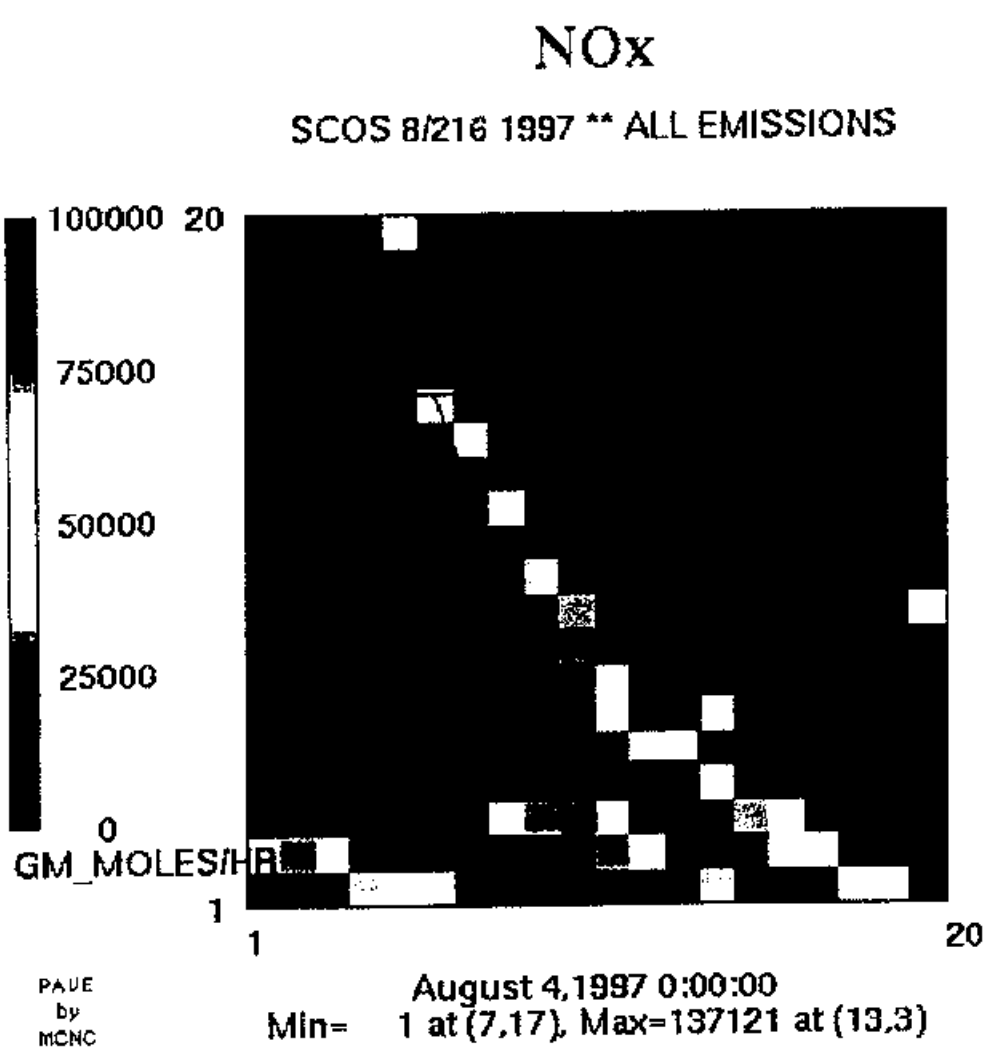

Figure 1-3. Spatial distribution of NO_x emissions in the Santa Clarita Valley area and definition of the 9 5-km grid cells used to represent the Santa Clarita Valley area.

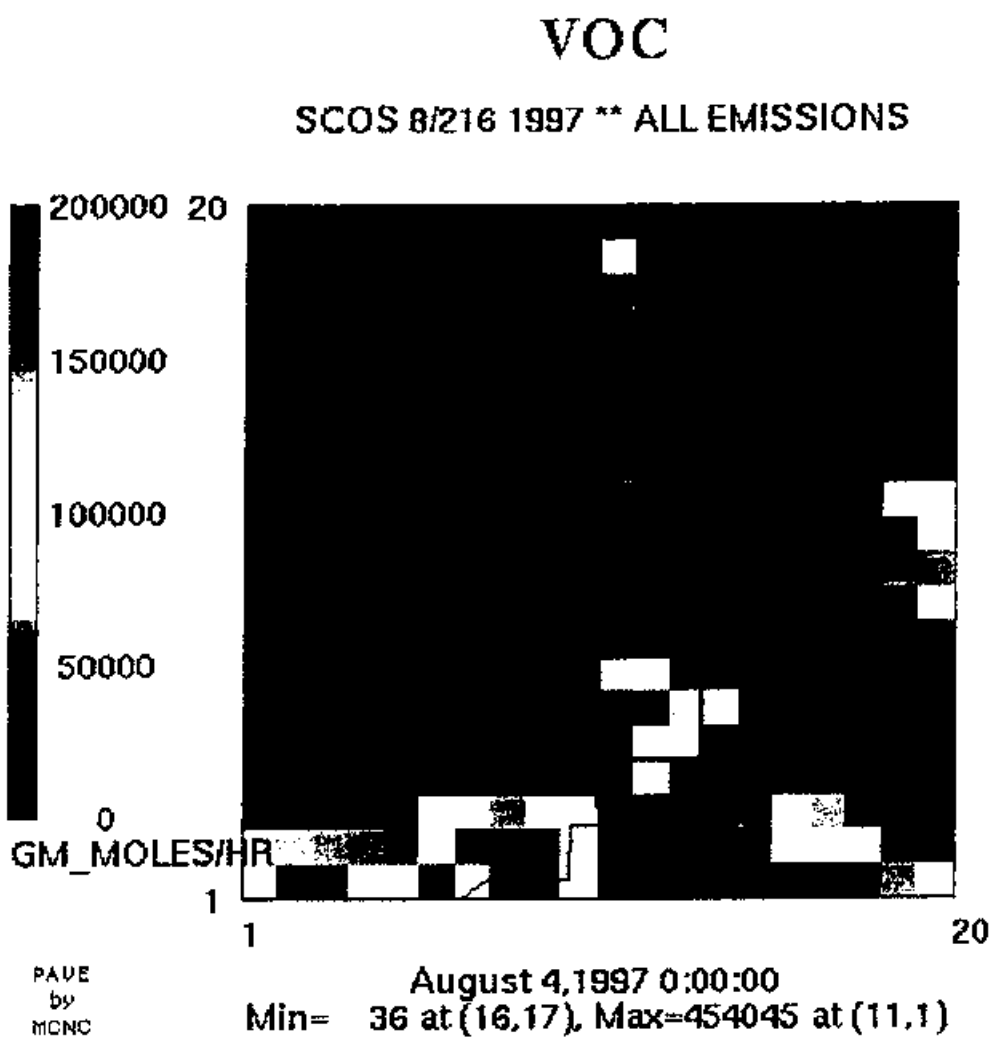

Figure 1-4. Spatial distribution of VOC emissions in the Santa Clarita Valley area and definition of the 9 5-km grid cells used to represent the Santa Clarita Valley area.

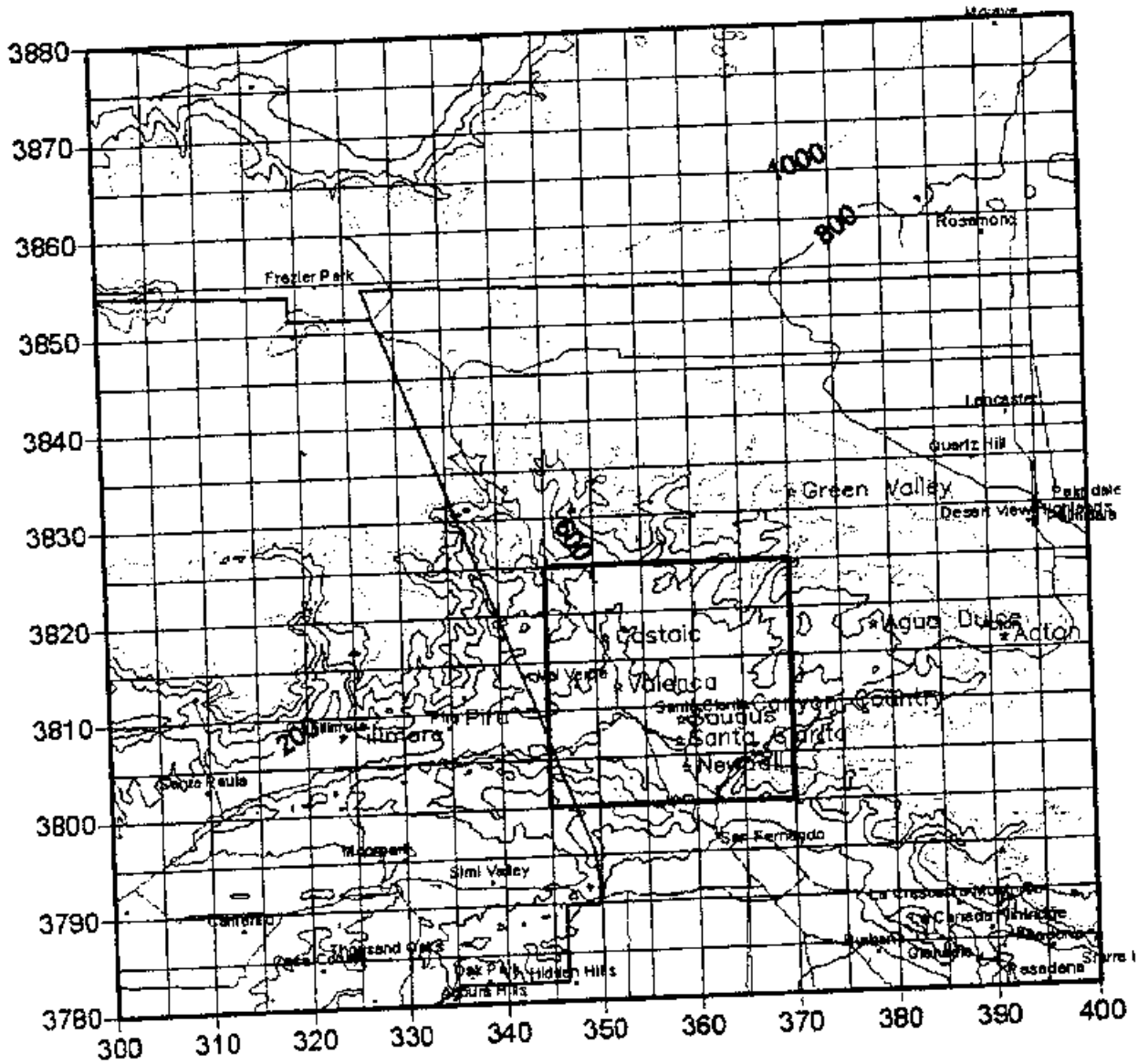

Figure 1-5. Cities, terrain heights and 5-km grid cell definitions in the subregion of the ozone/PM modeling domains that includes Santa Clarita and definition of the 25 5-km grid cells (red box) proposed to be used to represent the Santa Clarita Valley area.

Use of Photochemical Grid Models for Air Quality Planning

The ENVIRON Santa Clarita Valley and SCAQMD Santa Clarita Transport Studies both used Photochemical Grid Models (PGMs) (e.g., UAM and CAMx) to assess the contributions of local emissions on air quality in the Santa Clarita area. PGMs simulate the three-dimensional evolution of air quality within a modeling domain (e.g., Figure 1-1) solving numerical equations representing transport, diffusion, chemical transformation and deposition. The main inputs for a PGM consist of meteorology, emissions and boundary conditions (i.e., assumed concentrations entering the modeling domain). The steps in a PGM application typically consist of the following:

1. Selection of historical episode to be simulated.
2. Development of meteorological, emissions and boundary condition inputs for the historical episode.
3. Simulation of the episode year Base Case emissions scenario using the historical episode.
4. Comparison of the model estimated episode year Base Case concentration estimates against concurrent measured values in a model performance evaluation (MPE).
5. Assessment of whether model is replicating the observed concentrations well enough to proceed including comparison with EPA's model performance goals such as those for ozone (EPA, 1991; 1998) and PM (EPA, 2001). Make improvements to model inputs to improve model performance as necessary.
6. Develop new emission scenarios to assess air quality under different scenarios to answer specific questions, such as estimated air quality under future-year emission conditions or what would have air quality been like if specific emissions were eliminated.

Both the SCAQMD and ENVIRON transport studies used existing PGM databases that have already undergone steps 1 – 5 above, so just performed step 6. More specifically, the base case modeling and model performance evaluation for the ENVIRON Santa Clarita Valley Transport Study ozone and PM modeling can be found in reports by SCAQMD (2003) and Morris and Jia (2002), respectively.

2.0 OZONE MODELING RESULTS

To assess the effects of local emissions versus transport on 1-hour and 8-hour ozone concentrations in the Santa Clarita Valley area, the SCAQMD's August 3-7, 1997 Urban Airshed Model (UAM) database from the 2003 AQMP was used (SCAQMD, 2003). This is the same database reportedly used by the SCAQMD in their Santa Clarita Transport Study (J. Cassmassi, 2004, personal communication). The UAM is a three-dimensional photochemical grid model that simulates ozone formation using gridded emissions and meteorological inputs (Morris and Myers, 1990). Ozone is formed in the atmosphere through a complex set of nonlinear reactions involving oxides of nitrogen (NO_x) and Volatile Organic Compounds (VOC) (as well as Carbon Monoxide (CO) to a lesser extent) in the presence of sunlight.

EMISSIONS SCENARIOS ANALYZED

As noted in Section 1, three separate emission scenarios were analyzed for the 1997 and 2007 years:

- Base Case emissions scenario that represented actual emissions in 1997 and the 2003 AQMP control plan emissions in 2007;
- Santa Clarita Valley area 9-Grid Cell Zero-Out Case (designed to be similar to the area used in the SCAQMD Santa Clarita Transport Study); and
- Santa Clarita Valley area 25-Grid Cell Zero-Out Case (expanded definition of Santa Clarita Valley area).

Table 2-1 lists the total anthropogenic NO_x, VOC and CO emissions in the "SCOS" South Coast Air Basin domain (see Figure 1-1) for the three emission scenarios and two years analyzed. Anthropogenic NO_x, VOC and CO emissions in the 9-grid cell definition of the Santa Clarita Valley area represent 0.4% to 0.8% of the total emissions within the SCOS modeling domain. The 25-grid cell definition of the Santa Clarita Valley area contains 0.5% to 1.2% of the total emissions in the SCOS modeling domain.

There are substantial reductions in emissions in the SCOS modeling domain from the 1997 Base Case to the 2007 Base Case (i.e., 2003 AQMP Control Plan) with reductions in NO_x, VOC and CO emissions of approximately 30%, 40% and 60%, respectively. Emissions in the Santa Clarita Valley area contribute approximately 0.1% more to the total SCOS domain emissions in the 2007 Base Case emission scenario than in the 1997 Base Case.

Table 2-1. Summary of NO_x, VOC and CO anthropogenic emissions (tons per day, TPD) for the South Coast Air Basin "SCOS" domain (see Figure 1-1) for the 1997 and 2007 Base Case and 9-cell and 25-cell Santa Clarita Valley area Zero-Out Cases.

Scenario Species	Base Case (TPD)	9-Grid Cell SCV Area Emiss (TPD)	Diff (TPD)	%Diff (%)	25-Grid Cell SCV Area Emiss (TPD)	Diff (TPD)	%Diff (%)
1997 Emission Scenarios							
NOx	2318.4	2301.6	-16.8	-0.7%	2292.1	-26.3	-1.1%
VOC	2674.8	2665.4	-9.4	-0.4%	2661.2	-13.7	-0.5%
CO	19837.1	19762.9	-74.2	-0.4%	19722.5	-114.7	-0.6%
2007 Emission Scenarios							
NOx	1608.9	1596.74	-12.2	-0.8%	1589.68	-19.2	-1.2%
VOC	1543.6	1537.2	-6.4	-0.4%	1534.6	-9.0	-0.6%
CO	7407.1	7367.7	-39.4	-0.5%	7344.84	-62.2	-0.8%

OZONE MODELING RESULTS

Ozone modeling results are presented for both 1-hour and 8-hour ozone concentrations. The EPA has a Federal 1-hour ozone standard with a threshold of 0.12 ppm (120 ppb) that can be exceeded at a specific monitor no more than three days in three consecutive years. The Clean Air Act Amendments (CAAA) require that regions attain the Federal 1-hour ozone standard by specific years that are based on their attainment classification; the Federal 1-hour ozone attainment date for the South Coast Air Basin that includes the Santa Clarita Valley is 2010. The State of California has a 1-hour ozone standard with a threshold of 0.09 ppm (90 ppb). Regions in California must demonstrate progress toward achieving the California 1-hour ozone standard. There is also a new Federal 8-hour ozone standard with a threshold of 0.08 ppm (80 ppb) that is based on the three-year average of the fourth highest daily maximum 8-hour ozone concentration in three consecutive years. The State of California is considering the adoption of an 8-hour ozone standard with a threshold of 0.07 ppm (70 ppb).

The effects of the Santa Clarita Valley area Zero-Out Cases on 1-hour and 8-hour ozone concentrations using the August 1997 episode was examined using two definitions of the Santa Clarita Valley area:

- A 9-grid cell definition (3 x 3 5-km grid cells) of the Santa Clarita Valley area as shown by the red box in Figure 1-2; and
- A 25-grid cell definition (5 x 5 5-km grid cells) of the Santa Clarita Valley area as shown by the red box in Figure 1-5.

1-Hour Ozone Modeling Results

Table 2-2 and 2-3 display the peak 1-hour ozone concentrations for the 1997 and 2007 emissions scenarios, respectively, using the 9-grid cell and 25-grid cell definitions of the Santa Clarita Valley area. Spatial maps of daily maximum 1-hour ozone estimates for the northern South Coast Air Basin subdomain, the three emissions scenarios and the1997 and 2007 years are given in Appendices A and B, respectively.

An examination of the spatial maps of daily maximum 1-hour ozone concentrations for the Base Case and two Santa Clarita Valley Zero-Out cases and the 1997 (Appendix A) and 2007 (Appendix B) years reveals that emissions in the Santa Clarita Valley area have little effect on the maximum 1-hour ozone concentrations in the Santa Clarita Valley area. For the 1997 emission scenarios, the complete elimination of all anthropogenic emissions in the 9-grid cell definition of the Santa Clarita Valley area reduces the estimated peak 1-hour ozone concentration in the northern South Coast Air Basin subdomain by 0.1 ppb, 0.5 ppb, and 2.0 ppb (i.e., 0.1%, 0.2% and 1.1%) on, respectively, August 5, 6, and 7, 1997 (Appendix A). Even when the expanded 25-grid cell definition of the Santa Clarita Valley area is used, the1-hour peak ozone concentrations in the northern South Coast Air Basin domain are reduced only 0.4 ppb (0.3%) to 7.4 ppb (4.2%) when the Santa Clarita Valley area emissions are eliminated. The 1-hour peak ozone in the northern South Coast Air Basin subdomain on August 5th occurs west of Castaic at the Los Angeles/Ventura County line (Appendix A). On August 6th, the peak 1-hour ozone concentrations in the northern South Coast Air Basin subdomain occurs north of Piru on elevated terrain that lies west of the Santa Clarita Valley. On August 7th the peak 1-hour ozone concentration occurs on elevated terrain to the east of Santa Clarita Valley.

Tables 2-2 and 2-3 display the contributions of local Santa Clarita Valley area emissions versus transport for the peak 1-hour ozone concentrations within Santa Clarita Valley area using the 9-grid cell and 25-grid cell definitions of the Santa Clarita Valley area. The estimated 1-hour ozone peak is reduced by 0.1 ppb to 2.0 ppb (0.1% to 1.1%) and 1.1 ppb to 6.5 ppb (0.5% to 3.8%) when all anthropogenic emissions are eliminated in the, respectively, 9-grid cell and 25-grid cell definition of the Santa Clarita Valley area and using 1997 emissions (Table 2-2). Thus, for the 1997 emission scenarios emissions from outside the Santa Clarita Valley area (i.e. transport) contributes 95% or more to the peak 1-hour ozone concentrations in the Santa Clarita Valley area.

Larger reductions in the 1-hour ozone peaks are estimated using the 2007 (AQMP Control) emissions scenario, with reductions of 0.5 ppb to 7.7 ppb (0.4 % to 10.2%) and 0.8 ppb to 11.2 ppb (0.6% to 12.0%) estimated to occur using them 9-grid cell and 25-grid cell definitions of the Santa Clarita Valley area, respectively (Table 2-3). That is, for the 2007 emission scenarios ozone transport due to emissions outside of the Santa Clarita Valley area contributes > 92% and > 88%, respectively, of the peak 1-hour ozone concentrations in the Santa Clarita Valley area using the 9-grid cell and 25-grid cell definitions of the Santa Clarita Valley area, respectively.

It should be pointed out that the largest emissions reductions in the Santa Clarita Valley area due to local emission controls tend to occur on lower ozone days that are below the ozone standard. For example, the maximum reduction in the peak 1-hour ozone concentrations in the Santa Clarita Valley area that exceed the Federal 1-hour ozone standard is 3.8% and 0.8% for the 1997 and 2007 emissions scenarios, respectively.

Table 2-2. Estimated peak 1-hour ozone concentrations (ppb) for the 1997 Base Case and Santa Clarita Valley (SCV) area Zero-Out Cases and the 9-grid cell and 25-grid cell definitions of the SCV area (see Figures 1-3 and 1-5).

Date	1997 9-Grid Cell SCV Zero-Out				1997 25-Grid Cell SCV Zero-Out			
August 1997	Base Case (ppb)	Zero-Out (ppb)	Ozone Diff (ppb)	Ozone Diff (%)	Base Case (ppb)	Zero-Out (ppb)	Ozone Diff (ppb)	Ozone Diff (%)
Aug 5	116.4	116.4	-0.1	-0.1%	116.0	113.1	-2.9	-2.5%
Aug 6	276.0	275.5	-0.5	-0.2%	221.3	220.2	-1.1	-0.5%
Aug 7	175.8	173.8	-2.0	-1.1%	172.6	166.1	-6.5	-3.8%

Table 2-3. Estimated peak 1-hour ozone concentrations (ppb) for the 2007 Base Case and Santa Clarita Valley (SCV) area Zero-Out Cases and the 9-grid cell and 25-grid cell definitions of the SCV area (see Figures 1-3 and 1-5).

Date	2007 9-Grid Cell SCV Zero-Out				2007 25-Grid Cell SCV Zero-Out			
August 1997	Base Case (ppb)	Zero-Out (ppb)	Ozone Diff (ppb)	Ozone Diff (%)	Base Case (ppb)	Zero-Out (ppb)	Ozone Diff (ppb)	Ozone Diff (%)
Aug 5	75.4	67.7	-7.7	-10.2%	81.8	72.0	-9.9	-12.0%
Aug 6	132.4	131.9	-0.5	-0.4%	133.8	133.1	-0.8	-0.6%
Aug 7	108.1	102.6	-5.5	-5.1%	123.1	111.9	-11.2	-9.1%

8-Hour Ozone Modeling Results

Tables 2-4 and 2-5 display the effects of the Santa Clarita Valley area zero-out runs on peak 8-hour ozone concentrations in the Santa Clarita Valley area and vicinity. These results are qualitatively similar to the 1-hour ozone peak results. However, in the local Santa Clarita Valley area, for the 8-hour ozone peaks in the Santa Clarita Valley area, emissions sometimes have a negative contribution because the elimination of all anthropogenic emissions in the Santa Clarita Valley area results in a slight increase in the peak 8-hour ozone concentration in the Santa Clarita Valley area on some days. This is due to the elimination of the NO emissions in the Santa Clarita Valley area, which reduces ozone destruction through the ozone + NO titration reaction.

Table 2-4. Estimated peak 8-hour ozone concentrations (ppb) for the 1997 Base Case and Santa Clarita Valley (SCV) area Zero-Out Cases and the 9-grid cell and 25-grid cell definitions of the SCV area (see Figures 1-3 and 1-5).

Date	1997 9-Grid Cell SCV Zero-Out				1997 25-Grid Cell SCV Zero-Out			
August 1997	Base Case (ppb)	Zero-Out (ppb)	Ozone Diff (ppb)	Ozone Diff (%)	Base Case (ppb)	Zero-Out (ppb)	Ozone Diff (ppb)	Ozone Diff (%)
Aug 5	76.3	69.5	-6.8	-9.0%	84.8	85.0	+0.2	+0.2%
Aug 6	145.3	145.3	+0.3	+0.2%	151.7	150.6	-1.1	-0.7%
Aug 7	102.9	103.0	+0.2	+0.2%	132.1	124.0	-8.1	-6.1%

Table 2-5. Estimated peak 8-hour ozone concentrations (ppb) for the 2007 Base Case and Santa Clarita Valley (SCV) area Zero-Out Cases and the 9-grid cell and 25-grid cell definitions of the SCV area (see Figures 1-3 and 1-5).

Date	2007 9-Grid Cell SCV Zero-Out				2007 25-Grid Cell SCV Zero-Out			
August 1997	Base Case (ppb)	Zero-Out (ppb)	Ozone Diff (ppb)	Ozone Diff (%)	Base Case (ppb)	Zero-Out (ppb)	Ozone Diff (ppb)	Ozone Diff (%)
Aug 5	65.2	60.4	-4.8	-7.4%	68.3	63.3	-5.0	-7.3%
Aug 6	114.0	113.9	-0.1	-0.1%	119.2	118.6	-0.7	-0.6%
Aug 7	87.1	85.6	-1.4	-1.7%	102.5	94.6	-7.9	-7.7%

Summary of 1-Hour and 8-hour Ozone Modeling Results

Table 2-6 summarizes the contributions of local Santa Clarita Valley area emissions to peak 1-hour and 8-hour ozone concentrations in the Santa Clarita Valley area versus ozone that is due to emissions outside of the Santa Clarita Valley area and is transported into the area. Using the 1997 emissions, local Santa Clarita Valley area emissions are estimated to contribute less than 4% to the peak 1-hour ozone concentrations in the Santa Clarita Valley area; thus, transport is estimated to contribute over 96% to the peak 1-hour ozone concentrations in the Santa Clarita Valley area. Using the 2007 emissions, local Santa Clarita Valley area emissions are estimated to contribute 12% or less to the peak 1-hour ozone concentrations in 2007. Thus, in 2007, ozone transport contributes over 88% of the peak 1-hour ozone concentrations in the Santa Clarita Valley area in 2007.

For the 8-hour ozone peaks in the Santa Clarita Valley area, local emissions contribute –0.2% to 9.0% with transport contributing 91% to 100% under the 1997 and 2007 emission scenarios.

Table 2-6. Percent contribution of local emissions in the Santa Clarita Valley (SCV) area versus transport due to emissions from outside of the SCV area to peak 1-hour and 8-hour ozone concentrations in the SCV area using the 9-grid cell (3 x 3 5-km) and 25-grid cell (5 x 5 5-km) definitions of the SCV area.

Date	9-Grid Cell SCV Area			25-Grid Cell SCV Area		
August 1997	Peak Ozone (ppb)	Local Emissions (%)	Transport Emissions (%)	Peak Ozone (ppb)	Local Emissions (%)	Transport Emissions (%)
1997 1-Hour Ozone Concentrations						
Aug 5	85.8	1.7%	98.3%	116.0	2.5%	97.5%
Aug 6	168.2	0.6%	99.4%	221.3	0.5%	99.5%
Aug 7	131.4	3.4%	96.6%	172.6	3.8%	96.2%
2007 1-Hour Ozone Concentrations						
Aug 5	75.4	10.2%	89.8%	81.8	12.0%	88.0%
Aug 6	132.4	0.4%	99.6%	133.8	0.6%	99.4%
Aug 7	108.1	5.1%	94.9%	123.1	9.1%	90.9%
1997 8-Hour Ozone Concentrations						
Aug 5	76.3	9.0%	91.0%	84.8	-0.2%	100.2%
Aug 6	145.3	-0.2%	100.2%	151.7	0.7%	99.2%
Aug 7	102.9	-0.2%	100.2%	132.1	6.1%	93.9%
2007 8-Hour Ozone Concentrations						
Aug 5	65.2	7.4%	93.6%	68.3	7.3%	92.7%
Aug 6	114.0	0.1%	99.9%	119.2	0.6%	99.4%
Aug 7	87.1	1.7%	98.3%	102.5	7.7%	92.3%

3.0 PM MODELING RESULTS

To assess the effects of local emissions versus transport on PM concentrations in the Santa Clarita Valley area, an April 1998 to May 1999 annual PM modeling database was used. This database corresponds to the period used in the SCAQMD's annual modeling as part of the Multiple Air Toxics Exposure Study (MATES-II) (SCAQMD, 2000) and a Department of Energy (DOE) study to assess the effects of biodiesel fuel use on PM in the South Coast Air Basin region of southern California (Morris and Jia, 2002). The Comprehensive Air-quality Model with extensions (CAMx) (ENVIRON, 2004), a photochemical grid model (PGM), was used to assess the contributions of local emissions versus transport to PM air quality in the Santa Clarita Valley area. The contributions of local emissions to both annual and 24-hour PM concentrations were assessed as well as for PM with geometric size less than 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$). PM consists of primary emitted particles from combustion source, road dust, construction, wind blown dust, etc as well as secondary particles, such as sulfate, nitrate and secondary organic aerosols, that are formed in the atmosphere from gaseous pollutants. The contributions of local emissions verses transport was assessed accounting for both primary and secondary PM.

EMISSIONS SCENARIOS ANALYZED

Three separate PM emission scenarios were analyzed:

- Base Case emissions scenario that represented estimates of the actual emissions during the April 1998 to March 1999 year;
- Santa Clarita Valley Area 9-Grid Cell Zero-Out Case (designed to be similar to the study area used in the SCAQMD Santa Clarita Transport Study); and
- Santa Clarita Valley Area 25-Grid Cell Zero-Out Case (expanded definition of Santa Clarita Valley area).

Table 3-1 lists the total anthropogenic (man-made) NO_x, VOC, CO fine particulate ($PM_{2.5}$) and coarse particulate (PM_{10}) emissions in the "AQMP" South Coast Air Basin domain (see Figure 1-1) for the three emission scenarios and averaged over the winter 1999 and summer 1998 periods of the April 1998 through March 1999 modeling year. Anthropogenic NO_x, VOC CO, $PM_{2.5}$ and PM_{10} emissions in the 9-grid cell definition of the Santa Clarita Valley area represent 0.3% to 1.1% of the total emissions within the South Coast Air Basin AQMP modeling domain. The 25-grid cell definition of the Santa Clarita Valley area contains 0.5% to 1.7% of the total emissions in the AQMP modeling domain. Note that, for the PM modeling, the Santa Clarita Valley area emissions (Table 3-1) represent a larger fraction of the total emissions in the South Coast Air Basin than the ozone modeling (Table 2-1) because the PM modeling used the smaller "AQMP" domain compared to the ozone modeling that used the larger "SCOS" domain (see Figure 1-1).

Table 3-1. Summary of NO_x, VOC, CO, and fine ($PM_{2.5}$) and just the coarse mode ($PM_{2.5-10}$) component of PM_{10} ($PM_{2.5-10} = PM_{10} - PM_{2.5}$) mode particulate matter anthropogenic emissions (tons per day, TPD) for the South Coast Air Basin "AQMP" domain (see Figure 1-1) for the winter 1999 and summer 1998 Base Case and 9-cell and 25-cell Santa Clarita Valley (SCV) area Zero-Out Cases.

Scenario Species	Base Case (TPD)	9-Grid Cell SCV Area Emiss (TPD)	Diff (TPD)	%Diff (%)	25-Grid Cell SCV Area Emiss (TPD)	Diff (TPD)	%Diff (%)
1999 Winter Average							
NOx	1520.8	1503.6	-17.2	-1.1%	1495.1	-25.7	-1.7%
VOC	1461.2	1450.5	-10.7	-0.7%	1446.2	-14.9	-1.0%
CO	9291.7	9228.6	-63.1	-0.7%	9160.0	-95.7	-1.0%
$PM_{2.5}$	151.9	151.3	-0.6	-0.4%	150.9	-1.0	-0.6%
$PM_{2.5-10}$	851.1	848.4	-2.7	-0.3%	846.9	-4.2	-0.5%
1998 Summer Average							
NOx	1517.3	1501.2	-16.1	-1.1%	1492.7	-24.6	-1.6%
VOC	1500.3	1490.0	-10.3	-0.7%	1485.8	-14.5	-1.0%
CO	9874.3	9804.5	-70.0	-0.7%	9769.7	-104.6	-1.1%
$PM_{2.5}$	152.7	152.1	-0.6	-0.4%	151.7	-1.0	-0.6%
$PM_{2.5-10}$	855.3	852.6	-2.7	-0.3%	851.0	-4.2	-0.5%

PM MODELING RESULTS

Particulate Matter modeling results are presented for both PM_{10} and $PM_{2.5}$ concentrations. The EPA has a Federal annual and 24-hour average PM_{10} standard with thresholds of 50 and 150 $\mu g/m^3$, respectively. The CAAA require that PM_{10} nonattainment areas attain the Federal PM_{10} standard by specific years that are based on their attainment classification. The South Coast Air Basin, including the Santa Clarita Valley area, must attain the Federal PM_{10} by 2006. The State of California also has annual and 24-hour PM_{10} standards with thresholds of 20 and 50 $\mu g/m^3$. Regions in California must demonstrate progress toward achieving the California PM_{10} standards. There are also new Federal annual and 24-hour $PM_{2.5}$ standards with thresholds of 15 and 65 $\mu g/m^3$, respectively. EPA is planning to declare $PM_{2.5}$ nonattaiment areas by the end of 2005; the South Coast Air Basin, including the Santa Clarita Valley area, will be declared nonattainment for $PM_{2.5}$. The State of California also has an annual $PM_{2.5}$ standard with a threshold of 12 $\mu g/m^3$.

The effects of the Santa Clarita Valley area Zero-Out Cases on annual and 24-hour PM_{10} and $PM_{2.5}$ concentrations in the April 1998 to March 1999 annual modeling database for the South Coast Air Basin were assessed using the two definitions of the Santa Clarita Valley area:

- The 9-grid cell definition (3 x 3 5-km grid cells) of the Santa Clarita Valley area as shown by the red box in Figure 1-2; and
- The 25-grid cell definition (5 x 5 5-km grid cells) of the Santa Clarita Valley area as shown by the red box in Figure 1-5.

Annual and 24-Hour PM Modeling Results

Table 3-2 the displays the maximum annual average PM_{10} and $PM_{2.5}$ concentrations in the Santa Clarita Valley area for the 1998/1999 Base Case and two Santa Clarita Valley area Zero-Out Cases using the 9-grid cell (smaller) and 25-grid cell (larger) definitions of the Santa Clarita Valley area. Spatial maps of annual average PM_{10} and $PM_{2.5}$ concentration estimates for the northern South Coast Air Basin subdomain and the Base Case and two Santa Clarita Valley area Zero-Out Cases are shown Appendix C. The peak annual PM_{10} concentration in the Santa Clarita Valley area is 35.1 $\mu g/m^3$ using both the larger (25-grid cell) and smaller (9-grid cell) definitions of the Santa Clarita Valley area. The elimination of all anthropogenic emissions in the Santa Clarita Valley area reduces the peak annual average PM_{10} concentration in the Santa Clarita Valley area by 5.2 $\mu g/m^3$ and 5.7 $\mu g/m^3$ using the smaller and larger definitions of the Santa Clarita Valley area, respectively. These reductions represent 10% and 11% of the Federal annual PM_{10} standard of 50 $\mu g/m^3$.

The elimination of all anthropogenic emissions in the Santa Clarita Valley area reduces the maximum annual average $PM_{2.5}$ concentration estimate in the Santa Clarita Valley area by 2.8 and 3.2 $\mu g/m^3$ using the smaller and larger definitions of the Santa Clarita Valley area, respectively. These reductions represent approximately 20% of the Federal annual average $PM_{2.5}$ standard of 15 $\mu g/m^3$.

Table 3-2. Estimated peak annual average PM_{10} and $PM_{2.5}$ concentrations ($\mu g/m^3$) for the 1998/1999 Base Case and Santa Clarita Valley (SCV) Zero-Out Cases using the 9-grid cell and 25-grid cell definitions of the Santa Clarita Valley area.

Species	9-Grid Cell SCV Zero-Out				25-Grid Cell SCV Zero-Out			
	Base Case	Zero-Out	PM Diff	PM Diff	Base Case	Zero-Out	PM Diff	PM Diff
	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	(%)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	(%)
PM_{10}	35.1	29.9	-5.2	-14.9%	35.1	29.4	-5.7	-16.1%
$PM_{2.5}$	17.2	14.5	-2.8	-16.0%	17.2	14.0	-3.2	-18.7%

The spatial maps of annual average PM_{10} and $PM_{2.5}$ concentrations in Appendix C indicate why the Santa Clarita Valley area Zero-Out Cases have minimal effect on PM levels in the Santa Clarita Valley area. There are large PM concentration gradients from south to north with much higher PM concentrations seen in the San Fernando Valley, that exceed the Federal annual standard of 50 $\mu g/m^3$, and lower levels that are below 40 $\mu g/m^3$ occurring in the Santa Clarita area. These spatial maps of estimate PM concentrations clearly show the transport of PM concentrations from the southern areas of the San Fernando Valley and Los Angeles into the Santa Clarita Valley area.

Table 3-3 lists the contribution of local emissions in the Santa Clarita Valley area and the contribution from transport due to emissions from outside of the Santa Clarita Valley area to the maximum annual average PM_{10} and $PM_{2.5}$ in the Santa Clarita Valley area. Also shown in Table 3-3 are the local versus transport contributions to the maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations in the Santa Clarita Valley area for the four highest days of the 1998/1999 year. Using the smaller definition of the Santa Clarita Valley area, local emissions contribute approximately 15% and 16% to the maximum annual average PM_{10} and $PM_{2.5}$ concentrations in the Santa Clarita Valley area, respectively. When the larger cell definition of the Santa Clarita

Valley area is used, the contribution of local emissions to the annual average PM_{10} and $PM_{2.5}$ concentrations in the Santa Clarita Valley area are approximately 16% and 19%, respectively.

The contributions of local emissions to the four highest 24-hour PM_{10} concentrations in the Santa Clarita Valley area ranges from 5% to 14%. Local Santa Clarita Valley area emissions have a lower contribution to the four highest 24-hour $PM_{2.5}$ concentrations in the Santa Clarita Valley area with local contributions ranging from 2% to 7%. Local emissions have a lower relative contribution to $PM_{2.5}$ than PM_{10} concentrations because PM formed by pollution in the air is mostly fine and contributes more to transport; $PM_{2.5}$ does not deposit out as fast as PM_{10} and so has a longer transport distance.

Table 3-3. Percent contribution of local emissions in the Santa Clarita Valley (SCV) area versus transport due to emissions from outside of the SCV area to peak annual average PM_{10} and $PM_{2.5}$ concentrations and four-highest 24-hour PM_{10} and $PM_{2.5}$ concentrations in the SCV area during the May 1998 to April 1999 year using the 9-grid cell (3 x 3 5-km) and 25-grid cell (5 x 5 5-km) definitions of the SCV area.

Species Or Date	9-Grid Cell SCV Area			25-Grid Cell SCV Area		
	Peak PM (g/m³)	Local Emissions (%)	Transport Emissions (%)	Peak PM (g/m³)	Local Emissions (%)	Transport Emissions (%)
Annual Average PM Concentrations						
PM_{10}	35.1	14.9%	85.1%	35.1	16.1%	83.9%
$PM_{2.5}$	17.2	16.0%	84.0%	17.2	18.7%	81.3%
Four Highest 24-Hour PM_{10} Concentrations						
12/01/98	149.0	13.5%	86.5%	149.0	10.5%	89.5%
11/27/98	143.9	4.7%	95.3%	143.9	4.9%	95.1%
01/07/99	114.5	10.2%	89.8%	119.0	4.3%	95.7%
01/06/99	113.4	10.4%	89.6%	113.4	11.1%	88.9%
Four Highest 24-Hour $PM_{2.5}$ Concentrations						
12/01/98	79.9	7.3%	92.7%	80.0	4.7%	95.3%
11/27/98	68.5	2.3%	97.7%	69.4	2.5%	97.5%
10/12/98	64.9	5.0%	95.0%	68.6	5.3%	94.7%
01/07/99	60.8	3.0%	97.0%	69.9	1.9%	98.1%

4.0 REFERENCES

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APPENDIX A

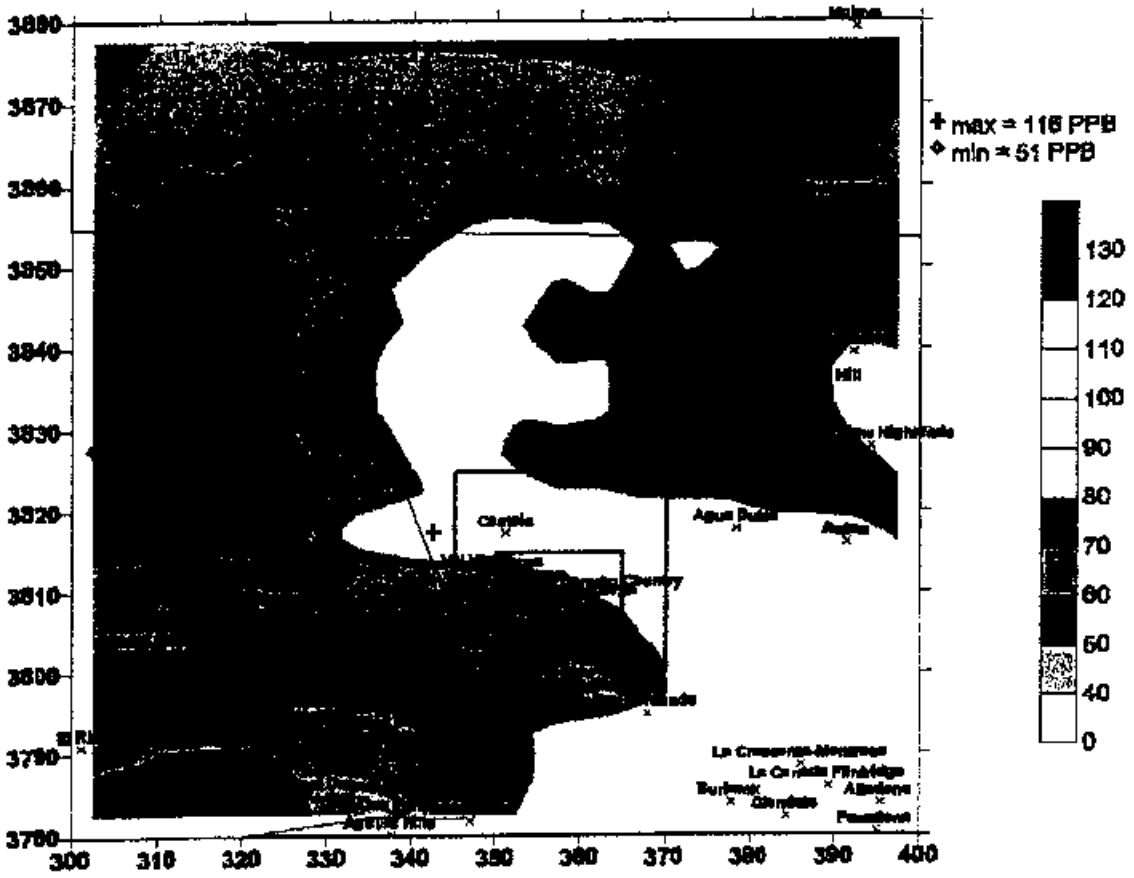
Daily Maximum 1-Hour Ozone Concentrations (ppb)

1997 Emission Scenarios

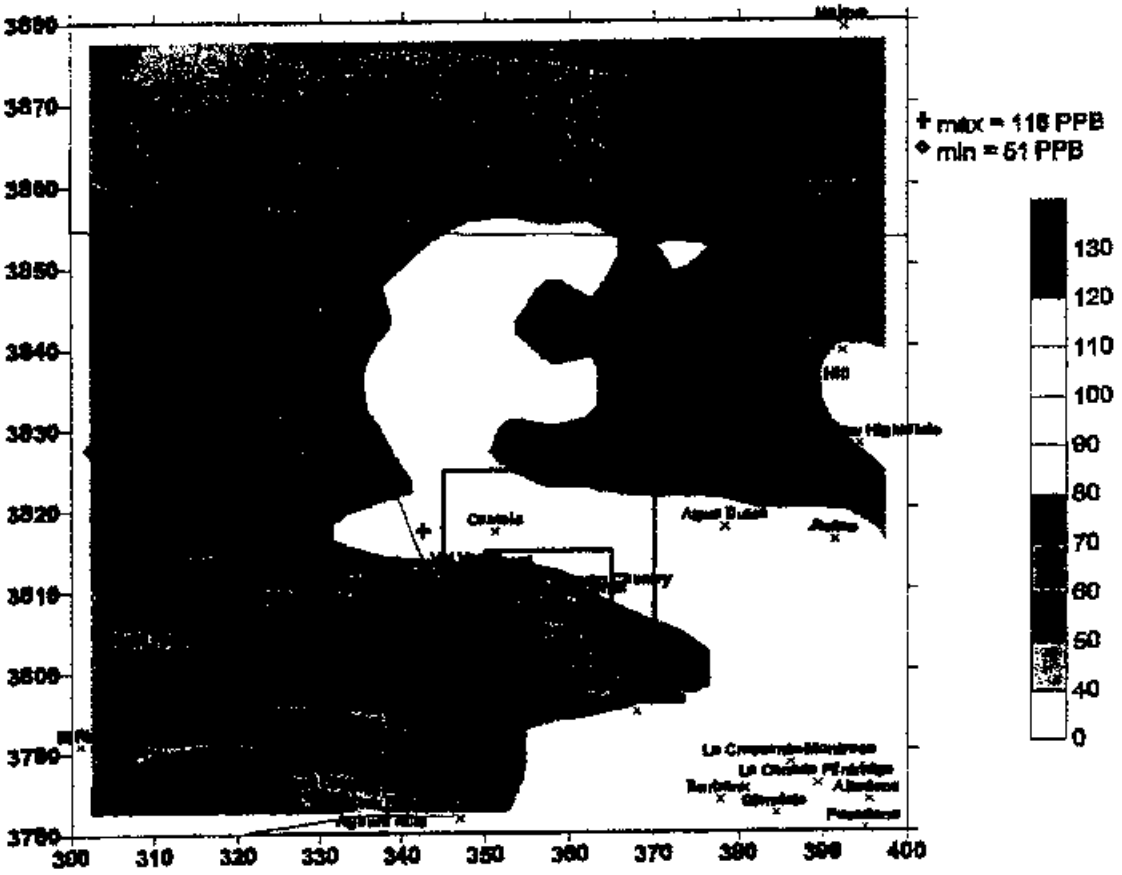
- Base Case
- 9-grid cell (3 x 3) Santa Clarita Valley area Zero-Out Case
- 25-grid cell (5 x 5) Santa Clarita Valley area Zero-Out Case

August 5-7, 1997

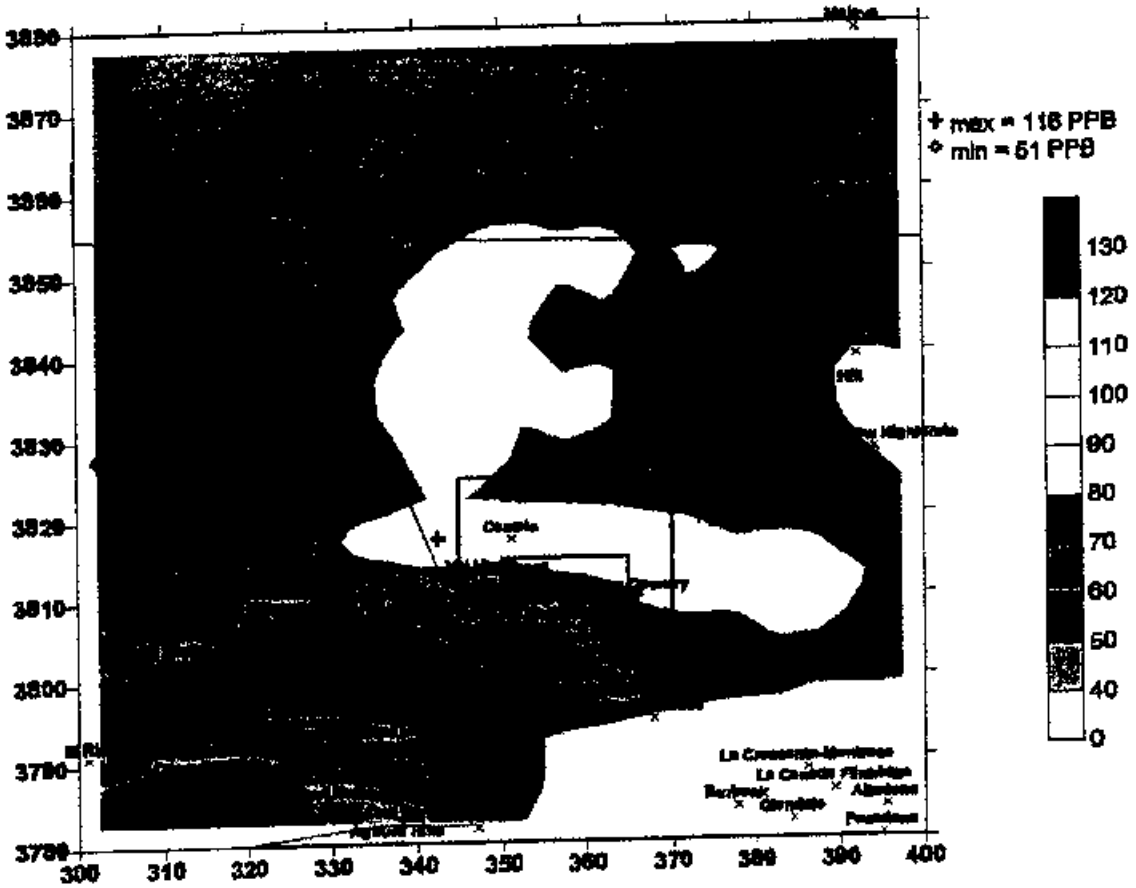
- August 5, 1997 (97217)
- August 6, 1997 (97218)
- August 7, 1997 (97219



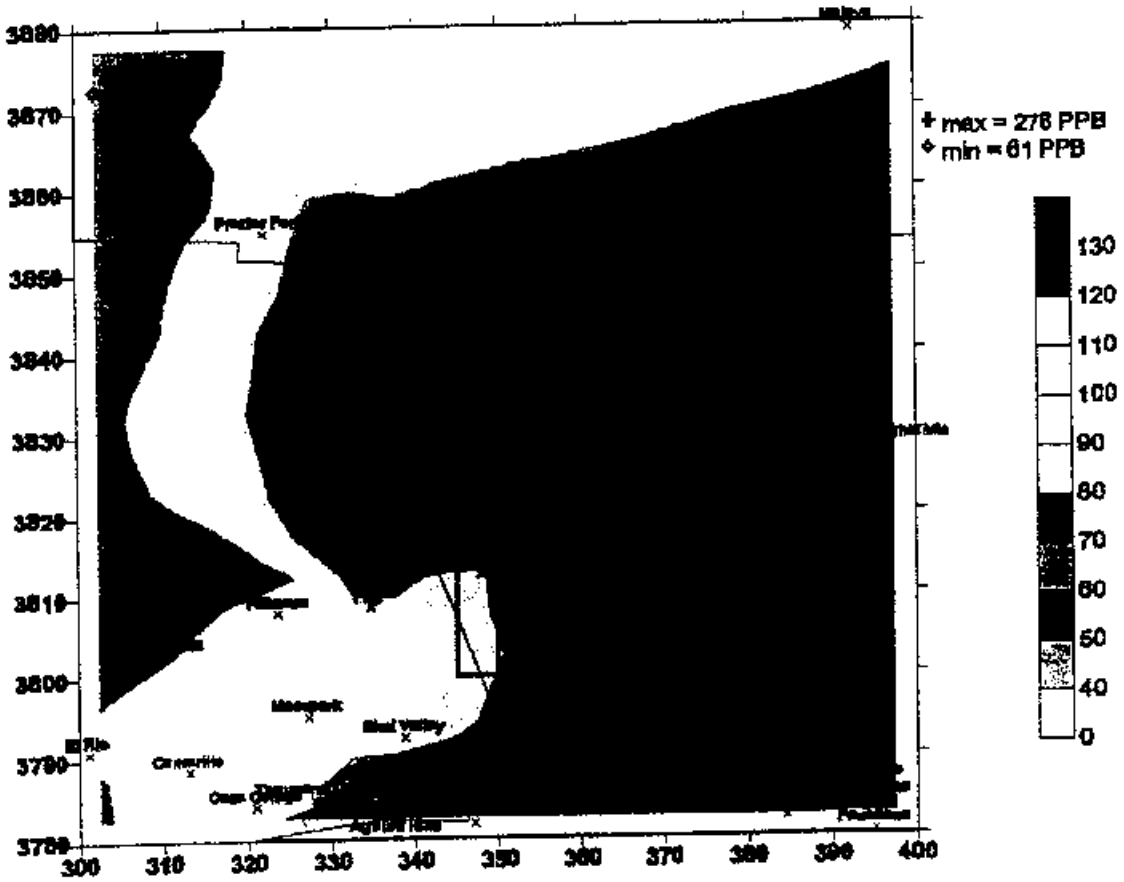
UAM Daily Max 1hr O3
97217
1997 Base Case



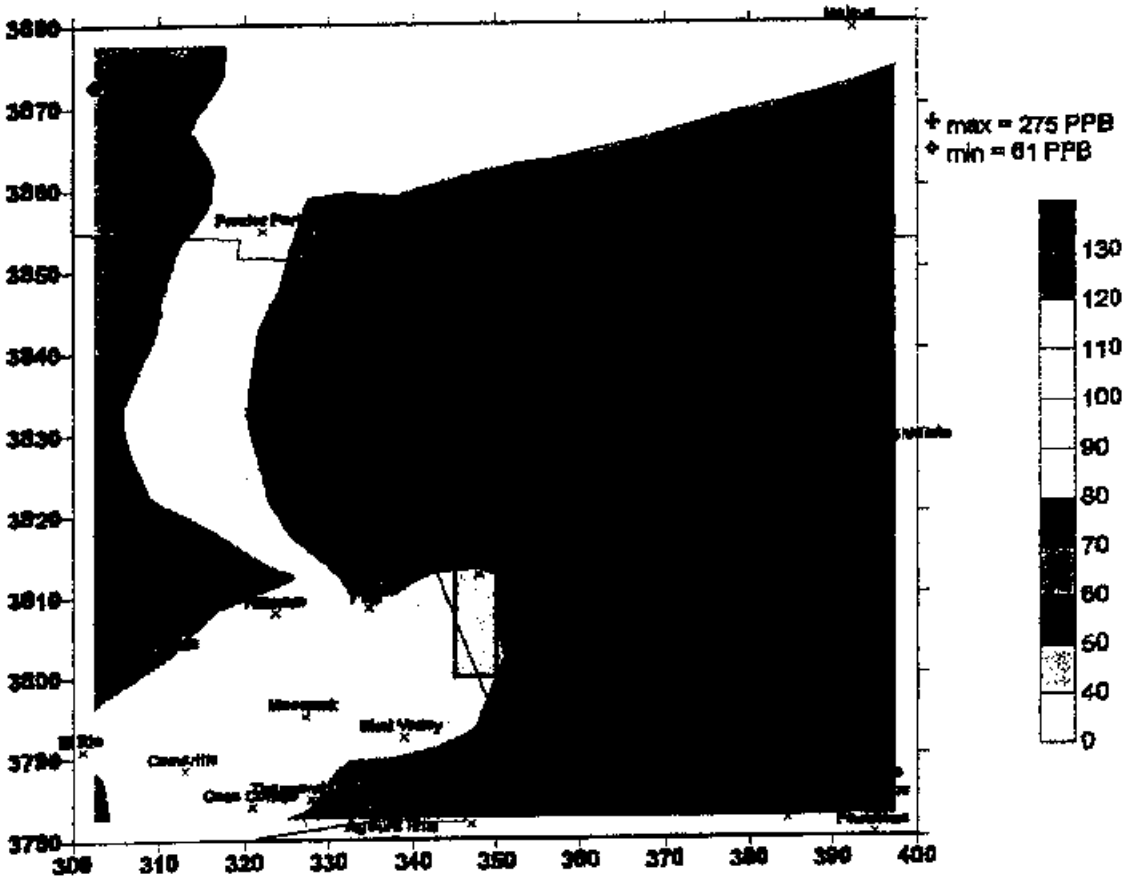
UAM Daily Max 1hr O3
97217
1997 ZeroOut 3x3



UAM Daily Max 1hr O3
97217
1997 ZeroOut 5x5



UAM Daily Max 1hr O3
97218
1997 Base Case



UAM Daily Max 1hr O3
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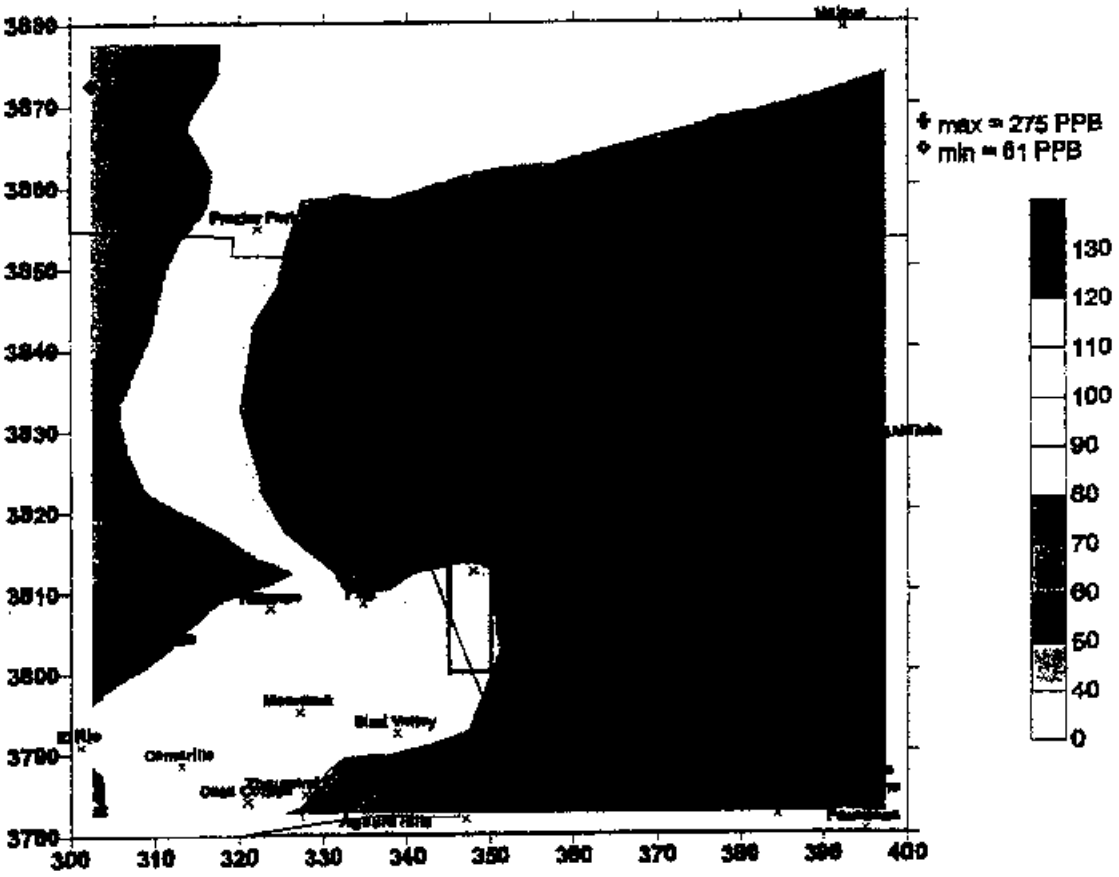
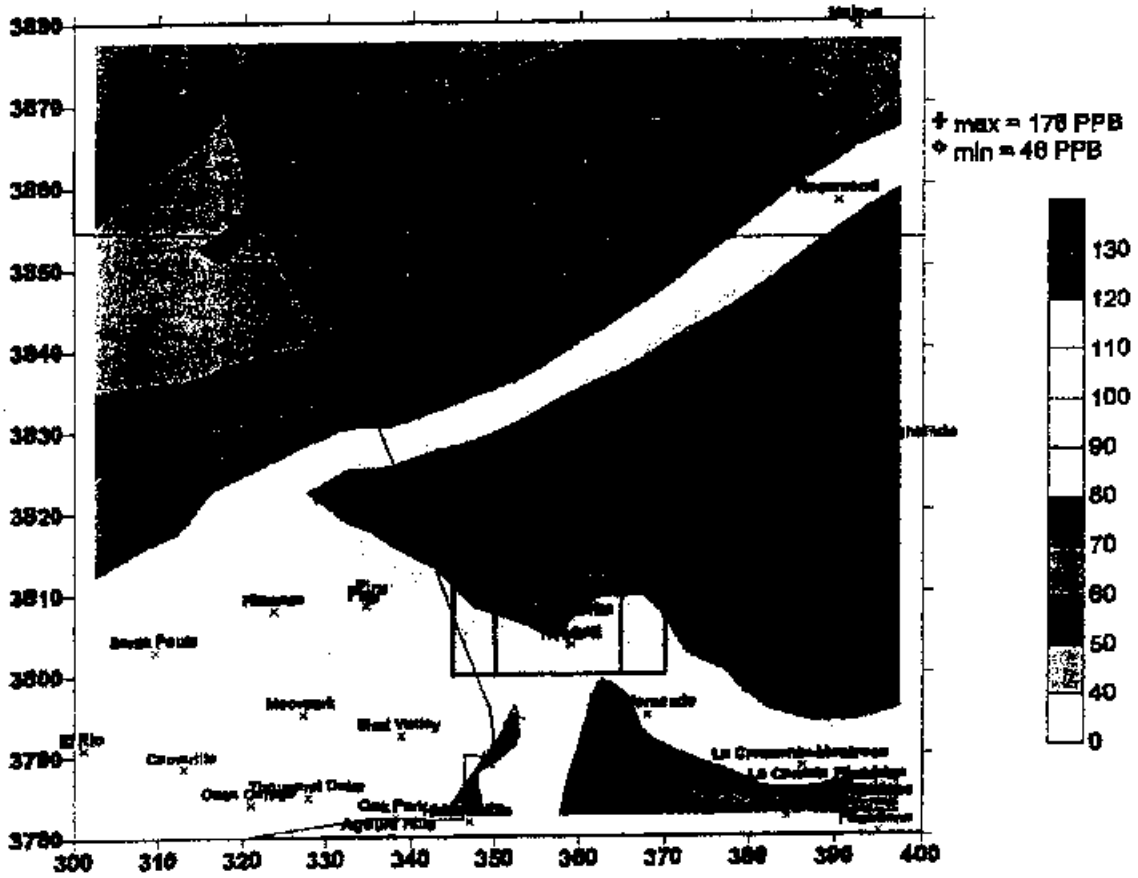
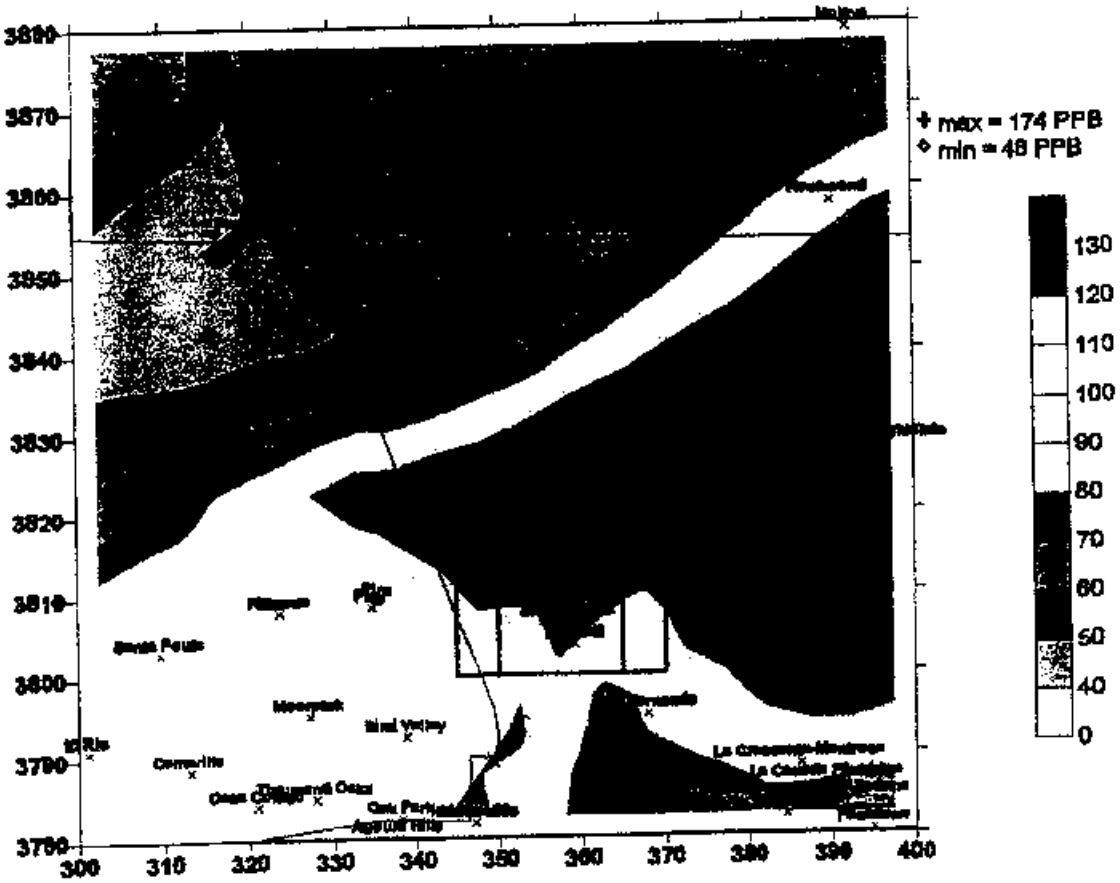
1997 ZeroOut 3x3



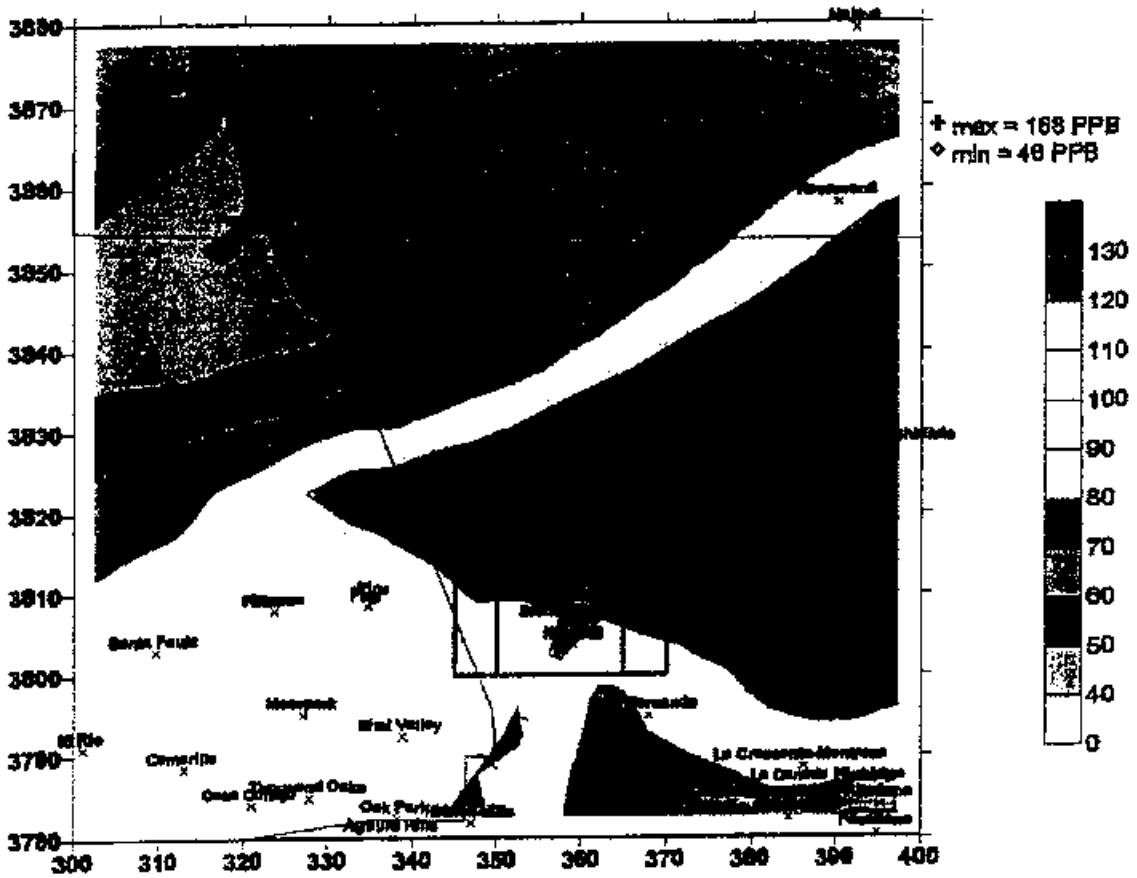
UAM Daily Max 1hr O3
97215
1997 ZeroOut 5x5



UAM Daily Max 1hr O3
97219
1997 Base Case



UAM Daily Max 1hr O3
97219
1997 ZeroOut 3x3



UAM Daily Max 1hr O3
97219
1997 ZeroOut 5x5

APPENDIX B

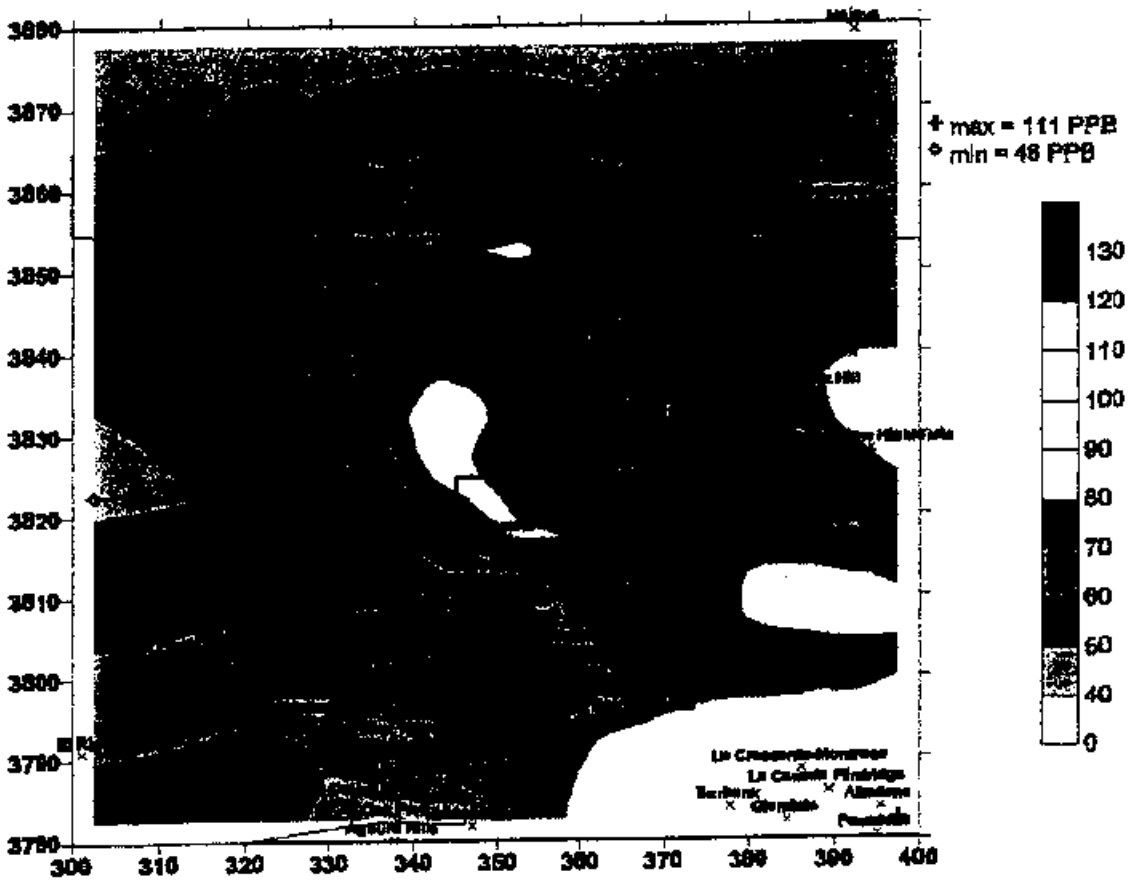
Daily Maximum 1-Hour Ozone Concentrations (ppb)

2007 Emission Scenarios

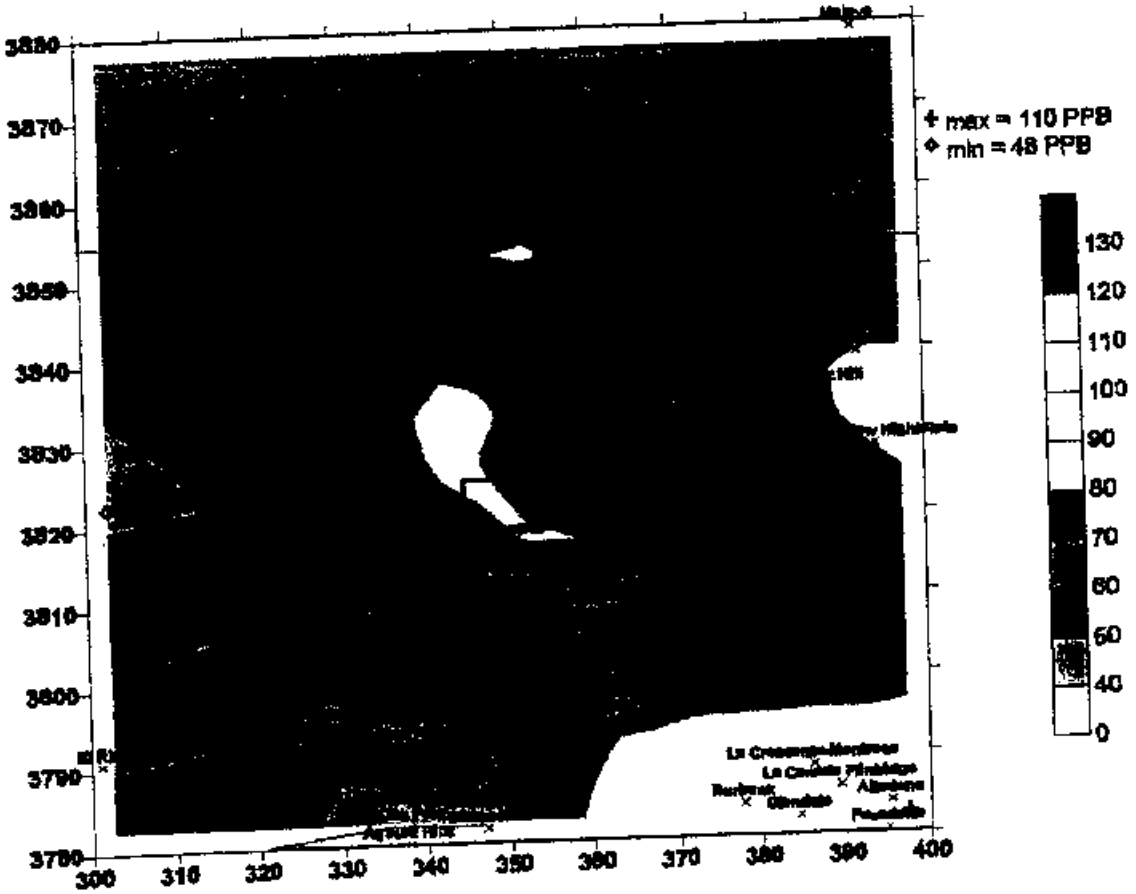
- Base Case
- 9-grid cell (3 x 3) Santa Clarita Valley area Zero-Out Case
- 25-grid cell (5 x 5) Santa Clarita Valley area Zero-Out Case

August 5-7, 1997

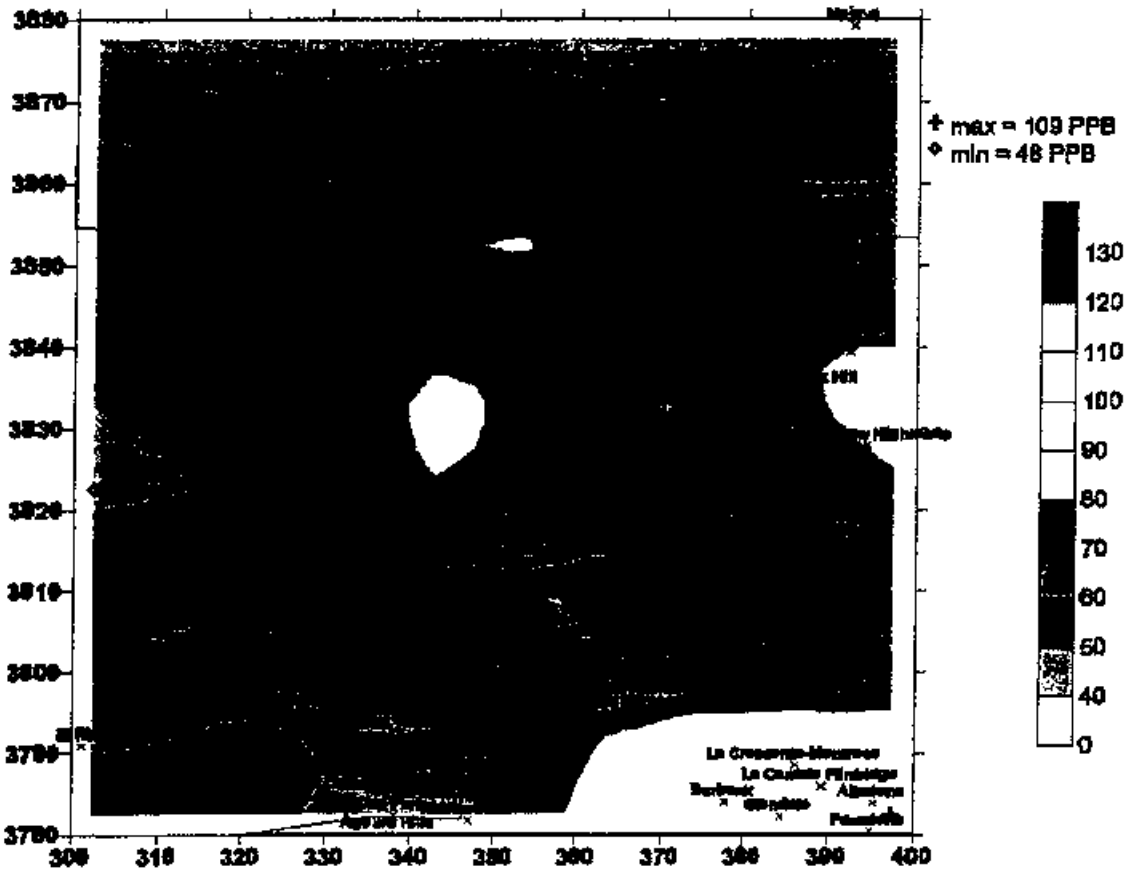
- August 5, 1997 (97217)
- August 6, 1997 (97218)
- August 7, 1997 (97219



UAM Daily Max 1hr O3
97217
2007 Base Case



UAM Daily Max 1hr O3
97217
2007 ZeroOut 3x3



UAM Daily Max 1hr O3
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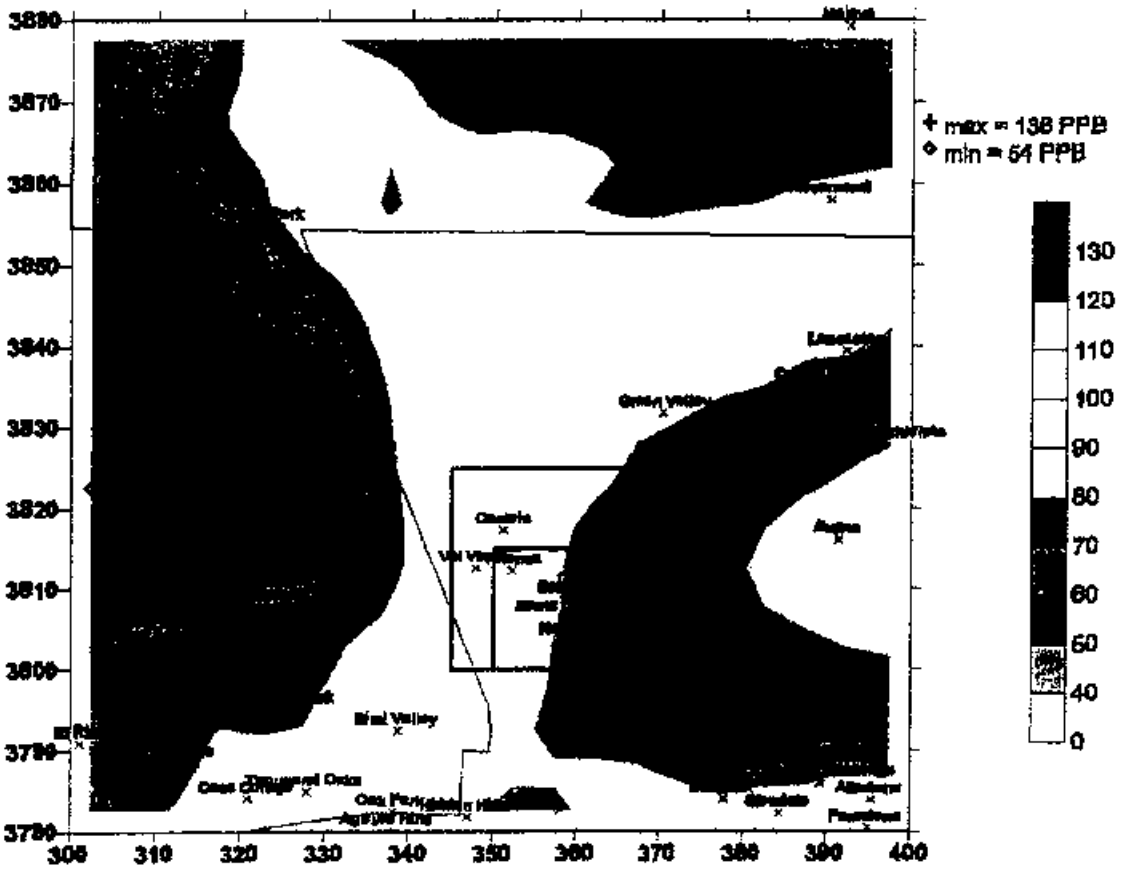
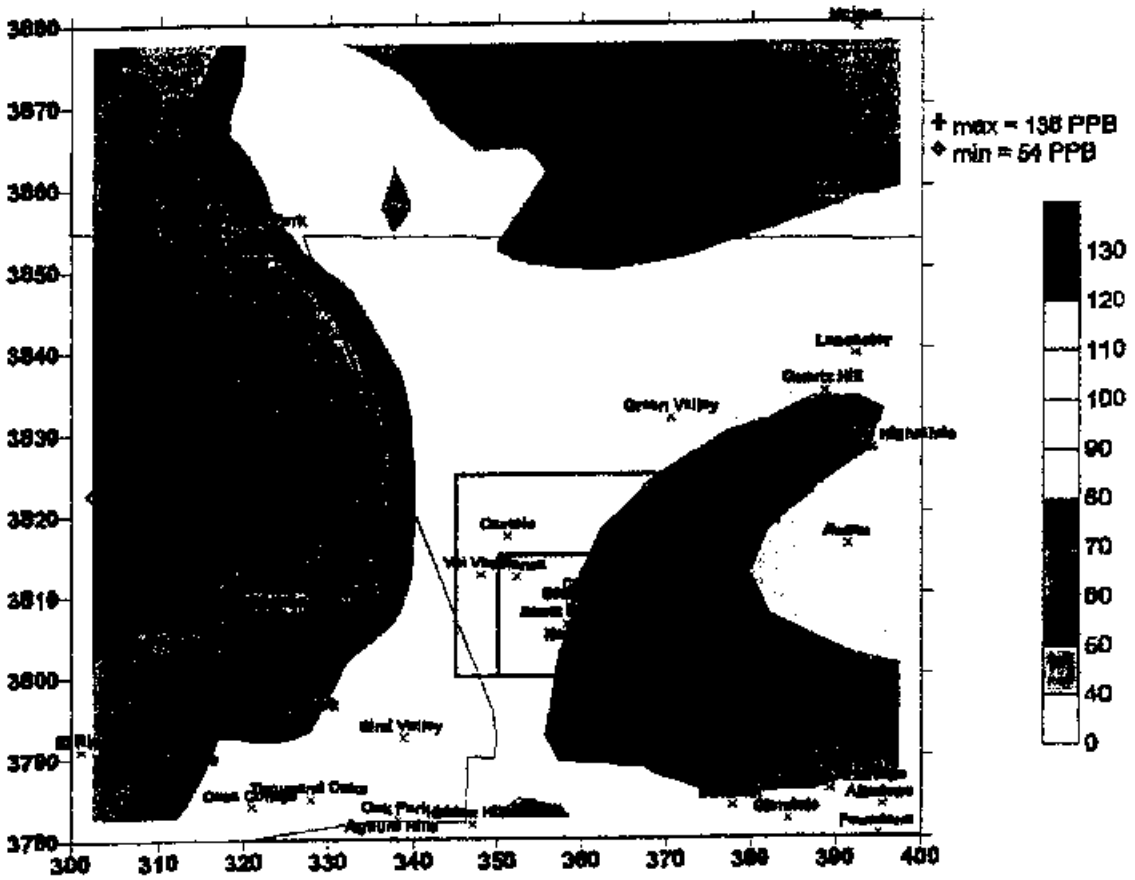
2007 ZeroOut 5x5



UAM Daily Max 1hr O3
97216
2007 Base Case



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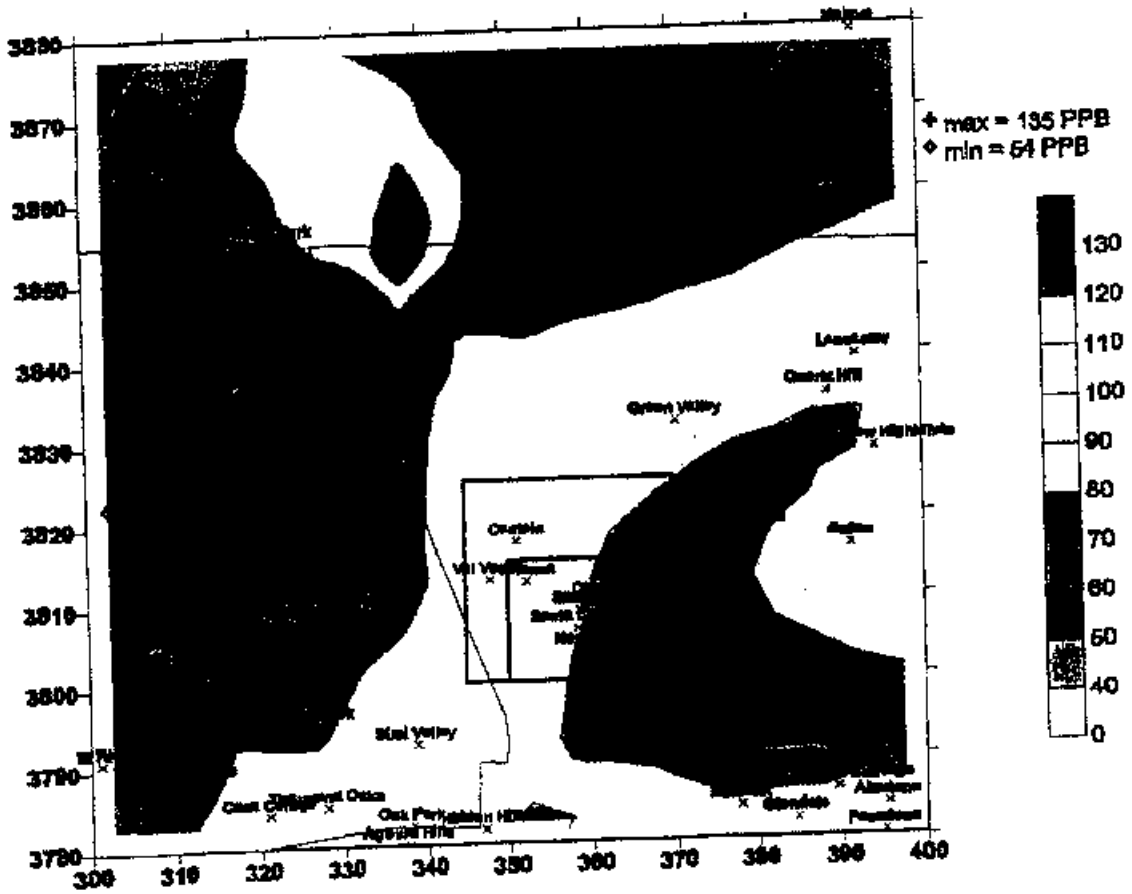
2007 ZeroOut 3x3



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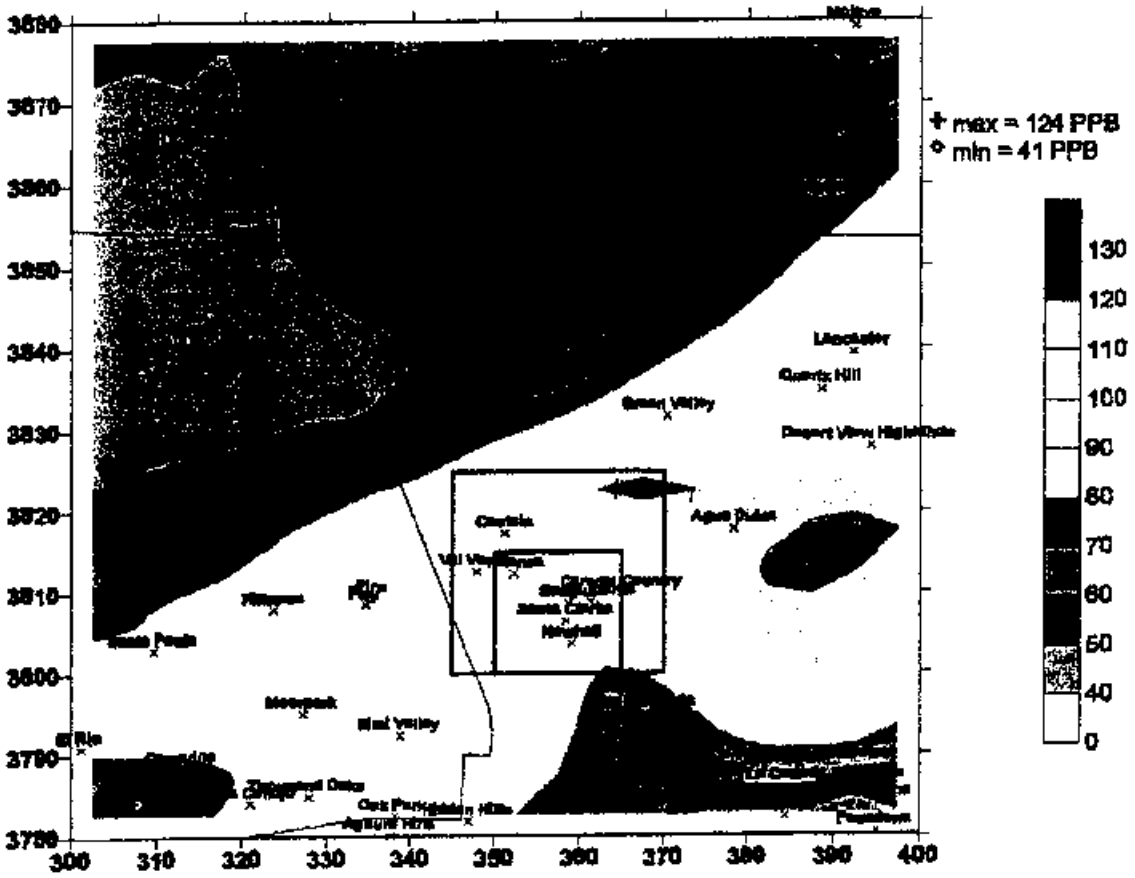

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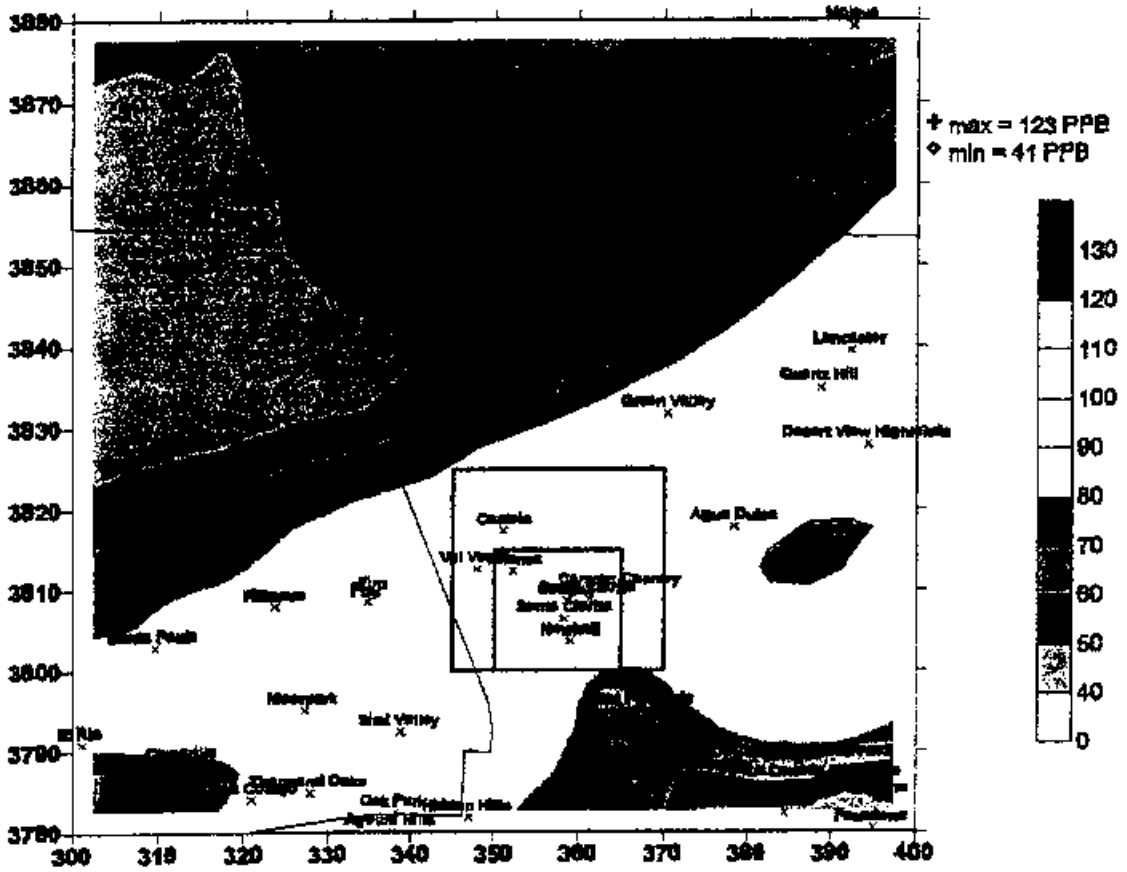

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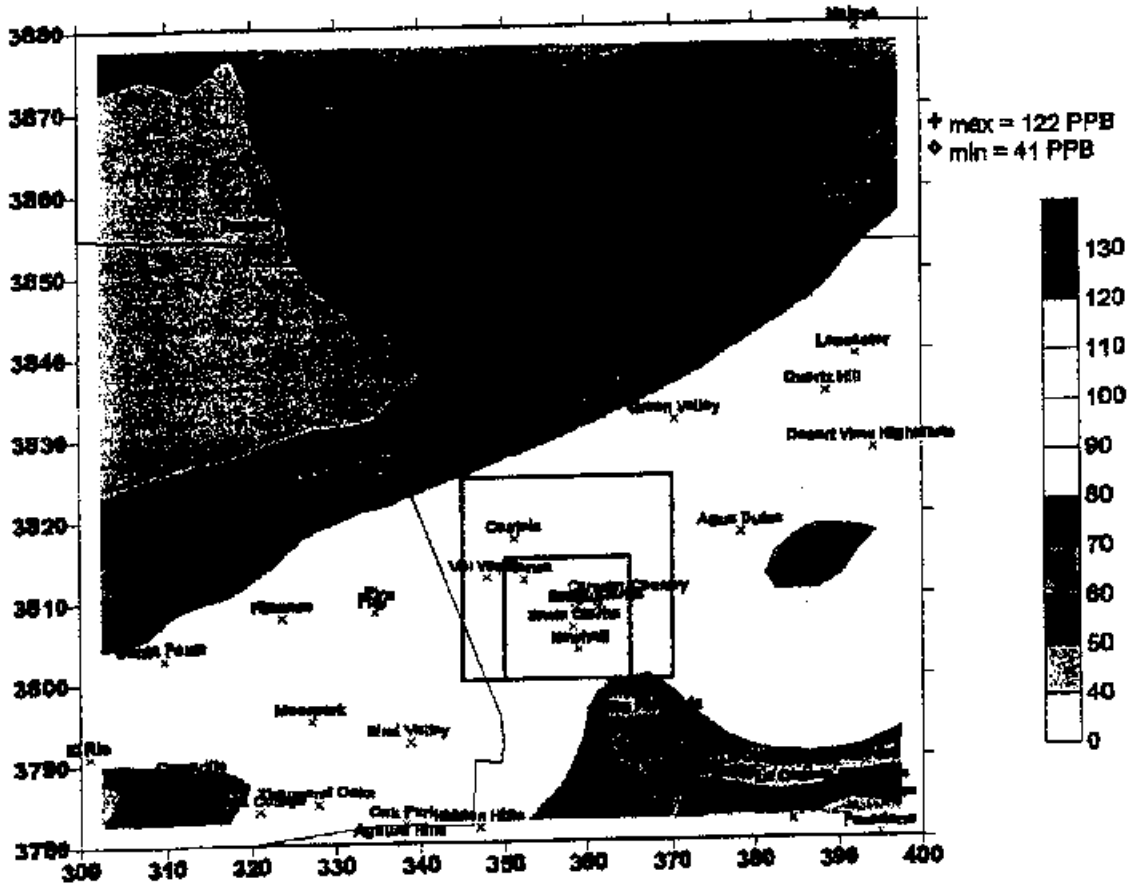

UAM Daily Max 1hr O3
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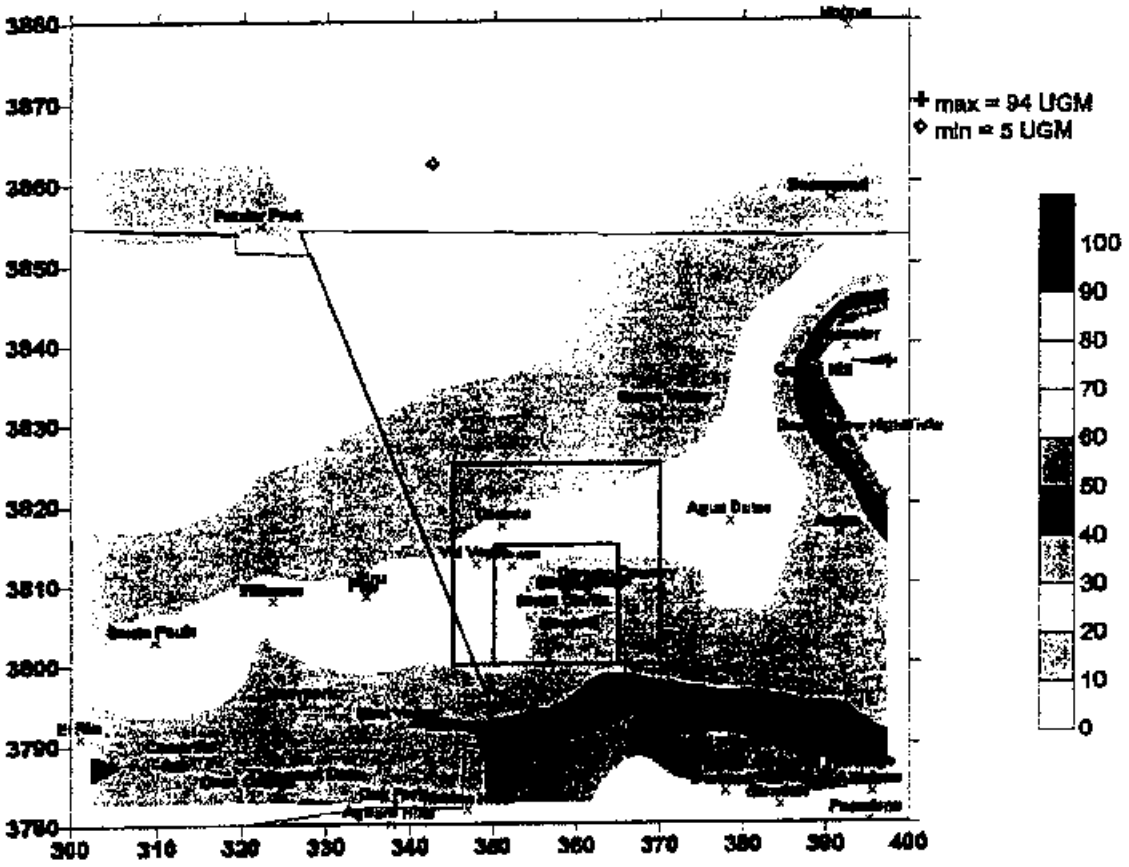
2007 ZeroOut 5x5

APPENDIX C

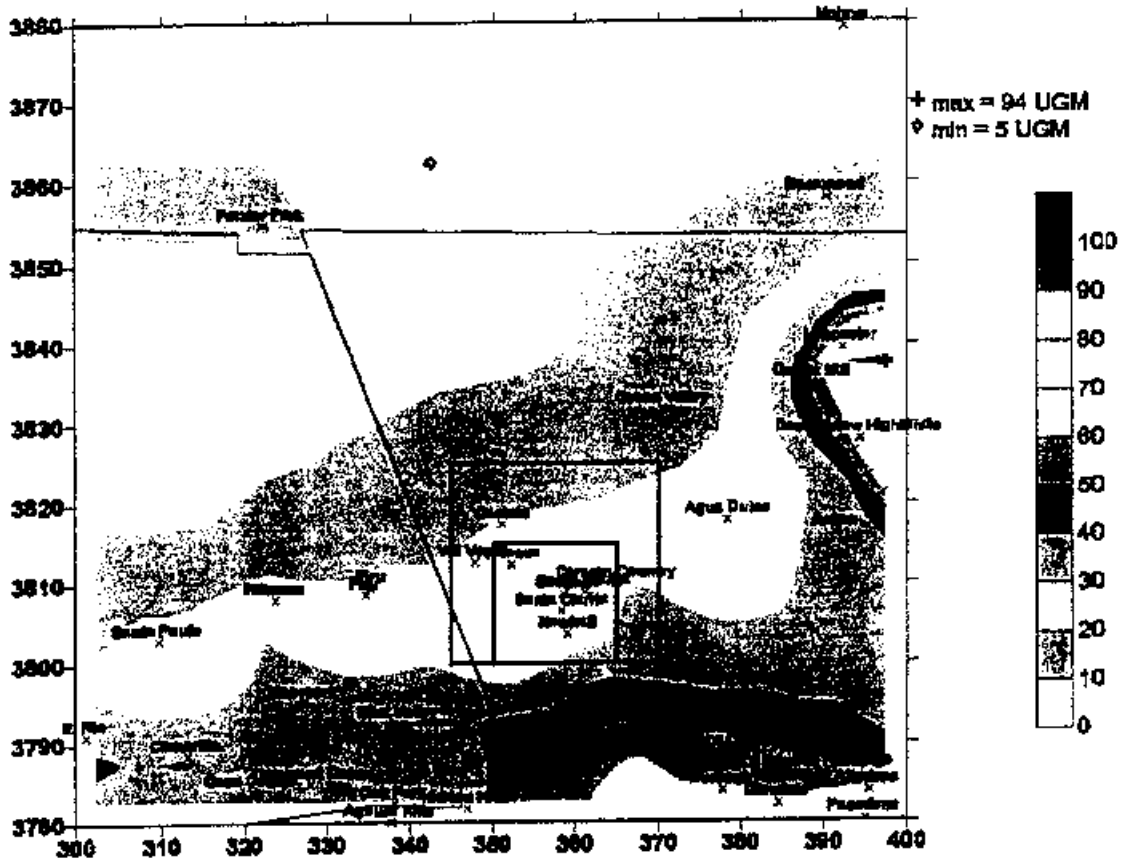
Annual Average PM_{10} and $PM_{2.5}$ Concentrations (ug/m^3)

1998/1999 Emission Scenario

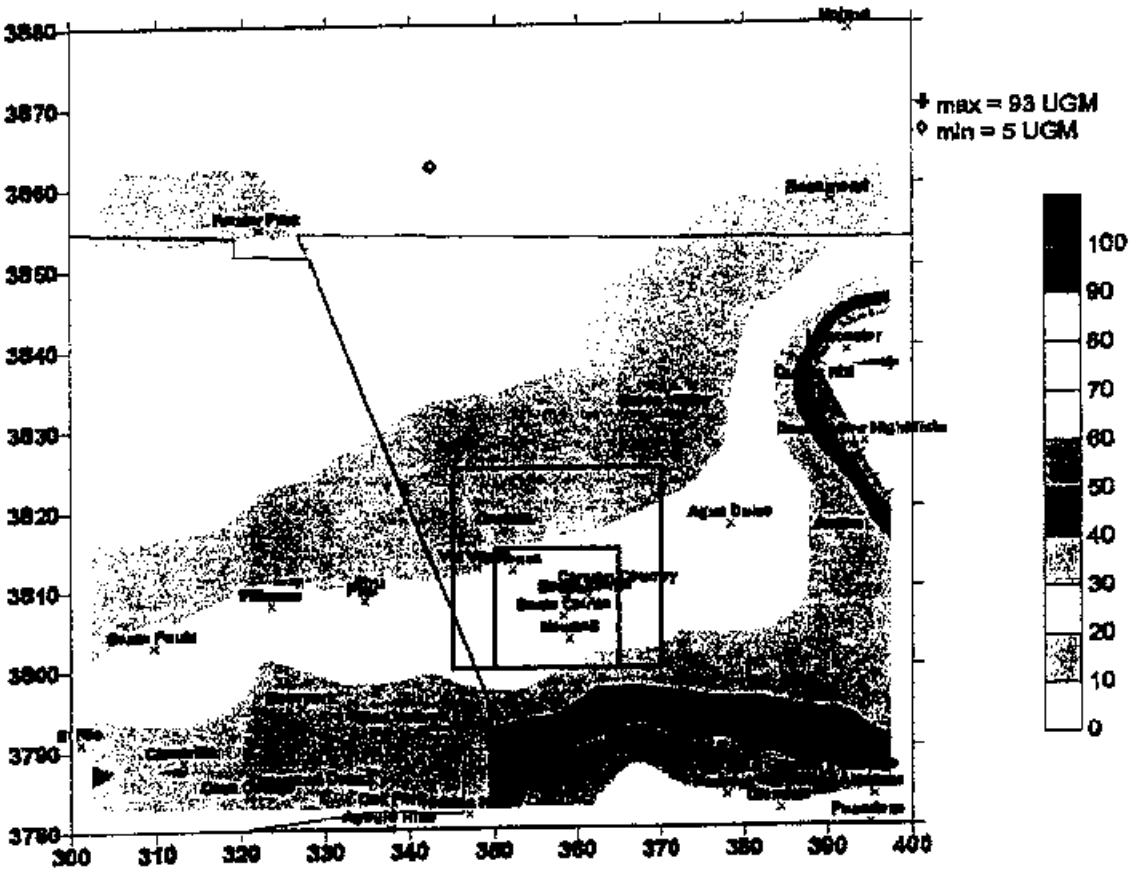
- Base Case
- 9-grid cell (3 x 3) Santa Clarita Valley area Zero-Out Case
- 25-grid cell (5 x 5) Santa Clarita Valley area Zero-Out Case



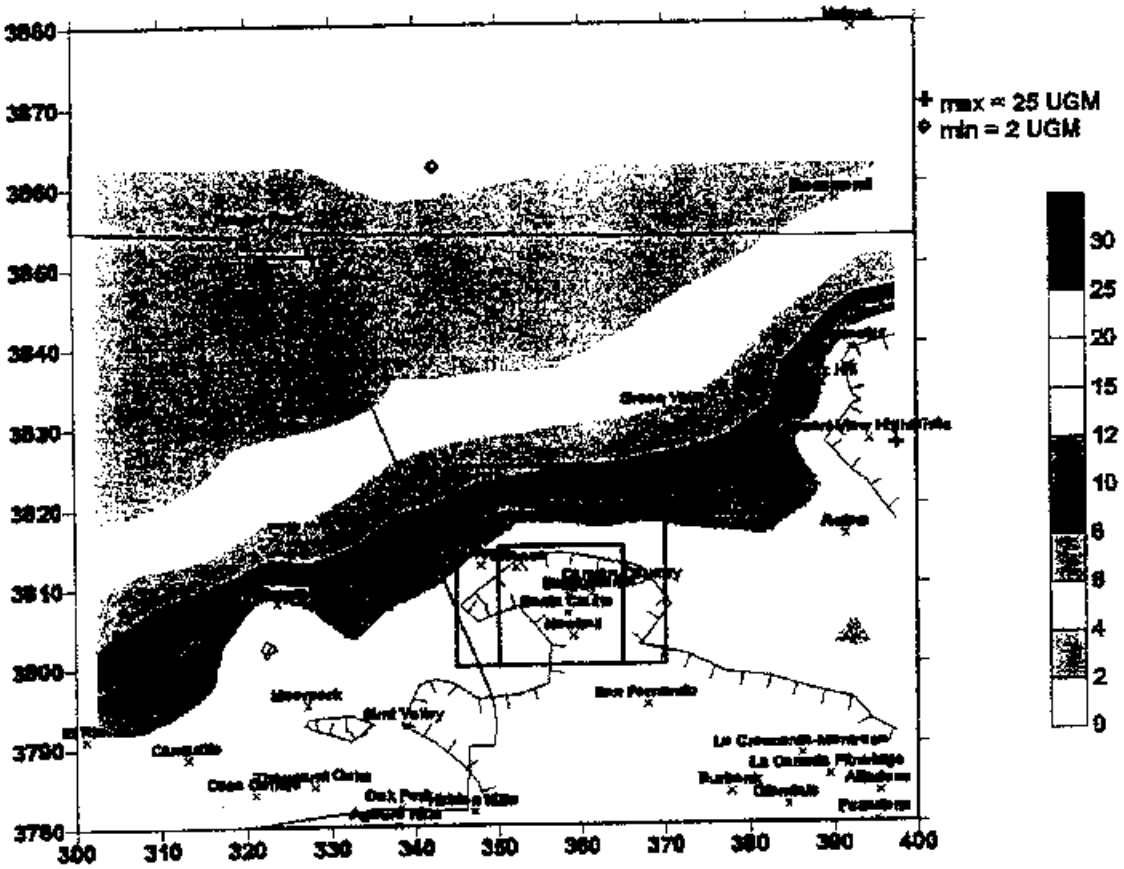
CAMx Annual PM10
April 1998 - March 1999
Base Case



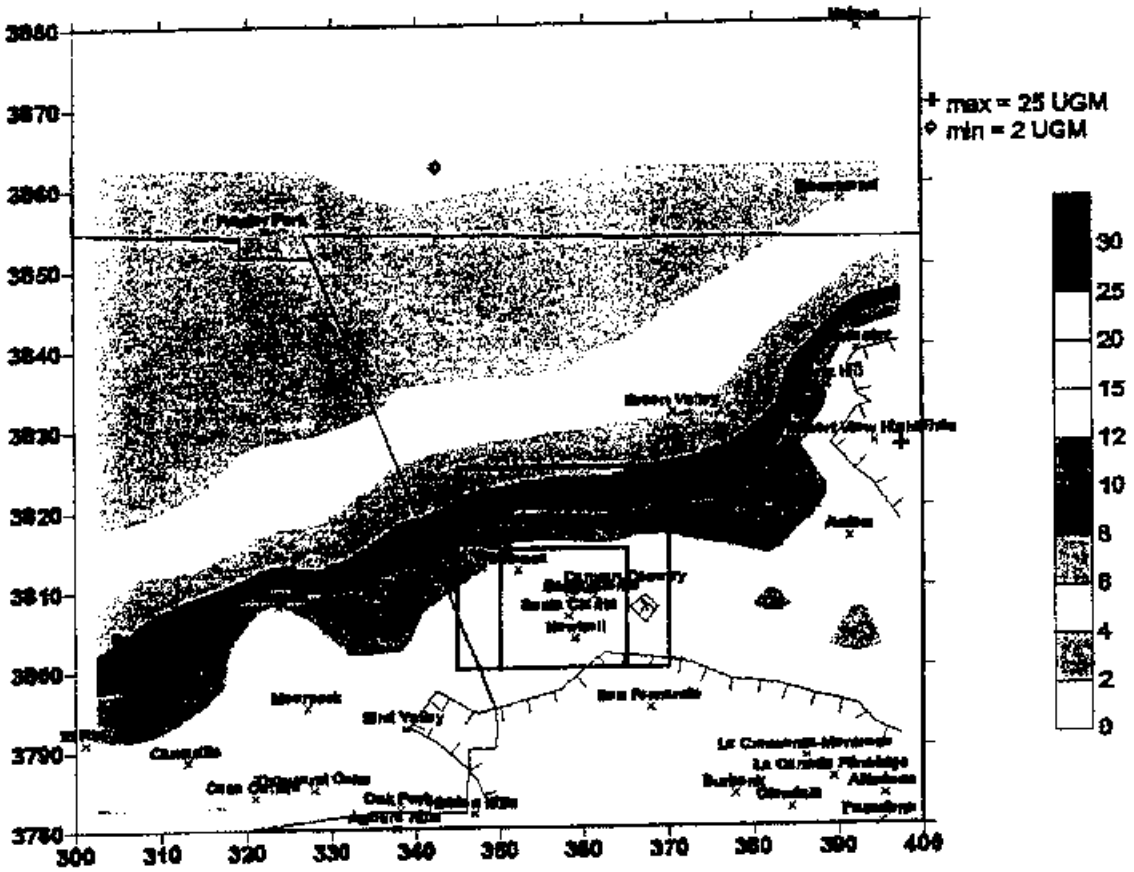
CANx Annual PM10
April 1998 - March 1999
Base Case without Anthropogenic Emissions from a 3x3 Block over Santa Clarita Valley



CAMx Annual PM10
April 1998 - March 1999
Base Case without Anthropogenic Emissions from a 5x5 Block over Santa Clarita Valley



CAMx Annual PM25
April 1998 - March 1999
Base Case



CAMx Annual PM25
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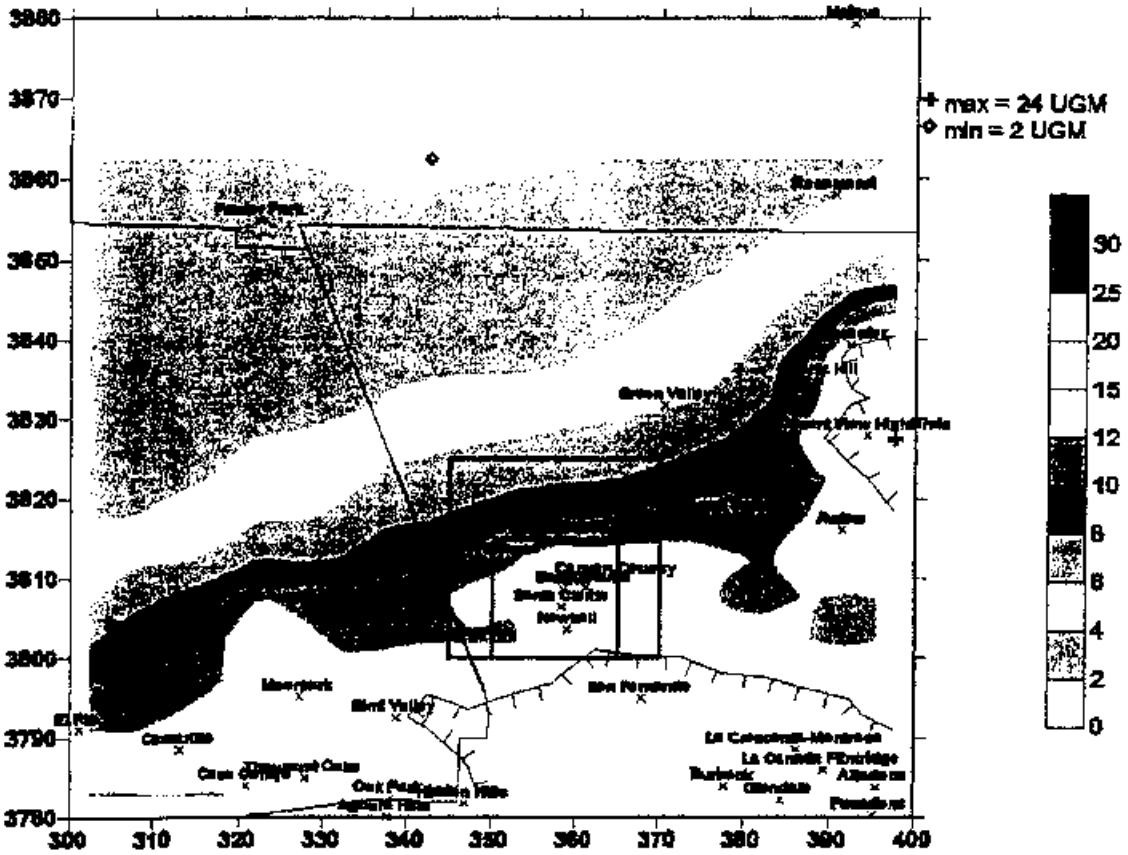
Base Case without Anthropogenic Emissions from a 3x3 Block over Santa Clarita Valley



CAMx Annual PM25
April 1998 - March 1999
Base Case without Anthropogenic Emissions from a 5x5 Block over Santa Clarita Valley

APPENDIX D

Fiscal Issues

Newhall Ranch Fiscal Impact Analysis
September 2006

NEWHALL RANCH WESTSIDE COMMUNITIES FISCAL IMPACT ANALYSIS: LOS ANGELES COUNTY CALIFORNIA

Prepared for:
NEWHALL LAND AND FARMING COMPANY

Prepared by:
ALLAN D. KOTIN & ASSOCIATES , AND
CBRE CONSULTING

SEPTEMBER 2006

ALLAN D. KOTIN & ASSOCIATES | CBRE CONSULTING

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September 19, 2006

Mr. Genji Nakata
Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, California 91355

Re: Fiscal Impact Analysis of Proposed Newhall Land Westside Communities Development

Dear Mr. Nakata:

Allan D. Kotin & Associates and CBRE Consulting are pleased to submit this report regarding the fiscal impact of the proposed development of the Westside Communities in Los Angeles County, California which has been prepared at the joint request of your company and the Chief Administrative Officer of Los Angeles County. The report discusses the proposed Project's marginal net fiscal impact on the County of Los Angeles resulting from the development being undertaken in an unincorporated area of the County, as opposed to an incorporated area.

Please note that the research for this analysis was completed in July 2006. Accordingly, we assume no responsibility for events or circumstances pertinent to the development or Los Angeles County's fiscal circumstances occurring after that date.

It has been a pleasure working with you on this assignment. Please let us know if you have any questions or additional needs.

Sincerely,

Allan D. Kotin
Principal

Ross S. Selvidge, Ph.D.
Managing Director

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I. EXECUTIVE SUMMARY

INTRODUCTION

The purpose of this Study is to estimate a portion of the net fiscal impact on Los Angeles County ("County") of the development of the 3,294 gross acres of land ("Project") in an unincorporated portion of the County in the vicinity of the Santa Clarita Valley and currently owned by Newhall Land and Farming Company ("Newhall Land"). The Study was undertaken at the joint request of Newhall Land and the County.

The Study focuses on the revenues the County will receive and expenses that the County will incur as a result of the proposed Project being developed in an unincorporated area of the County rather than in an incorporated city. Consequently, this Study excludes both revenues that the County receives and the expenditures that the County must incur on a County-wide basis, i.e., in both incorporated and unincorporated areas of the County.

The Study also estimates the one-time economic impacts of developing the Project on both Los Angeles County and Ventura County. These impacts were measured in terms of dollar output, payroll, jobs, and taxes.

The research for the Study was completed in July 2006 based largely on information provided during the first quarter of 2006. Accordingly, Allan D. Kotin & Associates and CBRE Consulting assume no responsibility for changed market conditions events or changes in Los Angeles County's fiscal circumstances occurring after that date.

The study deals only with the operating impacts of the Project. Capital costs for required infrastructure are not considered although the maintenance of such infrastructure and the impact of infrastructure timing on operating costs are both considered.

SUMMARY OF FINDINGS

Project Description and Impact Area

Upon completion the proposed Project will consist of a wide range of residential and non-residential products. The Project will be divided into seven communities, sometimes referred to as the Westside Communities, each with a different mix of products. A total of 27,893 residential units and 10.9 million square feet of non-residential improvements are planned. The first project components would be completed in 2009 with the final components completed in 2025. The projected resident population of the completed project is 74,250. It is estimated that a total of 32,400 employees will work in the project. The breakdown by major product type for the entire Project and each community is shown in Figure 1.

Figure 1
Development Program

	Entrada	Homestead	Potrero	Mission Village	Legacy	Landmark	Commerce Center	Project Total
Residential Units								
Owner-Occupied	2,827	5,488	7,908	4,285	2,741	993	0	24,950
Rental	708	187	520	1,046	739	451	0	3,651
Combined	3,535	5,675	8,428	5,331	3,480	1,444	0	27,893
Non-Residential SF								
Retail	1,543,625	27,500	628,500	314,850	170,000	94,199	300,715	3,079,389
Office	1,173,150	132,500	628,500	984,150	316,000	279,502	1,159,795	4,673,597
Other incl. Hotel	170,024	0	0	0	0	0	0	170,024
Industrial R&D	115,214	1,090,000	0	0	0	0	1,739,490	2,944,706
Combined	3,002,013	1,250,000	1,257,000	1,299,000	486,000	373,701	3,200,000	10,867,716

The impact area with which this Study deals is the unincorporated area of the County, west of Interstate 5 and north of the City of Los Angeles. Those areas include the developed areas known as Stevenson Ranch and Westridge, as well as the area around Magic Mountain. Exhibits 1 and 2 identify the location of the seven communities in the Project and the adjacent impact areas.

The annual net fiscal impact to the County was estimated on an annual basis in uninflated 2006 dollars for the entire 16-year build-out schedule. Principally because of the need to have a full fire station in place and operating at that point, the Project is projected to have a negative net fiscal impact, i.e. a deficit, in the second year. The net fiscal impact returns to positive, i.e., a surplus, in the third year and by the fifth year the annual surplus is projected to reach approximately $10.7 million. The net fiscal impact is estimated to reach $33.9 million in 2017 and $41.1 million in 2021. Upon completion of the build-and by 2025, the net fiscal impact is estimated to reach at approximately $42.3 million. The projected annual revenues and expenditures at five points in time during the build-out are shown in Figure 2 and are presented in more detail in Exhibit 3.

Figure 2
Total Annual Fiscal Impact (000)

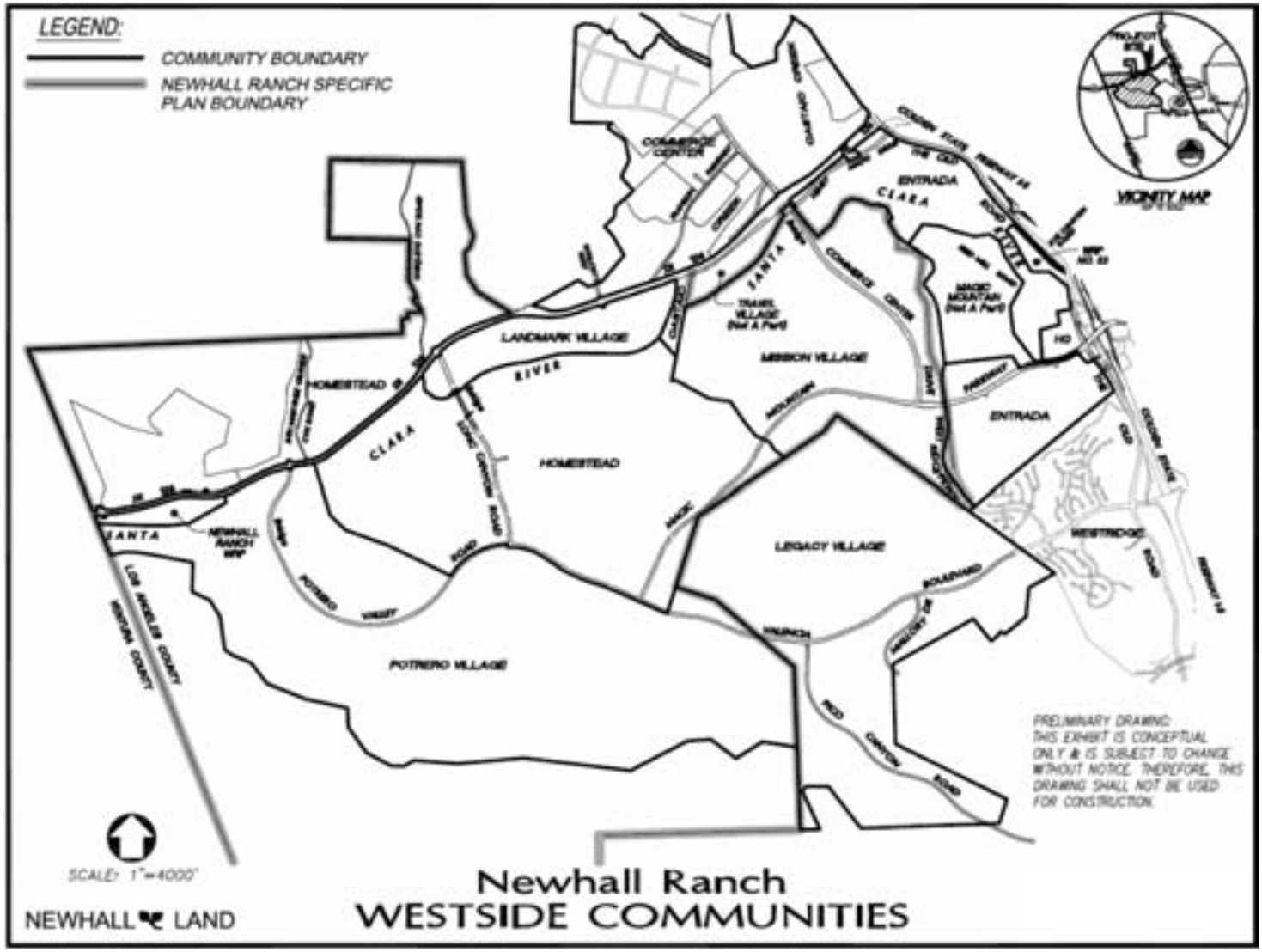
	2009	2013	2017	2021	2025
Revenues	$1,412	$26,493	$66,448	$78,530	$80,394
Expenditures	$682	$15,802	$32,540	$37,475	$38,047
Net	$730	$10,691	$33,908	$41,055	$42,347

The surplus that emerges as the Project reaches full build-out is attributable to a combination of factors. The County's various shares of the property tax in the Project area is relatively large and the properties will have relatively high assessed values because they will be going on the tax rolls at full market value. This produces a high level of revenues per resident or employee. In addition, a substantial amount of annual maintenance services that the County (or a city) might otherwise have to provide and fund are effectively being privatized or internalized by the Project through funding from homeowners associations or special tax or assessment districts. Annual maintenance of roadways is an example of services that will be funded in part from those alternative sources and reduce what would otherwise be County funding obligations.

Exhibit 1: Project Area Regional Context

Source: CB Richard Ellis

Exhibit 2: Community Boundaries



Source: Newhall Land

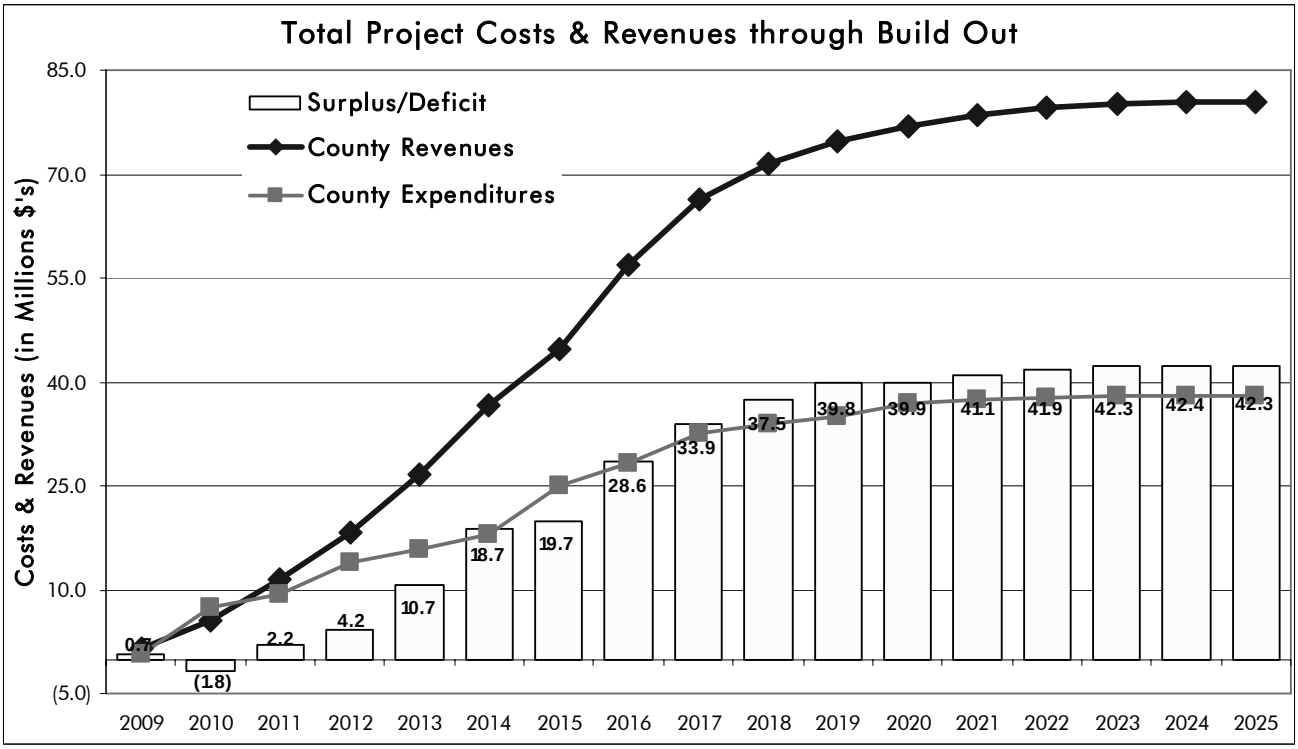
Exhibit 3

Summary of Revenues and Expenditures at 4-year Intervals

Expenditure/Revenue Items	Expenditures/Revenues in $ 000's					As Percentage of Total Revenues/Expenditures				
	2009	2013	2017	2021	2025	2009	2013	2017	2021	2025
REVENUES	**$1,412**	**$26,493**	**$66,448**	**$78,530**	**$80,394**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Property - General Levy	1,091	20,620	49,645	60,473	62,207	77.2%	77.8%	74.7%	77.0%	77.4%
Property - Special Taxes	40	788	1,893	2,322	2,401	2.8%	3.0%	2.8%	3.0%	3.0%
Retail Sales Tax	48	1,951	7,203	7,734	7,825	3.4%	7.4%	10.8%	9.8%	9.7%
Utility User Tax	57	1,699	4,414	5,167	5,300	4.0%	6.4%	6.6%	6.6%	6.6%
Transient Occupancy	0	0	1,232	1,232	1,232	0.0%	0.0%	1.9%	1.6%	1.5%
Docmentary Transfer	166	1,262	1,665	1,101	908	11.7%	4.8%	2.5%	1.4%	1.1%
Franchise Fee	11	173	395	502	520	0.8%	0.7%	0.6%	0.6%	0.6%
EXPENDITURES	**$682**	**$15,802**	**$32,540**	**$37,476**	**$38,047**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Sheriff's	291	4,399	10,036	12,743	13,200	42.6%	27.8%	30.8%	34.0%	34.7%
Fire Protection	0	5,660	12,513	12,513	12,513	0.0%	35.8%	38.5%	33.4%	32.9%
Library	0	1,714	1,714	2,940	2,940	0.0%	10.8%	5.3%	7.8%	7.7%
Public Works	242	1,044	1,483	1,675	1,675	35.4%	6.6%	4.6%	4.5%	4.4%
Animal Care & Control	12	180	412	523	541	1.7%	1.1%	1.3%	1.4%	1.4%
Parks	49	958	2,487	2,487	2,487	7.2%	6.1%	7.6%	6.6%	6.5%
Recreation	11	173	395	502	520	1.7%	1.1%	1.2%	1.3%	1.4%
Planning	16	237	541	686	711	2.3%	1.5%	1.7%	1.8%	1.9%
General Admin	62	1,437	2,958	3,407	3,459	9.1%	9.1%	9.1%	9.1%	9.1%
SURPLUS/(DEFICIT)	**$730**	**$10,691**	**$33,908**	**$41,054**	**$42,347**	**52%**	**40%**	**51%**	**52%**	**53%**

Note:

- Surplus/(Deficit) percent is a percentage of Total Revenues for respective Communities.
- All Dollar Amounts are in Uninflated 2006 Dollars.



Over time, the amount of the surplus as a percent of the total revenues can be expected to decline somewhat. This would be caused by the tendency for 1) municipal service costs to rise at a rate in excess of general inflation, and 2) the total assessed value of properties to lag behind actual market values. However, because of the size of the projected surplus at full build-out, it is unlikely that it could be significantly eroded by this effect.

Ventura County Impacts

There should also be a modest permanent beneficial fiscal impact on Ventura County from the full build out of the project. This modest impact is associated primarily with the completion of the Portrero community which extends virtually to the Ventura County line and which is actually more accessible to the currently limited urban areas of eastern Ventura County than to most of the urbanized portions of Los Angeles County.

Due to this circumstance and to the general proximity of much of the development to residents of eastern Ventura County, there should some positive economic impact on Ventura from the creation of additional jobs, primarily in the service industries, that are readily accessible to Ventura County residents.

Furthermore, to the extent that there currently exists some retail in eastern Ventura County and more is likely to develop over the term of this analysis, the proximity of the Portrero community residents should provide some additional support for Ventura County retailing.

Economic Impact

During the construction period of the Project (extending over 16 years) there will be significant one-time economic impacts on both Los Angeles and Ventura counties. Those impacts were estimated in terms of dollar output, payroll, jobs and taxes (state and local). The cumulative total impact of the Project on Los Angeles and Ventura counties over the term of the build-out is shown in Figure 3. A further breakdown of these impacts is presented in Exhibit 4.

These figures combine direct, indirect and induced impacts. The direct impact is that associated with the development of the Project itself. The indirect and induced impacts result from the direct impact of the Project being multiplied as businesses and households re-spend and spur activity in other sectors of the economy.

There will also be ongoing economic impacts. Notably, there may be a significant positive economic impact in the portion of northeastern Ventura County nearest to the Project. This impact would be expected both because of the proximity of the western portions of the Project to the Ventura County line and the convenience that businesses in that portion of Ventura County could offer to residents of the Project.

Figure 3
Combined Direct, Indirect & Induced Economic Impacts from Construction of the Project

	Los Angeles County	Ventura County	Total
Direct Construction Impacts			
Output (Millions)	$6,984	-	$6,984
Payroll (Millions)	$2,969	-	$2,969
Jobs	55,205	-	55,205
Indirect Impacts			
Output (Millions)	$2,549	$174	$2,723
Payroll (Millions)	$1,031	$78	$1,108
Jobs	23,627	1,776	25,403
Local Taxes (Millions)	$378	$28	$405
Induced Impacts			
Output (Millions)	$3,081	$245	$3,326
Payroll (Millions)	$1,086	$86	$1,172
Jobs	28,649	2,278	30,927
Total Impacts			
Output (Millions)	$12,613	$419	$13,032
Payroll (Millions)	$5,086	$164	$5,250
Jobs	107,481	4,054	111,534
Local Taxes (Millions)	$378	$28	$405

Sources of Information

The information on which this analysis is based derives largely from three sources:

1. Project descriptive information has been provided by Newhall Land and reviewed for both internal consistency and consistency with various publicly filed environmental documents.

2. Conversion of project parameters into revenue and employment impacts is based on factors assembled by the consulting team reflecting, for the most part, standard or widely accepted factors with well defined and clearly noted sources.

3. Expenditure data has in all cases come from Los Angeles County and, except for two expenditure areas, reflect responses by County officials to inquiries based specifically on a description of the Project. For Public Works, Recreation and Parks, project specific estimates could not be obtained and instead the consultants have extrapolated the relevant costs from recent County budget data on departmental expenditures in comparable geographic areas.

Finally, it should be noted that the consultant team has, when exercising judgment within a range of estimates, consistently chosen to utilize conservative assumptions, that is to say those which would understate revenues and overstate expenses.

Exhibit 4

One-Time Economic Impacts During Development (2009-2025)
Allocation to Counties /1

	Shares of Total Impacts				Total Impacts				Direct			Indirect				Induced		
	Output	Payroll	Jobs	Tax	Output (Million)	Payroll (Million)	Jobs	Tax (Million)	Output (Million)	Payroll (Million)	Jobs	Output (Million)	Payroll (Million)	Jobs	Tax (Million)	Output (Million)	Payroll (Million)	Jobs
Single Family																		
Los Angeles	96.9%	96.6%	96.1%	93.4%	$6,128	$2,193	$47,094	$190	$3,419	$1,176	$21,870	$1,378	$547	$12,853	$190	$1,330	$469	$12,371
Ventura	3.1%	3.4%	3.9%	6.6%	197	77	1,923	14	0	0	0	91	40	940	14	106	37	984
Total	100.0%	100.0%	100.0%	100.0%	6,325	2,270	49,017	204	3,419	1,176	21,870	1,469	587	13,793	204	1,436	506	13,354
Multi Family																		
Los Angeles	96.8%	97.0%	96.5%	92.9%	$3,243	$1,350	$28,280	$90	$1,840	$821	$15,125	$585	$241	$5,551	$90	$818	$288	$7,604
Ventura	3.2%	3.0%	3.5%	7.1%	107	42	1,035	7	0	0	0	42	19	430	7	65	23	605
Total	100.0%	100.0%	100.0%	100.0%	3,350	1,392	29,315	97	1,840	821	15,125	627	260	5,982	97	883	311	8,208
Commercial																		
Los Angeles	96.6%	97.2%	96.7%	93.0%	$3,265	$1,554	$32,323	$98	$1,737	$979	$18,332	$589	$244	$5,258	$98	$939	$331	$8,733
Ventura	3.4%	2.8%	3.3%	7.0%	116	45	1,103	7	0	0	0	41	19	408	7	75	26	694
Total	100.0%	100.0%	100.0%	100.0%	3,381	1,599	33,426	105	1,737	979	18,332	631	263	5,666	105	1,014	357	9,428
All Uses																		
Los Angeles	96.8%	96.9%	96.4%	93.2%	$12,635	$5,096	$107,697	$378	$6,995	$2,976	$55,327	$2,553	$1,032	$23,662	$378	$3,087	$1,088	$28,708
Ventura	3.2%	3.1%	3.6%	6.8%	420	164	4,061	28	0	0	0	174	78	1,779	28	245	86	2,282
Total	100.0%	100.0%	100.0%	100.0%	13,055	5,260	111,758	406	6,995	2,976	55,327	2,727	1,110	25,441	406	3,332	1,174	30,990

Ventura County (2006 $'s)

Total output (GDP) - all industries	$44,574,824,000
Total wages (Per IMPLAN)	14,920,789,000

Project as Percent of Ventura County Total /2

Total Output	**0.94%**
Total Payroll	**1.10%**

Notes:

/1 Sources: Applied Economics; IMPLAN; and CBRE Consulting

/2 Project 16-Year total compared to current one-year Ventura County total.

II. INTRODUCTION

PURPOSE OF THE STUDY

The primary purpose of the Study is to estimate the revenues that the County would receive, and expenditures for which it would be responsible, by virtue of the Project being developed in an unincorporated, as opposed an incorporated area of the County. Both the County and Newhall Land have an interest in the extent to which the new revenues that would be generated by the Project can be expected to cover the cost to the responsible jurisdiction of providing required "municipal" services for the Project. The extent to which the Project is likely to generate a net fiscal burden or a net fiscal surplus is of importance to the County in determining how it would plan to provide the necessary support services for the development.

A secondary purpose of the Study is to estimate the one-time economic impact on both Los Angeles and Ventura counties that would result from the construction of the Project over its build-out period. These are measured in terms of dollar output, payroll, number of jobs, and indirect tax revenues. Those impacts consist of direct, indirect and induced components. In the case of this Project, the direct impacts result from construction of the Project itself. The indirect impacts are new economic activity resulting from new business-to-business activity required to support the direct impact. The induced impact is a result of new spending by households as a result of their increased household income.

SOURCES OF INFORMATION

Information for this Study was obtained from a variety of sources. Newhall Land was the primary source of information on the physical and economic characteristics of the Project such as types and numbers of units, market values and timing of the build-out and were reviewed for reasonableness by the Consultants. The Office of Unincorporated Area Services of the Los Angeles County Chief Administrative Office was a primary contact on general budget matters. Other County departments were contacted for revenue and cost information for specific areas of concern. The Environmental Impact Report ("EIR") for the Project that has been certified by the County was also a source of some data. Data from the Consumer Expenditure Survey published by the U.S. Bureau of Labor Statistics were also used in projecting spending by new residents. Surveys of the surrounding areas were conducted to arrive at estimates of activities such as future shopping patterns. All financial figures are in terms of 2006 dollars.

LIMITATIONS

This Study is based on the Project assumptions presented. To the extent the actual Project differs in a material way from those assumptions, the fiscal impact may also differ materially. The results are also contingent on the basic parameters of the various revenues and expenditures on the part of the county remaining relatively constant over the term of build-out. This report is subject to the appended Assumptions and General Limiting Conditions.

ORGANIZATION OF THE REPORT

The report is organized into eight sections. Those sections are as follows.

I. Executive Summary
II. Introduction
III. Project Description and Specifications
IV. Analytic Approach
V. Revenues
VI. Expenditures
VII. Net Impact
VIII. One-Time Economic Impact

Tabulations of certain assumption derivations and projections of detailed findings are included in the Appendix.

AUTHORSHIP AND ACKNOWLEDGEMENTS

The study was conducted and this report was produced as a joint effort of Allan D. Kotin & Associates and CBRE Consulting ("ADK&A/CBRE"). Ross S. Selvidge, Ph.D. of CBRE Consulting was the principal author of this Study. Allan D. Kotin of Allan D. Kotin & Associates and Thomas R. Jirovsky of CBRE Consulting exercised administrative control. Martin Zimmerman of the Office of Unincorporated Area Services of the Los Angeles County Chief Administrative Office was of particular assistance in obtaining information on which this Study was based. Genji Nakata, Manager of Finance of Newhall Land provided extensive assistance in the form of providing information on the Project and development plans.

III. PROJECT DESCRIPTION AND SPECIFICATIONS

PHYSICAL DESCRIPTION

The Project will be located on 3,294 acres of largely undeveloped land in an unincorporated area of Los Angeles County. The land lies to the west of Interstate 5 ("I-5") on the western edge of the Santa Clarita Valley. State Highway 123 runs from I-5 west through the Project and into Ventura County. The City of Santa Clarita lies just to the east of I-5. The residential communities of Stevenson Ranch and Westridge are in unincorporated areas of the County adjacent to the southeast edge of the Project.

The Project will consist of seven different communities: Entrada, Potrero, Legacy, Homestead, Mission Village, Landmark, and Valencia Commerce Center. Each community will consist of a different mix of residential and non-residential products. These communities are referred to collectively as the Westside Communities.

At full build-out there will be a total of 27,893 residential units. There will be 24,242 owner occupied and 3,651 rental units. Approximately 10.9 million square feet of non-residential improvements are planned. That will consist of 3.1 million square feet of retail space, 4.7 million square feet of office space, 2.9 million square feet of R&D space and a 300-room hotel of approximately 165,000 square feet. Exhibit 5 presents a tabulation of the total number of acres of development, residential units and square feet of non-residential improvements for the entire Project and for each community separately. Exhibit 6 presents a tabulation of the amount of residential development in place in the first year and at four-year intervals thereafter. This proposed development is distinct from existing development on the west side of I-5 such as existing portions of Stevenson Ranch and Westridge.

TIMING OF DEVELOPMENT

A schedule of when the absorption begins and how long it lasts for each project component is presented in Exhibit 5. The first homes will be completed in 2009. The last homes will be completed in 2024. The Project is estimated to be approximately 50% built-out by 2015, and approximately 75% build-out by 2018. From that point, the amount of development slowly tapers off through the completion in 2024. Other than to note that the sales rates implied in the absorption forecasts seem generally reasonable, the consultants express no opinion as to the validity of the implied time periods for planning, land development, and construction.

POPULATION AND ASSESSED VALUE

Based on the average number of residents per each unit type specified in the EIR, the Project will contain 74,256 residents at full build-out. Of those, a total of 66,318 and 7,939 residents will live in the owner-occupied and rental portions of the Project, respectively. At full build-out, the Project will also contain 32,399 employees. The figures at full build-out for the entire Project and each community are presented in Exhibit 5. These are critical inputs for the derivation of fiscal impacts shown later in the report. The number of residents and employees in the first year and at four-year intervals thereafter are presented for the entire Project and each community in Exhibit 6.

Newhall Land provided an estimated sales price (in constant 2006 dollars) for each separate home or product type in the Project or the necessary information to derive those values. Based on the unit values, the total assessed value of the Project was computed. The total assessed value of the owner-occupied residential units was computed at approximately $13.4 billion and the assessed value for rental residential units were estimated at approximately $867 million. The combined assessed value of the non-residential products was estimated at approximately $3.6 billion. These total figures for the entire project as well as the individual communities are presented in Exhibit 5. The assessed values for the project components by community in the first year and at four-year intervals thereafter are presented in Exhibit 6.

PROJECT SPECIFIC FUNDING MECHANISMS

In developing new communities, Newhall Land has in the past and plans in the future to establish a number of special districts or other mechanisms by which the annual cost of maintaining certain public and private facilities will be funded. These may include community facilities districts ("CFD"), assessment districts ("AD"), and homeowner associations ("HOA"). In the case of CFDs or ADs, the facilities maintained would have to be publicly owned. An HOA can maintain privately owned facilities. These mechanisms can pay for the annual maintenance and operation of facilities such as streets, rights of way, open space and recreational facilities. To the extent these mechanisms are created and implemented, the County will be relieved of having to fund these costs from its General Fund revenues as is required in many other unincorporated areas.

HOAs rely on regular periodic assessments on properties for their funding. Maintenance of private roadways, recreation facilities and open space are examples of activities that are typically funded by HOAs. To the extent these are effectively substitutes for public facilities, the County is relieved of what could otherwise be its responsibility for maintenance funding.

CFDs and ADs receive their funding from levies that appear on annual property tax bills. They are in addition to the 1.00% general levy and other levies that have been approved by voters. As with HOA maintained facilities, maintaining publicly owned facilities by means of CFDs and ADs relieves the County of what could otherwise a burden for its general fund.

The consulting team has relied on information from Newhall Land as to which facilities' annual maintenance costs will be financed by CFDs, ADs, and HOAs. These facilities are identified in the discussion of expenditures on section VI. The principal facilities which it was assumed the County would maintain at its own expense were the quantities of roadways and park land that were identified by Newhall Land. The extent to which one or another of these alternative funding mechanisms will be utilized will vary from community to community and will depend on the specific design and facilities in each.

Exhibit 5: Summary of Expenditures and Revenues' Inputs, By Community and Land Use

Community Land Use	Acres	Units	GLA SF	Absorption Term (Years)	Absorption Start Date	Total Population	Total Employees	Assessed Value By Year 2031 /1 (Million $'s) /5	Retail Expenditure /2 in Uninc. LA County (Million $'s) /5	Sales in Project's New Retail Space (Million $'s) /5
TOTAL PROJECT /3	**3294.0**	**27,893**	**10,867,716**	**16.0**	**6/1/2009**	**74,256**	**32,399**	**17,805.65**	**264.92**	**517.63**
Residential for Sale	2,538.0	24,242		16.00	6/1/2009	66,318		13,380.05	219.98	
Apartment Use	139.0	3,651		10.00	1/1/2010	7,939		867.04	23.67	
Commercial - Retail	185.4		3,079,389	8.00	1/1/2010		7,663	1,370.17	5.03	
Commercial - Office	242.4		4,673,597	14.00	1/1/2010		18,694	1,645.83	12.27	
Commercial - Other	6.7		170,024	1.00	1/1/2016		152	40.13	0.10	
Industrial R&D	182.3		2,944,706	6.00	7/1/2010		5,889	502.44	3.87	
ENTRADA /4	**355.3**	**3,535**	**3,002,013**	**12.00**	**9/1/2012**	**8,744**	**8,899**	**2,646**	**35.00**	**260.00**
Residential for Sale	171.9	2,827		10.00	9/1/2012	7,059		1,337.98	24.50	
Apartment Use	23.0	708		7.00	12/1/2014	1,685		162.13	4.66	
Commercial - Retail	88.5		1,543,625	4.00	4/1/2014		3,823	703.42	2.51	
Commercial - Office	55.5		1,173,150	8.00	1/1/2016		4,693	390.49	3.08	
Commercial - Other	6.7		170,024	1.00	1/1/2016		152	40.13	0.10	
Industrial R&D	9.7		115,214	1.00	1/1/2016		230	12.31	0.15	
HOMESTEAD /4	**986.7**	**5,675**	**1,250,000**	**10.00**	**5/30/2010**	**14,777**	**2,779**	**3,547**	**54.55**	**4.95**
Residential for Sale	902.7	5,488		10.00	5/30/2010	14,332		3,347.76	51.50	
Apartment Use	7.4	187		1.00	2/28/2014	445		45.46	1.23	
Commercial - Retail	3.3		27,500	1.00	5/31/2014		69	11.81	0.05	
Commercial - Office	11.7		132,500	1.00	5/31/2014		530	38.81	0.35	
Industrial R&D	61.7		1,090,000	1.00	5/31/2014		2,180	103.53	1.43	
POTRERO /4	**895.0**	**8,428**	**1,257,000**	**11.00**	**11/30/2014**	**23,322**	**4,085**	**5,014**	**78.35**	**106.85**
Residential for Sale	810.0	7,908		11.00	11/30/2014	23,104		4,366.08	72.25	
Apartment Use	20.0	520		3.00	11/30/2017	218		125.33	3.42	
Commercial - Retail	32.5		628,500	2.00	2/28/2016		1,571	230.10	1.03	
Commercial - Office	32.5		628,500	2.00	2/28/2016		2,514	292.84	1.65	
MISSION VILLAGE /4	**413.8**	**5,331**	**1,299,000**	**10.00**	**8/30/2009**	**12,993**	**4,724**	**3,003**	**47.39**	**50.38**
Residential for Sale	317.4	4,285		8.00	8/30/2009	10,378		2,274.69	38.09	
Apartment Use	27.6	1,046		3.00	4/30/2010	2,615		235.16	6.20	
Commercial - Retail	17.8		314,850	3.00	5/31/2012		787	143.08	0.52	
Commercial - Office	51.0		984,150	5.00	5/31/2014		3,937	349.74	2.58	
LEGACY /4	**293.5**	**3,480**	**486,000**	**7.00**	**6/1/2012**	**10,144**	**1,689**	**1,842**	**30.82**	**27.20**
Residential for Sale	225.4	2,741		7.00	6/1/2012	8,296		1,470.78	24.53	
Apartment Use	40.1	739		6.00	9/1/2013	1,848		188.00	5.18	
Commercial - Retail	15.0		170,000	1.00	10/1/2014		425	80.29	0.28	
Commercial - Office	13.0		316,000	2.00	10/1/2014		1,264	103.00	0.83	
LANDMARK /4	**174.7**	**1,444**	**373,701**	**7.00**	**6/1/2009**	**4,275**	**1,354**	**815**	**12.97**	**14.13**
Residential for Sale	110.6	993		3.00	6/1/2009	3,148		582.77	9.11	
Apartment Use	21.0	451		1.00	1/1/2010	1,128		110.96	2.97	
Commercial - Retail	8.7		94,199	1.00	1/1/2010		235	35.45	0.15	
Commercial - Office	34.5		279,502	6.00	1/1/2010		1,118	85.46	0.73	
VALENCIA COM. CTR. /4	**175.0**	**0**	**3,200,002**	**2.00**	**7/1/2010**	**0**	**8,870**	**938**	**5.82**	**54.13**
Commercial - Retail	19.7		300,715	2.00	1/1/2011		752	166.02	0.49	
Commercial - Office	44.4		1,159,795	5.00	7/1/2010		4,639	385.48	3.05	
Industrial R&D	110.9		1,739,492	5.00	7/1/2010		3,479	386.60	2.28	

/1 Includes a 5% additional assessed value for 'Unsecured' commercial property.
/2 The portion of Project Area residents & employees' retail expenditure (excludeing Auto Sales), which is spent in Unincorporated area outside the Project Area.
/3 Refer Exhibit 5.0 for Consolidated Product Level Annual break-up of Costs & Revenues Drivers.
/4 Refer Exhibits 5.1 thru 5.6 for Consolidated Product Level Annual break-up, and Exhibits 6.1 thru 6.6 for Individual Product Level Annual schedule for Costs & Revenues Drivers
/5 All Dollar Amounts are in Uninflated 2006 Dollars.

Exhibit 6:

Summary of Revenue & Expenditure Inputs at 4-year intervals

Use - Product	2009	2013	2017	2021	2025
ABSORPTION					
RESIDENTIAL UNITS	528	9,478	21,036	26,908	27,893
Residential for Sale	528	7,951	18,223	23,257	24,242
Apartment Uses	0	1,527	2,813	3,651	3,651
NON-RESIDENTIAL SF	0	3,316,300	10,253,316	10,743,479	10,853,479
Commercial - Retail	0.0	642,814	3,065,152	3,065,152	3,065,152
Commercial - Office	0.0	1,125,994	4,073,434	4,563,597	4,673,597
Commercial - Other	0.0	0	170,024	170,024	170,024
Industrial R&D	0.0	1,547,492	2,944,706	2,944,706	2,944,706
POPULATION					
RESIDENT	1,636	24,745	56,459	71,682	74,256
Residential for Sale	1,636	20,928	49,552	63,744	66,318
Apartment Uses	0	3,818	6,907	7,939	7,939
EMPLOYEES	0	9,206	29,998	31,959	32,399
Commercial - Retail	0.0	1,607	7,663	7,663	7,663
Commercial - Office	0.0	4,504	16,294	18,254	18,694
Commercial - Other	0.0	0	152	152	152
Industrial R&D	0.0	3,095	5,889	5,889	5,889
ASSESSED VALUE (in Million $'s)	$300	$5,876	$14,138	$17,297	$17,806
Residential for Sale	$300.5	$4,488.6	$10,102.1	$12,903.6	$13,380.1
Apartment Uses	0.0	353.4	671.1	867.0	867.0
Commercial - Retail	0.0	317.0	1,370.2	1,370.2	1,370.2
Commercial - Office	0.0	372.1	1,452.5	1,613.6	1,645.8
Commercial - Other	0.0	0.0	40.1	40.1	40.1
Industrial R&D	0.0	344.7	502.4	502.4	502.4
RETAIL EXPENDITURE (in Million $'s)	$5	$87	$203	$256	$265
Residential for Sale	$4.8	$71.8	$164.9	$211.1	$220.0
Apartment Uses	0.0	9.4	18.1	23.7	23.7
Commercial - Retail	0.0	1.1	5.0	5.0	5.0
Commercial - Office	0.0	3.0	10.7	12.0	12.3
Commercial - Other	0.0	0.0	0.1	0.1	0.1
Industrial R&D	0.0	2.0	3.9	3.9	3.9

Note: All Dollar Amounts are in Uninflated 2006 Dollars

IV. ANALYTIC APPROACH

UNINCORPORATED IMPACT APPROACH

In undertaking this analysis, as expressed both in the consulting team proposal and the formal work statement and contract developed by Newhall Lan, the consulting team explicitly contemplated a focus on those fiscal impacts associated with the presence of the new developments in the unincorporated portions of Los Angeles County. The County of Los Angeles provides a meaningful group of services, i.e. health care, social welfare, the court system etc., to the entire population both in cities and in unincorporated areas. It is not the intention of this study to examine these services. Similarly, there is some amount of Project-generated revenues, primarily but not exclusively associated with property tax that accrue to the County by virtue of its role as a County.

There is a separate set of revenues that accrue to the County by virtue of the fact that the projects exist in unincorporated areas. This report focuses on the revenues uniquely associated with unincorporated status rather than the total revenues.

This approach represents a difference from an earlier fiscal impact study prepared by The Levander Company for Newhall Land in 1996 for the predecessor project. In that study, Levander considered all County revenue and all County expenses.

This methodology used has been adapted directly from the current methodology used by the Unincorporated Services and Special Projects Division of the Los Angeles County Chief Administrative Office, in examining and negotiating the fiscal implications of annexations and incorporations.

Briefly stated, it consists of identifying a group of six services that collectively comprise the core services that change status when an area is incorporated or annexed. The costs of these services are, in most cases, transferred from the County to the City. With respect to revenues, there are a whole group of revenues that automatically transfer by virtue of the fact that they are based on the incorporation status of a project. The revenue in question that is not automatically reclassified is property tax.

The basic method used by the Unincorporated Services Group and by Los Angeles County in annexations is to establish the ratio of property tax to the general fund (the Tax Ratio), and then to reallocate to the City that amount of property tax which equals the Tax Ratio, as defined above, applied to the total of the service costs that are transferred to the City.

For example, if the property tax represents 55% of the General Fund and the combined six services represent an annual cost of $10 million, then 55% of that cost or $5.5 million in property taxes would be shifted, usually after some period of transition, from the County to the City.

The rationale for this narrower approach lies in the assumption that the market forces that cause housing to be built at this location exist largely independent of whether or not the area remains unincorporated. If, for some reason, the County refused to process applications for development, there is a strong likelihood that the property owners would seek either to annex to an existing incorporated city or to incorporate a new jurisdiction. This pattern has characterized several other areas in Southern California and seems likely to occur at this location, absent the imposition of urban growth boundaries or some rule comparable to the SOAR initiative in Ventura County. Whether or not development processing in such alternative jurisdictions would cause changes inthe pattern of development or result in more or less exactions is outside the scope of this study. But historical evidence and the collective

experience of the consulting team confirm the core assumption that all or most of the development would occur anyway.

PRICE LEVEL ASSUMPTION

The analysis was conducted on a constant dollar basis. All figures in the Study are presented in terms of uninflated 2006 dollars. This eliminates the effects of price level changes that can lead to misinterpretation of results, particularly over the long term. As noted in the introduction and elsewhere in the analysis, this assumption may mask some deterioration in the surplus over time due to the lag between inflation in housing costs and a corresponding increase in property taxes.

REVENUES

The revenues that were included in the analysis are primarily taxes from major categories that will be received by the County as a consequence of the Project being located in an unincorporated area of the County. There are five separate property-specific taxes as well as sales tax, utility user tax, documentary transfer tax, and transient occupancy tax. Franchise fees are also included in the analysis. There are a number of other smaller revenues that will produce some revenues for the County. Hoverer, they are relatively small and due to unavailability of data, the portions attributable to the Project's unincorporated status cannot be calculated or estimated with any degree of reliability.

Most of the real estate based taxes are linked to the assessed value of the properties being taxed. The sales tax revenues are estimated based on both the typical sales of the type of retail development proposed and the propensity of the new residents to make taxable purchases outside of the Project, but still in an unincorporated area of the County. Utility user taxes were estimated based on anticipated utility usage. The transient occupancy tax was based on the projected gross room revenues of the hotel component. The documentary transfer tax revenue was estimated based on assumed turnover (i.e., resale) rates for the residential and non-residential components, in addition to the initial development of those properties. The estimates of franchise fees and gasoline tax subventions were based on per capita factors derived from the County's Fiscal Year 2005-2006 budget.

EXPENDITURES

There are eight principal categories of expenditures that the County would have to fund because the Project is in an unincorporated area of the County that it would not or might not be required to fund if the development was in an incorporated area. Those categories are:

1. Law enforcement (Sheriff),
2. Fire protection,
3. Library,
4. Public works,
5. Animal care and control,
6. Parks and recreation,
7. Planning and
8. General administrative support.

There is a wide range of services that the County provides irrespective of whether an area is unincorporated or incorporated. Those services were not included in the analysis

The Sheriff expenditures were estimated by the Sheriff's Department on the basis of an unincorporated area level of service average cost.

The fire protection costs were based on station estimates from the County Fire Department.

Annual Library expenditures and timing of the construction of the library facilities were based on information provided by the County Library. Public works expenditures were estimated based on unit costs provided by the County

Public Works department and physical specifications provided by Newhall Land. Parks maintenance expenditures were estimated based on the unit cost factors from the 1996 Levander fiscal analysis and physical specifications from Newhall Land, inflated to 2006 levels.

Animal care and control, recreation, and planning expenditures were estimated based on per capita factors derived from the County Fiscal Year 2005-2006 budget. For purposes of this calculation of per capita estimates, only the population of the unincorporated area of the County was utilized.

There exists no statutory definition of fiscal impact and it is manifest that fiscal impact will be measured differently as a function of the choice of jurisdiction and the scope of analysis. In this analysis of expenditures the following conventions are used for the reasons given:

- Only operating expenditures are considered since the funding of infrastructure is itself the subject of at least two other processes outside the scope of his analysis: (1) conditions of planning or subdivision approval; and (2) imposition of impact fees.

- Only those expenditures associated with unincorporated status of the project are considered specifically excluding countywide operating costs which would apply if the same improvements were constructed in an incorporated area. The rationale for this is that market forces would likely create the same improvements independent of their "unincorporated" status

- No consideration is given to cost or revenue impacts on jurisdictions other than Los Angeles County although it is manifest that such impacts exist. This convention reflects the critical and dominant nexus between fiscal impact measurement and the development approval process which tends to inevitably focus such impact measurement on the jurisdiction granting development approval.

V. REVENUES

PROPERTY TAXES

General Levy

The general levy property tax in California is set at 1.00% of assessed value. The assessed value of a property in California is set at its full market value each time it is sold or transferred. Between transactions, the assessed value of a property cannot be increased by more than 2.00% per year. Because this analysis is in terms of uninflated 2006 dollars, no change in the assessed values was assumed.

Different taxing entities receive different shares of the 1.00% general levy based on what is called the tax rate area ("TRA") in which a property is located. The vast majority of the land in the Project is in ten different TRAs. In each of those different TRAs, the taxing entities receive a different share of the 1.00% general levy. In addition, the County receives several shares of the 1.00% general levy for different designated purposes. The County share for its General Fund in those TRAs ranges from approximately 20% to 30% of the general levy. For the County Library the shares range from between 2% to 3% of the general levy. For the County Fire Department the share ranges from approximately 17% to 18% of the general levy.

As has already been indicated, if the Project area were to incorporate, the County would lose a part of the share of the general levy allocated to the County's General Fund. At the same time, The County would also shed the financial burden for providing certain "municipal" type services. The County's Chief Administrative Office estimates that the percent of their share of the general levy that is contingent on an area being unincorporated is not less than 55% and probably slightly higher. To avoid overstating the County's General Fund portion of their general levy property tax revenue that is dependent on the area being unincorporated, a 55% factor was used in the analysis.

To estimate the County's several allocations of the property taxes based on assessed value, the TRAs for each community were tabulated and the different allocations of shares of the general levy were averaged for each community. The County's General Fund shares for each community were also multiplied by the 55% factor to obtain the amount of that component of the property tax attributable to its unincorporated status. The County only receives the other two shares of the general levy (for fire protection and the Library) if the County also provides and funds those services. Exhibit 7 presents a derivation of the shares of the general levy for each of those shares for each of the communities.

After adjustment, the County's General Fund share of the general levy that is dependent on the area being unincorporated ranges from approximately 12% to 16% depending on the community involved. The County's general levy share for the Library varies slightly just above 2% in the six communities. The County's General Fund share of the general levy ranges from just below 18% to just over 19%, depending on the community. The combined shares of the general levy for the different communities are in the low to mid 30% range.

Exhibit 7

Assumptions for County Revenues

PROPERTY TAXES

	Property Tax Rate	**1.00%**						
GENERAL LEVY (Potion of 1%)		**Entrada**	**Homestead**	**Potrero**	**Mission Vil**	**Legacy**	**Landmark**	**VCC**
001.05	Los Angeles County General	0.2810	0.2297	0.2204	0.2383	0.2384	0.3003	0.2547
001.20	L.A. County Accum. Cap Outlay	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	Combined	0.2812	0.2298	0.2205	0.2384	0.2386	0.3004	0.2548
	Adjustment factor	55%	55%	55%	55%	55%	55%	55%
	Adj. General Levy	**0.1546**	**0.1264**	**0.1213**	**0.1311**	**0.1312**	**0.1652**	**0.1401**
003.01	L A County Library	**0.0245**	**0.0276**	**0.0276**	**0.0268**	**0.0296**	**0.0226**	**0.0262**
005.25	Road District #5	0.0065	0.0072	0.0072	0.0070	0.0077	0.0061	0.0069
007.30	Consol. Fire Pro. Dist. of L.A.County	0.1755	0.1849	0.1858	0.1832	0.1977	0.1703	0.1816
007.31	L A County Fire-FFW	0.0065	0.0053	0.0051	0.0055	0.0055	0.0069	0.0058
	Combined	**0.1820**	**0.1902**	**0.1909**	**0.1886**	**0.2032**	**0.1772**	**0.1875**

SPECIAL TAXES

	SFD	**Attached**	**Apartment**	**Comm**	**High Rise**
Library					
Per Unit	$25.72	$25.72	$25.72		
Fire Department					
Per Unit	$49.93	$49.93			
Mulit Unit or Commercial					
Base Amount			$63.07	$60.43	$73.58
Average					
Units Per Parcel			100		
Sq Ft Per Unit			1,100		
Sq Ft Per Parcel			110,000	200,000	200,000
Sq Ft Component					
Overage					
Exempt SF			1,555	1,555	1,555
Taxed SF			108,445	198,445	198,445
Tax Rate PSF			0.0064	0.0407	0.0496
Tax Amount			$694.05	$8,076.71	$9,842.87
Total			$757.00	$8,137.00	$9,916.00
Average Tax per Unit or SF			$7.57	$0.04	$0.05

DOCUMENTARY TRANSFER TAX

			County Share	As % of Transfer Value
Tax Dollars	$1.10	0.11%	50.00%	0.055%
Per Transfer Value	$1,000			

UTILITY USER TAXES

Water, Electricity & Gas Bill	**Residential**	**Retail**	**Office**
Per Unit	$1,560.00		
Per SF		$2.80	$2.00
Tax Rate	5%		
Telephone Bill			
Per Unit	$600		
Per Employee		$420	$780
Tax Rate	5%		

	Weighted Average Usage for Commercial Area by Community					
Electricity & Gas	**Entrada**	**Homestead**	**Potrero**	**Mission Vlg.**	**Legacy**	**Landmark**
Per SF	$2.41	$2.02	$2.40	$2.19	$2.28	$2.20
Telephone						
Per Employee	$595	$772	$600	$693	$654	$689

Note: All Dollar Amounts are in Uninflated 2006 Dollars

Exhibit 7 (Continued)

Assumptions for County Revenues

TRANSIENT OCCUPANCY TAX	
Number of Rooms	300
Hotel Sales' Tax	
Taxable Sales	
% of Room Revenue	30%
Amount	3,079,800
Tax	
Rate	1.00%
Amount	30,800
Gross Room Revenue	
ADR	$125
Occupancy	75%
Days	365
Amount	$10,266,000
Transient Occupancy Tax	
Rate	12.00%
Amount	$1,231,920

RETAIL SALES TAX							
General Sales Tax							
Tax Rate	1.00%						
Retail Space (SF)	**Entrada**	**Homestead**	**Potrero**	**Mission Vil**	**Legacy**	**Landmark**	**VCC**
A	28,475	27,500	628,500	97,650	170,000	6,534	0
B	194,150	0	0	73,500	0	7,079	91,429
C	750,000	0	0	16,000	0	80,586	209,286
D	571,000	0	0	121,500	0	0	0
E	0	0	0	6,200	0	0	0
Total	1,543,625	27,500	628,500	314,850	170,000	94,199	300,715
Groceries							
Sq Ft Each	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Number	2	0	2	2	1	1	0
Total Sq Ft	120,000	0	120,000	120,000	60,000	60,000	0
Percent of Total	7.8%	0.0%	19.1%	38.1%	35.3%	63.7%	0.0%
Taxable Sales							
Non-Grocery							
Percent of Sq Ft	92.2%	100.0%	80.9%	61.9%	64.7%	36.3%	100.0%
Sales PSF							
Un-Adjusted	$250	$250	$250	$250	$250	$250	$250
Non-Tax & Vacancy	30%	30%	30%	30%	30%	30%	30%
Adjusted	175	175	175	175	175	175	175
Grocery							
Sales PSF							
Total	450	450	450	450	450	450	450
Taxable							
Percent	30%	30%	30%	30%	30%	30%	30%
Amount	140	140	140	140	140	140	140
Combined Weighted PSF							
Non-Grocery	161	175	142	108	113	64	175
Grocery	11	0	27	53	49	89	0
Average used for Sales est.	**170**	**180**	**170**	**160**	**160**	**150**	**180**
	262,416,250	4,950,000	106,845,000	50,376,000	27,200,000	14,129,850	54,128,700

FRANCHISEE FEES	
Per Capita	$7.00

Note: All Dollar Amounts are in Uninflated 2006 Dollars

The assessed values for each of the separate owner-occupied residential unit types were based on target sales prices in 2006 dollars that were provided by Newhall Land. The assessed values for each of the separate income producing product types (rental residential and commercial) were derived based on projected rental income, as well as estimates of expense ratios and market capitalization rates. The total Project assessed value is estimated at approximately $300 million in the first year. Upon completion the assessed value is estimated at a total of approximately $17.8 billion. The residential component is valued at approximately $14.2 billion and the non-residential component is valued at approximately $3.6 billion.

In each community, each year's cumulative assessed value is multiplied by the appropriate percent share of the general levy to produce the annual property tax revenues for the different allocations (General Fund, fire protection and Library). As indicated in Figure 4a, the general levy revenues begin at approximately $1.1 million in the first year and rise to approximately $62.2 million at full build-out in 2025. The largest component of those funds are the share of the general levy dedicated to fire protection, followed closely by the General Fund component and then the Library component.

Figure 4a

	2009	2013	2017	2021	2025
Property Taxes – General Levy (000)	$1,091	$20,620	$49,645	$60,473	$62,207

Special Taxes

There are two special taxes that are levied in addition to the general levy and which the County would not receive if it were not required to provide certain services. One special tax is an augmentation to the County Library funding. That tax is levied at an annual rate of $25.72 per residential unit (owner-occupied or rental). During the build-out of the Project, this annual revenue is estimated to start at $14,000 and rise to approximately $717,000 in 2025.

The other special tax is dedicated to funding fire protection. It is levied on the basis of a formula that is applies different rates to the square feet of improvements of different types of non-owner occupied residential and commercial properties. A flat rate per unit is applied to owner-occupied residential properties. During the build-out of the Project, this annual revenue is estimated to start at approximately $26,000 and rise to approximately $1.7 million in 2025, giving total special taxes starting at $40,000 in 2009 and rising to approximately $2.4 million in 2025 (Figure 4b). The derivation of the rates applied to the different product types in the Project is presented in Exhibit 7.

Figure 4b

	2009	2013	2017	2021	2025
Special Taxes (000)	$40	$788	$1,893	$2,322	$2,401

DOCUMENTARY TRANSFER TAX

This tax is levied on the value transferred in most real estate transactions in California. The County receives a share of this value-based tax. The amount the County receives is 0.055% of the value of the real estate transferred. The County will receive these revenues when the various properties are first developed and sold to initial buyers, as well as when properties in the Project re-sell over time.

In each year the value of the new properties developed and sold to their initial purchasers is multiplied by the 0.055% rate to produce the documentary transfer tax from the initial sale. In addition, in each year, the value of all the previously developed properties is multiplied by a factor to estimate the value of the properties that, on average, can be expected to resell each year. That value of the resold properties is also multiplied by the 0.055% tax rate to produce the other component of the County's annual documentary transfer tax revenues. Residential real estate in California is widely believed on average, to sell at an interval of less than 10 years. Commercial real estate is believed to sell at a less frequent interval. To avoid overestimating the County's documentary transfer tax revenues, it was assumed that the owner-occupied residential properties sold on average of once every ten years. This would produce a 10% annual turnover for those properties. It was assumed that the other properties sold on average at a 20-year interval which would produce a 5% annual turnover for those properties.

In the first year, it is estimated that the County will receive approximately $166,000 in revenue from the documentary transfer tax, all from the initial purchases of the newly developed properties. The annual revenue is estimated to rise to $908,000 in 2025 at full build-out when the revenue would be generated by the resale transactions. Figure 4c presents these revenues at five points in time over the build-out.

Figure 4c

	2009	2013	2017	2021	2025
Documentary Transfer Taxes (000)	$166	$1,262	$1,665	$1,101	$908

UTILITY USER TAX

The County levies a 5.00% tax on the consumption of electric power, water, natural gas, and telephone service for both residential and non-residential users. The Project contains residential units of varying size and different types of non-residential products. An average annual dollar usage for the different utilities per residential unit was estimated. Those estimates were based on industry standard assumptions and trade sources such as the Building Owners and Managers Association (BOMA) and International Conference of Shopping Centers (ICSC). Those estimates were then multiplied by the number of completed units to produce the total annual dollar amount of utility usage by residential properties in each year. This dollar usage was multiplied by the 5.00% tax rate to produce the total annual utility user tax revenue for the County. The usage by the non-residential properties was estimated on a usage per square foot basis for electric power, water and natural gas and on a per employee basis for telephone service. These factors are presented in Exhibit 7.

In the first year, it is estimated that the County will receive approximately $57,000 in revenue from the utility user tax. The annual revenue is estimated to rise to $5.3 million in 2025 at full build-out. Figure 4d presents these revenues at five points in time over the build-out.

Figure 4d

	2009	2013	2017	2021	2025
Utility User Taxes (000)	$57	$1,699	$4,414	$5,167	$5,300

TRANSIENT OCCUPANCY TAX

The County levies a 12.00% transient occupancy tax ("TOT") on room revenues for hotels and motels located in unincorporated areas of the County. The Project contains a 300-room hotel that is scheduled to be completed in 2016. Based on estimates of average daily room rates ("ADR") and occupancy, an estimate of the annual gross room revenues was derived. This 12.00% was then applied to produce an estimate of the annual TOT revenue that the County would receive. Based on a relatively conservative estimate of the potential ADR, the annual TOT revenue is estimated to be in the range of $1.2 million. This derivation is presented in Exhibit 7.

Figure 4e

	2009	2013	2017	2021	2025
Transient Occupancy Taxes (000)	$0	$0	$1,232	$1,232	$1,232

In estimating the revenue from TOT generated by the new hotel facilities in the Project, the consultants have not considered any offset for possible transfer of patronage from existing hotels. However, at the same time, no effort has been made to estimate the additional patronage of existing hotels that will be created by visitors to the more than ten million square feet of new commercial space and over 27,000 new housing units developed as part of the Project. Consequently, the overall additional TOT revenues are likely to be understated, a result consistent with the general approach taken by the consultants. In this instance, any attempt to quantify induced hotel demand would require a host of essentially unverifiable assumptions about travel mix, access patterns, room rates and other items that would be highly speculative at this time.

SALES TAX

The County receives a 1.00% sales tax on all taxable purchases that take place at retailers located in the unincorporated areas of the County. The Project will produce new sales tax revenue for the County from two sources. The first source is the new taxable sales that will occur at the new retail space that is developed in the Project itself. The second source of new sales tax revenue will be from taxable purchases by the Project's residents and employees in nearby retailers in unincorporated areas of the County.

Shopping Patterns

The retail development that is planned in the Project is both local and regional serving. It can be expected to capture a large portion of the residents' spending on goods that are normally purchased close to home. The Project will also capture a portion of their other retail sales. Employees who work in the commercial portions of the Project can also be expected to spend a small but measurable amount on purchases near their workplace.

Based on the type of retailing that the Project will offer and a thorough survey of the shopping alternatives that are available outside of the Project, it was estimated that Project residents would make in the range of 32% of their non-automobile related retail purchases at new retailers in the Project. That same analysis also estimated that the residents of the Project would make approximately 15% of their non-automobile related retail purchases in nearby unincorporated areas of the County. Sales tax from both of those sources would be new sales tax revenue for the County.

Sales in Project Retail Components

Retail sales at the Project's retail components were estimated by dividing the components into categories to which industry standard sales productivity rates were then applied. Allowances were made for taxable and non-taxable sales and services as well as vacancies. The average annual taxable sales per square foot for each community were then multiplied by the number of retail square feet in operation in each community in each year. There will also be some sales tax associated with the hotel operation from "in house" taxable retail purchases by guests. The annual total taxable sales were multiplied by the 1.00% tax rate to derive the sales tax revenue to the County. The derivation of the sales per square foot figures is presented in Exhibit 7.

As previously noted, spending by the residents of the Project will account for a portion of the total retail sales in the Project. The remainder will be derived from spending by persons employed in the Project and other patrons who both live and work elsewhere. At full build-out and assuming the Project's retail achieves an industry standard level of sales productivity, the annual taxable sales are projected to reach $517 million.

Unlike virtually all other revenue estimates in this report, this projection of sales tax was not based essentially on endogenous, i.e. internal, characteristics of this project. In this instance, the large amount of proposed retail space must rely on patronage from other growth in the north county area for market support if it is to achieve target sales levels per square foot. The consultants have determined that, as of this date, projections show substantial non-Newhall Land growth in population and no apparent competitive projects in locations as well suited to capturing this growth as the Entrada and Valencia Commerce Center communities. Nevertheless, the consultants feel that it is appropriate to note that this estimate, unlike most of the others in this report, relies on the realization of projections and development patterns outside the control of Newhall land.

Total Sales Tax

In order to estimate the amount of new retail spending that may be generated by Project residents, it is necessary to estimate both the household incomes of the new residents as well as their spending patterns. The household incomes were computed by estimating how much household income would be required to afford and occupy the residential units in the Project. This was done utilizing factors such as the value of the owner-occupied house or rent, the amount of household income commonly spent on housing and home financing parameters such as down payments and interest rates. The required household incomes were divided into ranges and for each range a spending pattern was applied to derive the amount of total retail spending and the taxable portion.

The data on retail spending patterns by income level were obtained from the Consumer Expenditure Survey compiled by the Bureau of Labor Statistics. Based on that data, households in the Project area will spend between 18% and 26% of their income on non-automotive retail purchases. Across all income levels, the portion of that retail spending spent on taxable purchases ranges from 86% to 89%. The estimate of spending by employees was based on survey data from the ICSC which has analyzed employee spending patterns.

In the first year, before retail in the Project is completed, it is estimated that the County will receive approximately $48,000 in revenue that will come from sales tax on new purchases by Project residents outside the Project. The new annual sales tax revenue is estimated to rise to $7.8 million in 2025 at full build-out. Approximately 66% of the County's sales tax revenue is expected to be generated by the new

retail space in the Project with the balance coming from residents' expenditures elsewhere in the unincorporated County.

The geographic distribution of retail facilities within the project is not at all uniform as between the six communities. The Entrada and Potrero communities will ultimately account for approximately 66% of the total taxable retail sales in the Project. Figure 4f presents total sales tax revenues at five points in time over the build-out.

Figure 4f

	2009	2013	2017	2021	2025
Retail Sales Taxes (000)	$48	$1,951	$7,203	$7,734	$7,825

FRANCHISE FEES

These fees are changed to providers of services such as cable television in unincorporated areas. The amount of the revenues is considered to be generally correlated with the population in the unincorporated areas. Based on the County Fiscal Year 2005-2006 budget, the average annual per capita revenue to the County from this source is approximately $7.00. This will produce approximately $11,000 in revenues in the first year and rise to approximately $520,000 at full build-out in 2025. The amounts of these revenues at five different points in time during the build-out are presented in Figure 4g.

Figure 4g

	2009	2013	2017	2021	2025
Franchise Fees (000)	$11	$173	$395	$502	$520

VI. EXPENDITURES

SHERIFF

The County will provide law enforcement services to the Project via the Sheriff's Department. The cost of those services will be funded from the County's General Fund.

The Sheriff's Department provided an estimate of the cost of services to the Project. It is based on a specified level of staffing and the fully burdened cost per deputy. The level of service specified is one deputy per 1,000 residents. The current fully burdened annual cost per deputy is $179,000. On that basis and at full build-out, the total annual cost for law enforcement services for the Project will equal approximately $13.2 million. This is equivalent to approximately $179 per capita based on resident population.

Figure 5a

	2009	2013	2017	2021	2025
Sheriff Costs (000)	$291	$4,399	$10,036	$12,743	$13,200

For any jurisdiction law enforcement services are a function of the character of the area to be served and the desire on the part of elected officials to have a certain level of service. As a point of comparison for the estimate of the cost for the Project, the cost of contract law enforcement from the Sheriff's Department for the City of Santa Clarita was investigated. The City of Santa Clarita is generally similar demographically to the Project and has a very similar ratio of resident population to employees. The City of Santa Clarita currently pays approximately $13.8 million per year for contract law enforcement services from the Sheriff's Department. This is equivalent to approximately $82 per capita. The difference between these two per capita cost figures for generally similar areas is not known. However, it is a strong indicator that the estimated cost for the Project is very unlikely to be underestimated. Figure 5a presents the law enforcement cost for five points in time during the build-out.

FIRE PROTECTION

The Los Angeles County Fire Department will provide fire and paramedic services to the Project. Based on analyses by the County, the Project will require four fire stations to serve the Project. The County also provided an annual operating cost for each of the two fire stations. The costs ranged from $2.4 million to $4.4 million per station depending on the type of equipment at each station. The total annual cost for all four stations combined is $12.5 million. The Valencia Commerce Center community is in the service area of an existing fire station which has sufficient available capacity to serve that community.

The County was not able to provide a timing or sequencing for the fire stations because they lacked the necessary data on exactly when each element of the Project would be built and in exactly what location.

In the absence of a schedule from the County, the consulting team developed a deliberately conservative schedule of fire station development in which each of four stations was provided at the beginning of the relevant development cycle. The annual costs of the four stations were incorporated, one by one, beginning with the first station in the first year that properties are sold. The cost of the

second station was added when the Project was 25% built-out. The cost of the third station was added when the Project was 50% built-out and the fourth was added when the Project was 75% built-out. This sequencing has the effect of the cost of a new station being incorporated in years one, four, seven and nine by which time the full cost of the fire protection is being borne. Figure 5b presents the expenditures at five different points in time during the build-out.

Figure 5b

	2009	2013	2017	2021	2025
Fire Protection Costs (000)	$0	$5,660	$12,513	$12,513	$12,513

LIBRARY

The Los Angeles County Library will provide library services to the Project. The County has studied the need for library services for the Project and surrounding unincorporated areas. It has determined that the most reasonable approach to providing those library services for the area would be to construct an initial 30,000 square foot library and to later expand it to 60,000. The annual operating cost of the initial library would be approximately $2.7 million. The annual operating cost of the 60,000 square foot library would be approximately $4.6 million. Based on the build-out schedule for the Project and estimates of population growth in the other unincorporated areas to be served, the County has determined that the first library should begin operations in 2010 and the expanded should be competed in 2020.

The library is expected to ultimately serve a population of 117,000. The Project's 74,256 population represents approximately 65% of the total population that will be served. Therefore, the annual cost of the two different levels of library facilities will be multiplied by a 65% factor to compute the amount of the annual library cost that can fairly be allocated to the Project.

Based on this approach, the Project's annual library service costs will begin at approximately $1.7 million in 2010 and rise to approximately $2.9 million in 2020. Figure 5c presents the expenditures at five different points in time during the build-out.

Figure 5c

	2009	2013	2017	2021	2025
Library Costs (000)	$0	$1,714	$1,714	$2,940	$2,940

PUBLIC WORKS

The principal costs to the County in the Public Works category will be the maintenance of public roadways. Those costs are commonly estimated in terms of dollars per lane mile which allows for roadways of different widths. The bulk of the costs are associated with periodic maintenance of the streets and adjacent rights of way as well as lighting. Newhall Land estimates that approximately 182 lane miles of local and major collector roadways in the Project that would be maintained by the County. Appendix Exhibit A-5 details the lane miles by individual community and major, collector or local classification, which will be maintained by the County. It should be pointed out that a significant amount of the local streets in the Project (both private and public-access) will maintained by special districts or homeowners' associations and not by the County.

The County provided estimates of costs per lane mile for both street maintenance and lighting for local and major collector streets. The annual street maintenance costs per lane mile are $6,400 for major streets, $5,600 for collector streets and $4,700 for local streets. The annual cost per lane mile for lighting is $4,500 for major and collector streets, and $2,800 for local streets.

These costs are applied only to the publicly dedicated streets and explicitly exclude private streets within gated communities, the maintenance costs for which are covered by HOA or property owner association fees. Maintenance costs for a significant amount of the streets outside of the gated portions of the Project will also be maintained by special tax or assessment district funding.

The estimated annual Public Works expenditures are $242,000 in the first year and rise to a total of $1.7 million annually at full build-out in 2025. Figure 5d presents the annual expenditures at five different points of time during the build-out.

Figure 5d

	2009	2013	2017	2021	2025
Public Works Costs (000)	$242	$1,044	$1,483	$1,675	$1,675

ANIMAL CARE AND CONTROL

The County will provide animal care and control services for the project. The County was not able to independently provide an estimate of the cost for the Project. In the absence of that information, the cost to the Project was estimated on a per capita basis. The County has budgeted a net cost for these services of approximately $7.9 million in Fiscal Year 2005-2006. That is equivalent to $7.29 per capita for the unincorporated areas of the County and may overstate the cost to provide the service in the Project. Nevertheless, that factor was used to estimate the Project's cost in this service area to avoid understating the cost. At that per capita cost, the County's annual expenditures will begin at approximately $12,000 and rise to approximately $541,000 at full build-out in 2025. Figure 5e presents the annual expenditures at five different points in time during the build-out.

Figure 5e

	2009	2013	2017	2021	2025
Animal Care & Control Costs (000)	$12	$180	$412	$523	$541

PARKS AND RECREATION

The Parks and Recreation Department will incur costs in two different categories to serve the Project. The first is recreation services. This is the cost to provide various physical, educational and cultural programs and services. Levander estimated that the net per capita cost of recreation program services for unincorporated area residents was approximately $4.65. Cumulative inflation since 1996 is 26.6%. In abundance of caution and in order to not under estimate the current cost, the 1996 cost was increased by two times the overall inflation rate. This produced an annual per capita cost of approximately $7.00. As shown in Figure 5f, applying that factor to the Project results in an initial annual expenditure of approximately $11,000 and rising to $520,000 annually in 2025.

Figure 5f

	2009	2013	2017	2021	2025
Recreation Costs (000)	$11	$173	$395	$502	$520

The other cost category is the physical maintenance of any public parkland not maintained by a special district. Newhall Land estimates that approximately 254 acres of active parkland in the project that will have to be maintained by the County. Any recreational land and open space that would not be maintained by the County was excluded. The County was not able to provide a current estimate of the annual cost of operating and maintaining an acre of active parkland. In the absence of a current per acre cost being provided by the County, a cost was extrapolated from the unit cost used by Levander in its 1996 fiscal analysis of the predecessor project.

Levander estimated a $6,400 annual per acre cost in 1996 for active parks based on tabulations of actual unit costs provided by the Parks and Recreation Department. An inflation adjustment similar to that for recreation program services was applied to this cost factor. This produced an annual per acre cost of operations and maintenance of $9,700. As presented in Figure 5g, applying that cost factor to the number of acres that will be maintained by the County results in an initial annual cost of $49,000 rising to $2.5 million in 2016 and thereafter, by which time all of the parkland will be in place.

Figure 5g

	2009	2013	2017	2021	2025
Parks Costs (000)	$49	$958	$2,487	$2,487	$2,487

Exhibit 3 presents the annual cost or both recreation and parks expenditures at five different points in time during the build-out. There will be additional park land and open space in the Project which will not be a responsibility of the County to maintain. Maintenance of those facilities will be funded by HOA, special tax or assessment mechanisms. It is possible that Newhall Land will establish assessment districts to maintain some of the 254 acres of park land which it is assumed in this analysis will be maintained by the County from its general fund. If that occurs, the County will be relieved of $9,700 in annual maintenance costs for every acre whose annual maintenance burden is transferred to an assessment district.

PLANNING

The County provides a full range of regional planning services in the unincorporated areas. The County was unable to provide an estimate of the cost of providing those services to the Project or to provide cost factors that could be used to derive a cost estimate. Consequently, it was decided to derive a per capita net cost factor for those services. In the County Fiscal Year 2005-2006 budget the net cost of providing regional planning services is approximately $10.4 million. This is equivalent to $9.57 per capita. Applying that per capita cost factor, produces an initial annual cost of $16,000 in the first year that properties are completed. The annual expenditure rises to approximately $711,000 in 2025. Figure 5h presents the annual cost for planning services at five different points of time during the build-out.

Figure 5h

	2009	2013	2017	2021	2025
Planning Costs (000)	$16	$237	$541	$686	$711

Note that these costs exclude application fees and other charges. Therefore, they represent the net cost to the County and not the total cost of processing new proposals.

OTHER SERVICE CATEGORIES

Two other specific service categories are also associated with the unincorporated areas of the County. Those are the District Attorney and the Treasurer and Tax Collector. Discussions were held with representatives of each of those offices. Neither office believed that their operations would be affected in a material way as a consequence of the development of the Project.

GENERAL ADMINISTRATIVE SERVICES

The County provides a variety of support and overhead support to the various departments that provide direct services. In the 1996 fiscal analysis Levander determined that the cost of that overhead support cost the County approximately 7.7% of other activities. That analysis differed from this analysis in that it examined countywide services in addition to services that are associated only with unincorporated areas. Data is not available to allocate those general administrative service costs among countywide services and services for unincorporated areas. To avoid understating the cost of this overhead support services, a 10% factor has been used to compute the cost of providing general administrative services to accompany the other unincorporated area services for which individual costs have been estimated.

Figure 5i

	2009	2013	2017	2021	2025
General Administration Costs (000)	62	1,437	2,958	3,407	3,459

SPECIAL TAX AND ASSESSMENT CONSIDERATIONS

As mentioned previously, Newhall Land has announced its intention to establish both special districts and homeowners associations to fund the necessary annual operation and maintenance costs associated with a number of the facilities that will be constructed with the Project. Those facilities consist primarily of roadways. The presence of those funding mechanisms will very significantly reduce some of the usual funding burdens that the County bears in other unincorporated areas of the County. For the purpose of estimating annual County service expenditures, this analysis has focused on only those facilities that would in fact be operated and maintained by the County from its General Fund.

VII. NET IMPACT

COMBINED PROJECT

With the exception of the second year, the net fiscal impact of the Project will be positive (i.e., a surplus) and substantially so. A year-by-year tabulation of the individual categories of revenues and expenditures is presented in Exhibit 8. The somewhat anomalous condition in which in the first year is positive and the second year is negative is attributable to a one year delay in having to fund the new library facility and fire station.

The largest factor creating a negative fiscal impact in the second year is the need to construct and operate a new fire station at that point to serve the new houses that will be completed. That second year deficit is also attributable to cost of the new library, the first phase of which would begin operation in that year. Both of those facilities will have excess capacity during the first several years. The gross and net fiscal figures reach approximately 95% of their final amount in 2021, which is 13 years into the 16-year build-out term.

The large $42.3 million surplus at full build-out represents 53% of total revenues. This existence of a large surplus is attributable to several factors. The most significant factor is the relatively large combined share of property tax revenues to which the County is entitled. That high share of property tax and the relatively high property values produces unusually large revenue per capita.

Contributing to that effect is the fact that the Project is an entirely new community. This means that it does not have on the tax rolls a large stock of properties that have not transacted for years. It is common in other communities for there to be a significant number of properties that are carried on the books at very low assessed value because their ownership has not changed for many years and their assessed value has lagged far behind market values. All of the properties in the Project will be going onto the tax rolls at their full market value.

Also of note is the very large contribution that the fire protection share of the general levy makes to total revenues. It is the largest component (even larger than the General Fund share) of the 1.00% property tax general levy.

An additional significant factor contributing to there being a large positive fiscal impact is Newhall Land's plan to create special funding mechanisms to cover a number of annual service costs that are usually the responsibility of the general fund of a city or county. These mechanisms will include HOA fees as well as special tax or assessment districts. They will fund significant amount of the annual maintenance for roadways in the communities.

One aspect of the expenditure figures is unusual compared to what is commonly found in fiscal analyses. That aspect is that the annual fire protection cost is very close to the annual law enforcement cost. It is common to find that law enforcement costs exceed fire protection costs by 25% to 30% or sometimes more. This raises the question of whether the law enforcement costs could be understated or the fire protection costs overstated. The consultants necessarily must respect the estimates provided by County personnel. The consulting team would hypothesize that the newness of the community, the absence of poverty, and the absence of large public venues as well as some gated portions of the Project all contribute to a lower policing costs while leaving fire protection unchanged at the same time that low development density and higher property values may contribute to higher fire protection costs.

As indicated in the section of the report dealing with expenditures, the current annual cost of the Sheriff's Department providing law enforcement services under contract to the adjacent City of Santa Clarita is approximately $82 per capita. As indicated in that section it the Sheriff's Department estimates the law enforcement costs for the Project will be $179 per capita. That is a 118% higher cost than the contract services for the City of Santa Clarita. This suggests that the law enforcement costs are not likely to be understated. The fire protection expenditures are based on budget figures provided by the County after careful analysis of the Project's development characteristics. Thus, they are not likely to be overstated. The relative relationship between the law enforcement and fire protection expenditures may be attributable to the level of fire protection service being particularly extensive compared to a less severe law enforcement burden.

INDIVIDUAL COMMUNITIES

Breakdowns of the total revenues and expenditures for the seven different communities at five different points in time during the build-out term are presented in Exhibit 9. Breakdowns for individual revenue and expenditure line items for each community at full build-out are presented in Exhibit 10.

As a percent of the entire Project's net fiscal impact, Entrada at 24% and Potrero at 23% are the largest contributors. The principal factors in their large contribution to the entire Project's positive net fiscal revenue is the relatively large amount of sales tax being generated by both and the transient occupancy tax generated by the hotel in Entrada. Potrero also has a significantly higher total assessed value that the other communities.

SURPLUS OVER TIME

The results described in Exhibits 3 and 8 show a significant fiscal surplus to the County at full build-out. This surplus, which would appear to apply to each of the communities separately and in the aggregate amounts to approximately $42.3 million a year, requires some further discussion. There are two reasons that such a discussion is needed. One is the fact that the surplus is somewhat counterintuitive since residential development, which is the dominant form of development under study here, often yields negative rather than positive fiscal impacts. A second factor has to do with a convention adopted in the analysis which is to use only constant uninflated 2006 dollars.

In this section of the report, there will be a brief discussion of the reasons for this surplus and why they are not ultimately consistent with the more intuitive judgment that housing development, particularly under Proposition 13, is not "profitable" for cities. Separately, there will be a discussion of both the consequences and the implications of using constant uninflated dollars. The reason for this latter discussion is the fact that Proposition 13 does materially change the way in which assessed value and, by extension, property tax revenues fail to keep up with housing values. This phenomenon requires some discussion and analysis.

Origins of the Surplus

Broadly speaking, there appear to be three critical reasons for the fact that this analysis shows a substantial surplus:

1. All properties are "fully assessed".

2. Their properties are generally higher valued properties than county-wide medians.

3. Newhall Land has incorporated a significant number, though by no means all or even a majority, of municipal services in private development thereby relieving the County of some otherwise anticipated costs.

Each of these three warrants some further brief discussion.

At any given point in time, the property tax revenue from an older and settled area reflects a mixture of homes that have not been reassessed for long periods of time, a modest number of new homes, and an indeterminate number of homes that have recently turned over in the resale market and consequently have had their property tax income brought up to "full assessment".

In the analysis presented herein, all the properties are the equivalent of "fully assessed" because at the point where the analysis is being done, they are all "new". In part, this is an artifact of using constant dollars. The consulting team seriously considered whether or not to incorporate housing inflation, and concluded that such incorporation would create more problems than it would resolve. First of all, there was the issue of which housing inflation or appreciation rate to use. Recent inflation rates consistently in strong double digits may not be an appropriate characterization of the next 17 years. At the same time, if one set of numbers incorporates inflation, then the question becomes should all the other numbers ---notably including the costs of providing County services ---be also inflated and, if so, by what rate.

Accordingly, the originally stipulated framework for analysis, i.e. constant uninflated 2006 dollars, was maintained. In so doing, there is some risk that the impact of slower than "real" inflation in assessed value, due to Proposition 13, is possible. This will be discussed at greater length below.

The second major reason is that the housing proposed by Newhall Land for the west side of the I-5 Freeway in the six communities under study is generally higher than the median value of new housing in the area or for that matter in the County as a whole. This also leads to larger revenues relative to costs than would otherwise be expected in some sort of normal distribution of prices.

Finally, many parts of the proposed six communities will in fact be private gated communities, or pay directly for services and infrastructure maintenance through the use of locally funded municipal services entities of various types. Lighting and landscaping districts and in some cases actual private streets will all mitigate the costs otherwise normally incurred by the County in supporting residential development.

Collectively, these three factors account for the surplus.

ADK&A Allan D. Kotin & Associates

CBRE CB RICHARD ELLIS

Exhibit 8: Summary of Expenditures and Revenues Inputs, By Community and Land Use

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
EXP./REVENUES' INPUTS [1]																	
Absorption - Units	528	2,246	4,066	6,623	9,478	12,689	15,833	18,563	21,036	23,486	25,094	26,142	26,908	27,478	27,782	27,893	27,893
Absorption - SF	0	416,970	1,171,256	2,039,192	3,316,300	5,915,205	6,863,988	8,708,389	10,267,553	10,537,716	10,611,049	10,684,383	10,757,716	10,831,049	10,867,716	10,867,716	10,867,716
Population	1,636	6,239	10,883	17,333	24,745	33,365	42,064	49,560	56,459	62,629	66,661	69,556	71,682	73,237	73,987	74,256	74,256
Employees	0	1,252	3,403	5,670	9,206	15,171	17,574	23,977	29,998	31,079	31,372	31,666	31,959	32,252	32,399	32,399	32,399
Assessed Value (In Mn $'s)	300.5	1,197.7	2,473.3	3,977.5	5,875.8	8,062.9	9,939.4	12,164.2	14,138.4	15,461.3	16,314.2	16,881.9	17,297.0	17,595.3	17,747.2	17,805.7	17,805.7
New Retailers' Sales (Mn $'s)	0.0	14.1	40.0	86.4	107.9	169.7	186.2	351.9	517.6	517.6	517.6	517.6	517.6	517.6	517.6	517.6	517.6
Residents' Retail Expenditure (Mn $'s)	16.5	68.4	126.9	202.5	293.1	407.2	512.2	616.3	710.0	788.6	839.4	872.8	897.5	916.3	926.3	930.0	930.0
Total Property Tax (Mn $'s)	3.0	12.0	24.7	39.8	58.8	80.6	99.4	121.6	141.4	154.6	163.1	168.8	173.0	176.0	177.5	178.1	178.1
REVENUES ($ 000's) [3]																	
Taxes																	
Property - General Levy																	
Adjusted County Unrestricted [4]	485	1,805	3,509	5,499	8,051	10,965	13,464	16,460	19,072	20,739	21,812	22,526	23,046	23,415	23,602	23,673	23,673
Library	69	293	633	1,037	1,549	2,153	2,671	3,265	3,794	4,154	4,385	4,540	4,653	4,734	4,776	4,792	4,792
Fire	536	2,182	4,582	7,423	11,021	15,237	18,855	23,054	26,779	29,292	30,909	31,986	32,774	33,342	33,631	33,742	33,742
Total General Levy	1,091	4,279	8,724	13,959	20,620	28,355	34,990	42,779	49,645	54,185	57,107	59,052	60,473	61,491	62,009	62,207	62,207
Property - Special Taxes																	
Library	14	58	105	170	244	326	407	477	541	604	645	672	692	707	715	717	717
Fire	26	103	225	362	544	797	978	1,178	1,352	1,464	1,535	1,589	1,630	1,661	1,678	1,684	1,684
Total Special Taxes	40	161	329	532	788	1,123	1,385	1,655	1,893	2,068	2,180	2,261	2,322	2,368	2,393	2,401	2,401
Retail Sales Tax																	
Project Area Retailers	0	141	400	864	1,079	1,697	1,862	3,519	5,176	5,176	5,176	5,176	5,176	5,176	5,176	5,176	5,176
Other Retailers [2]	48	196	374	598	872	1,192	1,488	1,772	2,027	2,248	2,393	2,488	2,558	2,611	2,639	2,649	2,649
Total Sales Tax	48	337	774	1,462	1,951	2,889	3,350	5,291	7,203	7,425	7,569	7,664	7,734	7,787	7,815	7,825	7,825
Utility User Tax																	
Residential Units	57	243	439	715	1,024	1,370	1,710	2,005	2,272	2,536	2,710	2,823	2,906	2,968	3,000	3,012	3,012
Commercial Uses	0	88	243	416	675	1,168	1,358	1,773	2,142	2,209	2,226	2,244	2,261	2,279	2,288	2,288	2,288
Total Utility User Taxes	57	331	682	1,131	1,699	2,539	3,068	3,778	4,414	4,745	4,936	5,067	5,167	5,246	5,288	5,300	5,300
Transient Occupancy	0	0	0	0	0	0	0	1,232	1,232	1,232	1,232	1,232	1,232	1,232	1,232	1,232	1,232
Docmentary Transfer	166	507	770	962	1,262	1,587	1,523	1,679	1,665	1,456	1,270	1,157	1,101	1,059	990	941	908
Franchise Fee	11	44	76	121	173	234	294	347	395	438	467	487	502	513	518	520	520
TOTAL REVENUES	**1,412**	**5,659**	**11,356**	**18,168**	**26,493**	**36,727**	**44,611**	**56,761**	**66,448**	**71,549**	**74,761**	**76,920**	**78,530**	**79,696**	**80,244**	**80,426**	**80,394**
EXPENDITURES ($ 000's) [5]																	
Sheriff	291	1,109	1,935	3,081	4,399	5,931	7,478	8,810	10,036	11,133	11,850	12,364	12,743	13,019	13,152	13,200	13,200
Fire & EMS	0	3,200	3,200	5,660	5,660	5,660	10,053	10,053	12,513	12,513	12,513	12,513	12,513	12,513	12,513	12,513	12,513
Library	0	1,714	1,714	1,714	1,714	1,714	1,714	1,714	1,714	1,714	1,714	2,940	2,940	2,940	2,940	2,940	2,940
Public Works	242	470	689	925	1,044	1,234	1,308	1,383	1,483	1,580	1,613	1,646	1,675	1,675	1,675	1,675	1,675
Animal Care & Control	12	45	79	126	180	243	307	361	412	457	486	507	523	534	539	541	541
Parks	49	166	563	860	958	1,007	1,056	2,438	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487	2,487
Recreation	11	44	76	121	173	234	294	347	395	438	467	487	502	513	518	520	520
Planning	16	60	104	166	237	319	403	475	541	600	638	666	686	701	708	711	711
General Admin	62	681	836	1,265	1,437	1,634	2,261	2,558	2,958	3,092	3,177	3,361	3,407	3,438	3,453	3,459	3,459
TOTAL EXPENDITURES	**682**	**7,488**	**9,196**	**13,920**	**15,802**	**17,977**	**24,875**	**28,139**	**32,540**	**34,015**	**34,946**	**36,972**	**37,476**	**37,821**	**37,987**	**38,047**	**38,047**
SURPLUS/(DEFICIT) ($ 000's) [6]	**730**	**-1,830**	**2,160**	**4,248**	**10,691**	**18,750**	**19,736**	**28,622**	**33,908**	**37,534**	**39,816**	**39,948**	**41,054**	**41,875**	**42,257**	**42,380**	**42,347**

Notes:

[1] Refer Summary Exhibits 5.0 thru 5.6 for break-up of Costs & Revenues' Drivers by Community & Consolidated Product.

[2] Expenditure by Residents & Employees of Project Area at those retailers in Unincorporated LA County outside of Newhall Ranch Project Area.

[3] Refer Assumptions Exhibit A-1 for Standards & Methodology for deriving each Revenue item.

[4] The County Unrestricted portion of the Property Tax General Levy is adjusted for only the County share from Unincorporated Area

[5] Refer Assumptions Exhibit B-1 for Standards & Methodology for deriving each Expenditure item.

[6] All Amounts are in Uninflated 2006 Dollars.

Exhibit 9

Revenues and Expenditures, by Community and Development Phase

Project Area Community	In $ 000's					As Percentage of Total Revenues/Expenditures				
	2009	2013	2017	2021	2025	2009	2013	2017	2021	2025
ALL PROJECT										
Revenues	$1,412	$26,493	$66,448	$78,530	$80,394					
Expenditures	682	15,802	32,540	37,476	38,047					
Surplus/(Deficit)	**730**	**10,691**	**33,908**	**41,054**	**42,347**					
ENTRADA										
Revenues	$0	$1,456	$13,681	$15,161	$15,286	0%	5%	21%	19%	19%
Expenditures	0	899	3,630	4,203	4,126	0%	6%	11%	11%	11%
Surplus/(Deficit)	0	557	10,050	10,958	11,160	**0%**	**5%**	**30%**	**27%**	**26%**
HOMESTEAD										
Revenues	$0	$5,615	$14,118	$14,427	$14,427	0%	21%	21%	18%	18%
Expenditures	0	3,687	7,943	7,591	7,466	0%	23%	24%	20%	20%
Surplus/(Deficit)	0	1,928	6,175	6,836	6,962	**0%**	**18%**	**18%**	**17%**	**16%**
POTRERO										
Revenues	$0	$0	$9,470	$19,436	$21,174	0%	0%	14%	25%	26%
Expenditures	0	0	5,645	11,395	12,397	0%	0%	17%	30%	33%
Surplus/(Deficit)	0	0	3,824	8,041	8,777	**0%**	**0%**	**11%**	**20%**	**21%**
MISSION VILLAGE										
Revenues	$159	$10,460	$12,660	$12,925	$12,925	11%	39%	19%	16%	16%
Expenditures	180	7,317	7,424	6,815	6,698	26%	46%	23%	18%	18%
Surplus/(Deficit)	-22	3,143	5,236	6,110	6,227	**-3%**	**29%**	**15%**	**15%**	**15%**
LEGACY										
Revenues	$0	$1,068	$8,130	$8,192	$8,192	0%	4%	12%	10%	10%
Expenditures	0	1,139	5,278	5,008	4,929	0%	7%	16%	13%	13%
Surplus/(Deficit)	0	-71	2,852	3,184	3,263	**0%**	**-1%**	**8%**	**8%**	**8%**
LANDMARK										
Revenues	$1,253	$3,398	$3,665	$3,665	$3,665	89%	13%	6%	5%	5%
Expenditures	502	2,694	2,507	2,351	2,318	74%	17%	8%	6%	6%
Surplus/(Deficit)	752	704	1,158	1,314	1,346	**103%**	**7%**	**3%**	**3%**	**3%**
COMMERCE CENTER										
Revenues	$0	$4,495	$4,724	$4,724	$4,724	0%	17%	7%	6%	6%
Expenditures	0	66	113	113	113	0%	0%	0%	0%	0%
Surplus/(Deficit)	0	4,429	4,612	4,612	4,612	**0%**	**41%**	**14%**	**11%**	**11%**

Note: All Dollar Amounts are in Uninflated 2006 Dollars

Exhibit 10

Amount of Revenues and Expenditures, by Community, at Build-Out

Expenditure/Revenue Items	Entrada	Homestead	Potrero	Mission	Legacy	Landmark	Commerce Center	Project
REVENUES ($ 000's)	**15,286**	**14,427**	**21,174**	**12,925**	**8,192**	**3,665**	**4,724**	**80,394**
Property - General Levy	9,557	12,210	17,035	10,408	6,704	2,974	3,319	62,207
Property - Special Taxes	361	473	667	412	252	105	131	2,401
Retail Sales Tax	2,950	595	1,852	978	580	271	600	7,825
Utility User Tax	1,008	846	1,184	882	486	244	650	5,300
Transient Occupancy	1,232	0	0	0	0	0	0	1,232
Docmentary Transfer	117	200	274	154	98	41	25	908
Franchise Fee	61	103	163	91	71	30	0	520
EXPENDITURES ($ 000's)	**4,126**	**7,466**	**12,397**	**6,698**	**4,929**	**2,318**	**113**	**38,047**
Sheriff's	1,554	2,627	4,146	2,310	1,803	760	0	13,200
Fire Protection	1,586	2,546	3,781	2,392	1,561	648	0	12,513
Library	346	585	923	514	402	169	0	2,940
Public Works	56	481	384	215	273	165	102	1,675
Animal Care & Control	64	108	170	95	74	31	0	541
Parks	0	196	1,480	348	200	264	0	2,487
Recreation	61	103	163	91	71	30	0	520
Planning	84	141	223	124	97	41	0	711
General Admin	375	679	1,127	609	448	211	10	3,459
SURPLUS/(DEFICIT)	**11,160**	**6,962**	**8,777**	**6,227**	**3,263**	**1,346**	**4,612**	**42,347**

Note: All Dollar Amounts are in Uninflated 2006 Dollars

Shares of Revenues and Expenditures, by Community, at Build-Out

Expenditure/Revenue Items	Entrada	Homestead	Potrero	Mission	Legacy	Landmark	Commerce Center	Project
REVENUES	**19.0%**	**17.9%**	**26.3%**	**16.1%**	**10.2%**	**4.6%**	**5.9%**	**100.0%**
Property - General Levy	15.4%	19.6%	27.4%	16.7%	10.8%	4.8%	5.3%	100.0%
Property - Special Taxes	15.0%	19.7%	27.8%	17.2%	10.5%	4.4%	5.5%	100.0%
Retail Sales Tax	37.7%	7.6%	23.7%	12.5%	7.4%	3.5%	7.7%	100.0%
Utility User Tax	19.0%	16.0%	22.3%	16.6%	9.2%	4.6%	12.3%	100.0%
Transient Occupancy	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Docmentary Transfer	12.9%	22.0%	30.1%	16.9%	10.8%	4.5%	2.8%	100.0%
Franchise Fee	11.8%	19.9%	31.4%	17.5%	13.7%	5.8%	0.0%	100.0%
EXPENDITURES	**10.8%**	**19.6%**	**32.6%**	**17.6%**	**13.0%**	**6.1%**	**0.3%**	**100.0%**
Sheriff's	11.8%	19.9%	31.4%	17.5%	13.7%	5.8%	0.0%	100.0%
Fire Protection	12.7%	20.3%	30.2%	19.1%	12.5%	5.2%	0.0%	100.0%
Library	11.8%	19.9%	31.4%	17.5%	13.7%	5.8%	0.0%	100.0%
Public Works	3.3%	28.7%	22.9%	12.9%	16.3%	9.8%	6.1%	100.0%
Animal Care & Control	11.8%	19.9%	31.4%	17.5%	13.7%	5.8%	0.0%	100.0%
Parks	0.0%	7.9%	59.5%	14.0%	8.0%	10.6%	0.0%	100.0%
Recreation	11.8%	19.9%	31.4%	17.5%	13.7%	5.8%	0.0%	100.0%
Planning	11.8%	19.9%	31.4%	17.5%	13.7%	5.8%	0.0%	100.0%
General Admin	10.8%	19.6%	32.6%	17.6%	13.0%	6.1%	0.3%	100.0%
SURPLUS/(DEFICIT)	**26.4%**	**16.4%**	**20.7%**	**14.7%**	**7.7%**	**3.2%**	**10.9%**	**100.0%**

Note: All Dollar Amounts are in Uninflated 2006 Dollars

Exhibit 10 (Continued)

Shares of Revenues and Expenditures, within Community, at Build-Out

Expenditure/Revenue Items	Entrada	Homestead	Potrero	Mission	Legacy	Landmark	Commerce Center	Project
REVENUES	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Property - General Levy	62.5%	84.6%	80.5%	80.5%	81.8%	81.1%	70.3%	77.4%
Property - Special Taxes	2.4%	3.3%	3.2%	3.2%	3.1%	2.9%	2.8%	3.0%
Retail Sales Tax	19.3%	4.1%	8.7%	7.6%	7.1%	7.4%	12.7%	9.7%
Utility User Tax	6.6%	5.9%	5.6%	6.8%	5.9%	6.7%	13.8%	6.6%
Transient Occupancy	8.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%
Docmentary Transfer	0.8%	1.4%	1.3%	1.2%	1.2%	1.1%	0.5%	1.1%
Franchise Fee	0.4%	0.7%	0.8%	0.7%	0.9%	0.8%	0.0%	0.6%
EXPENDITURES	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Sheriff's	37.7%	35.2%	33.4%	34.5%	36.6%	32.8%	0.0%	34.7%
Fire Protection	38.4%	34.1%	30.5%	35.7%	31.7%	27.9%	0.0%	32.9%
Library	8.4%	7.8%	7.4%	7.7%	8.1%	7.3%	0.0%	7.7%
Public Works	1.3%	6.4%	3.1%	3.2%	5.5%	7.1%	90.9%	4.4%
Animal Care & Control	1.5%	1.4%	1.4%	1.4%	1.5%	1.3%	0.0%	1.4%
Parks	0.0%	2.6%	11.9%	5.2%	4.1%	11.4%	0.0%	6.5%
Recreation	1.5%	1.4%	1.3%	1.4%	1.4%	1.3%	0.0%	1.4%
Planning	2.0%	1.9%	1.8%	1.9%	2.0%	1.8%	0.0%	1.9%
General Admin	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%
SURPLUS/(DEFICIT) /1	**73.0%**	**48.3%**	**41.5%**	**48.2%**	**39.8%**	**36.7%**	**97.6%**	**52.7%**

'/1 Surplus/(Deficit) as a percentage of Total Revenues for respective Communities.
Note: All Dollar Amounts are in Uninflated 2006 Dollars

IMPLICATION OF THE USE OF CONSTANT DOLLARS

Since the passage of Proposition 13 in 1978, assessed values, on which most property taxes are based, no longer reliably track actual market values on a current basis since re assessment occurs only on sale. This "lagging" effect creates a calculation problem in determining fiscal impact using constant dollars. Constant dollars reliably reflect the balance between revenues and costs only if increases in property assessed valuation, which accounts for the bulk of County revenues, precisely parallel the inflation in municipal service costs. Under Proposition 13, however, this is clearly not the case since it is likely, perhaps even inevitable, that growth in assessed valuation will lag the growth in housing values.

Although assessed values will always lag behind changes in market value, it is possible that even so assessed value will keep up with general inflation. For over sixty years, real estate values have, on average, inflated at a higher rate than the general inflation rate. Therefore some of the lag factor associated with Proposition 13 and the lack of reassessment except at sale will be offset by the premium associated with "real" real estate appreciation.

Another issue to be considered is the fact County service costs are likely to rise faster than general inflation. Such costs are dominated by labor costs and labor costs have traditionally risen more rapidly than general inflation---although that has not been true in the current extended recovery. Over the planning horizon of this analysis it is possible---even likely---that there will a higher than average inflation rate for municipal service costs.

As noted earlier in this report, any attempt to quantify these impacts requires a whole host of complex assumptions the detailed resolution of which is out the scope of this analysis. Nevertheless, it is appropriate and perhaps even necessary, to consider how much the apparent surplus advantage of this project might deteriorate as a function of the lag in property values assessment as compared to ongoing inflation in municipal service costs.

To illustrate the potential for a deterioration in the estimated surplus, the consulting team has prepared an example analysis shown in Exhibit 20. In this Exhibit, assumptions are made about the different rates of inflation in different components and also the turnover in housing.

It is assumed, based on historical research undertaken by ADK&A that the long term rate of housing inflation is at least 1.25% greater than the long term rate of general inflation. Research, based in part on the index of housing values maintained by the Real Estate Research Committee of Southern California, supports this differential.

ADK&A and CB Richard Ellis Consulting have no formal data on the increase in municipal service costs. This increase is, itself, a very complex factor reflecting a change in the scope of mandates as well as the change in actual service costs for a constant bundle of functions. In an attempt to be deliberately conservative, the consulting team has used an assumed 2% premium over general inflation for municipal service costs.

Once again, it is important to realize that this is merely an illustration to demonstrate that, even with the differential inflation rates and the lag time associated with property values, the surplus would be maintained throughout the 17 years covered in this analysis. It would, however, cause the surplus to deteriorate as a proportion of total revenue. By the end of the period, the surplus would represent 48% of total revenues as compared to 59% at the beginning.

In the particular set of assumptions shown in Exhibit 11, it is assumed that the average turnover in housing is ten years or 10% per year. This is a deliberately conservative assumption with respect to ownership housing which is the dominant land use. Builder association and census statistics suggest 7-8 years as an average length on tenure. On the other hand, commercial properties tend to turn over at a slower rate.

It is further assumed that there is a premium for housing inflation of 1.25% and that in the absence of turnover of housing, the property values and assessed valuation occur at the statutory rate of 2%.

Based on analysis of several of the individual communities, it is assumed that at "stabilization", the surplus of revenues over municipal service costs represents roughly 48% of revenues.

For a hypothetical $10 million of fiscal impacts, this would be a surplus of $5.9 million.

It appears that approximately 81% of fiscal revenue is generated by property tax.

Combining these assumptions shows that there is in fact some deterioration of the surplus as a proportion of total revenue due to the assumed higher rate of inflation in municipal service costs than in real estate. In whole dollars, the surplus continues to grow. Notwithstanding this differential, even at the end of 17 years, there is a surplus roughly equal to 48% of total revenues.

In conclusion, it may be said that the factors that create the surplus while subject to some degradation over time are in fact fairly stable, and the County should be able to look forward to a continued substantial surplus of revenues over expenses for the full duration of this analysis.

Exhibit 11:

Simplified Illustrative Analysis of Differential Inflation Rates

GENERAL ASSUMPTIONS

Property Tax Revenues as Proportion of Total Revenue	80.48%	based on Prop. Tax =	$61.0	out of a total revenue=	$75.8
Initial Service Costs as Proportion of Total Revenue	41.03%	based on total costs=	$31.1		

	Property Tax	Other Revenue	Total Revenue	Service Costs	Surplus (Deficit) Amount	As Percent of Revenues	As Percent of Costs
SPECIFIC ASSUMPTIONS							
Annual Turnover Rate	10.00%						
Core Inflation Rate	3.00%	3.00%		3.00%			
Premium Over Core Rate	**1.25%**	0.00%		**2.00%**			
Combined Assumed Rate	4.25%	3.00%		5.00%			
Statutory Rate for Non Turnover	2.00%						
Initial Total Revenue			$10.00				
0	$8.05	$1.95	$10.00	$4.10	$5.90	59.0%	143.7%
1	8.23	2.01	10.24	4.31	5.93	57.9%	137.6%
2	8.43	2.07	10.50	4.52	5.98	56.9%	132.1%
3	8.66	2.13	10.79	4.75	6.04	56.0%	127.1%
4	8.91	2.20	11.10	4.99	6.12	55.1%	122.7%
5	9.19	2.26	11.45	5.24	6.21	54.3%	118.7%
6	9.50	2.33	11.83	5.50	6.33	53.5%	115.2%
7	9.84	2.40	12.24	5.77	6.47	52.8%	112.1%
8	10.22	2.47	12.69	6.06	6.63	52.2%	109.4%
9	10.63	2.55	13.18	6.36	6.81	51.7%	107.0%
10	11.08	2.62	13.71	6.68	7.02	51.2%	105.1%
11	11.55	2.70	14.26	7.02	7.24	50.8%	103.2%
12	12.05	2.78	14.83	7.37	7.46	50.3%	101.2%
13	12.56	2.87	15.42	7.74	7.69	49.8%	99.4%
14	13.09	2.95	16.04	8.12	7.92	49.4%	97.5%
15	13.65	3.04	16.69	8.53	8.16	48.9%	95.7%
16	14.23	3.13	17.36	8.96	8.40	48.4%	93.8%
17	14.83	3.23	18.06	9.40	8.65	47.9%	92.0%

Derivation of Real Estate Rate Assessed Value Growth Assuming Even Sequence of Turnover

Year	Share of total Property	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	100.00%
	Year-End Value of Each Cohort As Proportion of Original (Boxed Numbers Indicate Turnover)											Total Value
1		**104.25%**	102.00%	102.00%	102.00%	102.00%	102.00%	102.00%	102.00%	102.00%	102.00%	102.23%
2		106.34%	**108.68%**	104.04%	104.04%	104.04%	104.04%	104.04%	104.04%	104.04%	104.04%	104.73%
3		108.46%	110.85%	**113.30%**	106.12%	106.12%	106.12%	106.12%	106.12%	106.12%	106.12%	107.55%
4		110.63%	113.07%	115.57%	**118.11%**	108.24%	108.24%	108.24%	108.24%	108.24%	108.24%	110.68%
5		112.84%	115.33%	117.88%	120.48%	**123.13%**	110.41%	110.41%	110.41%	110.41%	110.41%	114.17%
6		115.10%	117.64%	120.23%	122.89%	125.60%	**128.37%**	112.62%	112.62%	112.62%	112.62%	118.03%
7		117.40%	119.99%	122.64%	125.34%	128.11%	130.94%	**133.82%**	114.87%	114.87%	114.87%	122.29%
8		119.75%	122.39%	125.09%	127.85%	130.67%	133.55%	136.50%	**139.51%**	117.17%	117.17%	126.97%
9		122.15%	124.84%	127.59%	130.41%	133.28%	136.23%	139.23%	142.30%	**145.44%**	119.51%	132.10%
10		124.59%	127.34%	130.15%	133.02%	135.95%	138.95%	142.01%	145.15%	148.35%	**151.62%**	137.71%
11		**158.07%**	129.88%	132.75%	135.68%	138.67%	141.73%	144.85%	148.05%	151.32%	154.65%	**143.56%**
12		161.23%	**164.78%**	135.40%	138.39%	141.44%	144.56%	147.75%	151.01%	154.34%	157.75%	149.67%
13		164.45%	168.08%	**171.79%**	141.16%	144.27%	147.45%	150.71%	154.03%	157.43%	160.90%	156.03%
14		167.74%	171.44%	175.22%	**179.09%**	147.16%	150.40%	153.72%	157.11%	160.58%	164.12%	162.66%
15		171.10%	174.87%	178.73%	182.67%	**186.70%**	153.41%	156.80%	160.25%	163.79%	167.40%	169.57%
16		174.52%	178.37%	182.30%	186.32%	190.43%	**194.63%**	159.93%	163.46%	167.07%	170.75%	176.78%
17		178.01%	181.93%	185.95%	190.05%	194.24%	198.53%	**202.91%**	166.73%	170.41%	174.17%	184.29%

Source: Allan D. Kotin & Associates

VIII. ONE-TIME ECONOMIC IMPACT

DEFINITIONS

Economic impacts are generally estimated in terms of output (in dollars), payroll and jobs. This differs from fiscal impacts which are actual dollar revenues or expenditures by a governmental entity. The jobs component is quantified in terms of full time equivalents ("FTE"). Each of those impacts is divided into direct, indirect and induced components. Direct impacts are those associated with the specific activity being analyzed. In the case of the Project, the direct activity would consist of the actual development and construction of the Project elements on site. Indirect impacts result from spending by the businesses (such as purchases from their suppliers) involved in the direct activity. Induced impacts consist of the spending by households that have received income from the direct and indirect activities. The addition of the indirect and induced economic activity to the direct activity is often referred to as the multiplier or effect or "spin off."

LOS ANGELES AND VENTURA COUNTIES

To estimate the one-time economic impacts, factors had to be derived that could be applied to various Project specifications. To derive those factors, it was necessary to define three prototype developments that represent the types that would occur in the Project. The developments include 100 units of single-family housing, 100 units of multi-family housing and 100,000 square feet of commercial space.

While the actual construction will take place in Los Angeles County, supplier purchases could be made from vendors in either county or elsewhere. In addition, workers may live in either county and generate household spending near their place of residence. This analysis focuses on the impact on Los Angeles County and Ventura County. Figure 6 on following page summarizes the output of this analysis.

The following describes the approach used to estimate the impacts. The IMPLAN economic impact model created by Minnesota IMPLAN Group, Inc. was used in the analysis. It is very widely used for estimating the economic impact of projects. The first step consisted of estimating the total impacts of construction for each project type on the two-county area. While multipliers exist for each county individually, they are not designed to calculate impacts comparatively. Using combined two-county multipliers, it is possible to estimate direct, indirect, induced and total impacts for each type prototype development. Each aspect of the impact is represented in terms of dollar output, payroll, and number of jobs. The direct output is the estimated total construction cost. Direct jobs and payroll correspond to the workers on the site in the Project. All of these numbers are annualized.

Indirect impacts represent business-to-business purchases. Output can be interpreted as the increase in demand for supplies as a result of the direct construction project activity. As suppliers increase their production to meet this demand, they in turn create additional jobs and payroll. These jobs, payroll and production are spread across a wide range of local businesses in the two-county area.

Induced impacts primarily represent consumer type purchases made by the direct and indirect employees and their families. The total economic impact is the sum of these three components.

The next step involved allocating the impacts between the two counties. Los Angeles and Ventura counties are very disparate in size and economic diversity, so even though a portion of the Project is

adjacent to the Ventura County line, the vast majority of impacts would likely occur in Los Angeles County. All direct impacts are by definition in Los Angeles County at the site of the Project.

Figure 6
Comparative Impacts of Project
Los Angeles and Ventura Counties
(Thousands of 2006 Dollars)

	Direct Impacts			Indirect Impacts			Induced			Total Impacts		
	Output	Payroll	Jobs	Output	Payroll	Jobs	Output	Payroll	Jobs	Output	Payroll	Jobs
100 Single Family Units												
Los Angeles	$24,500	$8,429	157	$9,876	$3,923	92	$9,531	$3,359	89	$43,907	$15,710	337
Ventura	0	0	0	653	287	7	758	267	7	1,410	554	14
Total	24,500	8,429	157	10,528	4,209	99	10,289	3,626	96	45,318	16,264	351
100 Multi Family Units												
Los Angeles	$13,200	$5,892	109	$4,200	$1,728	40	$5,867	$2,067	55	$23,267	$9,687	203
Ventura	0	0	0	300	134	3	466	164	4	766	298	7
Total	13,200	5,892	109	4,500	1,862	43	6,333	2,232	59	24,033	9,986	210
100,000 SF Non-Residential												
Los Angeles	$16,000	$9,016	169	$5,430	$2,249	48	$8,652	$3,049	80	$30,082	$14,314	298
Ventura	0	0	0	380	175	4	688	242	6	1,068	417	10
Total	16,000	9,016	169	5,810	2,423	52	9,340	3,291	87	31,150	14,731	308

In order to distribute the indirect impacts, it is necessary to break those impacts down by industry. The indirect output impacts are converted into indirect job impacts using industry-specific job multipliers that define the relationship between number of jobs and output by industry. Jobs are distributed based on the share of jobs by industry in each county and summed. Payroll was distributed based on the share of jobs in each county.

The distribution of induced impacts is more straightforward since the availability of consumer goods and services is fairly evenly distributed throughout the urbanized area. In this case, place of residence is assumed to be the driver for consumer purchases by construction workers and the supplier industry workers. Thus, induced impacts are distributed based on the relative population of each county. Since Los Angeles has a population of over 10 million, while Ventura County has a population of only 813,000, most of the impacts will occur in Los Angeles County. From a transportation and access perspective, the Project location is also linked more directly to Los Angeles County than to Ventura County.

The impact factors derived for the three representative prototype developments were applied to the actual Project development specifications over the full build-out term. This produced the total projected cumulative economic impact for the Project in both Los Angeles and Ventura counties. For all components of the Project (and combining direct, indirect and induced impacts), the dollar value of the total output that will occur in both counties is approximately $13.0 billion. The total new payroll impact in both counties will be approximately $5.2 billion. The jobs impact (direct construction and others) for the two counties will be approximately 111,500 man-years of employment. The distribution of these benefits is approximately 97% to Los Angeles County and 3% to Ventura County. These total combined impacts are presented in Exhibit 4.

In relative terms, the Project's impact on Ventura County is as follows. The Ventura County output impact distributed over 16 years is equivalent to approximately 0.94% of the County's current annual total economic output. The Ventura County payroll impact is equivalent to approximately 1.10% of the County's current annual payroll. The dollar amount of these impacts will be distributed over the entire 16-year term of the build-out. Those proportionate impacts will not occur in a single year.

While estimating the economic impact with this approach it was also possible to estimate a fiscal impact not yet covered. State and local tax revenues from the *indirect* impacts were also estimated. A portion of that category of taxes from the *direct* impacts is already being measured in main portion of this Study. It was estimated that the state and local taxes paid by businesses as a result of the indirect impacts is approximately $405 million. It was also estimated that approximately 93% of those taxes will be generated in Los Angeles County and 7% in Ventura County.

POTENTIAL ON-GOING VENTURA COUNTY IMPACT

There will also be ongoing economic impacts. The creation of more than 24,000 new jobs at locations at least as close to east Ventura County as they are to many parts of Los Angeles County will create at least a minor positive impact for Ventura County residents seeking the types of jobs created, e.g. largely in the service industries. Notably, there may be a significant positive economic impact in the portion of eastern Ventura County nearest to the Project.

This impact would be expected both because of the proximity of the western portions of the Project to the Ventura County line and the convenience that businesses in that portion of Ventura County could offer to residents of the Project.

This same proximity could, under certain circumstances, create additional retail sales in eastern Ventura County. Currently there is little other than local serving retail in the communities of Santa Paula and Fillmore in eastern Ventura County. This situation could change in which event pure proximity could create a situation in which residents of those portions of the project closest to the County line would find it more convenient to shop in Ventura than in Los Angeles County.

Neither of these factors is likely to be significant in the near or even in the medium term, but as urbanization in both counties continues, the interchange of employment and shopping will increase and probably somewhat to the benefit of Ventura County.

ASSUMPTIONS AND GENERAL LIMITING CONDITIONS

ADK&A/CBRE has made extensive efforts to confirm the accuracy and timeliness of the information contained in this study. Such information was compiled from a variety of sources, including interviews with government officials, review of County documents, and other third parties deemed to be reliable. Although ADK&A/CBRE believes all information in this study is correct, it does not warrant the accuracy of such information and assumes no responsibility for inaccuracies in the information by third parties. We have no responsibility to update this report for events and circumstances occurring after the date of this report. Further, no guarantee is made as to the possible effect on development of present or future federal, state or local legislation, including any regarding environmental or ecological matters.

The accompanying projections and analyses are based on estimates and assumptions developed in connection with the study. In turn, these assumptions, and their relation to the projections, were developed using currently available economic data and other relevant information. It is the nature of forecasting, however, that some assumptions may not materialize, and unanticipated events and circumstances may occur. Therefore, actual results achieved during the projection period will likely vary from the projections, and some of the variations may be material to the conclusions of the analysis.

This report may not be used for any purpose other than that for which it is prepared. Neither all nor any part of the contents of this study shall be disseminated to the public through publication advertising media, public relations, news media, sales media, or any other public means of communication without prior written consent and approval of ADK&A/CBRE.

APPENDIX

A-1.0
Summary of Revenue & Expenditure Drivers, by Development Phase & by Community

Retail Category	2009	2013	2017	2021	2025
TOTAL NEWHALL RANCH PROJECT					
Absorption					
Residential Units	528	9,478	21,036	26,908	27,893
Commercial Space - SF	-	436,298	7,053,314	7,543,477	7,653,477
Project Area Population					
Resident Population	1,636	24,745	56,459	71,682	74,256
Employees	-	1,232	21,280	23,241	23,681
Assessed Value (In Mn $'s)	300.5	5,021.9	13,200.3	16,358.9	16,867.6
Retail Expenditure (In Mn $'s) /1	4.8	81.9	196.9	250.0	259.1
ENTRADA					
Absorption					
Residential Units	-	602	2,762	3,535	3,535
Commercial Space - SF	-	-	2,584,443	2,877,776	2,987,776
Project Area Population					
Resident Population	-	1,553	6,905	8,744	8,744
Employees	-	-	7,437	8,611	9,051
Assessed Value (In Mn $'s)	-	312.8	2,230.5	2,614.3	2,646.5
Retail Expenditure (In Mn $'s) /1	-	5.3	27.8	34.7	35.0
HOMESTEAD					
Absorption					
Residential Units	-	2,175	5,456	5,675	5,675
Commercial Space - SF	-	-	1,250,000	1,250,000	1,250,000
Project Area Population					
Resident Population	-	5,798	14,221	14,777	14,777
Employees	-	-	2,779	2,779	2,779
Assessed Value (In Mn $'s)	-	1,339.1	3,445.9	3,547.4	3,547.4
Retail Expenditure (In Mn $'s) /1	-	20.0	52.6	54.6	54.6
POTRERO					
Absorption					
Residential Units	-	-	2,644	7,443	8,428
Commercial Space - SF	-	-	1,257,000	1,257,000	1,257,000
Project Area Population					
Resident Population	-	-	8,137	20,749	23,322
Employees	-	-	4,085	4,085	4,085
Assessed Value (In Mn $'s)	-	-	1,956.9	4,537.9	5,014.3
Retail Expenditure (In Mn $'s) /1	-	-	26.4	69.5	78.4
MISSION VILLAGE					
Absorption					
Residential Units	72	4,819	5,331	5,331	5,331
Commercial Space - SF	-	247,900	1,102,170	1,299,000	1,299,000
Project Area Populaiton					
Resident Population	190	11,852	12,993	12,993	12,993
Employees	-	620	3,936	4,724	4,724
Assessed Value (In Mn $'s)	34.3	2,384.5	2,934.3	3,002.7	3,002.7
Retail Expenditure (In Mn $'s) /1	0.6	40.3	46.9	47.4	47.4
LEGACY					
Absorption					
Residential Units	-	438	3,399	3,480	3,480
Commercial Space - SF	-	-	486,000	486,000	486,000
Project Area Population					
Resident Population	-	1,267	9,928	10,144	10,144
Employees	-	-	1,689	1,689	1,689
Assessed Value (In Mn $'s)	-	227.5	1,818.0	1,842.1	1,842.1
Retail Expenditure (In Mn $'s) /1	-	3.8	30.2	30.8	30.8
LANDMARK					
Absorption					
Residential Units	456	1,444	1,444	1,444	1,444
Commercial Space - SF	-	188,398	373,701	373,701	373,701
Project Area Population					
Resident Population	1,446	4,275	4,275	4,275	4,275
Employees	-	612	1,354	1,354	1,354
Assessed Value (In Mn $'s)	266.1	758.0	814.6	814.6	814.6
Retail Expenditure (In Mn $'s) /1	4.2	12.5	13.0	13.0	13.0
COMMERCE CENTER					
Absorption					
Residential Units	-	-	-	-	-
Commercial Space - SF	-	2,880,002	3,200,002	3,200,002	3,200,002
Project Area Population					
Resident Population	-	-	-	-	-
Employees	-	7,974	8,870	8,870	8,870
Assessed Value (In Mn $'s)	-	853.9	938.1	938.1	938.1
Retail Expenditure (In Mn $'s) /1	-	5.2	5.8	5.8	5.8

A-2.0
Summary of Retail Sales, Expenditure & Taxes at Built-Out, by Community

Retail Category / Community -->	Entrada	Homestead	Potrero	Mission Village	Legacy	Landmark	Commerce Center	Project Total
Resident & Employee Expenditure ($ Mn's)								
Total Retail Expenditure	128.31	192.91	277.13	169.33	109.78	46.70	26.61	950.76
Taxable Retail Expenditure	112.61	169.98	243.57	148.66	96.28	41.00	23.30	835.39
Taxable Expenditure in Uninc. Area								
Taxable Expenditure in Project Area	27.76	29.33	42.42	28.47	16.89	7.89	13.98	166.73
Taxable Expenditure outside Project Area	35.00	54.55	78.35	47.39	30.82	12.97	5.82	264.92
Total	**62.76**	**83.88**	**120.78**	**75.86**	**47.71**	**20.86**	**19.80**	**431.65**
New Retail Space Sales ($ Mn's)	**260.00**	**4.95**	**106.85**	**50.38**	**27.20**	**14.13**	**54.13**	**517.63**
Project Generated Sales Tax ($ 000's)								
From New Retail Space in Project	2.60	0.05	1.07	0.50	0.27	0.14	0.54	5.18
In Uninc. Area outside Project	0.35	0.55	0.78	0.47	0.31	0.13	0.06	2.65
Total	**2.95**	**0.60**	**1.85**	**0.98**	**0.58**	**0.27**	**0.60**	**7.83**

ADK&A Allan D. Kotin & Associates

CBRE CB RICHARD ELLIS

A-3.1

County Annual Revenues' & Expenditures' Schedule – by Community: ENTRADA

ENTRADA	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
COSTS & REVENUES' INPUTS /1																	
Absorption - Units	-	-	-	88	602	1,177	1,764	2,380	2,762	3,089	3,329	3,473	3,535	3,535	3,535	3,535	3,535
Absorption - SF	-	-	-	-	-	437,125	845,775	1,864,846	2,598,680	2,672,013	2,745,346	2,818,680	2,892,013	2,965,346	3,002,013	3,002,013	3,002,013
Population	-	-	-	222	1,553	3,035	4,506	5,995	6,905	7,683	8,254	8,597	8,744	8,744	8,744	8,744	8,744
Employees	-	-	-	-	-	278	521	4,094	7,285	7,579	7,872	8,165	8,459	8,752	8,899	8,899	8,899
Assessed Value (In Mn $'s)	-	-	-	51.1	312.8	639.7	916.5	1,655.1	2,230.5	2,375.1	2,490.0	2,567.0	2,614.3	2,636.6	2,646.5	2,646.5	2,646.5
Residents' Retail Expenditure (Mn $'s)	-	-	-	2.89	18.48	36.43	53.70	81.78	101.98	111.91	119.49	124.38	126.99	127.87	128.31	128.31	128.31
New Retailers' Sales (Mn $'s)	-	-	-	-	-	18.9	35.4	147.7	260.0	260.0	260.0	260.0	260.0	260.0	260.0	260.0	260.0
Total Property Tax (Mn $'s)	-	-	-	0.5	3.1	6.4	9.2	16.6	22.3	23.8	24.9	25.7	26.1	26.4	26.5	26.5	26.5
REVENUES (IN $ 000's)																	
Taxes																	
General Levy																	
Adj. County Unrestricted	-	-	-	79	484	989	1,417	2,559	3,449	3,673	3,850	3,969	4,043	4,077	4,092	4,092	4,092
Library	-	-	-	13	77	157	225	406	547	583	611	630	641	647	649	649	649
Fire	-	-	-	93	569	1,164	1,668	3,012	4,059	4,322	4,531	4,671	4,757	4,798	4,815	4,815	4,815
Total General Levy	-	-	-	184	1,130	2,310	3,310	5,977	8,055	8,577	8,992	9,270	9,441	9,522	9,557	9,557	9,557
Special Taxes																	
Library	-	-	-	2	15	30	45	61	71	79	86	89	91	91	91	91	91
Fire	-	-	-	4	30	76	117	183	226	240	251	259	265	268	270	270	270
Total Special Taxes	-	-	-	7	46	107	162	245	297	319	336	348	356	359	361	361	361
Retail Sales Tax																	
Project Area Retailers	-	-	-	-	-	189	354	1,477	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600
Other Retailers	-	-	-	8	53	105	154	227	278	306	327	340	347	349	350	350	350
Total Sales Tax	-	-	-	8	53	294	508	1,704	2,878	2,906	2,927	2,940	2,947	2,949	2,950	2,950	2,950
Utility User Tax																	
Residential Units	-	-	-	10	65	127	191	257	298	334	360	375	382	382	382	382	382
Commercial Uses	-	-	-	-	-	61	117	347	530	548	565	583	600	618	627	627	627
Total Utility User Taxes	-	-	-	10	65	188	308	604	828	881	925	958	982	1,000	1,008	1,008	1,008
Transient Occupancy	-	-	-	-	-	-	-	1,232	1,232	1,232	1,232	1,232	1,232	1,232	1,232	1,232	1,232
Docmentary Transfer	-	-	-	29	152	265	254	383	342	179	170	156	142	130	123	117	117
Franchise Fee	-	-	-	2	11	21	32	42	48	54	58	60	61	61	61	61	61
Total Revenues	**-**	**-**	**-**	**240**	**1,456**	**3,186**	**4,574**	**10,186**	**13,681**	**14,148**	**14,640**	**14,964**	**15,161**	**15,252**	**15,293**	**15,286**	**15,286**
EXPENDITURES (IN $ 000's)																	
Sheriff	-	-	-	39	276	540	801	1,066	1,227	1,366	1,467	1,528	1,554	1,554	1,554	1,554	1,554
Fire	-	-	-	75	359	525	1,120	1,289	1,643	1,646	1,660	1,662	1,644	1,610	1,592	1,586	1,586
Library	-	-	-	22	108	156	184	207	210	210	212	363	359	351	347	346	346
Public Works	-	-	-	19	37	56	56	56	56	56	56	56	56	56	56	56	56
Animal care	-	-	-	2	11	22	33	44	50	56	60	63	64	64	64	64	64
Parks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Recreation	-	-	-	2	11	21	32	42	48	54	58	60	61	61	61	61	61
Planning	-	-	-	2	15	29	43	57	66	74	79	82	84	84	84	84	84
General Admin	-	-	-	16	82	135	227	276	330	346	359	381	382	378	376	375	375
Total Expenditures	**-**	**-**	**-**	**177**	**899**	**1,483**	**2,494**	**3,037**	**3,630**	**3,807**	**3,951**	**4,196**	**4,203**	**4,157**	**4,134**	**4,126**	**4,126**
NET SURPLUS (IN $ 000's)	**-**	**-**	**-**	**63**	**557**	**1,702**	**2,080**	**7,150**	**10,050**	**10,341**	**10,688**	**10,768**	**10,958**	**11,095**	**11,158**	**11,160**	**11,160**

Note: All Dollar Amounts are in Un-Inflated 2006 Dollars.

ADK&A Allan D. Kotin & Associates

CBRE CB RICHARD ELLIS

A-3.2

County Annual Revenues' & Expenditures' Schedule – by Community: HOMESTEAD

HOMESTEAD	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
COSTS & REVENUES' INPUTS /1																	
Absorption - Units	-	150	847	1,442	2,175	3,268	4,302	5,035	5,456	5,672	5,675	5,675	5,675	5,675	5,675	5,675	5,675
Absorption - SF	-	-	-	-	-	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Population	-	390	2,172	3,764	5,798	8,614	11,304	13,158	14,221	14,770	14,777	14,777	14,777	14,777	14,777	14,777	14,777
Employees	-	-	-	-	-	2,779	2,779	2,779	2,779	2,779	2,779	2,779	2,779	2,779	2,779	2,779	2,779
Assessed Value (In Mn $'s)	-	72.2	423.6	771.3	1,339.1	2,140.2	2,792.4	3,247.9	3,445.9	3,547.4	3,547.4	3,547.4	3,547.4	3,547.4	3,547.4	3,547.4	3,547.4
Residents' Retail Expenditure (Mn $'s)	-	4.52	25.44	43.92	69.79	113.29	147.98	173.08	186.19	192.82	192.91	192.91	192.91	192.91	192.91	192.91	192.91
New Retailers' Sales (Mn $'s)	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Total Property Tax (Mn $'s)	-	0.7	4.2	7.7	13.4	21.4	27.9	32.5	34.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5
REVENUES (IN $ 000's)																	
Taxes																	
General Levy																	
Adj. County Unrestricted	-	91	535	975	1,693	2,705	3,530	4,105	4,356	4,484	4,484	4,484	4,484	4,484	4,484	4,484	4,484
Library	-	20	117	213	370	591	772	898	952	980	980	980	980	980	980	980	980
Fire	-	137	806	1,467	2,547	4,070	5,310	6,176	6,553	6,746	6,746	6,746	6,746	6,746	6,746	6,746	6,746
Total General Levy	-	249	1,458	2,655	4,609	7,367	9,612	11,179	11,861	12,210	12,210	12,210	12,210	12,210	12,210	12,210	12,210
Special Taxes																	
Library	-	4	22	37	56	84	111	130	140	146	146	146	146	146	146	146	146
Fire	-	7	42	72	109	207	258	295	316	327	327	327	327	327	327	327	327
Total Special Taxes	-	11	64	109	165	291	369	424	456	472	473	473	473	473	473	473	473
Sales Tax																	
Project Area Retailers	-	-	-	-	-	50	50	50	50	50	50	50	50	50	50	50	50
Other Retailers	-	13	72	125	200	318	417	489	526	545	546	546	546	546	546	546	546
Total Sales Tax	-	13	72	125	200	367	467	539	576	595	595	595	595	595	595	595	595
Utility User Tax																	
Residential Units	-	16	91	156	235	353	465	544	589	613	613	613	613	613	613	613	613
Commercial Uses	-	-	-	-	-	233	233	233	233	233	233	233	233	233	233	233	233
Total Utility User Taxes	-	16	91	156	235	586	698	777	823	846	846	846	846	846	846	846	846
Transient Occupancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Docmentary Transfer	-	40	201	221	366	531	491	422	303	254	200	200	200	200	200	200	200
Franchise Fee	-	3	15	26	41	60	79	92	100	103	103	103	103	103	103	103	103
Total Revenues	**-**	**332**	**1,902**	**3,291**	**5,615**	**9,202**	**11,716**	**13,434**	**14,118**	**14,481**	**14,428**	**14,427**	**14,427**	**14,427**	**14,427**	**14,427**	**14,427**
EXPENDITURES (IN $ 000's)																	
Sheriff	-	69	386	669	1,031	1,531	2,009	2,339	2,528	2,626	2,627	2,627	2,627	2,627	2,627	2,627	2,627
Fire	-	214	667	1,232	1,299	1,458	2,732	2,727	3,245	3,022	2,830	2,716	2,639	2,584	2,556	2,546	2,546
Library	-	107	342	372	402	443	461	455	432	404	380	625	606	593	587	585	585
Public Works	-	127	253	294	336	390	431	472	481	481	481	481	481	481	481	481	481
Animal care	-	3	16	27	42	63	82	96	104	108	108	108	108	108	108	108	108
Parks	-	49	49	98	147	147	196	196	196	196	196	196	196	196	196	196	196
Recreation	-	3	15	26	41	60	79	92	100	103	103	103	103	103	103	103	103
Planning	-	4	21	36	56	82	108	126	136	141	141	141	141	141	141	141	141
General Admin	-	58	175	276	335	417	610	650	722	708	687	700	690	683	680	679	679
Total Expenditures	**-**	**633**	**1,924**	**3,031**	**3,687**	**4,591**	**6,708**	**7,154**	**7,943**	**7,789**	**7,552**	**7,697**	**7,591**	**7,517**	**7,479**	**7,466**	**7,466**
NET SURPLUS (IN $ 000's)	**-**	**(301)**	**(22)**	**260**	**1,928**	**4,611**	**5,008**	**6,280**	**6,175**	**6,692**	**6,876**	**6,731**	**6,836**	**6,910**	**6,948**	**6,962**	**6,962**

Note: All Dollar Amounts are in Un-Inflated 2006 Dollars.

A-3.3
County Annual Revenues' & Expenditures' Schedule – by Community: POTRERO

POTRERO	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
COSTS & REVENUES' INPUTS /1																	
Absorption - Units	-	-	-	-	-	12	332	1,232	2,644	4,470	5,835	6,739	7,443	8,013	8,317	8,428	8,428
Absorption - SF	-	-	-	-	-	-	-	628,500	1,257,000	1,257,000	1,257,000	1,257,000	1,257,000	1,257,000	1,257,000	1,257,000	1,257,000
Population	-	-	-	-	-	38	1,052	3,898	8,137	12,764	16,218	18,770	20,749	22,303	23,054	23,322	23,322
Employees	-	-	-	-	-	-	-	2,043	4,085	4,085	4,085	4,085	4,085	4,085	4,085	4,085	4,085
Assessed Value (In Mn $'s)	-	-	-	-	-	5.5	171.6	916.7	1,956.9	2,941.2	3,679.3	4,170.1	4,537.9	4,813.8	4,955.9	5,014.3	5,014.3
Residents' Retail Expenditure (Mn $'s)	-	-	-	-	-	0.35	10.12	44.21	94.93	152.27	195.40	223.88	246.02	263.93	273.43	277.13	277.13
New Retailers' Sales (Mn $'s)	-	-	-	-	-	-	-	53.4	106.8	106.8	106.8	106.8	106.8	106.8	106.8	106.8	106.8
Total Property Tax (Mn $'s)	-	-	-	-	-	0.1	1.7	9.2	19.6	29.4	36.8	41.7	45.4	48.1	49.6	50.1	50.1
REVENUES (IN $ 000's)																	
Taxes																	
General Levy																	
Adj. County Unrestricted	-	-	-	-	-	7	208	1,112	2,373	3,567	4,462	5,058	5,504	5,838	6,011	6,082	6,082
Library	-	-	-	-	-	2	47	253	539	811	1,014	1,149	1,251	1,327	1,366	1,382	1,382
Fire	-	-	-	-	-	11	328	1,750	3,735	5,614	7,023	7,960	8,662	9,188	9,459	9,571	9,571
Total General Levy	-	-	-	-	-	19	583	3,114	6,648	9,992	12,499	14,167	15,416	16,354	16,836	17,035	17,035
Special Taxes																	
Library	-	-	-	-	-	0	9	32	68	115	150	173	191	206	214	217	217
Fire	-	-	-	-	-	1	17	87	182	261	321	366	401	430	445	450	450
Total Special Taxes	-	-	-	-	-	1	25	119	251	376	471	539	593	636	659	667	667
Sales Tax																	
Project Area Retailers	-	-	-	-	-	-	-	534	1,068	1,068	1,068	1,068	1,068	1,068	1,068	1,068	1,068
Other Retailers	-	-	-	-	-	1	29	123	264	427	550	632	695	746	773	784	784
Net Sales Tax	-	-	-	-	-	1	29	657	1,332	1,496	1,619	1,700	1,764	1,814	1,841	1,852	1,852
Utility User Tax																	
Residential Units	-	-	-	-	-	1	36	133	286	483	630	728	804	865	898	910	910
Commercial Uses	-	-	-	-	-	-	-	137	273	273	273	273	273	273	273	273	273
Total Utility User Taxes	-	-	-	-	-	1	36	270	559	756	904	1,001	1,077	1,139	1,172	1,184	1,184
Transient Occupancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Docmentary Transfer	-	-	-	-	-	3	93	418	623	656	581	484	441	412	349	306	274
Franchise Fee	-	-	-	-	-	0	7	27	57	89	114	131	145	156	161	163	163
Total Revenues	**-**	**-**	**-**	**-**	**-**	**25**	**773**	**4,605**	**9,470**	**13,365**	**16,188**	**18,023**	**19,436**	**20,511**	**21,018**	**21,207**	**21,174**
EXPENDITURES (IN $ 000's)																	
Sheriff	-	-	-	-	-	7	187	693	1,447	2,269	2,883	3,337	3,688	3,965	4,098	4,146	4,146
Fire	-	-	-	-	-	5	211	667	1,573	2,382	2,910	3,226	3,461	3,649	3,746	3,781	3,781
Library	-	-	-	-	-	2	43	135	247	349	417	793	851	895	916	923	923
Public Works	-	-	-	-	-	33	66	99	192	289	322	355	384	384	384	384	384
Animal care	-	-	-	-	-	0	8	28	59	93	118	137	151	163	168	170	170
Parks	-	-	-	-	-	49	49	1,431	1,480	1,480	1,480	1,480	1,480	1,480	1,480	1,480	1,480
Recreation	-	-	-	-	-	0	7	27	57	89	114	131	145	156	161	163	163
Planning	-	-	-	-	-	0	10	37	78	122	155	180	199	214	221	223	223
General Admin	-	-	-	-	-	10	58	312	513	707	840	964	1,036	1,090	1,117	1,127	1,127
Total Expenditures	**-**	**-**	**-**	**-**	**-**	**107**	**639**	**3,430**	**5,645**	**7,780**	**9,238**	**10,602**	**11,395**	**11,995**	**12,291**	**12,397**	**12,397**
NET SURPLUS (IN $ 000's)	**-**	**-**	**-**	**-**	**-**	**(81)**	**134**	**1,176**	**3,824**	**5,585**	**6,950**	**7,421**	**8,041**	**8,516**	**8,727**	**8,810**	**8,777**

Note: All Dollar Amounts are in Un-Inflated 2006 Dollars.

ADK&A Allan D. Kotin & Associates

CBRE CB RICHARD ELLIS

A-3.4
County Annual Revenues' & Expenditures' Schedule – by Community: MISSION VILLAGE

MISSION VILLAGE	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
COSTS & REVENUES' INPUTS /1																	
Absorption - Units	72	780	1,775	3,601	4,819	5,199	5,275	5,331	5,331	5,331	5,331	5,331	5,331	5,331	5,331	5,331	5,331
Absorption - SF	-	-	-	113,650	247,900	511,680	708,510	905,340	1,102,170	1,299,000	1,299,000	1,299,000	1,299,000	1,299,000	1,299,000	1,299,000	1,299,000
Population	190	1,979	4,435	8,920	11,852	12,729	12,881	12,993	12,993	12,993	12,993	12,993	12,993	12,993	12,993	12,993	12,993
Employees	-	-	-	284	620	1,574	2,362	3,149	3,936	4,724	4,724	4,724	4,724	4,724	4,724	4,724	4,724
Assessed Value (In Mn $'s)	34.3	384.0	984.0	1,821.7	2,384.5	2,663.1	2,768.5	2,865.2	2,934.3	3,002.7	3,002.7	3,002.7	3,002.7	3,002.7	3,002.7	3,002.7	3,002.7
Residents' Retail Expenditure (Mn $'s)	2.14	23.22	55.18	106.55	141.69	155.90	160.56	164.60	166.96	169.33	169.33	169.33	169.33	169.33	169.33	169.33	169.33
New Retailers' Sales (Mn $'s)	-	-	-	18.2	39.7	50.4	50.4	50.4	50.4	50.4	50.4	50.4	50.4	50.4	50.4	50.4	50.4
Total Property Tax (Mn $'s)	0.3	3.8	9.8	18.2	23.8	26.6	27.7	28.7	29.3	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
REVENUES (IN $ 000's)																	
Taxes																	
General Levy																	
Adj. County Unrestricted	45	504	1,290	2,389	3,127	3,492	3,631	3,757	3,848	3,938	3,938	3,938	3,938	3,938	3,938	3,938	3,938
Library	9	103	264	489	640	715	743	769	788	806	806	806	806	806	806	806	806
Fire	65	725	1,856	3,437	4,498	5,024	5,223	5,405	5,536	5,665	5,665	5,665	5,665	5,665	5,665	5,665	5,665
Total General Levy	119	1,331	3,411	6,315	8,265	9,231	9,597	9,931	10,171	10,408	10,408	10,408	10,408	10,408	10,408	10,408	10,408
Special Taxes																	
Library	2	20	46	93	124	134	136	137	137	137	137	137	137	137	137	137	137
Fire	4	32	81	151	206	236	248	259	267	275	275	275	275	275	275	275	275
Total Special Taxes	5	52	127	244	330	370	384	396	404	412	412	412	412	412	412	412	412
Sales Tax																	
Project Area Retailers	-	-	-	182	397	504	504	504	504	504	504	504	504	504	504	504	504
Other Retailers	6	66	159	304	403	442	454	464	469	474	474	474	474	474	474	474	474
Net Sales Tax	6	66	159	486	800	946	957	967	973	978	978	978	978	978	978	978	978
Utility User Tax																	
Residential Units	8	84	192	389	520	561	570	576	576	576	576	576	576	576	576	576	576
Commercial Uses	-	-	-	22	49	111	160	208	257	306	306	306	306	306	306	306	306
Total Utility User Taxes	8	84	192	411	569	672	729	784	833	882	882	882	882	882	882	882	882
Transient Occupancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Docmentary Transfer	19	196	357	521	413	285	202	200	188	190	154	154	154	154	154	154	154
Franchise Fee	1	14	31	62	83	89	90	91	91	91	91	91	91	91	91	91	91
Total Revenues	**159**	**1,743**	**4,277**	**8,039**	**10,460**	**11,593**	**11,959**	**12,370**	**12,660**	**12,961**	**12,925**	**12,925**	**12,925**	**12,925**	**12,925**	**12,925**	**12,925**
EXPENDITURES (IN $ 000's)																	
Sheriff	34	352	788	1,586	2,107	2,263	2,290	2,310	2,310	2,310	2,310	2,310	2,310	2,310	2,310	2,310	2,310
Fire	-	1,111	1,397	3,077	2,878	2,319	3,349	2,887	3,171	2,840	2,658	2,552	2,479	2,428	2,401	2,392	2,392
Library	-	544	699	882	821	654	525	449	395	356	334	549	533	522	516	514	514
Public Works	77	178	199	199	215	215	215	215	215	215	215	215	215	215	215	215	215
Animal care	1	14	32	65	86	93	94	95	95	95	95	95	95	95	95	95	95
Parks	49	49	250	299	348	348	348	348	348	348	348	348	348	348	348	348	348
Recreation	1	14	31	62	83	89	90	91	91	91	91	91	91	91	91	91	91
Planning	2	19	42	85	113	122	123	124	124	124	124	124	124	124	124	124	124
General Admin	16	228	344	626	665	610	703	652	675	638	618	628	620	613	610	609	609
Total Expenditures	**180**	**2,510**	**3,783**	**6,882**	**7,317**	**6,713**	**7,738**	**7,172**	**7,424**	**7,017**	**6,793**	**6,913**	**6,815**	**6,746**	**6,711**	**6,698**	**6,698**
NET SURPLUS (IN $ 000's)	**(22)**	**(767)**	**494**	**1,157**	**3,143**	**4,879**	**4,221**	**5,198**	**5,236**	**5,944**	**6,131**	**6,012**	**6,110**	**6,179**	**6,214**	**6,227**	**6,227**

Note: All Dollar Amounts are in Un-Inflated 2006 Dollars.

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A-3.5
County Annual Revenues' & Expenditures' Schedule – by Community: LEGACY

LEGACY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
COSTS & REVENUES' INPUTS /1																	
Absorption - Units	-	-	-	48	438	1,589	2,716	3,141	3,399	3,480	3,480	3,480	3,480	3,480	3,480	3,480	3,480
Absorption - SF	-	-	-	-	-	328,000	486,000	486,000	486,000	486,000	486,000	486,000	486,000	486,000	486,000	486,000	486,000
Population	-	-	-	152	1,267	4,673	8,046	9,240	9,928	10,144	10,144	10,144	10,144	10,144	10,144	10,144	10,144
Employees	-	-	-	-	-	1,057	1,689	1,689	1,689	1,689	1,689	1,689	1,689	1,689	1,689	1,689	1,689
Assessed Value (In Mn $'s)	-	-	-	26.3	227.5	918.3	1,537.6	1,726.7	1,818.0	1,842.1	1,842.1	1,842.1	1,842.1	1,842.1	1,842.1	1,842.1	1,842.1
Residents' Retail Expenditure (Mn $'s)	-	-	-	1.50	13.44	50.97	87.35	100.15	107.46	109.78	109.78	109.78	109.78	109.78	109.78	109.78	109.78
New Retailers' Sales (Mn $'s)	-	-	-	-	-	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Total Property Tax (Mn $'s)	-	-	-	0.3	2.3	9.2	15.4	17.3	18.2	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4
REVENUES (IN $ 000's)																	
Taxes																	
General Levy																	
Adj. County Unrestricted	-	-	-	35	299	1,205	2,017	2,266	2,385	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417
Library	-	-	-	8	67	272	455	511	538	545	545	545	545	545	545	545	545
Fire	-	-	-	53	462	1,866	3,124	3,508	3,694	3,743	3,743	3,743	3,743	3,743	3,743	3,743	3,743
Total General Levy	-	-	-	96	828	3,342	5,596	6,284	6,617	6,704	6,704	6,704	6,704	6,704	6,704	6,704	6,704
Special Taxes																	
Library	-	-	-	1	11	41	70	81	87	90	90	90	90	90	90	90	90
Fire	-	-	-	2	21	85	139	154	161	162	162	162	162	162	162	162	162
Total Special Taxes	-	-	-	4	32	126	209	235	248	252	252	252	252	252	252	252	252
Sales Tax																	
Project Area Retailers	-	-	-	-	-	272	272	272	272	272	272	272	272	272	272	272	272
Other Retailers	-	-	-	4	38	144	246	282	302	308	308	308	308	308	308	308	308
Net Sales Tax	-	-	-	4	38	416	518	554	574	580	580	580	580	580	580	580	580
Utility User Tax																	
Residential Units	-	-	-	5	47	172	293	339	367	376	376	376	376	376	376	376	376
Commercial Uses	-	-	-	-	-	72	111	111	111	111	111	111	111	111	111	111	111
Total Utility User Taxes	-	-	-	5	47	244	404	450	478	486	486	486	486	486	486	486	486
Transient Occupancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Docmentary Transfer	-	-	-	15	114	395	394	189	144	112	98	98	98	98	98	98	98
Franchise Fee	-	-	-	1	9	33	56	65	69	71	71	71	71	71	71	71	71
Total Revenues	**-**	**-**	**-**	**125**	**1,068**	**4,555**	**7,178**	**7,777**	**8,130**	**8,205**	**8,192**	**8,192**	**8,192**	**8,192**	**8,192**	**8,192**	**8,192**
EXPENDITURES (IN $ 000's)																	
Sheriff	-	-	-	27	225	831	1,430	1,642	1,765	1,803	1,803	1,803	1,803	1,803	1,803	1,803	1,803
Fire	-	-	-	41	262	709	1,724	1,701	2,022	1,854	1,735	1,666	1,618	1,585	1,567	1,561	1,561
Library	-	-	-	15	88	240	328	320	301	278	261	429	416	407	403	402	402
Public Works	-	-	72	188	230	273	273	273	273	273	273	273	273	273	273	273	273
Animal care	-	-	-	1	9	34	59	67	72	74	74	74	74	74	74	74	74
Parks	-	-	-	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Recreation	-	-	-	1	9	33	56	65	69	71	71	71	71	71	71	71	71
Planning	-	-	-	1	12	45	77	88	95	97	97	97	97	97	97	97	97
General Admin	-	-	7	47	104	236	415	436	480	465	451	461	455	451	449	448	448
Total Expenditures	**-**	**-**	**80**	**522**	**1,139**	**2,600**	**4,562**	**4,792**	**5,278**	**5,115**	**4,966**	**5,074**	**5,008**	**4,961**	**4,938**	**4,929**	**4,929**
NET SURPLUS (IN $ 000's)	**-**	**-**	**(80)**	**(397)**	**(71)**	**1,955**	**2,615**	**2,985**	**2,852**	**3,091**	**3,226**	**3,118**	**3,184**	**3,231**	**3,255**	**3,263**	**3,263**

Note: All Dollar Amounts are in Un-Inflated 2006 Dollars.

ADK&A Allan D. Kotin & Associates

CBRE CB RICHARD ELLIS

A-3.6

County Annual Revenues' & Expenditures' Schedule – by Community: LANDMARK

LANDMARK	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
COSTS & REVENUES' INPUTS /1																	
Absorption - Units	456	1,316	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444
Absorption - SF	-	188,398	188,398	188,398	188,398	188,398	373,701	373,701	373,701	373,701	373,701	373,701	373,701	373,701	373,701	373,701	373,701
Population	1,446	3,870	4,275	4,275	4,275	4,275	4,275	4,275	4,275	4,275	4,275	4,275	4,275	4,275	4,275	4,275	4,275
Employees	-	612	612	612	612	612	1,354	1,354	1,354	1,354	1,354	1,354	1,354	1,354	1,354	1,354	1,354
Assessed Value (In Mn $'s)	266.1	680.2	758.0	758.0	758.0	758.0	814.6	814.6	814.6	814.6	814.6	814.6	814.6	814.6	814.6	814.6	814.6
Residents' Retail Expenditure (Mn $'s)	14.40	40.25	44.47	44.47	44.47	44.47	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70
New Retailers' Sales (Mn $'s)	-	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
Total Property Tax (Mn $'s)	2.7	6.8	7.6	7.6	7.6	7.6	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
REVENUES (IN $ 000's)																	
Taxes																	
General Levy																	
Adj. County Unrestricted	440	1,124	1,252	1,252	1,252	1,252	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346	1,346
Library	60	154	171	171	171	171	184	184	184	184	184	184	184	184	184	184	184
Fire	472	1,206	1,343	1,343	1,343	1,343	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444	1,444
Total General Levy	972	2,483	2,767	2,767	2,767	2,767	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974
Special Taxes																	
Library	12	34	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Fire	23	54	61	61	61	61	68	68	68	68	68	68	68	68	68	68	68
Total Special Taxes	34	88	98	98	98	98	105	105	105	105	105	105	105	105	105	105	105
Sales Tax																	
Project Area Retailers	-	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141
Other Retailers	42	113	125	125	125	125	130	130	130	130	130	130	130	130	130	130	130
Net Sales Tax	42	254	266	266	266	266	271	271	271	271	271	271	271	271	271	271	271
Utility User Tax																	
Residential Units	49	142	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156
Commercial Uses	-	42	42	42	42	42	88	88	88	88	88	88	88	88	88	88	88
Total Utility User Taxes	49	184	198	198	198	198	244	244	244	244	244	244	244	244	244	244	244
Transient Occupancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Docmentary Transfer	146	238	78	40	40	40	64	41	41	41	41	41	41	41	41	41	41
Franchise Fee	10	27	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Total Revenues	**1,253**	**3,274**	**3,437**	**3,398**	**3,398**	**3,398**	**3,688**	**3,665**	**3,665**	**3,665**	**3,665**	**3,665**	**3,665**	**3,665**	**3,665**	**3,665**	**3,665**
EXPENDITURES (IN $ 000's)																	
Sheriff	257	688	760	760	760	760	760	760	760	760	760	760	760	760	760	760	760
Fire	-	1,875	1,136	1,234	862	644	917	782	859	769	720	691	672	658	650	648	648
Library	-	1,063	673	423	296	220	174	148	130	117	110	181	175	172	170	169	169
Public Works	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165
Animal care	11	28	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Parks	-	68	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264
Recreation	10	27	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Planning	14	37	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
General Admin	46	395	310	295	245	215	238	222	228	218	212	216	214	212	211	211	211
Total Expenditures	**502**	**4,346**	**3,410**	**3,242**	**2,694**	**2,370**	**2,620**	**2,442**	**2,507**	**2,395**	**2,332**	**2,379**	**2,351**	**2,332**	**2,322**	**2,318**	**2,318**
NET SURPLUS (IN $ 000's)	**752**	**(1,072)**	**27**	**156**	**704**	**1,029**	**1,068**	**1,222**	**1,158**	**1,270**	**1,332**	**1,286**	**1,314**	**1,333**	**1,343**	**1,346**	**1,346**

Note: All Dollar Amounts are in Un-Inflated 2006 Dollars.

ADK&A Allan D. Kotin & Associates

CBRE CB RICHARD ELLIS

A-3.7
County Annual Revenues' & Expenditures' Schedule – by Community: COMMERCE CENTER

COMMERCE CENTER	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
COSTS & REVENUES' INPUTS /1																	
Absorption - Units	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Absorption - SF	-	228,572	982,858	1,737,144	2,880,002	3,200,002	3,200,002	3,200,002	3,200,002	3,200,002	3,200,002	3,200,002	3,200,002	3,200,002	3,200,002	3,200,002	3,200,002
Population	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Employees	-	640	2,791	4,774	7,974	8,870	8,870	8,870	8,870	8,870	8,870	8,870	8,870	8,870	8,870	8,870	8,870
Assessed Value (In Mn $'s)	-	61.2	307.7	549.1	853.9	938.1	938.1	938.1	938.1	938.1	938.1	938.1	938.1	938.1	938.1	938.1	938.1
Residents' Retail Expenditure (Mn $'s)	-	0.4	1.8	3.1	5.2	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
New Retailers' Sales (Mn $'s)	-	-	25.9	54.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1
Total Property Tax (Mn $'s)	-	0.6	3.1	5.5	8.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
REVENUES (IN $ 000's)																	
Taxes																	
General Levy																	
Adj. County Unrestricted	-	85.8	431.2	769.6	1,196.8	1,314.7	1,314.7	1,314.7	1,314.7	1,314.7	1,314.7	1,314.7	1,314.7	1,314.7	1,314.7	1,314.7	1,314.7
Library	-	16.0	80.5	143.6	223.4	245.4	245.4	245.4	245.4	245.4	245.4	245.4	245.4	245.4	245.4	245.4	245.4
Fire	-	114.8	576.8	1,029.5	1,600.9	1,758.7	1,758.7	1,758.7	1,758.7	1,758.7	1,758.7	1,758.7	1,758.7	1,758.7	1,758.7	1,758.7	1,758.7
Total General Levy	-	217	1,088	1,943	3,021	3,319	3,319	3,319	3,319	3,319	3,319	3,319	3,319	3,319	3,319	3,319	3,319
Special Taxes																	
Library																	
Fire	-	9.4	40.3	71.2	118.1	131.2	131.2	131.2	131.2	131.2	131.2	131.2	131.2	131.2	131.2	131.2	131.2
Total Special Taxes	-	9	40	71	118	131	131	131	131	131	131	131	131	131	131	131	131
Retail Sales Tax																	
Project Area Retailers	-	-	259	541	541	541	541	541	541	541	541	541	541	541	541	541	541
Other Retailers	-	4	18	31	52	58	58	58	58	58	58	58	58	58	58	58	58
Total Sales Tax	-	4	277	573	594	600	600	600	600	600	600	600	600	600	600	600	600
Utility User Tax																	
Residential Units	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial Uses	-	47	202	351	584	650	650	650	650	650	650	650	650	650	650	650	650
Total Utility User Taxes	-	47	202	351	584	650	650	650	650	650	650	650	650	650	650	650	650
Transient Occupancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Docmentary Transfer	-	33	133	137	178	69	25	25	25	25	25	25	25	25	25	25	25
Franchise Fee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Revenues	**-**	**309**	**1,741**	**3,075**	**4,495**	**4,768**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**
EXPENDITURES (IN $ 000's)																	
Sheriff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fire	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Library	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Public Works	-	-	-	60	60	102	102	102	102	102	102	102	102	102	102	102	102
Animal care	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Recreation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Planning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
General Admin	-	-	-	6	6	10	10	10	10	10	10	10	10	10	10	10	10
Total Expenditures	**-**	**-**	**-**	**66**	**66**	**113**	**113**	**113**	**113**	**113**	**113**	**113**	**113**	**113**	**113**	**113**	**113**
NET SURPLUS (IN $ 000's)	**-**	**309**	**1,741**	**3,009**	**4,429**	**4,655**	**4,612**	**4,612**	**4,612**	**4,612**	**4,612**	**4,612**	**4,612**	**4,612**	**4,612**	**4,612**	**4,612**

Note: All Dollar Amounts are in Un-Inflated 2006 Dollars.

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CBRE
CB RICHARD ELLIS

A-4.0
County Annual Revenue and Expenditure Inputs: by Consolidated Product – ALL PROJECT
(All Dollar amounts in un-inflated 2006 dollars)

Use - Product	By 2025	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION /1																		
Residential for Sale	**24,242**	**528**	**1,097**	**1,820**	**1,947**	**2,559**	**2,868**	**2,802**	**2,442**	**2,160**	**1,945**	**1,317**	**1,006**	**766**	**570**	**304**	**111**	**-**
Category 1 - SFD	7,851	240	273	227	136	412	654	920	954	1,092	1,022	678	473	368	266	96	40	-
Category 2 - SFD-C	1,653	240	258	81	144	144	39	59	114	144	116	72	72	72	72	26	-	-
Category 3 - SFD-E	1,927	-	56	180	253	311	252	238	122	84	144	132	91	48	16	-	-	-
Category 4 - SFA-F	5,271	24	176	455	668	940	859	713	648	371	208	75	72	62	-	-	-	-
Category 5 - SFA-T	3,503	24	240	402	333	462	794	642	356	181	69	-	-	-	-	-	-	-
Category 6 - SFA-M	1,512	-	30	283	221	144	150	154	186	144	98	72	30	-	-	-	-	-
Category 7 - SNR	2,525	-	64	192	192	146	120	76	62	144	288	288	268	216	216	182	71	-
Apartment Uses	**3,651**	-	621	-	610	296	343	342	288	313	505	291	42	**-**	**-**	**-**	**-**	**-**
Commercial - Retail	**3,065,152**	-	94,199	143,751	270,615	134,250	375,763	97,075	974,750	974,750	-	-	-	-	-	-	-	-
Commercial - Office	**4,673,597**	-	185,628	285,378	197,846	457,144	615,330	540,133	895,988	895,988	270,163	73,333	73,333	73,333	73,333	36,667	-	-
Commercial - Other	**170,024**	-	-	-	-	-	-	-	170,024	-	-	-	-	-	-	-	-	-
Industrial R&D	**2,944,706**	-	137,143	325,159	399,476	685,715	1,282,000	-	115,214	-	-	-	-	-	-	-	-	-
POPULATION /1	**74,256**	**1,636**	**6,239**	**10,883**	**17,333**	**24,745**	**33,365**	**42,064**	**49,560**	**56,459**	**62,629**	**66,661**	**69,556**	**71,682**	**73,237**	**73,987**	**74,256**	**74,256**
Residential for Sale	**66,318**	**1,636**	**4,686**	**9,330**	**14,255**	**20,928**	**28,713**	**36,573**	**43,367**	**49,552**	**55,101**	**58,822**	**61,617**	**63,744**	**65,298**	**66,049**	**66,318**	**66,318**
Category 1 - SFD	24,888	761	1,626	2,346	2,777	4,083	6,156	9,073	12,097	15,558	18,798	20,947	22,447	23,613	24,457	24,761	24,888	24,888
Category 2 - SFD-C	5,119	761	1,579	1,835	2,235	2,635	2,751	2,938	3,300	3,756	4,124	4,352	4,580	4,808	5,037	5,119	5,119	5,119
Category 3 - SFD-E	6,109	-	178	748	1,550	2,536	3,335	4,089	4,476	4,742	5,199	5,617	5,906	6,058	6,109	6,109	6,109	6,109
Category 4 - SFA-F	12,545	57	476	1,559	3,149	5,386	7,430	9,127	10,670	11,553	12,048	12,226	12,397	12,545	12,545	12,545	12,545	12,545
Category 5 - SFA-T	9,009	57	628	1,585	2,378	3,487	5,642	7,429	8,341	8,829	9,009	9,009	9,009	9,009	9,009	9,009	9,009	9,009
Category 6 - SFA-M	3,599	-	71	745	1,271	1,614	1,971	2,337	2,780	3,123	3,356	3,527	3,599	3,599	3,599	3,599	3,599	3,599
Category 7 - SNR	5,050	-	128	512	896	1,188	1,428	1,580	1,704	1,992	2,568	3,144	3,680	4,112	4,544	4,908	5,050	5,050
Apartment Uses	**7,939**	-	1,553	1,553	3,078	3,818	4,652	5,491	6,194	6,907	7,528	7,839	7,939	7,939	7,939	7,939	7,939	7,939
EMPLOYEES /1	**32,399**	**-**	**1,252**	**3,403**	**5,670**	**9,206**	**15,171**	**17,574**	**23,977**	**29,998**	**31,079**	**31,372**	**31,666**	**31,959**	**32,252**	**32,399**	**32,399**	**32,399**
Commercial - Retail	**7,663**	-	235	595	1,271	1,607	2,546	2,789	5,226	7,663	7,663	7,663	7,663	7,663	7,663	7,663	7,663	7,663
Commercial - Office	**18,694**	-	743	1,884	2,675	4,504	6,965	9,126	12,710	16,294	17,374	17,668	17,961	18,254	18,548	18,694	18,694	18,694
Commercial - Other	**152**	-	-	-	-	-	-	-	152	152	152	152	152	152	152	152	152	152
Industrial R&D	**5,889**	-	274	925	1,724	3,095	5,659	5,659	5,889	5,889	5,889	5,889	5,889	5,889	5,889	5,889	5,889	5,889
ASSESSED VALUE /1	**17,806**	**300**	**1,198**	**2,473**	**3,977**	**5,876**	**8,063**	**9,939**	**12,164**	**14,138**	**15,461**	**16,314**	**16,882**	**17,297**	**17,595**	**17,747**	**17,806**	**17,806**
(in Million $'s)																		
Residential for Sale	**13,380**	**300**	**918**	**1,947**	**3,023**	**4,489**	**6,069**	**7,637**	**8,964**	**10,102**	**11,212**	**11,974**	**12,511**	**12,904**	**13,180**	**13,322**	**13,380**	**13,380**
Category 1 - SFD	4,296	165	343	470	543	785	1,166	1,669	2,170	2,751	3,294	3,652	3,904	4,094	4,224	4,272	4,296	4,296
Category 2 - SFD-C	833	114	233	267	338	406	420	454	522	606	671	709	746	784	821	833	833	833
Category 3 - SFD-E	2,351	-	67	290	563	932	1,243	1,570	1,760	1,851	2,051	2,218	2,300	2,341	2,351	2,351	2,351	2,351
Category 4 - SFA-F	2,413	12	105	331	637	1,070	1,463	1,785	2,073	2,240	2,330	2,359	2,388	2,413	2,413	2,413	2,413	2,413
Category 5 - SFA-T	1,568	10	121	307	457	666	1,019	1,300	1,459	1,538	1,568	1,568	1,568	1,568	1,568	1,568	1,568	1,568
Category 6 - SFA-M	715	-	13	139	239	305	373	440	531	604	656	697	715	715	715	715	715	715
Category 7 - SNR	1,204	-	36	142	247	323	385	419	449	512	642	770	889	989	1,087	1,169	1,204	1,204
Apartment Uses	**867**	-	155	155	285	353	437	523	594	671	792	859	867	867	867	867	867	867
Commercial - Retail	**1,370**	-	35	115	258	317	491	534	957	1,370	1,370	1,370	1,370	1,370	1,370	1,370	1,370	1,370
Commercial - Office	**1,646**	-	59	154	220	372	576	755	1,106	1,452	1,545	1,568	1,591	1,614	1,636	1,646	1,646	1,646
Commercial - Other	**40**	-	-	-	-	-	-	-	40	40	40	40	40	40	40	40	40	40
Industrial R&D	**502**	-	31	103	192	345	490	490	502	502	502	502	502	502	502	502	502	502
RETAIL EXPENDITURE /1 /2	**264.9**	**4.8**	**19.6**	**37.4**	**59.8**	**87.2**	**119.2**	**148.8**	**177.2**	**202.7**	**224.8**	**239.3**	**248.8**	**255.8**	**261.1**	**263.9**	**264.9**	**264.9**
(in Million $'s)																		
Residential for Sale	**220.0**	**4.8**	**14.7**	**31.1**	**48.5**	**71.8**	**97.6**	**123.2**	**145.5**	**164.9**	**183.0**	**195.3**	**204.3**	**211.1**	**216.2**	**218.9**	**220.0**	**220.0**
Category 1 - SFD	71.9	2.3	4.9	7.0	8.2	12.0	18.1	26.5	35.1	44.9	54.2	60.5	64.8	68.1	70.6	71.5	71.9	71.9
Category 2 - SFD-C	14.7	2.0	4.2	4.9	6.2	7.4	7.8	8.3	9.4	10.8	11.8	12.5	13.2	13.8	14.5	14.7	14.7	14.7
Category 3 - SFD-E	24.9	-	0.7	3.0	5.8	9.7	13.0	16.4	18.5	19.5	21.6	23.3	24.3	24.8	24.9	24.9	24.9	24.9
Category 4 - SFA-F	44.6	0.2	1.8	5.8	11.4	19.3	26.5	32.5	37.9	41.1	42.8	43.5	44.0	44.6	44.6	44.6	44.6	44.6
Category 5 - SFA-T	29.4	0.2	2.2	5.6	8.4	12.3	19.0	24.3	27.3	28.8	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
Category 6 - SFA-M	12.9	-	0.2	2.5	4.3	5.6	6.8	8.1	9.8	11.0	11.9	12.6	12.9	12.9	12.9	12.9	12.9	12.9
Category 7 - SNR	21.6	-	0.6	2.3	4.1	5.4	6.5	7.1	7.6	8.8	11.2	13.6	15.8	17.6	19.4	20.9	21.6	21.6
Apartment Uses	**23.7**	-	4.1	4.1	7.6	9.4	11.6	14.0	15.9	18.1	21.5	23.4	23.7	23.7	23.7	23.7	23.7	23.7
Commercial - Retail	**5.0**	-	0.2	0.4	0.8	1.1	1.7	1.8	3.4	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Commercial - Office	**12.3**	-	0.5	1.2	1.8	3.0	4.6	6.0	8.3	10.7	11.4	11.6	11.8	12.0	12.2	12.3	12.3	12.3
Commercial - Other	**0.1**	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Industrial R&D	**3.9**	-	0.2	0.6	1.1	2.0	3.7	3.7	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9

/1 Derived by combining data from individual community outputs - Refer Appendix A-4.1 through A-4.6
/2 The portion of Project Area residents & employees' retail expenditure (excludeing Auto Sales), which is spent in Unincorporated area outside the Project Area.

A-4.1

County Annual Revenue and Expenditure Inputs: by Consolidated Product – Community: ENTRADA

(All Dollar amounts in un-inflated 2006 dollars)

Use - Product	By 2025	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION /1																		
Residential for Sale	**2,827**	**-**	**-**	**-**	**88**	**514**	**569**	**455**	**472**	**238**	**183**	**144**	**102**	**62**	**-**	**-**	**-**	**-**
Category 1 - SFD	419	-	-	-	16	136	144	93	30	-	-	-	-	-	-	-	-	-
Category 2 - SFD-C	153	-	-	-	72	72	9	-	-	-	-	-	-	-	-	-	-	-
Category 4 - SFA-F	1,151	-	-	-	-	120	144	186	240	144	111	72	72	62	-	-	-	-
Category 5 - SFA-T	780	-	-	-	-	186	272	170	130	22	-	-	-	-	-	-	-	-
Category 6 - SFA-M	324	-	-	-	-	-	-	6	72	72	72	72	30	-	-	-	-	-
Apartments A-F	**708**	-	-	-	-	-	6	132	144	144	144	96	42	-	-	-	-	-
Commercial - Retail	**1,529,388**	-	-	-	-	-	111,313	97,075	660,500	660,500	-	-	-	-	-	-	-	-
Commercial - Office	**1,173,150**	-	-	-	-	-	-	-	384,908	384,908	73,333	73,333	73,333	73,333	73,333	36,667	-	-
Commercial - Other	**170,024**	-	-	-	-	-	-	-	170,024	-	-	-	-	-	-	-	-	-
Industrial R&D	**115,214**	-	-	-	-	-	-	-	115,214	-	-	-	-	-	-	-	-	-
POPULATION /1	**8,744**	**-**	**-**	**-**	**222**	**1,553**	**3,035**	**4,506**	**5,995**	**6,905**	**7,683**	**8,254**	**8,597**	**8,744**	**8,744**	**8,744**	**8,744**	**8,744**
Residential for Sale	**7,059**	**-**	**-**	**-**	**222**	**1,553**	**3,021**	**4,177**	**5,324**	**5,891**	**6,326**	**6,669**	**6,912**	**7,059**	**7,059**	**7,059**	**7,059**	**7,059**
Category 1 - SFD	1,328	-	-	-	51	482	938	1,233	1,328	1,328	1,328	1,328	1,328	1,328	1,328	1,328	1,328	1,328
Category 2 - SFD-C	364	-	-	-	171	343	364	364	364	364	364	364	364	364	364	364	364	364
Category 4 - SFA-F	2,739	-	-	-	-	286	628	1,071	1,642	1,985	2,249	2,420	2,592	2,739	2,739	2,739	2,739	2,739
Category 5 - SFA-T	1,856	-	-	-	-	443	1,090	1,495	1,804	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856
Category 6 - SFA-M	771	-	-	-	-	-	-	14	186	357	528	700	771	771	771	771	771	771
Apartments A-F	**1,685**	-	-	-	-	-	14	328	671	1,014	1,357	1,585	1,685	1,685	1,685	1,685	1,685	1,685
EMPLOYEES /1	**9,051**	**-**	**-**	**-**	**-**	**-**	**278**	**521**	**4,247**	**7,437**	**7,731**	**8,024**	**8,317**	**8,611**	**8,904**	**9,051**	**9,051**	**9,051**
Commercial - Retail	**3,823**	-	-	-	-	-	278	521	2,172	3,823	3,823	3,823	3,823	3,823	3,823	3,823	3,823	3,823
Commercial - Office	**4,693**	-	-	-	-	-	-	-	1,540	3,079	3,373	3,666	3,959	4,253	4,546	4,693	4,693	4,693
Commercial - Other	**152**	-	-	-	-	-	-	-	152	152	152	152	152	152	152	152	152	152
Industrial R&D	**230**	-	-	-	-	-	-	-	230	230	230	230	230	230	230	230	230	230
ASSESSED VALUE /1 **(in Million $'s)**	**2,646**	**-**	**-**	**-**	**51**	**313**	**640**	**917**	**1,655**	**2,231**	**2,375**	**2,490**	**2,567**	**2,614**	**2,637**	**2,646**	**2,646**	**2,646**
Residential for Sale	**1,338**	**-**	**-**	**-**	**51**	**313**	**584**	**786**	**997**	**1,108**	**1,196**	**1,267**	**1,313**	**1,338**	**1,338**	**1,338**	**1,338**	**1,338**
Category 1 - SFD	248	-	-	-	11	97	184	235	248	248	248	248	248	248	248	248	248	248
Category 2 - SFD-C	82	-	-	-	41	80	82	82	82	82	82	82	82	82	82	82	82	82
Category 4 - SFA-F	472	-	-	-	-	49	107	182	281	343	390	419	448	472	472	472	472	472
Category 5 - SFA-T	348	-	-	-	-	88	211	284	340	348	348	348	348	348	348	348	348	348
Category 6 - SFA-M	188	-	-	-	-	-	-	3	45	87	129	171	188	188	188	188	188	188
Apartments A-F	**162**	-	-	-	-	-	1	33	67	101	134	154	162	162	162	162	162	162
Commercial - Retail	**703**	-	-	-	-	-	54	98	405	703	703	703	703	703	703	703	703	703
Commercial - Office	**390**	-	-	-	-	-	-	-	134	266	289	313	336	358	381	390	390	390
Commercial - Other	**40**	-	-	-	-	-	-	-	40	40	40	40	40	40	40	40	40	40
Industrial R&D	**12**	-	-	-	-	-	-	-	12	12	12	12	12	12	12	12	12	12
RETAIL EXPENDITURE /1 /2 **(in Million $'s)**	**35.0**	**-**	**-**	**-**	**0.8**	**5.3**	**10.5**	**15.4**	**22.7**	**27.8**	**30.6**	**32.7**	**34.0**	**34.7**	**34.9**	**35.0**	**35.0**	**35.0**
Residential for Sale	**24.5**	**-**	**-**	**-**	**0.8**	**5.3**	**10.3**	**14.1**	**18.2**	**20.2**	**21.8**	**23.1**	**24.0**	**24.5**	**24.5**	**24.5**	**24.5**	**24.5**
Category 1 - SFD	3.9	-	-	-	0.2	1.4	2.7	3.6	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Category 2 - SFD-C	1.4	-	-	-	0.7	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Category 4 - SFA-F	9.5	-	-	-	-	1.0	2.1	3.7	5.6	6.8	7.8	8.4	9.0	9.5	9.5	9.5	9.5	9.5
Category 5 - SFA-T	6.6	-	-	-	-	1.6	3.9	5.4	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Category 6 - SFA-M	3.1	-	-	-	-	-	-	0.1	0.7	1.4	2.1	2.8	3.1	3.1	3.1	3.1	3.1	3.1
Apartments A-F	**4.7**	-	-	-	-	-	0.0	0.9	1.9	2.8	3.8	4.4	4.7	4.7	4.7	4.7	4.7	4.7
Commercial - Retail	**2.5**	-	-	-	-	-	0.2	0.3	1.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Commercial - Office	**3.1**	-	-	-	-	-	-	-	1.0	2.0	2.2	2.4	2.6	2.8	3.0	3.1	3.1	3.1
Commercial - Other	**0.1**	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Industrial R&D	**0.2**	-	-	-	-	-	-	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

/1 Derived by combining data from individual product level community outputs - Refer Appendix A-6.1

/2 The portion of Project Area residents & employees' retail expenditure (excludeing Auto Sales), which is spent in Unincorporated area outside the Project Area.

ADK&A
Allan D. Kotin & Associates

CBRE
CB RICHARD ELLIS

A-4.2

County Annual Revenue and Expenditure Inputs: by Consolidated Product –Community: HOMESTEAD

(All Dollar amounts in un-inflated 2006 dollars)

Use - Product	By 2025	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION /1																		
Residential for Sale	**5,488**	-	**150**	**697**	**595**	**733**	**906**	**1,034**	**733**	**421**	**216**	**3**	-	-	-	-	-	-
Category 1 - SFD	376	-	42	108	72	56	29	69	-	-	-	-	-	-	-	-	-	-
Category 2 - SFD-C	253	-	-	-	-	-	6	59	72	72	44	-	-	-	-	-	-	-
Category 3 - SFD-E	979	-	-	48	150	311	236	162	67	5	-	-	-	-	-	-	-	-
Category 4 - SFA-F	1,878	-	54	186	80	144	341	452	336	185	97	3	-	-	-	-	-	-
Category 5 - SFA-T	814	-	24	72	72	78	144	144	144	87	49	-	-	-	-	-	-	-
Category 6 - SFA-M	1,188	-	30	283	221	144	150	148	114	72	26	-	-	-	-	-	-	-
Apartment Uses	**187**	-	-	-	-	-	187	-	-	-	-	-	-	-	-	-	-	-
Commercial - Retail	**27,500**	-	-	-	-	-	27,500	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**132,500**	-	-	-	-	-	132,500	-	-	-	-	-	-	-	-	-	-	-
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**1,090,000**	-	-	-	-	-	1,090,000	-	-	-	-	-	-	-	-	-	-	-
POPULATION /1	**14,777**	-	**390**	**2,172**	**3,764**	**5,798**	**8,614**	**11,304**	**13,158**	**14,221**	**14,770**	**14,777**	**14,777**	**14,777**	**14,777**	**14,777**	**14,777**	**14,777**
Residential for Sale	**14,332**	-	**390**	**2,172**	**3,764**	**5,798**	**8,169**	**10,859**	**12,713**	**13,776**	**14,325**	**14,332**	**14,332**	**14,332**	**14,332**	**14,332**	**14,332**	**14,332**
Category 1 - SFD	1,192	-	133	476	704	881	973	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192
Category 2 - SFD-C	802	-	-	-	-	-	19	206	434	663	802	802	802	802	802	802	802	802
Category 3 - SFD-E	3,103	-	-	152	628	1,614	2,362	2,875	3,088	3,103	3,103	3,103	3,103	3,103	3,103	3,103	3,103	3,103
Category 4 - SFA-F	4,470	-	129	571	762	1,104	1,916	2,992	3,791	4,232	4,463	4,470	4,470	4,470	4,470	4,470	4,470	4,470
Category 5 - SFA-T	1,937	-	57	228	400	585	928	1,271	1,614	1,821	1,937	1,937	1,937	1,937	1,937	1,937	1,937	1,937
Category 6 - SFA-M	2,827	-	71	745	1,271	1,614	1,971	2,323	2,594	2,766	2,827	2,827	2,827	2,827	2,827	2,827	2,827	2,827
Apartment Uses	**445**	-	-	-	-	-	445	445	445	445	445	445	445	445	445	445	445	445
EMPLOYEES /1	**2,779**	-	-	-	-	-	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**
Commercial - Retail	**69**	-	-	-	-	-	69	69	69	69	69	69	69	69	69	69	69	69
Commercial - Office	**530**	-	-	-	-	-	530	530	530	530	530	530	530	530	530	530	530	530
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**2,180**	-	-	-	-	-	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180
ASSESSED VALUE /1 **(in Million $'s)**	**3,547**	-	**72**	**424**	**771**	**1,339**	**2,140**	**2,792**	**3,248**	**3,446**	**3,547**	**3,547**	**3,547**	**3,547**	**3,547**	**3,547**	**3,547**	**3,547**
Residential for Sale	**3,348**	-	**72**	**424**	**771**	**1,339**	**1,941**	**2,593**	**3,048**	**3,246**	**3,348**	**3,348**	**3,348**	**3,348**	**3,348**	**3,348**	**3,348**	**3,348**
Category 1 - SFD	187	-	21	75	110	138	153	187	187	187	187	187	187	187	187	187	187	187
Category 2 - SFD-C	153	-	-	-	-	-	3	37	82	127	153	153	153	153	153	153	153	153
Category 3 - SFD-E	1,234	-	-	45	186	556	847	1,092	1,234	1,234	1,234	1,234	1,234	1,234	1,234	1,234	1,234	1,234
Category 4 - SFA-F	875	-	27	120	157	225	384	594	748	832	875	875	875	875	875	875	875	875
Category 5 - SFA-T	372	-	11	45	79	115	181	246	311	350	372	372	372	372	372	372	372	372
Category 6 - SFA-M	527	-	13	139	239	305	373	437	486	517	527	527	527	527	527	527	527	527
Apartment Uses	**45**	-	-	-	-	-	45	45	45	45	45	45	45	45	45	45	45	45
Commercial - Retail	**12**	-	-	-	-	-	12	12	12	12	12	12	12	12	12	12	12	12
Commercial - Office	**39**	-	-	-	-	-	39	39	39	39	39	39	39	39	39	39	39	39
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**104**	-	-	-	-	-	104	104	104	104	104	104	104	104	104	104	104	104
RETAIL EXPENDITURE /1 /2 **(in Million $'s)**	**54.6**	-	**1.3**	**7.2**	**12.5**	**20.0**	**31.8**	**41.7**	**48.9**	**52.6**	**54.5**	**54.6**	**54.6**	**54.6**	**54.6**	**54.6**	**54.6**	**54.6**
Residential for Sale	**51.5**	-	**1.3**	**7.2**	**12.5**	**20.0**	**28.7**	**38.7**	**45.9**	**49.6**	**51.5**	**51.5**	**51.5**	**51.5**	**51.5**	**51.5**	**51.5**	**51.5**
Category 1 - SFD	3.2	-	0.4	1.3	1.9	2.4	2.7	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Category 2 - SFD-C	2.4	-	-	-	-	-	0.0	0.6	1.3	2.0	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Category 3 - SFD-E	13.2	-	-	0.5	2.0	5.9	9.0	11.5	13.0	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
Category 4 - SFA-F	16.0	-	0.5	2.1	2.8	4.1	6.9	10.8	13.6	15.2	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Category 5 - SFA-T	6.8	-	0.2	0.8	1.4	2.1	3.3	4.5	5.7	6.4	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
Category 6 - SFA-M	9.8	-	0.2	2.5	4.3	5.6	6.8	8.1	9.0	9.6	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
Apartment Uses	**1.2**	-	-	-	-	-	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Commercial - Retail	**0.0**	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commercial - Office	**0.3**	-	-	-	-	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**1.4**	-	-	-	-	-	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4

/1 Derived by combining data from individual product level community outputs - Refer Appendix A-6.2
/2 The portion of Project Area residents & employees' retail expenditure (excludeing Auto Sales), which is spent in Unincorporated area outside the Project Area.

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A-4.3

County Annual Revenue and Expenditure Inputs: by Consolidated Product – Community: POTRERO

(All Dollar amounts in un-inflated 2006 dollars)

Use - Product	By 2025	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION /1																		
Residential for Sale	**7,908**	-	-	-	-	-	**12**	**320**	**900**	**1,387**	**1,526**	**1,170**	**904**	**704**	**570**	**304**	**111**	-
Category 1 - SFD	5,143	-	-	-	-	-	12	292	804	1,092	1,022	678	473	368	266	96	40	-
Category 2 - SFD-C	500	-	-	-	-	-	-	-	42	72	72	72	72	72	72	26	-	-
Category 3 - SFD-E	586	-	-	-	-	-	-	28	48	79	144	132	91	48	16	-	-	-
Category 7 - SNR	1,679	-	-	-	-	-	-	-	6	144	288	288	268	216	216	182	71	-
Apartment Uses	**520**	-	-	-	-	-	-	-	-	25	300	195	-	-	-	-	-	-
Commercial - Retail	**628,500**	-	-	-	-	-	-	-	314,250	314,250	-	-	-	-	-	-	-	-
Commercial - Office	**628,500**	-	-	-	-	-	-	-	314,250	314,250	-	-	-	-	-	-	-	-
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POPULATION /1	**23,322**	-	-	-	-	-	**38**	**1,052**	**3,898**	**8,137**	**12,764**	**16,218**	**18,770**	**20,749**	**22,303**	**23,054**	**23,322**	**23,322**
Residential for Sale	**23,104**	-	-	-	-	-	**38**	**1,052**	**3,898**	**8,127**	**12,627**	**15,999**	**18,551**	**20,530**	**22,084**	**22,835**	**23,104**	**23,104**
Category 1 - SFD	16,303	-	-	-	-	-	38	964	3,512	6,974	10,214	12,363	13,862	15,029	15,872	16,177	16,303	16,303
Category 2 - SFD-C	1,585	-	-	-	-	-	-	-	133	361	590	818	1,046	1,274	1,503	1,585	1,585	1,585
Category 3 - SFD-E	1,858	-	-	-	-	-	-	89	241	491	948	1,366	1,655	1,807	1,858	1,858	1,858	1,858
Category 7 - SNR	3,358	-	-	-	-	-	-	-	12	300	876	1,452	1,988	2,420	2,852	3,216	3,358	3,358
Apartment Uses	**218**	-	-	-	-	-	-	-	-	11	137	218	218	218	218	218	218	218
EMPLOYEES /1	**4,085**	-	-	-	-	-	-	-	**2,043**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**
Commercial - Retail	**1,571**	-	-	-	-	-	-	-	786	1,571	1,571	1,571	1,571	1,571	1,571	1,571	1,571	1,571
Commercial - Office	**2,514**	-	-	-	-	-	-	-	1,257	2,514	2,514	2,514	2,514	2,514	2,514	2,514	2,514	2,514
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ASSESSED VALUE /1 **(in Million $'s)**	**5,014**	-	-	-	-	-	**6**	**172**	**917**	**1,957**	**2,941**	**3,679**	**4,170**	**4,538**	**4,814**	**4,956**	**5,014**	**5,014**
Residential for Sale	**4,366**	-	-	-	-	-	**6**	**172**	**654**	**1,428**	**2,339**	**3,031**	**3,522**	**3,890**	**4,166**	**4,308**	**4,366**	**4,366**
Category 1 - SFD	2,690	-	-	-	-	-	6	148	565	1,145	1,689	2,046	2,298	2,489	2,619	2,667	2,690	2,690
Category 2 - SFD-C	262	-	-	-	-	-	-	-	23	61	100	138	175	213	250	262	262	262
Category 3 - SFD-E	656	-	-	-	-	-	-	24	64	155	355	523	605	645	656	656	656	656
Category 7 - SNR	758	-	-	-	-	-	-	-	3	66	196	324	443	543	641	723	758	758
Apartment Uses	**125**	-	-	-	-	-	-	-	-	6	79	125	125	125	125	125	125	125
Commercial - Retail	**230**	-	-	-	-	-	-	-	116	230	230	230	230	230	230	230	230	230
Commercial - Office	**293**	-	-	-	-	-	-	-	147	293	293	293	293	293	293	293	293	293
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RETAIL EXPENDITURE /1 /2 **(in Million $'s)**	**78.4**	-	-	-	-	-	**0.1**	**2.9**	**12.3**	**26.4**	**42.7**	**55.0**	**63.2**	**69.5**	**74.6**	**77.3**	**78.4**	**78.4**
Residential for Sale	**72.2**	-	-	-	-	-	**0.1**	**2.9**	**10.9**	**23.5**	**37.9**	**48.9**	**57.1**	**63.4**	**68.5**	**71.2**	**72.2**	**72.2**
Category 1 - SFD	46.7	-	-	-	-	-	0.1	2.6	9.8	19.6	29.0	35.2	39.5	42.9	45.3	46.3	46.7	46.7
Category 2 - SFD-C	4.6	-	-	-	-	-	-	-	0.4	1.0	1.7	2.4	3.0	3.7	4.3	4.6	4.6	4.6
Category 3 - SFD-E	7.0	-	-	-	-	-	-	0.3	0.7	1.7	3.7	5.4	6.4	6.9	7.0	7.0	7.0	7.0
Category 7 - SNR	14.0	-	-	-	-	-	-	-	0.0	1.2	3.6	6.0	8.2	10.0	11.8	13.3	14.0	14.0
Apartment Uses	**3.4**	-	-	-	-	-	-	-	-	0.2	2.1	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Commercial - Retail	**1.0**	-	-	-	-	-	-	-	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Commercial - Office	**1.7**	-	-	-	-	-	-	-	0.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

/1 Derived by combining data from individual product level community outputs - Refer Appendix A-6.3

/2 The portion of Project Area residents & employees' retail expenditure (excludeing Auto Sales), which is spent in Unincorporated area outside the Project Area.

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A-4.4

County Annual Revenue and Expenditure Inputs: by Consolidated Product – Community: MISSION VILLAGE

(All Dollar amounts in un-inflated 2006 dollars)

Use - Product	By 2025	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION /1																		
Residential for Sale	**4,285**	**72**	**538**	**995**	**1,216**	**952**	**380**	**76**	**56**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Category 2 - SFD-C	344	24	80	72	72	72	24	-	-	-	-	-	-	-	-	-	-	-
Category 3 - SFD-E	291	-	56	132	103	-	-	-	-	-	-	-	-	-	-	-	-	-
Category 4 - SFA-F	1,745	24	122	269	588	548	194	-	-	-	-	-	-	-	-	-	-	-
Category 5 - SFA-T	1,059	24	216	330	261	186	42	-	-	-	-	-	-	-	-	-	-	-
Category 7 - SNR	846	-	64	192	192	146	120	76	56	-	-	-	-	-	-	-	-	-
Apartment Uses	**1,046**	-	170	-	610	266	-	-	-	-	-	-	-	-	-	-	-	-
Commercial - Retail	**314,850**	-	-	-	113,650	134,250	66,950	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**984,150**	-	-	-	-	-	196,830	196,830	196,830	196,830	196,830	-	-	-	-	-	-	-
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POPULATION /1	**12,993**	**190**	**1,979**	**4,435**	**8,920**	**11,852**	**12,729**	**12,881**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**
Residential for Sale	**10,378**	**190**	**1,554**	**4,010**	**6,970**	**9,237**	**10,114**	**10,266**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**
Category 2 - SFD-C	1,090	76	330	558	786	1,014	1,090	1,090	1,090	1,090	1,090	1,090	1,090	1,090	1,090	1,090	1,090	1,090
Category 3 - SFD-E	922	-	178	596	922	922	922	922	922	922	922	922	922	922	922	922	922	922
Category 4 - SFA-F	4,153	57	347	988	2,387	3,691	4,153	4,153	4,153	4,153	4,153	4,153	4,153	4,153	4,153	4,153	4,153	4,153
Category 5 - SFA-T	2,520	57	571	1,357	1,978	2,420	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520
Category 7 - SNR	1,692	-	128	512	896	1,188	1,428	1,580	1,692	1,692	1,692	1,692	1,692	1,692	1,692	1,692	1,692	1,692
Apartment Uses	**2,615**	-	425	425	1,950	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615
EMPLOYEES /1	**4,724**	**-**	**-**	**-**	**284**	**620**	**1,574**	**2,362**	**3,149**	**3,936**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**
Commercial - Retail	**787**	-	-	-	284	620	787	787	787	787	787	787	787	787	787	787	787	787
Commercial - Office	**3,937**	-	-	-	-	-	787	1,575	2,362	3,149	3,937	3,937	3,937	3,937	3,937	3,937	3,937	3,937
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ASSESSED VALUE /1 **(in Million $'s)**	**3,003**	**34**	**384**	**984**	**1,822**	**2,384**	**2,663**	**2,769**	**2,865**	**2,934**	**3,003**	**3,003**	**3,003**	**3,003**	**3,003**	**3,003**	**3,003**	**3,003**
Residential for Sale	**2,275**	**34**	**340**	**940**	**1,592**	**2,034**	**2,213**	**2,248**	**2,275**	**2,275**	**2,275**	**2,275**	**2,275**	**2,275**	**2,275**	**2,275**	**2,275**	**2,275**
Category 2 - SFD-C	149	12	50	80	110	139	149	149	149	149	149	149	149	149	149	149	149	149
Category 3 - SFD-E	376	-	67	245	376	376	376	376	376	376	376	376	376	376	376	376	376	376
Category 4 - SFA-F	827	12	78	211	480	736	827	827	827	827	827	827	827	827	827	827	827	827
Category 5 - SFA-T	477	10	110	262	378	459	477	477	477	477	477	477	477	477	477	477	477	477
Category 7 - SNR	446	-	36	142	247	323	385	419	446	446	446	446	446	446	446	446	446	446
Apartment Uses	**235**	-	44	44	174	235	235	235	235	235	235	235	235	235	235	235	235	235
Commercial - Retail	**143**	-	-	-	57	116	143	143	143	143	143	143	143	143	143	143	143	143
Commercial - Office	**350**	-	-	-	-	-	72	142	212	281	350	350	350	350	350	350	350	350
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RETAIL EXPENDITURE /1 /2 **(in Million $'s)**	**47.4**	**0.6**	**6.6**	**15.9**	**30.4**	**40.3**	**44.2**	**45.4**	**46.4**	**46.9**	**47.4**	**47.4**	**47.4**	**47.4**	**47.4**	**47.4**	**47.4**	**47.4**
Residential for Sale	**38.1**	**0.6**	**5.5**	**14.8**	**25.6**	**33.7**	**37.0**	**37.6**	**38.1**	**38.1**	**38.1**	**38.1**	**38.1**	**38.1**	**38.1**	**38.1**	**38.1**	**38.1**
Category 2 - SFD-C	2.9	0.2	0.9	1.5	2.1	2.7	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Category 3 - SFD-E	3.8	-	0.7	2.5	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Category 4 - SFA-F	14.9	0.2	1.3	3.7	8.6	13.2	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
Category 5 - SFA-T	8.9	0.2	2.0	4.8	7.0	8.5	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Category 7 - SNR	7.6	-	0.6	2.3	4.1	5.4	6.5	7.1	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Apartment Uses	**6.2**	-	1.1	1.1	4.6	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Commercial - Retail	**0.5**	-	-	-	0.2	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Commercial - Office	**2.6**	-	-	-	-	-	0.5	1.0	1.6	2.1	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

/1 Derived by combining data from individual product level community outputs - Refer Appendix A-6.4
/2 The portion of Project Area residents & employees' retail expenditure (excludeing Auto Sales), which is spent in Unincorporated area outside the Project Area.

A-4.5

County Annual Revenue and Expenditure Inputs: by Consolidated Product – by Community: LEGACY

(All Dollar amounts in un-inflated 2006 dollars)

Use - Product	By 2025	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION /1																		
Residential for Sale	**2,741**	-	-	-	**48**	**360**	**1,001**	**917**	**281**	**114**	**20**	-	-	-	-	-	-	-
Category 1 - SFD	1,323	-	-	-	48	220	469	466	120	-	-	-	-	-	-	-	-	-
Category 3 - SFD-E	71	-	-	-	-	-	16	48	7	-	-	-	-	-	-	-	-	-
Category 4 - SFA-F	497	-	-	-	-	128	180	75	72	42	-	-	-	-	-	-	-	-
Category 5 - SFA-T	850	-	-	-	-	12	336	328	82	72	20	-	-	-	-	-	-	-
Apartment Uses	**739**	-	-	-	-	30	150	210	144	144	61	-	-	-	-	-	-	-
Commercial - Retail	**170,000**	-	-	-	-	-	170,000	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**316,000**	-	-	-	-	-	158,000	158,000	-	-	-	-	-	-	-	-	-	-
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POPULATION /1	**10,144**	-	-	-	**152**	**1,267**	**4,673**	**8,046**	**9,240**	**9,928**	**10,144**	**10,144**	**10,144**	**10,144**	**10,144**	**10,144**	**10,144**	**10,144**
Residential for Sale	**8,296**	-	-	-	**152**	**1,192**	**4,223**	**7,071**	**7,905**	**8,233**	**8,296**	**8,296**	**8,296**	**8,296**	**8,296**	**8,296**	**8,296**	**8,296**
Category 1 - SFD	4,194	-	-	-	152	850	2,336	3,814	4,194	4,194	4,194	4,194	4,194	4,194	4,194	4,194	4,194	4,194
Category 3 - SFD-E	225	-	-	-	-	-	51	203	225	225	225	225	225	225	225	225	225	225
Category 4 - SFA-F	1,183	-	-	-	-	305	733	912	1,083	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183
Category 5 - SFA-T	2,695	-	-	-	-	38	1,103	2,143	2,403	2,631	2,695	2,695	2,695	2,695	2,695	2,695	2,695	2,695
Apartment Uses	**1,848**	-	-	-	-	75	450	975	1,335	1,695	1,848	1,848	1,848	1,848	1,848	1,848	1,848	1,848
EMPLOYEES /1	**1,689**	-	-	-	-	-	**1,057**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**
Commercial - Retail	**425**	-	-	-	-	-	425	425	425	425	425	425	425	425	425	425	425	425
Commercial - Office	**1,264**	-	-	-	-	-	632	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ASSESSED VALUE /1 **(in Million $'s)**	**1,842**	-	-	-	**26**	**228**	**918**	**1,538**	**1,727**	**1,818**	**1,842**	**1,842**	**1,842**	**1,842**	**1,842**	**1,842**	**1,842**	**1,842**
Residential for Sale	**1,471**	-	-	-	**26**	**220**	**742**	**1,256**	**1,408**	**1,462**	**1,471**	**1,471**	**1,471**	**1,471**	**1,471**	**1,471**	**1,471**	**1,471**
Category 1 - SFD	775	-	-	-	26	155	428	704	775	775	775	775	775	775	775	775	775	775
Category 3 - SFD-E	85	-	-	-	-	-	20	78	85	85	85	85	85	85	85	85	85	85
Category 4 - SFA-F	238	-	-	-	-	60	145	182	218	238	238	238	238	238	238	238	238	238
Category 5 - SFA-T	372	-	-	-	-	5	150	293	330	364	372	372	372	372	372	372	372	372
Apartment Uses	**188**	-	-	-	-	7	44	98	135	172	188	188	188	188	188	188	188	188
Commercial - Retail	**80**	-	-	-	-	-	80	80	80	80	80	80	80	80	80	80	80	80
Commercial - Office	**103**	-	-	-	-	-	52	103	103	103	103	103	103	103	103	103	103	103
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RETAIL EXPENDITURE /1 /2 **(in Million $'s)**	**30.8**	-	-	-	**0.4**	**3.8**	**14.4**	**24.6**	**28.2**	**30.2**	**30.8**	**30.8**	**30.8**	**30.8**	**30.8**	**30.8**	**30.8**	**30.8**
Residential for Sale	**24.5**	-	-	-	**0.4**	**3.6**	**12.5**	**20.8**	**23.4**	**24.4**	**24.5**	**24.5**	**24.5**	**24.5**	**24.5**	**24.5**	**24.5**	**24.5**
Category 1 - SFD	12.4	-	-	-	0.4	2.5	6.8	11.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4
Category 3 - SFD-E	0.9	-	-	-	-	-	0.2	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Category 4 - SFA-F	4.2	-	-	-	-	1.1	2.6	3.2	3.8	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Category 5 - SFA-T	7.0	-	-	-	-	0.1	2.9	5.5	6.2	6.9	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Apartment Uses	**5.2**	-	-	-	-	0.2	1.2	2.7	3.7	4.7	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Commercial - Retail	**0.3**	-	-	-	-	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Commercial - Office	**0.8**	-	-	-	-	-	0.4	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

/1 Derived by combining data from individual product level community outputs - Refer Appendix A-6.5

/2 The portion of Project Area residents & employees' retail expenditure (excludeing Auto Sales), which is spent in Unincorporated area outside the Project Area.

ADK&A Allan D. Kotin & Associates

CBRE CB RICHARD ELLIS

A-4.6

County Annual Revenue and Expenditure Inputs: by Consolidated Product – by Community: LANDMARK

(All Dollar amounts in un-inflated 2006 dollars)

Use - Product	By 2025	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION /1																		
Residential for Sale	**993**	**456**	**409**	**128**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Category 1 - SFD	590	240	231	119	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Category 2 - SFD-C	403	216	178	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Apartment Uses	**451**	**-**	**451**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Commercial - Retail	**94,199**	-	94,199	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**279,502**	-	94,199	-	-	-	-	185,303	-	-	-	-	-	-	-	-	-	-
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POPULATION /1	**4,275**	**1,446**	**3,870**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**
Residential for Sale	**3,148**	**1,446**	**2,742**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**
Category 1 - SFD	1,870	761	1,493	1,870	1,870	1,870	1,870	1,870	1,870	1,870	1,870	1,870	1,870	1,870	1,870	1,870	1,870	1,870
Category 2 - SFD-C	1,278	685	1,249	1,278	1,278	1,278	1,278	1,278	1,278	1,278	1,278	1,278	1,278	1,278	1,278	1,278	1,278	1,278
Apartment Uses	**1,128**	-	1,128	1,128	1,128	1,128	1,128	1,128	1,128	1,128	1,128	1,128	1,128	1,128	1,128	1,128	1,128	1,128
EMPLOYEES /1	**1,354**	**-**	**612**	**612**	**612**	**612**	**612**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**
Commercial - Retail	**235**	-	235	235	235	235	235	235	235	235	235	235	235	235	235	235	235	235
Commercial - Office	**1,118**	-	377	377	377	377	377	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ASSESSED VALUE /1 **(in Million $'s)**	**815**	**266**	**680**	**758**	**758**	**758**	**758**	**815**	**815**	**815**	**815**	**815**	**815**	**815**	**815**	**815**	**815**	**815**
Residential for Sale	**583**	**266**	**505**	**583**	**583**	**583**	**583**	**583**	**583**	**583**	**583**	**583**	**583**	**583**	**583**	**583**	**583**	**583**
Category 1 - SFD	395	165	322	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
Category 2 - SFD-C	187	102	183	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187
Apartment Uses	**111**	-	111	111	111	111	111	111	111	111	111	111	111	111	111	111	111	111
Commercial - Retail	**35**	-	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Commercial - Office	**85**	-	29	29	29	29	29	85	85	85	85	85	85	85	85	85	85	85
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RETAIL EXPENDITURE /1 /2 **(in Million $'s)**	**13.0**	**4.2**	**11.3**	**12.5**	**12.5**	**12.5**	**12.5**	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**
Residential for Sale	**9.1**	**4.2**	**7.9**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**
Category 1 - SFD	5.7	2.3	4.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Category 2 - SFD-C	3.4	1.8	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Apartment Uses	**3.0**	-	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Commercial - Retail	**0.2**	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Commercial - Office	**0.7**	-	0.2	0.2	0.2	0.2	0.2	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Commercial - Other	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

/1 Derived by combining data from individual product level community outputs - Refer Appendix A-6.6

/2 The portion of Project Area residents & employees' retail expenditure (excludeing Auto Sales), which is spent in Unincorporated area outside the Project Area.

ADK&A
Allan D. Kotin & Associates

CBRE
CB RICHARD ELLIS

A-4.7

County Annual Revenue and Expenditure Inputs: by Consolidated Product – by Community: COMMERCE CENTER

(All Dollar amounts in un-inflated 2006 dollars)

Use - Product	By 2025	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION /1	**3,200,002**	**-**	**228,572**	**754,287**	**754,286**	**1,142,858**	**320,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Commercial - Retail	**300,715**	-	-	143,751	156,965	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**1,159,795**	-	91,429	285,378	197,846	457,144	128,000	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**1,739,492**	-	137,143	325,159	399,476	685,715	192,000	-	-	-	-	-	-	-	-	-	-	-
EMPLOYEES /1	**8,870**	**-**	**640**	**2,791**	**4,774**	**7,974**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**
Commercial - Retail	**752**	-	-	359	752	752	752	752	752	752	752	752	752	752	752	752	752	752
Commercial - Office	**4,639**	-	366	1,507	2,299	4,127	4,639	4,639	4,639	4,639	4,639	4,639	4,639	4,639	4,639	4,639	4,639	4,639
Industrial R&D	**3,479**	-	274	925	1,724	3,095	3,479	3,479	3,479	3,479	3,479	3,479	3,479	3,479	3,479	3,479	3,479	3,479
ASSESSED VALUE /1 (in Million $'s)	**938**	**-**	**61**	**308**	**549**	**854**	**938**	**938**	**938**	**938**	**938**	**938**	**938**	**938**	**938**	**938**	**938**	**938**
Commercial - Retail	**166**	-	-	80	166	166	166	166	166	166	166	166	166	166	166	166	166	166
Commercial - Office	**385**	-	30	125	191	343	385	385	385	385	385	385	385	385	385	385	385	385
Industrial R&D	**387**	-	31	103	192	345	387	387	387	387	387	387	387	387	387	387	387	387
RETAIL EXPENDITURE /1 /2 (in Million $'s)	**5.8**	**-**	**0.4**	**1.8**	**3.1**	**5.2**	**5.8**	**5.8**	**5.8**	**5.8**	**5.8**	**5.8**	**5.8**	**5.8**	**5.8**	**5.8**	**5.8**	**5.8**
Commercial - Retail	**0.5**	-	-	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Commercial - Office	**3.0**	-	0.2	1.0	1.5	2.7	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Industrial R&D	**2.3**	-	0.2	0.6	1.1	2.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3

/1 Derived by combining data from individual product level community outputs - Refer Appendix A-6.7

/2 The portion of Project Area residents & employees' retail expenditure (excludeing Auto Sales), which is spent in Unincorporated area outside the Project Area.

A-5.0
Standards & Methodology Assumptions for deriving County Expenditure – ALL PROJECT

FACILITIES MAINTAINANCE EXPENDITURE FINANCED BY COUNTY GENERAL FUND - PARKS

(Not Financed Privately by HOA or by New Special District)

	Total (acres)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 <--	--> 2031
Acres Added	**253.8**														
Entrada	-														
Homestead	20.0		5.0		5.0	5.0		5.0							
Potrero	151.0						5.0		141.0	5.0					
Mission Village	35.5	5.0		20.5	5.0	5.0									
Legacy	20.4				20.4										
Landmark	26.9		6.9	20.0											
Cumulative Acres															
Entrada		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Homestead		0.0	5.0	5.0	10.0	15.0	15.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Potrero		0.0	0.0	0.0	0.0	0.0	5.0	5.0	146.0	151.0	151.0	151.0	151.0	151.0	151.0
Mission Village		5.0	5.0	25.5	30.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5
Legacy		0.0	0.0	0.0	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4
Landmark		0.0	6.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9
Annual Cost	**$/Ac**														
Entrada	9,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Homestead	9,800	0	49,000	49,000	98,000	147,000	147,000	196,000	196,000	196,000	196,000	196,000	196,000	196,000	196,000
Potrero	9,800	0	0	0	0	0	49,000	49,000	1,430,800	1,479,800	1,479,800	1,479,800	1,479,800	1,479,800	1,479,800
Mission Village	9,800	49,000	49,000	249,900	298,900	347,900	347,900	347,900	347,900	347,900	347,900	347,900	347,900	347,900	347,900
Legacy	9,800	0	0	0	199,920	199,920	199,920	199,920	199,920	199,920	199,920	199,920	199,920	199,920	199,920
Landmark	9,800	0	67,620	263,620	263,620	263,620	263,620	263,620	263,620	263,620	263,620	263,620	263,620	263,620	263,620

FACILITIES MAINTAINANCE EXPENDITURE FINANCED BY COUNTY GENERAL FUND - ROADS

(Not Financed Privately by HOA or by New Special District)

Cumulative Lane Miles		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 <--	--> 2031
Entrada (5.1 Lane Miles)															
Local	2	0	0	0	2	3	5	5	5	5	5	5	5	5	5
Collector	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Homestead (51.7 Lane Miles)															
Local	2	0	4	8	11	15	19	23	27	27	27	27	27	27	27
Collector	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	6	0	11	23	23	23	24	24	24	24	24	24	24	24	24
Potrero (40.3 Lane Miles)															
Local	2	0	0	0	0	0	3	6	9	12	15	18	21	24	24
Collector	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	6	0	0	0	0	0	0	0	0	8	16	16	16	16	16
Mission Village (26.3 Lane Miles)															
Local	2	0	2	4	4	5	5	5	5	5	5	5	5	5	5
Collector	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	6	10	21	21	21	21	21	21	21	21	21	21	21	21	21
Legacy (31.1 Lane Miles)															
Local	2	0	0	0	4	8	12	12	12	12	12	12	12	12	12
Collector	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	6	0	0	10	19	19	19	19	19	19	19	19	19	19	19
Landmark (17.4 Lane Miles)															
Local	2	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Collector	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7
VCC (10.1 Lane Miles)															
Collector	4	0.0	0.0	0.0	6.0	6.0	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1

A-5.0 .....Continued

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 <--	--> 2031
Costs on Cum. Lane Miles															
Entrada															
Local	10,900	0	0	0	18,509	37,019	55,528	55,528	55,528	55,528	55,528	55,528	55,528	55,528	55,528
Collector	10,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	7,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		0	0	0	18,509	37,019	55,528	55,528	55,528	55,528	55,528	55,528	55,528	55,528	55,528
Homestead															
Local	10,900	0	41,288	82,576	123,864	165,152	206,439	247,727	289,015	297,273	297,273	297,273	297,273	297,273	297,273
Collector	10,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	7,500	0	85,227	170,455	170,455	170,455	183,239	183,239	183,239	183,239	183,239	183,239	183,239	183,239	183,239
Total		0	126,515	253,030	294,318	335,606	389,678	430,966	472,254	480,511	480,511	480,511	480,511	480,511	480,511
Potrero															
Local	10,900	0	0	0	0	0	33,030	66,061	99,091	132,121	165,152	198,182	231,212	260,114	260,114
Collector	10,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	7,500	0	0	0	0	0	0	0	0	59,659	123,580	123,580	123,580	123,580	123,580
Total		0	0	0	0	0	33,030	66,061	99,091	191,780	288,731	321,761	354,792	383,693	383,693
Mission Village															
Local	10,900	0	20,644	41,288	41,288	57,803	57,803	57,803	57,803	57,803	57,803	57,803	57,803	57,803	57,803
Collector	10,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	7,500	76,705	157,670	157,670	157,670	157,670	157,670	157,670	157,670	157,670	157,670	157,670	157,670	157,670	157,670
Total		76,705	178,314	198,958	198,958	215,473	215,473	215,473	215,473	215,473	215,473	215,473	215,473	215,473	215,473
Legacy															
Local	10,900	0	0	0	42,712	85,425	128,137	128,137	128,137	128,137	128,137	128,137	128,137	128,137	128,137
Collector	10,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	7,500	0	0	72,409	144,818	144,818	144,818	144,818	144,818	144,818	144,818	144,818	144,818	144,818	144,818
Total		0	0	72,409	187,530	230,243	272,955	272,955	272,955	272,955	272,955	272,955	272,955	272,955	272,955
Landmark															
Local	10,900	109,413	109,413	109,413	109,413	109,413	109,413	109,413	109,413	109,413	109,413	109,413	109,413	109,413	109,413
Collector	10,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major	7,500	55,398	55,398	55,398	55,398	55,398	55,398	55,398	55,398	55,398	55,398	55,398	55,398	55,398	55,398
TOTAL		164,811	164,811	164,811	164,811	164,811	164,811	164,811	164,811	164,811	164,811	164,811	164,811	164,811	164,811
VCC															
Collector	10,100	0	0	0	60,398	60,398	102,414	102,414	102,414	102,414	102,414	102,414	102,414	102,414	102,414
Total		0	0	0	60,398	60,398	102,414	102,414	102,414	102,414	102,414	102,414	102,414	102,414	102,414

LIBRARY EXPENDITURE

Library Size - SF	60,000				
Costs				**phase 1**	**phase 2**
Absorption Start at Built Out %				0%	60%
Absorption Start Year				2010	2020
Cost Categories					
Personnel				984,000	1,480,000
Maintenance				200,000	400,000
Operations				1,500,000	2,723,000
Total				2,684,000	4,603,000
	2,006	2020-31	Ann. Growth		
Popln. In Service Area excl. NR	25,000	42,000	3.78%		
Share of Built-Out Project Popln to Service Area			**63.87%**		

A-5.0 .....Continued

SHERIFF'S DEPARTMENT'S EXPENDITURE - COST OF DEPUTIES

	Low	High	Average
Deputies	74	74	
Annual Cost	13,200,000	13,200,000	
Resident Population	74,256	90.2%	
Residents Per Deputy			
Resident Population	1,000	1,000	1,000
Cost Per			
Resident Population	178	178	**178**

FIRE DEPARTMENT EXPENDITURE

Station	1	2	3	4	Total
Type	A	A	B	A	
Start Year (At Built Out %):	0%	25%	50%	75%	100%
Equipment					
Engine	1	1	1	1	4
Quint	0	0	1	0	1
Batt HQ	No	No	Yes	No	
Annual Cost	3,200,000	2,460,000	4,393,000	2,460,000	12,513,000

ANIMAL CARE EXPENDITURE

Per Capita Expenses $ 7.29 (Per 2005-06 County of Los Angeles Budget's Animal Care expenditure per capita as benchmark)

PLANNING NET EXPENDITURE

Per Capita Expenses $ 9.57 (Per 2005-06 County of Los Angeles Budget's Planning expenditure per capita as benchmark)

GENERAL ADMINISTRATION EXPENDITURE

As % of Total Expenditure 10.0%

RECREATION EXPENDITURE

Per Capita Expenses $ 7.00 (Per 2005-06 County of Los Angeles Budget's Recreation expenditure per capita as benchmark)

A-6.1
Assumptions for Product Absorption; Population & Employee Estimates; & Assessed Value – by Community: ENTRADA

Community Use / Product	Type	DATA PER NEWHALL LAND: Acres	Units	Avg. Unit Size - SF	Unit Price	Absorption: Start Date	Units / Mo.	INFERRED DATA: Acres per Unit	Absorption Term (Yrs.)	ASSUMPTIONS: Household Size	Real Home Price Inflation	Turnover Rate
ENTRADA		**355.3**										
Residential for Sale		**171.9**	**2,827**									
PA5 - SFD	SFD	18.3	132	2,500	662,667	9/1/2012	4.0	0.14	4.0	3.17	0.0%	10.0%
PA6 - SFD	SFD	18.5	121	2,900	739,000	12/1/2012	4.0	0.15	4.0	3.17	0.0%	10.0%
PA7 - SFD	SFD	18.5	166	1,900	548,000	3/1/2013	4.0	0.11	4.0	3.17	0.0%	10.0%
PA4 - SFA	SFD-C	22.0	153	2,088	583,750	9/1/2012	6.0	0.14	3.0	2.38	0.0%	10.0%
PA8 - SFA	SFA-T	12.3	116	1,788	533,667	3/1/2013	6.0	0.11	2.0	2.38	0.0%	10.0%
PA13 - SFA	SFA-T	14.6	176	1,636	497,750	6/1/2013	6.0	0.08	3.0	2.38	0.0%	10.0%
PA12 - SFA	SFA-T	10.4	144	1,400	454,000	6/1/2013	6.0	0.07	3.0	2.38	0.0%	10.0%
PA11 - SFA	SFA-T	13.0	280	1,207	421,000	6/1/2013	6.0	0.05	5.0	2.38	0.0%	10.0%
PA9 - Apt/Condo	SFA-F	11.5	261	1,125	407,000	3/1/2013	6.0	0.04	4.0	2.38	0.0%	10.0%
PA10 - Apt/Condo	SFA-F	6.7	273	1,200	420,000	3/1/2013	6.0	0.02	4.0	2.38	0.0%	10.0%
PA15a - Loft Over Retail	SFA-F	10.9	153	1,350	471,000	6/1/2016	6.0	0.07	3.0	2.38	0.0%	10.0%
PA15b - Condo on Podium	SFA-F	9.9	464	1,066	420,000	6/1/2015	6.0	0.02	7.0	2.38	0.0%	10.0%
PA15c - Townhomes	SFA-T	3.6	64	1,350	491,000	12/1/2015	6.0	0.06	2.0	2.38	0.0%	10.0%
PA15d - Tower Condos	SFA-M	1.7	324	1,400	583,000	12/1/2015	6.0	0.01	6.0	2.38	0.0%	10.0%
Apartment Use		**23.0**	**708**									
PA1a - Apt		17.8	408	1,100	1,700	12/1/2014	6.0	0.04	7.0	2.38		
PA15e - Apt		5.2	300	1,100	1,700	3/1/2015	6.0	0.02	5.0	2.38		
Non-Residential Uses		**Acres**	**GLA**	**FAR**	**Rent $/SF/Mo.**	**Absorption: Start Date**	**Term (Mos.)**	**ASSUMPTIONS: Cap. Rate**	**Op. Exps.**	**SF/Empl.**	**Real Inflation**	**Turnover**
Apartment Use												
PA1a - Apt								5.8%	30%		0.0%	10.0%
PA15e - Apt								5.8%	30%		0.0%	10.0%
Commercial - Retail		**88.5**	**1,543,625**									
PA14		3.0	28,475	0.22	4.00	4/1/2014	6.0	7.1%	10%	400	0.0%	5.0%
PA3		18.8	194,150	0.24	3.00	4/1/2014	24.0	7.1%	10%	400	0.0%	5.0%
PA1b		66.7	750,000	0.22	3.00	1/1/2016	24.0	7.1%	10%	400	0.0%	5.0%
PA15f		0.0	571,000	-	3.00	1/1/2016	24.0	7.1%	10%	400	0.0%	5.0%
Commercial - Office		**55.5**	**1,173,150**									
PA1b - Lots 2-7		16.4	550,000	0.66	2.75	1/1/2016	90.0	7.2%	30%	250	0.0%	5.0%
PA15g		39.1	623,150	0.22	2.90	4/1/2016	24.0	7.2%	30%	250	0.0%	5.0%
Commercial - Other		**6.7**	**170,024**									
PA1b - Lot 1 Hospitality		4.4	165,000	0.49	-	1/1/2016	-	8.9%	10%	1110	0.0%	5.0%
PA1b - Lot 24 Service Stn.		2.4	5,024	0.05	1.75	1/1/2016	-	8.9%	10%	1430	0.0%	5.0%
Industrial R&D		**9.7**	**115,214**									
PA2		9.7	115,214	-	0.75	1/1/2016	12.0	7.4%	10%	500	0.0%	5.0%

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A-6.2

Assumptions for Product Absorption; Population & Employee Estimates; & Assessed Value – by Community: HOMESTEAD

Community Use Product	Type	DATA PER NEWHALL LAND Acres	Units	Avg. Unit Size - SF	Unit Price	Absorption Start Date	Absorption Units / Mo.	INFERRED DATA Acres per Unit	Absorption Term (Yrs.)	ASSUMPTIONS Household Size	Real Home Price Inflation	Turnover Rate
HOMESTEAD		**983.5**										
Residential for Sale		**902.7**	**5,488**									
Chiquito Det. Condos	SFD-C	4.0	23	1,347	458,000	11/30/2014	6.0	0.17	2.0	3.17	0.0%	10.0%
Chiquito Customs	SFD-E	19.0	29	5,000	2,500,000	8/30/2014	3.0	0.66	2.0	3.17	0.0%	10.0%
HS Central SFD	SFD-E	18.0	78	3,800	880,000	5/31/2014	4.0	0.23	3.0	3.17	0.0%	10.0%
HS Central Customs	SFD-E	105.5	86	5,000	2,500,000	5/31/2014	3.0	1.23	3.0	3.17	0.0%	10.0%
HS West HW-2	SFD-C	16.6	230	2,400	637,000	5/31/2015	6.0	0.07	4.0	3.17	0.0%	10.0%
HS West Custom	SFD-E	171.0	62	5,000	2,500,000	5/31/2015	3.0	2.76	3.0	3.17	0.0%	10.0%
HS West Green Court HW-1	SFD	10.0	75	1,650	510,000	11/30/2014	6.0	0.13	2.0	3.17	0.0%	10.0%
Long Canyon SFD 75	SFD-E	30.8	106	4,200	947,000	8/30/2011	4.0	0.29	3.0	3.17	0.0%	10.0%
Long Canyon SFD 80	SFD-E	44.1	115	4,800	1,049,000	8/30/2011	4.0	0.38	4.0	3.17	0.0%	10.0%
Long Canyon SFD 50	SFD-E	8.8	38	4,000	913,000	8/30/2011	4.0	0.23	2.0	3.17	0.0%	10.0%
LCS - 3 SFD5500	SFD-E	28.3	117	4,000	913,000	8/30/2012	4.0	0.24	4.0	3.17	0.0%	10.0%
LCS -4 SFD6500	SFD-E	27.6	127	4,100	925,000	8/30/2012	4.0	0.22	4.0	3.17	0.0%	10.0%
Onion Fields SFD 55	SFD-E	15.0	96	3,800	880,000	5/31/2013	4.0	0.16	3.0	3.17	0.0%	10.0%
Onion Fields SFD 50x90	SFD-E	6.0	37	3,600	846,000	2/28/2013	4.0	0.16	1.0	3.17	0.0%	10.0%
Onion Field SFD 35	SFD	4.8	47	1,750	527,000	8/30/2013	6.0	0.10	2.0	3.17	0.0%	10.0%
Potrero Ridge Customs	SFD-E	106.1	88	5,000	2,500,000	2/28/2013	6.0	1.21	2.0	3.17	0.0%	10.0%
Mesas West 4 SFD Cluster	SFD	14.0	108	1,650	510,000	5/30/2010	6.0	0.13	2.0	3.17	0.0%	10.0%
Mesas West 11 SFD Cluster	SFD	15.7	146	1,650	510,000	5/31/2011	6.0	0.11	3.0	3.17	0.0%	10.0%
HS Central 4 Plex HC-2	SFA-F	11.6	120	1,600	498,000	2/28/2014	6.0	0.10	2.0	2.38	0.0%	10.0%
HS Central 2 Story HC-3	SFA-F	18.5	351	1,440	471,000	2/28/2014	6.0	0.05	6.0	2.38	0.0%	10.0%
HS Central 3 Story HC-4	SFA-F	9.5	144	1,450	473,000	8/30/2014	6.0	0.07	3.0	2.38	0.0%	10.0%
HS Central E1 16 Plex	SFA-M	6.4	120	1,150	422,000	11/30/2014	6.0	0.05	3.0	2.38	0.0%	10.0%
HS West 3-4 Plex	SFA-F	17.0	229	1,345	498,000	2/28/2015	6.0	0.07	4.0	2.38	0.0%	10.0%
HS West Triplex HW-5	SFA-F	4.0	44	1,450	473,000	2/28/2015	6.0	0.09	1.0	2.38	0.0%	10.0%
Long Canyon 3 Story	SFA-F	8.4	326	1,359	458,000	11/30/2012	6.0	0.03	6.0	2.38	0.0%	10.0%
LCS 1 & 2	SFA-F	22.4	161	2,085	500,000	8/30/2012	6.0	0.14	3.0	2.38	0.0%	10.0%
Onion Fields Triplex	SFA-F	21.7	213	1,345	455,000	2/28/2014	6.0	0.10	4.0	2.38	0.0%	10.0%
Onion Fields 3 Story	SFA-T	10.6	237	1,359	458,000	11/30/2013	6.0	0.04	5.0	2.38	0.0%	10.0%
Mesas West 1A 3/4 Plex	SFA-F	7.6	97	1,550	490,000	11/30/2010	6.0	0.08	3.0	2.38	0.0%	10.0%
Mesas West 3A 3/4 Plex	SFA-F	11.0	145	1,550	490,000	5/31/2010	6.0	0.08	3.0	2.38	0.0%	10.0%
Mesas West 1B-10 Plex	SFA-M	7.0	85	1,317	450,000	2/28/2011	6.0	0.08	2.0	2.38	0.0%	10.0%
Mesas West 3B 10 Plex	SFA-M	6.7	85	1,317	450,000	8/30/2010	6.0	0.08	2.0	2.38	0.0%	10.0%
Mesas West 7A 10 Plex	SFA-M	6.0	60	1,317	450,000	11/1/3010	6.0	0.10	2.0	2.38	0.0%	10.0%
Mesas West 12A 10 Plex	SFA-M	6.9	70	1,317	450,000	5/31/2011	6.0	0.10	2.0	2.38	0.0%	10.0%
Mesas West 6 2/3 Duplex	SFA-F	5.0	48	2,050	575,000	11/30/2010	6.0	0.10	2.0	2.38	0.0%	10.0%
Mesas West 7B 10 Plex	SFA-M	7.7	96	1,317	450,000	2/28/2011	6.0	0.08	2.0	2.38	0.0%	10.0%
Mesas West 8B 2 Story	SFA-T	19.6	577	1,450	473,000	8/30/2010	6.0	0.03	9.0	2.38	0.0%	10.0%
Mesas West 10 16 Plex	SFA-M	35.7	464	1,450	473,000	11/30/2011	6.0	0.08	8.0	2.38	0.0%	10.0%
Mesas West 12B 16 Plex	SFA-M	14.1	208	1,450	473,000	2/28/2012	6.0	0.07	4.0	2.38	0.0%	10.0%
Apartment Use		7.4	187	1,100	1,700	2/28/2014	25.0	0.04	1.0	2.38		

Non-Residential Uses	Acres	GLA	FAR	Rent $/SF/Mo.	Absorption Start Date	Absorption Term (Mos.)	ASSUMPTIONS Cap. Rate	Op. Exps.	SF/Empl.	Real Inflation	Turnover
Apartment Use							5.8%	30.0%		0.0%	10.0%
Commercial - Retail	3.3	27,500	-	2.75	5/31/2014	9.0	7.1%	10.0%	400	0.0%	5.0%
Commercial - Office	11.7	132,500	44% mult story	2.45	5/31/2014	12.0	7.2%	30.0%	250	0.0%	5.0%
Commercial - Other											
Industrial R&D	61.7	1,090,000	37% Single Story	0.65	5/31/2014	12.0	7.4%	10.0%	500	0.0%	5.0%

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A-6.3
Assumptions for Product Absorption; Population & Employee Estimates; & Assessed Value – by Community: POTRERO

Community Use		DATA PER NEWHALL LAND						INFERRED DATA		ASSUMPTIONS		
Product	Type	Acres	Units	Avg. Unit Size - SF	Unit Price	Absorption Start Date	Absorption Units / Mo.	Acres per Unit	Absorption Term (Yrs.)	Household Size	Real Home Price Inflation	Turnover Rate
POTRERO		**862.5**										
Residential for Sale		**810.0**	**7,908**									
PE1 140 x 100 estates	SFD-E	45.0	90	5,000	2,500,000	8/30/2017	3.0	0.50	4.0	3.17	0.0%	10.0%
PE 2 140 x 100 estates	SFD-E	8.0	15	5,000	2,500,000	11/30/2017	3.0	0.53	2.0	3.17	0.0%	10.0%
P 6500	SFD-E	55.0	224	4,200	935,000	8/30/2017	4.0	0.25	6.0	3.17	0.0%	10.0%
P6000	SFD-E	42.0	257	3,800	861,000	5/31/2015	4.0	0.16	6.0	3.17	0.0%	10.0%
P5500	SFD	41.0	250	2,400	796,000	5/31/2016	4.0	0.16	6.0	3.17	0.0%	10.0%
P5000	SFD	38.0	225	3,200	759,000	11/30/2015	4.0	0.17	6.0	3.17	0.0%	10.0%
P4500	SFD	56.0	392	2,800	691,000	8/30/2016	4.0	0.14	9.0	3.17	0.0%	10.0%
P3500	SFD	35.0	276	2,500	625,000	8/30/2016	4.0	0.13	7.0	3.17	0.0%	10.0%
A1	SFD	76.0	180	2,713	676,000	2/28/2017	6.0	0.42	3.0	3.17	0.0%	10.0%
A2	SFD	31.0	248	2,495	693,000	8/30/2015	6.0	0.13	5.0	3.17	0.0%	10.0%
B1	SFD	50.0	498	1,975	551,000	11/30/2015	6.0	0.10	8.0	3.17	0.0%	10.0%
B2	SFD	60.0	540	1,650	496,000	2/28/2016	6.0	0.11	8.0	3.17	0.0%	10.0%
C1	SFD	11.0	150	2,100	572,000	2/28/2017	6.0	0.07	3.0	3.17	0.0%	10.0%
D	SFD	22.0	286	1,622	491,000	2/28/2015	6.0	0.08	5.0	3.17	0.0%	10.0%
E	SFD	18.0	270	1,200	420,000	8/30/2015	6.0	0.07	5.0	3.17	0.0%	10.0%
F	SFD	13.0	234	1,050	394,000	11/30/2015	6.0	0.06	5.0	3.17	0.0%	10.0%
G1	SFD	18.0	324	1,675	500,000	8/30/2015	6.0	0.06	6.0	3.17	0.0%	10.0%
G2	SFD	23.0	414	1,600	487,000	2/28/2017	6.0	0.06	6.0	3.17	0.0%	10.0%
H1	SFD	17.0	374	1,440	460,000	2/28/2016	6.0	0.05	6.0	3.17	0.0%	10.0%
H2	SFD	12.0	240	1,525	475,000	11/30/2014	6.0	0.05	5.0	3.17	0.0%	10.0%
I	SFD	11.0	242	1,413	456,000	11/30/2014	6.0	0.05	5.0	3.17	0.0%	10.0%
Lofts	SFD-C	25.0	500	1,925	543,000	5/31/2016	6.0	0.05	8.0	3.17	0.0%	10.0%
Senoirs 1	SNR	20.0	500	1,300	437,000	11/30/2016	6.0	0.04	8.0	2.00	0.0%	10.0%
Senoirs 2	SNR	30.0	450	1,500	470,000	5/31/2017	6.0	0.07	7.0	2.00	0.0%	10.0%
Senoirs 3	SNR	23.0	220	1,075	398,000	8/30/2017	6.0	0.10	4.0	2.00	0.0%	10.0%
Senoirs 4	SNR	30.0	509	1,981	532,000	11/30/2017	6.0	0.06	8.0	2.00	0.0%	10.0%
Apartment Use		20.0	520	1,100	1,700	11/30/2017	25.0	0.04	3.0	2.38		

Non-Residential Uses	Acres	GLA	FAR	Rent $/SF/Mo.	Absorption Start Date	Absorption Term (Mos.)	ASSUMPTIONS Cap. Rate	Op. Exps.	SF/Empl.	Real Inflation	Turnover
Apartment Use							5.8%	30%		0.0%	10.0%
Commercial - Retail	32.5	628,500	44% mult story	3.00	2/28/2016	24	7.1%	30%	400	0.0%	5.0%
Commercial - Office	32.5	628,500	44% mult story	3.00	2/28/2016	24	7.2%	10%	250	0.0%	5.0%
Commercial - Other											
Industrial R&D											

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A-6.4

Assumptions for Product Absorption; Population & Employee Estimates; & Assessed Value – by Community: MISSION VILLAGE

Community Use / Product	Type	DATA PER NEWHALL LAND: Acres	Units	Avg. Unit Size - SF	Unit Price	Absorption: Start Date	Units / Mo.	INFERRED DATA: Acres per Unit	Absorption Term (Yrs.)	ASSUMPTIONS: Household Size	Real Home Price Inflation	Turnover Rate
MISSION VALLEY		**413.8**										
Residential for Sale		**317.4**	**4,285**									
A2 SFD	SFD-E	28.7	123	3,633	843,500	2/28/2010	4.0	0.23	3.0	3.17	0.0%	10.0%
A7 SFD	SFD-E	25.1	95	4,025	1,080,000	11/30/2010	4.0	0.26	3.0	3.17	0.0%	10.0%
A8 Custom	SFD-E	42.5	73	5,000	2,509,000	8/30/2010	3.0	0.58	3.0	3.17	0.0%	10.0%
SeniorsArea C (SFD)	SNR	37.0	212	2,160	616,000	8/30/2010	4.0	0.17	6.0	2.00	0.0%	10.0%
A3a Duplex	SFD-C	7.0	80	1,667	507,500	8/30/2009	6.0	0.09	2.0	3.17	0.0%	10.0%
A3b Towns-Flats	SFA-T	10.4	168	1,467	473,500	2/28/2010	6.0	0.06	3.0	2.38	0.0%	10.0%
A4 Condo	SFD-C	12.6	264	1,167	422,500	8/30/2010	6.0	0.05	5.0	3.17	0.0%	10.0%
A5 3/4 Plex Towns	SFA-T	10.9	153	1,650	504,500	2/28/2010	6.0	0.07	3.0	2.38	0.0%	10.0%
A6 3 Story Towns	SFA-T	12.4	216	1,680	509,500	8/30/2010	6.0	0.06	4.0	2.38	0.0%	10.0%
A9 Duplex	SFA-F	6.4	60	1,975	559,500	11/30/2010	6.0	0.11	2.0	2.38	0.0%	10.0%
A10 Duplex	SFA-F	7.9	80	2,100	580,500	4/30/2010	6.0	0.10	2.0	2.38	0.0%	10.0%
B1 Duplex	SFA-F	8.7	92	1,750	521,500	8/30/2009	6.0	0.09	2.0	2.38	0.0%	10.0%
B2 3 Story Town	SFA-T	11.1	186	1,150	419,500	8/30/2009	6.0	0.06	4.0	2.38	0.0%	10.0%
B6 Towns/Flats	SFA-T	6.4	180	1,125	415,500	5/31/2011	6.0	0.04	3.0	2.38	0.0%	10.0%
B7	SFA-F	4.8	230	1,667	507,500	5/31/2011	6.0	0.02	4.0	2.38	0.0%	10.0%
Senior C6 Flats	SNR	21.3	440	1,650	504,500	8/30/2010	6.0	0.05	7.0	2.00	0.0%	10.0%
Senior Area C Duplex	SNR	34.4	194	2,202	597,500	8/30/2010	6.0	0.18	4.0	2.00	0.0%	10.0%
D2 Towns 2/3 Story	SFA-T	7.6	156	1,200	428,500	5/31/2012	6.0	0.05	3.0	2.38	0.0%	10.0%
F2a Live/Work 3 Story	SFA-F	0.4	15	2,450	671,500	8/30/2011	6.0	0.03	1.0	2.38	0.0%	10.0%
F2b Condo 4/5 Story	SFA-F	3.2	242	1,500	478,500	2/28/2012	8.0	0.01	3.0	2.38	0.0%	10.0%
F3a Live/Work 3 Story	SFA-F	0.4	15	2,450	671,500	11/30/2011	6.0	0.03	2.0	2.38	0.0%	10.0%
F3b Condo 4/5 Story	SFA-F	3.6	217	1,600	495,500	2/28/2012	8.0	0.02	3.0	2.38	0.0%	10.0%
F5a Condo 4/5 Story	SFA-F	2.0	140	1,350	453,500	5/31/2012	8.0	0.01	2.0	2.38	0.0%	10.0%
F5b Condo 4/5 Story	SFA-F	2.1	171	1,100	411,500	8/30/2012	8.0	0.01	3.0	2.38	0.0%	10.0%
F6a Condo 4 Story	SFA-F	2.0	76	1,450	470,500	8/30/2012	8.0	0.03	2.0	2.38	0.0%	10.0%
F6b Condo 4 Story	SFA-F	2.1	81	1,400	478,500	8/30/2012	8.0	0.03	2.0	2.38	0.0%	10.0%
F7 Condo 3 Story	SFA-F	2.1	138	1,200	428,500	5/31/2011	8.0	0.02	2.0	2.38	0.0%	10.0%
F8a Condo 3/4 Story	SFA-F	2.0	74	1,150	419,500	8/30/2011	8.0	0.03	2.0	2.38	0.0%	10.0%
F8b Condo 3/4 Story	SFA-F	2.1	114	1,050	402,500	8/30/2011	8.0	0.02	2.0	2.38	0.0%	10.0%
Apartment Use		**27.6**	**1,046**									
B3 -Market Rate		5.4	170	1,100	1,700	4/30/2010	25.0	0.03	1.0	2.50		
D1 Low & Mod		10.9	314	1,100	1,500	5/31/2012	25.0	0.03	2.0	2.50		
F9 -Low		3.6	188	900	900	5/31/2012	25.0	0.02	2.0	2.50		
F4 -Market Rate		4.1	214	1,100	1,700	8/30/2012	25.0	0.02	2.0	2.50		
F1a -Market Rate		0.4	15	1,100	1,700	2/28/2012	25.0	0.03	1.0	2.50		
F1b -Market Rate		3.2	145	1,100	1,700	2/28/2012	25.0	0.02	1.0	2.50		

Non-Residential Uses	Acres	GLA	FAR	Rent $/SF/Mo.	Absorption: Start Date	Term (Mos.)	ASSUMPTIONS: Cap. Rate	Op. Exps.	SF/Empl.	Real Inflation	Turnover
Apartment Use											
B3 -Market Rate							5.8%	30%		0.0%	10.0%
D1 Low & Mod							5.8%	30%		0.0%	10.0%
F9 -Low							5.8%	30%		0.0%	10.0%
F4 -Market Rate							5.8%	30%		0.0%	10.0%
F1a -Market Rate							5.8%	30%		0.0%	10.0%
F1b -Market Rate							5.8%	30%		0.0%	10.0%
Commercial - Retail	**17.8**	**314,850**									
F10	5.0	97,650	44% mult story	3.00	5/31/2012	12.0	7.1%	10%	400	0.0%	5.0%
F11	3.4	73,500	44% mult story	3.00	2/28/2013	12.0	7.1%	10%	400	0.0%	5.0%
F5B/F6B	0.4	16,000	single story	4.00	8/31/2012	6.0	7.1%	10%	400	0.0%	5.0%
F14	6.2	121,500	33.6 muti s-story	2.50	5/31/2013	24.0	7.1%	10%	400	0.0%	5.0%
E2	2.9	6,200	single story	4.00	5/31/2014	6.0	7.1%	10%	400	0.0%	5.0%
Commercial - Office	**51.0**	**984,150**	-	3.00	5/31/2014	60.0	7.2%	30%	250	0.0%	5.0%

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A-6.5

Assumptions for Product Absorption; Population & Employee Estimates; & Assessed Value – by Community: LEGACY

Community Use / Product	Type	DATA PER NEWHALL LAND: Acres	Units	Avg. Unit Size - SF	Unit Price	Absorption: Start Date	Absorption: Units / Mo.	INFERRED DATA: Acres per Unit	Absorption Term (Yrs.)	ASSUMPTIONS: Household Size	Real Home Price Inflation	Turnover Rate
LEGACY		**293.5**										
Residential for Sale		**225.4**	**2,741**									
A1 - Triplex	SFA-F	11.8	108	1,400	453,000	6/1/2013	6.0	0.11	2.0	2.38	0.0%	10.0%
A2 - 45x100	SFD	9.2	98	1,700	510,000	6/1/2012	4.0	0.09	3.0	3.17	0.0%	10.0%
A3 - Triplex	SFA-F	5.0	45	1,400	453,000	6/1/2014	6.0	0.11	2.0	2.38	0.0%	10.0%
A4 - 55x110	SFD	7.2	108	2,300	624,000	3/1/2014	4.0	0.07	3.0	3.17	0.0%	10.0%
A5 Luxury Flats	SFA-F	11.2	300	1,700	510,000	6/1/2013	6.0	0.04	5.0	2.38	0.0%	10.0%
A6 - 45x100	SFD	9.7	38	1,700	510,000	9/1/2013	4.0	0.25	2.0	3.17	0.0%	10.0%
A7 - 60x110	SFD	6.6	92	2,600	682,000	9/1/2013	4.0	0.07	3.0	3.17	0.0%	10.0%
A8 - 50x105	SFD	8.3	116	2,000	615,000	3/1/2013	4.0	0.07	3.0	3.17	0.0%	10.0%
A9 - 50x105	SFD	8.3	138	2,000	615,000	9/1/2012	4.0	0.06	4.0	3.17	0.0%	10.0%
A10 - 55x110	SFD	7.2	109	2,300	624,000	12/1/2012	4.0	0.07	4.0	3.17	0.0%	10.0%
A11 - 60x110	SFD	6.6	98	2,600	682,000	12/1/2013	4.0	0.07	3.0	3.17	0.0%	10.0%
A12 - 45x100	SFD	9.7	65	1,250	428,000	3/1/2014	6.0	0.15	2.0	3.17	0.0%	10.0%
A13 - Duplex	SFA-F	4.4	44	1,250	472,000	3/1/2013	6.0	0.10	1.0	2.38	0.0%	10.0%
B3 - Condos	SFA-T	4.6	72	1,279	433,000	3/1/2014	6.0	0.06	2.0	3.17	0.0%	10.0%
B4 - Condos	SFA-T	4.7	88	1,560	483,000	3/1/2014	6.0	0.05	2.0	3.17	0.0%	10.0%
B6 - Condos	SFA-T	15.5	278	1,560	483,000	6/1/2014	6.0	0.06	5.0	3.17	0.0%	10.0%
B8 Temp School	SFD	2.2	13	3,800	910,000	3/1/2014	4.0	0.17	1.0	3.17	0.0%	10.0%
B9 - Condos	SFA-T	4.9	74	1,450	462,000	9/1/2014	6.0	0.07	2.0	3.17	0.0%	10.0%
B10 - Condos	SFA-T	4.6	74	1,325	438,000	12/1/2014	6.0	0.06	2.0	3.17	0.0%	10.0%
B11 - Condos	SFA-T	6.0	104	1,200	420,000	12/1/2013	6.0	0.06	3.0	3.17	0.0%	10.0%
B12 - Condos	SFA-T	7.0	160	1,006	387,000	12/1/2013	6.0	0.04	4.0	3.17	0.0%	10.0%
C1a - 45x100	SFD	9.7	82	1,700	510,000	6/1/2014	4.0	0.12	3.0	3.17	0.0%	10.0%
C1b - 45x100	SFD	9.7	82	1,700	510,000	9/1/2014	4.0	0.12	3.0	3.17	0.0%	10.0%
C2a - 50x100	SFD	8.7	87	2,200	649,000	12/1/2014	4.0	0.10	3.0	3.17	0.0%	10.0%
C2b - 45x100	SFD	9.7	52	1,700	510,000	9/1/2014	4.0	0.19	2.0	3.17	0.0%	10.0%
C3 - 60x100	SFD	7.3	77	2,500	663,000	12/1/2014	4.0	0.09	3.0	3.17	0.0%	10.0%
C4 - 60x100	SFD	9.4	68	2,500	663,000	12/1/2014	4.0	0.14	3.0	3.17	0.0%	10.0%
D - SFR	SFD-E	16.3	71	5,000	1,237,500	9/1/2014	4.0	0.23	3.0	3.17	0.0%	10.0%
Apartment Use		**40.1**	**739**									
B5 - Apts		4.4	144	1,200	1,700	12/1/2013	6.0	0.03	3.0	2.50		
B7 - Apts		10.9	323	1,100	1,700	9/1/2013	6.0	0.03	6.0	2.50		
C5 - Apts		11.8	272	1,500	2,000	12/1/2014	6.0	0.04	5.0	2.50		

Non-Residential Uses	Acres	GLA	FAR	Rent $/SF/Mo.	Absorption: Start Date	Absorption: Term (Mos.)	ASSUMPTIONS: Cap. Rate	Op. Exps.	SF/Empl.	Real Inflation	Turnover
Apartment Use											
B5 - Apts							5.8%	30.0%		0.0%	10.0%
B7 - Apts							5.8%	30.0%		0.0%	10.0%
C5 - Apts							5.8%	30.0%		0.0%	10.0%
Commercial - Retail	15.0	170,000	-	3.00	10/1/2014	12.0	7.1%	10.0%	400	0.0%	5.0%
Commercial - Office	13.0	316,000	-	2.70	10/1/2014	24.0	7.2%	30.0%	250	0.0%	5.0%
Commercial - Other											
Industrial R&D											

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A-6.6

Assumptions for Product Absorption; Population & Employee Estimates; & Assessed Value – by Community: LANDMARK

Community Use / Product	Type	DATA PER NEWHALL LAND: Acres	Units	Avg. Unit Size - SF	Unit Price	Absorption: Start Date	Absorption: Units / Mo.	INFERRED DATA: Acres per Unit	Absorption Term (Yrs.)	ASSUMPTIONS: Household Size	Real Home Price Inflation	Turnover Rate
LANDMARK		**174.7**										
Residential for Sale		**110.6**	**993**									
Area D Alley	SFD	14.6	141	2,050	564,000	6/1/2009	4.0	0.10	3.0	3.17	0.0%	10.0%
Area E Alley	SFD	15.9	141	2,400	623,000	6/1/2009	4.0	0.11	3.0	3.17	0.0%	10.0%
Area F Alley / Traditional	SFD	15.2	114	2,700	674,000	6/1/2009	4.0	0.13	3.0	3.17	0.0%	10.0%
Area G SFD	SFD	17.3	107	3,175	755,000	6/1/2009	4.0	0.16	3.0	3.17	0.0%	10.0%
Area H SFD	SFD	17.4	87	3,525	816,000	6/1/2009	4.0	0.20	2.0	3.17	0.0%	10.0%
Area A Condo	SFD-C	8.6	144	1,200	420,000	12/1/2009	6.0	0.06	2.0	3.17	0.0%	10.0%
Area B Condo	SFD-C	10.9	153	1,500	470,000	10/1/2009	6.0	0.07	3.0	3.17	0.0%	10.0%
Area C Condo	SFD-C	10.7	106	1,800	521,000	10/1/2009	6.0	0.10	2.0	3.17	0.0%	10.0%
Other Land Uses/Apartments		**21.0**	**451**									
Market Rate		14.0	299	1,100	1,700	1/1/2010	25.0	0.05	1.0	2.50		
Affordable - 50%		7.0	152	1,100	1,700	1/1/2010	25.0	0.05	1.0	2.50		

Non-Residential Uses	Acres	GLA	FAR	Rent $/SF/Mo.	Absorption: Start Date	Absorption: Term (Mos.)	ASSUMPTIONS: Cap. Rate	Op. Exps.	SF/Empl.	Real Inflation	Turnover
Other Land Uses/Apartments											
Market Rate							5.8%	30.0%		0.0%	10.0%
Affordable - 50%							5.8%	30.0%		0.0%	10.0%
Commercial - Retail	**8.7**	**94,199**									
Lot 10	0.6	6,534	25% single story	3.00	1/1/2010	6.0	7.1%	10%	400	0.0%	5.0%
Lot 10	0.7	7,079	25% single story	3.00	1/1/2010	6.0	7.1%	10%	400	0.0%	5.0%
Lot 29	7.4	80,586	25% single story	2.25	1/1/2010	12.0	7.1%	10%	400	0.0%	5.0%
Commercial - Office	**34.5**	**279,502**									
Lot 15	8.7	94,199	N/A	2.50	1/1/2010	12.0	7.2%	30%	250	0.0%	5.0%
Lot 30	25.8	185,303	N/A	2.50	1/1/2015	12.0	7.2%	30%	250	0.0%	5.0%
Commercial - Other											
Industrial R&D											

Notes on Assumptions:

Cap Rate: Per Real Estate Research Corporation, "RERC Real Estate Report - Winter 2006"
Household Size: Per Newhall Ranch Specific Plan Revised Draft EIR
Square Feet per Employee: Per Newhall Ranch Specific Plan Revised Draft EIR
Real Home Price Inflation: Calculated based on historic differential of Housing Price Appreciation data (California Association of Realtors), and Consumer Price Index (Bureau of Labor Statistics) for Los Angeles County.

ASSESSED VALUE ASSUMPTIONS

Total Project Area:	3,258	Acres
Base Year Assessed Value	252,388,205	(In 2006 $'s)
Per Acre:	77,462	$/Acre

	Acreage	Base AV	Base AV/Acre
Entrada	355.3	**52,006,842**	146,385
Homestead	983.5	**76,532,255**	77,820
Potrero	862.5	**69,593,580**	80,688
Mission Village	413.8	**30,731,580**	74,269
Legacy	293.5	**1,101,288**	3,752
Landmark	174.7	**7,436,820**	42,574
VCC	175.0	**14,985,840**	85,621

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A-6.7

Assumptions for Product Absorption; Population & Employee Estimates; & Assessed Value – by Community: COMMERCE CENTER

Community	DATA PER NEWHALL LAND						ASSUMPTIONS				
Use	Acres	GLA	FAR	Rent	Absorption						
Product				$/SF/Mo.	Start Date	Term (Mos.)	Cap. Rate	Op. Exps.	SF/Empl.	Real Inflation	Turnover
VALENCIA COMMERCE CENTER	**175.0**										
Commercial - Retail	**19.7**	**300,715**									
Phase 1	-		0.35	3.50	7/1/2010	12.0	7.1%	10%	400	0.0%	5.0%
Phase 2	6.0	91,429	0.35	3.50	1/1/2011	12.0	7.1%	10%	400	0.0%	5.0%
Phase 3	13.7	209,286	0.35	3.50	10/1/2011	12.0	7.1%	10%	400	0.0%	5.0%
Phase 4	-		0.35	3.50	7/1/2012	12.0	7.1%	10%	400	0.0%	5.0%
Phase 5	-		0.35	3.50	1/1/2013	12.0	7.1%	10%	400	0.0%	5.0%
Phase 6	-		0.35	3.50	7/1/2013	12.0	7.1%	10%	400	0.0%	5.0%
Commercial - Office	**44.4**	**1,159,795**									
Phase 1	7.0	182,857	0.60	2.75	7/1/2010	12.0	7.2%	30%	250	0.0%	5.0%
Phase 2	6.3	164,572	0.60	2.75	1/1/2011	12.0	7.2%	30%	250	0.0%	5.0%
Phase 3	4.5	117,508	0.60	2.75	10/1/2011	12.0	7.2%	30%	250	0.0%	5.0%
Phase 4	8.4	219,429	0.60	2.75	7/1/2012	12.0	7.2%	30%	250	0.0%	5.0%
Phase 5	8.4	219,429	0.60	2.75	1/1/2013	12.0	7.2%	30%	250	0.0%	5.0%
Phase 6	9.8	256,000	0.60	2.75	7/1/2013	12.0	7.2%	30%	250	0.0%	5.0%
Industrial R&D	**110.9**	**1,739,492**									
Phase 1	17.5	274,286	0.36	1.50	7/1/2010	12.0	7.4%	10%	500	0.0%	5.0%
Phase 2	7.0	109,714	0.36	1.50	1/1/2011	12.0	7.4%	10%	500	0.0%	5.0%
Phase 3	20.0	313,206	0.36	1.50	10/1/2011	12.0	7.4%	10%	500	0.0%	5.0%
Phase 4	21.0	329,143	0.36	1.50	7/1/2012	12.0	7.4%	10%	500	0.0%	5.0%
Phase 5	21.0	329,143	0.36	1.50	1/1/2013	12.0	7.4%	10%	500	0.0%	5.0%
Phase 6	24.5	384,000	0.36	1.50	7/1/2013	12.0	7.4%	10%	500	0.0%	5.0%

ADK&A Allan D. Kotin & Associates

CBRE CB RICHARD ELLIS

A-7.1

Product Level Absorption Schedule – by Community: ENTRADA

Use - Product	Total	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION - UNITS	**3,535**	**88**	**514**	**575**	**587**	**616**	**382**	**327**	**240**	**144**	**62**	**-**	**-**	**-**	**-**
Residential for Sale	**2,827**	**88**	**514**	**569**	**455**	**472**	**238**	**183**	**144**	**102**	**62**	**-**	**-**	**-**	**-**
PA5 - SFD	132	12	48	48	24	-	-	-	-	-	-	-	-	-	-
PA6 - SFD	121	4	48	48	21	-	-	-	-	-	-	-	-	-	-
PA7 - SFD	166	-	40	48	48	30	-	-	-	-	-	-	-	-	-
PA4 - SFA	153	72	72	9	-	-	-	-	-	-	-	-	-	-	-
PA8 - SFA	116	-	60	56	-	-	-	-	-	-	-	-	-	-	-
PA13 - SFA	176	-	42	72	62	-	-	-	-	-	-	-	-	-	-
PA12 - SFA	144	-	42	72	30	-	-	-	-	-	-	-	-	-	-
PA11 - SFA	280	-	42	72	72	72	22	-	-	-	-	-	-	-	-
PA9 - Apt/Condo	261	-	60	72	72	57	-	-	-	-	-	-	-	-	-
PA10 - Apt/Condo	273	-	60	72	72	69	-	-	-	-	-	-	-	-	-
PA15a - Loft Over Retail	153	-	-	-	-	42	72	39	-	-	-	-	-	-	-
PA15b - Condo on Podium	464	-	-	-	42	72	72	72	72	72	62	-	-	-	-
PA15c - Townhomes	64	-	-	-	6	58	-	-	-	-	-	-	-	-	-
PA15d - Tower Condos	324	-	-	-	6	72	72	72	72	30	-	-	-	-	-
Apartments	**708**	**-**	**-**	**6**	**132**	**144**	**144**	**144**	**96**	**42**	**-**	**-**	**-**	**-**	**-**
PA1a - Apt	408	-	-	6	72	72	72	72	72	42	-	-	-	-	-
PA15e - Apt	300	-	-	-	60	72	72	72	24	-	-	-	-	-	-
ABSORPTION - SF	**2,987,776**	**-**	**-**	**111,313**	**97,075**	**1,330,646**	**1,045,408**	**73,333**	**73,333**	**73,333**	**73,333**	**73,333**	**36,667**	**-**	**-**
Commercial - Retail	**1,529,388**	**-**	**-**	**111,313**	**97,075**	**660,500**	**660,500**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
PA14	14,238	-	-	14,238	-	-	-	-	-	-	-	-	-	-	-
PA3	194,150	-	-	97,075	97,075	-	-	-	-	-	-	-	-	-	-
PA1b	750,000	-	-	-	-	375,000	375,000	-	-	-	-	-	-	-	-
PA15f	571,000	-	-	-	-	285,500	285,500	-	-	-	-	-	-	-	-
Commercial - Office	**1,173,150**	**-**	**-**	**-**	**-**	**384,908**	**384,908**	**73,333**	**73,333**	**73,333**	**73,333**	**73,333**	**36,667**	**-**	**-**
PA1b - Lots 2-7	550,000	-	-	-	-	73,333	73,333	73,333	73,333	73,333	73,333	73,333	36,667	-	-
PA15g	623,150	-	-	-	-	311,575	311,575	-	-	-	-	-	-	-	-
Commercial - Other	**170,024**	**-**	**-**	**-**	**-**	**170,024**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
PA1b - Lot 1 Hospitality	165,000	-	-	-	-	165,000	-	-	-	-	-	-	-	-	-
PA1b - Lot 24 Service Stn	5,024	-	-	-	-	5,024	-	-	-	-	-	-	-	-	-
Industrial R&D	**115,214**	**-**	**-**	**-**	**-**	**115,214**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
PA1b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PA2	115,214	-	-	-	-	115,214	-	-	-	-	-	-	-	-	-

Product Level Cumulative Population & Employee Estimates – by Community: ENTRADA

Use - Product	By 2031	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CUM. POPULATION	**8,744**	**222**	**1,553**	**3,035**	**4,506**	**5,995**	**6,905**	**7,683**	**8,254**	**8,597**	**8,744**	**8,744**	**8,744**	**8,744**	**8,744**
Residential for Sale	**7,059**	**222**	**1,553**	**3,021**	**4,177**	**5,324**	**5,891**	**6,326**	**6,669**	**6,912**	**7,059**	**7,059**	**7,059**	**7,059**	**7,059**
PA5 - SFD	418	38	190	342	418	418	418	418	418	418	418	418	418	418	418
PA6 - SFD	384	13	165	317	384	384	384	384	384	384	384	384	384	384	384
PA7 - SFD	526	-	127	279	431	526	526	526	526	526	526	526	526	526	526
PA4 - SFA	364	171	343	364	364	364	364	364	364	364	364	364	364	364	364
PA8 - SFA	276	-	143	276	276	276	276	276	276	276	276	276	276	276	276
PA13 - SFA	419	-	100	271	419	419	419	419	419	419	419	419	419	419	419
PA12 - SFA	343	-	100	271	343	343	343	343	343	343	343	343	343	343	343
PA11 - SFA	666	-	100	271	443	614	666	666	666	666	666	666	666	666	666
PA9 - Apt/Condo	621	-	143	314	486	621	621	621	621	621	621	621	621	621	621
PA10 - Apt/Condo	650	-	143	314	486	650	650	650	650	650	650	650	650	650	650
PA15a - Loft Over Retail	364	-	-	-	-	100	271	364	364	364	364	364	364	364	364
PA15b - Condo on Podium	1,104	-	-	-	100	271	443	614	785	957	1,104	1,104	1,104	1,104	1,104
PA15c - Townhomes	152	-	-	-	14	152	152	152	152	152	152	152	152	152	152
PA15d - Tower Condos	771	-	-	-	14	186	357	528	700	771	771	771	771	771	771
Apartments	**1,685**	**-**	**-**	**14**	**328**	**671**	**1,014**	**1,357**	**1,585**	**1,685**	**1,685**	**1,685**	**1,685**	**1,685**	**1,685**
PA1a - Apt	971	-	-	14	186	357	528	700	871	971	971	971	971	971	971
PA15e - Apt	714	-	-	-	143	314	486	657	714	714	714	714	714	714	714
CUM. EMPLOYEES	**8,899**	**-**	**-**	**278**	**521**	**4,094**	**7,285**	**7,579**	**7,872**	**8,165**	**8,459**	**8,752**	**8,899**	**8,899**	**8,899**
Commercial - Retail	**3,823**	**-**	**-**	**278**	**521**	**2,172**	**3,823**	**3,823**	**3,823**	**3,823**	**3,823**	**3,823**	**3,823**	**3,823**	**3,823**
PA14	36	-	-	36	36	36	36	36	36	36	36	36	36	36	36
PA3	485	-	-	243	485	485	485	485	485	485	485	485	485	485	485
PA1b	1,875	-	-	-	-	938	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875
PA15f	1,428	-	-	-	-	714	1,428	1,428	1,428	1,428	1,428	1,428	1,428	1,428	1,428
Commercial - Office	**4,693**	**-**	**-**	**-**	**-**	**1,540**	**3,079**	**3,373**	**3,666**	**3,959**	**4,253**	**4,546**	**4,693**	**4,693**	**4,693**
PA1b - Lots 2-7	2,200	-	-	-	-	293	587	880	1,173	1,467	1,760	2,053	2,200	2,200	2,200
PA15g	2,493	-	-	-	-	1,246	2,493	2,493	2,493	2,493	2,493	2,493	2,493	2,493	2,493
Commercial - Other	**152**	**-**	**-**	**-**	**-**	**152**	**152**	**152**	**152**	**152**	**152**	**152**	**152**	**152**	**152**
PA1b - Lot 1 Hospitality	149	-	-	-	-	149	149	149	149	149	149	149	149	149	149
PA1b - Lot 24 Service Stn	4	-	-	-	-	4	4	4	4	4	4	4	4	4	4
Industrial R&D	**230**	**-**	**-**	**-**	**-**	**230**	**230**	**230**	**230**	**230**	**230**	**230**	**230**	**230**	**230**
PA1b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PA2	230	-	-	-	-	230	230	230	230	230	230	230	230	230	230

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Product Level Cumulative Assessed Values – by Community: ENTRADA

Use - Product	By 2031	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ASSESSED VALUE	**2,591,870**	**51,089,387**	**312,775,522**	**637,107,621**	**911,886,916**	**1,626,974,916**	**2,181,893,401**	**2,325,353,341**	**2,439,104,916**	**2,514,997,135**	**2,561,205,383**	**2,582,499,330**	**2,591,869,828**	**2,591,869,828**	**2,591,869,828**
Residential for Sale	**1,337,977,187**	**51,089,387**	**312,775,522**	**584,302,164**	**785,684,669**	**996,589,254**	**1,108,188,781**	**1,196,198,371**	**1,267,157,010**	**1,313,382,004**	**1,337,977,187**	**1,337,977,187**	**1,337,977,187**	**1,337,977,187**	**1,337,977,187**
PA5 - SFD	81,140,238	7,708,473	38,298,834	67,915,071	81,140,238	81,140,238	81,140,238	81,140,238	81,140,238	81,140,238	81,140,238	81,140,238	81,140,238	81,140,238	81,140,238
PA6 - SFD	83,216,073	2,866,427	37,173,979	70,406,655	83,216,073	83,216,073	83,216,073	83,216,073	83,216,073	83,216,073	83,216,073	83,216,073	83,216,073	83,216,073	83,216,073
PA7 - SFD	83,949,204	-	21,267,089	46,134,684	70,218,786	83,949,204	83,949,204	83,949,204	83,949,204	83,949,204	83,949,204	83,949,204	83,949,204	83,949,204	83,949,204
PA4 - SFA	81,546,747	40,514,487	79,513,462	81,546,747	81,546,747	81,546,747	81,546,747	81,546,747	81,546,747	81,546,747	81,546,747	81,546,747	81,546,747	81,546,747	81,546,747
PA8 - SFA	59,173,530	-	31,088,710	59,173,530	59,173,530	59,173,530	59,173,530	59,173,530	59,173,530	59,173,530	59,173,530	59,173,530	59,173,530	59,173,530	59,173,530
PA13 - SFA	83,572,431	-	20,395,482	54,849,148	83,572,431	83,572,431	83,572,431	83,572,431	83,572,431	83,572,431	83,572,431	83,572,431	83,572,431	83,572,431	83,572,431
PA12 - SFA	62,204,330	-	18,623,966	50,106,732	62,204,330	62,204,330	62,204,330	62,204,330	62,204,330	62,204,330	62,204,330	62,204,330	62,204,330	62,204,330	62,204,330
PA11 - SFA	111,899,137	-	17,396,550	46,933,756	75,981,619	104,540,139	111,899,137	111,899,137	111,899,137	111,899,137	111,899,137	111,899,137	111,899,137	111,899,137	111,899,137
PA9 - Apt/Condo	101,989,414	-	24,033,006	52,485,619	80,473,839	101,989,414	101,989,414	101,989,414	101,989,414	101,989,414	101,989,414	101,989,414	101,989,414	101,989,414	101,989,414
PA10 - Apt/Condo	112,256,555	-	24,984,444	54,750,222	84,257,333	112,256,555	112,256,555	112,256,555	112,256,555	112,256,555	112,256,555	112,256,555	112,256,555	112,256,555	112,256,555
PA15a - Loft Over Retail	68,834,614	-	-	-	-	19,343,190	52,064,135	68,834,614	68,834,614	68,834,614	68,834,614	68,834,614	68,834,614	68,834,614	68,834,614
PA15b - Condo on Podium	189,287,560	-	-	-	17,509,219	47,394,242	77,055,070	106,491,702	135,704,137	164,692,377	189,287,560	189,287,560	189,287,560	189,287,560	189,287,560
PA15c - Townhomes	30,854,815	-	-	-	2,897,213	30,854,815	30,854,815	30,854,815	30,854,815	30,854,815	30,854,815	30,854,815	30,854,815	30,854,815	30,854,815
PA15d - Tower Condos	188,052,538	-	-	-	3,493,310	45,408,344	87,267,100	129,069,580	170,815,783	188,052,538	188,052,538	188,052,538	188,052,538	188,052,538	188,052,538
Apartments	**162,129,557**	**-**	**-**	**1,438,923**	**33,288,733**	**67,451,571**	**100,972,954**	**133,852,883**	**154,394,516**	**162,129,557**	**162,129,557**	**162,129,557**	**162,129,557**	**162,129,557**	**162,129,557**
PA1a - Apt	90,719,550	-	-	1,438,923	18,667,681	35,436,618	51,745,736	67,595,032	82,984,509	90,719,550	90,719,550	90,719,550	90,719,550	90,719,550	90,719,550
PA15e - Apt	71,410,007	-	-	-	14,621,052	32,014,952	49,227,219	66,257,851	71,410,007	71,410,007	71,410,007	71,410,007	71,410,007	71,410,007	71,410,007
Commercial - Retail	**669,924,454**	**-**	**-**	**51,366,534**	**92,913,515**	**385,720,917**	**669,924,454**	**669,924,454**	**669,924,454**	**669,924,454**	**669,924,454**	**669,924,454**	**669,924,454**	**669,924,454**	**669,924,454**
PA14	8,443,536	-	-	8,443,536	8,443,536	8,443,536	8,443,536	8,443,536	8,443,536	8,443,536	8,443,536	8,443,536	8,443,536	8,443,536	8,443,536
PA3	84,469,978	-	-	42,922,997	84,469,978	84,469,978	84,469,978	84,469,978	84,469,978	84,469,978	84,469,978	84,469,978	84,469,978	84,469,978	84,469,978
PA1b	327,598,944	-	-	-	-	166,241,901	327,598,944	327,598,944	327,598,944	327,598,944	327,598,944	327,598,944	327,598,944	327,598,944	327,598,944
PA15f	249,411,996	-	-	-	-	126,565,501	249,411,996	249,411,996	249,411,996	249,411,996	249,411,996	249,411,996	249,411,996	249,411,996	249,411,996
Commercial - Office	**371,894,467**	**-**	**-**	**0**	**0**	**127,269,012**	**252,863,049**	**275,433,470**	**297,684,773**	**319,616,957**	**341,230,022**	**362,523,969**	**371,894,467**	**371,894,467**	**371,894,467**
PA1b - Lots 2-7	165,129,618	-	-	-	-	23,208,659	46,098,199	68,668,621	90,919,924	112,852,108	134,465,173	155,759,119	165,129,618	165,129,618	165,129,618
PA15g	206,764,849	-	-	0	0	104,060,353	206,764,849	206,764,849	206,764,849	206,764,849	206,764,849	206,764,849	206,764,849	206,764,849	206,764,849
Commercial - Other	**38,219,963**	**-**	**-**	**-**	**-**	**38,219,963**	**38,219,963**	**38,219,963**	**38,219,963**	**38,219,963**	**38,219,963**	**38,219,963**	**38,219,963**	**38,219,963**	**38,219,963**
PA1b - Lot 1 Hospitality	37,500,000	-	-	-	-	37,500,000	37,500,000	37,500,000	37,500,000	37,500,000	37,500,000	37,500,000	37,500,000	37,500,000	37,500,000
PA1b - Lot 24 Service Stn	719,963	-	-	-	-	719,963	719,963	719,963	719,963	719,963	719,963	719,963	719,963	719,963	719,963
Industrial R&D	**11,724,200**	**-**	**-**	**-**	**-**	**11,724,200**	**11,724,200**	**11,724,200**	**11,724,200**	**11,724,200**	**11,724,200**	**11,724,200**	**11,724,200**	**11,724,200**	**11,724,200**
PA1b	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0
PA2	11,724,200	-	-	-	-	11,724,200	11,724,200	11,724,200	11,724,200	11,724,200	11,724,200	11,724,200	11,724,200	11,724,200	11,724,200

Product Level Cumulative Retail Expenditure Estimates – by Community: ENTRADA

Use - Product	By 2031	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
RETAIL EXPENDITURE	**35,000**	**834**	**5,349**	**10,483**	**15,391**	**22,718**	**27,822**	**30,563**	**32,660**	**34,006**	**34,711**	**34,904**	**35,000**	**35,000**	**35,000**
Residential for Sale	**24,497**	**834**	**5,349**	**10,261**	**14,141**	**18,174**	**20,234**	**21,835**	**23,107**	**23,985**	**24,497**	**24,497**	**24,497**	**24,497**	**24,497**
PA5 - SFD	1,330	121	605	1,089	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330
PA6 - SFD	1,027	34	441	849	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027
PA7 - SFD	1,530	-	369	811	1,254	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530
PA4 - SFA	1,442	679	1,357	1,442	1,442	1,442	1,442	1,442	1,442	1,442	1,442	1,442	1,442	1,442	1,442
PA8 - SFA	1,042	-	539	1,042	1,042	1,042	1,042	1,042	1,042	1,042	1,042	1,042	1,042	1,042	1,042
PA13 - SFA	1,561	-	373	1,011	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561
PA12 - SFA	1,167	-	341	924	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167
PA11 - SFA	2,319	-	348	944	1,541	2,137	2,319	2,319	2,319	2,319	2,319	2,319	2,319	2,319	2,319
PA9 - Apt/Condo	2,092	-	481	1,058	1,635	2,092	2,092	2,092	2,092	2,092	2,092	2,092	2,092	2,092	2,092
PA10 - Apt/Condo	2,256	-	496	1,091	1,686	2,256	2,256	2,256	2,256	2,256	2,256	2,256	2,256	2,256	2,256
PA15a - Loft Over Retail	1,286	-	-	-	-	353	958	1,286	1,286	1,286	1,286	1,286	1,286	1,286	1,286
PA15b - Condo on Podium	3,834	-	-	-	347	942	1,537	2,132	2,727	3,322	3,834	3,834	3,834	3,834	3,834
PA15c - Townhomes	560	-	-	-	53	560	560	560	560	560	560	560	560	560	560
PA15d - Tower Condos	3,050	-	-	-	56	734	1,412	2,090	2,768	3,050	3,050	3,050	3,050	3,050	3,050
Apartments	**4,660**	**-**	**-**	**39**	**908**	**1,856**	**2,804**	**3,752**	**4,384**	**4,660**	**4,660**	**4,660**	**4,660**	**4,660**	**4,660**
PA1a - Apt	2,685	-	-	39	513	987	1,461	1,935	2,409	2,685	2,685	2,685	2,685	2,685	2,685
PA15e - Apt	1,975	-	-	-	395	869	1,343	1,817	1,975	1,975	1,975	1,975	1,975	1,975	1,975
Commercial - Retail	**2,511**	**-**	**-**	**183**	**342**	**1,426**	**2,511**	**2,511**	**2,511**	**2,511**	**2,511**	**2,511**	**2,511**	**2,511**	**2,511**
PA14	23	-	-	23	23	23	23	23	23	23	23	23	23	23	23
PA3	319	-	-	159	319	319	319	319	319	319	319	319	319	319	319
PA1b	1,231	-	-	-	-	616	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231
PA15f	937	-	-	-	-	469	937	937	937	937	937	937	937	937	937
Commercial - Office	**3,081**	**-**	**-**	**-**	**-**	**1,011**	**2,022**	**2,214**	**2,407**	**2,600**	**2,792**	**2,985**	**3,081**	**3,081**	**3,081**
PA1b - Lots 2-7	1,445	-	-	-	-	193	385	578	770	963	1,156	1,348	1,445	1,445	1,445
PA15g	1,637	-	-	-	-	818	1,637	1,637	1,637	1,637	1,637	1,637	1,637	1,637	1,637
Commercial - Other	**100**	**-**	**-**	**-**	**-**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
PA1b - Lot 1 Hospitality	98	-	-	-	-	98	98	98	98	98	98	98	98	98	98
PA1b - Lot 24 Service Stn	2	-	-	-	-	2	2	2	2	2	2	2	2	2	2
Industrial R&D	**151**	**-**	**-**	**-**	**-**	**151**	**151**	**151**	**151**	**151**	**151**	**151**	**151**	**151**	**151**
PA1b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PA2	151	-	-	-	-	151	151	151	151	151	151	151	151	151	151

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Product Level Absorption Schedule, and Cumulative Population & Employee Estimates – by Community: HOMESTEAD

Use - Product	Total	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION - UNITS	**5,675**	**-**	**150**	**697**	**595**	**733**	**1,093**	**1,034**	**733**	**421**	**216**	**3**	**-**	**-**	**-**	**-**	**-**	**-**
Residential for Sale	**5,488**	**-**	**150**	**697**	**595**	**733**	**906**	**1,034**	**733**	**421**	**216**	**3**	**-**	**-**	**-**	**-**	**-**	**-**
Chiquito Det. Condos	23	-	-	-	-	-	6	17	-	-	-	-	-	-	-	-	-	-
Chiquito Customs	29	-	-	-	-	-	12	17	-	-	-	-	-	-	-	-	-	-
HS Central SFD	78	-	-	-	-	-	28	48	2	-	-	-	-	-	-	-	-	-
HS Central Customs	86	-	-	-	-	-	21	36	29	-	-	-	-	-	-	-	-	-
HS West HW-2	230	-	-	-	-	-	-	42	72	72	44	-	-	-	-	-	-	-
HS West Custom	62	-	-	-	-	-	-	21	36	5	-	-	-	-	-	-	-	-
HS West Green Court HW-1	75	-	-	-	-	-	6	69	-	-	-	-	-	-	-	-	-	-
Long Canyon SFD 75	106	-	-	16	48	42	-	-	-	-	-	-	-	-	-	-	-	-
Long Canyon SFD 80	115	-	-	16	48	48	3	-	-	-	-	-	-	-	-	-	-	-
Long Canyon SFD 50	38	-	-	16	22	-	-	-	-	-	-	-	-	-	-	-	-	-
LCS - 3 SFD5500	117	-	-	-	16	48	48	5	-	-	-	-	-	-	-	-	-	-
LCS -4 SFD6500	127	-	-	-	16	48	48	15	-	-	-	-	-	-	-	-	-	-
Onion Fields SFD 55	96	-	-	-	-	28	48	20	-	-	-	-	-	-	-	-	-	-
Onion Fields SFD 50x90	37	-	-	-	-	37	-	-	-	-	-	-	-	-	-	-	-	-
Onion Field SFD 35	47	-	-	-	-	24	23	-	-	-	-	-	-	-	-	-	-	-
Potrero Ridge Customs	88	-	-	-	-	60	28	-	-	-	-	-	-	-	-	-	-	-
Mesas West 4 SFD Cluster MW 9-15	108	-	42	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mesas West 11 SFD Cluster MW 32	146	-	-	42	72	32	-	-	-	-	-	-	-	-	-	-	-	-
HS Central 4 Plex HC-2	120	-	-	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-
HS Central 2 Story TF HC-3	351	-	-	-	-	-	60	72	72	72	72	3	-	-	-	-	-	-
HS Central 3 Story TF HC-4	144	-	-	-	-	-	24	72	48	-	-	-	-	-	-	-	-	-
HS Central E1 16 Plex	120	-	-	-	-	-	6	72	42	-	-	-	-	-	-	-	-	-
HS West 3-4 Plex	229	-	-	-	-	-	-	60	72	72	25	-	-	-	-	-	-	-
HS West Triplex HW-5	44	-	-	-	-	-	-	44	-	-	-	-	-	-	-	-	-	-
Long Canyon 3 Story	326	-	-	-	6	72	72	72	72	32	-	-	-	-	-	-	-	-
LCS 1 & 2	161	-	-	-	24	72	65	-	-	-	-	-	-	-	-	-	-	-
Onion Fields Triplex	213	-	-	-	-	-	60	72	72	9	-	-	-	-	-	-	-	-
Onion Fields 3 Story Towns	237	-	-	-	-	6	72	72	72	15	-	-	-	-	-	-	-	-
Mesas West 1A 3/4 Plex MW 1	97	-	6	72	19	-	-	-	-	-	-	-	-	-	-	-	-	-
Mesas West 3A 3/4 Plex MW7	145	-	42	72	31	-	-	-	-	-	-	-	-	-	-	-	-	-
Mesas West 1B-10 Plex MW 2	85	-	-	60	25	-	-	-	-	-	-	-	-	-	-	-	-	-
Mesas West 3B 10 Plex MW 8 & 16	85	-	24	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mesas West 7A 10 Plex MW 17	60	-	6	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mesas West 12A 10 Plex	70	-	-	42	28	-	-	-	-	-	-	-	-	-	-	-	-	-
Mesas West 6 2/3 Duplex MW 18-21	48	-	6	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mesas West 7B 10 Plex MW 22	96	-	-	60	36	-	-	-	-	-	-	-	-	-	-	-	-	-
Mesas West 8B 2 Story TF MW 23 24	577	-	24	72	72	72	72	72	72	72	49	-	-	-	-	-	-	-
Mesas West 10 16 Plex MW 26-30	464	-	-	6	72	72	72	72	72	72	26	-	-	-	-	-	-	-
Mesas West 12B 16 Plex	208	-	-	-	60	72	72	4	-	-	-	-	-	-	-	-	-	-
Apartments	**187**	-	-	-	-	-	187	-	-	-	-	-	-	-	-	-	-	-
ABSORPTION - SF	**1,250,000**	**-**	**-**	**-**	**-**	**-**	**1,250,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Commercial - Retail	**27,500**	-	-	-	-	-	27,500	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**132,500**	-	-	-	-	-	132,500	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**1,090,000**	-	-	-	-	-	1,090,000	-	-	-	-	-	-	-	-	-	-	-
HOMESTEAD	**By 2031**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
CUM. POPULATION	**14,777**	**-**	**390**	**2,172**	**3,764**	**5,798**	**8,614**	**11,304**	**13,158**	**14,221**	**14,770**	**14,777**	**14,777**	**14,777**	**14,777**	**14,777**	**14,777**	**14,777**
Residential for Sale	**14,332**	**-**	**390**	**2,172**	**3,764**	**5,798**	**8,169**	**10,859**	**12,713**	**13,776**	**14,325**	**14,332**	**14,332**	**14,332**	**14,332**	**14,332**	**14,332**	**14,332**
Chiquito Det. Condos	73	-	-	-	-	-	19	73	73	73	73	73	73	73	73	73	73	73
Chiquito Customs	92	-	-	-	-	-	38	92	92	92	92	92	92	92	92	92	92	92
HS Central SFD	247	-	-	-	-	-	89	241	247	247	247	247	247	247	247	247	247	247
HS Central Customs	273	-	-	-	-	-	67	181	273	273	273	273	273	273	273	273	273	273
HS West HW-2	729	-	-	-	-	-	-	133	361	590	729	729	729	729	729	729	729	729
HS West Custom	197	-	-	-	-	-	-	67	181	197	197	197	197	197	197	197	197	197
HS West Green Court HW-1	238	-	-	-	-	-	19	238	238	238	238	238	238	238	238	238	238	238
Long Canyon SFD 75	336	-	-	51	203	336	336	336	336	336	336	336	336	336	336	336	336	336
Long Canyon SFD 80	365	-	-	51	203	355	365	365	365	365	365	365	365	365	365	365	365	365
Long Canyon SFD 50	120	-	-	51	120	120	120	120	120	120	120	120	120	120	120	120	120	120
LCS - 3 SFD5500	371	-	-	-	51	203	355	371	371	371	371	371	371	371	371	371	371	371
LCS -4 SFD6500	403	-	-	-	51	203	355	403	403	403	403	403	403	403	403	403	403	403
Onion Fields SFD 55	304	-	-	-	-	89	241	304	304	304	304	304	304	304	304	304	304	304
Onion Fields SFD 50x90	117	-	-	-	-	117	117	117	117	117	117	117	117	117	117	117	117	117
Onion Field SFD 35	149	-	-	-	-	76	149	149	149	149	149	149	149	149	149	149	149	149
Potrero Ridge Customs	279	-	-	-	-	190	279	279	279	279	279	279	279	279	279	279	279	279
Mesas West 4 SFD Cluster MW 9-15	342	-	133	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342
Mesas West 11 SFD Cluster MW 32	463	-	-	133	361	463	463	463	463	463	463	463	463	463	463	463	463	463
HS Central 4 Plex HC-2	286	-	-	-	-	-	143	286	286	286	286	286	286	286	286	286	286	286
HS Central 2 Story TF HC-3	835	-	-	-	-	-	143	314	486	657	828	835	835	835	835	835	835	835
HS Central 3 Story TF HC-4	343	-	-	-	-	-	57	228	343	343	343	343	343	343	343	343	343	343
HS Central E1 16 Plex	286	-	-	-	-	-	14	186	286	286	286	286	286	286	286	286	286	286
HS West 3-4 Plex	545	-	-	-	-	-	-	143	314	486	545	545	545	545	545	545	545	545
HS West Triplex HW-5	105	-	-	-	-	-	-	105	105	105	105	105	105	105	105	105	105	105
Long Canyon 3 Story	776	-	-	-	14	186	357	528	700	776	776	776	776	776	776	776	776	776
LCS 1 & 2	383	-	-	-	57	228	383	383	383	383	383	383	383	383	383	383	383	383
Onion Fields Triplex	507	-	-	-	-	-	143	314	486	507	507	507	507	507	507	507	507	507
Onion Fields 3 Story Towns	564	-	-	-	-	14	186	357	528	564	564	564	564	564	564	564	564	564
Mesas West 1A 3/4 Plex MW 1	231	-	14	186	231	231	231	231	231	231	231	231	231	231	231	231	231	231
Mesas West 3A 3/4 Plex MW7	345	-	100	271	345	345	345	345	345	345	345	345	345	345	345	345	345	345
Mesas West 1B-10 Plex MW 2	202	-	-	143	202	202	202	202	202	202	202	202	202	202	202	202	202	202
Mesas West 3B 10 Plex MW 8 & 16	202	-	57	202	202	202	202	202	202	202	202	202	202	202	202	202	202	202
Mesas West 7A 10 Plex MW 17	143	-	14	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143
Mesas West 12A 10 Plex	167	-	-	100	167	167	167	167	167	167	167	167	167	167	167	167	167	167
Mesas West 6 2/3 Duplex MW 18-21	114	-	14	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114
Mesas West 7B 10 Plex MW 22	228	-	-	143	228	228	228	228	228	228	228	228	228	228	228	228	228	228
Mesas West 8B 2 Story TF MW 23 24	1,373	-	57	228	400	571	743	914	1,085	1,257	1,373	1,373	1,373	1,373	1,373	1,373	1,373	1,373
Mesas West 10 16 Plex MW 26-30	1,104	-	-	14	186	357	528	700	871	1,042	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104
Mesas West 12B 16 Plex	495	-	-	-	143	314	486	495	495	495	495	495	495	495	495	495	495	495
Apartments	**445**	-	-	-	-	-	445	445	445	445	445	445	445	445	445	445	445	445
CUM. EMPLOYEES	**2,779**	**-**	**-**	**-**	**-**	**-**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**	**2,779**
Commercial - Retail	**69**	-	-	-	-	-	69	69	69	69	69	69	69	69	69	69	69	69
Commercial - Office	**530**	-	-	-	-	-	530	530	530	530	530	530	530	530	530	530	530	530
Industrial R&D	**2,180**	-	-	-	-	-	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180

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Product Level Cumulative Assessed Values, and Cumulative Retail Expenditure Estimates – by Community: HOMESTEAD

HOMESTEAD	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CUM. ASSESSED VALUE	**63,763,861,320**	**-**	**72,227,787**	**423,640,304**	**771,256,765**	**1,339,087,433**	**2,132,876,042**	**2,785,085,913**	**3,240,531,721**	**3,438,548,684**	**3,540,068,102**	**3,540,041,428**	**3,540,041,428**	**3,540,041,428**	**3,540,041,428**	**3,540,041,428**	**3,540,041,428**	**3,540,041,428**
Residential for Sale	**3,347,758,493**	**-**	**72,227,787**	**423,640,304**	**771,256,765**	**1,339,087,433**	**1,940,593,107**	**2,592,802,978**	**3,048,248,786**	**3,246,265,749**	**3,347,785,166**	**3,347,758,493**	**3,347,758,493**	**3,347,758,493**	**3,347,758,493**	**3,347,758,493**	**3,347,758,493**	**3,347,758,493**
Chiquito Det. Condos	10,141,516	-	-	-	-	-	2,666,796	10,141,516	10,141,516	10,141,516	10,141,516	10,141,516	10,141,516	10,141,516	10,141,516	10,141,516	10,141,516	10,141,516
Chiquito Customs	70,409,589	-	-	-	-	-	29,388,172	70,409,589	70,409,589	70,409,589	70,409,589	70,409,589	70,409,589	70,409,589	70,409,589	70,409,589	70,409,589	70,409,589
HS Central SFD	65,371,552	-	-	-	-	-	24,137,162	65,012,316	65,371,552	65,371,552	65,371,552	65,371,552	65,371,552	65,371,552	65,371,552	65,371,552	65,371,552	65,371,552
HS Central Customs	199,343,666	-	-	-	-	-	50,495,226	135,053,695	199,343,666	199,343,666	199,343,666	199,343,666	199,343,666	199,343,666	199,343,666	199,343,666	199,343,666	199,343,666
HS West HW-2	143,297,312	-	-	-	-	-	-	26,518,103	71,741,812	116,561,127	143,297,312	143,297,312	143,297,312	143,297,312	143,297,312	143,297,312	143,297,312	143,297,312
HS West Custom	124,951,370	-	-	-	-	-	-	47,992,705	125,758,620	124,951,370	124,951,370	124,951,370	124,951,370	124,951,370	124,951,370	124,951,370	124,951,370	124,951,370
HS West Green Court HW-1	37,409,542	-	-	-	-	-	2,997,744	37,409,542	37,409,542	37,409,542	37,409,542	37,409,542	37,409,542	37,409,542	37,409,542	37,409,542	37,409,542	37,409,542
Long Canyon SFD 75	96,176,186	-	-	14,790,210	58,799,048	96,176,186	96,176,186	96,176,186	96,176,186	96,176,186	96,176,186	96,176,186	96,176,186	96,176,186	96,176,186	96,176,186	96,176,186	96,176,186
Long Canyon SFD 80	111,473,400	-	-	16,306,522	64,748,612	111,758,269	111,473,400	111,473,400	111,473,400	111,473,400	111,473,400	111,473,400	111,473,400	111,473,400	111,473,400	111,473,400	111,473,400	111,473,400
Long Canyon SFD 50	33,720,838	-	-	14,319,656	33,720,838	33,720,838	33,720,838	33,720,838	33,720,838	33,720,838	33,720,838	33,720,838	33,720,838	33,720,838	33,720,838	33,720,838	33,720,838	33,720,838
LCS - 3 SFD5500	101,004,640	-	-	-	14,306,829	56,926,146	98,641,951	101,004,640	101,004,640	101,004,640	101,004,640	101,004,640	101,004,640	101,004,640	101,004,640	101,004,640	101,004,640	101,004,640
LCS -4 SFD6500	112,080,039	-	-	-	14,529,406	57,847,032	100,352,876	112,080,039	112,080,039	112,080,039	112,080,039	112,080,039	112,080,039	112,080,039	112,080,039	112,080,039	112,080,039	112,080,039
Onion Fields SFD 55	82,048,119	-	-	-	-	24,299,537	65,615,422	82,048,119	82,048,119	82,048,119	82,048,119	82,048,119	82,048,119	82,048,119	82,048,119	82,048,119	82,048,119	82,048,119
Onion Fields SFD 50x90	30,835,079	-	-	-	-	30,835,079	30,835,079	30,835,079	30,835,079	30,835,079	30,835,079	30,835,079	30,835,079	30,835,079	30,835,079	30,835,079	30,835,079	30,835,079
Onion Field SFD 35	24,204,721	-	-	-	-	12,457,258	24,204,721	24,204,721	24,204,721	24,204,721	24,204,721	24,204,721	24,204,721	24,204,721	24,204,721	24,204,721	24,204,721	24,204,721
Potrero Ridge Customs	206,113,697	-	-	-	-	144,370,418	206,113,697	206,113,697	206,113,697	206,113,697	206,113,697	206,113,697	206,113,697	206,113,697	206,113,697	206,113,697	206,113,697	206,113,697
Mesas West 4 SFD Cluster MW 9-15	53,566,830	-	20,996,312	53,566,830	53,566,830	53,566,830	53,566,830	53,566,830	53,566,830	53,566,830	53,566,830	53,566,830	53,566,830	53,566,830	53,566,830	53,566,830	53,566,830	53,566,830
Mesas West 11 SFD Cluster MW 32	71,932,763	-	-	21,068,530	56,834,540	71,932,763	71,932,763	71,932,763	71,932,763	71,932,763	71,932,763	71,932,763	71,932,763	71,932,763	71,932,763	71,932,763	71,932,763	71,932,763
HS Central 4 Plex HC-2	58,405,929	-	-	-	-	-	29,428,643	58,405,929	58,405,929	58,405,929	58,405,929	58,405,929	58,405,929	58,405,929	58,405,929	58,405,929	58,405,929	58,405,929
HS Central 2 Story TF HC-3	159,697,661	-	-	-	-	-	28,013,902	61,384,486	94,459,753	127,239,702	159,724,334	159,697,661	159,697,661	159,697,661	159,697,661	159,697,661	159,697,661	159,697,661
HS Central 3 Story TF HC-4	66,756,632	-	-	-	-	-	11,228,785	44,791,924	66,756,632	66,756,632	66,756,632	66,756,632	66,756,632	66,756,632	66,756,632	66,756,632	66,756,632	66,756,632
HS Central E1 16 Plex	49,793,316	-	-	-	-	-	2,507,098	32,567,366	49,793,316	49,793,316	49,793,316	49,793,316	49,793,316	49,793,316	49,793,316	49,793,316	49,793,316	49,793,316
HS West 3-4 Plex	110,431,348	-	-	-	-	-	-	29,533,377	64,626,808	99,304,291	110,431,348	110,431,348	110,431,348	110,431,348	110,431,348	110,431,348	110,431,348	110,431,348
HS West Triplex HW-5	20,500,719	-	-	-	-	-	-	20,500,719	20,500,719	20,500,719	20,500,719	20,500,719	20,500,719	20,500,719	20,500,719	20,500,719	20,500,719	20,500,719
Long Canyon 3 Story	147,150,424	-	-	-	2,735,969	35,555,565	68,230,787	100,761,637	133,148,113	147,150,424	147,150,424	147,150,424	147,150,424	147,150,424	147,150,424	147,150,424	147,150,424	147,150,424
LCS 1 & 2	77,457,569	-	-	-	11,740,148	46,700,741	77,457,569	77,457,569	77,457,569	77,457,569	77,457,569	77,457,569	77,457,569	77,457,569	77,457,569	77,457,569	77,457,569	77,457,569
Onion Fields Triplex	92,086,751	-	-	-	-	-	26,824,310	58,537,793	89,680,449	92,086,751	92,086,751	92,086,751	92,086,751	92,086,751	92,086,751	92,086,751	92,086,751	92,086,751
Onion Fields 3 Story Towns	106,133,968	-	-	-	-	2,727,117	35,431,633	67,885,548	100,088,862	106,133,968	106,133,968	106,133,968	106,133,968	106,133,968	106,133,968	106,133,968	106,133,968	106,133,968
Mesas West 1A 3/4 Plex MW 1	46,426,398	-	2,903,416	37,707,831	46,426,398	46,426,398	46,426,398	46,426,398	46,426,398	46,426,398	46,426,398	46,426,398	46,426,398	46,426,398	46,426,398	46,426,398	46,426,398	46,426,398
Mesas West 3A 3/4 Plex MW7	69,273,016	-	20,332,049	54,939,038	69,273,016	69,273,016	69,273,016	69,273,016	69,273,016	69,273,016	69,273,016	69,273,016	69,273,016	69,273,016	69,273,016	69,273,016	69,273,016	69,273,016
Mesas West 1B-10 Plex MW 2	37,320,736	-	-	26,615,477	37,320,736	37,320,736	37,320,736	37,320,736	37,320,736	37,320,736	37,320,736	37,320,736	37,320,736	37,320,736	37,320,736	37,320,736	37,320,736	37,320,736
Mesas West 3B 10 Plex MW 8 & 16	37,581,387	-	10,652,783	37,581,387	37,581,387	37,581,387	37,581,387	37,581,387	37,581,387	37,581,387	37,581,387	37,581,387	37,581,387	37,581,387	37,581,387	37,581,387	37,581,387	37,581,387
Mesas West 7A 10 Plex MW 17	26,486,387	-	2,653,308	26,486,387	26,486,387	26,486,387	26,486,387	26,486,387	26,486,387	26,486,387	26,486,387	26,486,387	26,486,387	26,486,387	26,486,387	26,486,387	26,486,387	26,486,387
Mesas West 12A 10 Plex	30,640,865	-	-	18,577,824	30,640,865	30,640,865	30,640,865	30,640,865	30,640,865	30,640,865	30,640,865	30,640,865	30,640,865	30,640,865	30,640,865	30,640,865	30,640,865	30,640,865
Mesas West 6 2/3 Duplex MW 18-21	27,162,261	-	3,401,362	27,162,261	27,162,261	27,162,261	27,162,261	27,162,261	27,162,261	27,162,261	27,162,261	27,162,261	27,162,261	27,162,261	27,162,261	27,162,261	27,162,261	27,162,261
Mesas West 7B 10 Plex MW 22	42,226,275	-	-	26,625,490	42,226,275	42,226,275	42,226,275	42,226,275	42,226,275	42,226,275	42,226,275	42,226,275	42,226,275	42,226,275	42,226,275	42,226,275	42,226,275	42,226,275
Mesas West 8B 2 Story TF MW 23 24	265,558,968	-	11,288,557	45,090,785	78,702,684	112,124,254	145,355,495	178,396,407	211,246,990	243,907,244	265,558,968	265,558,968	265,558,968	265,558,968	265,558,968	265,558,968	265,558,968	265,558,968
Mesas West 10 16 Plex MW 26-30	207,389,310	-	-	2,802,075	36,391,054	69,548,935	102,275,719	134,571,407	166,435,997	197,869,491	207,389,310	207,389,310	207,389,310	207,389,310	207,389,310	207,389,310	207,389,310	207,389,310
Mesas West 12B 16 Plex	95,197,713	-	-	-	28,063,481	61,423,140	94,402,977	95,197,713	95,197,713	95,197,713	95,197,713	95,197,713	95,197,713	95,197,713	95,197,713	95,197,713	95,197,713	95,197,713
Apartments	**45,464,820**	-	-	-	-	-	45,464,820	45,464,820	45,464,820	45,464,820	45,464,820	45,464,820	45,464,820	45,464,820	45,464,820	45,464,820	45,464,820	45,464,820
Commercial - Retail	**11,250,606**	-	-	-	-	-	11,250,606	11,250,606	11,250,606	11,250,606	11,250,606	11,250,606	11,250,606	11,250,606	11,250,606	11,250,606	11,250,606	11,250,606
Commercial - Office	**36,966,312**	-	-	-	-	-	36,966,312	36,966,312	36,966,312	36,966,312	36,966,312	36,966,312	36,966,312	36,966,312	36,966,312	36,966,312	36,966,312	36,966,312
Industrial R&D	**98,601,198**	-	-	-	-	-	98,601,198	98,601,198	98,601,198	98,601,198	98,601,198	98,601,198	98,601,198	98,601,198	98,601,198	98,601,198	98,601,198	98,601,198

HOMESTEAD	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
RETAIL EXPENDITURE ($ 000's)	**54,553**	**-**	**1,280**	**7,229**	**12,510**	**19,964**	**31,782**	**41,724**	**48,911**	**52,641**	**54,528**	**54,553**	**54,553**	**54,553**	**54,553**	**54,553**	**54,553**	**54,553**
Residential for Sale	**51,498**	**-**	**1,280**	**7,229**	**12,510**	**19,964**	**28,727**	**38,669**	**45,856**	**49,586**	**51,472**	**51,498**	**51,498**	**51,498**	**51,498**	**51,498**	**51,498**	**51,498**
Chiquito Det. Condos	188	-	-	-	-	-	49	188	188	188	188	188	188	188	188	188	188	188
Chiquito Customs	667	-	-	-	-	-	276	667	667	667	667	667	667	667	667	667	667	667
HS Central SFD	739	-	-	-	-	-	265	720	739	739	739	739	739	739	739	739	739	739
HS Central Customs	1,978	-	-	-	-	-	483	1,311	1,978	1,978	1,978	1,978	1,978	1,978	1,978	1,978	1,978	1,978
HS West HW-2	2,231	-	-	-	-	-	-	407	1,106	1,804	2,231	2,231	2,231	2,231	2,231	2,231	2,231	2,231
HS West Custom	1,426	-	-	-	-	-	-	483	1,311	1,426	1,426	1,426	1,426	1,426	1,426	1,426	1,426	1,426
HS West Green Court HW-1	644	-	-	-	-	-	52	644	644	644	644	644	644	644	644	644	644	644
Long Canyon SFD 75	1,079	-	-	163	651	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079
Long Canyon SFD 80	1,211	-	-	168	674	1,179	1,211	1,211	1,211	1,211	1,211	1,211	1,211	1,211	1,211	1,211	1,211	1,211
Long Canyon SFD 50	373	-	-	157	373	373	373	373	373	373	373	373	373	373	373	373	373	373
LCS - 3 SFD5500	1,149	-	-	-	157	628	1,100	1,149	1,149	1,149	1,149	1,149	1,149	1,149	1,149	1,149	1,149	1,149
LCS -4 SFD6500	1,263	-	-	-	159	636	1,114	1,263	1,263	1,263	1,263	1,263	1,263	1,263	1,263	1,263	1,263	1,263
Onion Fields SFD 55	909	-	-	-	-	265	720	909	909	909	909	909	909	909	909	909	909	909
Onion Fields SFD 50x90	337	-	-	-	-	337	337	337	337	337	337	337	337	337	337	337	337	337
Onion Field SFD 35	417	-	-	-	-	213	417	417	417	417	417	417	417	417	417	417	417	417
Potrero Ridge Customs	2,024	-	-	-	-	1,380	2,024	2,024	2,024	2,024	2,024	2,024	2,024	2,024	2,024	2,024	2,024	2,024
Mesas West 4 SFD Cluster MW 9-15	928	-	361	928	928	928	928	928	928	928	928	928	928	928	928	928	928	928
Mesas West 11 SFD Cluster MW 32	1,255	-	-	361	980	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255
HS Central 4 Plex HC-2	1,065	-	-	-	-	-	532	1,065	1,065	1,065	1,065	1,065	1,065	1,065	1,065	1,065	1,065	1,065
HS Central 2 Story TF HC-3	2,950	-	-	-	-	-	504	1,109	1,714	2,319	2,924	2,950	2,950	2,950	2,950	2,950	2,950	2,950
HS Central 3 Story TF HC-4	1,215	-	-	-	-	-	203	810	1,215	1,215	1,215	1,215	1,215	1,215	1,215	1,215	1,215	1,215
HS Central E1 16 Plex	996	-	-	-	-	-	50	648	996	996	996	996	996	996	996	996	996	996
HS West 3-4 Plex	2,032	-	-	-	-	-	-	532	1,171	1,810	2,032	2,032	2,032	2,032	2,032	2,032	2,032	2,032
HS West Triplex HW-5	371	-	-	-	-	-	-	371	371	371	371	371	371	371	371	371	371	371
Long Canyon 3 Story	2,666	-	-	-	49	638	1,227	1,815	2,404	2,666	2,666	2,666	2,666	2,666	2,666	2,666	2,666	2,666
LCS 1 & 2	1,434	-	-	-	214	855	1,434	1,434	1,434	1,434	1,434	1,434	1,434	1,434	1,434	1,434	1,434	1,434
Onion Fields Triplex	1,731	-	-	-	-	-	488	1,073	1,658	1,731	1,731	1,731	1,731	1,731	1,731	1,731	1,731	1,731
Onion Fields 3 Story Towns	1,938	-	-	-	-	49	638	1,227	1,815	1,938	1,938	1,938	1,938	1,938	1,938	1,938	1,938	1,938
Mesas West 1A 3/4 Plex MW 1	847	-	52	681	847	847	847	847	847	847	847	847	847	847	847	847	847	847
Mesas West 3A 3/4 Plex MW7	1,267	-	367	996	1,267	1,267	1,267	1,267	1,267	1,267	1,267	1,267	1,267	1,267	1,267	1,267	1,267	1,267
Mesas West 1B-10 Plex MW 2	683	-	-	482	683	683	683	683	683	683	683	683	683	683	683	683	683	683
Mesas West 3B 10 Plex MW 8 & 16	683	-	193	683	683	683	683	683	683	683	683	683	683	683	683	683	683	683
Mesas West 7A 10 Plex MW 17	482	-	48	482	482	482	482	482	482	482	482	482	482	482	482	482	482	482
Mesas West 12A 10 Plex	563	-	-	338	563	563	563	563	563	563	563	563	563	563	563	563	563	563
Mesas West 6 2/3 Duplex MW 18-21	446	-	56	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446
Mesas West 7B 10 Plex MW 22	772	-	-	482	772	772	772	772	772	772	772	772	772	772	772	772	772	772
Mesas West 8B 2 Story TF MW 23 24	4,869	-	203	810	1,418	2,025	2,633	3,240	3,848	4,456	4,869	4,869	4,869	4,869	4,869	4,869	4,869	4,869
Mesas West 10 16 Plex MW 26-30	3,915	-	-	51	658	1,266	1,873	2,481	3,089	3,696	3,915	3,915	3,915	3,915	3,915	3,915	3,915	3,915
Mesas West 12B 16 Plex	1,755	-	-	-	506	1,114	1,721	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755
Apartments	**1,231**	-	-	-	-	-	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231
Commercial - Retail	**45**	-	-	-	-	-	45	45	45	45	45	45	45	45	45	45	45	45
Commercial - Office	**348**	-	-	-	-	-	348	348	348	348	348	348	348	348	348	348	348	348
Industrial R&D	**1,431**	-	-	-	-	-	1,431	1,431	1,431	1,431	1,431	1,431	1,431	1,431	1,431	1,431	1,431	1,431

A-7.3
Product Level Absorption Schedule – by Community: POTRERO

Use - Product	Total	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION - UNITS	**8,428**	**-**	**-**	**-**	**-**	**-**	**12**	**320**	**900**	**1,412**	**1,826**	**1,365**	**904**	**704**	**570**	**304**	**111**	**-**
Residential for Sale	**7,908**	**-**	**-**	**-**	**-**	**-**	**12**	**320**	**900**	**1,387**	**1,526**	**1,170**	**904**	**704**	**570**	**304**	**111**	**-**
PE1 140 x 100 estates	90	-	-	-	-	-	-	-	-	12	36	36	6	-	-	-	-	-
PE 2 140 x 100 estates	15	-	-	-	-	-	-	-	-	3	12	-	-	-	-	-	-	-
P 6500	224	-	-	-	-	-	-	-	-	16	48	48	48	48	16	-	-	-
P6000	257	-	-	-	-	-	-	28	48	48	48	48	37	-	-	-	-	-
P5500	250	-	-	-	-	-	-	-	28	48	48	48	48	30	-	-	-	-
P5000	225	-	-	-	-	-	-	4	48	48	48	48	29	-	-	-	-	-
P4500	392	-	-	-	-	-	-	-	16	48	48	48	48	48	48	48	40	-
P3500	276	-	-	-	-	-	-	-	16	48	48	48	48	48	20	-	-	-
A1	180	-	-	-	-	-	-	-	-	60	72	48	-	-	-	-	-	-
A2	248	-	-	-	-	-	-	24	72	72	72	8	-	-	-	-	-	-
B1	498	-	-	-	-	-	-	6	72	72	72	72	72	72	60	-	-	-
B2	540	-	-	-	-	-	-	-	60	72	72	72	72	72	72	48	-	-
C1	150	-	-	-	-	-	-	-	-	60	72	18	-	-	-	-	-	-
D	286	-	-	-	-	-	-	60	72	72	72	10	-	-	-	-	-	-
E	270	-	-	-	-	-	-	24	72	72	72	30	-	-	-	-	-	-
F	234	-	-	-	-	-	-	6	72	72	72	12	-	-	-	-	-	-
G1	324	-	-	-	-	-	-	24	72	72	72	72	12	-	-	-	-	-
G2	414	-	-	-	-	-	-	-	-	60	72	72	72	72	66	-	-	-
H1	374	-	-	-	-	-	-	-	60	72	72	72	72	26	-	-	-	-
H2	240	-	-	-	-	-	6	72	72	72	18	-	-	-	-	-	-	-
I	242	-	-	-	-	-	6	72	72	72	20	-	-	-	-	-	-	-
Lofts	500	-	-	-	-	-	-	-	42	72	72	72	72	72	72	26	-	-
Senoirs 1	500	-	-	-	-	-	-	-	6	72	72	72	72	72	72	62	-	-
Senoirs 2	450	-	-	-	-	-	-	-	-	42	72	72	72	72	72	48	-	-
Senoirs 3	220	-	-	-	-	-	-	-	-	24	72	72	52	-	-	-	-	-
Senoirs 4	509	-	-	-	-	-	-	-	-	6	72	72	72	72	72	72	71	-
Apartments	**520**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**25**	**300**	**195**	**-**	**-**	**-**	**-**	**-**	**-**
ABSORPTION - SF	**1,257,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**628,500**	**628,500**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Commercial - Retail	**628,500**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**314,250**	**314,250**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Commercial - Office	**628,500**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**314,250**	**314,250**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Product Level Cumulative Population & Employee Estimates – by Community: POTRERO

POTRERO	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CUM. POPULATION	**23,322**	**-**	**-**	**-**	**-**	**-**	**38**	**1,052**	**3,898**	**8,137**	**12,764**	**16,218**	**18,770**	**20,749**	**22,303**	**23,054**	**23,322**	**23,322**
Residential for Sale	**23,104**	**-**	**-**	**-**	**-**	**-**	**38**	**1,052**	**3,898**	**8,127**	**12,627**	**15,999**	**18,551**	**20,530**	**22,084**	**22,835**	**23,104**	**23,104**
PE1 140 x 100 estates	285	-	-	-	-	-	-	-	-	38	152	266	285	285	285	285	285	285
PE 2 140 x 100 estates	48	-	-	-	-	-	-	-	-	10	48	48	48	48	48	48	48	48
P 6500	710	-	-	-	-	-	-	-	-	51	203	355	507	659	710	710	710	710
P6000	815	-	-	-	-	-	-	89	241	393	545	697	815	815	815	815	815	815
P5500	793	-	-	-	-	-	-	-	89	241	393	545	697	793	793	793	793	793
P5000	713	-	-	-	-	-	-	13	165	317	469	621	713	713	713	713	713	713
P4500	1,243	-	-	-	-	-	-	-	51	203	355	507	659	812	964	1,116	1,243	1,243
P3500	875	-	-	-	-	-	-	-	51	203	355	507	659	812	875	875	875	875
A1	571	-	-	-	-	-	-	-	-	190	418	571	571	571	571	571	571	571
A2	786	-	-	-	-	-	-	76	304	533	761	786	786	786	786	786	786	786
B1	1,579	-	-	-	-	-	-	19	247	476	704	932	1,160	1,388	1,579	1,579	1,579	1,579
B2	1,712	-	-	-	-	-	-	-	190	418	647	875	1,103	1,331	1,560	1,712	1,712	1,712
C1	476	-	-	-	-	-	-	-	-	190	418	476	476	476	476	476	476	476
D	907	-	-	-	-	-	-	190	418	647	875	907	907	907	907	907	907	907
E	856	-	-	-	-	-	-	76	304	533	761	856	856	856	856	856	856	856
F	742	-	-	-	-	-	-	19	247	476	704	742	742	742	742	742	742	742
G1	1,027	-	-	-	-	-	-	76	304	533	761	989	1,027	1,027	1,027	1,027	1,027	1,027
G2	1,312	-	-	-	-	-	-	-	-	190	418	647	875	1,103	1,312	1,312	1,312	1,312
H1	1,186	-	-	-	-	-	-	-	190	418	647	875	1,103	1,186	1,186	1,186	1,186	1,186
H2	761	-	-	-	-	-	19	247	476	704	761	761	761	761	761	761	761	761
I	767	-	-	-	-	-	19	247	476	704	767	767	767	767	767	767	767	767
Lofts	1,585	-	-	-	-	-	-	-	133	361	590	818	1,046	1,274	1,503	1,585	1,585	1,585
Senoirs 1	1,000	-	-	-	-	-	-	-	12	156	300	444	588	732	876	1,000	1,000	1,000
Senoirs 2	900	-	-	-	-	-	-	-	-	84	228	372	516	660	804	900	900	900
Senoirs 3	440	-	-	-	-	-	-	-	-	48	192	336	440	440	440	440	440	440
Senoirs 4	1,018	-	-	-	-	-	-	-	-	12	156	300	444	588	732	876	1,018	1,018
Apartments	**218**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**11**	**137**	**218**	**218**	**218**	**218**	**218**	**218**	**218**
CUM. EMPLOYEES	**4,085**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2,043**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**
Commercial - Retail	**1,571**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**786**	**1,571**	**1,571**	**1,571**	**1,571**	**1,571**	**1,571**	**1,571**	**1,571**	**1,571**
Commercial - Office	**2,514**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1,257**	**2,514**	**2,514**	**2,514**	**2,514**	**2,514**	**2,514**	**2,514**	**2,514**	**2,514**

A-7.3 …Continued
Product Level Cumulative Assessed Values – by Community: POTRERO

POTRERO	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CUM. ASSESSED VALUE	**4,989,438**	**-**	**-**	**-**	**-**	**-**	**5,540**	**171,607**	**904,138**	**1,932,007**	**2,916,348**	**3,654,409**	**4,145,178**	**4,512,996**	**4,788,946**	**4,930,965**	**4,989,438**	**4,989,438**
Residential for Sale	**4,366,078,759**	**-**	**-**	**-**	**-**	**-**	**5,539,788**	**171,606,638**	**653,811,245**	**1,427,897,790**	**2,339,385,530**	**3,031,050,556**	**3,521,818,897**	**3,889,637,612**	**4,165,587,310**	**4,307,605,945**	**4,366,078,759**	**4,366,078,759**
PE1 140 x 100 estates	215,559,480	-	-	-	-	-	-	-	-	29,515,871	117,579,354	204,190,449	215,559,480	215,559,480	215,559,480	215,559,480	215,559,480	215,559,480
PE 2 140 x 100 estates	36,725,393	-	-	-	-	-	-	-	-	7,370,899	36,725,393	36,725,393	36,725,393	36,725,393	36,725,393	36,725,393	36,725,393	36,725,393
P 6500	193,907,520	-	-	-	-	-	-	-	-	14,643,011	58,255,053	100,916,127	142,626,233	183,385,371	193,907,520	193,907,520	193,907,520	193,907,520
P6000	209,712,527	-	-	-	-	-	-	23,738,781	64,064,614	103,757,501	142,817,440	181,244,432	209,712,527	209,712,527	209,712,527	209,712,527	209,712,527	209,712,527
P5500	187,487,406	-	-	-	-	-	-	0	21,917,480	59,119,782	95,686,907	131,618,854	166,915,623	187,487,406	187,487,406	187,487,406	187,487,406	187,487,406
P5000	160,895,177	-	-	-	-	-	-	2,981,491	38,704,869	73,774,135	108,189,288	141,950,329	160,895,177	160,895,177	160,895,177	160,895,177	160,895,177	160,895,177
P4500	249,385,883	-	-	-	-	-	-	-	10,871,570	43,301,849	75,178,838	106,502,536	137,272,943	167,490,060	197,153,887	226,264,422	249,385,883	249,385,883
P3500	161,326,437	-	-	-	-	-	-	-	9,836,285	39,181,424	68,035,418	96,398,265	124,269,968	151,650,524	161,326,437	161,326,437	161,326,437	161,326,437
A1	109,006,572	-	-	-	-	-	-	-	-	38,515,899	82,690,876	109,006,572	109,006,572	109,006,572	109,006,572	109,006,572	109,006,572	109,006,572
A2	164,037,244	-	-	-	-	-	-	16,389,935	65,317,677	113,519,224	160,994,578	164,037,244	164,037,244	164,037,244	164,037,244	164,037,244	164,037,244	164,037,244
B1	257,774,285	-	-	-	-	-	-	3,257,393	42,297,497	80,754,313	118,627,841	155,918,081	192,625,032	228,748,695	257,774,285	257,774,285	257,774,285	257,774,285
B2	245,677,639	-	-	-	-	-	-	-	29,222,079	63,750,652	97,633,719	130,871,280	163,463,336	195,409,887	226,710,931	245,677,639	245,677,639	245,677,639
C1	83,776,340	-	-	-	-	-	-	-	-	33,964,972	74,367,910	83,776,340	83,776,340	83,776,340	83,776,340	83,776,340	83,776,340	83,776,340
D	134,479,900	-	-	-	-	-	-	29,087,593	63,620,297	97,706,113	131,345,040	134,479,900	134,479,900	134,479,900	134,479,900	134,479,900	134,479,900	134,479,900
E	109,107,387	-	-	-	-	-	-	9,950,899	39,674,494	69,010,786	97,959,775	109,107,387	109,107,387	109,107,387	109,107,387	109,107,387	109,107,387	109,107,387
F	89,102,952	-	-	-	-	-	-	2,337,104	30,355,455	58,051,053	85,423,899	89,102,952	89,102,952	89,102,952	89,102,952	89,102,952	89,102,952	89,102,952
G1	156,782,163	-	-	-	-	-	-	11,892,416	47,462,079	82,708,989	117,633,146	152,234,550	156,782,163	156,782,163	156,782,163	156,782,163	156,782,163	156,782,163
G2	195,189,839	-	-	-	-	-	-	-	-	28,951,039	63,423,326	97,572,859	131,399,640	164,903,668	195,189,839	195,189,839	195,189,839	195,189,839
H1	166,927,302	-	-	-	-	-	-	-	27,379,941	60,015,812	92,387,612	124,495,342	156,339,001	166,927,302	166,927,302	166,927,302	166,927,302	166,927,302
H2	111,192,050	-	-	-	-	-	2,825,794	36,711,110	70,305,948	103,610,309	111,192,050	111,192,050	111,192,050	111,192,050	111,192,050	111,192,050	111,192,050	111,192,050
I	107,791,983	-	-	-	-	-	2,713,994	35,259,918	67,541,771	99,559,553	107,791,983	107,791,983	107,791,983	107,791,983	107,791,983	107,791,983	107,791,983	107,791,983
Lofts	262,196,650	-	-	-	-	-	-	-	22,636,555	61,272,632	99,618,232	137,673,354	175,437,998	212,912,165	250,095,855	262,196,650	262,196,650	262,196,650
Senoirs 1	211,870,657	-	-	-	-	-	-	-	2,602,635	33,814,888	64,794,758	95,542,247	126,057,354	156,340,078	186,390,421	211,870,657	211,870,657	211,870,657
Senoirs 2	201,914,241	-	-	-	-	-	-	-	-	19,514,073	52,740,843	85,580,309	118,032,472	150,097,331	181,774,887	201,914,241	201,914,241	201,914,241
Senoirs 3	83,274,723	-	-	-	-	-	-	-	-	9,349,546	37,195,730	64,434,551	83,274,723	83,274,723	83,274,723	83,274,723	83,274,723	83,274,723
Senoirs 4	260,977,011	-	-	-	-	-	-	-	-	3,163,466	41,096,522	78,687,169	115,935,405	152,841,232	189,404,650	225,625,658	260,977,011	260,977,011
Apartments	**125,327,635**	-	-	-	-	-	-	-	-	6,077,588	78,931,054	125,327,635	125,327,635	125,327,635	125,327,635	125,327,635	125,327,635	125,327,635
Commercial - Retail	**219,139,689**	-	-	-	-	-	-	-	110,225,436	219,139,689	219,139,689	219,139,689	219,139,689	219,139,689	219,139,689	219,139,689	219,139,689	219,139,689
Commercial - Office	**278,891,450**	-	-	-	-	-	-	-	140,101,317	278,891,450	278,891,450	278,891,450	278,891,450	278,891,450	278,891,450	278,891,450	278,891,450	278,891,450

Product Level Cumulative Retail Expenditure Estimates – by Community: POTRERO

POTRERO	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
RETAIL EXPENDITURE ($ 0	**78,355**	**-**	**-**	**-**	**-**	**-**	**100**	**2,891**	**12,259**	**26,390**	**42,747**	**55,046**	**63,200**	**69,512**	**74,602**	**77,299**	**78,355**	**78,355**
Residential for Sale	**72,250**	**-**	**-**	**-**	**-**	**-**	**100**	**2,891**	**10,918**	**23,543**	**37,925**	**48,941**	**57,095**	**63,407**	**68,496**	**71,194**	**72,250**	**72,250**
PE1 140 x 100 estates	2,070	-	-	-	-	-	-	-	-	276	1,104	1,932	2,070	2,070	2,070	2,070	2,070	2,070
PE 2 140 x 100 estates	345	-	-	-	-	-	-	-	-	69	345	345	345	345	345	345	345	345
P 6500	2,251	-	-	-	-	-	-	-	-	161	643	1,126	1,608	2,090	2,251	2,251	2,251	2,251
P6000	2,383	-	-	-	-	-	-	260	705	1,150	1,595	2,040	2,383	2,383	2,383	2,383	2,383	2,383
P5500	2,147	-	-	-	-	-	-	-	240	653	1,065	1,477	1,889	2,147	2,147	2,147	2,147	2,147
P5000	2,438	-	-	-	-	-	-	43	563	1,083	1,603	2,123	2,438	2,438	2,438	2,438	2,438	2,438
P4500	4,116	-	-	-	-	-	-	-	168	672	1,176	1,680	2,184	2,688	3,192	3,696	4,116	4,116
P3500	2,628	-	-	-	-	-	-	-	152	609	1,066	1,523	1,980	2,437	2,628	2,628	2,628	2,628
A1	1,850	-	-	-	-	-	-	-	-	617	1,357	1,850	1,850	1,850	1,850	1,850	1,850	1,850
A2	2,611	-	-	-	-	-	-	253	1,011	1,769	2,527	2,611	2,611	2,611	2,611	2,611	2,611	2,611
B1	4,615	-	-	-	-	-	-	56	723	1,390	2,057	2,724	3,391	4,059	4,615	4,615	4,615	4,615
B2	4,773	-	-	-	-	-	-	-	530	1,167	1,803	2,440	3,076	3,712	4,349	4,773	4,773	4,773
C1	1,386	-	-	-	-	-	-	-	-	554	1,220	1,386	1,386	1,386	1,386	1,386	1,386	1,386
D	2,503	-	-	-	-	-	-	525	1,155	1,785	2,416	2,503	2,503	2,503	2,503	2,503	2,503	2,503
E	2,231	-	-	-	-	-	-	198	793	1,388	1,983	2,231	2,231	2,231	2,231	2,231	2,231	2,231
F	1,817	-	-	-	-	-	-	47	606	1,165	1,724	1,817	1,817	1,817	1,817	1,817	1,817	1,817
G1	2,886	-	-	-	-	-	-	214	855	1,497	2,138	2,780	2,886	2,886	2,886	2,886	2,886	2,886
G2	3,595	-	-	-	-	-	-	-	-	521	1,146	1,771	2,396	3,021	3,595	3,595	3,595	3,595
H1	3,071	-	-	-	-	-	-	-	493	1,084	1,675	2,267	2,858	3,071	3,071	3,071	3,071	3,071
H2	2,034	-	-	-	-	-	51	661	1,271	1,881	2,034	2,034	2,034	2,034	2,034	2,034	2,034	2,034
I	1,970	-	-	-	-	-	49	635	1,221	1,808	1,970	1,970	1,970	1,970	1,970	1,970	1,970	1,970
Lofts	4,567	-	-	-	-	-	-	-	384	1,041	1,699	2,357	3,015	3,672	4,330	4,567	4,567	4,567
Senoirs 1	3,906	-	-	-	-	-	-	-	47	609	1,172	1,734	2,297	2,859	3,421	3,906	3,906	3,906
Senoirs 2	3,774	-	-	-	-	-	-	-	-	352	956	1,560	2,164	2,767	3,371	3,774	3,774	3,774
Senoirs 3	1,725	-	-	-	-	-	-	-	-	188	753	1,317	1,725	1,725	1,725	1,725	1,725	1,725
Senoirs 4	4,558	-	-	-	-	-	-	-	-	54	698	1,343	1,988	2,633	3,277	3,922	4,558	4,558
Apartments	**3,423**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**165**	**2,139**	**3,423**	**3,423**	**3,423**	**3,423**	**3,423**	**3,423**	**3,423**
Commercial - Retail	**1,032**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**516**	**1,032**	**1,032**	**1,032**	**1,032**	**1,032**	**1,032**	**1,032**	**1,032**	**1,032**
Commercial - Office	**1,651**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**825**	**1,651**	**1,651**	**1,651**	**1,651**	**1,651**	**1,651**	**1,651**	**1,651**	**1,651**

A-7.4

Product Level Absorption Schedule, and Cumulative Population & Employee Estimates – by Community: MISSION VILLAGE

Use - Product	Total	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION - UNITS	**5,331**	**72**	**708**	**995**	**1,826**	**1,218**	**380**	**76**	**56**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Residential for Sale	**4,285**	**72**	**538**	**995**	**1,216**	**952**	**380**	**76**	**56**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
A2 SFD	123	-	40	48	35	-	-	-	-	-	-	-	-	-	-	-	-	-
A7 SFD	95	-	4	48	43	-	-	-	-	-	-	-	-	-	-	-	-	-
A8 Custom	73	-	12	36	25	-	-	-	-	-	-	-	-	-	-	-	-	-
SeniorsArea C (SFD)	212	-	16	48	48	48	48	4	-	-	-	-	-	-	-	-	-	-
A3a Duplex	80	24	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3b Towns-Flats	168	-	60	72	36	-	-	-	-	-	-	-	-	-	-	-	-	-
A4 Condo	264	-	24	72	72	72	24	-	-	-	-	-	-	-	-	-	-	-
A5 3/4 Plex Towns	153	-	60	72	21	-	-	-	-	-	-	-	-	-	-	-	-	-
A6 3 Story Towns	216	-	24	72	72	48	-	-	-	-	-	-	-	-	-	-	-	-
A9 Duplex	60	-	6	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A10 Duplex	80	-	48	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B1 Duplex	92	24	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B2 3 Story Town	186	24	72	72	18	-	-	-	-	-	-	-	-	-	-	-	-	-
B6 Towns/Flats	180	-	-	42	72	66	-	-	-	-	-	-	-	-	-	-	-	-
B7	230	-	-	42	72	72	44	-	-	-	-	-	-	-	-	-	-	-
Senior C6 Flats	440	-	24	72	72	72	72	72	56	-	-	-	-	-	-	-	-	-
Senior Area C Duplex	194	-	24	72	72	26	-	-	-	-	-	-	-	-	-	-	-	-
D2 Towns 2/3 Story	156	-	-	-	42	72	42	-	-	-	-	-	-	-	-	-	-	-
F2a Live/Work 3 Story	15	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F2b Condo 4/5 Story	242	-	-	-	80	96	66	-	-	-	-	-	-	-	-	-	-	-
F3a Live/Work 3 Story	15	-	-	6	9	-	-	-	-	-	-	-	-	-	-	-	-	-
F3b Condo 4/5 Story	217	-	-	-	80	96	41	-	-	-	-	-	-	-	-	-	-	-
F5a Condo 4/5 Story	140	-	-	-	56	84	-	-	-	-	-	-	-	-	-	-	-	-
F5b Condo 4/5 Story	171	-	-	-	32	96	43	-	-	-	-	-	-	-	-	-	-	-
F6a Condo 4 Story	76	-	-	-	32	44	-	-	-	-	-	-	-	-	-	-	-	-
F6b Condo 4 Story	81	-	-	-	21	60	-	-	-	-	-	-	-	-	-	-	-	-
F7 Condo 3 Story	138	-	-	56	82	-	-	-	-	-	-	-	-	-	-	-	-	-
F8a Condo 3/4 Story	74	-	-	32	42	-	-	-	-	-	-	-	-	-	-	-	-	-
F8b Condo 3/4 Story	114	-	-	32	82	-	-	-	-	-	-	-	-	-	-	-	-	-
Apartments	**1,046**	**-**	**170**	**-**	**610**	**266**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
B3 -Market Rate	170	-	170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D1 Low & Mod	314	-	-	-	175	139	-	-	-	-	-	-	-	-	-	-	-	-
F9 -Low	188	-	-	-	175	13	-	-	-	-	-	-	-	-	-	-	-	-
F4 -Market Rate	214	-	-	-	100	114	-	-	-	-	-	-	-	-	-	-	-	-
F1a -Market Rate	15	-	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-
F1b -Market Rate	145	-	-	-	145	-	-	-	-	-	-	-	-	-	-	-	-	-
ABSORPTION - SF	**1,299,000**	**-**	**-**	**-**	**113,650**	**134,250**	**263,780**	**196,830**	**196,830**	**196,830**	**196,830**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Commercial - Retail	**314,850**	**-**	**-**	**-**	**113,650**	**134,250**	**66,950**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
F10	97,650	-	-	-	97,650	-	-	-	-	-	-	-	-	-	-	-	-	-
F11	73,500	-	-	-	-	73,500	-	-	-	-	-	-	-	-	-	-	-	-
F5B/F6B	16,000	-	-	-	16,000	-	-	-	-	-	-	-	-	-	-	-	-	-
F14	121,500	-	-	-	-	60,750	60,750	-	-	-	-	-	-	-	-	-	-	-
E2	6,200	-	-	-	-	-	6,200	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**984,150**	**-**	**-**	**-**	**-**	**-**	**196,830**	**196,830**	**196,830**	**196,830**	**196,830**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
MISSION VILLAGE	**By 2031**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
CUM. POPULATION	**12,993**	**190**	**1,979**	**4,435**	**8,920**	**11,852**	**12,729**	**12,881**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**	**12,993**
Residential for Sale	**10,378**	**190**	**1,554**	**4,010**	**6,970**	**9,237**	**10,114**	**10,266**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**	**10,378**
A2 SFD	390	-	127	279	390	390	390	390	390	390	390	390	390	390	390	390	390	390
A7 SFD	301	-	13	165	301	301	301	301	301	301	301	301	301	301	301	301	301	301
A8 Custom	231	-	38	152	231	231	231	231	231	231	231	231	231	231	231	231	231	231
SeniorsArea C (SFD)	424	-	32	128	224	320	416	424	424	424	424	424	424	424	424	424	424	424
A3a Duplex	254	76	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254
A3b Towns-Flats	400	-	143	314	400	400	400	400	400	400	400	400	400	400	400	400	400	400
A4 Condo	837	-	76	304	533	761	837	837	837	837	837	837	837	837	837	837	837	837
A5 3/4 Plex Towns	364	-	143	314	364	364	364	364	364	364	364	364	364	364	364	364	364	364
A6 3 Story Towns	514	-	57	228	400	514	514	514	514	514	514	514	514	514	514	514	514	514
A9 Duplex	143	-	14	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143
A10 Duplex	190	-	114	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190
B1 Duplex	219	57	219	219	219	219	219	219	219	219	219	219	219	219	219	219	219	219
B2 3 Story Town	443	57	228	400	443	443	443	443	443	443	443	443	443	443	443	443	443	443
B6 Towns/Flats	428	-	-	100	271	428	428	428	428	428	428	428	428	428	428	428	428	428
B7	547	-	-	100	271	443	547	547	547	547	547	547	547	547	547	547	547	547
Senior C6 Flats	880	-	48	192	336	480	624	768	880	880	880	880	880	880	880	880	880	880
Senior Area C Duplex	388	-	48	192	336	388	388	388	388	388	388	388	388	388	388	388	388	388
D2 Towns 2/3 Story	371	-	-	-	100	271	371	371	371	371	371	371	371	371	371	371	371	371
F2a Live/Work 3 Story	36	-	-	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
F2b Condo 4/5 Story	576	-	-	-	190	419	576	576	576	576	576	576	576	576	576	576	576	576
F3a Live/Work 3 Story	36	-	-	14	36	36	36	36	36	36	36	36	36	36	36	36	36	36
F3b Condo 4/5 Story	516	-	-	-	190	419	516	516	516	516	516	516	516	516	516	516	516	516
F5a Condo 4/5 Story	333	-	-	-	133	333	333	333	333	333	333	333	333	333	333	333	333	333
F5b Condo 4/5 Story	407	-	-	-	76	305	407	407	407	407	407	407	407	407	407	407	407	407
F6a Condo 4 Story	181	-	-	-	76	181	181	181	181	181	181	181	181	181	181	181	181	181
F6b Condo 4 Story	193	-	-	-	50	193	193	193	193	193	193	193	193	193	193	193	193	193
F7 Condo 3 Story	328	-	-	133	328	328	328	328	328	328	328	328	328	328	328	328	328	328
F8a Condo 3/4 Story	176	-	-	76	176	176	176	176	176	176	176	176	176	176	176	176	176	176
F8b Condo 3/4 Story	271	-	-	76	271	271	271	271	271	271	271	271	271	271	271	271	271	271
Apartments	**2,615**	**-**	**425**	**425**	**1,950**	**2,615**	**2,615**	**2,615**	**2,615**	**2,615**	**2,615**	**2,615**	**2,615**	**2,615**	**2,615**	**2,615**	**2,615**	**2,615**
B3 -Market Rate	425	-	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
D1 Low & Mod	785	-	-	-	438	785	785	785	785	785	785	785	785	785	785	785	785	785
F9 -Low	470	-	-	-	438	470	470	470	470	470	470	470	470	470	470	470	470	470
F4 -Market Rate	535	-	-	-	250	535	535	535	535	535	535	535	535	535	535	535	535	535
F1a -Market Rate	38	-	-	-	38	38	38	38	38	38	38	38	38	38	38	38	38	38
F1b -Market Rate	363	-	-	-	363	363	363	363	363	363	363	363	363	363	363	363	363	363
CUM. EMPLOYEES	**4,724**	**-**	**-**	**-**	**284**	**620**	**1,574**	**2,362**	**3,149**	**3,936**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**	**4,724**
Commercial - Retail	**787**	**-**	**-**	**-**	**284**	**620**	**787**	**787**	**787**	**787**	**787**	**787**	**787**	**787**	**787**	**787**	**787**	**787**
F10	244	-	-	-	244	244	244	244	244	244	244	244	244	244	244	244	244	244
F11	184	-	-	-	-	184	184	184	184	184	184	184	184	184	184	184	184	184
F5B/F6B	40	-	-	-	40	40	40	40	40	40	40	40	40	40	40	40	40	40
F14	304	-	-	-	-	152	304	304	304	304	304	304	304	304	304	304	304	304
E2	16	-	-	-	-	-	16	16	16	16	16	16	16	16	16	16	16	16
Commercial - Office - E1	**3,937**	**-**	**-**	**-**	**-**	**-**	**787**	**1,575**	**2,362**	**3,149**	**3,937**	**3,937**	**3,937**	**3,937**	**3,937**	**3,937**	**3,937**	**3,937**

A-7.4 ...Continued

Product Level Cumulative Assessed Values, and Cumulative Retail Expenditure Estimates – by Community: MISSION VILLAGE

MISSION VILLAGE	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CUM. ASSESSED VALUE	**58,479,488**	**34,333**	**384,048**	**983,979**	**1,818,996**	**2,378,980**	**2,652,923**	**2,754,958**	**2,848,246**	**2,914,106**	**2,979,209**	**2,979,209**	**2,979,209**	**2,979,209**	**2,979,209**	**2,979,209**	**2,979,209**	**2,979,209**
Residential for Sale	**2,274,691,694**	**34,333,107**	**340,488,060**	**940,419,454**	**1,591,524,689**	**2,033,750,622**	**2,213,362,135**	**2,248,021,614**	**2,274,691,694**	**2,274,691,694**	**2,274,691,694**	**2,274,691,694**	**2,274,691,694**	**2,274,691,694**	**2,274,691,694**	**2,274,691,694**	**2,274,691,694**	**2,274,691,694**
A2 SFD	99,400,839	-	33,046,827	72,009,846	99,400,839	99,400,839	99,400,839	99,400,839	99,400,839	99,400,839	99,400,839	99,400,839	99,400,839	99,400,839	99,400,839	99,400,839	99,400,839	99,400,839
A7 SFD	99,636,998	-	4,241,510	55,061,138	99,636,998	99,636,998	99,636,998	99,636,998	99,636,998	99,636,998	99,636,998	99,636,998	99,636,998	99,636,998	99,636,998	99,636,998	99,636,998	99,636,998
A8 Custom	177,406,275	-	29,589,138	117,837,688	177,406,275	177,406,275	177,406,275	177,406,275	177,406,275	177,406,275	177,406,275	177,406,275	177,406,275	177,406,275	177,406,275	177,406,275	177,406,275	177,406,275
SeniorsArea C (SFD)	120,585,365	-	9,648,609	38,387,043	66,503,303	93,997,389	120,869,301	120,585,365	120,585,365	120,585,365	120,585,365	120,585,365	120,585,365	120,585,365	120,585,365	120,585,365	120,585,365	120,585,365
A3a Duplex	39,924,156	12,024,036	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156	39,924,156
A3b Towns-Flats	77,892,872	-	28,134,145	61,619,265	77,892,872	77,892,872	77,892,872	77,892,872	77,892,872	77,892,872	77,892,872	77,892,872	77,892,872	77,892,872	77,892,872	77,892,872	77,892,872	77,892,872
A4 Condo	108,732,649	-	10,054,929	40,134,644	69,959,145	99,528,433	108,732,649	108,732,649	108,732,649	108,732,649	108,732,649	108,732,649	108,732,649	108,732,649	108,732,649	108,732,649	108,732,649	108,732,649
A5 3/4 Plex Towns	75,363,096	-	29,952,538	65,578,123	75,363,096	75,363,096	75,363,096	75,363,096	75,363,096	75,363,096	75,363,096	75,363,096	75,363,096	75,363,096	75,363,096	75,363,096	75,363,096	75,363,096
A6 3 Story Towns	107,903,164	-	12,125,674	48,400,372	84,368,093	107,903,164	107,903,164	107,903,164	107,903,164	107,903,164	107,903,164	107,903,164	107,903,164	107,903,164	107,903,164	107,903,164	107,903,164	107,903,164
A9 Duplex	33,047,149	-	3,309,468	33,047,149	33,047,149	33,047,149	33,047,149	33,047,149	33,047,149	33,047,149	33,047,149	33,047,149	33,047,149	33,047,149	33,047,149	33,047,149	33,047,149	33,047,149
A10 Duplex	45,501,246	-	27,511,967	45,501,246	45,501,246	45,501,246	45,501,246	45,501,246	45,501,246	45,501,246	45,501,246	45,501,246	45,501,246	45,501,246	45,501,246	45,501,246	45,501,246	45,501,246
B1 Duplex	47,163,306	12,347,443	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306	47,163,306
B2 3 Story Town	75,926,159	9,961,628	39,740,141	69,199,539	75,926,159	75,926,159	75,926,159	75,926,159	75,926,159	75,926,159	75,926,159	75,926,159	75,926,159	75,926,159	75,926,159	75,926,159	75,926,159	75,926,159
B6 Towns/Flats	73,898,579	-	-	17,339,572	46,953,126	73,898,579	73,898,579	73,898,579	73,898,579	73,898,579	73,898,579	73,898,579	73,898,579	73,898,579	73,898,579	73,898,579	73,898,579	73,898,579
B7	115,847,662	-	-	21,250,580	57,615,726	93,870,438	115,847,662	115,847,662	115,847,662	115,847,662	115,847,662	115,847,662	115,847,662	115,847,662	115,847,662	115,847,662	115,847,662	115,847,662
Senior C6 Flats	215,997,466	-	12,021,713	48,000,567	83,720,561	119,181,696	154,383,971	189,327,386	215,997,466	215,997,466	215,997,466	215,997,466	215,997,466	215,997,466	215,997,466	215,997,466	215,997,466	215,997,466
Senior Area C Duplex	109,567,413	-	14,023,938	55,779,688	96,587,251	109,567,413	109,567,413	109,567,413	109,567,413	109,567,413	109,567,413	109,567,413	109,567,413	109,567,413	109,567,413	109,567,413	109,567,413	109,567,413
D2 Towns 2/3 Story	65,717,118	-	-	-	17,845,035	48,284,559	65,717,118	65,717,118	65,717,118	65,717,118	65,717,118	65,717,118	65,717,118	65,717,118	65,717,118	65,717,118	65,717,118	65,717,118
F2a Live/Work 3 Story	10,042,050	-	-	10,042,050	10,042,050	10,042,050	10,042,050	10,042,050	10,042,050	10,042,050	10,042,050	10,042,050	10,042,050	10,042,050	10,042,050	10,042,050	10,042,050	10,042,050
F2b Condo 4/5 Story	115,303,347	-	-	-	38,200,698	83,962,235	115,303,347	115,303,347	115,303,347	115,303,347	115,303,347	115,303,347	115,303,347	115,303,347	115,303,347	115,303,347	115,303,347	115,303,347
F3a Live/Work 3 Story	10,029,870	-	-	4,016,820	10,029,870	10,029,870	10,029,870	10,029,870	10,029,870	10,029,870	10,029,870	10,029,870	10,029,870	10,029,870	10,029,870	10,029,870	10,029,870	10,029,870
F3b Condo 4/5 Story	106,937,477	-	-	-	39,540,884	86,890,829	106,937,477	106,937,477	106,937,477	106,937,477	106,937,477	106,937,477	106,937,477	106,937,477	106,937,477	106,937,477	106,937,477	106,937,477
F5a Condo 4/5 Story	63,282,048	-	-	-	25,336,585	63,282,048	63,282,048	63,282,048	63,282,048	63,282,048	63,282,048	63,282,048	63,282,048	63,282,048	63,282,048	63,282,048	63,282,048	63,282,048
F5b Condo 4/5 Story	70,058,855	-	-	-	13,138,258	52,523,289	70,058,855	70,058,855	70,058,855	70,058,855	70,058,855	70,058,855	70,058,855	70,058,855	70,058,855	70,058,855	70,058,855	70,058,855
F6a Condo 4 Story	35,546,921	-	-	-	14,993,458	35,546,921	35,546,921	35,546,921	35,546,921	35,546,921	35,546,921	35,546,921	35,546,921	35,546,921	35,546,921	35,546,921	35,546,921	35,546,921
F6b Condo 4 Story	38,558,360	-	-	-	10,007,295	38,558,360	38,558,360	38,558,360	38,558,360	38,558,360	38,558,360	38,558,360	38,558,360	38,558,360	38,558,360	38,558,360	38,558,360	38,558,360
F7 Condo 3 Story	58,909,570	-	-	23,931,505	58,909,570	58,909,570	58,909,570	58,909,570	58,909,570	58,909,570	58,909,570	58,909,570	58,909,570	58,909,570	58,909,570	58,909,570	58,909,570	58,909,570
F8a Condo 3/4 Story	30,830,231	-	-	13,359,768	30,830,231	30,830,231	30,830,231	30,830,231	30,830,231	30,830,231	30,830,231	30,830,231	30,830,231	30,830,231	30,830,231	30,830,231	30,830,231	30,830,231
F8b Condo 3/4 Story	45,681,452	-	-	12,835,387	45,681,452	45,681,452	45,681,452	45,681,452	45,681,452	45,681,452	45,681,452	45,681,452	45,681,452	45,681,452	45,681,452	45,681,452	45,681,452	45,681,452
Apartments	**235,163,445**	**-**	**43,559,513**	**43,559,513**	**173,570,192**	**235,163,445**	**235,163,445**	**235,163,445**	**235,163,445**	**235,163,445**	**235,163,445**	**235,163,445**	**235,163,445**	**235,163,445**	**235,163,445**	**235,163,445**	**235,163,445**	**235,163,445**
B3 -Market Rate	43,559,513	-	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513	43,559,513
D1 Low & Mod	70,384,374	-	-	-	39,478,408	70,384,374	70,384,374	70,384,374	70,384,374	70,384,374	70,384,374	70,384,374	70,384,374	70,384,374	70,384,374	70,384,374	70,384,374	70,384,374
F9 -Low	25,221,219	-	-	-	23,708,868	25,221,219	25,221,219	25,221,219	25,221,219	25,221,219	25,221,219	25,221,219	25,221,219	25,221,219	25,221,219	25,221,219	25,221,219	25,221,219
F4 -Market Rate	54,891,800	-	-	-	25,716,865	54,891,800	54,891,800	54,891,800	54,891,800	54,891,800	54,891,800	54,891,800	54,891,800	54,891,800	54,891,800	54,891,800	54,891,800	54,891,800
F1a -Market Rate	3,848,423	-	-	-	3,848,423	3,848,423	3,848,423	3,848,423	3,848,423	3,848,423	3,848,423	3,848,423	3,848,423	3,848,423	3,848,423	3,848,423	3,848,423	3,848,423
F1b -Market Rate	37,258,115	-	-	-	37,258,115	37,258,115	37,258,115	37,258,115	37,258,115	37,258,115	37,258,115	37,258,115	37,258,115	37,258,115	37,258,115	37,258,115	37,258,115	37,258,115
Commercial - Retail	**136,264,100**	**-**	**-**	**-**	**53,901,511**	**110,065,437**	**136,264,100**	**136,264,100**	**136,264,100**	**136,264,100**	**136,264,100**	**136,264,100**	**136,264,100**	**136,264,100**	**136,264,100**	**136,264,100**	**136,264,100**	**136,264,100**
F10	44,193,779	-	-	-	44,193,779	44,193,779	44,193,779	44,193,779	44,193,779	44,193,779	44,193,779	44,193,779	44,193,779	44,193,779	44,193,779	44,193,779	44,193,779	44,193,779
F11	33,292,045	-	-	-	-	33,292,045	33,292,045	33,292,045	33,292,045	33,292,045	33,292,045	33,292,045	33,292,045	33,292,045	33,292,045	33,292,045	33,292,045	33,292,045
F5B/F6B	9,707,732	-	-	-	9,707,732	9,707,732	9,707,732	9,707,732	9,707,732	9,707,732	9,707,732	9,707,732	9,707,732	9,707,732	9,707,732	9,707,732	9,707,732	9,707,732
F14	45,513,528	-	-	-	-	22,871,880	45,513,528	45,513,528	45,513,528	45,513,528	45,513,528	45,513,528	45,513,528	45,513,528	45,513,528	45,513,528	45,513,528	45,513,528
E2	3,557,016	-	-	-	-	-	3,557,016	3,557,016	3,557,016	3,557,016	3,557,016	3,557,016	3,557,016	3,557,016	3,557,016	3,557,016	3,557,016	3,557,016
Commercial - Office - E1	**333,089,413**	**-**	**-**	**-**	**-**	**-**	**68,132,961**	**135,508,383**	**202,126,265**	**267,986,609**	**333,089,413**	**333,089,413**	**333,089,413**	**333,089,413**	**333,089,413**	**333,089,413**	**333,089,413**	**333,089,413**
MISSION VILLAGE	**By 2031**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
RETAIL EXPENDITURE	**47,394**	**614**	**6,600**	**15,870**	**30,382**	**40,308**	**44,201**	**45,367**	**46,361**	**46,878**	**47,394**	**47,394**	**47,394**	**47,394**	**47,394**	**47,394**	**47,394**	**47,394**
Residential for Sale	**38,089**	**614**	**5,481**	**14,751**	**25,605**	**33,697**	**36,963**	**37,613**	**38,089**	**38,089**	**38,089**	**38,089**	**38,089**	**38,089**	**38,089**	**38,089**	**38,089**	**38,089**
A2 SFD	1,118	-	363	800	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118
A7 SFD	1,029	-	43	563	1,029	1,029	1,029	1,029	1,029	1,029	1,029	1,029	1,029	1,029	1,029	1,029	1,029	1,029
A8 Custom	1,685	-	277	1,108	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
SeniorsArea C (SFD)	1,990	-	150	601	1,051	1,502	1,952	1,990	1,990	1,990	1,990	1,990	1,990	1,990	1,990	1,990	1,990	1,990
A3a Duplex	684	205	684	684	684	684	684	684	684	684	684	684	684	684	684	684	684	684
A3b Towns-Flats	1,419	-	507	1,115	1,419	1,419	1,419	1,419	1,419	1,419	1,419	1,419	1,419	1,419	1,419	1,419	1,419	1,419
A4 Condo	2,194	-	199	798	1,396	1,995	2,194	2,194	2,194	2,194	2,194	2,194	2,194	2,194	2,194	2,194	2,194	2,194
A5 3/4 Plex Towns	1,301	-	510	1,122	1,301	1,301	1,301	1,301	1,301	1,301	1,301	1,301	1,301	1,301	1,301	1,301	1,301	1,301
A6 3 Story Towns	1,854	-	206	824	1,442	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854
A9 Duplex	543	-	54	543	543	543	543	543	543	543	543	543	543	543	543	543	543	543
A10 Duplex	750	-	450	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
B1 Duplex	808	211	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808	808
B2 3 Story Town	1,535	198	792	1,387	1,535	1,535	1,535	1,535	1,535	1,535	1,535	1,535	1,535	1,535	1,535	1,535	1,535	1,535
B6 Towns/Flats	1,472	-	-	343	932	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472
B7	1,967	-	-	359	975	1,591	1,967	1,967	1,967	1,967	1,967	1,967	1,967	1,967	1,967	1,967	1,967	1,967
Senior C6 Flats	3,741	-	204	816	1,428	2,041	2,653	3,265	3,741	3,741	3,741	3,741	3,741	3,741	3,741	3,741	3,741	3,741
Senior Area C Duplex	1,871	-	231	926	1,620	1,871	1,871	1,871	1,871	1,871	1,871	1,871	1,871	1,871	1,871	1,871	1,871	1,871
D2 Towns 2/3 Story	1,314	-	-	-	354	961	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314
F2a Live/Work 3 Story	153	-	-	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153
F2b Condo 4/5 Story	2,065	-	-	-	683	1,502	2,065	2,065	2,065	2,065	2,065	2,065	2,065	2,065	2,065	2,065	2,065	2,065
F3a Live/Work 3 Story	153	-	-	61	153	153	153	153	153	153	153	153	153	153	153	153	153	153
F3b Condo 4/5 Story	1,916	-	-	-	706	1,554	1,916	1,916	1,916	1,916	1,916	1,916	1,916	1,916	1,916	1,916	1,916	1,916
F5a Condo 4/5 Story	1,134	-	-	-	454	1,134	1,134	1,134	1,134	1,134	1,134	1,134	1,134	1,134	1,134	1,134	1,134	1,134
F5b Condo 4/5 Story	1,385	-	-	-	259	1,037	1,385	1,385	1,385	1,385	1,385	1,385	1,385	1,385	1,385	1,385	1,385	1,385
F6a Condo 4 Story	638	-	-	-	269	638	638	638	638	638	638	638	638	638	638	638	638	638
F6b Condo 4 Story	691	-	-	-	179	691	691	691	691	691	691	691	691	691	691	691	691	691
F7 Condo 3 Story	1,163	-	-	472	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163
F8a Condo 3/4 Story	611	-	-	264	611	611	611	611	611	611	611	611	611	611	611	611	611	611
F8b Condo 3/4 Story	904	-	-	254	904	904	904	904	904	904	904	904	904	904	904	904	904	904
Apartments	**6,204**	**-**	**1,119**	**1,119**	**4,591**	**6,204**	**6,204**	**6,204**	**6,204**	**6,204**	**6,204**	**6,204**	**6,204**	**6,204**	**6,204**	**6,204**	**6,204**	**6,204**
B3 -Market Rate	1,119	-	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119
D1 Low & Mod	1,824	-	-	-	1,016	1,824	1,824	1,824	1,824	1,824	1,824	1,824	1,824	1,824	1,824	1,824	1,824	1,824
F9 -Low	800	-	-	-	744	800	800	800	800	800	800	800	800	800	800	800	800	800
F4 -Market Rate	1,409	-	-	-	658	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409
F1a -Market Rate	99	-	-	-	99	99	99	99	99	99	99	99	99	99	99	99	99	99
F1b -Market Rate	954	-	-	-	954	954	954	954	954	954	954	954	954	954	954	954	954	954
Commercial - Retail	**517**	**-**	**-**	**-**	**187**	**407**	**517**	**517**	**517**	**517**	**517**	**517**	**517**	**517**	**517**	**517**	**517**	**517**
F10	160	-	-	-	160	160	160	160	160	160	160	160	160	160	160	160	160	160
F11	121	-	-	-	-	121	121	121	121	121	121	121	121	121	121	121	121	121
F5B/F6B	26	-	-	-	26	26	26	26	26	26	26	26	26	26	26	26	26	26
F14	199	-	-	-	-	100	199	199	199	199	199	199	199	199	199	199	199	199
E2	10	-	-	-	-	-	10	10	10	10	10	10	10	10	10	10	10	10
Commercial - Office - E1	**2,585**	**-**	**-**	**-**	**-**	**-**	**517**	**1,034**	**1,551**	**2,068**	**2,585**	**2,585**	**2,585**	**2,585**	**2,585**	**2,585**	**2,585**	**2,585**

A-7.5

Product Level Absorption Schedule, and Cumulative Population & Employee Estimates – by Community: LEGACY

Use - Product	Total	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION - UNITS	**3,480**	**-**	**-**	**48**	**390**	**1,151**	**1,127**	**425**	**258**	**81**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Residential for Sale	**2,741**	**-**	**-**	**48**	**360**	**1,001**	**917**	**281**	**114**	**20**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
A1 - Triplex	108	-	-	-	42	66	-	-	-	-	-	-	-	-	-	-	-
A2 - 45x100	98	-	-	28	48	22	-	-	-	-	-	-	-	-	-	-	-
A3 - Triplex	45	-	-	-	-	42	3	-	-	-	-	-	-	-	-	-	-
A4 - 55x110	108	-	-	-	-	40	48	20	-	-	-	-	-	-	-	-	-
A5 Luxury Flats	300	-	-	-	42	72	72	72	42	-	-	-	-	-	-	-	-
A6 - 45x100	38	-	-	-	16	22	-	-	-	-	-	-	-	-	-	-	-
A7 - 60x110	92	-	-	-	16	48	28	-	-	-	-	-	-	-	-	-	-
A8 - 50x105	116	-	-	-	40	48	28	-	-	-	-	-	-	-	-	-	-
A9 - 50x105	138	-	-	16	48	48	26	-	-	-	-	-	-	-	-	-	-
A10 - 55x110	109	-	-	4	48	48	9	-	-	-	-	-	-	-	-	-	-
A11 - 60x110	98	-	-	-	4	48	46	-	-	-	-	-	-	-	-	-	-
A12 - 45x100	65	-	-	-	-	60	5	-	-	-	-	-	-	-	-	-	-
A13 - Duplex	44	-	-	-	44	-	-	-	-	-	-	-	-	-	-	-	-
B3 - Condos	72	-	-	-	-	60	12	-	-	-	-	-	-	-	-	-	-
B4 - Condos	88	-	-	-	-	60	28	-	-	-	-	-	-	-	-	-	-
B6 - Condos	278	-	-	-	-	42	72	72	72	20	-	-	-	-	-	-	-
B8 Temp School	13	-	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
B9 - Condos	74	-	-	-	-	24	50	-	-	-	-	-	-	-	-	-	-
B10 - Condos	74	-	-	-	-	6	68	-	-	-	-	-	-	-	-	-	-
B11 - Condos	104	-	-	-	6	72	26	-	-	-	-	-	-	-	-	-	-
B12 - Condos	160	-	-	-	6	72	72	10	-	-	-	-	-	-	-	-	-
C1a - 45x100	82	-	-	-	-	28	48	6	-	-	-	-	-	-	-	-	-
C1b - 45x100	82	-	-	-	-	16	48	18	-	-	-	-	-	-	-	-	-
C2a - 50x100	87	-	-	-	-	4	48	35	-	-	-	-	-	-	-	-	-
C2b - 45x100	52	-	-	-	-	16	36	-	-	-	-	-	-	-	-	-	-
C3 - 60x100	77	-	-	-	-	4	48	25	-	-	-	-	-	-	-	-	-
C4 - 60x100	68	-	-	-	-	4	48	16	-	-	-	-	-	-	-	-	-
D - SFR	71	-	-	-	-	16	48	7	-	-	-	-	-	-	-	-	-
Apartments	**739**	**-**	**-**	**-**	**30**	**150**	**210**	**144**	**144**	**61**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
B5 - Apts	144	-	-	-	6	72	66	-	-	-	-	-	-	-	-	-	-
B7 - Apts	323	-	-	-	24	72	72	72	72	11	-	-	-	-	-	-	-
C5 - Apts	272	-	-	-	-	6	72	72	72	50	-	-	-	-	-	-	-
ABSORPTION - SF	**486,000**	**-**	**-**	**-**	**-**	**328,000**	**158,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Commercial - Retail	**170,000**	**-**	**-**	**-**	**-**	**170,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Commercial - Office	**316,000**	**-**	**-**	**-**	**-**	**158,000**	**158,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
LEGACY	**By 2031**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
CUM. POPULATION	**10,144**	**-**	**-**	**152**	**1,267**	**4,673**	**8,046**	**9,240**	**9,928**	**10,144**	**10,144**	**10,144**	**10,144**	**10,144**	**10,144**	**10,144**	**10,144**
Residential for Sale	**8,296**	**-**	**-**	**152**	**1,192**	**4,223**	**7,071**	**7,905**	**8,233**	**8,296**	**8,296**	**8,296**	**8,296**	**8,296**	**8,296**	**8,296**	**8,296**
A1 - Triplex	257	-	-	-	100	257	257	257	257	257	257	257	257	257	257	257	257
A2 - 45x100	311	-	-	89	241	311	311	311	311	311	311	311	311	311	311	311	311
A3 - Triplex	107	-	-	-	-	100	107	107	107	107	107	107	107	107	107	107	107
A7 - 60x110	342	-	-	-	-	127	279	342	342	342	342	342	342	342	342	342	342
A8 - 50x105	714	-	-	-	100	271	443	614	714	714	714	714	714	714	714	714	714
A9 - 50x105	120	-	-	-	51	120	120	120	120	120	120	120	120	120	120	120	120
A10 - 55x110	292	-	-	-	51	203	292	292	292	292	292	292	292	292	292	292	292
A11 - 60x110	368	-	-	-	127	279	368	368	368	368	368	368	368	368	368	368	368
A12 - 45x100	437	-	-	51	203	355	437	437	437	437	437	437	437	437	437	437	437
A13 - Duplex	346	-	-	13	165	317	346	346	346	346	346	346	346	346	346	346	346
B3 - Condos	311	-	-	-	13	165	311	311	311	311	311	311	311	311	311	311	311
B4 - Condos	206	-	-	-	-	190	206	206	206	206	206	206	206	206	206	206	206
B5 - Apts	105	-	-	-	105	105	105	105	105	105	105	105	105	105	105	105	105
B6 - Condos	228	-	-	-	-	190	228	228	228	228	228	228	228	228	228	228	228
B7 - Apts	279	-	-	-	-	190	279	279	279	279	279	279	279	279	279	279	279
B8 Temp School	881	-	-	-	-	133	361	590	818	881	881	881	881	881	881	881	881
B9 - Condos	41	-	-	-	-	41	41	41	41	41	41	41	41	41	41	41	41
B10 - Condos	235	-	-	-	-	76	235	235	235	235	235	235	235	235	235	235	235
B11 - Condos	235	-	-	-	-	19	235	235	235	235	235	235	235	235	235	235	235
B12 - Condos	330	-	-	-	19	247	330	330	330	330	330	330	330	330	330	330	330
C1a - 45x100	507	-	-	-	19	247	476	507	507	507	507	507	507	507	507	507	507
C1b - 45x100	260	-	-	-	-	89	241	260	260	260	260	260	260	260	260	260	260
C2a - 50x100	260	-	-	-	-	51	203	260	260	260	260	260	260	260	260	260	260
C2b - 45x100	276	-	-	-	-	13	165	276	276	276	276	276	276	276	276	276	276
C3 - 60x100	165	-	-	-	-	51	165	165	165	165	165	165	165	165	165	165	165
C4 - 60x100	244	-	-	-	-	13	165	244	244	244	244	244	244	244	244	244	244
C5 - Apts	216	-	-	-	-	13	165	216	216	216	216	216	216	216	216	216	216
D - SFR	225	-	-	-	-	51	203	225	225	225	225	225	225	225	225	225	225
Apartments	**1,848**	**-**	**-**	**-**	**75**	**450**	**975**	**1,335**	**1,695**	**1,848**	**1,848**	**1,848**	**1,848**	**1,848**	**1,848**	**1,848**	**1,848**
B5 - Apts	360	-	-	-	15	195	360	360	360	360	360	360	360	360	360	360	360
B7 - Apts	808	-	-	-	60	240	420	600	780	808	808	808	808	808	808	808	808
C5 - Apts	680	-	-	-	-	15	195	375	555	680	680	680	680	680	680	680	680
CUM. EMPLOYEES	**1,689**	**-**	**-**	**-**	**-**	**1,057**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**	**1,689**
Commercial - Retail	**425**	**-**	**-**	**-**	**-**	**425**	**425**	**425**	**425**	**425**	**425**	**425**	**425**	**425**	**425**	**425**	**425**
Commercial - Office	**1,264**	**-**	**-**	**-**	**-**	**632**	**1,264**	**1,264**	**1,264**	**1,264**	**1,264**	**1,264**	**1,264**	**1,264**	**1,264**	**1,264**	**1,264**

A-7.5 …Continued

Product Level Cumulative Assessed Values, and Cumulative Retail Expenditure Estimates – by Community: LEGACY

LEGACY	By 2031	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CUM. ASSESSED VALUE	**31,888,553**	**-**	**-**	**26,329**	**227,528**	**911,977**	**1,528,853**	**1,717,930**	**1,809,313**	**1,833,330**	**1,833,330**	**1,833,330**	**1,833,330**	**1,833,330**	**1,833,330**	**1,833,330**	**1,833,330**
Residential for Sale	**1,470,778,862**	**-**	**-**	**26,329,309**	**220,214,884**	**742,157,233**	**1,256,393,954**	**1,407,971,886**	**1,462,268,836**	**1,470,778,862**	**1,470,778,862**	**1,470,778,862**	**1,470,778,862**	**1,470,778,862**	**1,470,778,862**	**1,470,778,862**	**1,470,778,862**
A1 - Triplex	47,703,727	-	-	-	18,684,323	47,703,727	47,703,727	47,703,727	47,703,727	47,703,727	47,703,727	47,703,727	47,703,727	47,703,727	47,703,727	47,703,727	47,703,727
A2 - 45x100	48,568,717	-	-	14,084,377	38,033,399	48,568,717	48,568,717	48,568,717	48,568,717	48,568,717	48,568,717	48,568,717	48,568,717	48,568,717	48,568,717	48,568,717	48,568,717
A3 - Triplex	19,667,071	-	-	-	-	18,679,413	19,667,071	19,667,071	19,667,071	19,667,071	19,667,071	19,667,071	19,667,071	19,667,071	19,667,071	19,667,071	19,667,071
A7 - 60x110	66,223,508	-	-	-	-	24,761,951	54,278,242	66,223,508	66,223,508	66,223,508	66,223,508	66,223,508	66,223,508	66,223,508	66,223,508	66,223,508	66,223,508
A8 - 50x105	150,504,577	-	-	-	21,303,547	57,707,460	93,911,739	129,916,385	150,504,577	150,504,577	150,504,577	150,504,577	150,504,577	150,504,577	150,504,577	150,504,577	150,504,577
A9 - 50x105	18,358,378	-	-	-	7,857,297	18,358,378	18,358,378	18,358,378	18,358,378	18,358,378	18,358,378	18,358,378	18,358,378	18,358,378	18,358,378	18,358,378	18,358,378
A10 - 55x110	61,827,591	-	-	-	10,826,753	43,221,763	61,827,591	61,827,591	61,827,591	61,827,591	61,827,591	61,827,591	61,827,591	61,827,591	61,827,591	61,827,591	61,827,591
A11 - 60x110	70,043,842	-	-	-	24,387,515	53,440,048	70,043,842	70,043,842	70,043,842	70,043,842	70,043,842	70,043,842	70,043,842	70,043,842	70,043,842	70,043,842	70,043,842
A12 - 45x100	83,396,464	-	-	9,768,556	39,002,779	68,022,670	83,396,464	83,396,464	83,396,464	83,396,464	83,396,464	83,396,464	83,396,464	83,396,464	83,396,464	83,396,464	83,396,464
A13 - Duplex	66,715,960	-	-	2,476,377	32,173,275	61,634,693	66,715,960	66,715,960	66,715,960	66,715,960	66,715,960	66,715,960	66,715,960	66,715,960	66,715,960	66,715,960	66,715,960
B3 - Condos	66,065,729	-	-	-	2,707,993	35,183,901	66,065,729	66,065,729	66,065,729	66,065,729	66,065,729	66,065,729	66,065,729	66,065,729	66,065,729	66,065,729	66,065,729
B4 - Condos	26,437,463	-	-	-	-	25,016,382	26,437,463	26,437,463	26,437,463	26,437,463	26,437,463	26,437,463	26,437,463	26,437,463	26,437,463	26,437,463	26,437,463
B5 - Apts	20,441,218	-	-	-	20,441,218	20,441,218	20,441,218	20,441,218	20,441,218	20,441,218	20,441,218	20,441,218	20,441,218	20,441,218	20,441,218	20,441,218	20,441,218
B6 - Condos	30,544,767	-	-	-	-	25,693,076	30,544,767	30,544,767	30,544,767	30,544,767	30,544,767	30,544,767	30,544,767	30,544,767	30,544,767	30,544,767	30,544,767
B7 - Apts	41,917,191	-	-	-	-	28,742,104	41,917,191	41,917,191	41,917,191	41,917,191	41,917,191	41,917,191	41,917,191	41,917,191	41,917,191	41,917,191	41,917,191
B8 Temp School	130,642,067	-	-	-	-	20,112,263	54,416,691	88,423,284	122,132,042	130,642,067	130,642,067	130,642,067	130,642,067	130,642,067	130,642,067	130,642,067	130,642,067
B9 - Condos	11,663,713	-	-	-	-	11,663,713	11,663,713	11,663,713	11,663,713	11,663,713	11,663,713	11,663,713	11,663,713	11,663,713	11,663,713	11,663,713	11,663,713
B10 - Condos	33,710,877	-	-	-	-	10,971,154	33,710,877	33,710,877	33,710,877	33,710,877	33,710,877	33,710,877	33,710,877	33,710,877	33,710,877	33,710,877	33,710,877
B11 - Condos	32,039,212	-	-	-	-	2,600,041	32,039,212	32,039,212	32,039,212	32,039,212	32,039,212	32,039,212	32,039,212	32,039,212	32,039,212	32,039,212	32,039,212
B12 - Condos	42,872,995	-	-	-	2,494,245	32,399,423	42,872,995	42,872,995	42,872,995	42,872,995	42,872,995	42,872,995	42,872,995	42,872,995	42,872,995	42,872,995	42,872,995
C1a - 45x100	60,642,174	-	-	-	2,302,541	29,913,570	57,291,088	60,642,174	60,642,174	60,642,174	60,642,174	60,642,174	60,642,174	60,642,174	60,642,174	60,642,174	60,642,174
C1b - 45x100	40,189,280	-	-	-	-	14,034,515	37,848,200	40,189,280	40,189,280	40,189,280	40,189,280	40,189,280	40,189,280	40,189,280	40,189,280	40,189,280	40,189,280
C2a - 50x100	40,399,696	-	-	-	-	8,019,723	31,938,615	40,399,696	40,399,696	40,399,696	40,399,696	40,399,696	40,399,696	40,399,696	40,399,696	40,399,696	40,399,696
C2b - 45x100	55,399,495	-	-	-	-	2,566,252	33,331,523	55,399,495	55,399,495	55,399,495	55,399,495	55,399,495	55,399,495	55,399,495	55,399,495	55,399,495	55,399,495
C3 - 60x100	25,579,875	-	-	-	-	7,938,794	25,579,875	25,579,875	25,579,875	25,579,875	25,579,875	25,579,875	25,579,875	25,579,875	25,579,875	25,579,875	25,579,875
C4 - 60x100	50,119,672	-	-	-	-	2,623,990	34,083,862	50,119,672	50,119,672	50,119,672	50,119,672	50,119,672	50,119,672	50,119,672	50,119,672	50,119,672	50,119,672
C5 - Apts	43,815,554	-	-	-	-	2,611,082	33,903,154	43,815,554	43,815,554	43,815,554	43,815,554	43,815,554	43,815,554	43,815,554	43,815,554	43,815,554	43,815,554
D - SFR	85,288,050	-	-	-	-	19,527,211	77,836,053	85,288,050	85,288,050	85,288,050	85,288,050	85,288,050	85,288,050	85,288,050	85,288,050	85,288,050	85,288,050
Apartments	**187,996,096**	**-**	**-**	**-**	**7,312,743**	**44,069,084**	**97,903,963**	**135,402,762**	**172,489,398**	**187,996,096**	**187,996,096**	**187,996,096**	**187,996,096**	**187,996,096**	**187,996,096**	**187,996,096**	**187,996,096**
B5 - Apts	34,938,035	-	-	-	1,463,669	19,014,122	34,938,035	34,938,035	34,938,035	34,938,035	34,938,035	34,938,035	34,938,035	34,938,035	34,938,035	34,938,035	34,938,035
B7 - Apts	76,622,597	-	-	-	5,849,074	23,336,406	40,644,064	57,772,048	74,720,358	76,622,597	76,622,597	76,622,597	76,622,597	76,622,597	76,622,597	76,622,597	76,622,597
C5 - Apts	76,435,463	-	-	-	-	1,718,557	22,321,864	42,692,680	62,831,005	76,435,463	76,435,463	76,435,463	76,435,463	76,435,463	76,435,463	76,435,463	76,435,463
Commercial - Retail	**76,463,437**	**-**	**-**	**-**	**-**	76,463,437	76,463,437	76,463,437	76,463,437	76,463,437	76,463,437	76,463,437	76,463,437	76,463,437	76,463,437	76,463,437	76,463,437
Commercial - Office	**98,091,763**	**-**	**-**	**-**	**-**	**49,287,254**	**98,091,763**	**98,091,763**	**98,091,763**	**98,091,763**	**98,091,763**	**98,091,763**	**98,091,763**	**98,091,763**	**98,091,763**	**98,091,763**	**98,091,763**

LEGACY	By 2031	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
RETAIL EXPENDITURE	**30,822**	**-**	**-**	**429**	**3,831**	**14,365**	**24,589**	**28,178**	**30,190**	**30,822**	**30,822**	**30,822**	**30,822**	**30,822**	**30,822**	**30,822**	**30,822**
Residential for Sale	**24,533**	**-**	**-**	**429**	**3,633**	**12,480**	**20,823**	**23,380**	**24,361**	**24,533**	**24,533**	**24,533**	**24,533**	**24,533**	**24,533**	**24,533**	**24,533**
A1 - Triplex	874	-	-	-	340	874	874	874	874	874	874	874	874	874	874	874	874
A2 - 45x100	842	-	-	241	653	842	842	842	842	842	842	842	842	842	842	842	842
A3 - Triplex	364	-	-	-	-	340	364	364	364	364	364	364	364	364	364	364	364
A7 - 60x110	1,027	-	-	-	-	380	836	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027
A8 - 50x105	2,578	-	-	-	361	980	1,598	2,217	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578
A9 - 50x105	327	-	-	-	137	327	327	327	327	327	327	327	327	327	327	327	327
A10 - 55x110	954	-	-	-	166	663	954	954	954	954	954	954	954	954	954	954	954
A11 - 60x110	1,087	-	-	-	375	825	1,087	1,087	1,087	1,087	1,087	1,087	1,087	1,087	1,087	1,087	1,087
A12 - 45x100	1,293	-	-	150	600	1,050	1,293	1,293	1,293	1,293	1,293	1,293	1,293	1,293	1,293	1,293	1,293
A13 - Duplex	1,036	-	-	38	494	951	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036
B3 - Condos	1,016	-	-	-	41	539	1,016	1,016	1,016	1,016	1,016	1,016	1,016	1,016	1,016	1,016	1,016
B4 - Condos	547	-	-	-	-	505	547	547	547	547	547	547	547	547	547	547	547
B5 - Apts	371	-	-	-	371	371	371	371	371	371	371	371	371	371	371	371	371
B6 - Condos	613	-	-	-	-	511	613	613	613	613	613	613	613	613	613	613	613
B7 - Apts	758	-	-	-	-	517	758	758	758	758	758	758	758	758	758	758	758
B8 Temp School	2,394	-	-	-	-	362	982	1,602	2,222	2,394	2,394	2,394	2,394	2,394	2,394	2,394	2,394
B9 - Condos	127	-	-	-	-	127	127	127	127	127	127	127	127	127	127	127	127
B10 - Condos	610	-	-	-	-	198	610	610	610	610	610	610	610	610	610	610	610
B11 - Condos	579	-	-	-	-	47	579	579	579	579	579	579	579	579	579	579	579
B12 - Condos	859	-	-	-	50	645	859	859	859	859	859	859	859	859	859	859	859
C1a - 45x100	1,221	-	-	-	46	595	1,145	1,221	1,221	1,221	1,221	1,221	1,221	1,221	1,221	1,221	1,221
C1b - 45x100	705	-	-	-	-	241	653	705	705	705	705	705	705	705	705	705	705
C2a - 50x100	705	-	-	-	-	137	550	705	705	705	705	705	705	705	705	705	705
C2b - 45x100	859	-	-	-	-	40	514	859	859	859	859	859	859	859	859	859	859
C3 - 60x100	447	-	-	-	-	137	447	447	447	447	447	447	447	447	447	447	447
C4 - 60x100	776	-	-	-	-	40	524	776	776	776	776	776	776	776	776	776	776
C5 - Apts	686	-	-	-	-	40	524	686	686	686	686	686	686	686	686	686	686
D - SFR	879	-	-	-	-	198	792	879	879	879	879	879	879	879	879	879	879
Apartments	**5,180**	**-**	**-**	**-**	**197**	**1,192**	**2,658**	**3,689**	**4,721**	**5,180**	**5,180**	**5,180**	**5,180**	**5,180**	**5,180**	**5,180**	**5,180**
B5 - Apts	948	-	-	-	39	513	948	948	948	948	948	948	948	948	948	948	948
B7 - Apts	2,126	-	-	-	158	632	1,106	1,580	2,054	2,126	2,126	2,126	2,126	2,126	2,126	2,126	2,126
C5 - Apts	2,106	-	-	-	-	46	604	1,162	1,719	2,106	2,106	2,106	2,106	2,106	2,106	2,106	2,106
Commercial - Retail	**279**	**-**	**-**	**-**	**-**	**279**	**279**	**279**	**279**	**279**	**279**	**279**	**279**	**279**	**279**	**279**	**279**
Commercial - Office	**830**	**-**	**-**	**-**	**-**	**415**	**830**	**830**	**830**	**830**	**830**	**830**	**830**	**830**	**830**	**830**	**830**

A-7.6
Product Level Absorption Schedule – by Community: LANDMARK

Use - Product	Total	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION - UNITS	**1,444**	**456**	**860**	**128**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Residential for Sale	**993**	**456**	**409**	**128**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Area D Alley	141	48	48	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area E Alley	141	48	48	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area F Alley / Traditional	114	48	48	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area G SFD	107	48	48	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area H SFD	87	48	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area A Condo	144	72	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area B Condo	153	72	72	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area C Condo	106	72	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Apartments	**451**	**-**	**451**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Market Rate	299	-	299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Affordable - 50%	152	-	152	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ABSORPTION - SF	**373,701**	**-**	**188,398**	**-**	**-**	**-**	**-**	**185,303**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Commercial - Retail	**94,199**	**-**	**94,199**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Lot 10	6,534	-	6,534	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lot 10	7,079	-	7,079	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lot 29	80,586	-	80,586	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**279,502**	**-**	**94,199**	**-**	**-**	**-**	**-**	**185,303**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Lot 15	94,199	-	94,199	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lot 30	185,303	-	-	-	-	-	-	185,303	-	-	-	-	-	-	-	-	-	-

Product Level Cumulative Population & Employee Estimates – by Community: LANDMARK

LANDMARK	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CUM. POPULATION	**4,275**	**1,446**	**3,870**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**	**4,275**
Residential for Sale	**3,148**	**1,446**	**2,742**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**	**3,148**
PA5 - SFD	447	152	304	447	447	447	447	447	447	447	447	447	447	447	447	447	447	447
PA6 - SFD	447	152	304	447	447	447	447	447	447	447	447	447	447	447	447	447	447	447
PA9 - Apt/Condo	361	152	304	361	361	361	361	361	361	361	361	361	361	361	361	361	361	361
PA10 - Apt/Condo	339	152	304	339	339	339	339	339	339	339	339	339	339	339	339	339	339	339
PA15a - Loft Over Retail	276	152	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276
PA15b - Condo on Podium	456	228	456	456	456	456	456	456	456	456	456	456	456	456	456	456	456	456
PA15c - Townhomes	485	228	456	485	485	485	485	485	485	485	485	485	485	485	485	485	485	485
PA15d - Tower Condos	336	228	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336
Apartments	**1,128**	**-**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**	**1,128**
PA1a - Apt	748	-	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748	748
PA15e - Apt	380	-	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380
CUM. EMPLOYEES	**1,354**	**-**	**612**	**612**	**612**	**612**	**612**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**	**1,354**
Commercial - Retail	**235**	**-**	**235**	**235**	**235**	**235**	**235**	**235**	**235**	**235**	**235**	**235**	**235**	**235**	**235**	**235**	**235**	**235**
PA14	16	-	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
PA1b	18	-	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
PA15f	201	-	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201
Commercial - Office	**1,118**	**-**	**377**	**377**	**377**	**377**	**377**	**1,118**	**1,118**	**1,118**	**1,118**	**1,118**	**1,118**	**1,118**	**1,118**	**1,118**	**1,118**	**1,118**
PA1b - Lots 2-7	377	-	377	377	377	377	377	377	377	377	377	377	377	377	377	377	377	377
PA15g	741	-	-	-	-	-	-	741	741	741	741	741	741	741	741	741	741	741

A-7.6 …Continued
Product Level Cumulative Assessed Values – by Community: LANDMARK

LANDMARK	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ASSESSED VALUE	**17,713,960**	**266,137**	**677,126**	**754,931**	**754,931**	**754,931**	**754,931**	**808,881**	**808,881**	**808,881**	**808,881**	**808,881**	**808,881**	**808,881**	**808,881**	**808,881**	**808,881**	**808,881**
Residential for Sale	**582,767,532**	**266,137,227**	**504,962,829**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**	**582,767,532**
PA5 - SFD	79,413,266	27,053,350	54,088,050	79,413,266	79,413,266	79,413,266	79,413,266	79,413,266	79,413,266	79,413,266	79,413,266	79,413,266	79,413,266	79,413,266	79,413,266	79,413,266	79,413,266	79,413,266
PA6 - SFD	87,722,406	29,883,689	59,747,068	87,722,406	87,722,406	87,722,406	87,722,406	87,722,406	87,722,406	87,722,406	87,722,406	87,722,406	87,722,406	87,722,406	87,722,406	87,722,406	87,722,406	87,722,406
PA9 - Apt/Condo	76,706,920	32,327,985	64,631,955	76,706,920	76,706,920	76,706,920	76,706,920	76,706,920	76,706,920	76,706,920	76,706,920	76,706,920	76,706,920	76,706,920	76,706,920	76,706,920	76,706,920	76,706,920
PA10 - Apt/Condo	80,632,722	36,210,879	72,392,637	80,632,722	80,632,722	80,632,722	80,632,722	80,632,722	80,632,722	80,632,722	80,632,722	80,632,722	80,632,722	80,632,722	80,632,722	80,632,722	80,632,722	80,632,722
PA15a - Loft Over Retail	70,890,687	39,131,978	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687	70,890,687
PA15b - Condo on Podium	60,431,595	30,223,865	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595	60,431,595
PA15c - Townhomes	71,811,358	33,820,753	67,622,258	71,811,358	71,811,358	71,811,358	71,811,358	71,811,358	71,811,358	71,811,358	71,811,358	71,811,358	71,811,358	71,811,358	71,811,358	71,811,358	71,811,358	71,811,358
PA15d - Tower Condos	55,158,578	37,484,728	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578	55,158,578
Apartments	**110,960,590**	**-**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**	**110,960,590**
PA1a - Apt	73,563,382	-	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382	73,563,382
PA15e - Apt	37,397,208	-	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208	37,397,208
Commercial - Retail	**33,760,514**	**-**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**	**33,760,514**
PA14	2,979,461	-	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461	2,979,461
PA1b	3,227,978	-	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978	3,227,978
PA15f	27,553,075	-	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075	27,553,075
Commercial - Office	**81,392,149**	**-**	**27,442,251**	**27,442,251**	**27,442,251**	**27,442,251**	**27,442,251**	**81,392,149**	**81,392,149**	**81,392,149**	**81,392,149**	**81,392,149**	**81,392,149**	**81,392,149**	**81,392,149**	**81,392,149**	**81,392,149**	**81,392,149**
PA1b - Lots 2-7	27,442,251	-	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251	27,442,251
PA15g	53,949,898	-	-	-	-	-	-	53,949,898	53,949,898	53,949,898	53,949,898	53,949,898	53,949,898	53,949,898	53,949,898	53,949,898	53,949,898	53,949,898

Product Level Cumulative Retail Expenditure Estimates – by Community: LANDMARK

LANDMARK	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
RETAIL EXPENDITURE	**12,970**	**4,155**	**11,268**	**12,484**	**12,484**	**12,484**	**12,484**	**12,970**	**12,970**	**12,970**	**12,970**	**12,970**	**12,970**	**12,970**	**12,970**	**12,970**	**12,970**	**12,970**
Residential for Sale	**9,113**	**4,155**	**7,897**	**9,113**	**9,113**	**9,113**	**9,113**	**9,113**	**9,113**	**9,113**	**9,113**	**9,113**	**9,113**	**9,113**	**9,113**	**9,113**	**9,113**	**9,113**
PA5 - SFD	1,285	438	875	1,285	1,285	1,285	1,285	1,285	1,285	1,285	1,285	1,285	1,285	1,285	1,285	1,285	1,285	1,285
PA6 - SFD	1,338	456	911	1,338	1,338	1,338	1,338	1,338	1,338	1,338	1,338	1,338	1,338	1,338	1,338	1,338	1,338	1,338
PA9 - Apt/Condo	1,168	492	984	1,168	1,168	1,168	1,168	1,168	1,168	1,168	1,168	1,168	1,168	1,168	1,168	1,168	1,168	1,168
PA10 - Apt/Condo	1,153	517	1,035	1,153	1,153	1,153	1,153	1,153	1,153	1,153	1,153	1,153	1,153	1,153	1,153	1,153	1,153	1,153
PA15a - Loft Over Retail	765	422	765	765	765	765	765	765	765	765	765	765	765	765	765	765	765	765
PA15b - Condo on Podium	1,190	595	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190
PA15c - Townhomes	1,283	604	1,208	1,283	1,283	1,283	1,283	1,283	1,283	1,283	1,283	1,283	1,283	1,283	1,283	1,283	1,283	1,283
PA15d - Tower Condos	930	632	930	930	930	930	930	930	930	930	930	930	930	930	930	930	930	930
Apartments	**2,969**	**-**	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969	2,969
PA1a - Apt	1,968	-	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968
PA15e - Apt	1,000	-	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Commercial - Retail	**155**	**-**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**
PA14	11	-	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
PA1b	12	-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
PA15f	132	-	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132
Commercial - Office	**734**	**-**	**247**	**247**	**247**	**247**	**247**	**734**	**734**	**734**	**734**	**734**	**734**	**734**	**734**	**734**	**734**	**734**
PA1b - Lots 2-7	247	-	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247
PA15g	487	-	-	-	-	-	-	487	487	487	487	487	487	487	487	487	487	487

A-7.7
Product Level Absorption Schedule – by Community: COMMERCE CENTER

Use - Product	Total	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ABSORPTION - SF	**3,200,002**	**-**	**228,572**	**754,287**	**754,286**	**1,142,858**	**320,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Commercial - Retail	**300,715**	**-**	**-**	**143,751**	**156,965**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Phase 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 2	91,429	-	-	91,429	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 3	209,286	-	-	52,322	156,965	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**1,159,795**	**-**	**91,429**	**285,378**	**197,846**	**457,144**	**128,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Phase 1	182,857	-	91,429	91,429	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 2	164,572	-	-	164,572	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 3	117,508	-	-	29,377	88,131	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 4	219,429	-	-	-	109,715	109,715	-	-	-	-	-	-	-	-	-	-	-	-
Phase 5	219,429	-	-	-	-	219,429	-	-	-	-	-	-	-	-	-	-	-	-
Phase 6	256,000	-	-	-	-	128,000	128,000	-	-	-	-	-	-	-	-	-	-	-
Industrial R&D	**1,739,492**	**-**	**137,143**	**325,159**	**399,476**	**685,715**	**192,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Phase 1	274,286	-	137,143	137,143	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 2	109,714	-	-	109,714	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 3	313,206	-	-	78,302	234,905	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 4	329,143	-	-	-	164,572	164,572	-	-	-	-	-	-	-	-	-	-	-	-
Phase 5	329,143	-	-	-	-	329,143	-	-	-	-	-	-	-	-	-	-	-	-
Phase 6	384,000	-	-	-	-	192,000	192,000	-	-	-	-	-	-	-	-	-	-	-

Product Level Cumulative Population & Employee Estimates – by Community: COMMERCE CENTER

Use - Product	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CUM. POPULATION	**1,300**	**-**	**640**	**2,791**	**4,774**	**7,974**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**	**8,870**
Commercial - Retail	**752**	**-**	**-**	**359**	**752**	**752**	**752**	**752**	**752**	**752**	**752**	**752**	**752**	**752**	**752**	**752**	**752**	**752**
Phase 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 2	229	-	-	229	229	229	229	229	229	229	229	229	229	229	229	229	229	229
Phase 3	523	-	-	131	523	523	523	523	523	523	523	523	523	523	523	523	523	523
Phase 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**4,639**	**-**	**366**	**1,507**	**2,299**	**4,127**	**4,639**	**4,639**	**4,639**	**4,639**	**4,639**	**4,639**	**4,639**	**4,639**	**4,639**	**4,639**	**4,639**	**4,639**
Phase 1	731	-	366	731	731	731	731	731	731	731	731	731	731	731	731	731	731	731
Phase 2	658	-	-	658	658	658	658	658	658	658	658	658	658	658	658	658	658	658
Phase 3	470	-	-	118	470	470	470	470	470	470	470	470	470	470	470	470	470	470
Phase 4	878	-	-	-	439	878	878	878	878	878	878	878	878	878	878	878	878	878
Phase 5	878	-	-	-	-	878	878	878	878	878	878	878	878	878	878	878	878	878
Phase 6	1,024	-	-	-	-	512	1,024	1,024	1,024	1,024	1,024	1,024	1,024	1,024	1,024	1,024	1,024	1,024
Industrial R&D	**3,479**	**-**	**274**	**925**	**1,724**	**3,095**	**3,479**	**3,479**	**3,479**	**3,479**	**3,479**	**3,479**	**3,479**	**3,479**	**3,479**	**3,479**	**3,479**	**3,479**
Phase 1	549	-	274	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549
Phase 2	219	-	-	219	219	219	219	219	219	219	219	219	219	219	219	219	219	219
Phase 3	626	-	-	157	626	626	626	626	626	626	626	626	626	626	626	626	626	626
Phase 4	658	-	-	-	329	658	658	658	658	658	658	658	658	658	658	658	658	658
Phase 5	658	-	-	-	-	658	658	658	658	658	658	658	658	658	658	658	658	658
Phase 6	768	-	-	-	-	384	768	768	768	768	768	768	768	768	768	768	768	768

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Product Level Cumulative Assessed Values – by Community: COMMERCE CENTER

Use - Product	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ASSESSED VALUE	**893,430**	**-**	**58,308**	**293,016**	**522,983**	**813,266**	**893,430**	**893,430**	**893,430**	**893,430**	**893,430**	**893,430**	**893,430**	**893,430**	**893,430**	**893,430**	**893,430**	**893,430**
Commercial - Retail	**158,116,331**	-	-	**75,724,658**	###########	###########	**158,116,331**	**158,116,331**	**158,116,331**	**158,116,331**	**158,116,331**	**158,116,331**	**158,116,331**	**158,116,331**	**158,116,331**	**158,116,331**	**158,116,331**	**158,116,331**
Phase 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 2	48,162,822	-	-	48,162,822	48,162,822	48,162,822	48,162,822	48,162,822	48,162,822	48,162,822	48,162,822	48,162,822	48,162,822	48,162,822	48,162,822	48,162,822	48,162,822	48,162,822
Phase 3	109,953,508	-	-	27,561,836	109,953,508	109,953,508	109,953,508	109,953,508	109,953,508	109,953,508	109,953,508	109,953,508	109,953,508	109,953,508	109,953,508	109,953,508	109,953,508	109,953,508
Phase 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**367,126,926**	**-**	**29,033,792**	**119,357,998**	**182,089,053**	**326,898,910**	**367,126,926**	**367,126,926**	**367,126,926**	**367,126,926**	**367,126,926**	**367,126,926**	**367,126,926**	**367,126,926**	**367,126,926**	**367,126,926**	**367,126,926**	**367,126,926**
Phase 1	57,768,067	-	29,033,792	57,768,067	57,768,067	57,768,067	57,768,067	57,768,067	57,768,067	57,768,067	57,768,067	57,768,067	57,768,067	57,768,067	57,768,067	57,768,067	57,768,067	57,768,067
Phase 2	52,261,049	-	-	52,261,049	52,261,049	52,261,049	52,261,049	52,261,049	52,261,049	52,261,049	52,261,049	52,261,049	52,261,049	52,261,049	52,261,049	52,261,049	52,261,049	52,261,049
Phase 3	37,219,291	-	-	9,328,882	37,219,291	37,219,291	37,219,291	37,219,291	37,219,291	37,219,291	37,219,291	37,219,291	37,219,291	37,219,291	37,219,291	37,219,291	37,219,291	37,219,291
Phase 4	69,321,870	-	-	-	34,840,646	69,321,870	69,321,870	69,321,870	69,321,870	69,321,870	69,321,870	69,321,870	69,321,870	69,321,870	69,321,870	69,321,870	69,321,870	69,321,870
Phase 5	69,681,292	-	-	-	-	69,681,292	69,681,292	69,681,292	69,681,292	69,681,292	69,681,292	69,681,292	69,681,292	69,681,292	69,681,292	69,681,292	69,681,292	69,681,292
Phase 6	80,875,357	-	-	-	-	40,647,341	80,875,357	80,875,357	80,875,357	80,875,357	80,875,357	80,875,357	80,875,357	80,875,357	80,875,357	80,875,357	80,875,357	80,875,357
Industrial R&D	**368,186,950**	**-**	**29,274,401**	**97,933,597**	**182,777,802**	**328,251,145**	**368,186,950**	**368,186,950**	**368,186,950**	**368,186,950**	**368,186,950**	**368,186,950**	**368,186,950**	**368,186,950**	**368,186,950**	**368,186,950**	**368,186,950**	**368,186,950**
Phase 1	57,800,006	-	29,274,401	57,800,006	57,800,006	57,800,006	57,800,006	57,800,006	57,800,006	57,800,006	57,800,006	57,800,006	57,800,006	57,800,006	57,800,006	57,800,006	57,800,006	57,800,006
Phase 2	23,419,435	-	-	23,419,435	23,419,435	23,419,435	23,419,435	23,419,435	23,419,435	23,419,435	23,419,435	23,419,435	23,419,435	23,419,435	23,419,435	23,419,435	23,419,435	23,419,435
Phase 3	66,429,101	-	-	16,714,156	66,429,101	66,429,101	66,429,101	66,429,101	66,429,101	66,429,101	66,429,101	66,429,101	66,429,101	66,429,101	66,429,101	66,429,101	66,429,101	66,429,101
Phase 4	69,359,965	-	-	-	35,129,260	69,359,965	69,359,965	69,359,965	69,359,965	69,359,965	69,359,965	69,359,965	69,359,965	69,359,965	69,359,965	69,359,965	69,359,965	69,359,965
Phase 5	70,258,520	-	-	-	-	70,258,520	70,258,520	70,258,520	70,258,520	70,258,520	70,258,520	70,258,520	70,258,520	70,258,520	70,258,520	70,258,520	70,258,520	70,258,520
Phase 6	80,919,924	-	-	-	-	40,984,119	80,919,924	80,919,924	80,919,924	80,919,924	80,919,924	80,919,924	80,919,924	80,919,924	80,919,924	80,919,924	80,919,924	80,919,924

Product Level Cumulative Retail Expenditure Estimates – by Community: COMMERCE CENTER

Use - Product	By 2031	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
RETAIL EXP.	**5,824**	**-**	**420**	**1,833**	**3,135**	**5,236**	**5,824**	**5,824**	**5,824**	**5,824**	**5,824**	**5,824**	**5,824**	**5,824**	**5,824**	**5,824**	**5,824**	**5,824**
Commercial - Retail	**494**	-	-	**236**	**494**	**494**	**494**	**494**	**494**	**494**	**494**	**494**	**494**	**494**	**494**	**494**	**494**	**494**
Phase 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 2	150	-	-	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Phase 3	344	-	-	86	344	344	344	344	344	344	344	344	344	344	344	344	344	344
Phase 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phase 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commercial - Office	**3,046**	**-**	**240**	**990**	**1,509**	**2,710**	**3,046**	**3,046**	**3,046**	**3,046**	**3,046**	**3,046**	**3,046**	**3,046**	**3,046**	**3,046**	**3,046**	**3,046**
Phase 1	480	-	240	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480
Phase 2	432	-	-	432	432	432	432	432	432	432	432	432	432	432	432	432	432	432
Phase 3	309	-	-	77	309	309	309	309	309	309	309	309	309	309	309	309	309	309
Phase 4	576	-	-	-	288	576	576	576	576	576	576	576	576	576	576	576	576	576
Phase 5	576	-	-	-	-	576	576	576	576	576	576	576	576	576	576	576	576	576
Phase 6	672	-	-	-	-	336	672	672	672	672	672	672	672	672	672	672	672	672
Industrial R&D	**2,284**	**-**	**180**	**607**	**1,132**	**2,032**	**2,284**	**2,284**	**2,284**	**2,284**	**2,284**	**2,284**	**2,284**	**2,284**	**2,284**	**2,284**	**2,284**	**2,284**
Phase 1	360	-	180	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360
Phase 2	144	-	-	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144
Phase 3	411	-	-	103	411	411	411	411	411	411	411	411	411	411	411	411	411	411
Phase 4	432	-	-	-	216	432	432	432	432	432	432	432	432	432	432	432	432	432
Phase 5	432	-	-	-	-	432	432	432	432	432	432	432	432	432	432	432	432	432
Phase 6	504	-	-	-	-	252	504	504	504	504	504	504	504	504	504	504	504	504

ADK&A
Allan D. Kotin & Associates

CBRE
CB RICHARD ELLIS

A-8.1
Product Level Taxable Retail Expenditure spent per household in Unincorporated Los Angeles County outside Project Area – by Community: ENTRADA

Use Product	Unit Price	Interest (%)	Term (Years)	Down Payment (% of Price)	Insurance ($/Yr.)	Mortgage ($/Yr.)	Property Tax ($/Yr.)	Housing Exp. ($/Yr.)	Housing Share	Imputed HH Income ($/Yr.)	Retail Exp./HH Less Auto Sales (% of HH Income)	Taxable Sale	In Uninc. LA County % of Sales (%)	In Uninc. LA County Amount ($/Yr.)
Residential for Sale														
PA5 - SFD	662,667	6.50%	30	35%	975	32,984	6,627	40,586	30.0%	135,287	25.8%	88.0%	32.8%	10,079
PA6 - SFD	739,000	6.50%	30	35%	975	36,784	7,390	45,149	30.0%	150,497	19.3%	90.1%	32.5%	8,486
PA7 - SFD	548,000	6.50%	30	30%	830	29,375	5,480	35,685	30.0%	118,950	27.4%	87.5%	32.4%	9,217
PA4 - SFA	583,750	6.50%	30	30%	830	31,291	5,838	37,959	30.0%	126,530	25.8%	88.0%	32.8%	9,427
PA8 - SFA	533,667	6.50%	30	30%	830	28,607	5,337	34,773	30.0%	115,912	27.4%	87.5%	32.4%	8,982
PA13 - SFA	497,750	6.50%	30	25%	775	28,587	4,978	34,340	30.0%	114,466	27.4%	87.5%	32.4%	8,870
PA12 - SFA	454,000	6.50%	30	25%	775	26,075	4,540	31,390	30.0%	104,632	27.4%	87.5%	32.4%	8,108
PA11 - SFA	421,000	6.50%	30	25%	775	24,179	4,210	29,164	30.0%	97,214	28.6%	88.1%	33.8%	8,282
PA9 - Apt/Condo	407,000	6.50%	30	25%	775	23,375	4,070	28,220	30.0%	94,068	28.6%	88.1%	33.8%	8,014
PA10 - Apt/Condo	420,000	6.50%	30	25%	775	24,122	4,200	29,097	30.0%	96,990	28.6%	88.1%	33.8%	8,263
PA15a - Loft Over Retail	471,000	6.50%	30	25%	775	27,051	4,710	32,536	30.0%	108,453	27.4%	87.5%	32.4%	8,404
PA15b - Condo on Podiun	420,000	6.50%	30	25%	775	24,122	4,200	29,097	30.0%	96,990	28.6%	88.1%	33.8%	8,263
PA15c - Townhomes	491,000	6.50%	30	25%	775	28,200	4,910	33,885	30.0%	112,949	27.4%	87.5%	32.4%	8,752
PA15d - Tower Condos	583,000	6.50%	30	30%	830	31,251	5,830	37,911	30.0%	126,371	25.8%	88.0%	32.8%	9,415

OTHER USES:-

Apartment Use:
Summary table below give retail expenditure methodology per household for the three rent levels of apartment units across all the communities:-

Rent	As % of Income	Imputed Income	Retail Exp. per HH in %	Taxable Sales %	Per Capita Expenditure In Uninc. LA County % Out NR	% In NR	$ Out NR	$ In NR
1,700	30.0%	68,000	36.1%	87.2%	30.7%	15.3%	**6,582**	3,278
1,500	30.0%	60,000	36.1%	87.2%	30.7%	15.3%	**5,808**	2,893
900	30.0%	36,000	45.6%	85.3%	30.4%	16.3%	**4,253**	2,288

Non-Residential Uses:
Summary table below give retail expenditure methodology per employee working in Commercial & Industrial uses in Newhall Ranch communities:-

Retail Exp./Emp.	Taxable Sales %	Per Capita Expenditure In Uninc. LA County Outside NR	In NR	$ Ouside NR	$ in NR
$3,000	87.5%	25.0%	60.0%	**$ 657**	1,576

ASSUMPTIONS:-

Household Income	Retail Exp.	Taxable Sales	In Uninc. LA County Outside Project Area	In Project Area's New Retail Space
$30,000 to $39,999	45.6%	85.3%	30.4%	16.3%
$40,000 to $49,999	40.0%	86.2%	30.3%	15.9%
$50,000 to $69,999	36.1%	87.2%	30.7%	15.3%
$70,000 to $79,999	32.9%	87.5%	30.2%	15.2%
$80,000 to $99,999	28.6%	88.1%	33.8%	15.3%
$100,000 to $119,999	27.4%	87.5%	32.4%	15.8%
$120,000 to $149,999	25.8%	88.0%	32.8%	15.4%
$150,000 and More	19.3%	90.1%	32.5%	14.1%

Unit Price	% Down Payment	Insurance
Less than $500,000	25%	$775
$500,000 to $600,000	30%	$830
$600,000 to $750,000	35%	$975
$750,000 to $1,00,000	40%	$1,160
$1,000,000 to $2,000,000	45%	$1,360
$2,000,000 and More	50%	$1,650

Interest: Per California Association of Realtors, for January, 2006
Tax: 1% of the Property Value
Homeowner Insurance: Per California Department of Insurance (http://cdinswww.insurance.ca.gov/pls/wu_survey_homeowners/hpsw_get_prem$.startup)
Retail Expenditure per HH: Per Consumer Expenditure Survey (CES), 2004, for respective income brackets. Excluding Housing, Auto Sales, Health Care, Educational, and Other Services.
Taxable Retail Expenses: Assumes 70% of Food Stores expenses, and 30% of Drug Store expensese to be non-taxable. Percentage based on the share of each categories in respective income bracket.
% Spent in Uninc. LA County: Based on primary survey of resident consumers in the immediate site context, and CES.

A-8.2
Product Level Taxable Retail Expenditure spent per household in Unincorporated Los Angeles County outside Project Area – by Community: HOMESTEAD

Use Product	Unit Price	Interest (%)	Term (Years)	Down Payment (% of Price)	Insurance ($/Yr.)	Mortgage ($/Yr.)	Property Tax ($/Yr.)	Housing Exp. ($/Yr.)	Housing Share	Imputed HH Income ($/Yr.)	Retail Exp./HH Less Auto Sales (% of HH Income)	Taxable Sale	In Uninc. LA County % of Sales (%)	In Uninc. LA County Amount ($/Yr.)
Residential for Sale														
Chiquito Det. Condos	458,000	6.50%	30	25%	775	26,304	4,580	31,659	30.0%	105,531	27.4%	87.5%	32.4%	8,177
Chiquito Customs	2,500,000	6.50%	30	50%	1,650	95,722	25,000	122,372	30.0%	407,906	19.3%	90.1%	32.5%	23,000
HS Central SFD	880,000	6.50%	30	40%	1,160	40,433	8,800	50,393	30.0%	167,976	19.3%	90.1%	32.5%	9,471
HS Central Customs	2,500,000	6.50%	30	50%	1,650	95,722	25,000	122,372	30.0%	407,906	19.3%	90.1%	32.5%	23,000
HS West HW-2	637,000	6.50%	30	35%	975	31,707	6,370	39,052	30.0%	130,173	25.8%	88.0%	32.8%	9,698
HS West Custom	2,500,000	6.50%	30	50%	1,650	95,722	25,000	122,372	30.0%	407,906	19.3%	90.1%	32.5%	23,000
HS West Green Court HW	510,000	6.50%	30	30%	830	27,338	5,100	33,268	30.0%	110,894	27.4%	87.5%	32.4%	8,593
Long Canyon SFD 75	947,000	6.50%	30	40%	1,160	43,511	9,470	54,141	30.0%	180,471	19.3%	90.1%	32.5%	10,176
Long Canyon SFD 80	1,049,000	6.50%	30	45%	1,360	44,181	10,490	56,031	30.0%	186,771	19.3%	90.1%	32.5%	10,531
Long Canyon SFD 50	913,000	6.50%	30	40%	1,160	41,949	9,130	52,239	30.0%	174,130	19.3%	90.1%	32.5%	9,818
LCS - 3 SFD5500	913,000	6.50%	30	40%	1,160	41,949	9,130	52,239	30.0%	174,130	19.3%	90.1%	32.5%	9,818
LCS -4 SFD6500	925,000	6.50%	30	40%	1,160	42,500	9,250	52,910	30.0%	176,368	19.3%	90.1%	32.5%	9,944
Onion Fields SFD 55	880,000	6.50%	30	40%	1,160	40,433	8,800	50,393	30.0%	167,976	19.3%	90.1%	32.5%	9,471
Onion Fields SFD 50x90	846,000	6.50%	30	40%	1,160	38,871	8,460	48,491	30.0%	161,636	19.3%	90.1%	32.5%	9,114
Onion Field SFD 35	527,000	6.50%	30	30%	830	28,249	5,270	34,349	30.0%	114,498	27.4%	87.5%	32.4%	8,872
Potrero Ridge Customs	2,500,000	6.50%	30	50%	1,650	95,722	25,000	122,372	30.0%	407,906	19.3%	90.1%	32.5%	23,000
Mesas West 4 SFD Cluste	510,000	6.50%	30	30%	830	27,338	5,100	33,268	30.0%	110,894	27.4%	87.5%	32.4%	8,593
Mesas West 11 SFD Clus	510,000	6.50%	30	30%	830	27,338	5,100	33,268	30.0%	110,894	27.4%	87.5%	32.4%	8,593
HS Central 4 Plex HC-2	498,000	6.50%	30	25%	775	28,602	4,980	34,357	30.0%	114,522	27.4%	87.5%	32.4%	8,874
HS Central 2 Story TF HC	471,000	6.50%	30	25%	775	27,051	4,710	32,536	30.0%	108,453	27.4%	87.5%	32.4%	8,404
HS Central 3 Story TF HC	473,000	6.50%	30	25%	775	27,166	4,730	32,671	30.0%	108,903	27.4%	87.5%	32.4%	8,439
HS Central E1 16 Plex	422,000	6.50%	30	25%	775	24,237	4,220	29,232	30.0%	97,439	28.6%	88.1%	33.8%	8,302
HS West 3-4 Plex	498,000	6.50%	30	25%	775	28,602	4,980	34,357	30.0%	114,522	27.4%	87.5%	32.4%	8,874
HS West Triplex HW-5	473,000	6.50%	30	25%	775	27,166	4,730	32,671	30.0%	108,903	27.4%	87.5%	32.4%	8,439
Long Canyon 3 Story	458,000	6.50%	30	25%	775	26,304	4,580	31,659	30.0%	105,531	27.4%	87.5%	32.4%	8,177
LCS 1 & 2	500,000	6.50%	30	25%	775	28,717	5,000	34,492	30.0%	114,972	27.4%	87.5%	32.4%	8,909
Onion Fields Triplex	455,000	6.50%	30	25%	775	26,132	4,550	31,457	30.0%	104,857	27.4%	87.5%	32.4%	8,125
Onion Fields 3 Story Town	458,000	6.50%	30	25%	775	26,304	4,580	31,659	30.0%	105,531	27.4%	87.5%	32.4%	8,177
Mesas West 1A 3/4 Plex	490,000	6.50%	30	25%	775	28,142	4,900	33,817	30.0%	112,724	27.4%	87.5%	32.4%	8,735
Mesas West 3A 3/4 Plex	490,000	6.50%	30	25%	775	28,142	4,900	33,817	30.0%	112,724	27.4%	87.5%	32.4%	8,735
Mesas West 1B-10 Plex	450,000	6.50%	30	25%	775	25,845	4,500	31,120	30.0%	103,733	27.4%	87.5%	32.4%	8,038
Mesas West 3B 10 Plex	450,000	6.50%	30	25%	775	25,845	4,500	31,120	30.0%	103,733	27.4%	87.5%	32.4%	8,038
Mesas West 7A 10 Plex	450,000	6.50%	30	25%	775	25,845	4,500	31,120	30.0%	103,733	27.4%	87.5%	32.4%	8,038
Mesas West 12A 10 Plex	450,000	6.50%	30	25%	775	25,845	4,500	31,120	30.0%	103,733	27.4%	87.5%	32.4%	8,038
Mesas West 6 2/3 Duplex	575,000	6.50%	30	30%	830	30,822	5,750	37,402	30.0%	124,675	25.8%	88.0%	32.8%	9,289
Mesas West 7B 10 Plex	450,000	6.50%	30	25%	775	25,845	4,500	31,120	30.0%	103,733	27.4%	87.5%	32.4%	8,038
Mesas West 8B 2 Story T	473,000	6.50%	30	25%	775	27,166	4,730	32,671	30.0%	108,903	27.4%	87.5%	32.4%	8,439
Mesas West 10 16 Plex	473,000	6.50%	30	25%	775	27,166	4,730	32,671	30.0%	108,903	27.4%	87.5%	32.4%	8,439
Mesas West 12B 16 Plex	473,000	6.50%	30	25%	775	27,166	4,730	32,671	30.0%	108,903	27.4%	87.5%	32.4%	8,439

A-8.3
Product Level Taxable Retail Expenditure spent per household in Unincorporated Los Angeles County outside Project Area – by Community: POTRERO

Use Product	Unit Price	Interest (%)	Term (Years)	Down Payment (% of Price)	Insurance ($/Yr.)	Mortgage ($/Yr.)	Property Tax ($/Yr.)	Housing Exp. ($/Yr.)	Housing Share	Imputed HH Income ($/Yr.)	Retail Exp./HH Less Auto Sales (% of HH Income)	Taxable Sale	In Uninc. LA County % of Sales (%)	In Uninc. LA County Amount ($/Yr.)
Residential for Sale														
PE1 140 x 100 estates	2,500,000	6.50%	30	50%	1,650	95,722	25,000	122,372	30.0%	407,906	19.3%	90.1%	32.5%	23,000
PE 2 140 x 100 estates	2,500,000	6.50%	30	50%	1,650	95,722	25,000	122,372	30.0%	407,906	19.3%	90.1%	32.5%	23,000
P 6500	935,000	6.50%	30	40%	1,160	42,960	9,350	53,470	30.0%	178,233	19.3%	90.1%	32.5%	10,050
P6000	861,000	6.50%	30	40%	1,160	39,560	8,610	49,330	30.0%	164,433	19.3%	90.1%	32.5%	9,271
P5500	796,000	6.50%	30	40%	1,160	36,573	7,960	45,693	30.0%	152,311	19.3%	90.1%	32.5%	8,588
P5000	759,000	6.50%	30	40%	1,160	34,873	7,590	43,623	30.0%	145,411	25.8%	88.0%	32.8%	10,833
P4500	691,000	6.50%	30	35%	975	34,395	6,910	42,280	30.0%	140,933	25.8%	88.0%	32.8%	10,500
P3500	625,000	6.50%	30	35%	975	31,110	6,250	38,335	30.0%	127,782	25.8%	88.0%	32.8%	9,520
A1	676,000	6.50%	30	35%	975	33,648	6,760	41,383	30.0%	137,944	25.8%	88.0%	32.8%	10,277
A2	693,000	6.50%	30	35%	975	34,494	6,930	42,399	30.0%	141,331	25.8%	88.0%	32.8%	10,529
B1	551,000	6.50%	30	30%	830	29,536	5,510	35,876	30.0%	119,586	27.4%	87.5%	32.4%	9,266
B2	496,000	6.50%	30	25%	775	28,487	4,960	34,222	30.0%	114,073	27.4%	87.5%	32.4%	8,839
C1	572,000	6.50%	30	30%	830	30,662	5,720	37,212	30.0%	124,039	25.8%	88.0%	32.8%	9,241
D	491,000	6.50%	30	25%	775	28,200	4,910	33,885	30.0%	112,949	27.4%	87.5%	32.4%	8,752
E	420,000	6.50%	30	25%	775	24,122	4,200	29,097	30.0%	96,990	28.6%	88.1%	33.8%	8,263
F	394,000	6.50%	30	25%	775	22,629	3,940	27,344	30.0%	91,145	28.6%	88.1%	33.8%	7,765
G1	500,000	6.50%	30	25%	775	28,717	5,000	34,492	30.0%	114,972	27.4%	87.5%	32.4%	8,909
G2	487,000	6.50%	30	25%	775	27,970	4,870	33,615	30.0%	112,050	27.4%	87.5%	32.4%	8,682
H1	460,000	6.50%	30	25%	775	26,419	4,600	31,794	30.0%	105,981	27.4%	87.5%	32.4%	8,212
H2	475,000	6.50%	30	25%	775	27,281	4,750	32,806	30.0%	109,352	27.4%	87.5%	32.4%	8,473
I	456,000	6.50%	30	25%	775	26,189	4,560	31,524	30.0%	105,082	27.4%	87.5%	32.4%	8,142
Lofts	543,000	6.50%	30	30%	830	29,107	5,430	35,367	30.0%	117,890	27.4%	87.5%	32.4%	9,135
Senoirs 1	437,000	6.50%	30	25%	775	25,098	4,370	30,243	30.0%	100,811	27.4%	87.5%	32.4%	7,812
Senoirs 2	470,000	6.50%	30	25%	775	26,994	4,700	32,469	30.0%	108,228	27.4%	87.5%	32.4%	8,386
Senoirs 3	398,000	6.50%	30	25%	775	22,858	3,980	27,613	30.0%	92,045	28.6%	88.1%	33.8%	7,842
Senoirs 4	532,000	6.50%	30	30%	830	28,517	5,320	34,667	30.0%	115,558	27.4%	87.5%	32.4%	8,954

A-8.4
Product Level Taxable Retail Expenditure spent per household in Unincorporated Los Angeles County outside Project Area – by Community: MISSION VILLAGE

Use Product	Unit Price	Interest (%)	Term (Years)	Down Payment (% of Price)	Insurance ($/Yr.)	Mortgage ($/Yr.)	Property Tax ($/Yr.)	Housing Exp. ($/Yr.)	Housing Share	Imputed HH Income ($/Yr.)	Retail Exp./HH Less Auto Sales (% of HH Income)	Taxable Sale	In Uninc. LA County % of Sales (%)	In Uninc. LA County Amount ($/Yr.)
Residential for Sale														
A2 SFD	843,500	6.50%	30	40%	1,160	38,756	8,435	48,351	30.0%	161,169	19.3%	90.1%	32.5%	9,087
A7 SFD	1,080,000	6.50%	30	45%	1,360	45,487	10,800	57,647	30.0%	192,157	19.3%	90.1%	32.5%	10,835
A8 Custom	2,509,000	6.50%	30	50%	1,650	96,066	25,090	122,806	30.0%	409,355	19.3%	90.1%	32.5%	23,081
SeniorsArea C (SFD)	616,000	6.50%	30	35%	975	30,662	6,160	37,797	30.0%	125,989	25.8%	88.0%	32.8%	9,386
A3a Duplex	507,500	6.50%	30	30%	830	27,204	5,075	33,109	30.0%	110,364	27.4%	87.5%	32.4%	8,552
A3b Towns-Flats	473,500	6.50%	30	25%	775	27,195	4,735	32,705	30.0%	109,015	27.4%	87.5%	32.4%	8,447
A4 Condo	422,500	6.50%	30	25%	775	24,265	4,225	29,265	30.0%	97,552	28.6%	88.1%	33.8%	8,311
A5 3/4 Plex Towns	504,500	6.50%	30	30%	830	27,043	5,045	32,918	30.0%	109,728	27.4%	87.5%	32.4%	8,502
A6 3 Story Towns	509,500	6.50%	30	30%	830	27,311	5,095	33,236	30.0%	110,788	27.4%	87.5%	32.4%	8,585
A9 Duplex	559,500	6.50%	30	30%	830	29,992	5,595	36,417	30.0%	121,389	25.8%	88.0%	32.8%	9,044
A10 Duplex	580,500	6.50%	30	30%	830	31,117	5,805	37,752	30.0%	125,841	25.8%	88.0%	32.8%	9,375
B1 Duplex	521,500	6.50%	30	30%	830	27,955	5,215	34,000	30.0%	113,332	27.4%	87.5%	32.4%	8,782
B2 3 Story Town	419,500	6.50%	30	25%	775	24,093	4,195	29,063	30.0%	96,877	28.6%	88.1%	33.8%	8,254
B6 Towns/Flats	415,500	6.50%	30	25%	775	23,863	4,155	28,793	30.0%	95,978	28.6%	88.1%	33.8%	8,177
B7	507,500	6.50%	30	30%	830	27,204	5,075	33,109	30.0%	110,364	27.4%	87.5%	32.4%	8,552
Senior C6 Flats	504,500	6.50%	30	30%	830	27,043	5,045	32,918	30.0%	109,728	27.4%	87.5%	32.4%	8,502
Senior Area C Duplex	597,500	6.50%	30	30%	830	32,029	5,975	38,834	30.0%	129,445	25.8%	88.0%	32.8%	9,644
D2 Towns 2/3 Story	428,500	6.50%	30	25%	775	24,610	4,285	29,670	30.0%	98,900	28.6%	88.1%	33.8%	8,426
F2a Live/Work 3 Story	671,500	6.50%	30	35%	975	33,424	6,715	41,114	30.0%	137,047	25.8%	88.0%	32.8%	10,210
F2b Condo 4/5 Story	478,500	6.50%	30	25%	775	27,482	4,785	33,042	30.0%	110,139	27.4%	87.5%	32.4%	8,534
F3a Live/Work 3 Story	671,500	6.50%	30	35%	975	33,424	6,715	41,114	30.0%	137,047	25.8%	88.0%	32.8%	10,210
F3b Condo 4/5 Story	495,500	6.50%	30	25%	775	28,458	4,955	34,188	30.0%	113,960	27.4%	87.5%	32.4%	8,830
F5a Condo 4/5 Story	453,500	6.50%	30	25%	775	26,046	4,535	31,356	30.0%	104,520	27.4%	87.5%	32.4%	8,099
F5b Condo 4/5 Story	411,500	6.50%	30	25%	775	23,634	4,115	28,524	30.0%	95,079	28.6%	88.1%	33.8%	8,101
F6a Condo 4 Story	470,500	6.50%	30	25%	775	27,022	4,705	32,502	30.0%	108,341	27.4%	87.5%	32.4%	8,395
F6b Condo 4 Story	478,500	6.50%	30	25%	775	27,482	4,785	33,042	30.0%	110,139	27.4%	87.5%	32.4%	8,534
F7 Condo 3 Story	428,500	6.50%	30	25%	775	24,610	4,285	29,670	30.0%	98,900	28.6%	88.1%	33.8%	8,426
F8a Condo 3/4 Story	419,500	6.50%	30	25%	775	24,093	4,195	29,063	30.0%	96,877	28.6%	88.1%	33.8%	8,254
F8b Condo 3/4 Story	402,500	6.50%	30	25%	775	23,117	4,025	27,917	30.0%	93,056	28.6%	88.1%	33.8%	7,928

A-8.5
Product Level Taxable Retail Expenditure spent per household in Unincorporated Los Angeles County outside Project Area – by Community: LEGACY

Use Product	Unit Price	Interest (%)	Term (Years)	Down Payment (% of Price)	Insurance ($/Yr.)	Mortgage ($/Yr.)	Property Tax ($/Yr.)	Housing Exp. ($/Yr.)	Housing Share	Imputed HH Income ($/Yr.)	Retail Exp./HH Less Auto Sales (% of HH Income)	Taxable Sale	In Uninc. LA County % of Sales (%)	In Uninc. LA County Amount ($/Yr.)
Residential for Sale														
A1 - Triplex	453,000	6.50%	30	25%	775	26,017	4,530	31,322	30.0%	104,407	27.4%	87.5%	32.4%	8,090
A2 - 45x100	510,000	6.50%	30	30%	830	27,338	5,100	33,268	30.0%	110,894	27.4%	87.5%	32.4%	8,593
A3 - Triplex	453,000	6.50%	30	25%	775	26,017	4,530	31,322	30.0%	104,407	27.4%	87.5%	32.4%	8,090
A4 - 55x110	624,000	6.50%	30	35%	975	31,060	6,240	38,275	30.0%	127,583	25.8%	88.0%	32.8%	9,505
A5 Luxury Flats	510,000	6.50%	30	30%	830	27,338	5,100	33,268	30.0%	110,894	27.4%	87.5%	32.4%	8,593
A6 - 45x100	510,000	6.50%	30	30%	830	27,338	5,100	33,268	30.0%	110,894	27.4%	87.5%	32.4%	8,593
A7 - 60x110	682,000	6.50%	30	35%	975	33,947	6,820	41,742	30.0%	139,139	25.8%	88.0%	32.8%	10,366
A8 - 50x105	615,000	6.50%	30	35%	975	30,612	6,150	37,737	30.0%	125,789	25.8%	88.0%	32.8%	9,372
A9 - 50x105	615,000	6.50%	30	35%	975	30,612	6,150	37,737	30.0%	125,789	25.8%	88.0%	32.8%	9,372
A10 - 55x110	624,000	6.50%	30	35%	975	31,060	6,240	38,275	30.0%	127,583	25.8%	88.0%	32.8%	9,505
A11 - 60x110	682,000	6.50%	30	35%	975	33,947	6,820	41,742	30.0%	139,139	25.8%	88.0%	32.8%	10,366
A12 - 45x100	428,000	6.50%	30	25%	775	24,581	4,280	29,636	30.0%	98,788	28.6%	88.1%	33.8%	8,416
A13 - Duplex	472,000	6.50%	30	25%	775	27,108	4,720	32,603	30.0%	108,678	27.4%	87.5%	32.4%	8,421
B3 - Condos	433,000	6.50%	30	25%	775	24,869	4,330	29,974	30.0%	99,912	28.6%	88.1%	33.8%	8,512
B4 - Condos	483,000	6.50%	30	25%	775	27,740	4,830	33,345	30.0%	111,151	27.4%	87.5%	32.4%	8,613
B6 - Condos	483,000	6.50%	30	25%	775	27,740	4,830	33,345	30.0%	111,151	27.4%	87.5%	32.4%	8,613
B8 Temp School	910,000	6.50%	30	40%	1,160	41,811	9,100	52,071	30.0%	173,571	19.3%	90.1%	32.5%	9,787
B9 - Condos	462,000	6.50%	30	25%	775	26,534	4,620	31,929	30.0%	106,430	27.4%	87.5%	32.4%	8,247
B10 - Condos	438,000	6.50%	30	25%	775	25,156	4,380	30,311	30.0%	101,036	27.4%	87.5%	32.4%	7,829
B11 - Condos	420,000	6.50%	30	25%	775	24,122	4,200	29,097	30.0%	96,990	28.6%	88.1%	33.8%	8,263
B12 - Condos	387,000	6.50%	30	25%	775	22,227	3,870	26,872	30.0%	89,572	28.6%	88.1%	33.8%	7,631
C1a - 45x100	510,000	6.50%	30	30%	830	27,338	5,100	33,268	30.0%	110,894	27.4%	87.5%	32.4%	8,593
C1b - 45x100	510,000	6.50%	30	30%	830	27,338	5,100	33,268	30.0%	110,894	27.4%	87.5%	32.4%	8,593
C2a - 50x100	649,000	6.50%	30	35%	975	32,304	6,490	39,769	30.0%	132,564	25.8%	88.0%	32.8%	9,876
C2b - 45x100	510,000	6.50%	30	30%	830	27,338	5,100	33,268	30.0%	110,894	27.4%	87.5%	32.4%	8,593
C3 - 60x100	663,000	6.50%	30	35%	975	33,001	6,630	40,606	30.0%	135,353	25.8%	88.0%	32.8%	10,084
C4 - 60x100	663,000	6.50%	30	35%	975	33,001	6,630	40,606	30.0%	135,353	25.8%	88.0%	32.8%	10,084
D - SFR	1,237,500	6.50%	30	45%	1,360	52,121	12,375	65,856	30.0%	219,518	19.3%	90.1%	32.5%	12,377

A-8.6
Product Level Taxable Retail Expenditure spent per household in Unincorporated Los Angeles County outside Project Area – by Community: LANDMARK

Use Product	Unit Price	Interest (%)	Term (Years)	Down Payment (% of Price)	Insurance ($/Yr.)	Mortgage ($/Yr.)	Property Tax ($/Yr.)	Housing Exp. ($/Yr.)	Housing Share	Imputed HH Income ($/Yr.)	Retail Exp./HH Less Auto Sales (% of HH Income)	Taxable Sale	In Uninc. LA County % of Sales (%)	In Uninc. LA County Amount ($/Yr.)
Residential for Sale														
Area D Alley	564,000	6.50%	30	30%	830	30,233	5,640	36,703	30.0%	122,343	25.8%	88.0%	32.8%	9,115
Area E Alley	623,000	6.50%	30	35%	975	31,010	6,230	38,215	30.0%	127,383	25.8%	88.0%	32.8%	9,490
Area F Alley	674,000	6.50%	30	35%	975	33,549	6,740	41,264	30.0%	137,545	25.8%	88.0%	32.8%	10,247
Area G SFD	755,000	6.50%	30	40%	1,160	34,690	7,550	43,400	30.0%	144,665	25.8%	88.0%	32.8%	10,778
Area H SFD	816,000	6.50%	30	40%	1,160	37,492	8,160	46,812	30.0%	156,041	19.3%	90.1%	32.5%	8,798
Area A Condo	420,000	6.50%	30	25%	775	24,122	4,200	29,097	30.0%	96,990	28.6%	88.1%	33.8%	8,263
Area B Condo	470,000	6.50%	30	25%	775	26,994	4,700	32,469	30.0%	108,228	27.4%	87.5%	32.4%	8,386
Area C Condo	521,000	6.50%	30	30%	830	27,928	5,210	33,968	30.0%	113,226	27.4%	87.5%	32.4%	8,774

A-8.7
Consumer Expenditure Survey (CES) Methodology for estimating shares of Retail Expenditure & Taxable Sales by Household Income Categories
(Per 2004 CES, adjusted for 2004-06 inflation in individual categories)

Item (2006)	All consumer units	Less than $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $29,999	$30,000 to $39,999	$40,000 to $49,999	$50,000 to $69,999	$70,000 to $79,999	$80,000 to $99,999	$100,000 to $119,999	$120,000 to $149,999	$150,000 and more
Income before taxes	**$ 56,258**	**$ 1,133**	**$ 8,071**	**$ 12,913**	**$ 17,994**	**$ 25,588**	**$ 35,890**	**$ 46,125**	**$ 61,223**	**$ 76,904**	**$ 91,755**	**$ 112,356**	**$ 136,677**	**$ 235,579**
Income after taxes	**54,020**	**1,216**	**8,059**	**13,037**	**18,059**	**25,103**	**35,333**	**45,137**	**59,015**	**74,630**	**87,698**	**107,242**	**128,392**	**219,657**
Average annual expenditures	**46,113**	**18,096**	**15,510**	**20,662**	**24,465**	**29,479**	**35,357**	**40,597**	**50,741**	**58,458**	**69,545**	**79,924**	**92,767**	**126,931**
Less:														
Housing	14,864	6,728	6,029	8,024	8,939	10,294	11,900	13,224	15,698	18,606	21,783	23,786	28,129	38,709
	22.4%	*519.0%*	*67.0%*	*55.3%*	*43.3%*	*35.4%*	*28.4%*	*24.5%*	*21.8%*	*20.5%*	*20.0%*	*17.5%*	*16.7%*	*13.3%*
Transportation	6,815	1,736	1,573	2,437	3,070	4,311	5,335	5,944	8,511	8,607	11,075	12,160	14,095	17,288
Health care	2,790	960	1,269	1,958	2,179	2,338	2,583	2,766	3,115	3,283	3,668	4,045	4,132	4,966
Education	1,018	1,151	716	556	431	355	355	469	794	1,057	1,732	2,098	2,436	4,929
Cash contributions	1,408	276	213	414	828	738	844	1,284	1,360	1,551	2,052	2,445	2,672	7,037
Personal insurance and pensions	4,823	261	282	533	951	1,594	2,692	3,656	5,430	7,099	8,871	11,284	14,178	18,927
Plus:														
Housekeeping Supplies	613	335	230	326	411	393	529	559	666	699	889	921	1,085	1,508
Household furnishings and equipment	1,666	511	391	551	733	853	1,175	1,361	1,692	2,110	2,569	3,162	4,224	5,836
Drugs	520	229	312	505	511	516	537	525	529	554	572	617	644	682
Gasoline & Motor Oil	2,090	902	811	1,023	1,261	1,556	1,873	2,120	2,554	2,787	738	752	857	735
Vehicle Maintenance & Repairs	716	258	253	283	541	465	602	627	829	912	1,151	1,190	1,348	1,519
Retail Expenditure except Auto Sales	**$ 20,000**	**$ 9,214**	**$ 7,423**	**$ 9,428**	**$ 11,523**	**$ 13,631**	**$ 16,362**	**$ 18,445**	**$ 22,102**	**$ 25,315**	**$ 26,284**	**$ 30,748**	**$ 35,282**	**$ 45,355**
Retail as % of Income before Taxes	**35.6%**	**813.0%**	**92.0%**	**73.0%**	**64.0%**	**53.3%**	**45.6%**	**40.0%**	**36.1%**	**32.9%**	**28.6%**	**27.4%**	**25.8%**	**19.3%**
Food at home	3,500	2,123	1,773	2,202	2,547	2,710	3,196	3,413	3,807	4,266	4,228	5,244	5,796	6,108
Non-Taxable Share *(Assumes 70% Food Store Expenses & 30% Drug Store Expenses as Non-Taxable)*	2,606	1,555	1,335	1,693	1,936	2,052	2,398	2,546	2,824	3,152	3,132	3,856	4,250	4,480
Non-Taxable as % of Retail Expenditure	13.0%	16.9%	18.0%	18.0%	16.8%	15.1%	14.7%	13.8%	12.8%	12.5%	11.9%	12.5%	12.0%	9.9%
Taxable Sales as % of Retail Expenses	**87.0%**	**83.1%**	**82.0%**	**82.0%**	**83.2%**	**84.9%**	**85.3%**	**86.2%**	**87.2%**	**87.5%**	**88.1%**	**87.5%**	**88.0%**	**90.1%**
Expenditure in Uninc. Area Outside Newhall	$ 6,102	$ 2,654	$ 2,189	$ 2,857	$ 3,570	$ 4,261	$ 4,968	$ 5,592	$ 6,794	$ 7,645	$ 8,875	$ 9,954	$ 11,577	$ 14,739
% in Uninc. as % of Retail Exp.	**30.5%**	**28.8%**	**29.5%**	**30.3%**	**31.0%**	**31.3%**	**30.4%**	**30.3%**	**30.7%**	**30.2%**	**33.8%**	**32.4%**	**32.8%**	**32.5%**

APPENDIX E

Cultural/Paleontological Resources

Letter from W&S Consultants
February 15, 2007

W and S CONSULTANTS / cultural resources management studies

February 15, 2007

Mr. Glenn Adamick
Newhall Land
23823 Valencia Boulevard
Valencia, CA 91355

RE: Response to Issues Raised with the Landmark Draft EIR Cultural Resources Report

Dear Mr. Adamick:

I am writing in response to issues raised with language contained within the Landmark Village Cultural Resources Report included in the Landmark Village Draft EIR, specifically Section 2.2 Ethnographic Description on page 7 of Appendix 4.22a-1.

In the above referenced section, W&S stated in the first paragraph "...as the Tataviam are now extinct and were effectively so prior to the initiation of systematic anthropological studies at the turn of the century." As reference, we cited a report prepared by Drs. Chester King and Thomas Blackburn (published in The Handbook of North American Indians, Vol. 8, California, R. Heizer, editor, pp. 535-537, Smithsonian Institution, 1978).

W&S would like to personally apologize to the Tataviam Tribe for this inaccurate statement and reference. In fact, the next sentence of the above referenced section states "...the Tataviam are generally accepted as the aboriginal inhabitants of the region."

W&S Consultants has always been supportive of the local tribal groups, including the Tataviam, and recognizes the importance of their continuing cultural traditions, their connections to their traditional sites, and their involvement in the planning process. We know that Newhall Land shares in this commitment.

The language in Section 2.2 will be amended to reflect the existence of the Tataviam Tribe and the reference from the Handbook of North American Indians, Vol. 8, California will be removed from the Landmark Village Cultural Resources Report and replaced with Dr. King's *Ethnographic Overview of the Angeles National Forest, Tataviam and San Gabriel Mountain Serrano Ethnohistory (2004).*

We value our relationship with the Tataviam and look forward to continued collaboration with them in the future.

Sincerely,

David S. Whitley, Ph.D.

cc: Rudy Ortega Jr., Fernandeno Tataviam Band of Mission Indians
Susan Tebo, Impact Sciences
Daniel Fierros, Department of Regional Planning

2242 stinson street • simi valley, california 93065 • 805-581-3577

APPENDIX F

Land Use

Sustainability Summary

Sustainability In Action

LANDMARK VILLAGE

NEWHALL RANCH

SUSTAINABLE COMMUNITY DESIGN

Landmark Village's balance of new homes, jobs, environmental preservation and transportation solutions showcase the sustainable community design attributes found throughout Newhall Ranch.

As proposed, Landmark Village's 300 acres would include a diverse range of 1,444 new homes for all socio-economic levels. To minimize and shorten car trips, most homes will be within walking distance to the community's commercial and mixed-use areas, elementary school site, community park, trails and natural open space.

Green Building Program

=15% percent better than existing Title 24 requirements

1. All Residential Buildings
   - Improved insulation and ducting
   - Low E glass
   - High efficiency A/C
   - Radiant barrier in attic – as needed to achieve standard
2. All Commercial and Public Buildings
   - Improved insulation and ducting
   - Low E glass
   - High efficiency HVAC equipment
   - Energy efficient lighting design with occupancy sensors

Water Conservation (Community Wide)

- Water efficient fixtures in homes, commercial, and public buildings
- Drought tolerant landscaping
- Use of recycled water for irrigation
- Use of local ground water for potable supply
- Evapo-transpiration irrigation systems (smart sprinklers)

Renewable Energy

Explore and identify renewable energy sources for Newhall Ranch (including Landmark Village). Renewable energy sources could include solar, wind, cogeneration and other feasible sources.

Reduce Impermeable Surfaces / Water Re-use

To curtail urban runoff and maximize groundwater recharge, Landmark will utilize open/soft bottom channels, smaller street sections and natural water quality treatment basins. These water quality features will aid percolation of the groundwater recharging process.

Walkability

Landmark Village's design connects jobs, shops, schools, parks and recreation facilities with the community's trail system to promote walking and biking while minimizing car trips.

Recreation

Landmark's sustainable design includes parks for people to play, a neighborhood recreation center to exercise and a two-mile extension of the popular Santa Clara River Trail. The variety of recreational options will allow residents to enjoy an environmentally sustainable way of life.

Transportation Solutions

Landmark's circulation plan can be a model for how to minimize car trips and reduce carbon-dioxide emissions.

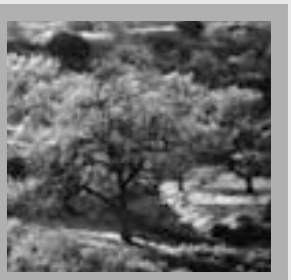
- **Convenient mass transit** would be offered through a new transit station, a park-and-ride lot and bus stops. A five-mile right-of-way for a potential Metrolink extension is also included in the plan.
- Trails and bike paths leading to close-to-home jobs, neighborhood serving retail and the school will encourage residents to **leave their cars behind**.
- Newhall Land's commitment to fund $300 million in roadway improvements in the Santa Clarita Valley (in conjunction with Newhall Ranch) will keep traffic moving.

Economy

A number of Newhall Ranch's projected 19,000 new jobs will be offered through Landmark's 37 acres (approximately 1 million sq ft) of mixed-use and commercial areas. A strong local job base is a critical component of sustainable communities because it offers the quality of life and environmental benefits of allowing people to work close to home, while generating tax revenue.

Protection of Natural Resources

As it passes by Landmark Village, the long-term health of the Santa Clara River will be protected with environmentally sensitive bank stabilization and development buffers to preserve the river's natural beauty, its native species, wildlife corridor and water quality.



Environmentally Sustainable Living

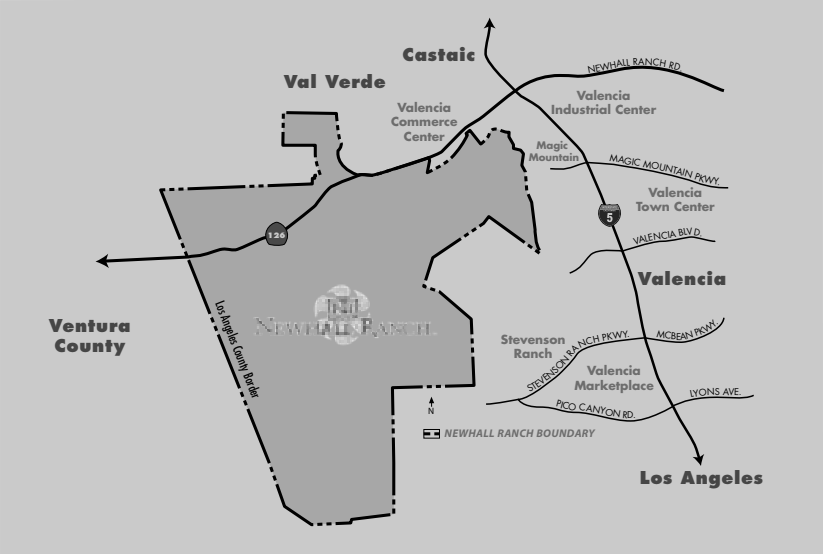
Over 50% of Newhall Ranch will be preserved as open space:

High Country preserve	4,200 acres
Santa Clara River Corridor	1,000 acres
Open space areas within villages	1,100 acres
Salt Creek Corridor on the western edge of Newhall Ranch	1,500 acres
Total open space set aside as a result of Newhall Ranch	**7,800 acres**

Landmark is the first of four planned villages, which will combine to form Newhall Ranch, with its 19,000 new jobs and 21,000 new-home choices, and environmentally sensitive design which permanently preserves 50 percent of the 12,000-acre property.

Much like Newhall Land's renowned community of Valencia, Newhall Ranch will be a sustainable new town thanks to its focus on all aspects of life – from social to economic to the natural environment.

- The Newhall Ranch Nature Preserve protects **high quality habitat**
- An ideal location **near existing jobs and infrastructure**
- A **broad range of homes** for every stage of life
- A **mix of land uses** including commercial, office and public facilities
- The creation of **19,000 jobs**
- Recycled water to meet 51 percent of all water needs: Independent (non State Water Project water) supplies to meet potable water needs
- Drought tolerant native landscaping and evapotranspiration controllers (smart sprinklers) substantially reducing irrigation needs
- Car trips minimized by **convenient mass transit** and by placing homes near jobs and neighborhood retail centers
- Significant improvements to SR-126, I-5 and other local roadways to **reduce traffic congestion** and improve mobility



IDEAL LOCATION: *Newhall Ranch is the logical, close-in location for a new master-planned community because it is adjacent to major job centers, existing infrastructure and development.*

Photograph by Ted Dayton

A WALKABLE COMMUNITY: *Newhall Ranch's sustainable design connects jobs, shops, schools, parks and recreation facilities with the community's trail system to encourage residents to leave their cars behind.*

The information depicted and written about in this document is subject to change and modification.

Affordable Housing Program

NEWHALL RANCH
AFFORDABLE HOUSING IMPLEMENTATION PLAN

Last Update: September 18, 2007

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1. SUMMARY OF AFFORDABLE HOUSING IMPLEMENTATION PLAN

This Affordable Housing Implementation Plan ("Implementation Plan") is based on the Affordable Housing Program adopted in May 2003, as part of the Newhall Ranch Specific Plan (section 3.10 Development Regulations/Affordable Housing Program, attached hereto as Appendix B) (the "Affordable Housing Program"). The Implementation Plan specifics may be modified or changed as development of the Newhall Ranch community unfolds. The basic plan calls for affordability guidelines, timing/delivery plans and monitoring obligations as summarized below:

A. Affordability Minimums
The Newhall Ranch will include a total of 2200 affordable homes or 10% of the total development, according to the following income schedule:

(1) 1210 homes shall be moderate income units (moderate income is defined as households with incomes at or below 120% of Los Angeles County median income)
(2) 220 homes shall be low income units serving households with income at or below 80% of Los Angeles County median income
(3) 330 homes shall be low income units serving households with income at or below 65% of Los Angeles County median income
(4) 440 homes shall be very low income units (very low income is defined as 0%-50% of Los Angeles County median income). A minimum of 44 of these units will be reserved for seniors 62 years of age or older.

B. Delivery of Units
The timing of the provision of the affordable homes is as follows:

(1) For the first 11,000 homes in the Newhall Ranch, 1100 affordable homes will be provided.
(2) At the completion of 16,500 homes, 1650 affordable homes will be provided.
(3) When 20,000 homes are completed at the Newhall Ranch, all 2200 affordable homes cumulative will be in place.

C. Monitoring
The affordable housing program specifies a monitoring program as follows:

(1) At the time of the submittal of the tentative tract map for the 5000th home, the Newhall Land and Farming Company will begin submitting annual reports until completion of the 2200th affordable unit.
(2) As units are completed, the owners and managers of the units will take over reporting responsibilities. Newhall Land and Farming Company will continue to report annually on units in planning and under construction until the 2200th unit is occupied.

2. NEWHALL LAND AND FARMING COMAPANY RESPONSIBILITIES

Newhall Land and Farming Company ("Newhall Land") will provide affordable housing on the Newhall Ranch according to the Affordable Housing Program. These obligations include:

A. Newhall Land agrees to implement the Affordable Housing Program as approved.

B. Newhall Land will provide a mix of for sale and rental housing per the Affordable Housing Program.

C. Newhall Land will provide a mix of housing for all income levels per the Affordable Housing Program.

D. Newhall Land will disperse affordable homes in 8-15 developments spread throughout the four Newhall Ranch communities of Landmark Village, Mission Village, Homestead and Potrero.

E. Newhall Land will provide a fifteen-year resale control program for homes offered for sale under the Affordable Housing Program.

F. Newhall Land will provide that all affordable rental homes will maintain affordable monthly rents for at least 15 years.

G. Newhall Land will sell land for development of these affordable units to qualified affordable housing developers. Those developers will be responsible for coordinating long-term monitoring or assistance from the Los Angeles County Community Development Commission

H. Newhall Land will implement the agreed upon monitoring program for units in planning or under construction.

3. NEWHALL RANCH DEVELOPMENT SCHEDULE

It is anticipated that the Newhall Ranch will be developed in four villages, with each of the four villages having its own tentative map. The number and location of affordable homes will be submitted, for each map, at the time of map submission.

A. The proposed number of affordable homes for each Village is still being determined as part of the master planning process, but is expected to be within the following ranges:

1. Landmark Village
250-350 affordable homes

2. Mission Village
500-800 affordable homes

3. Homestead
700-1000 affordable homes

4. Portrero
300-500 affordable homes

B. The number of affordable homes per Village may be adjusted through the approval process, but the total number of affordable homes within the Newhall Ranch will remain at 10% of the total development (currently calculated to be 2200).

C. With the filing of each village's tentative map, Newhall Land will provide an affordable housing plan for that village indicating the type of affordable housing, rental or for-sale, income level to be served (moderate, low, or very-low), and location within the community. This Village

Affordable Housing Plan will be incorporated as an appendix to the Affordable Housing Implementation Plan.

4. AFFIRMATIVE MARKETING PROGRAM

In order to assure opportunities for local residents and employees to obtain affordable housing, Newhall Land will implement an affirmative marketing program.

A. A marketing plan, that includes an affirmative marketing program, will be written for each affordable development before lease-up or sales of units begin. The Marketing Plan will be submitted to the Los Angeles County Community Development Commission for review and approval.

B. Each Marketing Plan will include provisions for the activities outlined below:

(1) Advertising
Although word of mouth and employer outreach may be sufficient to find qualified occupants of the affordable homes, some advertising may be required. If advertising is necessary, the program may include but is not limited to

a) Newspaper advertising
b) Informational flyers to local employers and local government agencies
c) On-site signage.

(2) Application Process

a) After receipt of building permits and prior to the release of applications, each Village will set up a method for prospective applicants to register their interest. Once applications become available, they will be mailed to all registered applicants.
b) Once released, applications will also be available for pick-up from the leasing or sales office, as applicable.

(3) Eligibility

a) Units will be offered to applicants on a first qualified, first offered basis.

C. Newhall Land and its sales and rental agents hereby agree not to discriminate against any housing prospect on the basis of race, gender, color, religion, creed, marital status, ancestry, or national origin. All advertising and informational flyers in villages with affordable homes may include information about affordable housing as well as fair housing information.

5. HOMEOWNERSHIP FINANCING

A. Initial Price Determination
In approximately April of each year, when current annual Los Angeles County income limit information is available from the U. S. Department of Housing and Urban Development for that year, Newhall Land will determine the sales price and rental rates of affordable homes according to the formula indicated in the Affordable Housing Program.

B. Financing Programs

Newhall Land will use a variety of financing programs to assist buyers to achieve homeownership. These programs may include CalFHA, VA/FHA, County Buyer assistance programs, local employer assistance programs, and lender programs.

C. Preferred Lenders
Newhall Land will designate a preferred lender to assist in buyer qualification. This lender will receive a copy of the implementation plan and will demonstrate, to the satisfaction of the developer, knowledge of financing programs for affordable housing. All buyer/applicants may be required to use the preferred lender for qualification purposes. Buyers may use a lender of their choice for their mortgage financing.

6. TERM OF RESTRICTIONS

A. FOR SALE
The adopted Affordable Housing Program does not include resale controls or restrictions on ownership housing. However, in order to avoid speculation, Newhall Land proposes a fifteen-year resale control on all ownership homes.

Any sales within the first fifteen years will be restricted to households within a fixed band of qualifying incomes. These restricted resales will be achieved through a third party monitoring company and deed restrictions recorded on title. The qualifying incomes may rise over time, depending on how long the seller has occupied the home, interest rates at the time of sale, and the existence and size of any secondary mortgages.

The purpose of allowing qualifying incomes to rise over time include:

1. To prevent the Seller from losing money at the sale. The circumstances under which this could happen are illustrated via an example in Exhibit A of this Plan.

2. To provide some share of appreciation on value to the Seller. This share will be larger depending on how long the Seller has occupied the home. The general guidelines that Newhall Land will follow in making this determination will be as follows:

Term of Occupancy	Share of Appreciation
5 years	25%
10 years	50%
15 years or more	100%

Such sharing of appreciation and resulting increases in qualifying income for subsequent buyers will be permitted at Newhall Land's sole discretion.

Prior to the issuance of the first building permit, Newhall Land will provide a sample resale control document to the Los Angeles County Community Development Commission for its review and approval. This document will be provided to prospective buyers on the website as well as individually when sale agreements are signed.

B. RENTAL
In accordance with the adopted Affordable Housing Program, all affordable rental homes will maintain affordable monthly rents for at least 15 years. Newhall Land will provide all potential rental housing operators with a copy of this Implementation Plan. Each operator will acknowledge receipt of The Affordable Housing Implementation Plan in writing.

Prior to occupancy of the first home in each affordable rental community, 15 year rent restrictions will be in place in accordance with the Affordable Housing Program.

7. MONITORING PROGRAM

Newhall Land will begin providing annual reports to the County of Los Angeles Regional Planning Department with a copy to the Los Angeles County Community Development Commission on March 1 in the year following the submittal of the tentative map for the 5000th home, or following the occupancy of the first affordable home, whichever is earlier. The report will contain the following information for each village for which a tentative map has been submitted:

A. Number of affordable homes in each village.
B. Location of affordable homes in each village.
C. Income level (very low, low, moderate) achieved for each affordable home in each village.
D. Indication for each home whether it is for-sale or rental by village.
E. Indication of initial sales price or monthly rent for each home by village.
F. Cumulative number of affordable homes provided in all villages.

8. COUNTY OF LOS ANGELES RESPONSIBILITIES

A. County will designate an employee to receive annual monitoring reports.
B. County will assist developer in finding a designee at the Los Angeles County Community Development Commission to receive annual monitoring reports.

EXHIBIT A – For Sale Income Banding Example

The following page outlines the finances of a hypothetical family who purchases an income restricted home in the year 2007. The exhibit makes certain assumptions about median income growth over time, and interest rates at time of purchase and resale. It uses these assumptions to project the amount the family will pay for their home and the amount they will be able to sell it for after a certain period of time (in this case, 5 years). The case below shows a scenario in which the family is close to "break-even", meaning they do not suffer a major loss, or receive a huge windfall of money. The determination of profit or loss below does not take into account benefits such as mortgage interest deductions and others that the family may receive during the time they own the home.

While the income restrictions on these homes will end after 15 years, some families will be required, due to employment or personal reasons, to sell before year 15. When this occurs, they will be required to sell to another income-eligible family. Depending on income growth during the years between their purchase and re-sale, and interest rates at the time of the re-sale, the original family could potentially lose money when they sell the home.

In order to prevent a major loss by a very-low, low or moderate income family, Newhall Land reserves the right to relax the affordability requirements, on a case by case basis, in order to allow families to break-even on resale.

The third-party monitor designated to manage the re-sale process will advise and assist Newhall Land with these decisions.

Re-Sale Income Banding Example

Assumptions:	2	Bedrooms	$250	Monthly HOA
	3	Person HH	1.10%	Tax Rate
	120%	AMI	0.25%	Insurance
	3%	Downpayment	33.00%	Debt Ratio

Initial Sale Structure:

2007 Qualifying Income:	$74,880	
Funds for Housing Costs (30% of Income):	$24,710.40	(annual)
HOA Costs:	$3,000	(annual)
Taxes & Insurance:	1.35%	
Mortgage Rate (30 year fixed):	***6.25%***	
Monthly Funds Available for Loan, Taxes, Ins:	$1,809.20	
Monthly Taxes & Insurance:	$279.50	
Supportable Mortgage:	$248,442	
Downpayment (3%):	$7,453	
TOTAL ORIGINAL PURCHASE PRICE:	$255,896	

Re-Sale Conditions:

Years Later:	5	years
Income Growth:	***2%***	***per annum***

Re-Sale Requirements:

New Qualifying Income:	$82,674	per year
Funds Available for Housing Costs:	$27,282.28	(annual)
HOA Costs:	$3,000	(annual)
Taxes & Insurance:	1.35%	
Mortgage Rate:	***7.00%***	
Monthly Funds Available for Loan, Taxes, Ins:	$2,023.52	
Monthly Taxes & Insurance:	$292.68	
Supportable Mortgage:	$260,159	
Downpayment:	$7,805	
TOTAL RESALE PURCHASE PRICE:	$267,964	

Closing Costs:

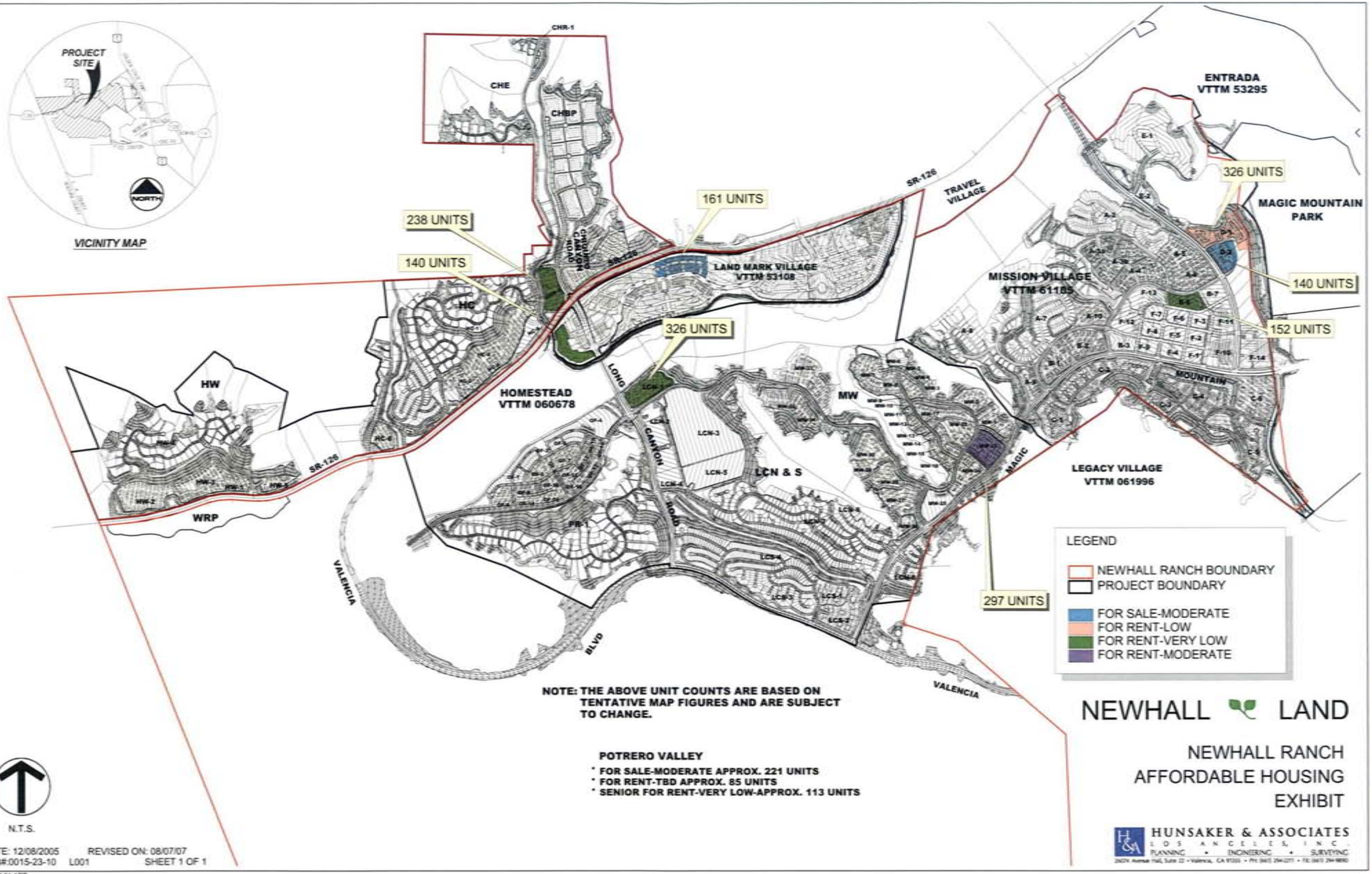
	5%	of sales price
	$13,398	total costs for sale
Net Money to Seller:	$254,566	
PROCEEDS TO SELLER:	**($1,330)**	

APPENDIX A – Affordable Housing Development Projects & Locations

Newhall Land: Affordable Housing at Newhall Ranch
Affordable Housing Development Projects & Locations

As Of: July 23, 2007

Community	Residential Home Sites (apprx)	Affordable Homes	For Sale	For Rent	Senior For Sale	Senior For Rent
Landmark	1,444	301	A-1 161 Moderate *Newhall Note* (81%-120%)	A-2 140 Very Low *4% TC, Bonds, MHP* (0% - 60%)		
Mission Village	5,331	618	A-4 140 Moderate *Newhall Note* (81%-120%)	A-5 152 *Very Low* *4% TC, Bonds, MHP* (0% - 60%) A-3 326 Low *Private Equity* (61% - 80%)		
Homestead	5,690	861		A-6 297 Moderate *Private Equity* (81% - 120%) A-7 326 Very Low *9% Tax Credits* (0% - 60%) A-8 238 Very Low *9% Tax Credits* (0% - 60%)		
Potrero	8,420	420	TBD 221 Moderate *Newhall Note* (81% - 120%)	TBD 86 TBD		TBD 113 Very Low *9% Tax Credits* (0% - 50%)
Totals	**20,885**	**2,200**	**522**	**1,565**	**0**	**113**



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HNR132-01.APR

A. Landmark Village Affordable Housing Plan

The Landmark community will contain 301 affordable homes located within the development. There will be two affordable programs within this community, moderate income for-sale homes, and very-low income family rentals.

1. FOR SALE HOMES FOR MODERATE INCOME FAMILIES

161 homes will be provided for moderate income (81-120% of Los Angeles County median income, adjusted for family size) families. These homes will be located in area A-1 per the attached map. This location is especially appropriate because of its access to transportation services and Highway 126, and its proximity to an elementary school, park, and commercial services.

2. RENTAL HOMES FOR VERY-LOW INCOME FAMILIES

140 rentals will be provided for very low income (0-50% of Los Angeles County Median Income, adjusted for family size) families in Area A-2. This location also has excellent access to schools, parks and commercial services.

B. Mission Village Affordable Housing Plan

Mission Village will contain 618 affordable homes in 4 different locations. There will be Moderate Income family for Sale, and two levels of Rentals: Low Income family and Very Low Income family.

1. FOR SALE HOMES FOR MODERATE INCOME FAMILIES

140 homes for moderate income (81-120% of Los Angeles County Median Income, adjusted for family size) families will be located in area A-4. Area A-4 is next to a park and near a commercial center with a school and recreation center within a mile.

2. RENTAL HOMES FOR LOW INCOME FAMILIES

326 homes will be provided for low-income (66-80% of Los Angeles County median income, adjusted for family size) families. All of these units will be located in Area A-3. Area A-3 is next to A-4, with the same amenities nearby.

3. RENTAL UNITS FOR VERY LOW INCOME FAMILIES

152 Units will be provided for very low income (0-60% of Los Angeles County median income, adjusted for family size). These units will be located in area A-5. Area A-5 is across the street from a school, near commercial services, a recreation center and a park.

C. Homestead Affordable Housing Plan

Homestead will contain 861 affordable homes in 3 locations. They will be rented to Moderate Income and Very Low Income Families.

1. RENTAL HOMES FOR MODERATE INCOME FAMILIES

297 homes for moderate income (81-120% of Los Angeles County Median Income, adjusted for family size) families will be located in area A-6. Area A-6 is near a school and designated open space.

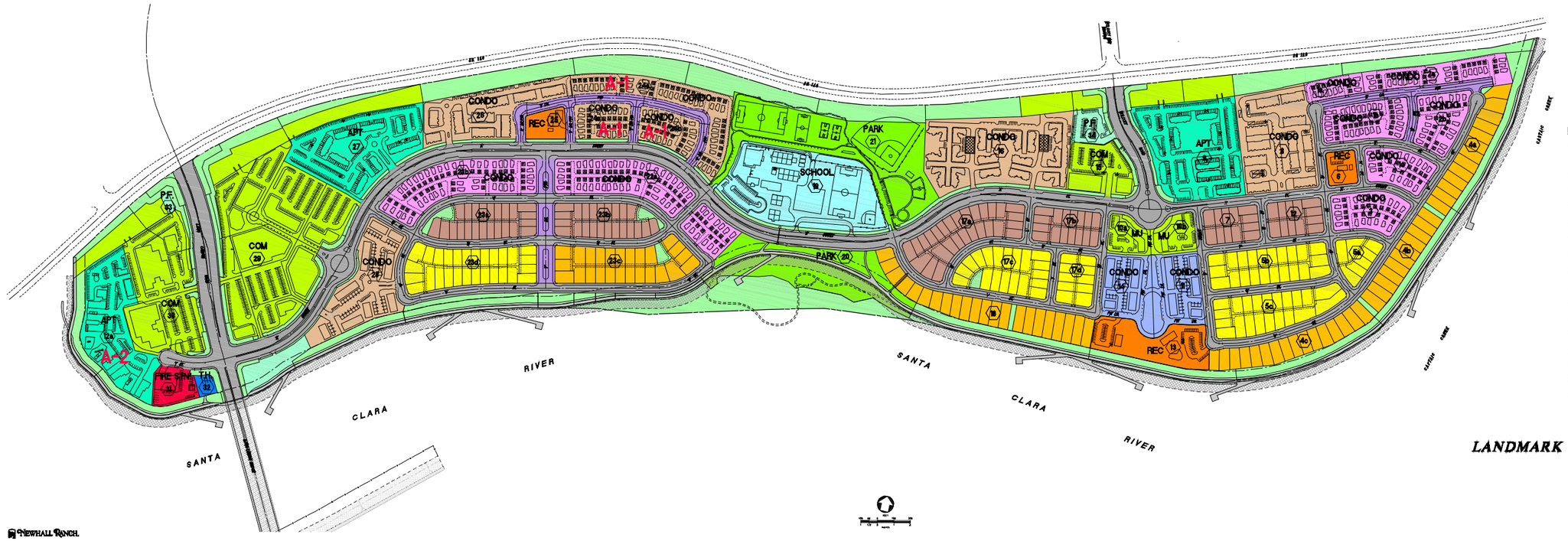
2. RENTAL UNITS FOR VERY LOW INCOME FAMILIES

564 Units will be provided for very low income (0-60% of Los Angeles County median income, adjusted for family size). These units will be located in areas A-7 and A-8. Area A-7 is next to a school and near parks and open space and Area A-8 is near a park and commercial services.

D. Potrero Affordable Housing Plan

To be provided with filing of tentative map

The following pages include site plans for available communities (as of this writing Potrero was not available), with the location of the affordable housing sites noted.



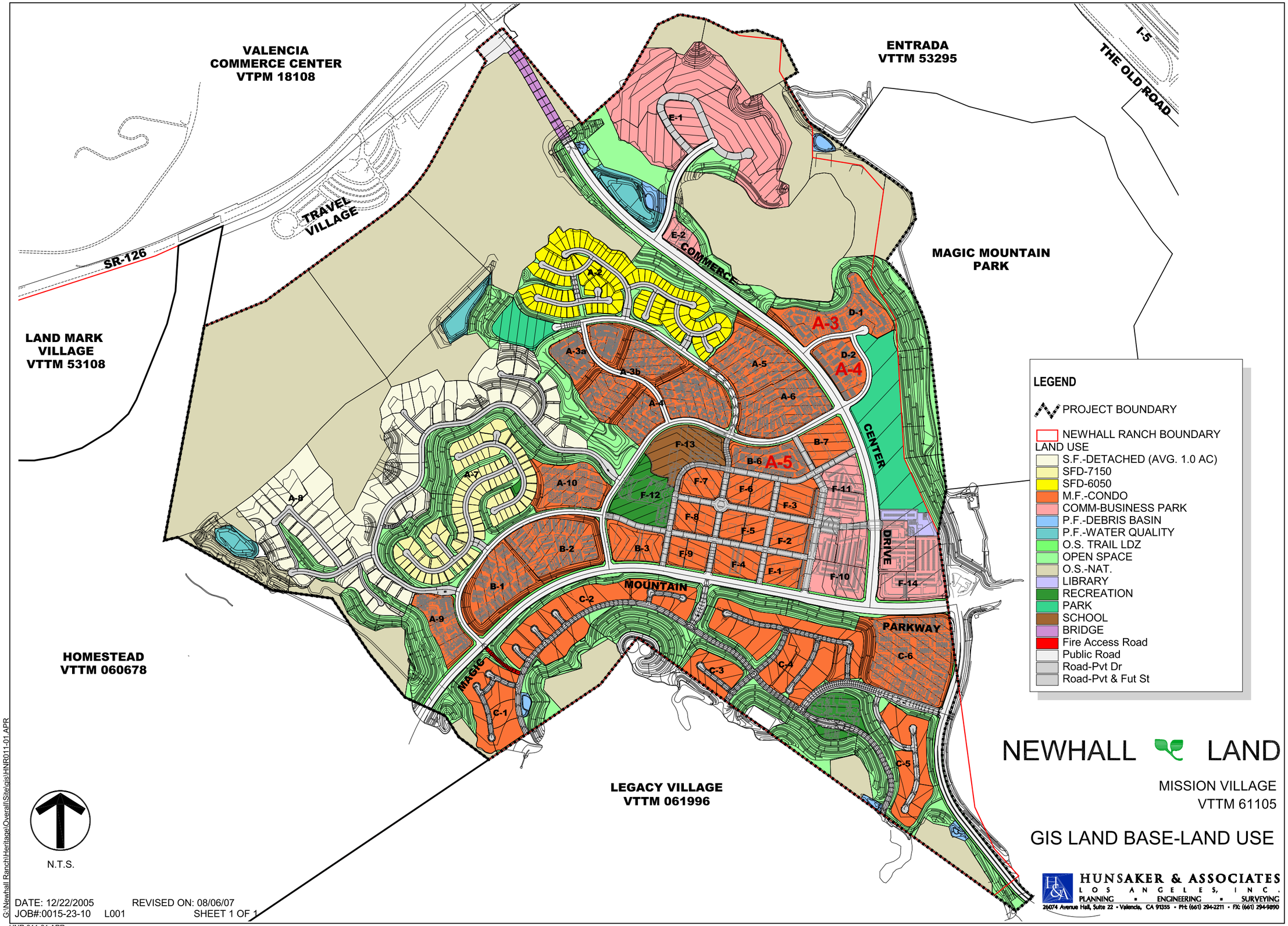
LANDMARK VILLAGE VTTM No. 53108

Land Use Exhibit

PSOMAS

DATE: 11/26/03 REVISED ON: 08/02/07

JOB No: 1NRC0107.08 T.220 SHEET 1 OF 1


VALENCIA
COMMERCE CENTER
VTPM 18108
ENTRADA
VTTM 53295
I-5
THE OLD ROAD
TRAVEL
VILLAGE
SR-126
MAGIC MOUNTAIN
PARK
LAND MARK
VILLAGE
VTTM 53108
COMMERCE
CENTER
DRIVE
MOUNTAIN
PARKWAY
MAGIC
HOMESTEAD
VTTM 060678
LEGACY VILLAGE
VTTM 061996
E-1
E-2
A-2
A-3
A-3a
A-3b
A-4
A-5
A-6
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A-8
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F-14
LEGEND
PROJECT BOUNDARY
NEWHALL RANCH BOUNDARY
LAND USE
S.F.-DETACHED (AVG. 1.0 AC)
SFD-7150
SFD-6050
M.F.-CONDO
COMM-BUSINESS PARK
P.F.-DEBRIS BASIN
P.F.-WATER QUALITY
O.S. TRAIL LDZ
OPEN SPACE
O.S.-NAT.
LIBRARY
RECREATION
PARK
SCHOOL
BRIDGE
Fire Access Road
Public Road
Road-Pvt Dr
Road-Pvt & Fut St
N.T.S.
NEWHALL LAND
MISSION VILLAGE
VTTM 61105
GIS LAND BASE-LAND USE
HUNSAKER & ASSOCIATES
LOS ANGELES, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
26074 Avenue Hall, Suite 22 • Valencia, CA 91355 • PH: (661) 294-2211 • FX: (661) 294-9890
DATE: 12/22/2005
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PROJECT SITE
GOLDEN STATE FWY
SR-126
MCBEAN PKWY
VALENCIA
NEWHALL
LYONS AV
PICO CANYON
L.A. COUNTY
VENTURA COUNTY
NORTH
VICINITY MAP
CHR-1
CHE
CHSP
VALENCIA COMMERCE CENTER VTPM 18108
TRAVEL VILLAGE
SR-126
LAND MARK VILLAGE VTTM 53108
MISSION VILLAGE VTTM 061105
A-8
A-7
A-6
HC
HC-1
HC-2
HC-3
HC-4
HC-6
HW
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HW-3
HW-4
HW-5
WRP
HOMESTEAD VTTM 060678
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OF-12
OF-13
OF-14
OF-15
PR-1
LONG CANYON ROAD
LCN-1
LCN-2
LCN-3
LCN-4
LCN-5
LCN & S
LCN-6
LCN-7
LCN-8
LCS-1
LCS-2
LCS-3
MW
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MW-9
MW-10
MW-11
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VALENCIA BLVD
MAGIC MOUNTAIN PARKWAY
LEGACY VILLAGE VTTM 061996
LEGEND
PROJECT BOUNDARY
NEWHALL RANCH BOUNDARY
Land Use
S.F.-DETACHED (AVG. 1.0 AC; 2.5 AC
S.F.-DETACHED (AVG. 1.0 AC)
S.F.-DETACHED (AVG. 2.5 AC)
SFD-10000
SFD-7500
SFD-6500
SFD-6000
SFD-5800
SFD-5500
SFD-5000
SFD-CONDO
M.F.-CONDO
COMM-BUSINESS PARK
P.F.-DEBRIS BASIN
P.F.-WATER QUALITY
Drainage
O.S. TRAIL LDZ
O.S.-LDZ
PUBLIC FACILITY
OPEN SPACE
O.S.-NAT.
RECREATION
PARK
SCHOOL
Public Road
Road-Pvt Dr
Road-Pvt & Fut St
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NEWHALL LAND
HOMESTEAD
VTTM 060678
GIS LAND BASE-LAND USE
HUNSAKER & ASSOCIATES
LOS ANGELES, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
26074 Avenue Hall, Suite 22 • Valencia, CA 91355 • PH: (661) 294-2211 • FX: (661) 294-9890

3.10 AFFORDABLE HOUSING PROGRAM

1. Program Description

The Newhall Ranch Affordable Housing Program provides for the direct inclusion of very low, low and moderate income affordable housing opportunities as herein defined within the Specific Plan Area. The Newhall Ranch Affordable Housing Program is consistent with Policy 5.2 of the Housing Element of the Los Angeles County General Plan that states:

> "Support and facilitate the development of housing affordable to lower-income households, and encourage the dispersal of new lower-income housing throughout the unincorporated areas of the County"

The Newhall Ranch Affordable Housing Program provides very low, low and moderate income affordable housing opportunities in several housing categories including for-sale units and rental units. While affordable units may be located within any planning area which allows for residential development, it is anticipated that most units will be located within the land use designations Medium Residential (M), High Residential (H) and Mixed-Use (MU). These categories allow for higher intensity residential uses associated with housing types that can provide sales and rental rates that lower income households can afford. This allows Affordable Housing opportunities to be dispersed throughout the community and within convenient proximity to employment and retail centers.

2. General Requirements

a. Affordable Housing Unit Requirement

Affordable Housing Units shall be designated and made available at rental rates or sales prices as required in Section 3.10, paragraph 3, Implementation of Affordable Housing Program. A total of 2,200 Affordable Housing Units

shall be provided, of which 440 units shall be Very Low Income Affordable Housing Units (of the 440 units a minimum of 44 units will be reserved for seniors 62 years of age or older), 330 units shall be Low Income Households at 65 percent of the Los Angeles County median income, 220 units shall be Low Income Affordable Housing Units at 80 percent of the Los Angeles County median Income, and 1210 units shall be Moderate Income Affordable Housing Units as all are herein defined. These units shall be provided in a variety of residential units (for-sale and for-rent) and will be disbursed throughout the Specific Plan area. The Affordable Housing Units provided will approximate the floor area and number of bedrooms of market rate units. Affordable Housing Units shall be constructed in pace with the overall residential development of the Specific Plan pursuant to Section 3.10, paragraph 3, Implementation of Affordable Housing Program.

b. Definitions

(1) Affordable Housing Unit

For purposes of this Specific Plan, residential units which comply with the criteria set forth in Section 3.10, paragraph 3a, Criteria For Affordable Housing Unit Credit, are defined as Affordable Housing Units and shall be credited to the Newhall Ranch Affordable Housing Unit Requirement.

(2) Very Low Income Affordable Household

For the purposes of this Specific Plan, a Very Low Income Affordable Household shall be defined as any household (one-person, two-person, etc.) whose total income is equal to or less than 50 percent of the corresponding household size Los Angeles County median household income, as determined by the United States Department of Housing and Urban Development pursuant to Section 8 of the United States Housing Act of 1937 at the time of sale or initial rental of a residential unit.

(3) Low Income Affordable Household

For the purposes of this Specific Plan, a Low Income Affordable Household shall be defined as any household (one-person, two-person, etc.) whose total income is either a) greater than 50 percent but not more than 65 percent of the corresponding household size Los Angeles County median household income, as determined by the United States Department of Housing and Urban Development pursuant to Section 8 of the United States Housing Act of 1937 at the time of sale or initial rental of a residential unit, hereinafter referred to as a Low Income (65%) Affordable Household; or b) greater than 65 percent but not more than 80 percent of the corresponding household size Los Angeles County median household income, as determined by the United States Department of Housing and Urban Development pursuant to Section 8 of the United States Housing Act of 1937 at the time of sale or initial rental of a residential unit, hereinafter referred to as a Low Income (80%) Affordable Household.

(4) Moderate Income Affordable Household

For the purposes of this Specific Plan, a Moderate Income Affordable Household shall be defined as any household (one-person, two-person, etc.) whose total household income is equal to or less than 120 percent of the corresponding household size Los Angeles County median household income, as determined by the United States Department of Housing and Urban Development pursuant to Section 8 of the United States Housing Act of 1937 at the time of sale or initial rental of a residential unit.

(5) Affordable Household Income

For the purposes of this Specific Plan, Affordable Household Income shall be defined as the total household income of the Affordable Household.

c. Affordable Housing Categories

The following Affordable Housing categories shall be allowed under the Newhall Ranch Affordable Housing Program:

(1) Rental units;
(2) For-sale units; and
(3) Any units supported by state, local or private affordable housing programs. Nothing set forth in Section 3.10 shall preclude the use of any affordable housing assistance from any sources, private, public or non-profit, for achieving the Affordable Housing Unit Requirement, provided additional Affordable Housing Units in excess of those set forth in Section 3.10, paragraph 2a are also provided in conjunction with the affordable housing assistance.

d. Affordable Housing Locations

Affordable Housing Units as defined above may be located within any area designated Low-Medium Residential (LM), Medium Residential (M), High Residential (H) or Mixed-Use (MU) on the Newhall Ranch Land Use Plan, Exhibit 2.3-1.

3. Implementation of Affordable Housing Program

a. Criteria for Affordable Housing Unit Credit

(1) Affordable Household Priority to Qualified Very Low, Low and Moderate Income Households and Credit:

To qualify and receive credit as an Affordable Housing Unit, designated residential units must first be reserved for sale or rent to Very Low, Low Income (65%), Low Income (80%), and Moderate Income Affordable Households for a period of ninety (90) days commencing from the date each designated Affordable Housing Unit is released for sale or rent.

(a) For-Sale Very Low Income Affordable Housing Unit

A for-sale unit shall qualify and be credited as a Very Low Income Affordable Housing Unit if purchased by a qualified Very Low Income Affordable Household and if the monthly mortgage payment is equal to or less than an amount calculated by multiplying one-twelfth times 33 percent times 50 percent of the Los Angeles County median annual household income of a household of four.

For purposes of this Specific Plan, for-sale monthly mortgage payments shall be calculated using a conventional 30-year fixed-rate mortgage interest rate and terms as published by Fannie Mae or Freddie Mac for the time of sale and shall include principal and interest.

(b) For-Sale Low Income Affordable Housing Unit

A for-sale unit shall qualify and be credited as a Low Income Affordable Housing Unit if purchased by a qualified Low Income (65%) or Low Income (80%) Affordable Household and if the monthly mortgage payment is equal to or less than an amount calculated by multiplying one-twelfth times 33 percent times 65 or

80 percent, as applicable, of the Los Angeles County median annual household income of a household of four.

(c) For-Sale Moderate Income Affordable Housing Unit

A for-sale unit shall qualify and be credited as a Moderate Income Affordable Housing Unit if purchased by a qualified Moderate Income Affordable Household and if the monthly mortgage payment is equal to or less than an amount calculated by multiplying one-twelfth times 33 percent times 120 percent of the Los Angeles County median annual household income of a household of four.

(d) For-Rent Very Low Income Affordable Housing Unit

A rental unit shall qualify and be credited as a Very Low Income Affordable Housing Unit if the monthly rental payment including utilities for the first fifteen (15) years of operation does not exceed the product of one-twelfth times 30 percent times 50 percent of the Los Angeles County median annual household income, adjusted for family size appropriate for the unit, in each month of operation.

For purposes of this Specific Plan, "adjusted for family size appropriate to the unit" shall mean a household of one person in the case of a studio unit, two persons in the case of a one-bedroom unit, three persons in the case of a two-bedroom unit, four persons in the case of a three-bedroom unit, and five persons in the case of a four-bedroom unit.

(e) For-Rent Low Income Affordable Housing Unit

A rental unit shall qualify and be credited as a Low Income (65%) or Low Income (80%) Affordable Housing Unit if the monthly rental payment including utilities for the first 15 years of operation does not exceed the product of one-twelfth times 30 percent times 65 or 80 percent, as applicable, of the Los Angeles County median

annual household income, adjusted for family size appropriate for the unit, in each month of operation.

(f) For-Rent Moderate Income Affordable Housing Unit

A rental unit shall qualify and be credited as a Moderate Income Affordable Housing Unit if the monthly rental payment including utilities for the first 15 years of operation does not exceed the product of one-twelfth times 30 percent times 120 percent of the Los Angeles County median annual household income, adjusted for family size appropriate for the unit, in each year of operation.

(2) Affordable Housing Unit Credit

(a) Any for-sale or for-rent Affordable Housing Unit occupied by an Affordable Household shall qualify for credit for the Affordable Housing Program, or:

(b) If after first being reserved and offered for sale to qualified Very Low, Low Income (65%), Low Income (80%), Moderate Income Households for a period of ninety (90) days after release for sale a valid purchase contract has not been executed by such a Household, or the purchase contract is canceled by the buyer after the ninety days has expired, the unit may be sold to the general public at market value and will qualify for credit as a Very Low, Low Income (65%), Low Income (80%), or Moderate Income Housing Unit; or

(c) If after first being offered for rent a valid lease contract has not been executed by a Very Low, Low Income (65%), Low Income (80%), or Moderate Affordable Household, or the lease contract is canceled by the renter after the 90 days has expired, the unit may be rented to the general public at market rental rates and will receive credit as an Affordable Housing Unit, provided the next available vacant unit of similar square footage and number of bedrooms is reserved and offered for rent to a qualified Very Low,

Low Income (65%), Low Income (80%), or Moderate Income Affordable Household for a period of 60 days. If after being offered for rent a valid lease contract has not been executed by an Affordable Household, or the lease contract is canceled by the renter after the 60 days has expired, the similar unit may be rented to the general public at market rental rates and the requirement to continue to make the next available similar size vacant unit available to Affordable Households for 60 days shall remain in effect until a unit is occupied by an Affordable Household. Whenever an Affordable Household vacates a qualified Affordable Rental Housing Unit during the first 15 years of operation the above requirements shall apply. No Affordable Housing Rental unit shall receive credit until initially occupied by a Very Low (50%) Income, Low Income (65%), or Low Income (80%) household.

A deed restriction with a term of 15 years shall be recorded upon initial occupancy of each qualified Affordable Rental Housing Unit containing the above provisions. Upon initial occupancy, the builder of any deed restricted rental unit shall contract with the Los Angeles County Community Development Commission (CDC) to monitor and enforce the rental provisions set forth above, assist the owner of any deed restricted unit in finding qualified Low Income (65%), Low Income (80%), or Moderate Income Affordable Households to rent the unit, or make CDC rental assistance programs available to prospective renters.

In order to provide maximum opportunity to Affordable Households seeking rental units, the designation of an Affordable Rental Housing Unit may be transferred from one residential rental unit to another at any time during the 15 year period, provided the monthly rent of the unit transferred to is equal to or less than the monthly rent of the Affordable Rental Housing Unit, and no more than 50 percent of units within the rental development being transferred to are designated Affordable Housing Units. Such transfers shall be identified in the Annual Affordable Housing Report described in Section 3.10, paragraph 3c.

b. Affordable Housing Monitoring Program

A monitoring program and Affordable Housing Phasing Increments shall be established as set forth below to provide Very Low, Low Income (65%), Low Income (80%), and Moderate Income Affordable Housing Units along with the construction of total residential development within the Specific Plan area. The monitoring program shall be initiated when the Newhall Ranch Tentative Tract Map that includes the 5,000th Planned residential unit is submitted to Los Angeles County. Said map application shall be accompanied by the first Affordable Housing Report that shall contain the information described in Section 3.10, paragraph 3c below. The requirements of the individual Phasing Increments are set forth below.

(1) First Affordable Housing Phasing Increment

The County may withhold or restrict building permits for Planned residential units in excess of the 11,000th Planned residential unit (except building permits for Affordable Housing Units), until such time as it can be demonstrated that 1,100 Affordable Housing Units have been made available for sale or rent.

(2) Second Affordable Housing Phasing Increment

The County may withhold or restrict building permits for Planned residential units in excess of the 16,500th Planned residential unit (except building permits for Affordable Housing Units), until such time as it can be demonstrated that 1,650 Affordable Housing Units have been made available for sale or rent.

(3) Third Affordable Housing Phasing Increment

The County may withhold or restrict building permits for any Planned residential units in excess of the 20,000th Planned residential unit (except building permits for Affordable Housing Units), until such time as it can be

demonstrated that 2,200 Affordable Housing Units have been made available for sale or rent.

(4) Affordable Household Unit Mix

(a) All Very Low Income Affordable Housing Units may be rental units.

(b) All Low Income (65%) Affordable Housing Units may be rental units.

(c) A minimum of fifty percent (50%) of Low Income (80%) Affordable Housing units shall be rental units.

(d) Moderate Income Affordable Housing Units may be either rental units or for-sale units.

(e) The proportion of Very Low, Low Income (65%), Low Income (80%), and Moderate Income Affordable Housing Units in each Affordable Housing Phasing Increment shall be provided in substantially the same proportion as their respective ratio to the total Affordable Housing Unit Requirement set forth in Section 3.10, paragraph 2a.

c. Annual Affordable Housing Report

Initiation of the Annual Affordable Housing Report shall start as described in Section 3.10, paragraph 3b above. Following the first Affordable Housing Report, Annual Affordable Housing Reports shall be submitted to Los Angeles County Department of Regional Planning and CDC on an annual basis no later than March 1 covering the Affordable Housing Program through December 31 of the previous year until such time as it is demonstrated that the Affordable Housing Unit Requirement set forth in Section 3.10, paragraph 2a has been achieved. The Annual Affordable Housing Report shall include the total number of residential units constructed within the Specific Plan area; the total number and percentage of Very Low, Low Income (65%), Low Income (80%), and Moderate Income Affordable Housing Units qualifying for credit under the Affordable Housing Program by housing category; the rents or sales prices and addresses of units qualifying for credit during the previous year; rents and addresses of rental units qualifying for credit during the immediate past 15 years; and the mortgage and payment calculations pursuant to Section 3.10, paragraph 3a above. The developer of any Affordable Housing Unit shall make a good-faith effort at marketing the units to qualified households and an affordable household marketing program (advertising promotion and other efforts to locate income-qualified households) shall be provided to CDC for their review and approval with the first annual Affordable Housing Report.

APPENDIX G

Water Quality

Letter from California Regional Water Quality Control Board,
September 11, 2007

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

REGION 4, LOS ANGELES REGION

320 W. 4th Street, Suite 200, Los Angeles, California 90013
(213) 576-6600 • Fax (213) 576-6640
http://www.waterboards.ca.gov

ORDER NO. <R4-2007-0046>
NPDES NO. <CA0064556>

WASTE DISCHARGE REQUIREMENTS FOR THE NEWHALL RANCH SANITATION DISTRICT (Newhall Ranch Water Reclamation Plant) DISCHARGE TO THE SANTA CLARA RIVER

The following Discharger is subject to waste discharge requirements as set forth in this Order:

Table 1. Discharger Information

Discharger	Newhall Ranch Sanitation District
Name of Facility	Newhall Ranch Water Reclamation Plant
Facility Address	Hwy 126 at Los Angeles/Ventura County Line
	Newhall, California, 91355
	Los Angeles County
The U.S. Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a major discharge.	

The discharge by the Newhall Ranch Sanitation District from the discharge points identified below is subject to waste discharge requirements as set forth in this Order:

Table 2. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Tertiary treated effluent	34 °, 0.403166',," N	118°, 0.6896667',," W	Santa Clara River

Table 3. Administrative Information

This Order was adopted by the Regional Water Quality Control Board on:	September 6, 2007
This Order shall become effective on:	October 27, 2007
This Order shall expire on:	August 10, 2012
The Discharger shall file a Report of Waste Discharge in accordance with title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than:	180 days prior to the Order expiration date

IT IS HEREBY ORDERED, that in order to meet the provisions contained in division 7 of the Water Code (commencing with section 13000) and regulations adopted thereunder and the provisions of the federal Clean Water Act (CWA) and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order.

I, Deborah J. Smith, Interim Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Los Angeles Region, on September 6, 2007.

Deborah J. Smith, Interim Executive Officer

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I. FACILITY INFORMATION

The following Discharger is subject to waste discharge requirements as set forth in this Order:

Table 4. Facility Information

DISCHARGER	Newhall Ranch Sanitation District
NAME OF FACILITY	Newhall Ranch Water Reclamation Plant
FACILITY ADDRESS	Hwy 126 at Los Angeles/Ventura County Line
	Newhall, California, 91355
	Los Angeles County
FACILITY CONTACT, TITLE, AND PHONE	Steve Sheridan, Principal Engineer (626) 458-7151
MAILING ADDRESS	900 South Fremont, Alhambra, CA 91803
TYPE OF FACILITY	POTW
FACILITY DESIGN FLOW	2 million gallons per day (MGD) in Phase I

II. FINDINGS

The California Regional Water Quality Control Board, Los Angeles Region (hereinafter Regional Water Board), finds:

A. **Background.** Newhall Land and Farming Company (Newhall Land) submitted a Report of Waste Discharge (ROWD), dated April 23, 2004, and applied for a National Pollutant Discharge Elimination System (NPDES) permit authorization to discharge up to 2 MGD of tertiary treated wastewater from a new privately owned treatment works that would treat the sewage generated by the inhabitants of Landmark Village, a new housing development. Newhall Land indicated to Regional Water Board staff that they were interested in applying for the NPDES permit as a publicly owned treatment works, not a privately owned treatment works. However, Newhall Land was in the process of applying to the Local Agency Formation Commission for Los Angeles County (LAFCO), for approval of the formation of a new sanitation district. On July 27, 2006, the Newhall Ranch Sanitation District (Newhall Ranch SD) was formed. In September 2007, the grant deed will be transferred from Newhall Land to Newhall Ranch SD. In January 2008 grading activities are scheduled to begin. In June 2008 Newhall Ranch SD is scheduled to approve the plans for the plant design. In September 2008, construction of the Newhall Ranch Water Reclamation Plant (Newhall Ranch WRP) is scheduled to begin. By August 2009, the Newhall Ranch WRP should be constructed. The Newhall Ranch WRP would have an initial design capacity of 2 MGD, and incrementally increase its design capacity to 6.8 MGD [2.0 MGD in Phase I; 4.0 MGD in Phase II; and 6.8 MGD in Phase III], to accommodate the sewage generated by new inhabitants, as additional tracts of the Landmark Village development project are completed. Newhall Land submitted a revised ROWD on September 27, 2004. Their consultants have been submitting additional information, including receiving water sampling analytical results to supplement the ROWD. On March 30, 2007, additional receiving water data was received at the Regional Water Board, submitted by Geosyntec on behalf of Newhall Land. The application has not been deemed complete because Newhall Ranch SD has not submitted the required signatures on the ROWD. Upon receipt of the revised ROWD with the signatory requirements for the Newhall SD, the ROWD may be considered as complete as possible, except for the effluent data which will need to be collected after start-up. On May 4 and May 23, 2007, the Regional Water Board received the required signatory statement.

   For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

B. **Facility Description.** Newhall Land is planning on transferring ownership of the land to Newhall Ranch SD in September 2007. Newhall Ranch SD will make a formal application to the existing twenty-four County Sanitation Districts to become signatory to the amended Joint Administration Agreement, dated July 1, 1980, of the County Sanitation Districts of Los Angeles County. Newhall Ranch SD will also make a formal

application to the Santa Clarita Valley Sanitation District to enter into an agreement regarding the ownership and operation of the Newhall Ranch WRP. These agreements will allow the Los Angeles County Sanitation District to be the operator of the Newhall Ranch WRP, and to provide engineering and administrative staff at the Newhall Ranch WRP. However, Newhall Ranch SD will retain ownership of the Newhall Ranch WRP.

Treatment at the Newhall Ranch WRP, a publicly owned treatment works (POTW), will consist of screening, activated sludge secondary treatment with membrane bioreactors, nitrification/denitrification, ultraviolet disinfection, and partial reverse osmosis (RO). There will be no solids handling facilities in the near term. Waste activated sludge, or biosolids, will be hauled away to the Valencia Water Reclamation Plant for further treatment and disposal; and will be regulated under the Valencia WRP's NPDES permit No. CA0054216. Brine from the RO system will be disposed of through deep well injection, under a separate USEPA permit. Treated wastewater will be discharged from Discharge Point 001 (see Table on Cover Page) to the Santa Clara River, a water of the United States, tributary to the Santa Clara River Estuary, within the Santa Clara River Watershed. Attachment B provides a map of the area around the facility. Attachment C provides the flow schematic of the facility.

C. **Legal Authorities.** This Order is issued pursuant to section 402 of the Federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. Environmental Protection Agency (USEPA) and Chapter 5.5, Division 7 of the California Water Code (CWC). It shall serve as a NPDES permit for point source discharges from this facility to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to Article 4, Chapter 4 of the CWC.

D. **Background and Rationale for Requirements**. The Regional Water Board developed the requirements in this Order based on information submitted as part of the application, through monitoring and reporting programs, and other available environmental information. Attachment F, which contains background information and rationale for Order requirements, is hereby incorporated into this Order and constitutes part of the Findings for this Order. Attachments A through E, and others are also incorporated into this Order.

E. **California Environmental Quality Act (CEQA).** The discharger is not a new source, as defined in the CWA. (See 40 CFR part 122.2.) Therefore, the approval of this permit is not subject to the California Environmental Quality Act (CEQA), as stated in section 13389 of the CWC.

F. **Technology-based Effluent Limitations.** The Code of Federal Regulations (CFR) at 40 CFR Section 122.44(a) requires that permits include applicable technology-based limitations and standards. This Order includes technology-based effluent limitations based on tertiary treatment or equivalent requirements that meet both the technology-based secondary treatment standards, at 40 CFR Part 133, for POTWs and protect the beneficial uses of the receiving waters. The Regional Water Board has considered the factors listed in CWC Section 13241 in establishing these requirements and Best Professional Judgment (BPJ) in accordance with 40 CFR Section 125.3. A detailed

discussion of the technology-based effluent limitations development is included in the Fact Sheet (Attachment F).

G. **Water Quality-Based Effluent Limitations.** Section 301(b) of the CWA and section 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. Section 122.44(d)(1)(i) mandates that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, water quality-based effluent limitations (WQBELs) must be established using: (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in section 122.44(d)(1)(vi).

H. **Water Quality Control Plans.** The Regional Water Board adopted a Water Quality Control Plan for the Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (hereinafter Basin Plan) on June 13, 1994 that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, State Water Resources Control Board (State Water Board) Resolution No. 88-63 requires that, with certain exceptions, the Regional Water Board assign the municipal and domestic water supply use to water bodies that do not have beneficial uses listed in the Basin Plan. Beneficial uses applicable to the Santa Clara River are as follows:

Table 5. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	Santa Clara River (Hydro Unit 403.51)	Existing: Industrial Service Supply (IND), Industrial Process Supply (PROC), Agricultural Supply (AGR), Ground Water Recharge (GWR), Freshwater Replenishment (FRSH), Water Contact Recreation (REC1), Non-contact Water Recreation (REC2), Warm freshwater habitat (WARM); Wildlife habitat (WILD), preservation or rare, threatened or endangered species (RARE), and Wetland Habitat (WET). Potential*: Municipal and domestic water supply (MUN).
	Santa Clara River (Hydro Unit 403.41)	Existing: IND, PROC, AGR, GWR, FRSH, REC1, REC2, WARM, WILD, RARE, Migration of Aquatic Organisms (MIGR) and WET. Potential*: MUN.

	Santa Clara River (Hydro Unit 403.31)	Existing: IND, PROC, AGR, GWR, FRSH, REC1, REC2, WARM; WILD, RARE, MIGR and WET. Potential*: MUN.
	Santa Clara River (Hydro Unit 403.21)	Existing: IND, PROC, AGR, GWR, FRSH, REC1, -REC2, WARM; WILD, RARE, MIGR and WET. Potential*: MUN.
	Santa Clara River (Hydro Unit 403.11)	Existing: IND, PROC, AGR, GWR, FRSH, REC1, REC2, WARM; Coldwater Habitat (COLD), WILD, RARE, MIGR and WET. Potential*: MUN.
	Santa Clara River Estuary (Hydro Unit 403.11)	Existing: Navigation (NAV); , REC1, REC2, Commercial and Sport Fishing (COMM); Estuarine Habitat (EST); Marine Habitat (MAR); WILD, RARE, MIGR; Spawning Reproduction, and/or Early Development (SPWN); and, WET.

* The potential municipal and domestic supply (p* MUN) beneficial use for the waterbody is consistent with the State Water Resources Control Board Order No. 88-63 and Regional Water Board Resolution No. 89-003; however, the Regional Water Board has only conditionally designated the MUN beneficial use of the surface water and at this time cannot establish effluent limitations designed to protect the conditional designation.

Requirements of this Order implement the Basin Plan.

On July 25, 2003, USEPA approved the State's most recent list of impaired waterbodies. The list (hereinafter referred to as the 303(d) list) was prepared in accordance with Section 303(d) of the Federal Clean Water Act to identify specific impaired waterbodies where water quality standards are not expected to be met after implementation of technology-based effluent limitations on point sources.

Santa Clara River, Santa Clara River Estuary, and their tributaries were on the 2002 303(d) List. The following pollutants/stressors, from point and non-point sources, were identified as impacting the receiving waters:

1. Santa Clara River Estuary: Chem A, High Coliform Count, Toxaphene;

2. Santa Clara River Reach 3 (Freeman Diversion to A Street): Ammonia, Chloride, Total Dissolved Solids;

3. Santa Clara River Reach 7 (Blue Cut to West Pier Hwy 99 Bridge): Chloride, High Coliform Count, Nitrate and Nitrite;

4. Santa Clara River Reach 8 (W. Pier Hwy 99 to Bouquet Canyon Rd. Bridge) -- Hydrologic Unit 403.51: Chloride and High Coliform Count; and,

5. Santa Clara River Reach 9 (Bouquet Canyon Rd to above Lang Gaging) – Hydrologic Unit 403.51: High Coliform Count.

On October 25, 2006, the State Water Board adopted a revised 303(d) list. The 2006 303(d) list was partially approved by the USEPA on November 30, 2006. However, on March 8, 2007, USEPA partially disapproved the State's 303(d) list, by disapproving the State's omission of impaired waters that met federal listing regulations or guidance. USEPA is adding 64 waters and 37 associated pollutants to the State's 303(d) list.

Santa Clara River, Santa Clara River Estuary, and their tributaries are on the 2006 303(d) List. The following pollutants/stressors, from point and non-point sources, were identified as impacting the receiving waters:

1. Santa Clara River Estuary: Chem A, Coliform Bacteria, and Toxaphene;

2. Santa Clara River Reach 1 (Estuary to Hwy 101 Bridge): Toxicity:

3. Santa Clara River Reach 3 (Freeman Diversion to A Street): Total Dissolved Solids;

4. Santa Clara River Reach 5 [formerly Reach 7 in 2002 303d list] (Blue Cut to West Pier Hwy 99 Bridge): Coliform Bacteria;

5. Santa Clara River Reach 6 [formerly Reach 8 in 2002 303d list] (W. Pier Hwy 99 to Bouquet Canyon Rd. Bridge) -- Hydrologic Unit 403.51: Chlorpyrifos, Coliform Bacteria, Diazinon, and Toxicity; and,

6. Santa Clara River Reach 7 [formerly Reach 9 in 2002 303d list] (Bouquet Canyon Rd to above Lang Gaging) -- Hydrologic Unit 403.51: Coliform Bacteria.

I. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995 and November 9, 1999. About forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants.

J. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP became effective on April 28, 2000 with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Board in the Basin Plan. The SIP became effective on May 18, 2000 with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005 that became effective on July 13, 2005. The SIP establishes

implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

K. **Compliance Schedules and Interim Requirements.** Section 2.1 of the SIP provides that, based on a Discharger's request and demonstration that it is infeasible for an existing Discharger to achieve immediate compliance with an effluent limitation derived from a CTR criterion, compliance schedules may be allowed in an NPDES permit. Unless an exception has been granted under section 5.3 of the SIP, a compliance schedule may not exceed 5 years from the date that the permit is issued or reissued, nor may it extend beyond 10 years from the effective date of the SIP (or May 17, 2010) to establish and comply with CTR criterion-based effluent limitations. Where a compliance schedule for a final effluent limitation exceeds 1 year, the Order must include interim numeric limitations for that constituent or parameter. Where allowed by the Basin Plan, compliance schedules and interim effluent limitations or discharge specifications may also be granted to allow time to implement a new or revised water quality objective. This Order does not include compliance schedules or interim effluent limitations.

L. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards (WQS) become effective for CWA purposes. (40 C.F.R. § 131.21; 65 Fed. Reg. 24641 (April 27, 2000).) Under the revised regulation (also known as the Alaska rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000 may be used for CWA purposes, whether or not approved by USEPA.

M. **Stringency of Requirements for Individual Pollutants.** This Order contains restrictions on individual pollutants that are no more stringent than required by the federal CWA. Individual pollutant restrictions consist of technology-based restrictions and water quality-based effluent limitations. The technology-based effluent limitations consist of restrictions on biochemical oxygen demand (BOD), total suspended solids (TSS), and hydrogen ion concentration (pH). Restrictions on BOD, TSS, and pH are specified in federal regulations as discussed in Finding F, and the permit's technology-based pollutant restrictions are no more stringent than required by the CWA. Water quality-based effluent limitations have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant water quality-based effluent limitations were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The scientific procedures for calculating the individual water quality-based effluent limitations are based on the CTR-SIP, which was approved by USEPA on May 18, 2000. Most beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA"

pursuant to 40 CFR 131.21(c)(1). For the most part, this Order's restrictions on individual pollutants are no more stringent than required to implement the requirements of the CWA.

This Order contains pollutant restrictions that are more stringent than applicable federal requirements and standards. Specifically, this Order includes effluent limitations for bis(2-ethylhexyl)phthalate that are more stringent than applicable federal standards, but that are nonetheless necessary to meet numeric objectives or protect beneficial uses. The rationale for including these limitations is explained in this Fact Sheet. In addition, the Regional Water Board has considered the factors in Water Code section 13241 in Facts Sheet Section IV.D.3.

N. **Antidegradation Policy.** Section 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the state and federal antidegradation policies. As discussed in detail in the Fact Sheet the permitted discharge is consistent with the antidegradation provision of section 131.12 and State Water Board Resolution No. 68-16.

O. **Anti-Backsliding Requirements.** Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at 40 CFR Section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. Since this is a new discharge, all effluent limitations and requirements contained in this Order are new. Therefore, there is no relaxation of effluent limitations. The WDR is consistent with the anti-backsliding requirements of the CWA and federal regulations.

P. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the state. The discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

Q. **Monitoring and Reporting.** Section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code sections 13267 and 13383 authorizes the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program establishes monitoring and reporting requirements to implement federal and State requirements. This Monitoring and Reporting Program is provided in Attachment E.

R. **Standard and Special Provisions.** Standard Provisions, which apply to all NPDES permits in accordance with section 122.41, and additional conditions applicable to specified categories of permits in accordance with section 122.42, are provided in Attachment D. The discharger must comply with all standard provisions and with those additional conditions that are applicable under section 122.42. The Regional Water Board has also included in this Order special provisions applicable to the Discharger. A rationale for the special provisions contained in this Order is provided in the attached Fact Sheet.

S. **Provisions and Requirements Implementing State Law.** The provisions/requirements in subsection IV.C of this Order is included to implement state law only. These provisions/requirements are not required or authorized under the federal CWA; consequently, violations of these provisions/requirements are not subject to the enforcement remedies that are available for NPDES violations.

T. **Notification of Interested Parties.** The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe Waste Discharge Requirements for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet of this Order.

U. **Consideration of Public Comment.** The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet of this Order.

III. DISCHARGE PROHIBITIONS

A. Wastes discharged from Discharge Serial No. 001 shall be limited to tertiary-treated wastewater, as proposed in the ROWD.

B. Discharges not specifically authorized under this Order are prohibited.

C. The bypass or overflow of untreated wastewater or wastes to surface waters or surface water drainage courses is prohibited, except as allowed in Standard Provision I.G. of Attachment D, Federal Standard Provisions.

D. The effluent temperature shall not exceed 86°F, except as a result of external ambient temperature.

E. Radioactivity of the wastes discharged shall not exceed the limits specified in Title 22, Chapter 15, Article 5, Section 64443, CCR, or subsequent revisions.

F. In accordance with 40 CFR, Parts 133.102(a)(3) and 133.102(b)(3), for BOD and total suspended solids, respectively, the 30-day average percent removal shall not be less than 85 percent. Percent removal is defined as a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent pollutant concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

G. The wastes discharged to water courses shall at all times be adequately disinfected. For the purpose of this requirement, the wastes shall be considered adequately disinfected if the median number of coliform organisms at some point in the treatment process does not exceed 2.2 per 100 milliliters, and the number of coliform organisms does not exceed 23 per 100 milliliters in more than one sample within any 30-day period. The median value shall be determined from the bacteriological results of the last seven (7) days for which analysis has been completed. Samples shall be collected at a time when wastewater flow and characteristics are most demanding on treatment facilities and the disinfection processes.

H. For the protection of the water contact recreation beneficial use, the wastes discharged to water courses shall have received adequate treatment, so that the turbidity of the treated wastewater does not exceed: (a) 0.2 Nephelometric turbidity units (NTUs) more than 5 percent of the time (72 minutes) during any 24 hour period; and (b) 0.5 NTUs at any time.

I. To protect underlying ground water basins, pollutants shall not be present in the wastes discharged at concentrations that pose a threat to ground water quality.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations – Discharge Point 001

1. Final Effluent Limitations – Discharge Point 001

a. The Discharge of tertiary-treated effluent shall maintain compliance with the following effluent limitations at Discharge Point 001, with compliance measured at Monitoring Location EFF-001, RSW-001U, RSW-001D and RSW-002D as described in the attached Monitoring and Reporting Program (Attachment E):

Table 6. Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Biochemical Oxygen Demand 5-day @ 20°C	mg/L	20	30	45	--	--
	lbs/day[1]	330	500	750	--	--
Total Suspended Solids	mg/L	15	40	45	--	--
	lbs/day	250	670	750	--	--
pH	standard units	--	--	--	6.5	8.5
Settleable solids	mL/L	0.1	--	0.3	--	--
Oil and grease	mg/L	10	--	15	--	--
	lbs/day[1]	170	--	250	--	--
Total dissolved solids	mg/L	1000	--	--	--	--
	lbs/day[1]	16,700	--	--	--	--
Chloride	mg/L	100[2]	--	--	--	--
	lbs/day[1]	1,700	--	--	--	--
Sulfate	mg/L	400	--	--	--	--
	lbs/day[1]	6,700	--	--	--	--

[1] The mass emission rates are based on the plant design flow rate of 2.0 mgd, and are calculated as follows: Flow(MGD) x Concentration (mg/L) x 8.34 (conversion factor) = lbs/day. However, the design capacity will incrementally increase to 6.8 MGD, as the phased plant upgrades approach completion. The mass-based effluent limitation will accordingly be modified following an Anti-degradation analysis demonstration conducted by the Discharger, and upon certification and approval of increased treatment plant capacity. During wet-weather storm events in which the flow exceeds the design capacity, the mass discharge rate limitations shall not apply, and concentration limitations will provide the only applicable effluent limitations.

[2] This is the water quality objective for chloride in the current Basin Plan. This effluent limitation is consistent with the assumptions of the Chloride TMDL for the Santa Clara River, Resolution No. 2002-018, *Amendment to the Water Quality Control Plan for the Los Angeles Region to Include a TMDL for Chloride in the Santa Clara River (Chloride TMDL)*. This effluent limitation applies immediately. However, if a chloride site specific objective (Chloride SSO) is adopted for the reach of the Santa Clara River in which Newhall Ranch WRP will discharge, then the permit may be reopened to make the necessary changes to this permit, following USEPA approval of the Chloride SSO.

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Boron	mg/L	1.5	--	--	--	--
	lbs/day[1]	25	--	--	--	--
Total ammonia (NH_3 as N)	mg/L	1.93[3]	--	3.87[4]	--	--
	lbs/day[1]	25	--	65	--	--
Nitrate-N + Nitrite-N	mg/L	5	--	--	--	--
	lbs/day[1]	80	--	--	--	--
Nitrite-N	mg/L	0.9	--	--	--	--
	lbs/day[1]	15	--	--	--	--
Detergents (as MBAS)	mg/L	0.5	--	--	--	--
	lbs/day[1]	8	--	--	--	--
Total residual chlorine	mg/L	--	--	0.1	--	--
Antimony	µg/L	6	--	--	--	--
	lbs/day[1]	0.1	--	--	--	--
Arsenic	µg/L	10	--	--	--	--
	lbs/day[1]	0.2	--	--	--	--
Copper	µg/L	22	--	44	--	--
	lbs/day[1]	0.37	--	0.73	--	--
Lead	µg/L	13	--	26	--	--
	lbs/day[1]	0.22	--	0.43	--	--
Mercury	µg/L	0.051	--	0.10	--	--
	lbs/day[1]	0.00085	--	0.0017	--	--
Nickel	µg/L	100	--	--	--	--
	lbs/day[1]	1.7	--	--	--	--
Selenium	µg/L	4.1	--	8.2	--	--
	lbs/day	0.068	--	0.14	--	--
Zinc	µg/L	5000	--	--	--	--
	lbs/day[1]	83	--	--	--	--
Cyanide	µg/L	4.2	--	8.5	--	--
	lbs/day[1]	0.07	--	0.14	--	--
Acrylonitrile	µg/L	0.66	--	1.3	--	--
	lbs/day[1]	0.011	--	0.022	--	--
Tetrachloroethylene	µg/L	5	--	--	--	--
	lbs/day[1]	0.08	--	--	--	--

[3] This is the monthly average effluent limit calculated according to the Implementation Plan for ammonia in the Basin Plan, which specifies how to translate the Ammonia WQO into a final effluent limit, consistent with the assumptions of the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011.

[4] This is the daily maximum effluent limit calculated according to the Implementation Plan for ammonia in the Basin Plan, which specifies how to translate the Ammonia WQO into a final effluent limit, consistent with the assumptions of the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011.

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Bis(2-ethylhexyl)phthalate	µg/L	4	--	--	--	--
	lbs/day[1]	0.07	--	--	--	--
p-Dichlorobenzene (1,4-Dichlorobenzene)	µg/L	5	--	--	--	--
	lbs/day[1]	0.08	--	--	--	--
Lindane	µg/L	0.2	--	--	--	--
	lbs/day	0.003	--	--	--	--
4,4-DDE	µg/L	0.00059	--	0.0012	--	--
	lbs/day	0.0000098	--	0.00002	--	--
Iron	µg/L	300	--	--	--	--
	lbs/day	5	--	--	--	--

b. **Percent Removal:** The average monthly percent removal of BOD 5-day 20°C and total suspended solids shall not be less than 85 percent.

c. Acute Toxicity Limitation and Effluent Requirements:

1. The acute toxicity of the effluent shall be such that:
   (i) the average survival in the undiluted effluent for any three (3) consecutive 96-hour static renewal bioassay tests shall be at least 90%, and
   (ii) no single test producing less than 70% survival

2. If either of the above requirements IV.A.1.c.1.i. or IV.A.1.c.1.ii. is not met, the Discharger shall conduct six additional tests over a twelve-week period. The Discharger shall ensure that they receive results of a failing acute toxicity test within 24 hours of the completion of the test and the additional tests shall begin within 5 business days of the receipt of the result. If the additional tests indicate compliance with acute toxicity limitation, the Discharger may resume testing at the regular frequency as specified in the monitoring and reporting program. However, if the results of any two of the six accelerated tests are less than 90% survival, then the Discharger shall begin a Toxicity Identification Evaluation (TIE). The TIE shall include all reasonable steps to identify the sources of toxicity. Once the sources are identified, the Discharger shall take all reasonable steps to reduce toxicity to meet the limits.

3. If the initial test and any of the additional six acute toxicity bioassay tests result in less than 70 % survival, the Discharger shall immediately implement the Initial Investigation Toxicity Reduction Evaluation (TRE) Workplan described later in this section.

4. The Discharger shall conduct acute toxicity monitoring as specified in Monitoring and Reporting Program (MRP) No. YYYY.

d. Chronic Toxicity Requirements

1. The chronic toxicity of the effluent shall be expressed and reported in toxic units, where:

$$TU_c = \frac{100}{NOEC}$$

The No Observable Effect Concentration (NOEC) is expressed as the maximum percent effluent concentration that causes no observable effect on test organisms, as determined by the results of a critical life stage toxicity test.

2. There shall be no chronic toxicity in the effluent discharge

3. If the chronic toxicity of the effluent exceeds the monthly median of 1.0 TUc, the Discharger shall immediately implement accelerated chronic toxicity testing according to MRP CI No. 9322, Section V.B.3. If any three out of the initial test and the six accelerated test results exceed 1.0 TUc, the Discharger shall initiate a TIE and implement the Initial Invetsigation TRE Workplan, as specified in the MRP section of this Order (Sections V.D and V.E).

4. The Discharger shall conduct chronic toxicity monitoring as specified in MRP CI No. 9322.

5. This permit may be reopened to include effluent limitations for pollutants found to be causing chronic toxicity and to include numeric chronic toxicity effluent limitations based on direction from the State Water Resources Control Board or failure of the District to comply fully with the TRE/TIE requirements.

2. Interim Effluent Limitations

a. Interim Effluent Limitations are not applicable for new dischargers.

Table 7. Interim Effluent Limitations

Parameter	Units	Effluent Limitations			
		Average Monthly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum

B. Land Discharge Specifications

[Not Applicable. Holding ponds at the Newhall Ranch WRP will be concrete-lined and are not designed for purposeful groundwater recharge.]

Table 8. Land Discharge Specifications

Parameter	Units	Discharge Specifications		
		Average Monthly	Maximum Daily	Average Annual

C. Reclamation Specifications

[Not Applicable. Water recycling requirements will be regulated under a separate order. Newhall intends on recycling all of its treated effluent during dry weather.]

Table 9. Reclamation Discharge Specifications

Parameter	Units	Discharge Specifications		
		Average Monthly	Maximum Daily	Average Annual

V. RECEIVING WATER LIMITATIONS

A. Surface Water Limitations

Receiving water limitations are based on water quality objectives contained in the Basin Plan and are a required part of this Order. The discharge shall not cause the following in the Santa Clara River:

1. For waters designated with a warm freshwater habitat (WARM) beneficial use, the temperature of the receiving water at any time or place and within any given 24-hour period shall not be altered by more than 5°F above the natural temperature (or above 70°F if the ambient receiving water temperature is less than 60°F) due to the discharge of effluent at the receiving water station located downstream of the discharge. Natural conditions shall be determined on a case-by-case basis.

2. The pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of wastes discharged. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of wastes discharged. Natural conditions shall be determined on a case-by-case basis.

3. The dissolved oxygen in the receiving water shall not be depressed below 5 mg/L as a result of the wastes discharged.

4. The fecal coliform concentration in the receiving water shall not exceed the following, as a result of wastes discharged:

    a. Geometric Mean Limits

        i. E.coli density shall not exceed 126/100 mL.

        ii. Fecal coliform density shall not exceed 200/100 mL.

    b. Single Sample Limits

        E.coli density shall not exceed 235/100 mL.

        ii. Fecal coliform density shall not exceed 400/100 mL.

5. Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in natural turbidity attributable to controllable water quality factors shall not exceed the following limits, as a result of wastes discharged:

    a. Where natural turbidity is between 0 and 50 NTU, increases shall not exceed 20%, and

b. Where natural turbidity is greater than 50 NTU, increases shall not exceed 10%.

6. The wastes discharged shall not produce concentrations of toxic substances in the receiving water that are toxic to or cause detrimental physiological responses in human, animal, or aquatic life.

7. The wastes discharged shall not cause concentrations of contaminants to occur at levels that are harmful to human health in waters which are existing or potential sources of drinking water.

8. The concentrations of toxic pollutants in the water column, sediments, or biota shall not adversely affect beneficial uses as a result of the wastes discharged.

9. The wastes discharged shall not contain substances that result in increases in BOD, which adversely affect the beneficial uses of the receiving waters.

10. Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.

11. The wastes discharged shall not cause the receiving waters to contain any substance in concentrations that adversely affect any designated beneficial use.

12. The wastes discharged shall not alter the natural taste, odor, and color of fish, shellfish, or other surface water resources used for human consumption.

13. The wastes discharged shall not result in problems due to breeding of mosquitoes, gnats, black flies, midges, or other pests.

14. The wastes discharged shall not result in visible floating particulates, foams, and oil and grease in the receiving waters.

15. The wastes discharged shall not alter the color of the receiving waters; create a visual contrast with the natural appearance of the water; nor cause aesthetically undesirable discoloration of the receiving waters.

16. The wastes discharged shall not contain any individual pesticide or combination of pesticides in concentrations that adversely affect beneficial uses of the receiving waters. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life as a result of the wastes discharged.

B. Groundwater Limitations

1. In ground waters used for domestic or municipal supply the concentration of coliform organisms over any seven day period shall be less than 1.1/ 100 ml.

2. Ground waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents and radionuclides in excess of the limits specified in the provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into the Basin Plan.

3. Ground waters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen (NO_3-N + NO_2-N), 45 mg/L as nitrate (NO_3), 10 mg/L as nitrate-nitrogen (NO_3-N), or 1 mg/L as nitrite-nitrogen (NO_2-N).

4. Groundwaters shall not contain taste or odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

VI. PROVISIONS

A. Standard Provisions

1. The Discharger shall comply with all Standard Provisions included in Attachment D of this Order.

2. The Discharger shall comply with the following provisions:

   a. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.

   b. Odors, vectors, and other nuisances of sewage or sludge origin beyond the limits of the treatment plant site or the sewage collection system due to improper operation of facilities, as determined by the Regional Water Board, are prohibited.

   c. All facilities used for collection, transport, treatment, or disposal of "wastes" shall be adequately protected against damage resulting from overflow, washout, or inundation from a storm or flood having a recurrence interval of once in 100 years.

   d. Collection, treatment, and disposal systems shall be operated in a manner that precludes public contact with wastewater.

   e. Collected screenings, sludges, and other solids removed from liquid wastes shall be disposed of in a manner approved by the Executive Officer of the Regional Water Board.

   f. The provisions of this order are severable. If any provision of this order is found invalid, the remainder of this Order shall not be affected.

   g. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the CWA.

   h. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

   i. The Discharger must comply with the lawful requirements of municipalities, counties, drainage districts, and other local agencies regarding discharges of

storm water to storm drain systems or other water courses under their jurisdiction; including applicable requirements in municipal storm water management program developed to comply with NPDES permits issued by the Regional Water Board to local agencies.

j. Discharge of wastes to any point other than specifically described in this Order is prohibited, and constitutes a violation thereof.

k. The Discharger shall comply with all applicable effluent limitations, national standards of performance, toxic effluent standards, and all federal regulations established pursuant to Sections 301, 302, 303(d), 304, 306, 307, 316, 403, and 405 of the Federal CWA and amendments thereto.

l. These requirements do not exempt the operator of the waste disposal facility from compliance with any other laws, regulations, or ordinances which may be applicable; they do not legalize this waste disposal facility, and they leave unaffected any further restraints on the disposal of wastes at this site which may be contained in other statutes or required by other agencies.

m. Oil or oily material, chemicals, refuse, or other contaminating materials shall not be stored or deposited in areas where they may be picked up by rainfall and carried off of the property and/or discharged to surface waters. Any such spill of such materials shall be contained and removed immediately.

n. A copy of these waste discharge specifications shall be maintained at the discharge facility so as to be available at all times to operating personnel.

o. If there is any storage of hazardous or toxic materials or hydrocarbons at this facility and if the facility is not manned at all times, a 24-hour emergency response telephone number shall be prominently posted where it can easily be read from the outside.

p. The Discharger shall file with the Regional Water Board a report of waste discharge at least 120 days before making any material change or proposed change in the character, location or volume of the discharge.

q. In the event of any change in name, ownership, or control of these waste disposal facilities, the discharger shall notify the Regional Water Board of such change and shall notify the succeeding owner or operator of the existence of this Order by letter, copy of which shall be forwarded to the Regional Water Board.

r. The CWC provides that any person who violates a waste discharge requirement or a provision of the CWC is subject to civil penalties of up to $5,000 per day, $10,000 per day, or $25,000 per day of violation, or when the violation involves the discharge of pollutants, is subject to civil penalties of up to $10 per gallon per

day or $25 per gallon per day of violation; or some combination thereof, depending on the violation, or upon the combination of violations. Violation of any of the provisions of the NPDES program or of any of the provisions of this Order may subject the violator to any of the penalties described herein, or any combination thereof, at the discretion of the prosecuting authority; except that only one kind of penalty may be applied for each kind of violation.

s. Under CWC 13387, any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this order, including monitoring reports or reports of compliance or noncompliance, or who knowingly falsifies, tampers with, or renders inaccurate any monitoring device or method required to be maintained in this order and is subject to a fine of not more than $25,000 or imprisonment of not more than two years, or both. For a second conviction, such a person shall be punished by a fine of not more than $25,000 per day of violation, or by imprisonment of not more than four years, or by both.

t. The discharge of any waste resulting from the combustion of toxic or hazardous wastes to any waste stream that ultimately discharges to waters of the United States is prohibited, unless specifically authorized elsewhere in this permit.

u. The Discharger shall notify the Executive Officer in writing no later than 6 months prior to planned discharge of any chemical, other than the products previously reported to the Executive Officer, which may be toxic to aquatic life. Such notification shall include:
(1) Name and general composition of the chemical,
(2) Frequency of use,
(3) Quantities to be used,
(4) Proposed discharge concentrations, and
(5) USEPA registration number, if applicable.

v. In the event the Discharger does not comply or will be unable to comply for any reason, with any prohibition, maximum daily effluent limitation, or receiving water limitation of this Order, the Discharger shall notify the Watershed Regulatory Section Chief at the Regional Water Board by telephone (213) 576-6616, or electronically, within 24 hours of having knowledge of such noncompliance, and shall confirm this notification in writing within five days, unless the Regional Water Board waives confirmation. The written notification shall state the nature, time, duration, and cause of noncompliance, and shall describe the measures being taken to remedy the current noncompliance and, prevent recurrence including, where applicable, a schedule of implementation. Other noncompliance requires written notification as above at the time of the normal monitoring report.

B. Monitoring and Reporting Program (MRP) Requirements

The Discharger shall comply with the MRP, and future revisions thereto, in Attachment E of this Order.

C. Special Provisions

1. Reopener Provisions

a. This Order may be modified, revoked and reissued, or terminated for cause, including, but not limited to:

(1) Violation of any term or condition contained in this Order;

(2) Obtaining this Order by misrepresentation, or by failure to disclose fully all relevant facts;

(3) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the Discharger for an Order modification, revocation, and issuance or termination, or a notification of planned changes or anticipated noncompliances does not stay any condition of this Order.

b. This Order may be reopened and modified, in accordance with SIP section 2.2.2.A to incorporate the results of revised reasonable potential analyses to be conducted upon receipt of additional data.

c. This Order may be modified, in accordance with the provisions set forth in 40 CFR, Parts 122 and 124 to include requirements for the implementation of the watershed protection management approach.

d. The Board may modify, or revoke and reissue this Order if present or future investigations demonstrate that the discharge(s) governed by this Order will cause, have the potential to cause, or will contribute to adverse impacts on water quality and/or beneficial uses of the receiving waters.

e. This Order may also be modified, revoked, and reissued or terminated in accordance with the provisions of 40 CFR, Parts 122.44, 122.62 to 122.64, 125.62, and 125.64. Causes for taking such actions include, but are not limited to, failure to comply with any condition of this Order, endangerment to human health or the environment resulting from the permitted activity, or acquisition of newly obtained information which would have justified the application of different conditions if known at the time of Order adoption. The filing of a request by the

District for an Order modification, revocation and issuance or termination, or a notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

f. This Order may be modified, in accordance with the provisions set forth in 40 CFR, Parts 122 to 124, to include new MLs.

g. If applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under section 307(a) of the CWA for a toxic pollutant and that standard or prohibition is more stringent than any limitation on the pollutant in this Order, the Regional Water Board may institute proceedings under these regulations to modify or revoke and reissue the Order to conform to the toxic effluent standard or prohibition.

h. The waste discharged shall not cause a violation of any applicable water quality standard for receiving waters. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the CWA, or amendments, thereto, the Regional Water Board will revise and modify this Order in accordance with such standards.

i. This Order may be reopened and modified, to revise effluent limitations as a result of future Basin Plan Amendments, such as an update of a water quality objective, the adoption of a site specific objective, or the adoption of a TMDL for the Santa Clara River Watershed.

j. This Order may be reopened and modified to revise the chronic toxicity effluent limitation or the residual chlorine effluent limitation, to the extent necessary, to be consistent with State Water Board precedential decisions, new policies, new laws, or new regulations.

k. This Order may be reopened to modify final effluent limits, if at the conclusion of necessary studies conducted by the Discharger, the Regional Water Board determines that dilution credits, attenuation factors, or metal translators are warranted.

l. This Order may be reopened to increase the design capacity, following certification of the EIR for subsequent housing developments, those which will come after the Landmark Village project.

m. This Order may be reopened to re-calculate the ammonia-nitrogen water quality based final effluent limitations, if the effluent pH and temperature differ significantly from the receiving water pH and temperature monitoring data.

2. Special Studies, Technical Reports and Additional Monitoring Requirements

a. Treatment Plant Capacity

The Discharger shall submit a written report to the Executive Officer of the Regional Water Board within 90 days after the "30-day (monthly) average" daily dry-weather flow equals or exceeds 75 percent of the design capacity of waste treatment and/or disposal facilities. The Discharger's senior administrative officer shall sign a letter, which transmits that report and certifies that the discharger's policy-making body is adequately informed of the report's contents. The report shall include the following:

(1) The average daily flow for the month, the date on which the peak flow occurred, the rate of that peak flow, and the total flow for the day;

(2) The best estimate of when the monthly average daily dry-weather flow rate will equal or exceed the design capacity of the facilities; and

(3) A schedule for studies, design, and other steps needed to provide additional capacity for waste treatment and/or disposal facilities before the waste flow rate equals the capacity of present units.

This requirement is applicable to those facilities which have not reached 75 percent of capacity as of the effective date of this Order. For those facilities that have reached 75 percent of capacity by that date but for which no such report has been previously submitted, such report shall be filed within 90 days of the issuance of this Order.

b. Toxicity Reduction Requirements.

The Discharger shall prepare and submit a copy of the Discharger's initial investigation Toxicity Reduction Evaluation (TRE) workplan to the Executive Officer of the Regional Water Board for approval within 90 days of the effective date of this permit. If the Executive Officer does not disapprove the workplan within 60 days from the date in which it was received, the workplan shall become effective. The Discharger shall use USEPA manual EPA/833B-99/002 (municipal) as guidance, or most current version. At a minimum, the initial investigation TRE workplan must contain the provisions in **Attachment G**. This workplan shall describe the steps the Discharger intends to follow if toxicity is detected, and should include, at a minimum:

(1) A description of the investigation and evaluation techniques that will be used to identify potential causes and sources of toxicity, effluent variability, and treatment system efficiency.

(2) A description of the facility's methods of maximizing in-house treatment efficiency and good housekeeping practices, and a list of all chemicals used in the operation of the facility; and,

(3) If a toxicity identification evaluation (TIE) is necessary, an indication of the person who would conduct the TIEs (i.e., an in-house expert or an outside contractor).

If the effluent toxicity test result exceeds the 1.0 TUc toxicity trigger, then the Discharger shall immediately implement accelerated toxicity testing that consists of six additional tests, approximately every two weeks, over a 12-week period. Effluent sampling for the first test of the six additional tests shall commence within 5 business days of receipt of the test results exceeding the toxicity trigger.

If the results of any two of the six tests (any two tests in a 12-week period) exceed the limitation, the Discharger shall initiate a Toxicity Reduction Evaluation (TRE).

If results of the implementation of the facility's initial investigation TRE workplan (as described above) indicate the need to continue the TRE/TIE, the Discharger shall expeditiously develop a more detailed TRE workplan for submittal to the Executive Officer within 15 days of completion of the initial investigation TRE.

Detailed toxicity testing and reporting requirements are contained in Section V of the MRP (Attachment E).

3. Best Management Practices and Pollution Prevention

a. Storm Water Pollution Prevention Plan (SWPPP)

Within 90 days from the Newhall Ranch WRP's start-up date, the Discharger shall submit an updated SWPPP that describes site-specific management practices for minimizing contamination of storm water runoff and for preventing contaminated storm water runoff from being discharged directly to waters of the State to the Regional Water Board. The SWPPP shall be developed in accordance with the requirements in *Storm Water Pollution Prevention Plan Requirements* **(Attachment H)**. If all storm water is captured and treated on-site and no storm water is discharged or allowed to run off-site from the Facility, the Discharge shall provide certification with descriptions of on-site storm water management to the Regional Water Board.

b. Spill Contingency Plan (SCP)

The Discharger shall maintain a SCP for the Newhall WRP and its sanitary sewage collection system in an up-to-date condition and shall amend the SCP

whenever there is a change (e.g. in the design, construction, operation, or maintenance of the sewage system or sewage facilities) which materially affects the potential for spills. The Discharger shall review and amend the SCP as appropriate after each spill from the Newhall WRP or in the service area of the Facility. Upon request of the Regional Water Board, the Discharge shall submit the SCP and any amendments to the Regional Water Board. The Discharger shall ensure that the up-to-date SPC is readily available to the sewage system personnel at all times and that the sewage system personnel are familiar with it.

c. **Pollutant Minimization Program (PMP)**

Reporting protocols in the Monitoring and Reporting Program, Attachment E, Section VIII.B.4 describe sample results that are to be reported as Detected but Not Quantified (DNQ) or Not Detected (ND). Definitions for a reported Minimum Level (ML) and Method Detection Limit (MDL) are provided in Attachment A. These reporting protocols and definitions are used in determining the need to conduct a Pollution Minimization Program (PMP) as follows:

The Discharger shall be required to develop a PMP as further described below when there is evidence (e.g., sample results reported as DNQ when the effluent limitation is less than the MDL, sample results from analytical methods more sensitive than those methods required by this Order, presence of whole effluent toxicity, health advisories for fish consumption, results of benthic or aquatic organism tissue sampling) that a pollutant is present in the effluent above an effluent limitation and either:

(1) The concentration of the pollutant is reported as DNQ and the effluent limitation is less than the reported ML; or

(2) The concentration of the pollutant is reported as ND and the effluent limitation is less than the MDL.

The goal of the PMP shall be to reduce all potential sources of a pollutant through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Regional Water Board may consider cost-effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to CWC Section 13263.3(d), shall be considered to fulfill the PMP requirements.

The PMP shall include, but not be limited to, the following actions and submittals acceptable to the Regional Water Board:

(1) An annual review and semi-annual monitoring of potential sources of the reportable pollutant(s), which may include fish tissue monitoring and other bio-uptake sampling;
(2) Quarterly monitoring for the reportable pollutant(s) in the influent to the wastewater treatment system;

(3) Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable pollutant(s) in the effluent at or below the effluent limitation;

(4) Implementation of appropriate cost-effective control measures for the reportable pollutant(s), consistent with the control strategy; and

(5) An annual status report that shall be sent to the Regional Water Board including:

(a) All PMP monitoring results for the previous year;

(b) A list of potential sources of the reportable pollutant(s);

(c) A summary of all actions undertaken pursuant to the control strategy; and

(d) A description of actions to be taken in the following year.

4. Construction, Operation and Maintenance Specifications

a. Wastewater treatment facilities subject to this Order shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Chapter 3, Subchapter 14, Title 23 of the California Code of Regulations (Section 13625 of the California Water Code).

b. The Discharger shall maintain in good working order a sufficient alternate power source for operating the wastewater treatment and disposal facilities. All equipment shall be located to minimize failure due to moisture, liquid spray, flooding, and other physical phenomena. The alternate power source shall be designed to permit inspection and maintenance and shall provide for periodic testing. If such alternate power source is not in existence, the discharger shall halt, reduce, or otherwise control all discharges upon the reduction, loss, or failure of the primary source of power.

5. Special Provisions for Municipal Facilities (POTWs Only)

a. **Biosolids Requirements**

(1) The Discharger shall comply with the requirements of 40 CFR 503, in general, and in particular the requirements in **Attachment I** of this Order, [Biosolids/sludge Management]. These requirements are enforceable by USEPA.

(2) The Discharger shall ensure compliance with the requirements in SWRCB Order No. 2004- 10-DWQ, General Waste Discharge Requirements for the Discharge of Biosolids to Land for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural and Land Reclamation Activities" for those sites receiving the Discharger's biosolids which a Regional Water Quality Control Board has placed under this general order, and with the requirements in individual Waste Discharge Requirements (WDRs) issued by a Regional Water Board for sites receiving the Discharger's biosolids.

(3) The Discharger shall comply, if applicable, with WDRs issued by other Regional Water Boards to which jurisdiction the biosolids are transported and applied, and with the State of Arizona's biosolids rule for biosolids transported to Arizona for treatment and/or use.

(4) The Discharger shall furnish this Regional Water Board with a copy of any report submitted to USEPA, State Water Board or other Regional Water Board, with respect to municipal sludge or biosolids.

b. **Pretreatment Requirements**

(1) This Order does not include any requirements for a Pretreatment Program because the discharge is less than 2.0 MGD and because the POTW does not have any significant industrial users (SIUs). In the future, once the design flow approaches 5.0 MGD, the Discharger will be required to develop a Pretreatment Program; and implement and enforce the pretreatment program in its entire service area.

(2) Once an approved Pretreatment Program has been developed, the Discharger shall evaluate whether its pretreatment local limits are adequate to meet the requirements of this Order. If the Newhall Ranch WRP becomes interconnected with the Los Angeles County Sanitation Districts of Los Angeles County's Saugus and Valencia WRPs joint outfall sewer system, then the Discharger will consider, in the development of local limits, the effluent limitations contained in these Orders, and other relevant factors due to the interconnectedness of the system and protection of the upstream plants. One year prior to increasing the design capacity to 5 MDG or prior to having a significant industrial user (SIU) discharge into the treatment plant's collection system, the Discharger shall submit to the Regional Water Board their proposed Pretreatment Program and the results of the evaluation indicating whether local limits are needed. Any revised local limits shall be

submitted to the Regional Water Board for approval under 40 CFR 403.18. In addition, the Discharger shall consider collection system overflow protection from such constituents as oil and grease, etc. Lack of adequate local limits shall not be a defense against liability for violations of effluent limitations and overflow prevention requirements contained in this Order.

(3) Any substantial modifications to the approved Pretreatment Program, as defined in 40 CFR 403.18(b), shall be submitted in writing to the Regional Water Board and shall not become effective until Regional Water Board approval is obtained.

(4) The Discharger shall enforce the requirements promulgated under Sections 307(b), 307(c), 307(d), and 402(b) of the CWA with timely, appropriate, and effective enforcement actions. The Discharger shall require all nondomestic users subject to the federal categorical standards to comply with those standards and shall take enforcement actions against those users who do not comply with the standards. Such enforcement actions shall be consistent with an enforcement response plan, developed pursuant to 40 CFR 403.8(f)(5). The Discharger shall ensure that all nondomestic users subject to the federal categorical standards achieve compliance no later than the date specified in those requirements or, in the case of a new nondomestic user, upon commencement of the discharge.

(5) The Discharger shall perform the pretreatment functions as required in Federal Regulations 40 CFR 403 including, but not limited to:

(a) Implement the necessary legal authorities as provided in 40 CFR 403.8(f)(1);

(b) Enforce the pretreatment requirements under 40 CFR 403.5 and 403.6;

(b) Implement the programmatic functions as provided in 40 CFR 403.8(f)(2); and

(d) Provide the requisite funding and personnel to implement the Pretreatment Program as provided in 40 CFR 403.8(f)(3).

(6) The Discharger shall submit semiannual and annual reports to the Regional Water Board, describing the Discharger's pretreatment activities over the period. The annual and semiannual reports shall contain, but not be limited to, the information required in the attached *Pretreatment Reporting Requirements* (**Attachment J**), or an approved revised version thereof. A full scan of the priority pollutants for the influent and effluent should be conducted at least annually in August. If the Discharger is not in compliance with any conditions or requirements of this Order, the Discharger shall include the

reasons for noncompliance and shall state how and when the Discharger will comply with such conditions and requirements.

(7) The Discharger shall be responsible and liable for the performance of all control authority pretreatment requirements contained in 40 CFR 403, including subsequent regulatory revisions thereof. Where Part 403 or subsequent revision places mandatory actions upon the Discharger as Control Authority but does not specify a timetable for completion of the actions, the Discharger shall complete the required actions within six months from the effective date of this Order or the effective date of Part 403 revisions, whichever comes later. For violations of pretreatment requirements, the Discharger shall be subject to enforcement actions, penalties, fines, and other remedies by the Regional Water Board, USEPA, or other appropriate parties, as provided in the CWA. The Regional Water Board or USEPA may initiate enforcement action against a nondomestic user for noncompliance with applicable standards and requirements, as provided in the CWA and/or the California Water Code.

c. **Spill Reporting Requirements**

(1) Notification

For certain spills, overflows and bypasses, the Discharger shall make notifications as required below:

a. For any spills or overflows of any volume, discharged where they are, or will probably be discharged, to waters of the State, the Discharger shall immediately notify the local health agency in accordance with the California Health and Safety Code section 5411.5. This notification shall occur no later than two hours after the knowledge of the incident.

b. For any spills or overflows of 1000 gallons or more discharged where they are, or probably be discharged to waters of the State, the Discharger shall immediately notify the State Office of Emergency Services pursuant to Water Code section 13271. This notification shall occur no later than two hours after the knowledge of the incident.

c. For spills, overflows or bypasses of any volume that flowed to receiving waters or entered a shallow ground water aquifer or has public exposure, the Discharger shall notify such spills to the Regional Water Board, by telephone or electronically as soon as possible but not later than two hours of knowledge of the incident. The following information shall be included in the initial notification: location; date and time of spill; volume and nature of the spill; cause(s) of the spill; mitigation measures implemented, if known at the time.

(2) Monitoring

For certain spills, overflows and bypasses, the Discharger shall monitor as required below:

a. To define the geographical extent of spill's impact the Discharger shall obtain grab samples for spills, overflows or bypasses of any volume that reach receiving waters. The Discharger shall analyze the samples for total and fecal coliforms or E. coli, and enterococcus, and relevant pollutants of concern, upstream and downstream of the point of entry of the spill (if feasible, accessible and safe). This monitoring shall be done on a daily basis from time the spill is known until the results of two consecutive sets of bacteriological monitoring indicate the return to the background level or the County Department of Health Services authorizes cessation of monitoring.

b. The Discharger shall obtain a grab sample (if feasible, accessible, and safe) for spills, overflows or bypasses of any volume that flowed to receiving waters, entered a shallow ground water aquifer, or have the potential for public exposure; and for all spills, overflows or bypasses of 1,000 gallons or more. The Discharger shall analyze the sample for total and fecal coliforms or E. coli, and enterococcus, and relevant pollutants of concern depending on the area and nature of spills or overflows if feasible, accessible and safe.

(3) Reporting

The Regional Water Board initial notification shall be followed by:

a. A written preliminary report five working days after disclosure of the incident (submission to the Regional Water Board of the log number of the Sanitary Sewer Overflow Database entry shall satisfy this requirement). Within 30 days after submitting the preliminary report, the Discharger shall submit the final written report to this Regional Water Board. (A copy of the final written report, for a given incident, already submitted pursuant to a Statewide General Waste Discharge Requirements for Wastewater Collection System Agencies, may be submitted to the Regional Water Board to satisfy this requirement.) The written report shall document the information required in paragraph 4. below, monitoring results and any other information required in provisions of the Standard Provisions document including corrective measures implemented or proposed to be implemented to prevent/minimize future occurrences. The Executive Officer for just cause can grant an extension for submittal of the final written report.

b. The Discharger shall include a certification in the annual summary report (due according to the schedule in the Monitoring and Reporting Program) that states—the sewer system emergency equipment, including alarm systems, backup pumps, standby power generators, and other critical emergency pump station components were maintained and tested in accordance with the Discharger's Preventative Maintenance Plan. Any deviations from or modifications to the Plan shall be discussed.

(4) Records

The Discharger shall develop and maintain a record of all spills, overflows or bypasses of raw or partially treated sewage from its collection system or treatment plant. This record shall be made available to the Regional Water Board upon request and a spill summary shall be included in the annual summary report. The records shall contain:

a. the date and time of each spill, overflow or bypass;

b. the location of each spill, overflow or bypass;

c. the estimated volume of each spill, overflow or bypass including gross volume, amount recovered and amount not recovered, monitoring results;

d. the cause of each spill, overflow or bypass;

e. whether each spill, overflow or bypass entered a receiving water and, if so, the name of the water body and whether it entered via storm drains or other man-made conveyances;

f. mitigation measures implemented; and,

g. corrective measures implemented or proposed to be implemented to prevent/minimize future occurrences.

(5) Activities Coordination

In addition, Regional Water Board expects that the POTW's owners/operators will coordinate their compliance activities for consistency and efficiency with other entities that have responsibilities to implement: (i) this NPDES permit, including the Pretreatment Program, (ii) a MS4 NPDES permit that may contain spill prevention, sewer maintenance, reporting requirements and (iii) the SSO WDR.

(6) Consistency with Sanitary Sewer Overflows WDRs

The Clean Water Act prohibits the discharge of pollutants from point sources to surface waters of the United States unless authorized under a NPDES permit. (33 U.S.C. §§1311, 1342). The State Water Board adopted General Waste Discharge Requirements (WDRs) for Sanitary Sewer Systems, (WQ Order No. 2006-0003) on May 2, 2006, to provide a consistent, statewide regulatory approach to address Sanitary Sewer Overflows (SSOs). The SSOs WDR requires public agencies that own or operate sanitary sewer systems to develop and implement sewer system management plans and report all SSOs to the State Water Board's online SSO database.

The requirements contained in this Order in Sections VI.C.3.b. (Spill Contingency Plan Section), VI.C.4. (Construction, Operation and Maintenance Specifications Section), and VI.C.6. (Spill Reporting Requirements) are intended to be consistent with the requirements of the SSO WDR. The Regional Water Board recognizes that there may be some overlap between the NPDES permit provisions and SSO WDR requirements. The requirements of the SSO WDR are considered the minimum thresholds (see Finding 11 of WQ Order No. 2006-0003). The Regional Water Board will accept the documentation prepared by the Permittees under the SSO WDR for compliance purposes, as satisfying the requirements in Sections VI.C.3.b., VI.C.4., and VI.C.6. provided any more specific or stringent provisions enumerated in this Order, have also been addressed

(7) The Discharger shall provide standby or emergency power facilities and/or storage capacity or other means so that in the event of plant upset or outage due to power failure or other cause, discharge of raw or inadequately treated sewage does not occur.

7. Compliance Schedules

a. Since this is a new discharge, Newhall Ranch WRP is not eligible for interim effluent limitations or compliance schedules. Final effluent limitations shall apply at all times. However, there may be an exception during the start-up operations of a new biological system. Compliance will be measured at Monitoring Location EFF 001, RSW-001U, and RSW-002D as described in the attached Monitoring and Reporting Program.

b. As effluent data becomes available, and it is demonstrated that the Discharger will have difficulty meeting an effluent limitation, Newhall Ranch SD may request that the Board revisit the idea of issuing a compliance schedule with interim limits under a separate enforcement order, such as a Time Schedule Order (TSO) or a Cease and Desist Order (CDO).

VII. COMPLIANCE DETERMINATION

Compliance with the effluent limitations contained in section IV of this Order will be determined as specified below:

A. General.

Compliance with effluent limitations for priority pollutants shall be determined using sample reporting protocols defined in the MRP and Appendix A of this Order. Dischargers shall be deemed out of compliance with effluent limitations if the concentration of the monitoring sample is greater than the effluent limitation and greater than or equal to the reported minimum level (ML).

B. Multiple Sample Data Reduction.

When determining compliance with a measure of central tendency (arithmetic mean, geometric mean, median, etc.) of multiple sample analyses and the data set contains one or more reported determinations of "Detected, but Not Quantified" (DNQ) or "Not Detected" (ND). In those cases, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

1. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

2. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

C. Average Monthly Effluent Limitation (AMEL).

If the average (or when applicable, the median determined by subsection B above for multiple sample data) of daily discharges over a calendar month exceeds the AMEL for a given parameter, this will represent a single violation, though the Discharger may be considered out of compliance for each day of that month for that parameter (e.g., resulting in 31 days of non-compliance in a 31-day month). If only a single sample is taken during the calendar month and the analytical result for that sample exceeds the AMEL, the Discharger may be considered out of compliance for that calendar month. The Discharger will only be considered out of compliance for days when the discharge occurs. For any one calendar month during which no sample (daily discharge) is taken, no compliance determination can be made for that calendar month.

If the analytical result of a single sample, monitored monthly, quarterly, semiannually, or annually, does not exceed the AMEL for a given parameter, the Discharger will have demonstrated compliance with the AMEL for each day of that month for that parameter.

If the analytical result of any single sample, monitored monthly, quarterly, semiannually, or annually, exceeds the AMEL for any parameter, the Discharger shall collect up to four additional samples within the same calendar month. All analytical results shall be reported in the monitoring report for that month. The concentration of pollutant (an arithmetic mean or a median) in these samples estimated from the "Multiple Sample Data Reduction" Section above, will be used for compliance determination.

In the event of noncompliance with an AMEL, the sampling frequency for that parameter shall be increased to weekly and shall continue at this level until compliance with the AMEL has been demonstrated.

D. Average Weekly Effluent Limitation (AWEL).

If the average of daily discharges over a calendar week exceeds the AWEL for a given parameter, an alleged violation will be flagged and the discharger will be considered out of compliance for each day of that week for that parameter, resulting in 7 days of non-compliance. The average of daily discharges over the calendar week that exceeds the AWEL for a parameter will be considered out of compliance for that week only. If only a single sample is taken during the calendar week and the analytical result for that sample exceeds the AWEL, the discharger will be considered out of compliance for that calendar week. For any one calendar week during which no sample (daily discharge) is taken, no compliance determination can be made for that calendar week.

A calendar week will begin on Sunday and end on Saturday. Partial weeks consisting of four or more days at the end of any month will include the remaining days of the week, which occur in the following month in order to calculate a consecutive seven-day average. This value will be reported as a weekly average or seven-day average on the SMR for the month containing the partial week of four or more days. Partial calendar weeks consisting of less than four days at the end of any month will be carried forward to the succeeding month and reported as a weekly average or a seven-day average for the calendar week that ends with the first Saturday of that month.

E. Maximum Daily Effluent Limitation (MDEL).

If a daily discharge exceeds the MDEL for a given parameter, an alleged violation will be flagged and the discharger will be considered out of compliance for that parameter for that 1 day only within the reporting period. For any 1 day during which no sample is taken, no compliance determination can be made for that day.

F. Instantaneous Minimum Effluent Limitation.

If the analytical result of a single grab sample is lower than the instantaneous minimum effluent limitation for a parameter, a violation will be flagged and the discharger will be considered out of compliance for that parameter for that single sample. Non-compliance for each sample will be considered separately (e.g., the results of two grab samples taken within a calendar day that both are lower than the instantaneous minimum effluent limitation would result in two instances of non-compliance with the instantaneous minimum effluent limitation).

G. Instantaneous Maximum Effluent Limitation.

If the analytical result of a single grab sample is higher than the instantaneous maximum effluent limitation for a parameter, a violation will be flagged and the discharger will be considered out of compliance for that parameter for that single sample. Non-compliance for each sample will be considered separately (e.g., the results of two grab samples taken within a calendar day that both exceed the instantaneous maximum effluent limitation would result in two instances of non-compliance with the instantaneous maximum effluent limitation).

H. Six-month Median Effluent Limitation.

If the median of daily discharges over any 180-day period exceeds the six-month median effluent limitation for a given parameter, an alleged violation will be flagged and the discharger will be considered out of compliance for each day of that 180-day period for that parameter. The next assessment of compliance will occur after the next sample is taken. If only a single sample is taken during a given 180-day period and the analytical result for that sample exceeds the six-month median, the discharger will be considered out of compliance for the 180-day period. For any 180-period during which no sample is taken, no compliance determination can be made for the six-month median limitation.

I. Percent Removal.

The average monthly percent removal is the removal efficiency expressed in percentage across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of pollutant concentrations (C in mg/L) of influent and effluent samples collected at about the same time using the following equation:
Percent Removal (%) = $[1-(C_{Effluent}/ C_{Influent})] \times 100$ %
When preferred, the Discharger may substitute mass loadings and mass emissions for the concentrations.

J. Mass and Concentration Limitations

Compliance with mass and concentration effluent limitations for the same parameter shall be determined separately with their respective limitations. When the concentration of a constituent in an effluent sample is determined to be ND or DNQ, the corresponding mass emission rate determined from that sample concentration shall also be reported as ND or DNQ.

K. Compliance with single constituent effluent limitations

Dischargers are out of compliance with the effluent limitation if the concentration of the pollutant (see Section B "Multiple Sample Data Reduction" above) in the monitoring sample is greater than the effluent limitation and greater than or equal to the RML.

L. Compliance with effluent limitations expressed as a sum of several constituents

Dischargers are out of compliance with an effluent limitation which applies to the sum of a group of chemicals (e.g., PCB's) if the sum of the individual pollutant concentrations is greater than the effluent limitation. Individual pollutants of the group will be considered to have a concentration of zero if the constituent is reported as ND or DNQ.

M. Mass Emission Rate.

The mass emission rate shall be obtained from the following calculation for any calendar day:

$$\text{Mass emission rate (lb/day)} = \frac{8.34}{N} \sum_{i=1}^{N} Q_i C_i$$

$$\text{Mass emission rate (kg/day)} = \frac{3.79}{N} \sum_{i=1}^{N} Q_i C_i$$

in which 'N' is the number of samples analyzed in any calendar day. 'Qi' and 'Ci' are the flow rate (MGD) and the constituent concentration (mg/L), respectively, which are associated with each of the 'N' grab samples, which may be taken in any calendar day. If a composite sample is taken, 'Ci' is the concentration measured in the composite sample and 'Qi' is the average flow rate occurring during the period over which samples are composited.

The daily concentration of all constituents shall be determined from the flow-weighted average of the same constituents in the combined waste streams as follows:

$$\text{Daily concentration} = \frac{1}{Q_t} \sum_{i=1}^{N} Q_i C_i$$

in which 'N' is the number of component waste streams. 'Qi' and 'Ci' are the flow rate (MGD) and the constituent concentration (mg/L), respectively, which are associated with each of the 'N' waste streams. 'Qt' is the total flow rate of the combined waste streams.

N. Bacterial Standards and Analysis.

1. The geometric mean used for determining compliance with bacterial standards is calculated with the following equation:

   Geometric Mean = (C1 x C2 x ... x Cn)1/n

   where n is the number of days samples were collected during the period and C is the concentration of bacteria (MPN/100 mL or CFU/100 mL) found on each day of sampling.

2. For bacterial analyses, sample dilutions should be performed so the expected range of values is bracketed (for example, with multiple tube fermentation method or membrane filtration method, 2 to 16,000 per 100 ml for total and fecal coliform, at a minimum, and 1 to 1000 per 100 ml for enterococcus). The detection methods used for each analysis shall be reported with the results of the analyses.

3. Detection methods used for coliforms (total and fecal) shall be those presented in Table 1A of 40 CFR 136 (revised March 12, 2007), unless alternate methods have been approved by USEPA pursuant to 40 CFR 136, or improved methods have been determined by the Executive Officer and/or USEPA.

4. Detection methods used for enterococcus shall be those presented in the USEPA publication EPA 600/4-85/076, *Test Methods for Escherichia coli and Enterococci in Water By Membrane Filter Procedure* or any improved method determined by the Executive Officer and/or USEPA to be appropriate.

O. Single Operational Upset

A single operational upset (SOU) that leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation and limits the Discharger's liability in accordance with the following conditions:

1. A single operational upset is broadly defined as a single unusual event that temporarily disrupts the usually satisfactory operation of a system in such a way that it results in violation of multiple pollutant parameters.

2. A Discharger may assert SOU to limit liability only for those violations which the Discharger submitted notice of the upset as required in Provision V.E.2(b) of Attachment D – Standard Provisions.

3. For purpose outside of CWC Section 13385 (h) and (i), determination of compliance and civil liability (including any more specific definition of SOU, the requirements for Dischargers to assert the SOU limitation of liability, and the manner of counting violations) shall be in accordance with USEPA Memorandum "Issuance of Guidance Interpreting Single Operational Upset" (September 27, 1989).

4. For purpose of CWC Section 13385 (h) and (i), determination of compliance and civil liability (including any more specific definition of SOU, the requirements for Dischargers to assert the SOU limitation of liability, and the manner of counting violations) shall be in accordance with CWC Section 13385 (f)(2).

ATTACHMENT A – DEFINITIONS

Acutely Toxic Conditions, as used in the context of mixing zones, refers to lethality that occurs to mobile aquatic organisms that move or drift through the mixing zone.

Arithmetic Mean (μ), also called the average, is the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$ where: Σx is the sum of the measured ambient water concentrations, and **n** is the number of samples.

Average Monthly Effluent Limitation (AMEL): the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL): the highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Best Management Practices (BMPs) are methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint source discharges including storm water. BMPs include structural and non-structural controls, and operation and maintenance procedures, which can be applied before, during, and/or after pollution producing activities.

Bioaccumulative pollutants are those substances taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Biologically-Based Receiving Water Flow refers to the method for determining receiving water flows developed by the U.S. EPA Office of Research and Development which directly uses the averaging periods and exceedance frequencies specified in the acute and chronic aquatic life criteria for individual pollutants (e.g., 1 day and 3 years for acute criteria, and 4 days and 3 years for the chronic criteria). Biologically-based flows can be calculated using the program DFLOW.

Carcinogenic pollutants are substances that are known to cause cancer in living organisms.

Coefficient of Variation (CV) is a measure of the data variability and is calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Completely-Mixed Discharge condition means not more than a 5 percent difference, accounting for analytical variability, in the concentration of a pollutant exists across a transect of the water body at a point within two stream/river widths from the discharge point.

Daily Discharge: Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ) are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

Dilution Credit is the amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Dilution Ratio is the critical low flow of the upstream receiving water divided by the flow of the effluent discharged.

Discharger-Specific WER is a WER that is applied to individual pollutant limits in an NPDES permit issued to a particular permit holder. A discharger-specific WER applies only to the applicable limits in the discharger's permit. Discharger-specific WERs are distinguished for WERs that are developed on a waterbody or watershed basis as part of a water quality standards action resulting in adoption of an SSO.

Dynamic Models used for calculating effluent limitations predict the effects of receiving water and effluent flow and of concentration variability. The outputs of dynamic models can be used to base effluent limitations on probability estimates of receiving water concentrations rather than critical conditions (which are used in the steady-state model). The three dynamic

modeling techniques recommended by the U.S. EPA for calculating effluent limitations are continuous simulation, Monte Carlo simulation, and lognormal probability modeling.

Effluent Concentration Allowance (ECA) is a value derived from the water quality criterion/objective, dilution credit, and ambient background concentration that is used, in conjunction with the coefficient of variation for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as waste load allocation (WLA) as used in USEPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays means indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration is the estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

Estuaries means waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters included, but are not limited to, the Sacramento-San Joaquin Delta, as defined in Water Code section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Existing Discharger means any discharger that is not a new discharger. An existing discharger includes an "increasing discharger" (i.e., an existing facility with treatment systems in place for its current discharge that is or will be expanding, upgrading, or modifying its existing permitted discharge after the effective date of this Policy).

Four-Day Average of Daily Maximum Flows is the average of daily maximums taken from the data set in four-day intervals.

Harmonic Mean flows are expressed as $Q_{hm} = (n)/(\Sigma^{n}_{i=1} 1/x_i)$, where x_i = specific data values and n = number of data values.

Incompletely-Mixed Discharge is a discharge that contributes to a condition that does not meet the meaning of a completely-mixed discharge condition.

Infeasible means not capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

Inland Surface Waters are all surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation: the highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation: the lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Load Allocation (LA) is the portion of a receiving water's total maximum daily load that is allocated to one of its nonpoint sources of pollution or to natural background sources.

Long-Term Arithmetic Mean Flow is at least two years of flow data used in calculating an arithmetic mean as defined in this appendix.

Maximum Daily Flow is the maximum flow sample of all samples collected in a calendar day.

Maximum Daily Effluent Limitation (MDEL) means the highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median is the middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the $n/2$ and $n/2+1$).

Method Detection Limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in title 40 of the Code of Federal Regulations, Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML) is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone is a limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

Mutagenic pollutants are substances that are known to cause a mutation (i.e., change in a gene or chromosome) in living organisms.

Mutual Water Company is defined in the Public Utilities Code, section 2725 as: "any private corporation or association organized for the purpose of delivering water to its stockholders and members at cost, including use of works for conserving, treating and reclaiming water".

New Discharger includes any building, structure, facility, or installation from which there is, or may be, a discharge of pollutants, the construction of which commenced after the effective date of this Policy.

Not Detected (ND) are those sample results less than the laboratory's MDL.

Objectionable Bottom Deposits are an accumulation of materials or substances on or near the bottom of a water body, which creates conditions that adversely impact aquatic life, human health, beneficial uses, or aesthetics. These conditions include, but are not limited to, the accumulation of pollutants in the sediments and other conditions that result in harm to benthic organisms, production of food chain organisms, or fish egg development. The presence of such deposits shall be determined by RWQCB(s) on a case-by-case basis.

Ocean Waters are the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Water Board's California Ocean Plan.

Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pollutant Minimization Program (PMP) means waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of the PMP shall be to reduce all potential sources of a priority pollutant(s) through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Regional Water Board may consider cost effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to Water Code section 13263.3(d), shall be considered to fulfill the PMP requirements.

Pollution Prevention means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State or Regional Water Board.

Process Optimization means minor changes to the existing facility and treatment plant operations that optimize the effectiveness of the existing treatment processes.

Public Entity includes the federal government or a state, county, city and county, city, district, public authority, or public agency.

Reporting Level (RL) is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from Appendix 4 of the SIP in accordance with section 2.4.2 of the SIP or established in accordance with section 2.4.3 of the SIP. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Satellite Collection System is the portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility that a sanitary sewer system is tributary to.

Source of Drinking Water is any water designated as municipal or domestic supply (MUN) in a Regional Water Board Basin Plan.

Standard Deviation (σ) is a measure of variability that is calculated as follows:

$$\sigma = (\Sigma[(x - \mu)^2]/(n - 1))^{0.5}$$

where:

x is the observed value;

μ is the arithmetic mean of the observed values; and

n is the number of samples.

Teratogenic pollutants are substances that are known to cause structural abnormalities or birth defects in living organisms.

Toxicity Reduction Evaluation (TRE) is a study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

Use Attainability Analysis is a structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological and economic factors as described in 40 CFR 131.10(g) (40 CFR 131.3, revised as of July 1, 1997).

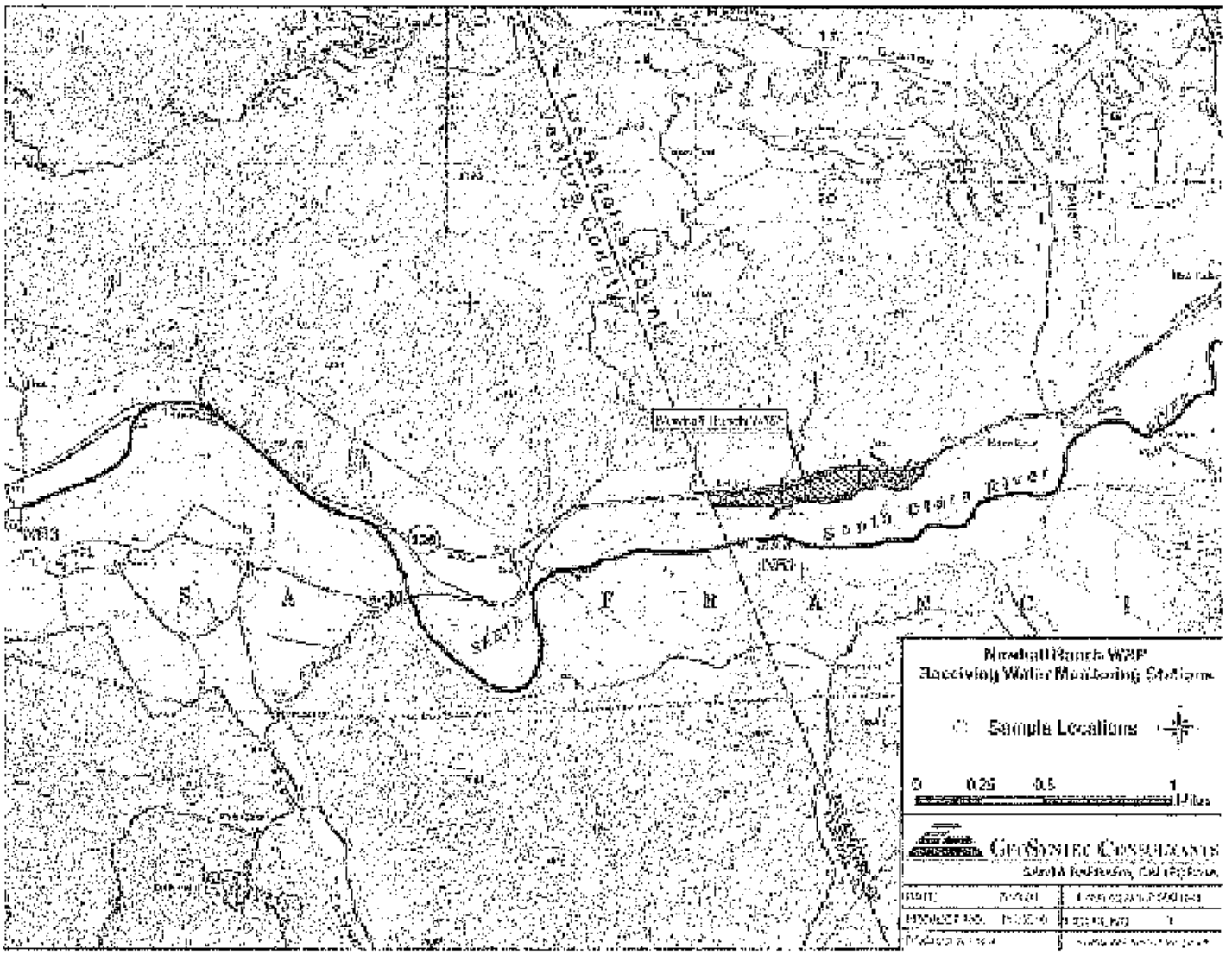
Water Effect Ratio (WER) is an appropriate measure of the toxicity of a material obtained in a site water divided by the same measure of the toxicity of the same material obtained simultaneously in a laboratory dilution water.

1Q10 is the lowest flow that occurs for one day with a statistical frequency of once every 10 years.

7Q10 is the average low flow that occurs for seven consecutive days with a statistical frequency of once every 10 years.

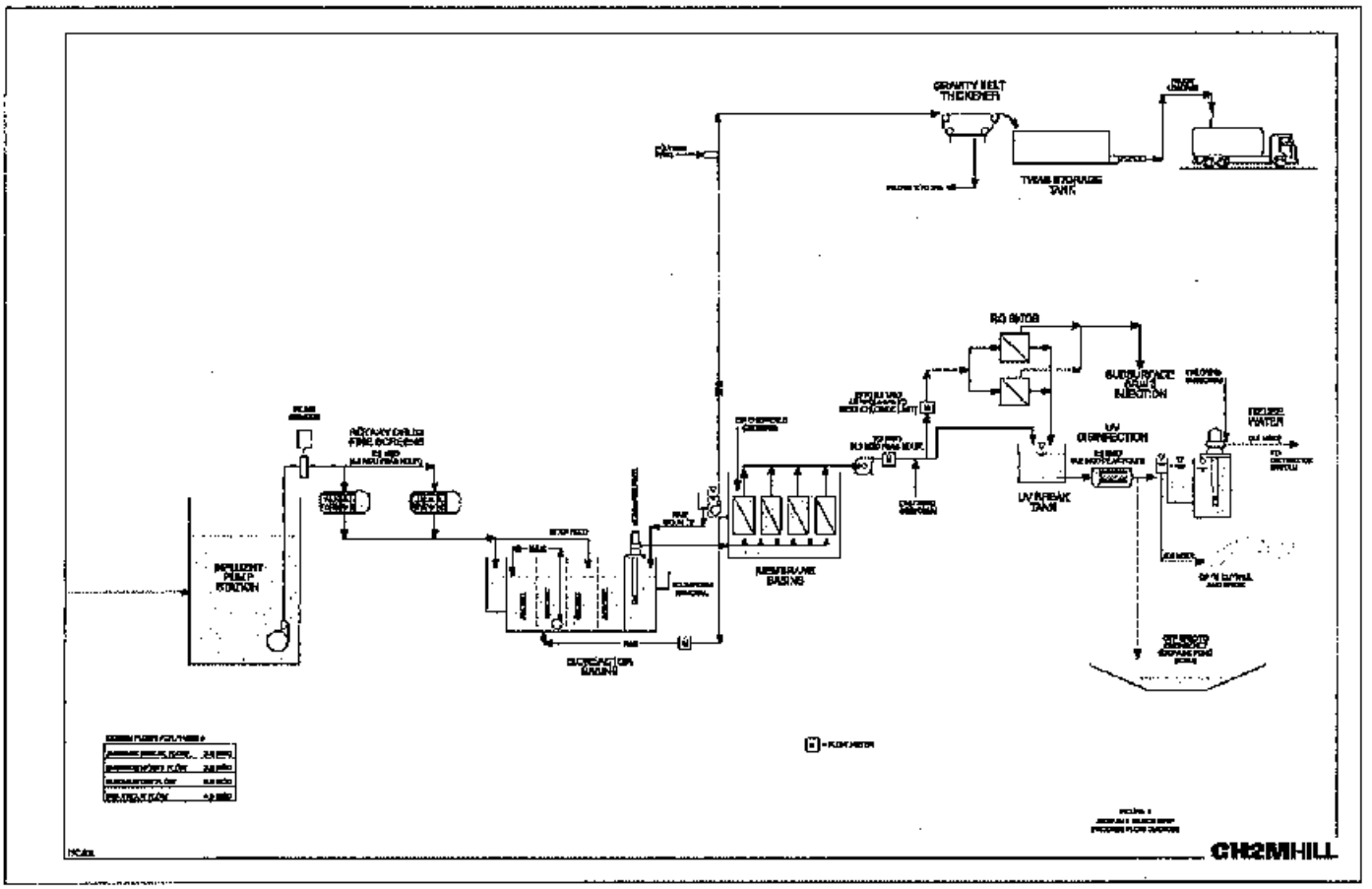
90th Percentile of Observed Data is the measurement in the ordered set of data (lowest to highest) where 90 percent of the reported measurements are less than or equal to that value.

ATTACHMENT B – MAP



ATTACHMENT C – FLOW SCHEMATIC

Phase I



ATTACHMENT D – STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. (40 C.F.R. § 122.41(a).)

2. The Discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 C.F.R. § 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 C.F.R. § 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 C.F.R. § 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order. (40 C.F.R. § 122.41(e).)

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 C.F.R. § 122.41(g).)

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 C.F.R. § 122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Regional Water Board, State Water Board, United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (40 C.F.R. § 122.41(i); Wat. Code, § 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (40 C.F.R. § 122.41(i)(1));

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (40 C.F.R. § 122.41(i)(2));

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (40 C.F.R. § 122.41(i)(3)); and

4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (40 C.F.R. § 122.41(i)(4).)

G. Bypass

1. Definitions

   a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 C.F.R. § 122.41(m)(1)(i).)

   b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does

not mean economic loss caused by delays in production. (40 C.F.R. § 122.41(m)(1)(ii).)

2. Bypass not exceeding limitations. The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3, I.G.4, and I.G.5 below. (40 C.F.R. § 122.41(m)(2).)

3. Prohibition of bypass. Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless (40 C.F.R. § 122.41(m)(4)(i)):

   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 C.F.R. § 122.41(m)(4)(i)(A));

   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 C.F.R. § 122.41(m)(4)(i)(B)); and

   c. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance I.G.5 below. (40 C.F.R. § 122.41(m)(4)(i)(C).)

4. The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above. (40 C.F.R. § 122.41(m)(4)(ii).)

5. Notice

   a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass. (40 C.F.R. § 122.41(m)(3)(i).)

   b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). (40 C.F.R. § 122.41(m)(3)(ii).)

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 C.F.R. § 122.41(n)(1).)

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance I.H.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 C.F.R. § 122.41(n)(2).).

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 C.F.R. § 122.41(n)(3)):

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 C.F.R. § 122.41(n)(3)(i));

   b. The permitted facility was, at the time, being properly operated (40 C.F.R. § 122.41(n)(3)(ii));

   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 C.F.R. § 122.41(n)(3)(iii)); and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 C.F.R. § 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 C.F.R. § 122.41(n)(4).)

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or

termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 C.F.R. § 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 C.F.R. § 122.41(b).)

C. Transfers

This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the Water Code. (40 C.F.R. § 122.41(l)(3); § 122.61.)

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 C.F.R. § 122.41(j)(1).)

B. Monitoring results must be conducted according to test procedures under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503 unless other test procedures have been specified in this Order. (40 C.F.R. § 122.41(j)(4); § 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by Part 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 C.F.R. § 122.41(j)(2).)

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 C.F.R. § 122.41(j)(3)(i));

2. The individual(s) who performed the sampling or measurements (40 C.F.R. § 122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 C.F.R. § 122.41(j)(3)(iii));

4. The individual(s) who performed the analyses (40 C.F.R. § 122.41(j)(3)(iv));

5. The analytical techniques or methods used (40 C.F.R. § 122.41(j)(3)(v)); and

6. The results of such analyses. (40 C.F.R. § 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 C.F.R. § 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 C.F.R. § 122.7(b)(1)); and

2. Permit applications and attachments, permits and effluent data. (40 C.F.R. § 122.7(b)(2).)

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Regional Water Board, State Water Board, or USEPA within a reasonable time, any information which the Regional Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or USEPA copies of records required to be kept by this Order. (40 C.F.R. § 122.41(h); Wat. Code, § 13267.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, and V.B.5 below. (40 C.F.R. § 122.41(k).)

2. All permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA). (40 C.F.R. § 122.22(a)(3).).

3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 C.F.R. § 122.22(b)(1));

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 C.F.R. § 122.22(b)(2)); and

   c. The written authorization is submitted to the Regional Water Board and State Water Board. (40 C.F.R. § 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting V.B.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 C.F.R. § 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.3 above shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 C.F.R. § 122.22(d).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 C.F.R. § 122.22(l)(4).)

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. (40 C.F.R. § 122.41(l)(4)(i).)

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Water Board. (40 C.F.R. § 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 C.F.R. § 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 C.F.R. § 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. (40 C.F.R. § 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 C.F.R. § 122.41(l)(6)(ii)):

   a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(A).)

   b. Any upset that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

3. The Regional Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours. (40 C.F.R. § 122.41(l)(6)(iii).)

F. Planned Changes

The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 C.F.R. § 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in section 122.29(b) (40 C.F.R. § 122.41(l)(1)(i)); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 C.F.R. § 122.41(l)(1)(ii).)

3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. (40 C.F.R.§ 122.41(l)(1)(iii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with General Order requirements. (40 C.F.R. § 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above. (40 C.F.R. § 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information. (40 C.F.R. § 122.41(l)(8).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Regional Water Board is authorized to enforce the terms of this permit under several provisions of the Water Code, including, but not limited to, sections 13385, 13386, and 13387.

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Publicly-Owned Treatment Works (POTWs)

All POTWs shall provide adequate notice to the Regional Water Board of the following (40 C.F.R. § 122.42(b)):

1. Any new introduction of pollutants into the POTW from an indirect discharger that would be subject to sections 301 or 306 of the CWA if it were directly discharging those pollutants (40 C.F.R. § 122.42(b)(1)); and

2. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of the Order. (40 C.F.R. § 122.42(b)(2).)

3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW. (40 C.F.R. § 122.42(b)(3).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

The Code of Federal Regulations section 122.48 requires that all NPDES permits specify monitoring and reporting requirements. Water Code Sections 13267 and 13383 also authorize the Regional Water Quality Control Board (Regional Water Board) to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements, which implement the federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. All samples shall be representative of the waste discharge under conditions of peak load. Quarterly effluent analyses shall be performed during the months of January, April, July, and October. Semiannual analyses shall be performed during the months of January and July. Annual analyses shall be performed during the month of July (except for bioassessment monitoring, which will be conducted in the spring/summer). Should there be instances when monitoring could not be done during these specified months, the Discharger must notify the Regional Water Board, state the reason why monitoring could not be conducted, and obtain approval from the Executive Officer for an alternate schedule. Results of quarterly, semiannual, and annual analyses shall be reported in the third monthly monitoring report following the analysis.

B. Pollutants shall be analyzed using the analytical methods described in 40 CFR, Part 136.3, 136.4, and 136.5 (revised March 12, 2007); or where no methods are specified for a given pollutant, by methods approved by this Regional Water Board or the State Water Board. Laboratories analyzing effluent samples and receiving water samples shall be certified by the California Department of Health Services Environmental Laboratory Accreditation Program (ELAP) or approved by the Executive Officer and must include quality assurance/quality control (QA/QC) data in their reports. A copy of the laboratory certification shall be provided each time a new certification and/or renewal of the certification is obtained from ELAP.

C. Water/wastewater samples must be analyzed within allowable holding time limits as specified in 40 CFR, Part 136.3. All QA/QC analyses must be run on the same dates that samples are actually analyzed. The Discharger shall retain the QA/QC documentation in its files and make available for inspection and/or submit them when requested by the Regional Water Board. Proper chain of custody procedures must be followed and a copy of that documentation shall be submitted with the monthly report.

D. The Discharger shall calibrate and perform maintenance procedures on all monitoring instruments and to insure accuracy of measurements, or shall insure that both equipment activities will be conducted.

E. For any analyses performed for which no procedure is specified in the USEPA guidelines, or in the MRP, the constituent or parameter analyzed and the method or procedure used must be specified in the monitoring report.

F. Each monitoring report must affirm in writing that "all analyses were conducted at a laboratory certified for such analyses by the Department of Health Services or approved by the Executive Officer and in accordance with current USEPA guideline procedures or as specified in this MRP."

G. The monitoring report shall specify the USEPA analytical method used, the Method Detection Limit (MDL), the minimum level (ML), and the Reported Minimum Level (RML) for each pollutant. The MLs are those published by the State Water Board in the *Policy for the Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California,* February 9, 2005, Appendix 4. The ML represents the lowest quantifiable concentration in a sample based on the proper application of all method-based analytical procedures and the absence of any matrix interference. When all specific analytical steps are followed and after appropriate application of method specific factors, the ML also represents the lowest standard in the calibration curve for that specific analytical technique. When there is deviation from the method analytical procedures, such as dilution or concentration of samples, other factors may be applied to the ML depending on the sample preparation. The resulting value is the reported minimum level.

H. The Discharger shall select the analytical method that provides a ML lower than the permit limit established for a given parameter, unless the Discharger can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR, Part 136, and obtains approval for a higher ML from the Executive Officer, as provided for in Section J below. If the effluent limitation is lower than all the MLs in Appendix 4, SIP, the Discharge must select the method with the lowest ML for compliance purposes. The Discharger shall include in the Annual Summary Report a list of the analytical methods employed for each test.

I. The Discharger shall instruct its laboratories to establish calibration standards so that the ML (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve. In accordance with section J, below, the Discharger's laboratory may employ a calibration standard lower than the ML in Appendix 4 of the SIP.

J. In accordance with Section 2.4.3 of the SIP, the Regional Water Board Executive Officer, in consultation with the State Water Board's Quality Assurance Program Manager, may establish an ML that is not contained in Appendix 4 of the SIP to be included in the discharger's permit in any of the following situations:

a. When the pollutant under consideration is not included in Appendix 4, SIP;

b. When the discharger and the Regional Water Board agree to include in the permit a test method that is more sensitive than those specified in 40 CFR, Part 136 (revised as of March 12, 2007);

c. When a discharger agrees to use an ML that is lower than those listed in Appendix 4;

d. When a discharger demonstrates that the calibration standard matrix is sufficiently different from that used to establish the ML in Appendix 4 and proposes an appropriate ML for the matrix; or,

e. When the discharger uses a method, which quantification practices are not consistent with the definition of the ML. Examples of such methods are USEPA-approved method 1613 for dioxins, and furans, method 1624 for volatile organic substances, and method 1625 for semi-volatile organic substances. In such cases, the discharger, the Regional Water Board, and the State Water Resources Control Board shall agree on a lowest quantifiable limit and that limit will substitute for the ML for reporting and compliance determination purposes.

If there is any conflict between foregoing provisions and the State Implementation Policy (SIP), the provisions stated in the SIP (Section 2.4) shall prevail.

K. If the Discharger samples and performs analyses (other than for process/operational control, startup, research, or equipment testing) on any influent, effluent, or receiving water constituent more frequently than required by this Program using approved analytical methods, the results of those analyses shall be included in the report. These results shall be reflected in the calculation of the average used in demonstrating compliance with average effluent, receiving water, etc., limitations.

L. The Discharger shall develop and maintain a record of all spills or bypasses of raw or partially treated sewage from its collection system or treatment plant according to the requirements in the WDR section of this Order. This record shall be made available to the Regional Water Board upon request and a spill summary shall be included in the annual summary report.

M. For all bacteriological analyses, sample dilutions should be performed so the expected range of values is bracketed (for example, with multiple tube fermentation method or membrane filtration method, 2 to 16,000 per 100 ml for total and fecal coliform, at a minimum, and 1 to 1000 per 100 ml for enterococcus). The detection methods used for each analysis shall be reported with the results of the analyses.

a. Detection methods used for coliforms (total and fecal) shall be those presented in Table 1A of 40 CFR, Part 136 (revised March 12, 2007), unless alternate methods

have been approved in advance by the United State Environmental Protection Agency (USEPA) pursuant to 40 CFR Part 136.

b. Detection methods used for enterococcus shall be those presented in the USEPA publication EPA 600/4-85/076, *Test Methods for Escherichia coli and Enterococci in Water By Membrane Filter Procedure* or any improved method determined by the Regional Water Board to be appropriate.

N. Since compliance monitoring focuses on the effects of a point source discharge, it is not designed to assess impacts from other sources of pollution (e.g., non-point source run-off, aerial fallout) or to evaluate the current status of important ecological resources on a regional basis.

A watershed-wide Monitoring Program will be developed within two years from the effective date of this Order and permit for the Santa Clara River Watershed, under the leadership of the Regional Water Board and the stakeholder groups developing salt and nutrient TMDLs that the Santa Clara River Watershed and in compliance with those TMDLs. The goals of the watershed-wide monitoring program will include evaluating or assessing: compliance with receiving water objectives, trends in surface water quality, impacts to beneficial uses, the health of the biological community, data needs for modeling contaminants of concern, and attaining the goals of the TMDLs under implementation in the Santa Clara River. The Discharger shall participate in the development and implementation of the watershed-wide monitoring program, and submit a copy of the proposed program to the Regional Water Board,

Changes to the compliance monitoring program may be required to fulfill the goals of the watershed-wide monitoring program, while retaining the compliance monitoring component required to evaluate compliance with the NPDES permit. Revisions to the Discharger's program will be made under the direction of the Regional Water Board, as necessary, to accomplish the goal, and may include a reduction or increase in the number of parameters to be monitored, the frequency of monitoring, and/or the number of samples collected.

Until such time when a watershed-wide monitoring program is developed, Newhall Land shall implement the monitoring program in the following sections.

II. MONITORING LOCATIONS

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order:

Table 1. Monitoring Station Locations

Discharge Point Name	Monitoring Location Name	Monitoring Location Description (include Latitude and Longitude when available)
--	INF-001	Sampling stations shall be established at each point of inflow to the sewage treatment plant and shall be located upstream of any in-plant return flows and where representative samples of the influent can be obtained.
001	EFF-001	The effluent sampling station shall be located downstream of any inplant return flows and after the final disinfection process, where representative samples of the effluent can be obtained. Latitude 34°0.403166' and Longitude 118°0.689667'
--	RSW-001U	Santa Clara River, approximately 100 feet upstream of the discharge point
--	RSW-001D	Santa Clara River, approximately 100 feet downstream of the discharge point
--	RSW-002D*	Santa Clara River, approximately 300 feet downstream of the discharge point
--	RGW-001	Groundwater aquifer, upgradient of discharge point
--	RGW-002	Groundwater aquifer, downgradient of discharge point
--	RGW-003	Groundwater aquifer, downgradient of discharge point

* The location of this receiving water station may vary depending upon the meander of the river. The Discharger shall endeavor to take a sample representative of actual downstream receiving water conditions, after flows are commingled. However, if flows do not commingle, the receiving water sample shall still be collected. The monitoring report shall specify whether or not there was commingling.

III. INFLUENT MONITORING REQUIREMENTS

Influent monitoring is required to:

- Determine compliance with NPDES permit conditions.
- Assess treatment plant performance.
- Assess effectiveness of the Pretreatment Program

A. Monitoring Location INF-001

1. The Discharger shall monitor influent to the facility at INF-001 as follows:

Table 2. Influent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow	mgd	recorder	continuous[1]	[2]
pH	pH unit	grab	daily	[2]

[1] Total daily flow and instantaneous peak daily flow (24-hr basis). Actual monitored flow shall be reported (not the maximum flow, i.e., design capacity).

[2] Pollutants shall be analyzed using the analytical methods described in 40 CFR 136; where no methods are specified for a given pollutant, by methods approved by this Regional Water Board or State Water Resources Control Board. For any pollutant whose effluent limitation is lower than all the minimum levels (MLs) specified in Attachment 4 of the SIP, the analytical method with the lowest ML must be selected.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Total suspended solids	mg/L	24-hour composite	daily	[2]
BOD_5 20°C	mg/L	24-hour composite	daily	[2]
Nitrite nitrogen	mg/L	24-hour composite	weekly	[2]
Nitrate nitrogen	mg/L	24-hour composite	weekly	[2]
Ammonia nitrogen	mg/L	24-hour composite	weekly	[2]
Total Nitrogen	mg/L	24-hour composite	weekly	[2]
Total phosphorus	mg/L	24-hour composite	weekly	[2]
Orthophosphate-P	mg/L	24-hour composite	weekly	[2]
Chloride	mg/L	24-hour composite	monthly	[2]
Antimony	µg/L	24-hour composite	monthly	[2]
Arsenic	µg/L	24-hour composite	monthly	[2]
Cadmium	µg/L	24-hour composite	quarterly	[2]
Chromium III	µg/L	grab	quarterly	[2]
Chromium VI	µg/L	grab	quarterly	[2]
Copper	µg/L	24-hour composite	monthly	[2]
Lead	µg/L	24-hour composite	monthly	[2]
Mercury	µg/L	24-hour composite	monthly	[2]
Selenium	µg/L	24-hour composite	quarterly	[2]
Silver	µg/L	24-hour composite	quarterly	[2]
Thallium	µg/L	24-hour composite	quarterly	[2]
Zinc	µg/L	24-hour composite	quarterly	[2]
Cyanide	µg/L	grab	quarterly	[2]
Acrylonitrile	µg/L	grab	quarterly	[2]
Tetrachloroethylene	µg/L	grab	quarterly	[2]
Bis(2-ethylhexyl)phthalate	µg/L	grab	quarterly	[2]
p-Dichlorobenzene	µg/L	grab	quarterly	[2]
Lindane	µg/L	grab	quarterly	[2]
4,4-DDE	µg/L	grab	quarterly	[2]
Iron	µg/L	24-hour composite	quarterly	[2]
Remaining EPA priority pollutants [3] excluding asbestos	µg/L	24-hour composite/grab for VOCs	semiannually	[2]

Influent monitoring must be performed at plant start-up.

IV. EFFLUENT MONITORING REQUIREMENTS

Effluent monitoring is required to:

- Determine compliance with NPDES permit conditions and water quality standards.

[3] Priority pollutants are those constituents referred to in 40 CFR 401.15; a list of these pollutants is provided as Appendix A to 40 CFR 423.

- , Assess plant performance, identify operational problems and improve plant performance.
- Provide information

A. Monitoring Location EFF-001

1. The Discharger shall monitor the discharge of tertiary-treated effluent at EFF-001 as follows. If more than one analytical test method is listed for a given parameter, the Discharger must select from the listed methods and corresponding Minimum Level:

Table 3. Effluent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method and (Minimum Level, units), respectively
Total waste flow	mgd	recorder	continuous[4]	4
Turbidity[7]	NTU	recorder	continuous	5
Total residual chlorine	mg/L	grab	daily[6]	5
Total coliform[7]	MPN/ 100mL	grab	daily	5
Fecal coliform[7]	MPN/ 100mL	grab	daily	5
E.coli	MPN/ 100mL	grab	daily[8]	5
Temperature	°F	grab	daily	5
pH	pH units	grab	daily	5
Settleable solids	mL/L	grab	daily	5
Suspended solids	mg/L	24-hour composite	weekly	5
BOD_5 20°C	mg/L	24-hour composite	weekly[9]	5
Oil and grease	mg/L	grab	monthly	5

4 Where continuous monitoring of a constituent is required, the following shall be reported:
Total waste flow – Total daily and peak daily flow (24-hr basis);
Turbidity – Maximum daily value, total amount of time each day the turbidity exceeded 0.2 turbidity units, flow-proportioned average daily value.

5 Pollutants shall be analyzed using the analytical methods described in 40 CFR 136; where no methods are specified for a given pollutant, by methods approved by this Regional Water Board or State Water Resources Control Board. For any pollutant whose effluent limitation is lower than all the minimum levels (MLs) specified in Attachment 4 of the SIP, the analytical method with the lowest ML must be selected.

6 Daily grab samples shall be collected at monitoring location EFF-001B, Monday through Friday only, except for holidays. Analytical results of daily grab samples will be used to determine compliance with total residual chlorine effluent limitation.

7 Coliform and turbidity samples shall be obtained at some point in the treatment process at a time when wastewater flow and characteristics are most demanding on the treatment facilities, filtration, and disinfection procedures. Fecal coliform testing shall be conducted only if total coliform test result is positive.

8 E. coli testing shall be conducted only if fecal coliform testing is positive. If the fecal coliform analysis results in no detection, a result of less than (<) the reporting limit for fecal coliform will be reported for E. coli.

9 If the result of the weekly BOD analysis yields a value greater than the 30-day average limit, the frequency of analysis shall be increased to daily within one week of knowledge of the test result for at least 30 days and until compliance with the 7-day and 30-day average BOD limits is demonstrated; after which the frequency shall revert to weekly.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method and (Minimum Level, units), respectively
Dissolved oxygen	mg/L	grab	weekly	5
Total dissolved solids	mg/L	24-hour composite	monthly	5
Chloride	mg/L	24-hour composite	monthly	5
Sulfate	mg/L	24-hour composite	monthly	5
Boron	mg/L	24-hour composite	monthly	5
Fluoride	mg/L	24-hour composite	monthly	5
Ammonia Nitrogen[10]	mg/L	24-hour composite	weekly	5
Nitrite nitrogen	mg/L	24-hour composite	weekly	5
Nitrate nitrogen	mg/L	24-hour composite	weekly	5
Organic nitrogen	mg/L	24-hour composite	weekly	5
Total nitrogen	mg/L	24-hour composite	weekly	5
Surfactants (MBAS)[11]	mg/L	24-hour composite	monthly	5
Surfactants (CTAS)	mg/L	24-hour composite	monthly	5
Total hardness ($CaCO_3$)	mg/L	24-hour composite	weekly	5
Chronic toxicity	TUc	24-hour composite	monthly	5
Acute toxicity	% Survival	24-hour composite	monthly	5
Perchlorate	µg/L	grab	semiannually	5
1,4-Dioxane	µg/L	grab	semiannually	5
1,2,3-Trichloropropane	µg/L	grab	semiannually	5
Methyl tert-butyl ether (MTBE)	µg/L	grab	semiannually	5
Antimony	µg/L	24-hour composite	monthly	5
Arsenic	µg/L	24-hour composite	monthly	5
Beryllium	µg/L	24-hour composite	monthly	5
Cadmium	µg/L	24-hour composite	monthly	5
Chromium III	µg/L	grab	monthly	5
Chromium VI	µg/L	grab	monthly	5
Copper	µg/L	24-hour composite	monthly	5
Lead	µg/L	24-hour composite	monthly	5
Mercury	µg/L	24-hour composite	monthly	5
Nickel	µg/L	24-hour composite	monthly	5
Selenium	µg/L	24-hour composite	monthly	5
Silver	µg/L	24-hour composite	monthly	5
Thallium	µg/L	24-hour composite	monthly	5

10 Nitrate nitrogen, nitrite nitrogen, ammonia nitrogen, organic nitrogen, pH, and temperature sampling shall be conducted concurrently.

11 MBAS is Methylene blue active substances and CTAS is cobalt thiocyanate active substances. Reaches of the Santa Clara River are unlined in several reaches downstream of the points of wastewater discharge and are designated with the beneficial use of groundwater recharge (GWR) in the Basin Plan. Monitoring is required to assess compliance with the Title 22-based limit prescribed to protect underlying groundwater quality with the MUN beneficial use.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method and (Minimum Level, units), respectively
Zinc	µg/L	24-hour composite	monthly	[5]
Cyanide	µg/L	grab	monthly	[5]
2,3,7,8-TCDD[12]	µg/L	24-hour composite	quarterly	[5]
Acrylonitrile	µg/L	grab	quarterly	[5]
Bromoform	µg/L	grab	quarterly	[5]
Dibromochloromethane	µg/L	grab	quarterly	[5]
Chloroform	µg/L	grab	quarterly	[5]
Bromodichlorormethane	µg/L	grab	quarterly	[5]
1,2-Dichloroethane	µg/L	grab	quarterly	[5]
Methyl bromide (Bromomethane)	µg/L	grab	quarterly	[5]
Methyl chloride (Chloromethane)	µg/L	grab	quarterly	[5]
Methylene chloride	µg/L	grab	quarterly	[5]
Tetrachloroethylene	µg/L	grab	quarterly	[5]
Benzidine	µg/L	24-hour composite	quarterly	[5]
Benzo(a)anthracene	µg/L	24-hour composite	quarterly	[5]
Bis(2-ethylhexyl)phthalate	µg/L	24-hour composite	quarterly	[5]
p-Dichlorobenzene (1,4-Dichlorobenzene)	µg/L	24-hour composite	quarterly	[5]
3,3-Dichlorobenzidine	µg/L	24-hour composite	quarterly	[5]
1,2-Diphenylhydrazine	µg/L	24-hour composite	quarterly	[5]
Hexachlorobenzene	µg/L	24-hour composite	quarterly	[5]
Aldrin	µg/L	24-hour composite	quarterly	[5]
Gamma-BHC(Lindane)	µg/L	24-hour composite	quarterly	[5]
Chlordane	µg/L	24-hour composite	quarterly	[5]
4,4-DDT	µg/L	24-hour composite	quarterly	[5]
4,4-DDE	µg/L	24-hour composite	quarterly	[5]
4,4-DDD	µg/L	24-hour composite	quarterly	[5]
Dieldrin	µg/L	24-hour composite	quarterly	[5]

[12] In accordance with the SIP, the Discharger shall conduct effluent monitoring for the seventeen 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD or dioxin) congeners in the effluent and in the receiving water Station RSW-002D, located downstream of the discharge point. The Discharger shall use the appropriate Toxicity Equivalence Factor (TEF) to determine Toxic Equivalence (TEQ). Where TEQ equals the product between each of the 17 individual congeners' (i) concentration analytical result (C_i) and their corresponding Toxicity Equivalence Factor (TEF_i)., (i.e., $TEQ_i = C_i \times TEF_i$). Compliance with the Dioxin limitation shall be determined by the summation of the seventeen individual TEQs, or the following equation:

$$\text{Dioxin concentration in effluent} = \sum_{1}^{17}(TEQ_i) = \sum_{1}^{17}(C_i)(TEF_i)$$

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method and (Minimum Level, units), respectively
Endrin	µg/L	24-hour composite	quarterly	[5]
Heptachlor	µg/L	24-hour composite	quarterly	[5]
Heptachlor epoxide	µg/L	24-hour composite	quarterly	[5]
PCBs	µg/L	24-hour composite	quarterly	[5]
Toxaphene	µg/L	24-hour composite	quarterly	[5]
Barium	µg/L	24-hour composite	quarterly	[5]
Iron	µg/L	24-hour composite	quarterly	[5]
Methoxychlor	µg/L	24-hour composite	quarterly	[5]
2,4-D	µg/L	24-hour composite	quarterly	[5]
2,4,5-TP (Silvex)	µg/L	24-hour composite	quarterly	[5]
Remaining EPA priority pollutants (except asbestos)	µg/L	24-hour composite; grab for VOCs	semiannually	[5]
Radioactivity (Including gross alpha, gross beta, combined radium-226 and radium-228, tritium, strontium-90 and uranium)	PCi/L	24-hour composite	quarterly	[13]

Effluent monitoring shall be performed at plant start-up.

B. Other Effluent Monitoring Location

1. Not Applicable. The Discharger only proposes to have one effluent discharge point.

Table 4. Other Effluent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method and (Minimum Level, units), respectively
N/A				

V. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS

A. Acute Toxicity

1. Definition of Acute Toxicity

[13] Analyze these radiochemicals by the following USEPA methods: method 900.0 for gross alpha and gross beta, method 903.0 or 903.1 for radium-226, method 904.0 for radium-228, method 906.0 for tritium, method 905.0 for strontium-90, and method 908.0 for uranium. Analysis for combined Radium-226 & 228 shall be conducted only if gross alpha results for the same sample exceed 15 pCi/L or beta greater than 50 pCi/L. If Radium-226 & 228 exceeds the stipulated criteria, analyze for Tritium, Strontium-90 and uranium.

Acute toxicity is a measure of primarily lethal effects that occur over a 96-hour period. Acute toxicity shall be measured in percent survival measured in undiluted (100%) effluent.

a. The average survival in the undiluted effluent for any three (3) consecutive 96-hour static or continuous flow bioassay tests shall be at least 90%, and

b. No single test shall produce less than 70% survival.

2. Acute Toxicity Effluent Monitoring Program

a. **Method.** The Discharger shall conduct acute toxicity tests on 100% effluent and receiving water grab samples by methods specified in 40 CFR Part 136, which cites USEPA's *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, October, 2002 (EPA-821-R-02-012) or a more recent edition to ensure compliance.

b. **Test Species.** The fathead minnow, *Pimephales promelas*, shall be used as the test species for fresh water discharges and the topsmelt, *Atherinops affinis*, shall be used as the test species for brackish discharges. However, if the salinity of the receiving water is between 1 to 32 parts per thousand (ppt), the Discharger may have the option of using the inland silverslide, *Menidia beryllina*, instead of the topsmelt. The method for topsmelt is found in USEPA's *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, October, 2002 (EPA-821-R-02-012).

c. **Alternate Reporting.** In lieu of conducting the standard acute toxicity testing with the fathead minnow, the Discharger may elect to report the results or endpoint from the first 96 hours of the chronic toxicity test as the results of the acute toxicity test, but only if the Discharger uses USEPA's October 2002 protocol (EPA-821-R-02-013) and fathead minnow is used to conduct the chronic toxicity test.

d. **Acute Toxicity Accelerated Monitoring.** If either of the effluent or receiving water toxicity requirements in Section IV.A.1.c.(i) and (ii), and Section V.A.17.c. respectively, of this Order is not met, the Discharger shall conduct six additional tests approximately every two weeks, over a six-week period. The Discharger shall ensure that results of a failing acute toxicity test are received by the Discharger within 24 hours of completion of the test and the additional tests shall begin within 5 business days of receipt of the result. If the additional tests indicate compliance with acute toxicity limitation, the Discharger may resume regular testing.

However, if the extent of the acute toxicity of the receiving water upstream of the discharge is greater than the downstream and the results of the effluent acute toxicity test comply with acute toxicity limitation, the accelerated monitoring need not be implemented for the receiving water.

e. **Toxicity Identification Evaluation (TIE).**

1. If the results of any two of the six accelerated tests are less than 90% survival, then the Discharger shall begin a Toxicity Identification Evaluation (TIE). The TIE shall include all reasonable steps to identify the sources of toxicity. Once the sources are identified, the Discharger shall take all reasonable steps to reduce toxicity to meet the objective.

2. If the initial test and any of the additional six acute toxicity bioassay tests results are less than 70% survival, the Discharger shall immediately implement Initial Investigation Toxicity Reduction Evaluation (TRE) Workplan. Once the sources are identified the Discharger shall take all reasonable steps to reduce toxicity to meet the requirements.

B. Chronic Toxicity Testing

1. Definition of Chronic Toxicity

Chronic toxicity is a measure of adverse sub-lethal effects in plants, animals, or invertebrates in a long-term test. The effects measured may include lethality or decreases in fertilization, growth, and reproduction.

2. Chronic Toxicity Effluent Monitoring Program

a. **Test Methods**. The Discharger shall conduct critical life stage chronic toxicity tests on 24-hour composite 100 % effluent samples or receiving water samples in accordance with EPA's *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, October 2002 (EPA-821-R-02-013) or EPA's *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, October 2002 (EPA-821-R-02-014), or current version.

b. **Frequency**

1. **Screening and Monitoring**. - The Discharger shall conduct the first chronic toxicity test screening for three consecutive months beginning from the date of initial discharge. The Discharger shall conduct short-term tests with the cladoceran, water flea (*Ceriodaphnia dubia* - survival and reproduction test), the fathead minnow (*Pimephales promelas* - larval survival and growth test), and the green alga (*Selenastrum capricornutum* - growth test) as an initial screening process for a minimum of three, but not to exceed, five suites of tests to account for potential variability of the effluent / receiving water. After this screening period, monitoring shall be conducted using the most sensitive species.

2. **Re-screening** Re-screening is required every 24 months. The Discharger shall re-screen with the three species listed above and continue to monitor with the most sensitive species. If the first suite of re-screening tests demonstrates that the same species is the most sensitive then the re-screening does not need to include more than one suite of tests. If a different species is the most sensitive or if there is ambiguity, then the Discharger shall proceed with suites of screening tests for a minimum of three, but not to exceed five suites.

3. Regular toxicity tests - After the screening period, monitoring shall be conducted monthly using the most sensitive species.

c. **Toxicity Units.** The chronic toxicity of the effluent shall be expressed and reported in Chronic Toxic Units, TUc, where,

$$TUc = \frac{100}{NOEC}$$

The No Observable Effect Concentration (NOEC) is expressed as the maximum percent effluent concentration that causes no observable effect on test organisms, as determined by the results of a critical life stage toxicity test.

3. Accelerated Monitoring

If the chronic toxicity of the effluent or the receiving water downstream the discharge exceeds the monthly trigger median of 1.0 TU_c, the Discharger shall conduct six additional tests, approximately every two weeks, over a 12-week period. The Discharger shall ensure that they receive results of a failing chronic toxicity test within 24 hours of the completion of the test and the additional tests shall begin within 5 business days of the receipt of the result. However, if the chronic toxicity of the receiving water upstream of the discharge is greater than the downstream and the TUc of the effluent chronic toxicity test is less than or equal to a monthly median of 1 TU_c trigger, then accelerated monitoring need not be implemented for the receiving water.

a. If any three out of the initial test and the six additional tests results exceed 1.0 TU_c the Discharger shall immediately implement the Initial Investigation TRE workplan.

b. If implementation of the initial investigation TRE workplan indicates the source of toxicity (e.g., a temporary plant upset, etc.), then the Discharger shall return to the normal sampling frequency required in Table 3 and Table 4 of this MRP.

c. If all of the six additional tests required above do not exceed 1 TUc, then the Discharger may return to the normal sampling frequency.

d. If a TRE/TIE is initiated prior to completion of the accelerated testing schedule required, then the accelerated testing schedule may be terminated, or used as necessary in performing the TRE/TIE, as determined by the Executive Officer.

C. Quality Assurance

1. Concurrent testing with a reference toxicant shall be conducted. Reference toxicant tests shall be conducted using the same test conditions as the effluent toxicity tests (e.g., same test duration, etc).

2. If either the reference toxicant test or effluent test does not meet all test acceptability criteria (TAC) as specified in the test methods manual (EPA-821-R-02-012 and/or EPA-821-R-02-013), then the Discharger must re-sample and re-test within 14 days.

3. Control and dilution water should be receiving water or laboratory water, as appropriate, as described in the manual. If the dilution water used is different from the culture water, a second control using culture water shall be used.

D. Preparation of an Initial Investigation TRE Workplan

The Discharger shall prepare and submit a copy of the Discharger's initial investigation Toxicity Reduction Evaluation (TRE) workplan to the Executive Officer of the Regional Water Board for approval within 90 days of the effective date of this permit. If the Executive Officer does not disapprove the workplan within 60 days, the workplan shall become effective. The Discharger shall use USEPA manual EPA/833B-99/002 (municipal) as guidance, or most current version. At a minimum, the TRE Workplan must contain the provisions in Attachment G. This workplan shall describe the steps the Discharger intends to follow if toxicity is detected, and should include, at a minimum:

1. A description of the investigation and evaluation techniques that will be used to identify potential causes and sources of toxicity, effluent variability, and treatment system efficiency.

2. A description of the facility's methods of maximizing in-house treatment efficiency and good housekeeping practices, and a list of all chemicals used in the operation of the facility; and,

3. If a toxicity identification evaluation (TIE) is necessary, an indication of the person who would conduct the TIEs (i.e., an in-house expert or an outside contractor). See MRP Section V.E.3 for guidance manuals.

E. Steps in Toxicity Reduction Evaluation (TRE) and Toxicity Identification Evaluation (TIE)

1. If results of the implementation of the facility's initial investigation TRE workplan indicate the need to continue the TRE/TIE, the Discharger shall expeditiously develop a more detailed TRE workplan for submittal to the Executive Officer within 15 days of completion of the initial investigation TRE. The detailed workplan shall include, but not be limited to:

   a. Further actions to investigate and identify the cause of toxicity;

   b. Actions the Discharger will take to mitigate the impact of the discharge and prevent the recurrence of toxicity; and

   c. A schedule for these actions.

2. The following section summarizes the stepwise approach used in conducting the TRE:

   a. Step 1 includes basic data collection.

   b. Step 2 evaluates optimization of the treatment system operation, facility housekeeping, and selection and use of in-plant process chemicals.

   c. If Steps 1 and 2 are unsuccessful, Step 3 implements a Toxicity Identification Evaluation (TIE) and employment of all reasonable efforts using currently available TIE methodologies. The objective of the TIE shall be to identify the substance or combination of substances causing the observed toxicity.

   d. Assuming successful identification or characterization of the toxicant(s), Step 4 evaluates final effluent treatment options.

   e. Step 5 evaluates in-plant treatment options.

   f. Step 6 consists of confirmation once a toxicity control method has been implemented.
   Many recommended TRE elements parallel source control, pollution prevention, and storm water control program best management practices (BMPs). To prevent duplication of efforts, evidence of compliance with those requirements may be sufficient to comply with TRE requirements. By requiring the first steps of a TRE to be accelerated testing and review of the facility's TRE workplan, a TRE may be ended in its early stages. All reasonable steps shall be taken to reduce toxicity to the required level. The TRE may be ended at any stage if monitoring indicates there are no longer toxicity violations.

3. The Discharger may initiate a TIE as part of the TRE process to identify the cause(s) of toxicity. The Discharger shall use the USEPA acute manual, chronic manual, EPA/600/R-96-054 (Phase I), EPA/600/R-92/080 (Phase II), and EPA-600/R-92/081 (Phase III), as guidance.

4. If a TRE/TIE is initiated prior to completion of the accelerated testing required in Section V.D. of this program, then the accelerated testing schedule may be terminated, or used as necessary in performing the TRE/TIE, as determined by the Executive Officer.

5. Toxicity tests conducted as part of a TRE/TIE may also be used for compliance, if appropriate.

6. The Regional Water Board recognizes that toxicity may be episodic and identification of causes of and reduction of sources of toxicity may not be successful in all cases. Consideration of enforcement action by the Board will be based, in part, on the Discharger's actions and efforts to identify and control or reduce sources of consistent toxicity.

   a. If all the results of the six additional tests are in compliance with the chronic toxicity limitation, the Discharger may resume regular monthly testing.

   b. If the results of any of the six accelerated tests exceeds the limitation, the Discharger shall continue to monitor bi-weekly until six consecutive weekly tests are in compliance. At that time, the Discharger may resume regular monthly testing.

   c. If the results of two of the six tests, or any two tests in a six-week period, exceed the limitation, the Discharger shall initiate a TRE.

   d. If implementation of the initial investigation TRE workplan (see item D.3, above) indicates the source of toxicity (e.g., a temporary plant upset, etc.), then the Discharger shall return to the regular testing frequency.

F. Ammonia Removal

1. Except with prior approval from the Executive Officer of the Regional Water Board, ammonia shall not be removed from bioassay samples. The Discharger must demonstrate the effluent toxicity is caused by ammonia *because of increasing test pH* when conducting the toxicity test. It is important to distinguish the potential toxic effects of ammonia from other pH sensitive chemicals, such as certain heavy metals, sulfide, and cyanide. The following may be steps to demonstrate that the toxicity is caused by ammonia and not other toxicants before the Executive Officer would allow for control of pH in the test.

a. There is consistent toxicity in the effluent and the maximum pH in the toxicity test is in the range to cause toxicity due to increased pH.

b. Chronic ammonia concentrations in the effluent are greater than 4 mg/L total ammonia.

c. Conduct graduated pH tests as specified in the toxicity identification evaluation methods. For example, mortality should be higher at pH 8 and lower at pH 6.

d. Treat the effluent with a zeolite column to remove ammonia. Mortality in the zeolite treated effluent should be lower than the non-zeolite treated effluent. Then add ammonia back to the zeolite-treated samples to confirm toxicity due to ammonia.

2. When it has been demonstrated that toxicity is due to ammonia because of increasing test pH, pH may be controlled using appropriate procedures which do not significantly alter the nature of the effluent, after submitting a written request to the Regional Water Board , and receiving written permission expressing approval from the Executive Officer of the Regional Water Board.

G. Reporting

The Discharger shall submit a full report of the toxicity test results, including any accelerated testing conducted during the month, as required by this permit. Test results shall be reported in percent Survival (% Survival) for Acute Toxicity and Chronic Toxicity Units (TUc) for chronic toxicity, as required, with the self-monitoring report (SMR) for the month in which the test is conducted. If an initial investigation indicates the source of toxicity and accelerated testing is unnecessary, pursuant to Section V.A.2.d and V.B.3, then those results also shall be submitted with the SMR for the period in which the Investigation occurred.

1. The full report shall be received by the Regional Water Board by the 15th day of the third month following sampling.

2. The full report shall consist of (1) the results; (2) the dates of sample collection and initiation of each toxicity test; (3) the toxicity trigger; and, (4) printout of the toxicity program (ToxCalc or CETIS).

3. Test results for toxicity tests also shall be reported according to the appropriate manual chapter on Report Preparation and shall be attached to the SMR. Routine reporting shall include, at a minimum, as applicable, for each test, as appropriate:

   a. sample date(s)

   b. test initiation date

c. test species

d. end point value(s) for each dilution (e.g. number of young, growth rate, percent survival)

e. NOEC values in percent effluent

f. TUc value(s), where $TU_c = \frac{100}{NOEC}$

g. Mean percent mortality (+standard deviation) after 96 hours in 100% effluent (if applicable)

h. NOEC and LOEC (Lowest Observable Effect Concentration) values for reference toxicant test(s)

i. Available water quality measurements for each test (e.g., pH, D.O., temperature, conductivity, hardness, salinity, ammonia).

4. The Discharger shall provide a compliance summary that includes a summary table of toxicity data from at least eleven of the most recent samples.

5. The Discharger shall notify this Regional Water Board immediately of any toxicity trigger exceedance and in writing 14 days after the receipt of the results of the exceedance. The notification will describe actions the Discharger has taken or will take to investigate and correct the cause(s) of toxicity. It may also include a status report on any actions required by the permit, with a schedule for actions not yet completed. If no actions have been taken, the reasons shall be given.

VI. LAND DISCHARGE MONITORING REQUIREMENTS

Not Applicable.

VII. RECLAMATION MONITORING REQUIREMENTS

Not applicable. Water Recycling Requirements (WRR) monitoring will be required in a separate Order.

VIII. RECEIVING WATER MONITORING REQUIREMENTS – SURFACE WATER AND GROUNDWATER

A. Monitoring Location RSW-001U and RSW-002D

1. The Discharger shall monitor The Santa Clara River at RSW-001U and RSW-002D as follows:

Table 7a.1. Receiving Water Monitoring Requirements

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Total waste flow	mgd	grab	weekly	[14]
Turbidity	NTU	grab	weekly	14
Total residual chlorine	mg/L	grab	weekly	14
Total coliform	MPN/ 100mL	grab	daily	14
Fecal coliform	MPN/ 100mL	grab	daily	14
E.coli	MPN/ 100mL	grab	daily[15]	14
Temperature[16]	°F	grab	daily	14
pH[16]	pH units	grab	daily	14
Settleable solids	mL/L	grab	daily	14
Suspended solids	mg/L	grab	weekly	14
BOD_5 20°C	mg/L	grab	weekly	14
Oil and grease	mg/L	grab	monthly	14
Dissolved oxygen	mg/L	grab	weekly	14
Total dissolved solids	mg/L	grab	monthly	14
Chloride	mg/L	grab	monthly	14
Sulfate	mg/L	grab	monthly	14
Boron	mg/L	grab	monthly	14
Fluoride	mg/L	grab	quarterly	14
Ammonia Nitrogen[16]	mg/L	grab	weekly	14
Nitrite nitrogen[16]	mg/L	grab	weekly	14
Nitrate nitrogen[16]	mg/L	grab	weekly	14
Organic nitrogen[16]	mg/L	grab	weekly	14
Total nitrogen	mg/L	grab	weekly	14
Total phosphorus	mg/L	grab	monthly	14
Orthophosphate-P	mg/L	grab	monthly	14
Algal biomass[17]	mg/L	grab	monthly	14

[14] Pollutants shall be analyzed using the analytical methods described in 40 CFR 136; where no methods are specified for a given pollutant, by methods approved by this Regional Water Board or State Water Resources Control Board. For any pollutant whose effluent limitation is lower than all the minimum levels (MLs) specified in Attachment 4 of the SIP, the analytical method with the lowest ML must be selected.

[15] E. coli testing shall be conducted only if fecal coliform testing is positive. If the fecal coliform analysis results in no detection, a result of less than (<) the reporting limit for fecal coliform will be reported for E. coli.

[16] Nitrate nitrogen, nitrite nitrogen, ammonia nitrogen, organic nitrogen, pH, and temperature sampling shall be conducted concurrently.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Surfactants (MBAS)[18]	mg/L	grab	monthly	14
Surfactants (CTAS)[18]	mg/L	grab	monthly	14
Total hardness ($CaCO_3$)	mg/L	grab	weekly	14
Chronic toxicity	TUc	grab	monthly	14
Acute toxicity	% Survival	grab	monthly	14
Perchlorate	µg/L	grab	semiannually	14
1,4-Dioxane	µg/L	grab	semiannually	14
1,2,3-Trichloropropane	µg/L	grab	semiannually	14
Methyl tert-butyl ether (MTBE)	µg/L	grab	semiannually	14
Antimony	µg/L	grab	monthly	14
Arsenic	µg/L	grab	monthly	14
Beryllium	µg/L	grab	semiannually	14
Cadmium	µg/L	grab	quarterly	14
Chromium III	µg/L	grab	quarterly	14
Chromium VI	µg/L	grab	quarterly	14
Copper	µg/L	grab	monthly	14
Lead	µg/L	grab	monthly	14
Mercury	µg/L	grab	monthly	14
Nickel	µg/L	grab	monthly	14
Selenium	µg/L	grab	monthly	14
Silver	µg/L	grab	quarterly	14
Thallium	µg/L	grab	quarterly	14
Zinc	µg/L	grab	monthly	14
Cyanide	µg/L	grab	monthly	14
2,3,7,8-TCDD[19]	µg/L	grab	semiannually	14

[17] Algal biomass or Chlorophyll A samples shall be collected by obtaining scrapings from the substrate. This will be a measure of benthic algae, rather than algae in the water column. Percent cover shall also be reported.

[18] MBAS is Methylene blue active substances and CTAS is cobalt thiocyanate active substances. Reaches of the Santa Clara River are unlined in several reaches downstream of the points of wastewater discharge and are designated with the beneficial use of groundwater recharge (GWR) in the Basin Plan. Monitoring is required to assess compliance with the Title 22-based limit prescribed to protect underlying groundwater quality with the MUN beneficial use.

[19] In accordance with the SIP, the Discharger shall conduct effluent monitoring for the seventeen 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD or dioxin) congeners in the effluent and in the receiving water Station RSW-002D, located downstream of the discharge point. The Discharger shall use the appropriate Toxicity Equivalence Factor (TEF) to determine Toxic Equivalence (TEQ). Where TEQ equals the product between each of the 17 individual congeners' (i) concentration analytical result (C_i) and their corresponding Toxicity Equivalence Factor (TEF_i)., (i.e., $TEQ_i = C_i \times TEF_i$). Compliance with the Dioxin limitation shall be determined by the summation of the seventeen individual TEQs, or the following equation:

$$\text{Dioxin concentration in effluent} = \sum_{1}^{17}(TEQ_i) = \sum_{1}^{17}(C_i)(TEF_i)$$

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Acrylonitrile	µg/L	grab	monthly	14
Bromoform	µg/L	grab	quarterly	14
Dibromochloromethane	µg/L	grab	quarterly	14
Chloroform	µg/L	grab	quarterly	14
Bromodichloromethane	µg/L	grab	quarterly	14
1,2-Dichloroethane	µg/L	grab	semiannually	14
Methyl bromide (Bromomethane)	µg/L	grab	semiannually	14
Methyl chloride (Chloromethane)	µg/L	grab	semiannually	14
Methylene chloride	µg/L	grab	semiannually	14
Tetrachloroethylene	µg/L	grab	monthly	14
Benzidine	µg/L	grab	semiannually	14
Benzo(a)anthracine	µg/L	grab	semiannually	14
Bis(2-ethylhexyl)phthalate	µg/L	grab	quarterly	14
p-Dichlorobenzene (1,4-Dichlorobenzene)	µg/L	grab	quarterly	14
3,3-Dichlorobenzidine	µg/L	grab	semiannually	14
1,2-Diphenylhydrazine	µg/L	grab	semiannually	14
Hexachlorobenzene	µg/L	grab	semiannually	14
Aldrin	µg/L	grab	semiannually	14
Gamma-BHC(Lindane)	µg/L	grab	semiannually	14
Chlordane	µg/L	grab	semiannually	14
4,4-DDT	µg/L	grab	semiannually	14
4,4-DDE	µg/L	grab	semiannually	14
4,4-DDD	µg/L	grab	semiannually	14
Dieldrin	µg/L	grab	semiannually	14
Endrin	µg/L	grab	semiannually	14
Heptachlor	µg/L	grab	semiannually	14
Heptachlor epoxide	µg/L	grab	semiannually	14
Diazinon[20]	µg/L	grab	semiannually	14
PCBs	µg/L	grab	semiannually	14
Toxaphene	µg/L	grab	semiannually	14
Barium	µg/L	grab	semiannually	14
Iron	µg/L	grab	monthly	14
Methoxychlor	µg/L	grab	semiannually	14
2,4-D	µg/L	grab	semiannually	14
2,4,5-TP (Silvex)	µg/L	grab	semiannually	14
Remaining EPA priority pollutants (except for asbestos)	µg/L	grab	semiannually	14

[20] Diazinon sampling shall be conducted concurrently with the receiving water chronic toxicity sampling.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Radioactivity(Including gross alpha, gross beta, combined radium-226 and radium-228, tritium, strontium-90 and uranium)[21]	PCi/L	grab	semiannually	14

Receiving water samples need not be collected during months in which there is no discharge to the Santa Clara River. However, a minimum of two samples per year, for each constituent, are required to be collected.

2. The Discharger shall monitor the Santa Clara River at a receiving water station RSW-001D located 100 feet downstream of the discharge as follows:

Table 7.a.2. Ammonia Receiving Water Monitoring Requirements

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Temperature	°F	grab	monthly	14
pH	pH units	grab	monthly	14
Ammonia Nitrogen	mg/L	grab	monthly	14
Acute Toxicity	% Survival	grab	monthly	14
Chronic Toxicity	TUc	grab	monthly	14

a. Toxicity Testing Requirement

i. Acute Toxicity – For this particular testing, only Fathead Minnow shall be used as the test species.

ii. Chronic Toxicity testing procedures shall follow the requirements described in Section V.B. of the MRP.

b. Ambient Receiving Water Requirements

The Discharger shall delineate the pH and temperature of the ambient receiving water conditions within 100 feet downstream from the point of discharge. A workplan describing the pH and temperature fluctuation study shall be submitted to the Executive Officer for Approval within 60 days from the date of adoption of this permit.

[21] Analyze these radiochemicals by the following USEPA methods: method 900.0 for gross alpha and gross beta, method 903.0 or 903.1 for radium-226, method 904.0 for radium-228, method 906.0 for tritium, method 905.0 for strontium-90, and method 908.0 for uranium. Analysis for combined Radium-226 & 228 shall be conducted only if gross alpha results for the same sample exceed 15 pCi/L or beta greater than 50 pCi/L. If Radium-226 & 228 exceeds the stipulated criteria, analyze for Tritium, Strontium-90 and uranium.

3. Receiving water samples shall not be taken during or within 48 hours following the flow of rainwater runoff into the Santa Clara River system. Sampling may be rescheduled at receiving water stations if weather and/or flow conditions would endanger personnel collecting receiving water samples. The monthly monitoring report shall note such occasions.

B. Monitoring Location RGW-001, RGW-002, and RGW-003

1. The Discharger shall monitor the groundwater aquifer at RGW-001 (Upgradient well), RGW-002 (Downgradient well) and RGW-003 (Downgradient well) as follows:

Table 7b. Receiving Ground Water Monitoring Requirements

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Nitrite nitrogen	mg/L	grab	quarterly	1
Nitrate nitrogen	mg/L	grab	quarterly	1
Organic nitrogen	mg/L	grab	quarterly	1
Total nitrogen	mg/L	grab	quarterly	1
Total phosphorus	mg/L	grab	quarterly	1
Orthophosphate-P	mg/L	grab	quarterly	1
Total Dissolved Solids	mg/L	grab	quarterly	1
Chloride	mg/L	grab	quarterly	1
Sulfate	mg/L	grab	quarterly	1
Boron	mg/L	grab	quarterly	1
Methyl tert-butyl ether (MTBE)	µg/L	grab	semiannually	USEPA 8260B (2 µg/L detection limit)
Perchlorate	µg/L	grab	semiannually	USEPA 314 (2 µg/L detection limit)
1,4-Dioxane	µg/L	grab	semiannually	USEPA 8270c (2 µg/L detection limit)
1,2,3-Trichloropropane	µg/L	grab	semiannually	USEPA 504.1 (0.005 µg/L detection limit)

1 Pollutants shall be analyzed using the analytical methods described in 40 CFR 136; where no methods are specified for a given pollutant, by methods approved by this Regional Water Board or State Water Resources Control Board. For any pollutant whose effluent limitation is lower than all the minimum levels (MLs) specified in Attachment 4 of the SIP, the analytical method with the lowest ML must be selected.

A workplan for a groundwater monitoring network capable of detecting any impact to the groundwater as a result of Newhall Ranch WRP's discharge, is due to the Regional Water Board 180 days upon the adoption of this Order. Groundwater monitoring shall commence no later than six months before the Newhall Ranch WRP's start-up date.

IX. OTHER MONITORING REQUIREMENTS

A. Watershed Monitoring

The goals of the Watershed-wide Monitoring Program for the Santa Clara River Watershed are to:

- Determine compliance with receiving water limits;
- Monitor trends in surface water quality;
- Ensure protection of beneficial uses;
- Provide data for modeling contaminants of concern;
- Characterize water quality including seasonal variation of surface waters within the watershed;
- Assess the health of the biological community; and
- Determine mixing dynamics of effluent and receiving waters in the estuary.

1. The Discharger shall participate in the implementation of the Watershed-wide Monitoring Program. The District's responsibilities under the Watershed-wide Monitoring Program are described in the Receiving Water Monitoring Requirements section. To achieve the goals of the Watershed-wide Monitoring Program, revisions to the Receiving Water Monitoring Requirements will be made under the direction of USEPA and the Regional Board. The District shall participate with the Santa Clara River Enhancement and Management Plan Steering Committee, and other stakeholders, in the development and implementation of a watershed-wide monitoring program. The Discharger shall submit a draft Watershed-wide Monitoring Program by October 15, 2009, to the Regional Board. In the interim, the Discharger shall submit quarterly progress reports detailing ongoing efforts towards the development of a Watershed-wide Monitoring Program. The first report should be received in the Regional Board office by April 15, 2008.

2. In coordination with interested stakeholders in the Santa Clara River Watershed, the Discharger shall conduct instream bioassessment monitoring once a year, during the spring/summer period (unless an alternate sampling period is approved by the Executive Officer). Over time, bioassessment monitoring will provide a measure of the physical condition of the waterbody and the integrity of its biological communities.

   A. The bioassessment program shall include an analysis of the community structure of the instream macroinvertebrate assemblages and physical habitat assessment at the monitoring stations RSW-001U and RSW-002D.

      This program shall be implemented by appropriately trained staff. Alternatively, a professional subcontractor qualified to conduct bioassessments may be selected to perform the bioassessment work for the Discharger. Analyses of the results of the bioassessment monitoring program, along with photographs of the monitoring site locations taken during sample collection, shall be submitted in the corresponding annual report. If another stakeholder, or interested party in the watershed subcontracts a

qualified professional to conduct bioassessment monitoring during the same season and at the same location as specified in the MRP, then the Discharger may, in lieu of duplicative sampling, submit the data, a report interpreting the data, photographs of the site, and related QA/QC documentation in the corresponding annual report.

B. The Discharger must provide a copy of their Standard Operation Procedures (SOPs) for the Bioassessment Monitoring Program to the Regional Board upon request. The document must contain step-by-step field, laboratory and data entry procedures, as well as, related QA/QC procedures. The SOP must also include specific information about each bioassessment program including: assessment program description, its organization and the responsibilities of all its personnel; assessment project description and objectives; qualifications of all personnel; and the type of training each member has received.

C. Field sampling must conform to the SOP established for the California Stream Bioassessment Procedure (CSBP) or more recently established sampling protocols, such as used by the Surface Water Ambient Monitoring Program (SWAMP). Field crews shall be trained on aspects of the protocol and appropriate safety issues. All field data and sample Chain of Custody (COC) forms must be examined for completion and gross errors. Field inspections shall be planned with random visits and shall be performed by the Discharger or an independent auditor. These visits shall report on all aspects of the field procedure with corrective action occurring immediately.

D. A taxonomic identification laboratory shall process the biological samples that usually consist of subsampling organisms, enumerating and identifying taxonomic groups and entering the information into an electronic format. The Regional Board may require QA/QC documents from the taxonomic laboratories and examine their records regularly. Intra-laboratory QA/QC for subsampling, taxonomic validation and corrective actions shall be conducted and documented. Biological laboratories shall also maintain reference collections, vouchered specimens (the Discharger may request the return of their sample voucher collections) and remnant collections. The laboratory should participate in an (external) laboratory taxonomic validation program at a recommended level of 10% or 20%. External QA/QC may be arranged through the California Department of Fish and Game's Aquatic Bioassessment Laboratory located in Rancho Cordova, California.

3. The Executive Officer of the Regional Water Board may modify Monitoring and Reporting Program to accommodate the watershed-wide monitoring.

X. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

1. The Discharger shall comply with all Standard Provisions (Attachment D) related to monitoring, reporting, and recordkeeping.

2. If there is no discharge during any reporting period, the report shall so state.

3. Each monitoring report shall contain a separate section titled "Summary of Non-Compliance" which discusses the compliance record and the corrective actions taken or planned that may be needed to bring the discharge into full compliance with waste discharge requirements. This section shall clearly list all non-compliance with discharge requirements, as well as all excursions of effluent limitations.

4. The Discharger shall inform the Regional Board well in advance of any proposed construction activity that could potentially affect compliance with applicable requirements.

5. Each monthly monitoring report shall include a determination of compliance with receiving water ammonia water quality objectives at RSW-001D. Any exceedances of an ammonia water quality objective shall be noted in the "Summary of Non-Compliance" section of the monitoring report.

B. Self Monitoring Reports (SMRs)

1. At any time during the term of this permit, the State or Regional Water Board may notify the Discharger to electronically submit Self-Monitoring Reports (SMRs) using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site (http://www.waterboards.ca.gov/ciwqs/index.html). Until such notification is given, the Discharger shall submit hard copy SMRs. The CIWQS Web site will provide additional directions for SMR submittal in the event there will be service interruption for electronic submittal.

2. The Discharger shall report in the SMR the results for all monitoring specified in this MRP under sections III through IX. Additionally, the Discharger shall report in the SMR the results of any special studies, acute and chronic toxicity testing, TRE/TIE, PMP, and Pollution Prevention Plan required by Special Provisions of this Order. The Discharger shall submit monthly and annual SMRs including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this Order. If the Discharger monitors any pollutant more frequently than required by this Order, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR.

3. Monitoring periods and reporting for all required monitoring shall be completed according to the following schedule:

Table 8. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On...	Monitoring Period	SMR Due Date
Continuous	Permit effective date	All	Submit with monthly SMR
Daily	Permit effective date	(Midnight through 11:59 PM) or any 24-hour period that reasonably represents a calendar day for purposes of sampling.	Submit with monthly SMR
Weekly	Sunday following permit effective date or on permit effective date if on a Sunday	Sunday through Saturday	Submit with monthly SMR
Monthly	First day of calendar month following permit effective date or on permit effective date if that date is first day of the month	1st day of calendar month through last day of calendar month	By the 15th day of the third month after the month of sampling
Quarterly	Closest of January 1, April 1, July 1, or October 1 following (or on) permit effective date	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31	June15 September 15 December 15 March 15
Semiannually	Closest of January 1 or July 1 following (or on) permit effective date	January 1 through June 30 July 1 through December 31	September15 March15
Annually	January 1 following (or on) permit effective date	January 1 through December 31	April 15

4. Reporting Protocols. The Discharger shall report with each sample result the applicable Reporting Level (RL) and the current Method Detection Limit (MDL), as determined by the procedure in 40 CFR Part 136.

   The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

   a. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

   b. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The *estimated chemical concentration of the sample shall also be reported.

      For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the

reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

c. Sample results less than the laboratory's MDL shall be reported as "Not Detected," or ND.

d. Dischargers are to instruct laboratories to establish calibration standards so that the ML value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from *extrapolation* beyond the lowest point of the calibration curve.

5. The Discharger shall submit SMRs in accordance with the following requirements:

a. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the facility is operating in compliance with interim and/or final effluent limitations. The Discharger is not required to duplicate the submittal of data that is entered in a tabular format within CIWQS. When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format within the system, the Discharger shall electronically submit the data in a tabular format as an attachment.

b. The Discharger shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify violations of the WDRs; discuss corrective actions taken or planned; and the proposed time schedule for corrective actions. Identified violations must include a description of the requirement that was violated and a description of the violation.

c. SMRs must be submitted to the Regional Water Board, signed and certified as required by the Standard Provisions (Attachment D), to the address listed below: (Reference the reports to Compliance File No. YYYY to facilitate routing to the appropriate staff and file.)

California Regional Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, CA 90013
Attention: Information Technology Unit

C. Discharge Monitoring Reports (DMRs)

1. As described in Section X.B.1 above, at any time during the term of this permit, the State or Regional Water Board may notify the Discharger to electronically submit SMRs that will satisfy federal requirements for submittal of Discharge Monitoring Reports (DMRs). Until such notification is given, the Discharger shall submit DMRs in accordance with the requirements described below.

2. DMRs must be signed and certified as required by the standard provisions (Attachment D). The Discharge shall submit the original DMR and one copy of the DMR to the address listed below:

STANDARD MAIL	FEDEX/UPS/ OTHER PRIVATE CARRIERS
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO Box 100 Sacramento, CA 95812-1000	State Water Resources Control Board Division of Water Quality c/o DMR Processing Center 1001 I Street, 15th Floor Sacramento, CA 95814

3. All discharge monitoring results must be reported on the official USEPA pre-printed DMR forms (EPA Form 3320-1). Forms that are self-generated will not be accepted unless they follow the exact same format of EPA Form 3320-1.

D. Other Reports

1. Annual Summary Report

By April 15 of each year, the Discharger shall submit an annual report containing a discussion of the previous year's influent/effluent analytical results and receiving water bacterial monitoring data. The annual report shall contain graphical and tabular summaries of the monitoring analytical data. The annual report shall also contain an overview of any plans for upgrades to the treatment plant's collection system, the treatment processes, or the outfall system. The Discharger shall submit a hard copy annual report to the Regional Water Board in accordance with the requirements described in subsection B.5 above.

Each annual monitoring report shall contain a separate section titled "Reasonable Potential Analysis" which discusses whether or not reasonable potential was triggered for pollutants which do not have a final effluent limitation in the NPDES permit. This section shall contain the following statement:" The analytical results for this sampling period did/ did not trigger reasonable potential." If reasonable potential was triggered, then the following information should also be provided:

a. A list of the pollutant(s) that triggered reasonable potential;
b. The Basin Plan or CTR criteria that was exceeded for each given pollutant;
c. The concentration of the pollutant(s);
d. The test method used to analyze the sample; and,
e. The date and time of sample collection.

2. The Discharger shall submit to the Regional Water Board, together with the first monitoring report required by this permit, a list of all chemicals and proprietary additives which could affect this waste discharge, including quantities of each. Any subsequent changes in types and/or quantities shall be reported promptly.

3. The Regional Board requires the Discharger to file with the Regional Board, within 90 days after the effective date of this Order, a technical report on his preventive (failsafe) and contingency (cleanup) plans for controlling accidental discharges, and for minimizing the effect of such events. The technical report should:

   a. Identify the possible sources of accidental loss, untreated waste bypass, and contaminated drainage. Loading and storage areas, power outage, waste treatment unit outage, and failure of process equipment, tanks, and pipes should be considered.

   b. Evaluate the effectiveness of present facilities and procedures and state when they become operational.

   c. Describe facilities and procedures needed for effective preventive and contingency plans.
   d. Predict the effectiveness of the proposed facilities and procedures and provide an implementation schedule contingent interim and final dates when they will be constructed, implemented, or operational.

ATTACHMENT F – FACT SHEET

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ATTACHMENT F – FACT SHEET

As described in section II of this Order, this Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for Dischargers in California. Only those sections or subsections of this Order that are specifically identified as "not applicable" have been determined not to apply to this Discharger. Sections or subsections of this Order not specifically identified as "not applicable" are fully applicable to this Discharger.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the facility.

Table 1. Facility Information

WDID	
Discharger	Newhall Ranch Sanitation District
Name of Facility	Newhall Ranch Water Reclamation Plant
Facility Address	Hwy 126 at Los Angeles/Ventura County Line
	Newhall, California, 91355
	Los Angeles County
Facility Contact, Title and Phone	Steve Sheridan, Principal Engineer (626) 458-7151
Authorized Person to Sign and Submit Reports	Steve Sheridan, Principal Engineer (626) 458-7151
Mailing Address	900 South Fremont, Alhambra, CA 91803
Billing Address	900 South Fremont, Alhambra, CA 91803
Type of Facility	POTW
Major or Minor Facility	Major
Threat to Water Quality	1
Complexity	A
Pretreatment Program	N
Reclamation Requirements	Future producer, applied for new water recycling requirements under separate Order
Facility Permitted Flow	2 million gallons per day (MGD)
Facility Design Flow	2 MGD
Watershed	Santa Clara River
Receiving Water	Santa Clara River
Receiving Water Type	Inland surface water

A. Ownership.

Newhall Land and Farming Company (Newhall Land) is planning on transferring ownership of the land to Newhall Ranch Sanitation District (Newhall Ranch SD) in September 2007. Newhall Ranch SD will make a formal application to the existing twenty-four County Sanitation Districts to become signatory to the amended Joint Administration Agreement (JAA), dated July 1, 1980, of the County Sanitation Districts of Los Angeles County. Newhall Ranch SD will also make a formal application to the Santa Clarita Valley Sanitation District to enter into an agreement regarding the ownership and operation of the Newhall Ranch WRP. These agreements will allow the County Sanitation Districts of Los Angeles County to be the operator of the Newhall Ranch WRP, and to provide engineering and administrative staff at the Newhall Ranch WRP. However, the Los Angeles County Department of Public Works will staff the Newhall Ranch SD until such time as Newhall Ranch SD joins the JAA. Newhall Ranch SD will retain ownership of the Newhall Ranch WRP.

For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

B. Proposed Discharge.

The Discharger proposes to discharge tertiary-treated wastewater to the Santa Clara River, a water of the United States. The Newhall Ranch Water Reclamation Plant will be a new discharger and is currently not regulated by any other Order. Although Newhall Land has obtained coverage under the General Order No. R4-2003-0111, National Pollutant Discharge Elimination System (NPDES) permit No. CAG994004, to discharge groundwater associated with dewatering and construction activities. Discharge of tertiary-treated effluent, as proposed in the Report of Waste Discharge (ROWD), should commence several months after the effective date of this NPDES Order.

C. ROWD.

The Discharger filed a report of waste discharge and submitted an application for new Waste Discharge Requirements (WDRs) and NPDES permit on April 23, 2004, years in advance of the anticipated discharge date and prior to the formation of the new Newhall Ranch Sanitation District. Supplemental information, including the analytical results of receiving water sampling, was submitted between September 27, 2004 and March 30, 2007. The required signatory requirements for the ROWD were received on May 4, 2007 and May 23, 2007. A site visit was conducted on May 23, 2007, to observe the site where the new POTW would be constructed.

II. FACILITY DESCRIPTION

A. Description of Wastewater and Biosolids Treatment or Controls

Treatment at the Newhall Ranch WRP, a publicly owned treatment works (POTW), will consist of screening, activated sludge secondary treatment with membrane bioreactors, nitrification/denitrification, ultraviolet disinfection, and partial reverse osmosis. There will

be no solids handling facilities in the near term. Waste activated sludge will be hauled away to the Valencia Water Reclamation Plant for further treatment and disposal. Brine from the RO system will be disposed of through deep well injection, under a separate USEPA permit. Treated wastewater will be discharged from Discharge Point 001 (see Table on Cover Page) to the Santa Clara River, a water of the United States, tributary to the Santa Clara River Estuary, within the Santa Clara River Watershed.

B. Discharge Points and Receiving Waters

The Newhall Ranch WRP will discharge tertiary-treated wastewater to an unlined section of the Santa Clara River, a water of the United States, through Discharge Serial No. 001(Latitude 34° 0.403166'N, Longitude 118° 0.6896667'W), within the Santa Clara River Watershed. The Newhall Ranch WRP will be located downstream of the Los Angeles County Sanitation District's Saugus and Valencia WRPs It will have an initial design capacity of 2 MGD, and incrementally increase its design capacity to 6.8 MGD [2.0 MGD in Phase I; 4.0 MGD in Phase II; and 6.8 MGD in Phase III], to accommodate the sewage generated by new inhabitants, as additional tracts of the Landmark Village development project are completed.

The Santa Clara River is one of the largest river systems in southern California. The River originates in the northern slope of the San Gabriel Mountains in Los Angeles County, traverses Ventura County, and flows into the Pacific Ocean, halfway between the cities of San Buenaventura and Oxnard.

Extensive patches of riparian habitat are present along the length of the River and its tributaries. The endangered fish, the unarmored stickleback, is resident in the river. One of the largest of the Santa Clara River's tributaries, Sespe Creek, is designated as a wild trout stream by the state of California and supports significant spawning and rearing habitat. The Sespe Creek is also designated a wild and scenic river. Piru and Santa Paula Creeks, which are tributaries to the Santa Clara River, support habitat for steelhead. In addition, the river serves as an important wildlife corridor. A lagoon exists at the mouth of the river and supports a large variety of wildlife.

C. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

Not applicable. Newhall Ranch WRP does not have any existing requirements.

Table 2. Historic Effluent Limitations and Monitoring Data

Parameter	Units	Effluent Limitation			Monitoring Data (From <Date> – To <Date>)		
		Average Monthly	Average Weekly	Maximum Daily	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge

D. Compliance Summary

Not applicable. Newhall Ranch WRP does not have any existing requirements.

E. Planned Changes

The Newhall Ranch WRP would have an initial design capacity of 2 MGD, and incrementally increase its design capacity to 6.8 MGD [2.0 MGD in Phase I; 4.0 MGD in Phase II; and 6.8 MGD in Phase III], to accommodate the sewage generated by new inhabitants, as additional tracts of the Landmark Village development project are completed.

- In January 2008 grading activities are scheduled to begin.
- In June 2008 Newhall Ranch SD is scheduled to approve the plans for the plant design.
- In September 2008, construction of the Newhall Ranch WRP is scheduled to begin.
- By August 2009, the Newhall Ranch WRP (2 MGD capacity) should be constructed.

Pending the outcome of TMDL-based studies being conducted in the Santa Clara River Watershed, the plant may be modified in the future to provide reverse osmosis treatment to a portion of the treated effluent, in an effort to reduce the chloride concentrations discharged.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in the proposed Order are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. Environmental Protection Agency (USEPA) and chapter 5.5, division 7 of the California Water Code (commencing with section 13370). It shall serve as an NPDES permit for point source discharges from this facility to surface waters. This Order also serves as WDRs pursuant to article 4, chapter 4, division 7 of the Water Code (commencing with section 13260).

B. California Environmental Quality Act (CEQA)

The discharger is not a new source, as defined in the CWA. (See 40 CFR part 122.2.) Therefore, the approval of this permit is not subject to the California Environmental Quality Act (CEQA), as stated in section 13389 of the CWC.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plans.** The Regional Water Board adopted a Water Quality Control Plan for the Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (hereinafter Basin Plan) on June 13, 1994 that designates beneficial uses, establishes water quality objectives, and contains

implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, State Water Resources Control Board (State Water Board) Resolution No. 88-63 requires that, with certain exceptions, the Regional Water Board assign the municipal and domestic water supply use to water bodies that do not have beneficial uses listed in the Basin Plan. Beneficial uses applicable to the Santa Clara River are as follows:

Table 3. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	Santa Clara River (Hydro Unit 403.51)	Existing: Industrial Service Supply (IND); Industrial Process Supply (PROC); Agricultural Supply (AGR); Ground Water Recharge (GWR); Freshwater Replenishment (FRSH);Water Contact Recreation (REC-1); Non-contact Water Recreation (REC-2); Warm Freshwater Habitat (WARM); Wildlife Habitat (WILD); preservation or rare, threatened or endangered species (RARE); and, Wetland Habitat (WET). Potential*: Municipal and domestic water supply (MUN).
	Santa Clara River (Hydro Unit 403.41)	Existing: IND; PROC; AGR; GWR; FRSH; REC-1; REC-2; WARM; WILD; RARE; Migration of Aquatic Organisms (MIGR) and, WET. Potential*: MUN
	Santa Clara River (Hydro Unit 403.31)	Existing: IND; PROC; AGR; GWR; FRSH; REC-1; REC-2; WARM; WILD; RARE; MIGR and, WET. Potential*: MUN
	Santa Clara River (Hydro Unit 403.21)	Existing: IND; PROC; AGR; GWR; FRSH; REC-1; REC-2; WARM; WILD; RARE; MIGR and, WET. Potential*: MUN.
	Santa Clara River (Hydro Unit 403.11)	Existing: IND; PROC; AGR; GWR; FRSH; REC-1; REC-2; WARM; Cold Water Habitat (COLD); WILD; RARE; MIGR and, WET. Potential*: MUN.
	Santa Clara River Estuary (Hydro Unit 403.11)	Existing: Navigation (NAV); REC-1; REC-2; Commercial and Sport Fishing (COMM); Estuarine Habitat (EST); Marine Habitat (MAR); WILD; RARE; MIGR; Spawning, Reproduction, and/or Early Development (SPWN); and, WET.

Requirements of this Order implement the Basin Plan and subsequent amendments.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995 and November 9, 1999. About forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants.

3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The SIP became effective on April 28, 2000 with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Board in the Basin Plan. The SIP became effective on May 18, 2000 with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005 that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

4. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards (WQS) become effective for CWA purposes (40 C.F.R. § 131.21, 65 Fed. Reg. 24641 (April 27, 2000)). Under the revised regulation (also known as the Alaska rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

5. **Antidegradation Policy.** Section 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. The permitted discharge must be consistent with the antidegradation provision of section 131.12 and State Water Board Resolution No. 68-16.

6. **Anti-Backsliding Requirements.** Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at title 40, Code of Federal Regulations[1] section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require

[1] All further statutory references are to title 40 of the Code of Federal Regulations unless otherwise indicated.

that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed. Since this is a new discharge, all effluent limitations and requirements contained in this Order are new. Therefore, there is no relaxation of effluent limitations. The WDR is consistent with the anti-backsliding requirements of the CWA and federal regulations.

D. Impaired Water Bodies on CWA 303(d) List

On November 30, 2006, USEPA approved the State's 2004-2006 303(d) list of impaired waterbodies. The list (hereinafter referred to as the 303(d) list) was prepared in accordance with section 303(d) of the Federal Clean Water Act to identify specific impaired waterbodies where water quality standards are not expected to be met after the implementation of technology-based effluent limitations on point sources.

Santa Clara River, Santa Clara River Estuary, and their tributaries are on the 2006 303(d) List. The following pollutants/stressors, from point and non-point sources, were identified as impacting the receiving waters:

7. Santa Clara River Estuary: Chem A, and Coliform Bacteria;

8. Santa Clara River Reach 1 (Estuary to Hwy 101 Bridge): Toxicity:

9. Santa Clara River Reach 3 (Freeman Diversion to A Street): Total Dissolved Solids;

10. Santa Clara River Reach 5 [formerly Reach 7 in 2002 303d list] (Blue Cut to West Pier Hwy 99 Bridge): Coliform Bacteria;

11. Santa Clara River Reach 6 [formerly Reach 8 in 2002 303d list] (W. Pier Hwy 99 to Bouquet Canyon Rd. Bridge) -- Hydrologic Unit 403.51: Chlorpyrifos, Coliform Bacteria, Diazinon, and Toxicity; and,

12. Santa Clara River Reach 7 [formerly Reach 9 in 2002 303d list] (Bouquet Canyon Rd to above Lang Gaging) -- Hydrologic Unit 403.51: Coliform Bacteria.

E. Other Plans, Polices and Regulations

1. **Sources of Drinking Water Policy**. On May 19, 1988, the State Water Board adopted Resolution No. 88-63, *Sources of Drinking Water (SODW) Policy*, which established a policy that all surface and ground waters, with limited exemptions, are suitable or potentially suitable for municipal and domestic supply. To be consistent with State Water Board's SODW policy, on March 27, 1989, the Regional Water Board adopted Resolution No. 89-03, *Incorporation of Sources of Drinking Water Policy into the Water Quality Control Plans (Basin Plans)– Santa Clara River Basin (4A)/ Los Angeles River Basin (4B).*

Consistent with Regional Water Board Resolution No. 89-03 and State Water Board Resolution No. 88-63, in 1994 the Regional Water Board conditionally designated all inland surface waters in Table 2-1 of the 1994 Basin Plan as existing, intermittent, or potential for Municipal and Domestic Supply (MUN). However, the conditional designation in the 1994 Basin Plan included the following implementation provision: "no new effluent limitations will be placed in Waste Discharge Requirements as a result of these [potential MUN designations made pursuant to the SODW policy and the Regional Water Board's enabling resolution] until the Regional Water Board adopts [a special Basin Plan Amendment that incorporates a detailed review of the waters in the Region that should be exempted from the potential MUN designations arising from SODW policy and the Regional Water Board's enabling resolution]." On February 15, 2002, the USEPA clarified its partial approval (May 26, 2000) of the 1994 Basin Plan amendments and acknowledged that the conditional designations do not currently have a legal effect, do not reflect new water quality standards subject to USEPA review, and do not support new effluent limitations based on the conditional designations stemming from the SODW Policy until a subsequent review by the Regional Water Board finalizes the designations for these waters. This permit is designed to be consistent with the existing Basin Plan.

2. **Secondary Treatment Regulations**. Section 133 of 40 CFR establishes the minimum levels of effluent quality to be achieved by secondary treatment. These limitations, established by USEPA, are incorporated into this Order, except where more stringent limitations are required by other applicable plans, policies, or regulations.

3. **Storm Water**. CWA section 402(p), as amended by the Water Quality Act of 1987, requires NPDES permits for storm water discharges. Pursuant to this requirement, in 1990, USEPA promulgated 40 CFR, Section 122.26 that established requirements for storm water discharges under an NPDES program. To facilitate compliance with federal regulations, on November 1991, the State Water Board issued a statewide general permit, *General NPDES Permit No. CAS000001 and Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities.* This permit was amended in September 1992 and reissued on April 17, 1997 in State Water Board Order No. 97-03-DWQ to regulate storm water discharges associated with industrial activity.

   General NPDES permit No. CAS000001 is applicable to storm water discharges from the Newhall Ranch WRP's premises. Newhall Ranch SD will file a Notice of Intent to comply with the requirements of the general permit. Newhall Ranch SD will develop and implement a Storm Water Pollution Prevention Plan (SWPPP), to comply with the State Water Board's (Order No. 97-03-DWQ). Newhall Ranch SD will capture and treat a percentage of the first flush runoff that falls on the Newhall Ranch WRP.

4. **Sanitary Sewer Overflows.** The Clean Water Act prohibits the discharge of pollutants from point sources to surface waters of the United States unless authorized under an NPDES permit. (33 U.S.C. §§1311, 1342). The State Water Board adopted Statewide General Waste Discharge Requirements (WDRs) for

Sanitary Sewer Systems, Water Quality Order No. 2006-0003 on May 2, 2006, to provide a consistent, statewide regulatory framework to address Sanitary Sewer Overflows (SSOs). The WDR requires public agencies that own or operate sanitary sewer systems to develop and implement sewer system management plans and report all SSOs to the State Water Board's online SSO database.

The requirements contained in this Order in Sections VI.C.3.b, VI.C.4, and VI.C.5.c.6. are intended to be consistent with the requirements in the SSO WDR. The Regional Water Board recognizes that there are areas of overlapping interest between the NPDES permit conditions and the SSO WDR requirements. The requirements of the SSO WDR are considered the minimum thresholds (see Finding 11 of WQ Order N0. 2006-0003). The Regional Water Board will accept the documentation prepared by the Permittee under the SSO WDR for compliance purposes, as satisfying the requirements in Sections VI.C.3.b, VI.C.4, and VI.C.5.c.6, provided for any more specific or stringent provisions enumerated in this Order, have also been addressed.

5. **Watershed Management** - This Regional Water Board has been implementing a Watershed Management Approach (WMA), to address water quality protection in the Los Angeles Region, as detailed in the Watershed Management Initiative (WMI). The WMI is designed to integrate various surface and ground water regulatory programs while promoting cooperative, collaborative efforts within a watershed. It is also designed to focus limited resources on key issues and use sound science. Information about the Santa Clara River Watershed and other watersheds in the region can be obtained from the Regional Water Board's web site at *http://www.swrcb.ca.gov/rwqcb4/* and clicking on the word "Watersheds".

6. **Relevant Total Maximum Daily Loads** - A Total Maximum Daily Load (TMDL) is a determination of the amount of a pollutant, from point, non-point, and natural background sources, including a margin of safety that may be discharged to a water quality-limited water body. Section 303(d) of the CWA established the TMDL process. The statutory requirements are codified at 40 CFR, Part 130.7. TMDLs must be developed for the pollutants of concern, which impact the water quality of water bodies on the 303(d) list. The Regional Water Board has developed a TMDL that assesses the extent and sources of the ammonia and algae (nutrient/nitrogen) problems in the Santa Clara River. According to the TMDL schedule, under the amended concent decree, *Heal the Bay, Santa Monica Bay Keeper, et al. v. Browner, et al.* (March 23, 1999), the nitrogen and chloride TMDLs for the Santa Clara River must be completed by 2004 and 2003, respectively. The coliform TMDL was scheduled for completion by 2006.

   a. **Chloride TMDL.**
      i. On October 24, 2002, the Regional Water Board adopted Resolution No. 2002-018, *Amendment to the Basin Plan for the Los Angeles Region to Incorporate a Total Maximum Daily Load to Reduce Chloride Loading in the Upper Santa Clara River*. Soon after, the Regional Water Board submitted the TMDL to the State Water Board for approval. On February 19, 2003, the

State Water Board adopted Resolution No. 2003-0014, the "Remand Resolution," finding that the Regional Water Board staff prepared the documents and followed procedures satisfying environmental documentation requirements in accordance with the California Environmental Quality Act, scientific peer review, and other State laws and regulations to develop a TMDL. However, the Remand Resolution directed the Regional Water Board to consider revising the implementation provisions of the chloride TMDL. On July 10, 2003, the Regional Water Board reconsidered Resolution No. 2002-018, in light of the Remand Resolution, and adopted Resolution No. 2003-008 which modified the chloride TMDL implementation provisions by:

(1) Expanding the phased-TMDL approach to allow CSDLAC to complete the implementation tasks sequentially and within 13 years;
(2) Extending the interim limits beyond the proposed two and a half years but not to exceed 13 years, so that the interim limits may remain in effect during the planning, construction, and execution portions of the TMDL's implementation tasks; and,
(3) Modifying the TMDL analysis task list to include an assessment/ evaluation of alternative water supplies for agricultural beneficial uses.

On May 6, 2004, the Regional Water Board adopted Resolution No. 2004-004, amending the Upper Santa Clara River Chloride TMDL. State Water Board, OAL, and USEPA approval occurred on July 22, 2004, November 15, 2004, and April 28, 2005, respectively. The Chloride TMDL became effective on May 4, 2005.

On August 3, 2006, the Regional Water Board adopted Resolution No. R4-2006-016, Amendment to the Water Quality Control Plan for the Los Angeles Region through revision of the Implementation Plan for the Upper Santa Clara River Chloride TMDL, which shortened the compliance schedule from thirteen to eleven years. State Water Board approved the resolution on May 22, 2007. OAL, and USEPA approval is pending.

ii. On March 26, 2007, TMDL staff wrote a technical memo regarding the waste load allocation for chloride for Newhall Ranch WRP. The memo included the following background information and conclusions

(1) <u>Background</u>.

a. The Newhall Ranch WRP, currently in the planning stages, is part of the Newhall Ranch Specific Plan which guides the long-term development of the 11963-acre Newhall Ranch Community. Based on information provided by the Newhall Ranch Company on November 22, 2006, the Newhall Ranch WRP treatment capacity will be 6.8 MGD of municipal and commercial wastewater that will be generated by the prospective Newhall Ranch community. The treated wastewater will be reclaimed for landscape irrigation during dry weather conditions. During wet weather, when irrigation demands are lower, unused reclaimed water will be

discharged to Reach 5 of the Santa Clara River. A new sanitation district will be formed to maintain and operate the Newhall Ranch WRP.

b. The existing water quality objective (WQO) for chloride in Reaches 5 and 6 of the Santa Clara River is 100 milligrams per liter (mg/L). The most sensitive beneficial uses for chloride is agricultural supply (AGR). Because chloride levels in the Upper Santa Clara River (USCR) exceeded the water quality objective WQO, the USCR was listed on the 1998 303(d) list and a total maximum daily load (TMDL) for chloride in the USCR was adopted by the Regional Water Board. The USCR Chloride TMDL became effective on May 4, 2005, and the chloride wasteload allocation for existing major Publicly-Owned Treatment Works (POTWs) discharging to the USCR is also 100 mg/L. The TMDL found that the nonpoint sources of chloride were not significant relative to the point sources and that concentration based wasteload allocations were effective in protecting beneficial uses. The TMDL identified wastewater discharges from the Los Angeles County Sanitation Districts (Districts) Saugus and Valencia Water Reclamation Plants (WRPs) as the primary source of chloride and assigns waste load allocations (WLAs) of 100 mg/L chloride to the Districts WRPs. Other NPDES discharges contribute a minor chloride load and the chloride WLAs for these point sources is 100 mg/L.

c. The USCR chloride WLAs are expressed on a concentration basis derived from and equivalent to the existing WQO, thereby providing direct protection of the most sensitive beneficial use, , agricultural supply (AGR). Under the TMDL Implementation Plan, a special study was conducted to confirm that the concentration-based WLA of 100 mg/L chloride is protective of AGR. That study has been completed and confirms that the concentration-based WLA of 100 mg/L is protective of salt sensitive AGR. A concentration-based WLA also accommodates future growth and provides beneficial uses protection from chloride loads that were in place at the time of the TMDL development. Protection of beneficial uses from additional chloride loads that were not assigned wasteload allocations is provided by using the WLAs as effluent limits in permits for new and future sources such as Newhall Ranch WRP.

d. The Staff Report for the TMDL, dated August 21, 2002, states "A concentration-based target accommodates future growth by allowing increased mass as long as it is accompanied by additional flow. This analysis is based on existing discharge locations in the Upper Santa Clara River. Regional Water Board staff understands that an additional water reclamation plant is planned to accommodate future growth in the Santa Clarita Valley and that this plant will discharge only during rain events. Permitting of additional discharges may compromise the success of the TMDL without additional studies." Although the Staff Report implies that permitting of additional discharges may require

additional studies, it is a general statement that does not define the types of studies needed. Staff finds that additional studies are not needed in order to conclude that water quality will not be degraded if concentration-based wasteload allocations that are equivalent to the WQO are assigned to new facilities. If the WLAs and effluent limits for new facilities in the Upper Santa Clara River watershed are set at the end-of pipe and are equivalent to the TMDL WLA and WQO staff finds that these WLAs will not cause degradation of water quality. Studies regarding the effect of additional chloride load on groundwater basins underlying the USCR River are underway and scheduled for completion by November 2007. Initial results from these studies show that discharges at effluent limits of 100 mg/L chloride will not degrade groundwater quality. Staff finds that results from these studies may be used to revise the effluent limits for all dischargers discharging at 100 mg/L if necessary. If this occurs, the NPDES permit for Newhall Ranch WRP will be reopened.

e. The majority of effluent from the Newhall Ranch WRP will be used for reclaimed water purposes. Discharge to the Santa Clara River (SCR) will primarily occur during periods when the effluent supply exceeds the reclaimed demand, such as during the peak wet months of the November through March. During years 1 and 2 of the WRP operation, the WRP will operate at a maximum of 2 mgd, with an estimated average discharge flow rate of 0.2 mgd during the 5 month wet period. No sooner than year 3 will the WRP be expanded to 6.8 mgd, with an approximate average discharge flowrate of 0.6 mgd during this 5 month wet period. Therefore, discharge periods will coincide with peak wet months when dilution capacity is maximal (i.e., instream flows are highest). The average November-March instream flowrate at USGS station 11109000 (Newhall Bridge, approximately 2.5 miles downstream of the County line) is 188 cfs (121 mgd) based on measured average daily flow data for water years 1977-2006. Newhall WRP effluent will represent less than 1% of this average volume. Consequently, TMDL staff finds that the proposed discharge will not add appreciable chloride loads to the surface water or underlying groundwater.

(2) Conclusion.

The Upper Santa Clara River Chloride TMDL WLAs for discharges from the Saugus and Valencia WRPs into Reach 5 and 6 of the Santa Clara River are concentration-based which protects sensitive AGR uses in the River while accommodating future growth. The TMDL does not prohibit future growth or increased loads. Use of concentration-based WLAs requires that increased chloride loads are concurrent with increased discharge flow to the USCR. The increased flow increases the capacity of the receiving water to assimilate chloride. Because the Newhall Ranch WRP will increase flow in the WRP, the discharge of the NRWRP would not contribute to further impairment of surface water in Reaches 5 and 6 of

the Santa Clara River if the chloride concentration in discharge is equal to or less than the WQO and TMDL WLA of 100 mg/L. An NPDES discharge permit with an effluent limit of 100 mg/L chloride would be consistent with the TMDL. Additional studies are not needed at this time if the effluent limit for chloride is concentration-based and set at, or is less than the WQO the of 100 mg/L.

b. **Nitrogen Compounds TMDL**. On August 7, 2003, the Regional Water Board adopted Resolution No. 2003-11, the *Santa Clara River Nitrogen Compounds TMDL (Nitrogen Compounds TMDL)*. State Water Board, OAL, and USEPA approval occurred on November 19, 2003, February 27, 2004, and March 18, 2004, respectively. The Nitrogen Compounds TMDL became effective on March 23, 2004. Although the Nitrogen Compounds TMDL does not specify an individual WLA for the Newhall Ranch WRP, the Nitrogen Compounds TMDL staff report does discuss future growth. The staff report states that "the numeric targets for POTWs with increasing capacity or new POTWs will be set on a concentration basis...."

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the Code of Federal Regulations: section 122.44(a) requires that permits include applicable technology-based limitations and standards; and section 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water.

A. Discharge Prohibitions

Effluent and receiving water limitations in this Board Order are based on the Federal Clean Water Act, Basin Plan, State Water Board 's plans and policies, USEPA guidance and regulations, and best practicable waste treatment technology. This order authorizes the discharge of tertiary-treated wastewater through Discharge Serial No. 001 only. It does not authorize any other types of discharges.

B. Technology-Based Effluent Limitations

1. Scope and Authority

Technology-based effluent limits require a minimum level of treatment for industrial/municipal point sources based on currently available treatment technologies while allowing the discharger to use any available control techniques to meet the effluent limits. The 1972 CWA required POTWs to meet performance requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level--referred to as "secondary

treatment"--that all POTWs were required to meet by July 1, 1977. More specifically, Section 301(b)(1)(B) of the CWA required that EPA develop secondary treatment standards for POTWs as defined in Section 304(d)(1). Based on this statutory requirement, EPA developed national secondary treatment regulations which are specified in 40 CFR 133. These technology- based regulations apply to all POTWs and identify the minimum level of effluent quality to be attained by secondary treatment in terms of five-day biochemical oxygen demand, total suspended solids, and pH.

Section 301(b) of the CWA and implementing USEPA permit regulations at section 122.44, title 40 of the Code of Federal Regulations, require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at Part 133 and Best Professional Judgment (BPJ) in accordance with Part 125, section 125.3.

2. Applicable Technology-Based Effluent Limitations

This facility is subject to the technology-based regulations for the minimum level of effluent quality attainable by secondary treatment in terms of $BOD_5 20°C$, TSS, and pH. The following Table summarizes the technology-based effluent limitations applicable to the Facility:

Summary of Technology-based Effluent Limitations
Discharge Point 001

Table 4. Summary of Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
$BOD_5 20°C$	mg/L	20	30	45	--	--
	lbs/day *	330	500	750	--	--
Total Suspended solids (TSS)	mg/L	15	40	45	--	--
	lbs/day	250	670	750	--	--
pH	standard units	--	--	--	6.5	8.5
Removal Efficiency for BOD and TSS	%	85	--	--	--	--

* The mass emission rates are based on the plant design flow rate of 2.0 mgd, and are calculated as follows: Flow(MGD) x Concentration (mg/L) x 8.34 (conversion factor) = lbs/day. However, the design capacity will incrementally increase to 6.8 MGD, as the phased plant upgrades approach completion. The mass-based effluent limitation will accordingly be modified following an Anti-degradation analysis demonstration conducted by the Discharger, and upon certification and approval of increased treatment plant capacity. During wet-weather storm events in which the flow exceeds the design capacity, the mass discharge rate limitations shall not apply, and concentration limitations will provide the only applicable effluent limitations.

However, this facility is also subject to technology-based effluent limitations contained in similar NPDES permits, for similar facilities, based on the treatment level achievable by tertiary-treated wastewater treatment systems. These effluent limitations are consistent with the State Water Board precedential decision, State Water Board Order No. WQ 2004-0010 for the City of Woodland. Further, mass-based effluent limitations are based on a design flow rate of 2.0 MGD for Phase I, and ultimately on a 6.8 MGD flow rate for Phase III.

C. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

Section 301(b) of the CWA and section 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. This Order contains requirements, expressed as a technology equivalence requirement, more stringent than secondary treatment requirements that are necessary to meet applicable water quality standards. The rationale for these requirements, which consist of tertiary treatment or equivalent requirements or other provisions, is discussed starting from Section IV.C.2.b.

Section 122.44(d)(1)(i) mandates that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, water quality-based effluent limitations (WQBELs) must be established using: (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in section 122.44(d)(1)(vi).

The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the CTR and NTR. Table R1 contains the RP analysis.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

a. The Basin Plan establishes the beneficial uses for surface water bodies in the Los Angeles region. The beneficial uses of the Santa Clara River affected by the

discharge have been described previously in this Fact Sheet and in the WDR findings.

b. The Basin Plan also specifies narrative and numeric water quality objectives applicable to surface water as shown in the following discussions.

i. Table 5 summarizes the applicable water quality criteria/objective for priority pollutants reported in detectable concentrations in the effluent or receiving water. These criteria were used in conducting the Reasonable Potential Analysis for this Order.

ii. **Biochemical Oxygen Demand (BOD) and Suspended solids**

Biochemical oxygen demand (BOD) is a measure of the quantity of the organic matter in the water and, therefore, the water's potential for becoming depleted in dissolved oxygen. As organic degradation takes place, bacteria and other decomposers use the oxygen in the water for respiration.

Unless there is a steady resupply of oxygen to the system, the water will quickly become depleted of oxygen. Adequate dissolved oxygen levels are required to support aquatic life. Depressions of dissolved oxygen can lead to anaerobic conditions resulting in odors, or, in extreme cases, in fish kills.

40 CFR, Part 133 describes the minimum level of effluent quality attainable by secondary treatment, for BOD and suspended solids, as:

a. the monthly average shall not exceed 30 mg/L; and,
b. the 7-day average shall not exceed 45 mg/L.

The Newhall Ranch WRP will provide tertiary treatment, as such, the limits in the permit are more stringent than secondary treatment requirements. The Plant will achieve solids removal rates that are better than secondary-treated wastewater by adding a polymer/coagulant to enhance the precipitation of solids, and by filtering the effluent.

In addition to having mass-based and concentration-based effluent limitations for BOD and suspended solids, the Newhall Ranch WRP also has a percent removal requirement for these two constituents. In accordance with 40 CFR, Sections 133.102(a)(3) and 133.102(b)(3), the 30-day average percent removal shall not be less than 85 percent. Percent removal is defined as a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent pollutant concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

iii. **pH**

The hydrogen ion activity of water (pH) is measured on a logarithmic scale, ranging from 0 to 14. While the pH of "pure" water at 25°C is 7.0, the pH of natural waters is usually slightly basic due to the solubility of carbon dioxide from the atmosphere. Minor changes from natural conditions can harm aquatic life. The effluent limitation for pH which reads, "the wastes discharged shall at all times be within the range of 6.5 to 8.5," is taken from the Basin Plan (page 3-15) which reads" the pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharge.

iv. **Settleable solids**

Excessive deposition of sediments can destroy spawning habitat, blanket benthic (bottom dwelling) organisms, and abrade the gills of larval fish. The limits for settleable solids are based on the Basin Plan (page 3-16) narrative, "Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses." The numeric limits are empirically based on results obtained from the settleable solids 1-hour test, using an Imhoff cone.

It is impracticable to use a 7-day average limitation, because short term spikes of settleable solid levels that would be permissible under a 7-day average scheme would not be adequately protective of all beneficial uses.

v. **Oil and Grease**

Oil and grease are not readily soluble in water and form a film on the water surface. Oily films can coat birds and aquatic organisms, impacting respiration and thermal regulation, and causing death. Oil and grease can also cause nuisance conditions (odors and taste), are aesthetically unpleasant, and can restrict a wide variety of beneficial uses. The limits for oil and grease are based on the Basin Plan (page 3-11) narrative, "Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses."

The numeric limits are empirically based on concentrations at which an oily sheen becomes visible in water. It is impracticable to use a 7-day average limitation, because spikes that occur under a 7-day average scheme could cause visible oil sheen. A 7-day average scheme would not be sufficiently protective of beneficial uses.

vi. Residual chlorine

Disinfection of wastewaters with chlorine produces chlorine residual. Chlorine and its reaction products are toxic to aquatic life. The limit for residual chlorine is based on the Basin Plan (page 3-9) narrative, "Chlorine residual shall not be present in surface water discharges at concentrations that exceed 0.1 mg/L and shall not persist in receiving waters at any concentration that causes impairment of beneficial uses."

It is impracticable to use a 7-day average or a 30-day average limitation, because it is not as protective as of beneficial uses as a daily maximum limitation is. Chlorine is very toxic to aquatic life and short-term exposures of chlorine may cause fish kills.

Although the Newhall Ranch WRP proposes to use UV light as its primary means of disinfection, similar facilities have had to use small concentrations of residual chlorine to supplement UV disinfection, in order to kill certain virus present in wastewater or for maintenance purposes to clean the UV lamps. The facility has reasonable potential for residual chlorine because it proposes to use sodium hypochlorite to clean and wash the UV lamps. In addition, all potable water has traces of residual chlorine. In addition, the facility may choose to add residual chlorine to their effluent at a later date, similar to what other POTWs with UV have done.

vii. Total Dissolved Solids, Chloride, Sulfate, and Boron

The limits for total dissolved solids, sulfate, chloride, and boron are based on Basin Plan Table 3-8 (page 3-12), for the Santa Clara River watershed (between West Pier Highway 99 and Blue Cut Gauging Station). TDS = 1000 mg/L; Sulfate = 400 mg/L; Chloride = 100 mg/L; and Boron = 1.5 mg/L. It is practicable to express these limits as monthly averages, since they are not expected to cause acute effects on beneficial uses. These limits will protect waters of the US and prevent degradation.

viii. Methylene Blue Activated Substances (MBAS)

The MBAS procedure tests for the presence of anionic surfactants (detergents) in surface and ground waters. Surfactants disturb the water surface tension, which affects insects and can affect gills in aquatic life. The MBAS can also impart an unpleasant soapy taste to water, as well as cause scum and foaming in waters, which impact the aesthetic quality of both surface and ground waters.

Given the nature of the facility (a POTW) which accepts domestic washwater into the sewer system and treatment plant, and the characteristics of the wastes discharged, the discharge has reasonable potential to exceed both the numeric MBAS water quality objective (WQO) and the narrative WQO for prohibition of floating material such as foams and scums. Therefore an effluent limitation is required.

The Discharger has collected receiving water samples and has reported detectable quantities of MBAS concentrations in the Santa Clara River in the vicinity of the proposed discharge. The discharge from the Newhall Ranch WRP may have reasonable potential to contribute to an exceedance of the 0.5 mg/L WQO. The 0.5 mg/L concentration (which has been determined to be protective of beneficial uses and the aesthetic quality of waters), is based on the Department of Health Services' secondary drinking water standard, and on the Basin Plan WQO (p.3-11) which reads, "Waters shall not have MBAS concentrations greater than 0.5 mg/L in waters designated MUN." While the wastewater from this POTW is not directly discharged into a MUN designated surface water body, it will percolate into unlined reaches of the Santa Clara River [via ground water recharge designated beneficial use (GWR)] to ground water designated for MUN beneficial use. In addition, the Basin Plan states that "Ground water shall not contain taste or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses." Therefore, the secondary MCL should be the MBAS limit for this discharge to protect ground water recharge and the MUN use of the underlying ground water, while also protecting surface waters from exhibiting scum or foaming.

Since the Basin Plan objective is based on a secondary drinking water standard, it is practicable to have a monthly average limitation in the permit, rather than a daily maximum.

ix. **Total Inorganic Nitrogen**

Total inorganic nitrogen is the sum of Nitrate-nitrogen and Nitrite-nitrogen. High nitrate levels in drinking water can cause health problems in humans. Infants are particularly sensitive and can develop methemoglobinemia (blue-baby syndrome). Nitrogen is also considered a nutrient. Excessive amounts of nutrients can lead to other water quality impairments, ex. algae.

(1) **Concentration-based Limit -** The effluent limit for total inorganic nitrogen (NO_2-N + NO_3-N) of 5 mg/L is based on Basin Plan Table 3-8 (page 3-12), for the Santa Clara River watershed (between West Pier Highway 99 and Blue Cut Gaging Station).

(2) **Mass-based Limit** - The mass bases limits are based on the Phase I initial plant design flow rate of 2.0 mgd, and are calculated as follows: Flow(MDG) x Concentration (mg/L) x 8.34 (conversion factor) = lbs/day. However, the design capacity will incrementally increase to 6.8 MGD, as the phased plant expansion approaches completion. The mass-based effluent limitation will accordingly be modified upon certification and approval of increased treatment plant capacity. During wet-weather storm events in which the flow exceeds the design capacity, the mass discharge rate limitations shall not apply, and concentration limitations will provide the only applicable effluent limitations.

x. <u>Nitrite as Nitrogen</u>

Chapter 3 of the Basin Plan (page 3-11) contains the following water quality objective, "Waters shall not exceed the 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen (NO_3-N + NO_2-N), 45 mg/L as nitrate (NO_3), 10 mg/L as nitrate-nitrogen (NO_3-N), or 1 mg/L as nitrite-nitrogen (NO_2-N) or as otherwise designated in Table 3-8."

However, the TMDL for Nitrogen Compounds in the Santa Clara River *(Nitrogen Compounds* TMDL), Resolution No. 2003-011, adopted by the Regional Water Board on August 7, 2003, contains a 0.9 mg/L concentration-based WLA for POTWs in the Santa Clara River Watershed. The 0.9 mg/L WLA is based upon the Basin Plan WQO, with a 10% margin of safety. The TMDL supercedes the generic Basin Plan WQO. Given the nature of the facility, the Discharger has reasonable potential to cause or contribute to an exceedance based on best professional judgment, and therefore needs a limit for Nitrite-N. The 0.9 mg/L limit will have to be met at the end-of-pipe, because dilution is not an option at the present time.

xi. <u>Ammonia Nitrogen</u>

Ammonia is a pollutant routinely found in the wastewater effluent of Publicly Owned Treatment Works (POTWs), in landfill-leachate, as well as in run-off from agricultural fields where commercial fertilizers and animal manure are applied. Ammonia exists in two forms – un-ionized ammonia (NH_3) and the ammonium ion (NH_4^+). They are both toxic, but the neutral, un-ionized ammonia species (NH_3) is much more toxic, because it is able to diffuse across the epithelial membranes of aquatic organisms much more readily than the charged ammonium ion. The form of ammonia is primarily a function of pH, but it is also affected by temperature and other factors. Additional impacts can also occur as the oxidation of ammonia lowers the dissolved oxygen content of the water, further stressing aquatic organisms. Oxidation of ammonia to nitrate may lead to groundwater impacts in areas of recharge. [There is groundwater recharge in these reaches]. Ammonia also combines

with chlorine (often both are present in POTW treated effluent discharges) to form chloramines – persistent toxic compounds that extend the effects of ammonia and chlorine downstream.

Ammonia was 303(d) listed in Reach 3 of the Santa Clara River, downstream of the discharge, in the 2002 303(d) list. Due to the nature of the facility, ammonia has reasonable potential to cause or contribute to an excursion of a water quality objective. Therefore, a water quality-based effluent limitation for total ammonia is required in order to be protective of the water quality objective.

The 1994 Basin Plan contained water quality objectives for ammonia to protect aquatic life, in Tables 3-1 through Tables 3-4. However, those ammonia objectives were revised on April 25, 2002, by the Regional Water Board, with the adoption of Resolution No. 2002-011, *Amendment to the Water Quality Control Plan for the Los Angeles Region to Update the Ammonia Objectives for Inland Surface Waters (including enclosed bays, estuaries and wetlands) with Beneficial Use designations for protection of Aquatic Life*. This Resolution also modified the Basin Plan to include an implementation provision which specifies the procedure for translating the ammonia WQO into final effluent limitations. Resolution No. 2002-011 was approved by the State Water Board, the Office of Administrative Law, and USEPA on April 30, 2003, June 5, 2003, and June 19, 2003, respectively.

On August 7, 2003, the Regional Water Board adopted Resolution No. 2003-011, *Amendment to the Basin Plan for the Los Angeles Region to Include a TMDL for Nitrogen Compounds in the Santa Clara River (Nitrogen Compounds* TMDL). The TMDL does not contain an ammonia nitrogen Waste Load Allocations (WLA) for the Newhall Ranch WRP. However, the TMDL staff report contains the following statement: "The numeric targets for POTWs with increasing capacity or new POTWs will be set on a concentration basis...". The final effluent limitations for ammonia prescribed in this Order are based on the Nitrogen Compounds TMDL numeric target for TMDL-Reach 7 at the County Line, and apply at the end of pipe.

On December 1, 2005, the Regional Water Board adopted Resolution No. 2005-014, *Amendment to the Water Quality Control Plan for the Los Angeles Region Revise the Early Life Stage Implementation Provision of the Freshwater Ammonia Objectives for Inland Surface Waters (including enclosed bays, estuaries and wetlands) for Protection of Aquatic Life.* Resolution No. 2005-014 was approved by the State Water Board, the Office of Administrative Law, and USEPA on July 19, 2006, August 31, 2006, and April 5, 2007, respectively. This amendment contains ammonia objectives to protect Early Life Stages (ELS) of fish in inland surface water supporting aquatic life. It revised the implementation provision included as part of the

freshwater ammonia objectives relative to the protection of ELS of fish in inland surface waters. ELS of fish has been determined to be present in the Santa Clara River, because the receiving water is not included in the list of waterbodies where ELS is absent.

The limitations for ammonia prescribed in this Order are based on the ammonia criteria as revised by Resolution 2002-011 and Resolution No. R4-2005-014. Consistent with methods used to develop ammonia waste load allocation for TMDLs in the Los Angeles region (such as the Los Angeles River Nutrient TMDL and the Malibu Creek Nutrient TMDL), the 50th percentile of receiving water pH and temperature data (7.8 pH units and 15.6°C, respectively), as measured at what would be the immediate downstream receiving water location, were used to calculate the monthly average ammonia limitation that resulted to 1.93 mg-N/L. The 90th percentile of pH data (8.4 pH units), as measured at what would be the immediate downstream receiving water location, was used to calculate the daily maximum ammonia effluent limitation that resulted to 3.87 mg-N/L.

Use of 50th percentile receiving water data to set monthly average limitations and 90th percentile data to set daily maximum limitations is protective of downstream receiving water bodies. Although there are no available ammonia effluent data points with which to determine seasonal or other long-term trends, for this newly proposed POTW,bsed on other POTWs with NDN systems ammonia concentrations are expected to fluctuate around the 50th percentile value over the course of a month. Use of a 50th percentile value is more representative of average conditions in the receiving water body that one or only a few grab samples taken over the course of a month. Note that half the time the limit would be expected to be overly protective. Use of a 90th percentile value to set a daily maximum limit is also protective. Ninety percent of the time the limit will be overly protective, and the limit will only be under protective ten percent of the time.

Table 3, Basin Plan Beneficial Uses of this Fact Sheet summarizes the applicable beneficial uses for the receiving water body. This Table indicates that Santa Clara River does not have a "COLD" or "MIGR" beneficial use designation.

a. One-Hour Average Objective (Maximum Daily Effluent Limit, MDEL)

The Facility discharges into a receiving waterbody that does not have a "COLD" or "MIGR" beneficial use designation. It is assumed that salmonids may be absent. The one-hour average objective is dependent upon pH and the presence of coldwater fish species, such as salmonids, but it is independent of temperature.

For freshwater, the one-hour average concentration of total ammonia as nitrogen (in mg N/L) shall not exceed the values in Table 3-1 (amended on April 25, 2002) of the Basin Plan or as described in the equation below:

$$\text{One-hour Average Concentration} = \frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}}$$

The 90th percentile of pH is 8.4, measured at the immediate downstream receiving water (Station R-A). Using the pH value of 8.4 in the formula above, the resulting MDEL is equal to 3.87 mg/L.

b. 30-Day Average Objective (Average Monthly Effluent Limit, AMEL)

Early life stage of fish is presumptively present and must be protected at all times of the year unless the water body is listed in Table 3-X of the Basin Plan (in Resolution No. 2005-014) or unless a site-specific study is conducted, which justifies applying the ELS absent condition or a seasonal ELS present condition. The Santa Clara River is not included in Table 3-X. Therefore, the above-mentioned receiving waters are considered "ELS Present". For freshwaters subject to the "Early Life Stage Present" condition, the thirty-day average concentration of total ammonia as nitrogen (in mg N/L) shall not exceed the values in Table 3-2 of the Basin Plan or as described in the equation below:

$$\text{30-day Average Concentration} = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) * \text{MIN}(2.85, 1.45 * 10^{0.028*(25-(T))})$$

Where T = temperature expressed in °C.

The 30-day average objective[1] is dependent on pH, temperature, and the presence or absence of early life stages of fish. The 50th percentile of pH and temperature at the immediate downstream receiving water is 7.8 pH and 15.6°C, respectively. Using the Discharger's monitoring data in the formula above, the resulting AMEL is equal to 1.93 mg/L.

[1] This is the current Basin Plan definition of the 30-day average objective, according to the Ammonia Basin Plan Amendment, Resolution No. 2002-011, *Amendment to the Water Quality Control Plan for the Los Angeles Region to Update the Ammonia Objectives for Inland Surface Waters (including enclosed bays, estuaries and wetlands) with Beneficial Use designations for protection of "Aquatic Life,"* adopted by the Los Angeles Regional Water Quality Control Board on April 25, 2002. It was amended by Resolution No. 2005-014, adopted by the Regional Board on December 1, 2005 and was approved by the USEPA on April 5, 2007. This new Resolution implements ELS Provision as described under "implementation", subparagraph 3. In this Resolution, the Discharger's receiving waterbody is designated as ELS absent.

c. Site Specific Objective (SSO)

On June 7, 2007, the Regional Water Board adopted Amendments to the Water Quality Control Plan-Los Angeles Region-To Incorporate Site-Specific Objectives for Select Inland Surface Waters in the San Gabriel River, Los Angeles River, and Santa Clara River Watersheds. This amendment to the Basin Plan will incorporate site-specific 30-day average objectives for ammonia along with corresponding site-specific early life stage implementation provisions for select waterbody reaches and tributaries in Santa Clara, Los Angeles, and San Gabriel River watersheds. Once the amendment is approved by USEPA, this permit will be opened to incorporate the SSO-derived 30-day objective. The application of the SSO is not considered backsliding under Exemption (2) of Section 402(0)(2) of the Clean Water Actand 40 CFR 122.44. At this time any calculation of SSO derived effluent limitations will not be included in this permit. However, the ammonia chronic SSO will not impact the final effluent limits for ammonia, because it is the acute ammonia criteria that drives the more stringent ammonia final effluent limits. The dischargers may wish to embark on a SSO study that would lead to a Basin Plan amendment to modify the acute ammonia criteria. This permit contains a reopener which would allow the Regional Water Board to open up the permit and insert applicable new provisions resulting from future TMDLs or other Basin Plan Amendments, such as a new SSO.

This permit includes final effluent ammonia-nitrogen effluent limitations based on receiving water pH and temperature, because there is no effluent pH and temperature available at this time. Conditions in the effluent may be significantly different than the receiving water conditions. The Basin Plan's water quality objective for ammonia shall be met at the receiving water at all times. In this permit, the Discharger has to meet the ammonia water quality objective within the first 100 feet downstream of the discharge outfall. In order to determine the variability and changing conditions in the receiving water, additional receiving water monitoring and compliance determinations will be required in addition to the effluent limits, to ensure that ammonia water quality objectives are met in the receiving water at all times.

This permit requires the Discharger to submit an approvable workplan to determine the pH and temperature fluctuations in the first 100 feet downstream of the discharge outfall. This workplan shall be submitted to this Regional Water Board for approval by the Executive Officer within 60 days from the date of adoption of this permit.

xii. <u>Coliform Bacteria</u>

Total and fecal coliform bacteria are used to indicate the likelihood of pathogenic bacteria in surface waters. Given the nature of the facility, a

wastewater treatment plant, pathogens are likely to be present in the effluent in cases where the disinfection process is not operating adequately. As such, the permit contains the following:

i. Effluent Limitations:

- The 7 day median number of coliform organisms at some point in the treatment process must not exceed a Most Probable Number (MPN) or Colony Forming Unit (CFU) of 2.2 per 100 milliliters, and

- The number of coliform organisms must not exceed an MPN or CFU of 23 per 100 milliliters in more than one sample within any 30-day period.

These disinfection-based effluent limitations for coliform are for human health protection and are consistent with requirements established by the Department of Health Services. These limits for coliform must be met at the point of the treatment train immediately following disinfection, as a measure of the effectiveness of the disinfection process.

ii. Receiving Water Limitation

- Geometric Mean Limits
  - E.coli density shall not exceed 126/100 mL.
  - Fecal coliform density shall not exceed 200/100 mL.

- Single Sample Limits
  - E.coli density shall not exceed 235/100 mL.
  - Fecal coliform density shall not exceed 400/100 mL.

These receiving water limitations are based on Resolution No. 01-018, Amendment to the Water Quality Control Plan for the Los Angeles Region to Update the Bacteria Objectives for Water Bodies Designated for Water Contact Recreation, adopted by the Regional Water Board on October 25, 2001. The Resolution was approved by State Water Board, OAL, and USEPA, on July 18, 2002, September 19, 2002, and September 25, 2002, respectively.

xiii. <u>Temperature</u>

USEPA document, *Quality Criteria for Water 1986* [EPA 440/5-86-001, May 1, 1986], also referred to as the *Gold Book*, discusses temperature and its effects on beneficial uses, such as recreation and aquatic life.

- The Federal Water Pollution Control Administration in 1967 called temperature "a catalyst, a depressant, an activator, a restrictor, a

stimulator, a controller, a killer, and one of the most important water quality characteristics to life in water." The suitability of water for total body immersion is greatly affected by temperature. Depending on the amount of activity by the swimmer, comfortable temperatures range from 20°C to 30°C (68 °F to 86 °F).

- Temperature also affects the self-purification phenomenon in water bodies and therefore the aesthetic and sanitary qualities that exist. Increased temperatures accelerate the biodegradation of organic material both in the overlying water and in bottom deposits which makes increased demands on the dissolved oxygen resources of a given system. The typical situation is exacerbated by the fact that oxygen becomes less soluble as water temperature increases. Thus, greater demands are exerted on an increasingly scarce resource which may lead to total oxygen depletion and obnoxious septic conditions. Increased temperature may increase the odor of water because of the increased volatility of odor-causing compounds. Odor problems associated with plankton may also be aggravated.

- Temperature changes in water bodies can alter the existing aquatic community. Coutant (1972) has reviewed the effects of temperature on aquatic life reproduction and development. Reproductive elements are noted as perhaps the most thermally restricted of all life phases, assuming other factors are at or near optimum levels. Natural short-term temperature fluctuations appear to cause reduced reproduction of fish and invertebrates.

The Basin Plan lists temperature requirements for the receiving waters. Based on the requirements of the Basin Plan and a white paper developed by Regional Water Board staff entitled *Temperature and Dissolved Oxygen Impacts on Biota in Tidal Estuaries and Enclosed Bays in the Los Angeles Region*, a maximum effluent temperature limitation of 86 °F is included in the Order. The white paper evaluated the optimum temperatures for steelhead, topsmelt, ghost shrimp, brown rock crab, jackknife clam, and blue mussel. The new temperature effluent limitation is reflective of new information available that indicates that the 100°F temperature which was formerly used in permits was not protective of aquatic organisms. A survey was completed for several kinds of fish and the 86°F temperature was found to be protective. It is impracticable to use a 7-day average or a 30-day average limitation for temperature, because it is not as protective as of beneficial uses as a daily maximum limitation is. A daily maximum limit is necessary to protect aquatic life and is consistent with the fishable/swimmable goals of the CWA.

xiv. <u>Turbidity</u>

Turbidity is an expression of the optical property that causes light to be scattered in water due to particulate matter such as clay, silt, organic matter, and microscopic organisms. Turbidity can result in a variety of water quality impairments. The effluent limitation for turbidity which reads, "For the protection of the water contact recreation beneficial use, the wastes discharged to water courses shall have received adequate treatment, so that the turbidity of the wastewater does not exceed: (a) a daily average of 0.2 Nephelometric turbidity units (NTUs) more than 5 percent of the time (72 minutes) during any 24 hour period; and (b) 0.5 NTUs at any time," is based on the Basin Plan's incorporation by reference of Title 22 and the definition of filtered wastewater. In comparison to other POTWs in this region, the turbidity limit for the Newhall Ranch WRP is more stringent than the typical turbidity requirement for other POTWs because the Newhall POTW proposes, according to their ROWD, to have microfiltration, rather than the conventional soils or bed of media filter which is typical in most other tertiary-level POTWs. The limitation, therefore reflects what the technology of choice by the Discharger is designed to achieve.

xv. <u>Radioactivity</u>

Radioactive substances are generally present in natural waters in extremely low concentrations. Mining or industrial activities increase the amount of radioactive substances in waters to levels that are harmful to aquatic life, wildlife, or humans. Section 301 (f) of the CWA contains the following statement with respect to effluent limitations for radioactive substances: "Notwithstanding any other provisions of this Act it shall be unlawful to discharge any radiological, chemical, or biological warfare agent, any high-level radioactive waste, or any medical waste, into the navigable waters." Chapter 5.5 of the Water Code contains a similar prohibition under Section 13375, which reads as follows: "The discharge of any radiological, chemical, or biological warfare agent into the waters of the state is hereby prohibited." However, rather than give a hard and fast absolute prohibition on radioactive substances, Regional Water Board staff have set the following effluent limit for radioactivity: "Radioactivity of the wastes discharged shall not exceed the limits specified in Title 22, Chapter 15, Article 5, Section 64443, of the California Code of Regulations, or subsequent revisions." The limit is based on the Basin Plan incorporation of Title 22, *Drinking Water Standards,* by reference, to protect beneficial uses. Therefore, the accompanying Order will retain the limit for radioactivity.

xvi. <u>Iron</u>

The effluent limitation of 300 mg/l for iron was developed based on the USEPA document, *Quality Criteria for Water 1986* [EPA 440/5-86-001, May 1, 1986], also referred to as the *Gold Book*, for the protection of GWR beneficial use.

300 µg/L is the secondary MCL for iron, however iron is not a priority pollutant. Some POTWs have a final effluent limitation for iron. Using the receiving water sample resultsand the TSD methodology, the discharge currently has reasonable potential to contribute to an exceedance of the Gold Book criteria; the secondary Federal MCL; and, the secondary California MCL for iron. The limit was expressed as a monthly average rather than a daily maximum, because it was assumed that the groundwater basins have assimilative capacity for iron. A WQBEL is now proposed which has to be met at the end of pipe, for protection of the GWR beneficial use in the surface water, since the discharge has reasonable potential to cause or contribute to an exceedance.

The California Toxic Rule (CTR) and State Implementation Policy (SIP) specify numeric objectives for toxic substances and the procedures whereby these objectives are to be implemented. The procedures include those used to conduct reasonable potential analysis to determine the need for effluent limitations for priority and non-priority pollutants.

3. Determining the Need for WQBELs

The Regional Water Board developed WQBELs for ammonia-nitrogen, nitrite-nitrogen, nitrite plus nitrite as nitrogen, and chloride based upon Total Maximum Daily Loads (TMDLs). The effluent limitations for these pollutants were established regardless of whether or not there is reasonable potential for the pollutants to be present in the discharge at levels that would cause or contribute to a violation of water quality standards. The Regional Water Board developed water quality-based effluent limitations for these pollutants pursuant to section 122.44(d)(1)(vii), which does not require or contemplate a reasonable potential analysis. The Regional Water Board has determined that the WQBEL is consistent with the assumptions of the TMDL. Similarly, compliance with the effluent limitation will satisfy the requirements of the TMDL. Similarly, the SIP at Section 1.3 recognizes that reasonable potential analysis is not appropriate if a TMDL has been developed.

In accordance with Section 1.3 of the SIP, the Regional Water Board conducted a reasonable potential analysis for each priority pollutant with an applicable criterion or objective to determine if a WQBEL is required in the permit. The Regional Water Board analyzed effluent data to determine if a pollutant in a discharge has a reasonable potential to cause or contribute to an excursion above a state water quality standard. For all parameters that demonstrate reasonable potential, numeric WQBELs are required. The RPA considers water quality criteria from the CTR and NTR, and when applicable, water quality objectives specified in the Basin Plan. To conduct the RPA, the Regional Water Board staff would normally identified the maximum effluent concentration (MEC) and maximum background concentration in the receiving water for each constituent, based on data provided by the Discharger.

Section 1.3 of the SIP provides the procedures for determining reasonable potential to exceed applicable water quality criteria and objectives. The SIP specifies three triggers to complete a RPA:

Trigger 1 – If the MEC is greater than or equal to the CTR water quality criteria or applicable objective (C), a limitation is needed.

Trigger 2 – If background water quality (B) > C and the pollutant is detected in the effluent, a limitation is needed.

Trigger 3 – If other related information such as CWA 303(d) listing for a pollutant, discharge type, compliance history, then best professional judgment is used to determine that a limit is needed.

Sufficient effluent and ambient data are needed to conduct a complete RPA. If data are not sufficient, the Discharger will be required to gather the appropriate data for the Regional Water Board to conduct the RPA. Upon review of the data, and if the Regional Water Board determines that WQBELs are needed to protect the beneficial uses, the permit will be reopened for appropriate modification.

However, since the Newhall Ranch WRP has yet to be constructed, there is no effluent data available from which to select the MEC. Although, there is ample receiving water data available. This receiving water data provides information to be able to determine that the discharge could contribute to an exceedance. In the absence of final effluent data, Reasonable potential analysis was also conducted using the procedure in section 3.2 of the Technical Support Document, where other information and best professional judgement was used to prescribe effluent limits based on similar facilities with similar processes.

The RPA was performed for the priority pollutants regulated in the CTR for which data are available. Based on the RPA, there was reasonable potential for the Discharge to contribute to an exceedance of the following pollutants: antimony, arsenic, copper, lead, mercury, nickel, selenium, zinc, cyanide, acrylonitrile, iron, tetrachloroethylene, bis(2-ethylhexyl)phthalate, 1,4-dichlorobenzene, lindane, and 4,4-DDE.

4. WQBEL Calculations

a. **Calculation Options.** Once RPA has been conducted using either the TSD or the SIP methodologies, WQBELs are calculated. Alternative procedures for calculating WQBELs include:

1. Use WLA from applicable TMDL
2. Use a steady-state model to derive Maximum Daily Effluent Limits and Average Monthly Effluent Limits.
3. Where sufficient data exist, use a dynamic model which has been approved by the State Water Board.

b. **SIP Calculation Procedure.** Section 1.4 of the SIP requires the step-by-step procedure to "adjust" or convert CTR numeric criteria into Average Monthly Effluent Limitations (AMELs) and Maximum Daily Effluent Limitations (MDELs), for toxics.

Step 3 of Section 1.4 of the SIP (page 8) lists the statistical equations that adjust CTR criteria for effluent variability.

Step 5 of Section 1.4 of the SIP (page 10) lists the statistical equations that adjust CTR criteria for averaging periods and exceedance frequencies of the criteria/objectives. This section also reads, "For this method only, maximum daily effluent limitations shall be used for publicly-owned treatment works (POTWs) in place of average weekly limitations.

Sample calculation for 4,4'-DDE:

Step 1: Identify applicable water quality criteria.

From California Toxics Rule (CTR), we can obtain the Criterion Maximum Concentration (CMC) and the Criterion Continuous Concentration (CCC).

Freshwater Aquatic Life Criteria:
CMC = NA µg/L (CTR page 31715, column B1) and
CCC = NA µg/L (CTR page 31715, column B2); and
Human Health Criteria for Organisms only = 0.00059 µg/L (CTR page 31715, column D2).

Step 2: Calculate effluent concentration allowance (ECA)

ECA = Criteria in CTR, since no dilution is allowed.

Step 3: Determine long-term average (LTA) discharge condition

i. Calculate CV:

CV = Standard Deviation/Mean
= 0.6 (By default because data was > 80% nondetect, SIP page 6)

ii. Find the ECA Multipliers from SIP Table 1 (page 7), or by calculating them using equations on SIP page 6. When CV = 0.6, then:

ECA Multiplier acute = 0.321 and
ECA Multiplier chronic = 0.527

iii. LTA acute = ECA acute x ECA Multiplier acute
= NA µg/L x 0.321 = NA µg/L

iv. LTA chronic = ECA chronic x ECA Multiplier chronic
= NA µg/L x 0.527 = NA µg/L

Step 4: Select the lowest LTA

In this case, the lowest LTA is not applicable.

Step 5: Calculate the Average Monthly Effluent Limitation (AMEL) & Maximum Daily Effluent Limitation (MDEL) for AQUATIC LIFE

i. Find the multipliers. You need to know CV and n (frequency of sample collection per month). If effluent samples are collected 4 times a month or less, then n = 4. CV was determined to be 0.6 in a previous step.

AMEL Multiplier = 1.552
MDEL Multiplier = 3.114

ii. AMEL aquatic life = lowest LTA (from Step4) x AMEL Multiplier
= NA µg/L x 1.552 = NA µg/L

iii. MDEL aquatic life = lowest LTA (from Step4) x AMEL Multiplier
= NA µg/L x 3.114 = NA µg/L

Step 6: Find the Average Monthly Effluent Limitation (AMEL) & Maximum Daily Effluent Limitation (MDEL) for HUMAN HEALTH

i. Find factors. Given CV = 0.6 and n = 4.

For AMEL human health limit, there is no factor.
The MDEL/AMEL human health factor = 2.006

ii. AMEL human health = ECA = 0.00059 µg/L

iii. MDEL human health = ECA x MDEL/AMEL factor
= 0.00059 µg/L x 2.006 = 0.001184 µg/L

Step 7: Compare the AMELs for Aquatic life and Human health and select the lowest. Compare the MDELs for Aquatic life and Human health and select the lowest

i. Lowest AMEL = 0.00059 µg/L (Based on Human Health protection)

ii. Lowest MDEL = 0.001184 µg/L (Based on Human Health protection)

c. **Mass based limits.** 40 CFR section 122.45(f)(1) requires that except under certain conditions, all permit limits, standards, or prohibitions be expressed in terms of mass units. 40 CFR section 122.45(f)(2) allows the permit writer, at its discretion, to express limits in additional units (e.g., concentration units). The regulations mandate that, where limits are expressed in more than one unit, the permittee must comply with both.

Generally, mass-based limits ensure that proper treatment, and not dilution, is employed to comply with the final effluent concentration limits. Concentration-based effluent limits, on the other hand, discourage the reduction in treatment efficiency during low-flow periods and require proper operation of the treatment units at all times. In the absence of concentration-based effluent limits, a permittee would be able to increase its effluent concentration (i.e., reduce its level of treatment) during low-flow periods and still meet its mass-based limits. To account for this, this permit includes mass and concentration limits for some constituents

d. **Mixing Zones and Dilution Credits -** Mixing zones, dilution credits, and attenuation factors are not allowed in the accompanying Order. Allowance of a mixing zone is in the Regional Water Board's discretion under Section 1.4.2 of the SIP and under the Basin Plan (Basin Plan Chapter 4, page 30). If the Discharger subsequently conducts appropriate mixing zone and dilution credit studies, the Regional Water Board can evaluate the propriety of granting a mixing zone or establishing dilution credits. The Regional Water Board has concluded mixing zones and dilution credits would be inappropriate to grant, at this time, in light of the following factors:

1. Several reaches of the Santa Clara River [including those subject to this Order] are 303(d) listed (i.e., impaired) for certain constituents;

2. Impaired waters do not have the capacity to assimilate pollutants of concern at concentrations greater than the applicable objective;

3. For the protection of the beneficial uses is listed in the Order;

4. Consistent with Antidegradation Policies;

5. Because a mixing zone study has not been conducted; and,

6. Because hydrologic models of the discharge and the receiving waters have not been conducted.

On July 16, 2003, the State Water Board adopted Order No. WQO 2003-0009, directing Regional Water Board staff to work with CSDLAC, once data was provided, to determine whether dilution and attenuation are appropriate factors to consider in developing effluent limits to protect the GWR beneficial use, in the Whittier Narrows WRP NPDES permit. However, this does not apply to the Newhall Ranch WRP because Newhall has not provided the necessary site-specific data or studies regarding the ground water basins in the Newhall area.

e. **Interim Monitoring Requirements** - In accordance with the SIP, the Regional Water Board may impose interim monitoring requirements upon the Discharger, so that the Discharger obtains adequate ambient, background water data for priority pollutants upstream of the discharge point as well as suitable effluent data. The Executive Officer directed major Dischargers to begin an interim monitoring program for the duration of 18 months, beginning July 2001. The monitoring results that will be obtained when Newhall Ranch WRP implements the monitoring requirements contained in Attachment E will be used by Regional Water Board staff to conduct RPA once again, to determine if additional numeric limitations are necessary. Section 1.3, Step 8, of the SIP authorizes the Regional Water Board to use the gathered data to conduct RPA, as outlined in Steps 1 through 7, and determine if a water quality-based effluent limitation is required.

A reopener provision is included in this Order that allows the permit to be reopened to allow the inclusion of new numeric limitations for any constituent that exhibits reasonable potential to cause or contribute to exceedance of applicable water quality objectives.

Summary of Water Quality-based Effluent Limitations
Discharge Point 001

Table 5. Summary of Water Quality-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Total ammonia (NH_3 as N)	mg/L	1.93[2]	--	3.87[3]	--	--
	lbs/day[1]	25	--	65	--	--
Nitrate-N + Nitrite-N	mg/L	5	--	--	--	--
	lbs/day[1]	80	--	--	--	--
Nitrite-N	mg/L	0.9	--	--	--	--
	lbs/day[1]	15	--	--	--	--
Detergents (as MBAS)	mg/L	0.5	--	--	--	--
	lbs/day[1]	8	--	--	--	--
Total residual chlorine	mg/L	--	--	0.1	--	--
Antimony	µg/L	6	--	--	--	--
	lbs/day[1]	0.1	--	--	--	--
Arsenic	µg/L	10	--	--	--	--
	lbs/day[1]	0.2	--	--	--	--
Copper	µg/L	22	--	44	--	--
	lbs/day[1]	0.37	--	0.73	--	--
Lead	µg/L	13	--	26	--	--
	lbs/day[1]	0.22	--	0.43	--	--
Mercury	µg/L	0.051	--	0.10	--	--
	lbs/day[1]	0.00085	--	0.0017	--	--
Nickel	µg/L	100	--	--	--	--
	lbs/day[1]	1.7	--	--	--	--
Selenium	µg/L	4.1	--	8.2	--	--

1 The mass emission rates are based on the plant design flow rate of 2.0 mgd, and are calculated as follows: Flow(MGD) x Concentration (mg/L) x 8.34 (conversion factor) = lbs/day. However, the design capacity will incrementally increase to 6.8 MGD, as the phased plant upgrades approach completion. The mass-based effluent limitation will accordingly be modified following an Anti-degradation analysis demonstration conducted by the Discharger, and upon certification and approval of increased treatment plant capacity. During wet-weather storm events in which the flow exceeds the design capacity, the mass discharge rate limitations shall not apply, and concentration limitations will provide the only applicable effluent limitations.

2 This is the monthly average effluent limit calculated according to the Implementation Plan for ammonia in the Basin Plan, which specifies how to translate the Ammonia WQO into a final effluent limit, consistent with the assumptions of the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011.

3 This is the daily maximum effluent limit calculated according to the Implementation Plan for ammonia in the Basin Plan, which specifies how to translate the Ammonia WQO into a final effluent limit, consistent with the assumptions of the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011.

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
	lbs/day	0.068	--	0.14	--	--
Zinc	µg/L	5000	--	--	--	--
	lbs/day[1]	83	--	--	--	--
Cyanide	µg/L	4.2	--	8.5	--	--
	lbs/day[1]	0.07	--	0.14	--	--
Acrylonitrile	µg/L	0.66	--	1.3	--	--
	lbs/day[1]	0.011	--	0.022	--	--
Tetrachloroethylene	µg/L	5	--	--	--	--
	lbs/day[1]	0.08	--	--	--	--
Bis(2-ethylhexyl)phthalate	µg/L	4	--	--	--	--
	lbs/day[1]	0.07	--	--	--	--
p-Dischlorobenzene (1,4-Dichlorobenzene)	µg/L	5	--	--	--	--
	lbs/day[1]	0.08	--	--	--	--
Lindane	µg/L	0.2	--	--	--	--
	lbs/day	0.003	--	--	--	--
4,4-DDE	µg/L	0.00059	--	0.0012	--	--
	lbs/day	0.0000098	--	0.00002	--	--
Iron	µg/L	300	--	--	--	--
	lbs/day	5	--	--	--	--

5. Whole Effluent Toxicity (WET)

Ambient monitoring data indicates that the background concentration in the lower Santa Clara is toxic to aquatic organisms, and therefore exceeds water quality standards. Final effluent water quality data for the Newhall WRP is not available. However, effluent data contained in monitoring reports for other POTWs in the watershed, shows that chronic toxicity in the effluent has sometimes exceeded 1TUc (monthly median). Therefore, pursuant to the TSD, reasonable potential exists for toxicity. As such, the permit should contain a numeric effluent limitation for toxicity.

The toxicity numeric effluent limitations are based on:

a. CFR 122.44(d)(v) – limits on whole effluent toxicity are necessary when chemical-specific limits are not sufficient to attain and maintain applicable numeric or narrative water quality standards;

b. 40 CFR 122.44(d)(vi)(A) – where a State has not developed a water quality criterion for a specific pollutant that is present in the effluent and has reasonable potential, the permitting authority can establish effluent limits using numeric water quality criterion;

c. Basin Plan objectives and implementation provisions for toxicity;

d. Regions 9 & 10 Guidance for Implementing Whole Effluent Toxicity Programs Final May 31, 1996;

e. Whole Effluent Toxicity (WET) Control Policy July 1994; and,

f. Technical Support Document (several chapters and Appendix B).

However, the circumstances warranting a numeric chronic toxicity effluent limitation when there is reasonable potential were under review by the State Water Resources Control Board (State Water Board) in SWRCB/OCC Files A-1496 & A-1496(a) [Los Coyotes/Long Beach Petitions]. On September 16, 2003, at a public hearing, the State Water Board adopted Order No. 2003-0012 deferring the issue of numeric chronic toxicity effluent limitations until Phase II of the SIP is adopted. In the mean time, the State Water Board replaced the numeric chronic toxicity limit with a narrative effluent limitation and a 1 TUc trigger, in the Long Beach and Los Coyotes WRP NPDES permits. This permit contains a similar narrative chronic toxicity effluent limitation, with a numeric trigger for accelerated monitoring.

Phase II of the SIP has been adopted, however, the toxicity control provisions were not revised.

On January 17, 2006, the State Water Board Division of Water Quality held a California Environmental Quality Act (CEQA) scoping meeting to seek input on the scope and content of the environmental information that should be considered in the planned revisions of the Toxicity Control Provisions of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). However, the Toxicity Control Provisions of the SIP continue unchanged.

This Order contains a reopener to allow the Regional Water Board to modify the permit, if necessary, consistent with any new policy, law, or regulation. Until such time, this Order will have toxicity limitations that are consistent with the State Water Board's precedential decision.

Acute Toxicity Limitation:

The Dischargers may test for Acute toxicity by using USEPA's *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, October 2002 (EPA-821-R-02-012). Acute toxicity provisions in the accompanying Order are derived from the Basin Plan's toxicity standards (Basin Plan 3-16 and 3-17). The provisions require the Discharger to accelerate acute toxicity monitoring and take further actions to identify the source of toxicity and to reduce acute toxicity.

Chronic Toxicity Limitation and Requirements:

Chronic toxicity provisions in the accompanying Order are derived from the Basin Plan's toxicity standards (Basin Plan 3-16 and 3-17). The provisions require the Discharger to accelerate chronic toxicity monitoring and take further actions to identify the source of toxicity and to reduce chronic toxicity. The monthly median trigger of 1.0 TU_c for chronic toxicity is based on *USEPA Regions 9 & 10 Guidance for Implementing Whole Effluent Toxicity (WET) Programs* Final May 31, 1996 (Chapter 2 – Developing WET Permitting Conditions, page 2-8). In cases where effluent receives no dilution or where mixing zones are not allowed, the 1.0 TU_c chronic criterion should be expressed as a monthly median. The "median" is defined as the middle value in a distribution, above which and below which lie an equal number of values. For example, if the results of the WET testing for a month were 1.5, 1.0, and 1.0 TU_c, the median would be 1.0 TU_c.

The *USEPA Regions 9 & 10 Guidance for Implementing Whole Effluent Toxicity (WET) Programs* Final May 31, 1996 (Chapter 2 – Developing WET Permitting Conditions, page 2-8) recommends two alternatives: using 2.0 TUc as the maximum daily limit; or using a statistical approach to develop a maximum daily effluent limitation.

D. Final Effluent Limitations

Section 402(o) of the CWA and 40 CFR 122.44 require that effluent limitations or conditions in reissued Orders be at least as stringent as those in the existing Orders based on the submitted sampling data. However, since this is a new discharge, there is no existing Order. The final effluent limitations established in this Order, for the discharge of tertiary-treated effluent through Discharge Serial No.EFF-001, as proposed in the ROWD, are listed below in Table 7:

1. Satisfaction of Anti-Backsliding Requirements

Since this is a new discharge, all proposed effluent limitations and requirements contained in the accompanying Order are new. Therefore, there is no relaxation of effluent limitations. Furthermore, the proposed effluent limitations are at least as stringent as the effluent limitations contained in a similar Order for a nearby facility, the Valencia Water Reclamation Plant. The proposed Order is consistent with the anti-backsliding requirements of the CWA and federal regulations.

2. Satisfaction of Antidegradation Policy

The Discharger proposes to use microfiltration and reverse osmosis in their treatment process. These are state-of-the art treatment facilities which are expected to produce high quality tertiary-treated effluent. Because modeling for chloride indicates no adverse impact or degradation of existing water quality, there should be no impact from other less conservative pollutants. In addition, groundwater monitoring will ensure that no degradation to groundwater resources occurs. The proposed discharge is consistent with the antidegradation provision of 40 CFR 131.12 and State Water Board Resolution No. 68-16.

3. Stringency of Requirements for Individual Pollutants

This Order contains restrictions on individual pollutants that are no more stringent than required by the federal CWA. Individual pollutant restrictions consist of technology-based restrictions and water quality-based effluent limitations. The technology-based effluent limitations consist of restrictions on biochemical oxygen demand (BOD), total suspended solids (TSS), and hydrogen ion concentration (pH). Restrictions on BOD, TSS, and pH are specified in federal regulations as discussed in Finding F, and the permit's technology-based pollutant restrictions are no more stringent than required by the CWA. Water quality-based effluent limitations have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant water quality-based effluent limitations were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The scientific procedures for calculating the individual water quality-based effluent limitations are based on the CTR-SIP, which was approved by USEPA on

May 18, 2000. Most beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA" pursuant to 40 CFR 131.21(c)(1). For the most part, this Order's restrictions on individual pollutants are no more stringent than required to implement the technology-based requirements of the CWA and the applicable water quality standards for purposes of the CWA.

This Order contains pollutant restrictions that are more stringent than applicable federal requirements and standards. Specifically, this Order includes effluent limitations for bis(2-ethylhexyl)phthalate that are more stringent than applicable federal standards, but that are nonetheless necessary to meet numeric objectives or protect beneficial uses. The rationale for including these limitations is explained in this Fact Sheet. In addition, the Regional Water Board has considered the factors in Water Code section 13241.

The California MCLs are the same as the USEPA MCL for iron and tetrachloroethylene, therefore the limits for iron and tetrachloroethylene, based on the MCLs, are not more stringent than federal requirements. The California MCL for Arsenic is less stringent than the USEPA MCL, therefore the limit for Arsenic is not more stringent than the federal requirement. The California MCL for Bis(2-ethylhexyl)phthalate is more stringent than the USEPA MCL and more stringent than the CTR criteria, therefore the monthly average effluent limitation for Bis(2-ethylhexyl)phthalate is the only limit more stringent than the federal requirements. Therefore, an economic analysis should be done for Bis(2-ethylhexyl)phthalate.

According to Section 13241 of the CWC, the factors to be considered by a regional board in establishing water quality objectives include, but are not necessarily be limited to, all of the following:

(a) Past, present, and probable future beneficial uses of water.
(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.
(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.
(d) Economic considerations.
(e) The need for developing housing within the region.
(f) The need to develop and use recycled water.

Regional Board staff have considered all of the above factors.

The proposed Order is protective of all beneficial uses of surface waters (using CWA) and ground water (using CWC);

The environmental characteristics of the discharge and of the watershed in which the facility is located have been taken into consideration and provisions of the applicable TMDLs have been incorporated into the Order, in an attempt to restore waters under section 303(d) of the CWA;

Limitations which could reasonably be achieved have been placed in the Order to protect the water quality of the immediate receiving waters and those located downstream of the discharge point;

Economic considerations have also been considered

1. **DHS' Economic Analysis**. The technical and economic feasibility of regulating MCLs is evaluated as part of the MCL development and adoption process by the California Department of Health Services, a sister agency. The technical feasibility includes an evaluation of commercial laboratories' ability to analyze for and detect the chemical in drinking water, the costs of monitoring, and the costs of treatment required to remove it.

2. **Requirements under future WDR,WRR Order for Recycling** Newhall Ranch Sanitation District will apply for water recycling requirements. They will be required to comply with the Maximum Contaminant Levels of the current California Drinking Water Standards for inorganic and organic chemicals, under a separate order ahich serves as waste discharge requirements for water recycling. Since the Newhall Ranch WRP will have advanced treatment technology, the discharge is expected to meet the MCLs, and no additional treatment units are believed to be necessary in order to meet the limitations in the accompanying NPDES permit.

3. **Similar Facilities**. Other POTWs in Region 4 have similar NPDES permit requirements. When Regional Board staff was preparing the first set of permits that would implement the SIP and the CTR, they asked the State Board, Division of Water Quality's Standard Development Section to prepare an economic analysis of the cost of complying with the California Toxics Rule for the five Los Angeles County Sanitation District (LACSD) inland POTWs in the San Gabriel River Watershed. The State Board contracted Sciences Applications International Corporation (SAIC) to prepare the economic analysis. Their report titled, *Potential Costs of Complying with the California Toxics Rule for Five Los Angeles County Sanitation District Facilities* (March 21, 2001), presented a worst case scenario and a most likely control scenario for all five facilities. Of the five LACSD POTWs, the smallest is the Pomona WRP, with a 15 MGD capacity. For the Pomona WRP, the worst case control scenario would require the use of Granular Activated Carbon (GAC), with a construction cost of about

$12 Million, and an operation costs of $387,000 per year. The most likely control scenario required implementation of a source control or pollutant minimization program, a plant study for process optimization, and an improved coagulant chemical addition process, at a cost of $141,000 per year. Although the focus of the study was to consider CTR-based limits, the study did include consideration of the 4 µg/L MCL-based limit for Bis(2-ethylhexyl)phthalate. The LACSD plants have focused on source control and pollution prevention, process optimization, and cleaner laboratory analytical techniques to achieve compliance with their permit limitations. In the case of Bis(2-ethylhexyl)phthalate, using cleaner sampling techniques has made a big difference in eliminating the amounts of detects (or false positives) obtained. The clean hands technique involved using gloves and bottles that were free of phthalates, for example using teflon and glassware. In no case did any of the LACSD POTWs have to install costly treatment systems for the removal of CTR-based or MCL-based pollutants.

Regional Board staff conclude that additional treatment units would not be required to meet the new limitations contained in the accompanying Order. Newhall Ranch Sanitation District may conduct an economic analysis and submit it to the Regional Board for consideration, during the public comment period, if so desired.

We are aware that Newhall Land anticipates building additional housing projects, aside from the Landmark Village project. The Newhall Ranch WRP is designed in such a way that it will be able to expand its treatment capacity in phases, to accommodate the additional sewage generated by the new housing developments.

The Discharger has not submitted any economic information to indicate what the cost of complying with this Order would be. As discussed in other sections of the Fact Sheet, the individual pollutant restrictions are reasonably necessary to protect beneficial uses identified in the Basin Plan, and the economic information related to costs of compliance are not sufficient, in the Regional Water Board's determination, to justify failing to protect beneficial uses. Since this is a new discharge, it is not appropriate to issue a Time Schedule Order.

Summary of Final Effluent Limitations
Discharge Point 001

Table 6. Summary of Final Effluent Limitations

Parameter	Units	Effluent Limitations					Basis
		Average Monthly	Average Weekly	Maximum Daily	Instant-aneous Minimum	Instant-aneous Maximum	
$BOD_5$20°C	mg/L	20	30	45	--	--	Technology
	lbs/day	330	500	750	--	--	Calculated
Total Suspended solids (TSS)	mg/L	15	40	45	--	--	Technology
	lbs/day	250	670	750	--	--	Calculated
pH	standard units	--	--	--	6.5	8.5	Basin Plan
Total ammonia (NH_3 as N)	mg/L	1.93[4]	--	3.87[5]	--	--	TMDL/Basin Plan WQO
	lbs/day[1]	25	--	65	--	--	Calculated
Nitrate-N + Nitrite-N	mg/L	5	--	--	--	--	TMDL/Basin Plan WQO
	lbs/day[1]	80	--	--	--	--	Calculated
Nitrite-N	mg/L	0.9	--	--	--	--	Basin Plan WQO
	lbs/day[1]	15	--	--	--	--	Calculated
Detergents (as MBAS)	mg/L	0.5	--	--	--	--	Basin Plan WQO
	lbs/day[1]	8	--	--	--	--	Calculated
Total residual chlorine	mg/L	--	--	0.1	--	--	Basin Plan WQO
Antimony	µg/L	6	--	--	--	--	TSD Chap.3.2
	lbs/day[1]	0.1	--	--	--	--	Calculated
Arsenic	µg/L	10	--	--	--	--	TSD Chap.3.2
	lbs/day[1]	0.2	--	--	--	--	Calculated
Copper	µg/L	22	--	44	--	--	CTR Aquatic Life
	lbs/day[1]	0.37	--	0.73	--	--	Calculated

[4] This is the thirty-day Ammonia-N (NH_3-N) numeric target for Reach 7 of the Santa Clara River at the County Line, according to the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011, applied as the average monthly effluent limitation.

[5] This is the one-hour Ammonia-N (NH_3-N) numeric target for Reach 7 of the Santa Clara River at the County Line, according to the Santa Clara River Nitrogen Compounds TMDL, Resolution No. 03-011, applied as the daily maximum effluent limitation.

Parameter	Units	Effluent Limitations					Basis
		Average Monthly	Average Weekly	Maximum Daily	Instant-aneous Minimum	Instantan-eous Maximum	
Lead	µg/L	13	--	26	--	--	CTR Aquatic Life
	lbs/day[1]	0.22	--	0.43	--	--	Calculated
Mercury	µg/L	0.051	--	0.10	--	--	CTR Human health
	lbs/day[1]	0.00085	--	0.0017	--	--	Calculated
Nickel	µg/L	100	--	--	--	--	TDS Chap.3.2
	lbs/day[1]	1.7	--	--	--	--	Calculated
Selenium	µg/L	4.1	--	8.2	--	--	CTR Aquatic Life
	lbs/day	0.068	--	0.14	--	--	Calculated
Zinc	µg/L	5000	--	--	--	--	TSD Chap.3.2
	lbs/day[1]	83	--	--	--	--	Calculated
Cyanide	µg/L	4.2	--	8.5	--	--	TSD Chap.3.2
	lbs/day[1]	0.07	--	0.14	--	--	Calculated
Acrylonitrile	µg/L	0.66	--	1.3	--	--	TSD Chap.3.2
	lbs/day[1]	0.011	--	0.022	--	--	Calculated
Tetrachloroethy-lene	µg/L	5	--	--	--	--	TSD Chap.3.2
	lbs/day[1]	0.08	--	--	--	--	Calculated
Bis(2-ethylhexyl) phthalate	µg/L	4	--	--	--	--	TSD Chap.3.2
	lbs/day[1]	0.07	--	--	--	--	Calculated
p-Dichlorobenzene (1,4-Dichlorobenzene)	µg/L	5	--	--			TSD Chap.3.2--
	lbs/day[1]	0.08	--	--			Calculated
Lindane	µg/L	0.2	--	--			TSD Chap.3.2
	lbs/day	0.003	--	--			Calculated
4,4-DDE	µg/L	0.00059	--	0.0012			CTR Human health
	lbs/day	0.0000098	--	0.00002			Calculated
Iron	µg/L	300	--	--			Basin Plan/ MCL
	lbs/day	5	--	--			Calculated

E. Interim Effluent Limitations

Not Applicable. This is a new discharge.

F. Land Discharge Specifications

Not Applicable. Holding ponds at the Newhall Ranch WRP will be concrete-lined and are not designed for purposeful groundwater recharge.

G. Reclamation Specifications

Not Applicable. Water recycling requirements will be regulated under a separate order. Newhall intends on recycling almost 100% of its treated effluent during dry weather.

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

A. Surface Water

The Basin Plan contains numeric and narrative water quality objectives applicable to all surface waters within the Los Angeles Region. Water quality objectives include an objective to maintain the high quality waters pursuant to federal regulations (40 CFR § 131.12) and State Water Board Resolution No. 68-16. Receiving water limitations in the Order are included to ensure protection of beneficial uses of the receiving water and are based on the water quality objectives contained in the Basin Plan.

B. Groundwater

The Basin Plan contains numeric and narrative water quality objectives applicable to all groundwaters within the Los Angeles Region. Water quality objectives include incorporation by reference to Title 22 drinking water standards, bacteria objectives, and others. Limitations are included in this Order to ensure protection of beneficial uses of the groundwater receiving water.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

Section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code sections 13267 and 13383 authorizes the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (MRP), Attachment E of this Order, establishes monitoring and reporting requirements to implement federal and state requirements. The following provides the rationale for the monitoring and reporting requirements contained in the MRP for this facility.

A. Influent Monitoring

Influent monitoring is required:

- To determine compliance with the permit conditions for BOD_5 20°C and suspended solids removal rates;
- To assess treatment plant performance;
- To assess the effectiveness of the Pretreatment Program (once a pretreatment program is in place); and,
- As a requirement of the Pollution Minimization Program

B. Effluent Monitoring

The Discharger is required to conduct monitoring of the permitted discharges in order to evaluate compliance with permit conditions. Monitoring requirements are given in the proposed Monitoring and Reporting Program (Attachment E). This provision requires compliance with the Monitoring and Reporting Program, and is based on 40 CFR 122.44(i), 122.62,122.63, and 124.5. The Monitoring and Reporting Program is a standard requirement in almost all NPDES permits (including the proposed Order) issued by the Regional Water Board. In addition to containing definition of terms, it specifies general sampling/analytical protocols and the requirements of reporting spills, violation, and routine monitoring data in accordance with NPDES regulations, the California Water Code, and Regional Water Board policies. The Monitoring and Reporting Program also contains sampling program specific for the Discharger's wastewater treatment plant. It defines the sampling stations and frequency, pollutants to be monitored, and additional reporting requirements. Pollutants to be monitored include all pollutants for which effluent limitations are specified. Further, in accordance with Section 1.3 of the SIP, a periodic monitoring is required for all priority pollutants defined by the CTR, for which criteria apply and for which no effluent limitations have been established, to evaluate reasonable potential to cause or contribute to an excursion above a water quality standard.

Monitoring for those pollutants expected to be present in the discharge from the facility, will be required as shown on the proposed Monitoring and Reporting Program (Attachment E) and as required in the SIP. Monitoring requirements are similar to those found in the near-by Valencia WRP's Monitoring and Reporting Program. Annual monitoring for priority pollutants in the effluent is required in accordance with the SIP.

Since this is a new discharge, the effluent monitoring requirements are new.

C. Whole Effluent Toxicity Testing Requirements

Whole effluent toxicity (WET) protects the receiving water quality from the aggregate toxic effect of a mixture of pollutants in the effluent. An acute toxicity test is conducted over a short time period and measures mortality. A chronic toxicity test is conducted over a longer period of time and may measure mortality, reproduction, and growth.

This requirement establishes conditions and protocol by which compliance with the Basin Plan narrative water quality objective for toxicity will be demonstrated and in accordance with Section 4.0 of the SIP. Conditions include required monitoring and evaluation of the effluent for acute and chronic toxicity and numerical values for chronic toxicity evaluation to be used as 'triggers' for initiating accelerated monitoring and toxicity reduction evaluation(s).

D. Receiving Water Monitoring

1. Surface Water

Receiving water monitoring is required to determine compliance with receiving water limitations and to characterize the water quality of the receiving water.

2. Groundwater

Groundwater monitoring is required to determine compliance with groundwater limitations and to track impacts to the groundwater basins.

E. Other Monitoring Requirements

1. Watershed Monitoring and Bioassessment Monitoring

The goals of the Watershed-wide Monitoring Program including the bioassessment monitoring for the San Gabriel River Watershed are to:

- Determine compliance with receiving water limits;
- Monitor trends in surface water quality;
- Ensure protection of beneficial uses;
- Provide data for modeling contaminants of concern;
- Characterize water quality including seasonal variation of surface waters within the watershed;
- Assess the health of the biological community; and
- Determine mixing dynamics of effluent and receiving waters in the estuary.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions

Standard Provisions, which apply to all NPDES permits in accordance with section 122.41, and additional conditions applicable to specified categories of permits in accordance with section 122.42, are provided in Attachment D. The discharger must comply with all standard provisions and with those additional conditions that are applicable under section 122.42.

Section 122.41(a)(1) and (b) through (n) establish conditions that apply to all State-issued NPDES permits. These conditions must be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to the regulations must be included in the Order. Section 123.25(a)(12) allows the state to omit or modify conditions to impose more stringent requirements. In accordance with section 123.25, this Order omits federal conditions that address enforcement authority specified in sections 122.41(j)(5) and (k)(2) because the enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates by reference Water Code section 13387(e).

B. Special Provisions

1. Reopener Provisions

This provision is based on 40 CFR Part 123. The Regional Water Board may reopen the permit to modify permit conditions and requirements. Causes for modifications include the promulgation of new regulations, modification in sludge use or disposal practices, or adoption of new regulations by the State Water Board or Regional Water Board, including revisions to the Basin Plan.

2. Special Studies and Additional Monitoring Requirements

a. **Antidegredation Analysis and Engineering Report for Proposed Plant Expansion.** This provision is based on the State Water Resources Control Board Resolution No. 68-16, which requires the Regional Water Board in regulation the discharge of waste to maintain high quality waters of the State, the Discharger must demonstrate that it has implemented adequate controls (e.g., adequate treatment capacity) to ensure that high quality waters will be maintained. This provision requires the Discharger to clarify it has increase plant capacity through the addition of new treatment system(s) to obtain alternative effluent limitations for the discharge from the treatment system(s). This provision requires the Discharger to report specific time schedules for the plants projects. This provision requires the Discharger to submit report to the Regional Water Board for approval.

b. **Operations Plan for Proposed Expansion.** This provision is based on Section 13385(j)(1)(D) of the CWC and allows a time period not to exceed 90 days in which the Discharger may adjust and test the treatment system(s). This provision requires the Discharger to submit an Operations Plan describing the actions the Discharger will take during the period of adjusting and testing to prevent violations.

c. **Treatment Plant Capacity.** The treatment plant capacity study required by this Order shall serve as an indicator for the Regional Water Board regarding Facility's increasing hydraulic capacity and growth in the service area.

3. Best Management Practices and Pollution Prevention

a. **Pollutant Minimization Program.** This provision is based on the requirements of Section 2.4.5 of the SIP.

4. Construction, Operation, and Maintenance Specifications

This provision is based on the requirements of 40 CFR 122.41(e) and similar requirements for similar facilities.

5. Special Provisions for Municipal Facilities (POTWs Only)

a. **Biosolids Requirements.** To implement CWA Section 405(d), on February 19, 1993, USEPA promulgated 40 CFR 503 to regulate the use and disposal of municipal sewage sludge. This regulation was amended on September 3, 1999. The regulation requires that producers of sewage sludge meet certain reporting, handling, and disposal requirements. It is the responsibility of the Discharger to comply with said regulations that are enforceable by USEPA, because California has not been delegated the authority to implement this program. The Discharger is also responsible for compliance with WDRs and NPDES permits for the generation, transport and application of biosolids issued by the State Water Board, other Regional Water Boards, Arizona Department of Environmental Quality or USEPA, to whose jurisdiction the Facility's biosolids will be transported and applied.

b. **Pretreatment Requirements.** This Order does not include any requirements for a Pretreatment Program because the discharge is less than 2.0 MGD and because the POTW does not have any significant industrial users (SIUs). In the future, once the design flow approaches 5.0 MGD, the Discharger will be required to develop a Pretreatment Program; and implement and enforce the pretreatment program in its entire service area. At that time, the permit will contain pretreatment requirements consistent with applicable effluent limitations, national standards of performance, and toxic and performance effluent standards established pursuant to Sections 208(b), 301, 302, 303(d), 304, 306, 307, 403,

404, 405, and 501 of the CWA, and amendments thereto. The permit would also contain requirements for the implementation of an effective pretreatment program pursuant to Section 307 of the CWA; 40 CFR 35 and 403; and/or Section 2233, Title 23, California Code of Regulations.

c. **Spill Reporting Requirements.** This Order established a reporting protocol for how different types of spills, overflow or bypasses of raw or partially treated sewage from its collection system or treatment plant covered by this Order shall be reported to regulatory agencies.

The State Water Board issued General Waste Discharge Requirements for Sanitary Sewer Systems, Water Quality Order No. 2006-0003-DWQ (General Order) on May 2, 2006. The General Order requires public agencies that own or operate sanitary sewer systems with greater than one mile of pipes or sewer lines to enroll for coverage under the General Order. The General Order requires agencies to develop sanitary sewer management plans (SSMPs) and report all sanitary sewer overflows (SSOs), among other requirements and prohibitions.

Furthermore, the General Order contains requirements for operation and maintenance of collection systems and for reporting and mitigating sanitary sewer overflows. The Discharger must comply with both the General Order and this Order.

6. Other Special Provisions

Not applicable.

7. Compliance Schedules

Not applicable because this is a new disharge.

VIII. PUBLIC PARTICIPATION

The California Regional Water Quality Control Board, Los Angeles Region (Regional Water Board) is considering the issuance of waste discharge requirements (WDRs) that will serve as a National Pollutant Discharge Elimination System (NPDES) permit for the Newhall Ranch Sanitation District's Newhall Ranch Water Reclamation Plant. As a step in the WDR adoption process, the Regional Water Board staff has developed tentative WDRs. The Regional Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for the discharge and

has provided them with an opportunity to submit their written comments and recommendations. Notification was provided through the following: publication in local newspapers.

B. Written Comments

The staff determinations are tentative. Interested persons are invited to submit written comments concerning these tentative WDRs. Comments must be submitted either in person or by mail to the Executive Office at the Regional Water Board at the address above on the cover page of this Order.

To be fully responded to by staff and considered by the Regional Water Board, written comments must be received at the Regional Water Board offices by 5:00 p.m. on July 6, 2007. However, the comment period was extended by a few days. Comments were due by the close of business on July 18, 2007. Comments on the strikeout & underline sections of the Revised Tentative were due by close of business on August 20, 2007.

C. Public Hearing Date and Location

The Regional Water Board will hold a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date: September 6, 2007
Time: 9:00 AM
Location: Metropolitan Water District of Southern California Board Room
700 North Alameda Street
Los Angeles, California

Interested persons are invited to attend. At the public hearing, the Regional Water Board will hear testimony, if any, pertinent to the discharge, WDRs, and permit. Oral testimony will be heard; however, for accuracy of the record, important testimony should be in writing.

Please be aware that dates and venues may change. Our Web address is http://www.waterboards.ca.gov/losangeles/ where you can access the current agenda for changes in dates and locations.

D. Scope of Hearing

The validity of the TMDL for Chloride in the Upper Santa Clara River, the TMDL for Nitrogen Compounds in the Upper Santa Clara River, nor the EIR for the Newhall Land development are at issue before the Regional Water Board in this proceeding. Evidence or argument that challenges the validity of those TMDLs or the EIR, or any aspects of them will not be permitted. The only matter before the Board is the adoption of new Waste Discharge Requirements and permit under the National Pollutant

Discharge Elimination System (NPDES) to incorporate applicable water quality objectives associated with discharges to the waters of the United States.

E. Availability of Documents

The Report of Waste Discharge (ROWD), other documents relied upon, tentative effluent limitations and special provisions, comments received, and other information are on file are available for inspection and copying between the hours of 8:00 a.m. and 4:30 p.m. by appointment at the following address:

Los Angeles Regional Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Arrangements for file review and/or obtaining copies of the documents may be made by calling the Los Angeles Regional Water Board at (213) 576-6600. Additionally, the agenda, the fact sheet, the draft order will be available online at:

http://www.waterboards.ca.gov/losangeles/

under the "Tentative Permits" heading in the left hand margin.

The entire file will become a part of the administrative record of this proceeding, irrespective of whether individual documents are specifically referenced during the hearing or contained in the agenda packet. The entire file will not be present in the hearing room. In addition to the materials generated for this proceeding, the file includes the administrative records for Resolution 2002-011 (relating to the Ammonia Criteria Implementation Plan) and other applicable Basin Plan amendments. Should any interested persons desire staff to bring to the hearing any particular documents that are not included in the agenda packet, they must submit a written or electronic request to staff during business hours, not later than five business days before the hearing. The request must identify the documents with enough specificity for staff to locate them.

F. Public Comments and Submittal of Evidence

Persons wishing to comment on, or object to, the tentative waste discharge requirements, or submit evidence for the Board to consider, are invited to submit them in writing to Veronica Cuevas at the above address, or send them electronically to vcuevas@waterboards.ca.gov. To be evaluated and responded to by Regional Water Board staff, included in the Board's agenda folder, and fully considered by the Board, written comments or testimony regarding the tentative must be received no later than close of business July 18, 2007. Failure to comply with these requirements is grounds for the Regional Water Board to refuse to admit the proposed written comment or exhibit into evidence pursuant to section 648.4, title 23 of the California Code of Regulations.

G. Nature of Hearing

This proceeding will be a formal adjudicatory proceeding. For such proceedings, the Regional Water Board follows procedures established by the State Water Resources Control Board. These procedures are set forth in regulations commencing with section 647 of title 23 of the California Code of Regulations, in particular, Article 2, commencing with section 648.

H. Parties to the Hearing

The following are the parties to this proceeding:

1. The applicant/permittee (Newhall Ranch Sanitation District)
2. Regional Water Board Staff

Any other persons requesting party status must submit a written or electronic request to staff not later than 20 business days before the hearing. All parties will be notified if other persons are so designated.

I. Hearing Procedure

The board meeting, of which this hearing is a part, will start at 9:00 a.m. Interested persons are invited to attend. When the agenda item is called, staff will present the matter under consideration, after which oral statements from parties or interested persons will be heard. For accuracy of the record, all important testimony should be in writing. The Board will include in the administrative record written transcriptions of oral testimony that is actually presented at the hearing. Oral testimony may be limited to five minutes or less for each interested person, depending on the number of interested persons wishing to be heard.

Parties or interested persons with similar concerns or opinions are encouraged to choose one representative to speak, and are encouraged to coordinate their presentations with each other. Parties will be advised after the receipt of public comments, but prior to the date of the hearing, of the amount of time each is allocated for presentations. That decision will be based upon the complexity and number of issues under consideration, the extent to which the parties have coordinated, the number of parties and interested persons anticipated, and the time available for the hearing. The parties are invited to contact staff not later than July 26, 2007 (two weeks prior to the hearing) to discuss how much time they believe is necessary for their presentations, and staff will endeavor to accommodate reasonable requests.
At the conclusion of testimony, the Board will deliberate in open or close session, and render a decision.

The Board does not generally require the prior identification of witnesses or the cross examination of witnesses, or other procedures not specified in this notice. Parties or persons with special procedural requests or requests for alternative hearing procedures should contact staff, who will endeavor to accommodate reasonable requests. Objections to any procedure to be used during this hearing must be submitted in writing no later than close of business 15 business days prior to the date of the hearing. (Any objections related to the amount of time allocated for parties' presentations much be submitted within two business days of notice thereof, if that date is less than 15 business before the hearing.) Absent such objections, any procedure not specified in this hearing notice will be waived pursuant to section 648(d) of title 23 of the California Code of Regulations. Procedural objections will not be entertained at the hearing.

If there should not be a quorum on the scheduled date of this meeting, all cases will be automatically continued to the next scheduled meeting on October 4, 2007. A continuance will not extend any time set forth herein.

J. Staff Contacts

If you have any question regarding this proposed action, please contact Veronica Cuevas at (213) 576-6662 or via email at vcuevas@waterboards.ca.gov or her supervisor, Blythe Ponek-Bacharowski at (213) 576-6720 or via email at bponek@waterboards.ca.gov .

K. Petitions

Any aggrieved person may petition the State Water Resources Control Board to review the decision of the Regional Water Board regarding the final WDRs. The petition must be submitted within 30 days of the Regional Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

TABLE R1
Reasonable Potential Analysis and Limit Derivation

Newhall Ranch Sanitation District - Newhall Ranch WRP
(Receiving Water Data only, No POTW Data Avail.)
(CA0064556, CI#9322)

					CTR CRITERIA					REASONABLE POTENTIAL ANALYSIS (RPA)								HUMAN HEALTH CALCULATIONS		
					Freshwater		Human Health		Basin Plan									Organisns Only		
CTR#	DATE	Units	CV	MEC	C acute = CMC tot	C chronic = CCC tot	Not applicable C hh W&O	C hh O	Title 22 GWR	Lowest C	MEC >= Lowest C	Tier 1 - Need limit?	B at NR1	B at NR3	Tier 2 - Need limit?	Tier 3 - other info. ?	Tier 3 - need limit?	AMELhh = ECA = C hh O	MDEL/ AMEL multiplier	MDEL hh
1	Antimony	µg/L		Not available	NONE	NONE	14	4300	6	6	Not available	Go to Tier 2	1.4	1.3	Go to tier 3	YES	Similar facility		2.01	
2	Arsenic	µg/L		Not available	340	150	NONE	NONE	10 (Federal MCL)	10	Not available	Go to Tier 2	3.6	4.5	NO	YES	Similar Facility		2.01	
3	Beryllium	µg/L		Not available	NONE	NONE	Narrative	Narrative	4	4	Not available	Go to Tier 2	0.4	0.5	Go to tier 3	NO	NO			
4	Cadmium*	µg/L		Not available	18.6	6.6	Narrative	Narrative	5	5	Not available	Go to Tier 2	0.69	1.73	Go to tier 3	NO	NO	NA		NA
5a	Chromium III*	µg/L		Not available	4844	577	Narrative	Narrative		577	Not available	Go to Tier 2			Go to tier 3	NO	NO			
5b	**Chromium VI**	**µg/L**		**Not available**	**16.3**	**11.4**	**Narrative**	**Narrative**	**50**	**11**	**Not available**	**Go to Tier 2**	**7.6**	**9.6**	**NO**	**NO**	**NO**	**N/A**	**2.01**	**N/A**
6	Copper*	µg/L	0.6	Not available	45	27	1300	NONE		27	Not available	Go to Tier 2	11	15	No	Yes, may contri-bute to exceed ance	Yes	N/A	2.01	N/A
7	Lead*	µg/L	0.6	Not available	402	16	Narrative	Narrative		16	Not available	Go to Tier 2	4.6	5.8	No	Yes, may contrib ute to exceed ance	YES			
8	Mercury	µg/L	0.6	Not available	Reserved	Reserved	0.05	0.051	2	0.051	Not available	Go to Tier 2	0.31	<0.01	YES			0.051	2.01	0.10251
9	Nickel*	µg/L		Not available	1353	150	610	4600	100	100	Not available	Go to Tier 2	12	17	Go to tier 3	YES	Similar Facility			
10	Selenium	µg/L	0.6	Not available	Reserved	5	Narrative	Narrative	50	5	Not available	Go to Tier 2	4.4	6.2	YES			NA	2.01	NA
11	Silver*	µg/L		Not available	35	none	NONE	NONE		35	Not available	Go to Tier 2	0.8	0.5	Go to tier 3	NO	NO			
12	Thallium	µg/L		Not available	NONE	NONE	1.7	6.3	2	2	Not available	Go to Tier 2	0.5	<0.2	Go to tier 3	NO	NO			
13	Zinc*	µg/L	0.6	Not available	346	346	none	NONE		346	Not available	Go to Tier 2	30	51	NO	YES	Similar facility		2.01	NA
14	Cyanide	µg/L	0.6	Not available	22	5.2	700	220,000	200	5.2	Not available	Go to Tier 2	<5	<5	NO	YES	Similar facility			
18	Acrylonitrile	µg/L	0.6	Not available	NONE	NONE	0.059	0.66		0.66	Not available	Go to Tier 2	<10	<10	Go to tier 3	YES	Similar facility	0.66	2.01	1.3266
38	Tetrachloroethylene	µg/L	0.6	Not available	NONE	NONE	0.8	8.85	5	5	Not available	Go to Tier 2	<0.5	<0.5	NO	YES	Similar facility			
68	Bis(2-Ethylhexyl) Phthalate	µg/L	0.6	Not available	NONE	NONE	1.8	5.9	4	4	Not available	Go to Tier 2	<2	<2	NO	YES	Similar facility	5.9	2.83	17

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			AQUATIC LIFE CALCULATIONS					AQUATIC LIFE CALCULATIONS				PROPOSED LIMITS		
			Freshwater					Freshwater						
CTR#	DATE	Units	ECA acute multiplier (p.7)	LTA acute	ECA chronic multiplier	LTA chronic	Lowest LTA	AMEL multiplier (n=4)	AMEL aq.life	MDEL multiplier (n=4)	MDEL aqlife	Lowest AMEL	Lowest MDEL	Recommendation
1	Antimony	µg/L										6	--	Need Limit Tier 3 - Similar facility
2	Arsenic	µg/L	0.321	109.14	0.527	79.05	79.05	1.55	122.528	3.11	245.85	10	--	Need Limit Tier 3 - Similar facility
3	Beryllium	µg/L										--	--	Interim Monitoring - No CTR-based Limit
4	Cadmium*	µg/L										--	--	Interim Monitoring - No CTR-based Limit
5a	Chromium III*	µg/L										--	--	Interim Monitoring - No CTR-based Limit
5b	**Chromium VI**	µg/L										--	--	Interim Monitoring - No CTR-based Limit
6	Copper*	µg/L	0.321	14.445	0.527	14.229	14.229	1.55	22.055	3.11	44.252	22	44	Need Limit. RP to exceed the CTR Freshwater Aquatic life criteria.
7	Lead*	µg/L	0.321	129.042	0.527	8.432	8.432	1.55	13.0696	3.11	26.224	13	26	Need limit. RP to exceed the CTR Freshwater Aquatic life criteria.
8	Mercury	µg/L	0.321	NA	0.527	NA	NA	1.55	NA	3.11	NA	0.051	0.1	Need Limit. RP to exceed the CTR Human Health Organims only criteria.
9	Nickel*	µg/L										100	--	Need Limit Tier 3 - Similar facility
10	Selenium	µg/L	0.321	#VALUE!	0.527	2.635	2.635	1.55	4.08425	3.11	8.1949	4.1	8.2	Need Limit. RP to exceed the CTR Freshwater Aquatic Life Criteria.
11	Silver*	µg/L										--	--	No new limit, because there was no RP to exceed the CTR criteria.
12	Thallium	µg/L										--	--	No new limit, because there was no RP to exceed the CTR criteria.
13	Zinc*	µg/L										5000.0	--	Need Limit Tier 3 - Similar facility
14	Cyanide	µg/L	0.321	7.062	0.527	2.7404	2.7404	1.55	4.24762	3.11	8.5226	4.2	8.5	Need Limit Tier 3 - Similar facility
18	Acrylonitrile	µg/L										0.66	1.3	Need Limit Tier 3 - Similar facility
38	Tetrachloroethylene	µg/L										5.0	--	Need Limit Tier 3 - Similar facility
68	Bis(2-Ethylhexyl) Phthalate	µg/L										4.0	--	Need Limit Tier 3 - Similar facility

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(CA0064556, CI#9322)

					CTR CRITERIA					REASONABLE POTENTIAL ANALYSIS (RPA)								HUMAN HEALTH CALCULATIONS		
					Freshwater		Human Health		Basin Plan									Organisns Only		
CTR#	DATE	Units	CV	MEC	C acute = CMC tot	C chronic = CCC tot	Not applicable C hh W&O	C hh O	Title 22 GWR	Lowest C	MEC >= Lowest C	Tier 1 - Need limit?	B at NR1	B at NR3	Tier 2 - Need limit?	Tier 3 - other info. ?	Tier 3 - need limit?	AMELhh = ECA = C hh O	MDEL/ AMEL multiplier	MDEL hh
77	1,4-Dichlorobenzene	µg/L	0.6	Not available	NONE	NONE	400	2,600	5	5	Not available	Go to Tier 2	<2	<2	Go to tier 3	YES	Similar facility			
105	gamma-BHC (aka Lindane)	µg/L	0.6	Not available	0.95	NONE	0.019	0.063	0.2	0.063	Not available	Go to Tier 2	<0.001	<0.001	NO	YES	Similar facility			
109	4,4'-DDE	µg/L	0.6	Not available	NONE	NONE	0.00059	0.00059		0.00059	Not available	Go to Tier 2	<0.001	0.011	YES			0.00059	2.01	0.0012
126	Toxaphene	µg/L	0.6	Not available	0.73	0.0002	0.0073	0.00075	3	0.00075	Not available	Go to Tier 2	<0.2		Go to tier 3	NO	NO			
	Iron	µg/L	0.6						300	300			10,000	13,800						
FOOTNOTE:																				
*	These metals are hardness dependent. CTR criteria was calculated using a minimum receiving water hardness of 350 mg/L at station NR1. Individual hardness values were capped at 400 mg/L, pursuant to CTR.																			

TABLE R1
Reasonable Potential Analysis and Limit Derivation

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			AQUATIC LIFE CALCULATIONS					AQUATIC LIFE CALCULATIONS						
			Freshwater					Freshwater				PROPOSED LIMITS		
CTR#	DATE	Units	ECA acute multiplier (p.7)	LTA acute	ECA chronic multiplier	LTA chronic	Lowest LTA	AMEL multiplier (n=4)	AMEL aq.life	MDEL multiplier (n=4)	MDEL aqlife	Lowest AMEL	Lowest MDEL	Recommendation
77	1,4-Dichlorobenzene	µg/L										5	--	Need Limit Tier 3 - Similar facility
105	gamma-BHC (aka Lindane)	µg/L										0.2	--	Need Limit Tier 3 - Similar facility
109	4,4'-DDE	µg/L										0.00059	0.0012	Need Limit - RP to exceed CTR Human Health criteria
126	Toxaphene	µg/L										--	--	Interim Monitoring - No Limit
	Iron	µg/L										300	--	Need Limit RP to exceed MCL Basin Plan WQO
FOOTNOTE:														
*	These metals are hardness dependent. CTR criteria was calculated using a minimum receiving water hardness of 350 mg/L at station NR1. Individual hardness values were capped at 400 mg/L, pursuant to CTR.													

ATTACHMENT G

GENERIC TOXICITY REDUCTION EVALUATION (TRE) WORKPLAN POTW

1. **Information and Data Acquisition**
   a. **Operations and performance review**
      i. NPDES permit requirements
         (1) Effluent limitations
         (2) Special conditions
         (3) Monitoring data and compliance history
      ii. POTW design criteria
         (1) Hydraulic loading capacities
         (2) Pollutant loading capacities
         (3) Biodegradation kinetics calculations/assumptions
      iii. Influent and effluent conventional pollutant data
         (1) Biochemical oxygen demand (BOD_5)
         (2) Chemical oxygen demand (COD)
         (3) Suspended solids (SS)
         (4) Ammonia
         (5) Residual chlorine
         (6) pH
      iv. Process control data
         (1) Primary sedimentation - hydraulic loading capacity and BOD and SS removal
         (2) Activated sludge - Food-to-microorganism (F/M) ratio, mean cell residence time (MCRT), mixed liquor suspended solids (MLSS), sludge yield, and BOD and COD removal
         (3) Secondary clarification - hydraulic and solids loading capacity, sludge volume index and sludge blanket depth
      v. Operations information
         (1) Operating logs
         (2) Standard operating procedures
         (3) Operations and maintenance practices
      vi. Process sidestream characterization data
         (1) Sludge processing sidestreams
         (2) Tertiary filter backwash
         (3) Cooling water
      vii. Combined sewer overflow (CSO) bypass data
         (1) Frequency
         (2) Volume
      viii. Chemical coagulant usage for wastewater treatment and sludge processing
         (1) Polymer
         (2) Ferric chloride
         (3) Alum

b. POTW influent and effluent characterization data

i. Toxicity

ii. Priority pollutants

iii. Hazardous pollutants

iv. SARA 313 pollutants,

v. Other chemical-specific monitoring results

c. Sewage residuals (raw, digested, thickened and dewatered sludge and incinerator ash) characterization data

i. EP toxicity

ii. Toxicity Characteristic Leaching Procedure (TCLP)

iii. Chemical analysis

d. Industrial waste survey (IWS)

i. Information on IUs with categorical standards or local limits and other significant non-categorical IUs

ii. Number of IUs

iii. Discharge flow

iv. Standard Industrial Classification (SIC) code

v. Wastewater flow
   (1) Types and concentrations of pollutants in the discharge
   (2) Products manufactured

vi. Description of pretreatment facilities and operating practices

vii. Annual pretreatment report

viii. Schematic of sewer collection system

ix. POTW monitoring data
   (1) Discharge characterization data
   (2) Spill prevention and control procedures
   (3) Hazardous waste generation

x. IU self-monitoring data
   (1) Description of operations
   (2) Flow measurements
   (3) Discharge characterization data
   (4) Notice of sludge loading
   (5) Compliance schedule (if out of compliance)

xi. Technically based local limits compliance reports

xii. Waste hauler monitoring data manifests

xiii. Evidence of POTW treatment interferences (i.e., biological process inhibition

ATTACHMENT H

SECTION A: STORM WATER POLLUTION PREVENTION PLAN REQUIREMENTS[1]

1. Implementation Schedule

A storm water pollution prevention plan (SWPPP) shall be developed and implemented for this facility in accordance with the following schedule.

a. Facility operators beginning industrial activities before October 1, 1992 shall develop and implement the SWPPP no later than October 1, 1992. Facility operators beginning industrial activities after October 1, 1992 shall develop and implement the SWPPP when industrial activities begin.

b. Existing facility operators that submitted a Notice of Intent (NOI), pursuant to State Water Resources Control Board (State Water Board) Order No. 91-013-DWQ (as amended by Order No. 92-12) or San Francisco Bay Regional Water Quality Control Board (Regional Water Board) Order No. 92-11 (as amended by Order No. 92-116), shall continue to implement their existing SWPPP and shall implement any necessary revisions to their SWPPP in a timely manner, but in no case later than August 1, 1997.

2. Objectives

The SWPPP has two major objectives: (a) to identify and evaluate sources of pollutants associated with industrial activities that may affect the quality of storm water discharges and authorized non-storm water discharges from the facility; and (b) to identify and implement site- specific best management practices (BMPs) to reduce or prevent pollutants associated with industrial activities in storm water discharges and authorized non-storm water discharges. BMPs may include a variety of pollution prevention measures or other low-cost and pollution control measures. They are generally categorized as non-structural BMPs (activity schedules, prohibitions of practices, maintenance procedures, and other low-cost measures) and as structural BMPs (treatment measures, run-off controls, over-head coverage.) To achieve these objectives, facility operators should consider the five phase process for SWPPP development and implementation as shown in Table A.

The SWPPP requirements are designed to be sufficiently flexible to meet the needs of various facilities. SWPPP requirements that are not applicable to a facility should not be included in the SWPPP.

A facility's SWPPP is a written document that shall contain a compliance activity schedule, a description of industrial activities and pollutant sources, descriptions of BMPs, drawings, maps, and relevant copies or references of parts of other plans.

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[1] From State Water Board's Water Quality Order No. 97-03-DWQ (NPDES General Permit No. CAS000001), *Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities.*

The SWPPP shall be revised whenever appropriate and shall be readily available for review by facility employees or Regional Water Board inspectors.

3. Planning and Organization

a. Pollution Prevention Team

The SWPPP shall identify a specific individual or individuals and their positions within the facility organization as members of a storm water pollution prevention team responsible for developing the SWPPP, assisting the facility manager in SWPPP implementation and revision, and conducting all monitoring program activities required in Section B of this General Permit. The SWPPP shall clearly identify the General Permit related responsibilities, duties, and activities of each team member. For small facilities, storm water pollution prevention teams may consist of one individual where appropriate.

b. Review Other Requirements and Existing Facility Plans

The SWPPP may incorporate or reference the appropriate elements of other regulatory requirements. Facility operators should review all local, State, and Federal requirements that impact, complement, or are consistent with the requirements of this General Permit. Facility operators should identify any existing facility plans that contain storm water pollutant control measures or relate to the requirements of this General Permit. As examples, facility operators whose facilities are subject to Federal Spill Prevention Control and Countermeasures' requirements should already have instituted a plan to control spills of certain hazardous materials. Similarly, facility operators whose facilities are subject to air quality related permits and regulations may already have evaluated industrial activities that generate dust or particulates.

4. Site Map

The SWPPP shall include a site map. The site map shall be provided on an 8-½ x 11 inch or larger sheet and include notes, legends, and other data as appropriate to ensure that the site map is clear and understandable. If necessary, facility operators may provide the required information on multiple site maps.

TABLE A
FIVE PHASES FOR DEVELOPING AND IMPLEMENTING INDUSTRIAL STORM WATER POLLUTION PREVENTION PLANS

PLANNING AND ORGANIZATION

Form Pollution Prevention Team
Review other plans

ASSESSMENT PHASE

Develop a site map
Identify potential pollutant sources
Inventory of materials and chemicals
List significant spills and leaks
Identify non-storm water discharges
Assess pollutant Risks

BEST MANAGEMENT PRACTICES IDENTIFICATION PHASE

Non-structural BMPs
Structural BMPs
Select activity and site-specific BMPs

IMPLEMENTATION PHASE

Train employees
Implement BMPs
Conduct recordkeeping and reporting

EVALUATION / MONITORING

Conduct annual site evaluation
Review monitoring information
Evaluate BMPs
Review and revise SWPPP

The following information shall be included on the site map:

a. The facility boundaries; the outline of all storm water drainage areas within the facility boundaries; portions of the drainage area impacted by run-on from surrounding areas; and direction of flow of each drainage area, on-site surface water bodies, and areas of soil erosion. The map shall also identify nearby water bodies (such as rivers, lakes, and ponds) and municipal storm drain inlets where the facility's storm water discharges and authorized non-storm water discharges may be received.

b. The location of the storm water collection and conveyance system, associated points of discharge, and direction of flow. Include any structural control measures that affect storm water discharges, authorized non-storm water discharges, and run-on. Examples of structural control measures are catch basins, berms, detention ponds, secondary containment, oil/water separators, diversion barriers, etc.

c. An outline of all impervious areas of the facility, including paved areas, buildings, covered storage areas, or other roofed structures.

d. Locations where materials are directly exposed to precipitation and the locations where significant spills or leaks identified in Section A.6.a.iv. below have occurred.

e. Areas of industrial activity. This shall include the locations of all storage areas and storage tanks, shipping and receiving areas, fueling areas, vehicle and equipment storage/maintenance areas, material handling and processing areas, waste treatment and disposal areas, dust or particulate generating areas, cleaning and rinsing areas, and other areas of industrial activity which are potential pollutant sources.

5. <u>List of Significant Materials</u>

The SWPPP shall include a list of significant materials handled and stored at the site. For each material on the list, describe the locations where the material is being stored, received, shipped, and handled, as well as the typical quantities and frequency. Materials shall include raw materials, intermediate products, final or finished products, recycled materials, and waste or disposed materials.

6. <u>Description of Potential Pollutant Sources</u>

a. The SWPPP shall include a narrative description of the facility's industrial activities, as identified in Section A.4.e above, associated potential pollutant sources, and potential pollutants that could be discharged in storm water discharges or authorized non-storm water discharges. At a minimum, the following items related to a facility's industrial activities shall be considered:

i. Industrial Processes

Describe each industrial process, the type, characteristics, and quantity of significant materials used in or resulting from the process, and a description of the manufacturing, cleaning, rinsing, recycling, disposal, or other activities related to the process. Where applicable, areas protected by containment structures and the corresponding containment capacity shall be described.

ii. Material Handling and Storage Areas

Describe each handling and storage area, type, characteristics, and quantity of significant materials handled or stored, description of the shipping, receiving, and loading procedures, and the spill or leak prevention and response procedures. Where applicable, areas protected by containment structures and the corresponding containment capacity shall be described.

iii. Dust and Particulate Generating Activities

Describe all industrial activities that generate dust or particulates that may be deposited within the facility's boundaries and identify their discharge locations; the characteristics of dust and particulate pollutants; the approximate quantity of dust and particulate pollutants that may be deposited within the facility boundaries; and a description of the primary areas of the facility where dust and particulate pollutants would settle.

iv. Significant Spills and Leaks

Describe materials that have spilled or leaked in significant quantities in storm water discharges or non-storm water discharges since April 17, 1994. Include toxic chemicals (listed in 40 CFR, Part 302) that have been discharged to storm water as reported on U.S. Environmental Protection Agency (U.S. EPA) Form R, and oil and hazardous substances in excess of reportable quantities (see 40 Code of Federal Regulations [CFR], Parts 110, 117, and 302).

The description shall include the type, characteristics, and approximate quantity of the material spilled or leaked, the cleanup or remedial actions that have occurred or are planned, the approximate remaining quantity of materials that may be exposed to storm water or non-storm water discharges, and the preventative measures taken to ensure spill or leaks do not reoccur. Such list shall be updated as appropriate during the term of this General Permit.

v. Non-Storm Water Discharges

Facility operators shall investigate the facility to identify all non-storm water discharges and their sources. As part of this investigation, all drains (inlets and outlets) shall be evaluated to identify whether they connect to the storm drain system.

All non-storm water discharges shall be described. This shall include the source, quantity, frequency, and characteristics of the non-storm water discharges and associated drainage area.

Non-storm water discharges that contain significant quantities of pollutants or that do not meet the conditions provided in Special Conditions D. are prohibited by this General Permit (Examples of prohibited non-storm water discharges are contact and non-contact cooling water, boiler blowdown, rinse water, wash water, etc.). Non-storm water discharges that meet the conditions provided in Special Condition D. are authorized by this General Permit. The SWPPP must include BMPs to prevent or reduce contact of non-storm water discharges with significant materials or equipment.

vi. Soil Erosion

Describe the facility locations where soil erosion may occur as a result of industrial activity, storm water discharges associated with industrial activity, or authorized non-storm water discharges.

b. The SWPPP shall include a summary of all areas of industrial activities, potential pollutant sources, and potential pollutants. This information should be summarized similar to Table B. The last column of Table B, "Control Practices", should be completed in accordance with Section A.8. below.

7. <u>Assessment of Potential Pollutant Sources</u>

a. The SWPPP shall include a narrative assessment of all industrial activities and potential pollutant sources as described in A.6. above to determine:

i. Which areas of the facility are likely sources of pollutants in storm water discharges and authorized non-storm water discharges, and

ii. Which pollutants are likely to be present in storm water discharges and authorized non-storm water discharges. Facility operators shall consider and evaluate various factors when performing this assessment such as current storm water BMPs; quantities of significant materials handled, produced, stored, or disposed of; likelihood of exposure to storm water or authorized non-storm water discharges; history of spill or leaks; and run-on from outside sources.

b. Facility operators shall summarize the areas of the facility that are likely sources of pollutants and the corresponding pollutants that are likely to be

present in storm water discharges and authorized non-storm water discharges.

Facility operators are required to develop and implement additional BMPs as appropriate and necessary to prevent or reduce pollutants associated with each pollutant source. The BMPs will be narratively described in Section 8 below.

8. Storm Water Best Management Practices

The SWPPP shall include a narrative description of the storm water BMPs to be implemented at the facility for each potential pollutant and its source identified in the site assessment phase (Sections A.6. and 7. above). The BMPs shall be developed and implemented to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. Each pollutant and its source may require one or more BMPs. Some BMPs may be implemented for multiple pollutants and their sources, while other BMPs will be implemented for a very specific pollutant and its source.

TABLE B
EXAMPLE

ASSESSMENT OF POTENTIAL POLLUTION SOURCES AND CORRESPONDING BEST MANAGEMENT PRACTICES SUMMARY

Area	Activity	Pollutant Source	Pollutant	Best Management Practices
Vehicle & Equipment Fueling	Fueling	Spills and leaks during delivery. Spills caused by topping off fuel tanks. Hosing or washing down fuel oil fuel area. Leaking storage tanks. Rainfall running off fuel oil, and rainfall running onto and off fueling area.	fuel oil	Use spill and overflow protection. Minimize run-on of storm water into the fueling area. Cover fueling area. Use dry cleanup methods rather than hosing down area. Implement proper spill prevention control program. Implement adequate preventative maintenance program to preventive tank and line leaks. Inspect fueling areas regularly to detect problems before they occur. Train employees on proper fueling, cleanup, and spill response techniques.

The description of the BMPs shall identify the BMPs as (1) existing BMPs, (2) existing BMPs to be revised and implemented, or (3) new BMPs to be implemented. The description shall also include a discussion on the effectiveness

of each BMP to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. The SWPPP shall provide a summary of all BMPs implemented for each pollutant source. This information should be summarized similar to Table B.

Facility operators shall consider the following BMPs for implementation at the facility:

a. Non-Structural BMPs

Non-structural BMPs generally consist of processes, prohibitions, procedures, schedule of activities, etc., that prevent pollutants associated with industrial activity from contacting with storm water discharges and authorized non-storm water discharges. They are considered low technology, cost-effective measures. Facility operators should consider all possible non-structural BMPs options before considering additional structural BMPs (see Section A.8.b. below). Below is a list of non-structural BMPs that should be considered:

i. Good Housekeeping

Good housekeeping generally consist of practical procedures to maintain a clean and orderly facility.

ii. Preventive Maintenance

Preventive maintenance includes the regular inspection and maintenance of structural storm water controls (catch basins, oil/water separators, etc.) as well as other facility equipment and systems.

iii. Spill Response

This includes spill clean-up procedures and necessary clean-up equipment based upon the quantities and locations of significant materials that may spill or leak.

iv. Material Handling and Storage

This includes all procedures to minimize the potential for spills and leaks and to minimize exposure of significant materials to storm water and authorized non-storm water discharges.

v. Employee Training

This includes training of personnel who are responsible for (1) implementing activities identified in the SWPPP, (2) conducting inspections, sampling, and visual observations, and (3) managing storm water. Training should address topics such as spill response, good housekeeping, and material handling procedures, and actions necessary to implement all BMPs identified in the SWPPP. The

SWPPP shall identify periodic dates for such training. Records shall be maintained of all training sessions held.

vi. Waste Handling/Recycling

This includes the procedures or processes to handle, store, or dispose of waste materials or recyclable materials.

vii. Recordkeeping and Internal Reporting

This includes the procedures to ensure that all records of inspections, spills, maintenance activities, corrective actions, visual observations, etc., are developed, retained, and provided, as necessary, to the appropriate facility personnel.

viii. Erosion Control and Site Stabilization

This includes a description of all sediment and erosion control activities. This may include the planting and maintenance of vegetation, diversion of run-on and runoff, placement of sandbags, silt screens, or other sediment control devices, etc.

ix. Inspections

This includes, in addition to the preventative maintenance inspections identified above, an inspection schedule of all potential pollutant sources. Tracking and follow-up procedures shall be described to ensure adequate corrective actions are taken and SWPPPs are made.

x. Quality Assurance

This includes the procedures to ensure that all elements of the SWPPP and Monitoring Program are adequately conducted.

b. Structural BMPs

Where non-structural BMPs as identified in Section A.8.a. above are not effective, structural BMPs shall be considered. Structural BMPs generally consist of structural devices that reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. Below is a list of structural BMPs that should be considered:

i. Overhead Coverage

This includes structures that provide horizontal coverage of materials, chemicals, and pollutant sources from contact with storm water and authorized non-storm water discharges.

ii. Retention Ponds

This includes basins, ponds, surface impoundments, bermed areas, etc. that do not allow storm water to discharge from the facility.

iii. Control Devices

This includes berms or other devices that channel or route run-on and runoff away from pollutant sources.

iv. Secondary Containment Structures

This generally includes containment structures around storage tanks and other areas for the purpose of collecting any leaks or spills.

v. Treatment

This includes inlet controls, infiltration devices, oil/water separators, detention ponds, vegetative swales, etc. that reduce the pollutants in storm water discharges and authorized non-storm water discharges.

9. Annual Comprehensive Site Compliance Evaluation

The facility operator shall conduct one comprehensive site compliance evaluation (evaluation) in each reporting period (July 1-June 30). Evaluations shall be conducted within 8-16 months of each other. The SWPPP shall be revised, as appropriate, and the revisions implemented within 90 days of the evaluation. Evaluations shall include the following:

a. A review of all visual observation records, inspection records, and sampling and analysis results.

b. A visual inspection of all potential pollutant sources for evidence of, or the potential for, pollutants entering the drainage system.

c. A review and evaluation of all BMPs (both structural and non-structural) to determine whether the BMPs are adequate, properly implemented and maintained, or whether additional BMPs are needed. A visual inspection of equipment needed to implement the SWPPP, such as spill response equipment, shall be included.

d. An evaluation report that includes, (i) identification of personnel performing the evaluation, (ii) the date(s) of the evaluation, (iii) necessary SWPPP revisions, (iv) schedule, as required in Section A.10.e, for implementing SWPPP revisions, (v) any incidents of non-compliance and the corrective actions taken, and (vi) a certification that the facility operator is in compliance with this General Permit. If the above certification cannot be provided, explain in the evaluation report why the facility operator is not in compliance with this General Permit. The evaluation report shall be submitted as part of the annual report, retained for at least five years, and signed and certified in accordance with Standard Provisions 9. and 10. of Section C. of this General Permit.

10. SWPPP General Requirements

a. The SWPPP shall be retained on site and made available upon request of a representative of the Regional Water Board and/or local storm water management agency (local agency) which receives the storm water discharges.

b. The Regional Water Board and/or local agency may notify the facility operator when the SWPPP does not meet one or more of the minimum requirements of this Section. As requested by the Regional Water Board and/or local agency, the facility operator shall submit an SWPPP revision and implementation schedule that meets the minimum requirements of this section to the Regional Water Board and/or local agency that requested the SWPPP revisions. Within 14 days after implementing the required SWPPP revisions, the facility operator shall provide written certification to the Regional Water Board and/or local agency that the revisions have been implemented.

c. The SWPPP shall be revised, as appropriate, and implemented prior to changes in industrial activities which (i) may significantly increase the quantities of pollutants in storm water discharge, (ii) cause a new area of industrial activity at the facility to be exposed to storm water, or (iii) begin an industrial activity which would introduce a new pollutant source at the facility.

d. Other than as provided in Provisions B.11, B.12, and E.2 of the General Permit, the SWPPP shall be revised and implemented in a timely manner, but in no case more than 90 days after a facility operator determines that the SWPPP is in violation of any requirement(s) of this General Permit.

e. When any part of the SWPPP is infeasible to implement by the deadlines specified in Provision E.2 or Sections A.1, A.9, A.10.c, and A.10.d of this General Permit due to proposed significant structural changes, the facility operator shall submit a report to the Regional Water Board prior to the applicable deadline that (i) describes the portion of the SWPPP that is infeasible to implement by the deadline, (ii) provides justification for a time extension, (iii) provides a schedule for completing and implementing that portion of the SWPPP, and (iv) describes the BMPs that will be implemented in the interim period to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. Such reports are subject to Regional Water Board approval and/or modifications. Facility operators shall provide written notification to the Regional Water Board within 14 days after the SWPPP revisions are implemented.

f. The SWPPP shall be provided, upon request, to the Regional Water Board. The SWPPP is considered a report that shall be available to the public by the Regional Water Board under Section 308(b) of the Clean Water Act.

ATTACHMENT I
BIOSOLIDS USE AND DISPOSAL REQUIREMENTS

1. All biosolids generated by the Discharger shall be reused or disposed of in compliance with the applicable portions of:

   a. 40 CFR 503: for biosolids that are land applied, placed in surface disposal sites (dedicated land disposal sites or monofills), or incinerated; 40 CFR 503 Subpart B (land application) applies to biosolids placed on the land for the purpose of providing nutrients or conditioning the soil for crops or vegetation. 40 CFR 503 Subpart C (surface disposal) applies to biosolids placed on the land for the purpose of disposal.

   b. 40 CFR 258: for biosolids disposed of in Municipal Solid Waste landfills.

   c. 40 CFR 257: for all biosolids disposal practices not covered under 40 CFR 258 or 503.

2. The Discharger is responsible for assuring that all biosolids from its facility are used or disposed of in accordance with 40 CFR 503, whether the Discharger reuses or disposes of the biosolids itself or transfers them to another party for further treatment, reuse, or disposal. The Discharger is responsible for informing subsequent preparers, appliers, or disposers of the requirements they must meet under 40 CFR 503.

3. Duty to mitigate: The Discharger shall take all reasonable steps to prevent or minimize any biosolids use or disposal which may adversely impact human health or the environment.

4. No biosolids shall be allowed to enter wetland or other waters of the United States.

5. Biosolids treatment, storage, and use or disposal shall not contaminate groundwater.

6. Biosolids treatment, storage, and use or disposal shall not create a nuisance such as objectionable odors or flies.

7. The Discharger shall assure that haulers who transport biosolids off site for further treatment, storage, reuse, or disposal take all necessary measures to keep the biosolids contained.

8. If biosolids are stored for over two years from the time they are generated, the Discharger must ensure compliance with all the requirements for surface disposal under 40 CFR 503 Subpart C, or must submit a written request to EPA with the information in 503.20 (b), requesting permission for longer temporary storage.

9. Sewage sludge containing more than 50 mg/kg PCB's shall be disposed of in accordance with 40 CFR 761.

10. Any off-site biosolids treatment, storage, use or disposal site operated by the Discharger within Region 4 (Los Angeles Region of RWQCB) that is not subject to its own Waste Discharge Requirements shall have facilities adequate to divert surface runoff from the adjacent area, to protect the site boundaries from erosion, and to prevent any conditions that would cause drainage from the materials in the disposal site to escape from the site. Adequate protection is defined as protected from at least a 100-year storm and from the highest tidal stage that may occur.

11. Inspection and Entry: The Regional Board, USEPA or an authorized representative thereof, upon the presentation of credentials, shall be allowed by the Discharger, directly or through contractual arrangements with their biosolids management contractors, to:

    a. enter upon all premises where biosolids are produced by the Discharger and all premises where Discharger biosolids are further treated, stored, used, or disposed, either by the Discharger or by another party to whom the Discharger transfers the biosolids for further treatment, storage, use, or disposal;

    b. have access to and copy any records that must be kept under the conditions of this permit or of 40 CFR 503, by the Discharger or by another party to whom the Discharger transfers the biosolids for further treatment, storage, use, or disposal; and

    c. inspect any facilities, equipment (including monitoring and control equipment), practices, or operations used in the production of biosolids and further treatment, storage, use, or disposal by the Discharger or by another party to whom the Discharger transfers the biosolids for further treatment, storage, use, or disposal.

12. Monitoring shall be conducted as follows:

    a. Biosolids shall be tested for the metals required in section 503.16 (for land application) or 503.26 (for surface disposal), using the methods in "Test Methods for Evaluating Solids Waste, Physical/Chemical Methods" (SW-:846), as required in 503.8(b}(4}, at the following minimum frequencies:

Volume (dry metric tons/year)	Frequency
0 – 290	once per year
290 – 1500	once per quarter
1500 – 15000	once per 60 days
> 15000	once per month

For accumulated, previously untested biosolids, the Discharge~ shall develop a

representative sampling plan, which addresses the number and location of sampling points, and collect representative samples.

Test results shall be expressed in mg pollutant per kg biosolids on a 100% dry weight basis.

Biosolids to be land applied shall be tested for Organic-N, ammonium-N, and nitrate-N at the frequencies required above.

b. Prior to land application, the Discharger shall demonstrate that the biosolids meet Class A or Class B pathogen reduction levels by one of the methods listed in 503.32. Prior to disposal in a surface disposal site, the Discharger shall demonstrate that the biosolids meet Class B levels or shall ensure that the site is covered at the end of each operating day.

c. For biosolids that are land applied or placed in a surface disposal site, the Discharger shall track and keep records of the operational parameters used to achieve Vector Attraction Reduction requirements in 503.33 (b).

d. Class 1 facilities (facilities with pretreatment programs or others designated as Class 1 by the Regional Administrator) and Federal facilities with> 5 mgd influent flow shall sample biosolids for pollutants listed under Section 307 (a) of the Act (as required in the pretreatment section of the permit for POTWs with pretreatment programs.) Class 1 facilities and Federal Facilities with> 5 mgd influent flow shall test dioxins/dibenzofurans using a detection limit of < 1 pg/g during their next sampling period if they have not done so within the past 5 years and once per 5 years thereafter.

e. The biosolids shall be tested annually, or more frequently if necessary to determine hazardousness in accordance with California Law.

f. If biosolids are placed in a surface disposal site (dedicated land disposal site or monofill), a qualified groundwater scientist shall develop a groundwater monitoring program for the site, or shall certify that the placement of biosolids on the site will not contaminate an aquifer.

g. Biosolids placed in a municipal landfill shall be tested semi-annually by the Paint Filter Test (SW-846, Method 9095) to demonstrate that there are no free liquids.

13. The Discharger either directly or through contractual arrangements with their biosolids management contractors shall comply with the following 40 CFR 503 notification requirements:

a. A reuse/disposal plan shall be submitted to EPA Region IX Coordinator and, in the absence of other state or regional reporting requirements, to the state permitting

agency, prior to the use or disposal of any biosolids from this facility to a new or previously unreported site. The plan shall be submitted by the land applier of the biosolids and shall include, a description and a topographic map of the proposed site(s) for reuse or disposal, names and addresses of the applier(s) and site owner(s), and a list of any state or local permits which must be obtained. For land application sites, the plan shall include a description of the crops or vegetation to be grown, proposed nitrogen loadings to be used for the crops, and a groundwater monitoring plan if one exists.

b. If the Discharger biosolids do not meet 503.13 Table 3 metals concentration limits, the Discharger must require their land applier to contact the state permitting authority to determine whether bulk biosolids subject to the cumulative pollutant loading rates in 503.12(b)(2) have been applied to the site since July 20, 1993, and, if so, the cumulative amount of pollutants applied to date, and background concentration, if known. The Discharger shall then notify EPA Region IX Coordinator of this information.

c. For biosolids that are land applied, the Discharger shall notify the applier in writing of the nitrogen content of the biosolids, and the applier's requirements under 503, including the requirements that the applier certify that the requirement to obtain information in Subpart A, and that the management practices, site restrictions, and any applicable vector attraction reduction requirements Subpart D have been met. The Discharger shall require the applier to certify at the end of 38 months following application of Class B biosolids that those harvesting restrictions in effect for up to 38 months have been met.

d. If bulk biosolids are shipped to another State or to Indian Lands, the Discharger must send written notice prior to the initial application of bulk biosolids to the permitting authorities in the receiving State or Indian Land (the EPA Regional Office for the area and the State/Indian authorities).

e. Notification of 503 non-compliance: The Discharger shall require appliers of their biosolids to notify EPA Region 9 and their state permitting agency of any noncompliance within 24 hours if the non-compliance may seriously endanger health or the environment. For other instances of non-compliance, the Discharger shall require appliers of their biosolids to notify EPA Region 9 and their state permitting agency of the non-compliance in writing within 10working days of becoming aware of the non-compliance.

14. The Discharger shall submit an annual biosolids report to EPA Region IX Biosolids Coordinator and the Los Angeles Regional Water Quality Control Board by February 19 of each year for the period covering the previous calendar year. The report shall include:

a. The amount of biosolids generated that year, in dry metric tons, and the amount

accumulated from previous years.

b. Results of all pollutant monitoring required in the Monitoring Section above.

c. Descriptions of pathogen reduction methods, and vector attraction reduction methods, as required in 503.17 and 503.27.

d. Results of any groundwater monitoring or certification by groundwater scientist that the placement of biosolids in a surface disposal site will not contaminate an aquifer.

e. Names and addresses of land appliers and surface disposal site operators, and volumes applied (dry metric tons).

f. Names and addresses of persons who received biosolids for storage, further treatment, disposal in a municipal waste landfill, or for other reuse/disposal methods not covered in 14.c, above, and volumes delivered to each.

15. The Discharger shall require all parties contracted to manage their biosolids to submit an annual biosolids report to EPA Region IX Biosolids Coordinator by February 19 of each year for the period covering the previous calendar year. The report shall include:

a. Names and addresses of land appliers and surface disposal site operators, name, location (latitude/longitude), and size (hectares) of site(s), volumes applied/disposed (dry metric tons) and for land application, biosolids loading rates (metric tons per hectare), nitrogen loading rates (kg/ha), dates of applications, crops grown, dates of seeding and harvesting and certifications that the requirement to obtain information in 503.12(e)(2), management practices in 503.14 and site restrictions in 503.32(b)(5) have been met.

Waste Discharge Requirements for the Newhall Ranch Sanitation District (Newhall Ranch Water Reclamation Plant), Discharge to the Santa Clara River, Order No. R4-2007-0046, NPDES No. CA0064556

California Regional Water Quality Control Board
Los Angeles Region

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.waterboards.ca.gov/losangeles

Linda S. Adams
Cal/EPA Secretary

Arnold Schwarzenegger
Governor

COMMUNITY

SEP 14 2007

DEVELOPMENT

September 11, 2007

Mr. Mark Subbotin
Senior Vice President
Newhall Land/Newhall Ranch Division
23823 Valencia Boulevard
Valencia, CA 91355

Dear Mr. Subbotin:

ADOPTED WASTE DISCHARGE REQUIREMENTS AND NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT – NEWHALL RANCH SANITATION DISTRICT, NEWHALL RANCH WATER RECLAMATION PLANT (NPDES NO. CA0064556, CI No. 9322)

Our letter dated August 6, 2007, transmitted revised tentative Waste Discharge Requirements for the discharge of treated municipal and industrial wastewater from the Newhall Ranch Water Reclamation Plant (WRP) into the Santa Clara River.

Pursuant to Division 7 of the California Water Code, this Regional Board at a public hearing held on September 6, 2007, reviewed the revised tentative requirements, considered all factors in the case, and adopted Order No. R4-2007-0046 (copies attached) relative to the Newhall Ranch WRP's waste discharge. Order No. R4-2007-0046 serves as your NPDES permit, for the Newhall Ranch WRP and expires on August 10, 2012. Section 13376 of the California Water Code requires that a complete application for a new permit must be filed at least 180 days before the expiration date.

The monitoring and reporting programs require you to implement the monitoring programs on the first of the month following the month of the effective date of the Order (i.e., on November 1, 2007). Your first monitoring report must be received in the Regional Board office by February 15, 2008, and will cover the November 2007 sampling period. If no discharge occurred, the report shall so state. Bioassessment annual monitoring is required to begin in the 2008 spring/summer period.

When submitting monitoring or technical reports to the Regional Board, as required by your "Monitoring and Reporting Program", please send them ATTN: Information Technology Unit and include a reference to "Compliance File No. 9322" for the Newhall Ranch WRP. This will assure that the reports are directed to the appropriate file and staff. Also, please do not combine other reports with your monitoring reports. Submit each type of report as a separate document.

We are sending the final copy of Order No. R4-2007-0046 only to Newhall Land, to save printing and postage costs. For those on the mailing list, an electronic copy will be emailed to you.

If you have any questions, please contact Veronica Cuevas at (213) 576-6662 or call me at (213) 576-6720.

Sincerely,

Blythe Ponek-Bacharowski

Blythe Ponek-Bacharowski
Unit Chief, Municipal Permitting Unit (NPDES)

Enclosures

cc: Environmental Protection Agency, Region 9, Permits Branch (WTR-5)
Jody Cook, U.S. Forest Service
U.S. Army Corps of Engineers
NOAA, National Marine Fisheries Service
Department of Interior, U.S. Fish and Wildlife Service
Mr. Philip Isorena, State Water Resources Control Board, Division of Water Quality
Mr. Michael Levy, State Water Resources Control Board, Office of Chief Counsel
Department of Fish and Game, Region 5
California State Parks and Recreation
Mr. Christopher Kroll, State Coastal Conservancy
Los Angeles County, DPW, Environmental Programs
Mr. Rod Kubumoto, Los Angeles County, DPW, Watershed Division
Los Angeles County, Department of Health Services
Heal the Bay
Environment Now
Santa Monica Baykeeper
Natural Resources Defense Council
Tim Malloy, UCLA School of Law
Ventura Coast Keeper
City of Santa Clarita
City of Valencia
Ms. Dana Wisehart, United Water Conservation District
Stephan C. Volker
Sierra Club, Los Angeles Chapter
Friends of the Santa Clara River

MAILING LIST (Cont.)

Mr. Steve Cole, Newhall Country Water District
Mr. Dennis Slivinski, County of Ventura
Mr. Gerald Johns, CA Department of Water Resources
Mr. Jeffrey M. Smith, Southern California Association of Governments
Russ Behrens, McCormick, Kidman & Behrens, LLP
Mr. Chris Stephens, Resource Management Agency County of Ventura
Mr. James Hartl, County of Los ANgeles
Mr. Michael Murphy, City of Santa Clarita
Ms. Judy Reinsma, Santa Clarita Valley Well Owners Association
Sand Canyon Well Owners Association
Paul Fancett, Castaic Area Town Council
Paul Ash, Westranch Town Council
Santa Clarita Sierra Club
Santa Clarita Organization for Planning the Environment (SCOPE)
Jae Kim, Tetra Tech

APPENDIX H

Staff Reports

January 31, 2007 Staff Report

THE REGIONAL PLANNING COMMISSION

County of Los Angeles

AGENDA

Meeting Place: Room 150 Hall of Records
320 W. Temple Street
Los Angeles, California 90012

Meeting Date: January 31, 2007 - Wednesday Time: 9:00 a.m.

PART I - PLEDGE OF ALLEGIANCE

1. Commission

PART II - REPORTS

2. Approval of Agenda

3. Director

4. County Counsel

PART III - MINUTES FOR APPROVAL

5. January 10, 2007

PART IV - PUBLIC HEARING

Land Divisions

6. Vesting Tentative Tract Map No. 53108, (Ms. Tae)
General Plan Amendment/Local Plan Amendment/Specific Plan Amendment Case Nos. 00-196-(5), Conditional Use Permit Case Nos. 00-196-(5) and 2005-01121-(5), and Oak Tree Permit Case No. 00-196-(5) - (Landmark Village)
Newhall Land and Farming Company
Within the Newhall Ranch Specific Plan, north of the Santa Clara River, south of Highway 126, east of Ventura County boundary and west of Interstate 5 Freeway
Newhall Zoned District

(Continued)

- Si no entiende este aviso o necesita mas informacion por favor llame este numero (213) 974-6466.
- If you require special accommodations or material in alternate format, please contact the ADA Coordinator Office, at (213) 974-6488 (Voice) or (213) 617-2292 (TDD), with at least three business day's notice.

*** Commission Office: (213) 974-6409 ***

The length of the Commission Agenda may necessitate that some items be heard in the afternoon after a lunch break.

THE REGIONAL PLANNING COMMISSION

PART IV - PUBLIC HEARING (Cont.)

Land Divisions

a. General Plan Amendment Case No. 00-196-(5)
To amend the Los Angeles Countywide General Plan to remove "A" Street from the County Master Plan of Highways;

b. Local Plan Amendment Case No. 00-196-(5)
To amend the Santa Clarita Valley Area Plan to remove "A" Street from the Circulation Plan;

c. Specific Plan Amendment Case No. 00-196-(5)
To amend the Newhall Ranch Specific Plan to downgrade "A" Street from a Secondary Highway to a local collector street;

d. Vesting Tentative Tract Map No. 53108
To create 415 lots consisting of 308 single-family lots, 20 multi-family lots (11 condominium lots with 282 detached condos, four condominium lots with 347 attached condos in 47 buildings, three apartment lots with 451 for-lease apartments in 28 buildings, and two condominium or lease-only lots with 56 units in nine buildings), 14 commercial lots with 15 for-lease buildings, 10 commercial lots with no development planned, 12 private driveway lots, three recreation lots, two park lots, one school lot, 25 open space lots and 20 open space/desilting basin lots on 292.6 acres;

e. Conditional Use Permit Case No. 00-196-(5)
To ensure compliance with the requirements of development within a Significant Ecological Area/Special Management Area and onsite project grading;

f. Conditional Use Permit Case No. 2005-01121-(5)
To ensure compliance with the requirements for offsite project grading and utilities, including water tanks; and

g. Oak Tree Permit Case No. 00-196-(5)
To authorize removal of 67 oak trees (including 10 heritage oaks) and encroachment into the protected zone of 14 oak trees (including three heritage oaks).

THE REGIONAL PLANNING COMMISSION

PART V - CONTINUATION OF REPORTS

7. Commission/Counsel

PART VI - OTHER MATTERS

8. Public comment pursuant to Section 54954.3 of the Government Code.

ADJOURNMENT TO 6:30 P.M. MONDAY, FEBRUARY 5, 2007

TIME LIMITS: The Commission has established time limits with respect to receipt of testimony regarding matters on this Agenda. Applicants will be allowed fifteen (15) minutes to present testimony in support of their application, with an additional ten (10) minutes for responses to issues raised by other witnesses. Other proponents and opponents will be limited to three (3) minutes per speaker. Responses to questions from the Commission will not be included in these time limitations. All speakers are urged to refrain from repeating testimony presented by others. The Chair may impose different time limits, depending upon the length of the agenda, the number of speakers wishing to give testimony and/or the complexity of an agenda item.

WRITTEN TESTIMONY: Written testimony that is received prior to the public hearing will be made a part of the record and need not be read into the record.

PUBLIC HEARING CLOSING AND RE-OPENING: Public hearings that are closed during the course of the meeting may be re-opened by the Commission without notice at any time prior to adjournment of the meeting.

LOBBYIST REGISTRATION: Any person who seeks support or endorsement from the Regional Planning Commission on any official action may be subject to the provisions of Ordinance No. 93-0031, relating to lobbyists. Violation of the lobbyist ordinance may result in a fine and other penalties. FOR INFORMATION, CALL (213) 974-1093.

01/31/07

RPC MEETING DATE
January 31, 2007
AGENDA ITEM NO.
6 a, b, c, d, e, f, g

REGIONAL PLANNING COMMISSION TRANSMITTAL CHECKLIST

PROJECT NO: 00-196-(5)

CASE NO. Vesting Tentative Tract Map No. 53108
General Plan/Local Plan/Specific Plan Amendment
Case Nos. 00-196-(5)
Conditional Use Permit Case No. 00-196-(5)
Conditional Use Permit Case No. 2005-01121-(5)
Oak Tree Permit Case No. 00-196-(5)

CONTACT PERSON: Susan Tae

- ☒ STAFF REPORT
- ☒ DRAFT CONDITIONS
- ☒ BURDEN OF PROOF STATEMENT (Zoning or Plan Amendment Requests)
- ☐ ENVIRONMENTAL DOCUMENTATION - Previously submitted
- ☒ THOMAS BROTHERS MAP (Identifying Subject Property)
- ☒ LAND USE RADIUS MAP
- ☒ TENTATIVE TRACT MAP
- ☒ EXHIBIT "A" MAP
- ☒ PHOTOGRAPHS
- ☒ CORRESPONDENCE
- ☒ GIS-NET MAP
- ☒ APPLICANT: LANDMARK PLANNING NOTEBOOK, JAN 2007
- ☐ _____

Reviewed By: Susan Tae

Los Angeles County Department of Regional Planning
320 West Temple Street, Los Angeles, California 90012
Telephone (213) 974-6433

PROJECT No. 00-196-(5)
TRACT MAP NO. 53108
GPA/LPA/SPA 00-196-(5)
CUP 00-196-(5), 2005-01121-(5)
OTP 00-196-(5)

RPC MEETING DATE	CONTINUE TO
AGENDA ITEM #6 a,b,c,d,e,f,g	
PUBLIC HEARING DATE January 31, 2007	

APPLICANT	OWNER	REPRESENTATIVE
Newhall Land and Farming	Newhall Land and Farming	Psomas

REQUEST "Landmark Village"
Tentative Tract Map: 415 lots consisting of 308 single-family, 20 multi-family (11 condominium lots with 282 detached condos, 4 condominium lots with 347 attached condos in 47 buildings, 3 apartment lots with 451 for-lease apartments in 28 buildings, and two condo or for lease lots with 56 units in nine buildings), 14 commercial with 15 for-lease buildings, 10 commercial with no development planned, 12 private driveway, 3 recreation, 2 park, 1 school, 25 open space and 20 open space/desilting basin lots on 292.6 acres
General/Local/Specific Plan Amendments: To remove "A" Street from the County Master Plan of Highways and SCVAP Circulation Plan, and redesignate from a secondary highway to a local collector street
Conditional Use Permits: To ensure compliance with the requirements of development within a Significant Ecological Area/Special Management Area, onsite project grading; and offsite project grading and utilities, including water tanks
Oak Tree Permit: To authorize removal of 67 oak trees (including 10 heritage oaks) and encroachment within the protected zone of 14 oak trees (including three heritage oaks)

LOCATION/ADDRESS	ZONED DISTRICT
North of the Santa Clara River, south of Highway 126, east of Ventura County boundary and west of Interstate 5 ("I-5") Freeway within Newhall Ranch Specific Plan	Newhall
	COMMUNITY: Newhall Ranch: Landmark Village
ACCESS: State Route ("SR") Highway 126	EXISTING ZONING: SP (Specific Plan)

SIZE	EXISTING LAND USE	SHAPE	TOPOGRAPHY
292.6 Gross Acres	Agricultural	Irregular	Slight to steeply sloping

SURROUNDING LAND USES & ZONING

North: Single-family residences, water tank/City of Agoura Hills	**East:** Single-family residences, religious facility and vacant property/City of Agoura Hills
South: Fire station, single-family residences and vacant property/A-1-20 (Light Agricultural-20 Ac Min Area), A-1-2, A-1-10, O-S (Open Space)	**West:** Single-family residences and vacant property/A-1-20 (Light Agricultural-20 Ac Min Area) and City of Agoura Hills

GENERAL PLAN	DESIGNATION	MAXIMUM DENSITY	CONSISTENCY
Newhall Ranch Specific Plan	Portions of RW-09, 27, 29, 30, 31, 32, 33, 34a, 34b, 35, 36, 37	1,444 DU	Yes

ENVIRONMENTAL STATUS
Draft Environmental Impact Report: Impacts that cannot be mitigated to less than significant include Biota, Visual Qualities, Noise, Air Quality, Solid Waste Disposal and Cumulative Agricultural Resources.

DESCRIPTION OF SITE PLAN ("Landmark Village")
The tentative map and exhibit "A" depict the residential and commercial mixed-use development. Residential types include single-family homes, detached and attached condominiums, apartments. Also proposed are for sale and lease-only commercial uses. Onsite project grading consists of 209,000 cubic yards of cut and 5,555,400 cubic yards of fill, with 5,346,400 cubic yards of import. Offsite grading will include Adobe Canyon (cut 6,969,000 cubic yards, fill 218,000 cubic yards, export 5,705,700 cubic yards) and Chiquito Canyon (cut 1,019,100 cubic yards, fill 666,300 cubic yards fill, no export). Open space consists of 20 acres with an additional 16-acrepublic park and an additional approximately 19 acres of open facility open space areas. A minimum 12-foot riding and hiking trail easement is provided along Santa Clara River with additional interpretive/nature trail boardwalk to be maintained by the development's homeowners' association.

KEY ISSUES
- Public has requested that a continuance be granted for the public comment period to the Draft EIR: requests are for either an additional 30 or 60 days. Original public notice period was for 60 days, and extended once to coincide with the public hearing date

(If more space is required, use opposite side)

TO BE COMPLETED ONLY ON CASES TO BE HEARD BY THE BOARD OF SUPERVISORS

STAFF CONTACT PERSON		
RPC HEARING DATE (S)	RPC ACTION DATE	RPC RECOMMENDATION
MEMBERS VOTING AYE	MEMBERS VOTING NO	MEMBERS ABSTAINING
STAFF RECOMMENDATION (PRIOR TO HEARING)		*(O) = Opponents (F) = In Favor
SPEAKERS* (O) (F)	PETITIONS (O) (F)	LETTERS (O) (F)

Project No. 00-196-(5)

COMMITTEE RECOMMENDATION (Subject to revision based on public hearing)

☐ APPROVAL ☐ DENIAL

☐ No improvements ____20 Acre Lots ____10 Acre Lots ____2½ Acre Lots ____Sect 191.2

☒ Street improvements _X_ Paving _X_ Curbs and Gutters _X_ Street Lights

_X_ Street Trees ____ Inverted Shoulder _X_ Sidewalks ____ Off Site Paving ____ft.

☒ Water Mains and Hydrants

☒ Drainage Facilities

☒ Sewer ☐ Septic Tanks ☐ Other _____

☒ Park Dedication "In-Lieu Fee"

SPECIAL INDIVIDUAL DEPARTMENT CONCERNS

Engineer

Road

Flood

Forester & Fire Warden

Parks & Rec

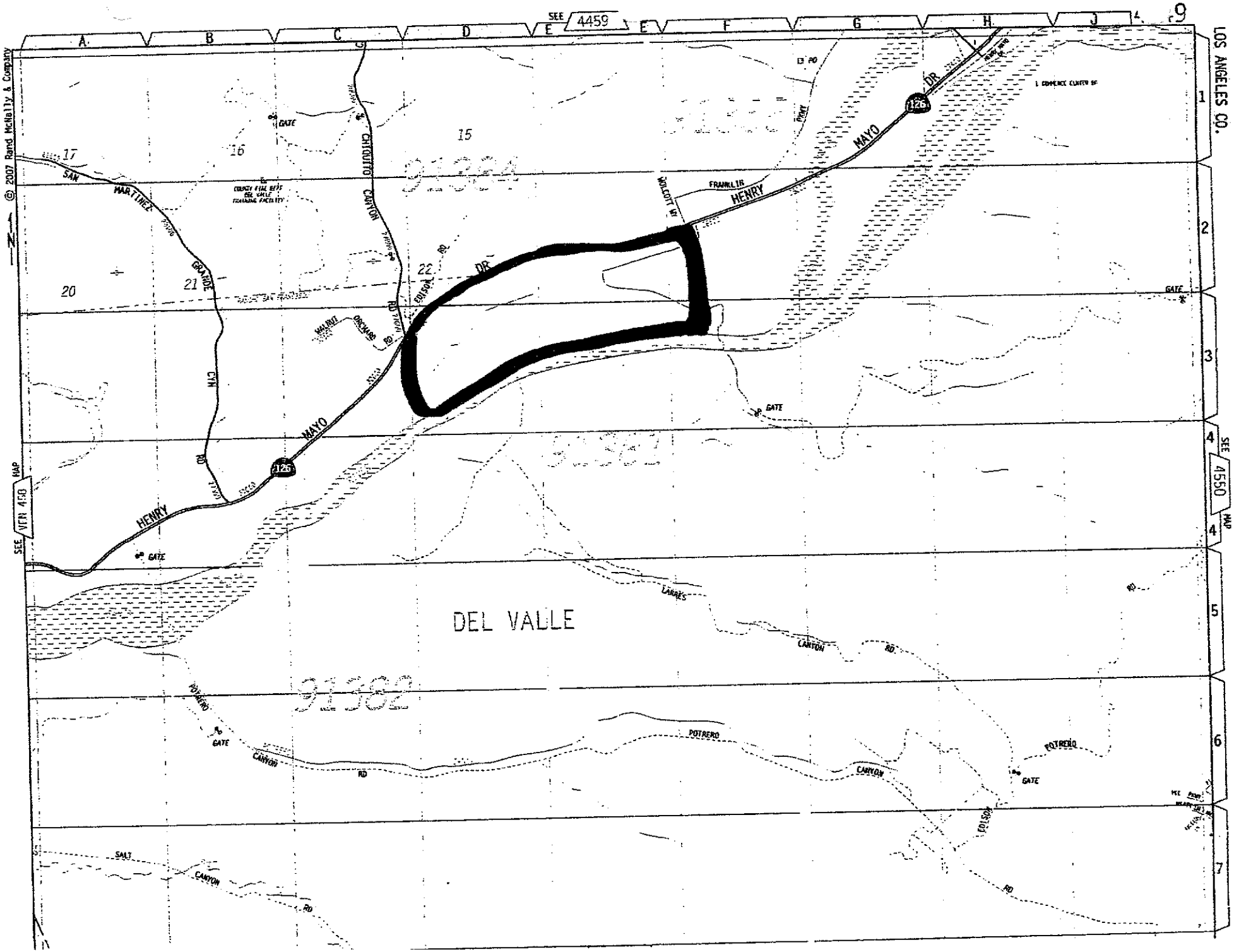
Health

Planning

ISSUES AND ANALYSIS

The Draft EIR analyzes potentially significant impacts of the project, and concludes that impacts that cannot be mitigated to less than significant include Biota, Visual Qualities, Noise, Air Quality, Solid Waste Disposal and Cumulative Agricultural Resources.

Prepared by: Susan Tae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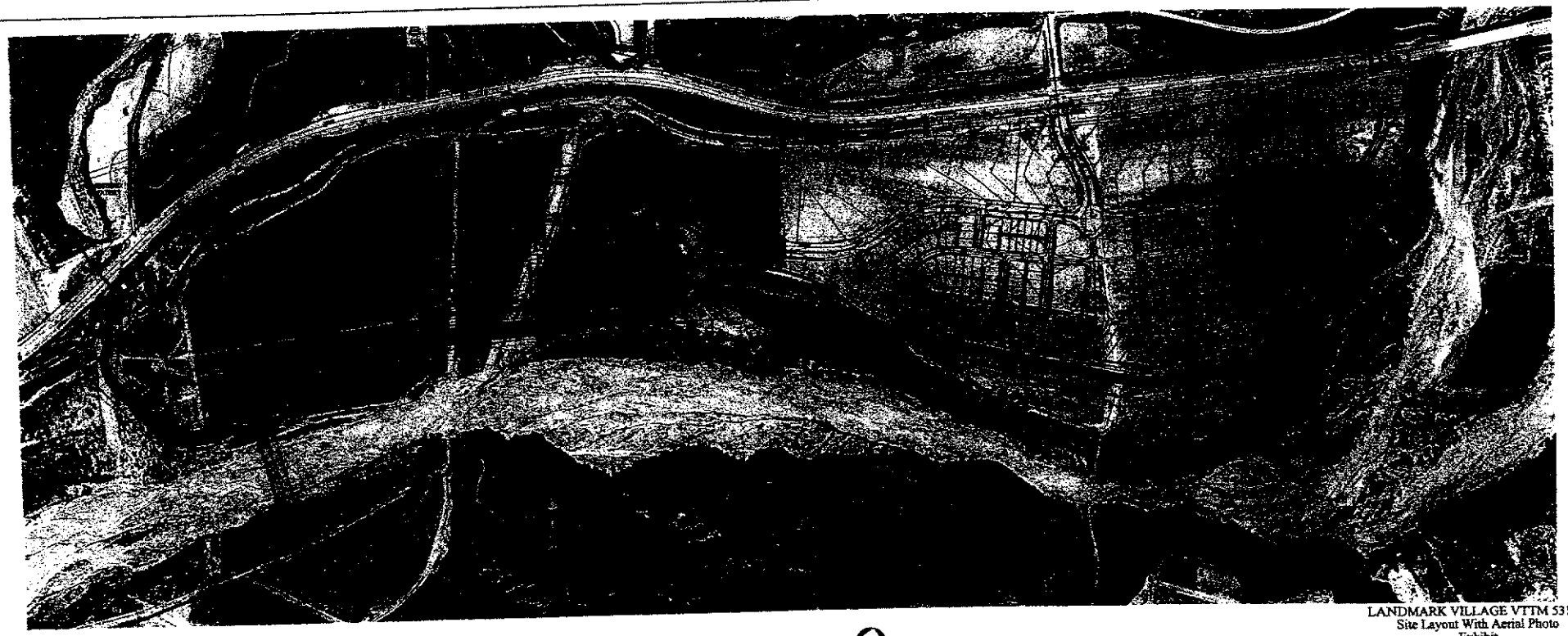

LANDMARK VILLAGE VTTM 53108
Site Layout With Aerial Photo
Exhibit

PSOMAS

DATE: 04-05-06 REVISED ON:
JOB No:

SHEET 1 OF 1
RV06-01

NEWHALL RANCH.

PROJECT NO. 00-196-(5)
GENERAL PLAN AMENDMENT CASE NO. 00-196-(5)
LOCAL PLAN AMENDMENT CASE NO. 00-196-(5)
SPECIFIC PLAN AMENDMENT CASE NO. 00-196-(5)
VESTING TENTATIVE TRACT MAP NO. 53108
CONDITIONAL USE PERMIT CASE NO. 00-196-(5)
CONDITIONAL USE PERMIT CASE NO. 2005-01121-(5)
OAK TREE PERMIT CASE NO. 00-196-(5)

STAFF ANALYSIS
January 31, 2007 REGIONAL PLANNING COMMISSION PUBLIC HEARING

PROJECT OVERVIEW

The applicant, Newhall Land and Farming Company, proposes a 291-acre master-planned neotraditional community development (known as Landmark Village) of a maximum 1,444 residential units and 1,033,000 square feet of nonresidential uses as well as 45 acres of open space, including a 16-acre community park, trail system, and elementary school. This project is within the "Riverwood" village of the adopted Newhall Ranch Specific Plan ("Specific Plan"). This project is the first within the boundaries of the Specific Plan, and located north of the Santa Clara River, south of State Route 126 ("SR-126"), east of the Ventura County boundary, and west of Interstate 5 Freeway.

The proposal requires amendments to the Los Angeles Countywide General Plan ("General Plan") and Santa Clarita Valley Area Plan ("Area Plan") to amend the Master Plan of Highways and Circulation Plan to eliminate "A" Street/Wolcott Road as a secondary highway, and amendment to the Specific Plan to downgrade "A" Street from a secondary highway to a local collector street. The project also requests approval of conditional use permits for compliance with requirements of development within a Significant Ecological Area/Special Management Area ("SEA/SMA"), onsite and offsite project grading and offsite utilities, including water tanks, and transport of materials. An oak tree permit is also required for removal of 67 oak trees (including 10 heritage oaks) and encroachment into the protected zone of 14 oak trees (including three heritage oaks). The applicant alsos requests a determination of substantial conformance related to shared parking, street widths, front yard setbacks and hillside resources. The Specific Plan includes a procedure for such determinations, and gives authority to the Director of the Los Angeles County Department of Regional Planning ("Planning Director") to refer to the Commission for public hearing. Such determinations for substantial conformance may apply to future projects within the Specific Plan boundary.

Access to the subject property is provided by SR-126, with internal access provided by "A" Street as a 'spine' road that provides 110 feet of right-of-way through most of the project. Connections from Highway 126 to "A" Street is provided by major highway Long Canyon Road to the west, and collector Wolcott Road to the east. The Long Canyon Road bridge is part of this project, and will span the Santa Clara River, approximately 1,100 feet in length and 100 feet in width. Two traffic circles, or 'roundabouts,' are also proposed on "A" Street within the development.

Major engineering features associated with the project include bank stabilization along the Santa Clara River and desilting basins and swales. Major offsite improvements include the creation of the utility corridor consisting of sewer trunklines to the future Newhall Ranch Water Reclamation Plan ("WRP") and existing Los Angeles County Sanitation District No. 32 WRP, and water mainline extensions; offsite debris basins and water tanks. Approximately 209,000 cubic yards of cut and approximately 5.5 million cubic yards of fill are proposed for the project, with net export from Adobe Canyon the south at 5,705,700 cubic yards. Offsite grading is also proposed at Chiquito Canyon,

north of SR-126, with approximately 1 million cubic yards of cut and 866,300 cubic yards of fill and no export.

The Draft Environmental Impact Report ("EIR"), which is a tiered document from the certified Specific Plan EIR, analyzes potentially significant impacts of the project, including Geology and Soils, Hydrology, Water Quality, Bioa, Floodplain Modifications, Visual Qualities, Traffic/Access, Noise, Air Quality, Water Resources, Wastewater Disposal, Solid Waste Disposal, Sheriff Services, Fire Services/Hazards, Education, Parks and Recreation, Libraries, Agricultural Resources, Utilities, Mineral Resources, Environmental Safety and Cultural/Paleontological Resources. Impacts that cannot be mitigated to less than significant include Biota, Visual Qualities, Noise, Air Quality, Solid Waste Disposal and Cumulative Agricultural Resources.

DESCRIPTION OF PROJECT PROPERTY

Location: The project site is located north of the Santa Clara River, south of SR-126, east of the Ventura County boundary, and west of Interstate 5 Freeway within the Specific Plan and in the Newhall Zoned District. The project is also surrounded by area within the Castaic Area Community Standards District, but is exempt from its provisions.

Physical Features: The subject property is approximately 292.6 acres in size, and consists of four parcels. The total project, including offsite improvements, is approximately 1,044 gross acres in size. The property is irregular in shape with slight to steeply sloping terrain in offsite areas where grading is proposed. The subject property is disturbed by historic and ongoing agricultural activity but contains existing sensitive biological resources and habitat types, including upland scrub habitat and sensitive riparian habitat. The project boundary aso includes coastal sage chaparral scrub, live oak woodland, southern cottonwood willow riparian habitat; and wildlife habitat including horned lizards, sparrows, blackbirds, kites, hawks and plovers, jackrabbits, woodrats and mountain lion. The Santa Clara River, which within and south of the subdivison boundary, is also an SEA/SMA.

Access: SR-126 serves as primary access to the site, with connections provided by Long Canyon Road and Wolcott Road to "A" Street that provides main internal access. Numerous public street and private driveways also serve areas within the subdivision from "A" Street.

Services: Domestic water will be provided by Valencia Water Company. Reclaimed water will be provided by either the proposed Newhall Ranch WRP, if operational at the time Landmark Village will be occupied, or the existing Valencia WRP. Sanitary service will be provided by the Sanitation District via the Newhall Ranch WRP, or existing Valencia WRP if the Newhall WRP is not yet operational. Gas utilities will be provided by Southern California Gas Company, and electricity by Southern California Edison Company. The project is within the boundaries of the Castaic School District and the William S. Hart Union High School District. Shopping and employment exist nearby including the Valencia Commerce Center directly north and east of the project. Nearby recreation areas include Magic Mountain Amusement Park and Val Verde Regional Park as well as Castaic Lake Recreation Area.

ENTITLEMENTS REQUESTED

General Plan Amenmdent: The applicant requests a General Plan Amendment to amend the County's Master Plan of Highways to remove "A" Street/Wolcott Road as a secondary highway as local collector streets are not shown.

Local Plan Amendment: The applicant requests to amend the Circulation Plan of the Area Plan to eliminate "A" Street/Wolcott Road as a secondary highway and redesignate as a local collector street.

Specific Plan Amendment: The aplicant requests to amend the Specific Plan's Master Circulation Plan to change "A" Street/Wolcott Road from a secondary highway to a local collector street.

Vesting Tentative Tract Map: The applicant requests approval of a vesting tentative tract map to create 415 lots consisting of 308 single-family and 20 multi-family (11 condominium lots with 282 detached condos, 4 condominium lots with 347 attached condos in 47 buildings, 3 apartment lots with 451 for-lease apartments in 28 buildings, and two condo or for lease lots with 56 units in nine buildings) lots [total of 1,444 residential units], 14 commercial lots with 15 for-lease buildings, 10 commercial lots with no development planned (reserved as rail right-of-way), 12 private driveway lots, 3 recreation lots, 2 park lots, 1 school lot, 25 open space lots and 20 open space/desilting basin lots. The applicant requests unit phasing.

Conditional Use Permit: The applicant requests approval of conditional use permits ("CUP") to ensure compliance with the requirements of development within an SEA/SMA and onsite project grading; and offsite project grading and utilities, including water tanks, and transport of materials.

Oak Tree Permit: The applicant requests approval of an Oak Tree Permit to remove 67 oak trees (including 10 heritage oaks), and encroach into the protected zone of 14 oak trees (including three heritage oaks).

While not technically an entitlement, the applicant also requests a determination of substantial conformance with the Specific Plan for shared parking, street widths, front yard setbacks, and offsite transport of materials with conformance with grading and hillside management criteria. Section 5.2.2 of the Specific Plan contains procedures for makng substantial conformance determinations, with authority lying with the Planning Director of the Los Angeles County Department of Regional Planning ("Regional Planning") and the Director of the Los Angeles County Department of Public Works ("Public Works"), with discretion by the Planning Director to refer to a public hearing. While this request for substantial conformance is associated with this project, such determinations for substantial conformance may apply to future projects within the Specific Plan boundary.

EXISTING ZONING

Subject Property: The subject property is zoned SP (Specific Plan).

Surrounding Properties: Surrounding zoning is as follows:

North: SP, A-2-2 (Heavy Agricultural – Two Acre Minimum Required Lot Area), A-2-5 (Heavy Agricultural – Five Acre Minimum Required Lot Area), M-1-½ (Restricted Heavy Manufacturing);
East: SP, A-2-5, M-1-½, P-R (Parking Restricted) and C-R (Commercial-Recreation);
South: SP; and
West: SP.

EXISTING LAND USES

Subject Property: The subject property is used for agricultural activity and related storage, and consists of four parcels from the previously approved Newhall Ranch Tentative Parcel Map No. 24500).

Surrounding Properties: Surrounding uses are as follows:

North: SR-126, vacant property, scattered single-family residences, Chiquita Canyon Landfill and business parks;
East: Castaic Creek, RV park, and further east light industrial uses, agricultural land and Valencia WRP;
South: Santa Clara River and vacant land; and
West: Vacant property and agricultural land.

PREVIOUS CASE/ZONING HISTORY

The current SP zoning on the subject property became effective on June 26, 2003, following the adoption of Ordinance No. 2003-0031Z, which established Zone Change Case No. 94-087-(5). The zone change was associated with the Specific Plan.

The Specific Plan was adopted by the Los Angeles County Board of Supervisors ("Board") on May 27, 2003, along with a general and local (sub-plan) amendments, a conditional use permit and a tentative parcel map. The Specific Plan authorized the development of the approximately 11,963-acre property for 20,885 dwelling units with 423 second units; 629 acres of mixed use development (including 4,101 of the 20,885 units approved); 67 acres of commercial uses; 249 acres of business park land use; 37 acres of vistor-serving uses; 1,010 acres of open area (including 141 acres of community parks and 869 acres of other open areas); 5,159 areas within SMAs; 50 acres within 10 neighborhood parks; a 15-acre lake; public trail system; 18-hole golf course; two fire stations; one public library; one electrical substation; reservation of five elementary schools, one junior high school and one high school site; a 6.8-million gallon per day WRP; and other associated community facilities, such as roads and bridges.

The Specific Plan area is organized in five "villages," with the Landmark project within the "Riverwood" Village. Within the approximately 2,330 acres of Riverwood, 3,210 dwelling units and 234 second units were approved as well as 2,966,000 square feet of nonresidential square footage. The Santa Clara River is also a major Open Area feature within Riverwood.

A program-level EIR (and project-level for the Newhall WRP) was also certified with adoption of the Specific Plan, which had concluded that the project had significant unavoidable impacts to biological resources, agricultural resources, visual resources, air quality and solid waste disposal. In approving the project, the Board also adopted a Statement of Overriding Considerations that concluded that there were significant overriding public benefits with approval of the project. These included preservation of nearly 1,000 acres of the Santa Clara River and open areas; over 50 miles of trails including the Santa Clara River Trail; provision of improved parks, library and fire station which were 'above and beyond' mitigations required by CEQA; provision of 2,200 affordable homes; and preservation of the River Corridor to retain Santa Clara River's significant riparian vegetation and habitat.

PROJECT DESCRIPTION

Vesting Tentative Tract Map No. 53108 and Conditional Use Permit Case Nos. 00-196-(5) and 2005-01121-(5) Exhibit "A", dated November 7, 2005, depict a subdivision of 415 lots consisting of single-family, multi-family, commercial, recreation, park, school, open space and open space/public facility lots on 292.6 gross acres. The housing types range from single-family detached and attached homes as well as live-work units. Fourteen (14) commercial lots are also proposed with 15 for-lease buildings, 12 private driveway lots, three recreation lots, two park lots, and one school lot. Ten (10) commercial lots are also proposed with no development planned, and serve as reservation of future right-of-way for Metrolink. Twenty-five (25) open space lots as well as 20 open space/desilting basin lots are also depicted.

Residential

A range of housing types is provided in various clusters within the subdivision. Traditional single-family lots (i.e. one home on each lot) are clustered in three areas along the southern portion of the subdivision: to the west, across from the proposed elementary school, and to the east. These lots have been designed for garage access from the front, and by alley from the back; and range in size from minimum 3,200 square feet to 6,000 square feet.

Multi-family housing is also proposed both as for-lease apartments and for-sale condominiums, and generally in the northern portions of the subdivision and conceptual designs for site layout are depicted on the exhibit maps. Apartments, including 152 senior affordable rental units, are proposed in the western portion, just east of the office and retail center identified in the Specific Plan as the Village Center. Additional condominiums are proposed near the Village Center, north and south of "A" Street as well as north of "A" Street east of the elementary school and near Wolcott Road, with 144 single-family condo units reserved for moderate income (81 to 120 percent of the Los Angeles County median income, adjusted for family size) families between the elementary school and the commercial lots off of Wolcott Road. A total of 1,080 residential units are provided in 357 buildings.

A total of 1,388 dwelling units are provided within the residential lots.

Commercial

The Village Center, as described in the Specific Plan, is located east and west of Long Canyon Road on the western portion of the subdivision. Retail and office are anticipated, with an approximate

maximum of 1,795,450 square feet as well as 2,958 parking spaces based on estimates of office and retail use. Internal access within the Village Center is proposed by 28-foot wide drive aisles.

Commercial is also proposed near Wolcott Road with an approximate maximum of 762,450 square feet with 490 parking spaces and 26-foot wide drive aisles.

A total of 1,033,000 square feet of office and retail commercial is proposed as well as provision of 3,448 parking spaces for 15 buildings.

Commercial – No Development Planned
Ten (10) commercial lots are proposed with no development planned. These reflect future reservation of right-of-way for Metrolink, and are located just south of SR-126 along the northern subdivision boundary, and vary in width from 35 feet to 50 feet in width.

Mixed Use
Live/work units are proposed within Lot Nos. 334 and 335 for a total of 56 dwelling units and 255,608 square feet of nonresidential uses. One hundred twelve (112) parking spaces are also provided as part of the residential component along with 30 guest parking spaces.

The project totals a maximum of 1,444 dwelling units throughout the subdivision.

Elementary School
A nine-acre elementary school site (Lot No. 345) is depicted in the approximate center of the subdivision property, north of "A" Street, and with 157 parking spaces provided at one parking space per classroom. Actual site designs for the school are to be determined through design workshops with the school district. There is a potential for joint use with the adjacent public park.

Parks/Recreation/Open Space
Two park lots are depicted within the subdivision. North of "A" Street, a public park (Lot No. 344) is proposed with active recreation, and potential for joint use with the elementary school. A passive park (Lot No. 337), south of "A" Street, will be owned and maintained by the project's homeowners' association ("HOA"). The passive park will include connections to the Regional River Trail, a 12-foot wide trail that travels along the entire length of the Santa Clara River within this development, as well as drainage and water quality basins that can also serve as additional play areas. A private interpretive trail is also proposed with an outlook point towards the Santa Clara River.

Three private recreation lots (Lot Nos. 330, 336 and 340) are proposed, with proposed improvements with grass play area, swimming pool/tot lot and recreation buildings. A total of 103 onsite parking spaces is also depicted for all three recreation lots.

A total of 45 open space lots are provided, with 25 lots for open space and 20 lots for open space and desilting purposes. These open space lots are depicted along the northern and souther boundaries of the subdivision, adjacent to SR-126 and the Santa Clara River.

Alternate Site Plans
Alternate site plans are depicted for two areas of the subdivision. One depicts a debris basin (Lot No. 409) where detached condominiums are proposed, off of "T" Drive north of "A" Street. The inclusion of the debris basin would result in a reduction of 20 condominium units.

The other alternate site plan is for Apartment/Condominium Lot No. 349, which depicts 20 additional units from 155 to 175 attached units, in nine buildings, with associated parking increase. Total parking provided, including guest parking, is 394 parking spaces with the 175-unit alternate.

Access and Roads
Long Canyon Road and Wolcott Road are the two points of connection from SR-126 with "A" Street as the main 'spine' collector road through the development. Long Canyon Road is a major highway, and provides at least 119 feet of right-of-way north of "A" Street with bike lanes in both directions of traffic as well as an eight-foot sidewalk and varying center planter widths. SR-126 is expected to be grade-separated (higher) than Long Canyon Road in the future, with the future interchange depicted as five northbound lanes (one left turn dedicated to SR-126, two for thru traffic under SR-126, and two for right turn traffic). Long Canyon Road also spans over the Santa Clara River as an 100-foot wide bridge to be constructed with this project. Wolcott Road is a secondary highway with 106 feet of right-of-way consisting of four travel lanes, a six-foot parkway and six-fot sidewalk on each side, and a 14-foot wide planter in the center. Wolcott Road is also depicted with a future interchange with SR-126. "A" Street is depicted as with a 110-foot wide right-of-way, with varying widths of improvements. At its widest improvements, which is from Long Canyon Road to 200 feet east of Long Canyon Road, seven travel lanes are provided with bike lane on one side, and four feet of parkway and six feet of sidewalk on both sides; no on-street parking would be provided. At its narrowest, two travel lanes with center lane is provided, along with bike lanes on each side, 10-foot-parkway and six-foot sidewalk on one side, and 24 foot-wide swale and eight-foot trail provied on the other side.

Private driveway lots are also proposed within the development, providing internal access in single-family and multi-family neighborhoods between the Village Center and the park/school, with widths ranging from 34 feet to 110 feet wide.

Other features of the local roads within the subdivision are curb extensions, which serve as traffic calming details by narrowing the road to promote slowing down traffic mid-block and at intersections. Roads are depicted at minimum 26 feet wide with mid-block lanes as narrow as 24 feet wide before combining to 62 feet wide.

Grading – Onsite and Offsite
Onsite grading consists of 209,000 cubic yards of cut and 5,555,400 cubic yards of fill.

Offsite project grading is proposed in mainly three locations: Adobe Canyon, Chiquito Canyon and the Santa Clara River. Adobe Canyon is located south of the subdivision on the south side of the Santa Clara River, and will serve as a borrow site for Landmark Village. From Adobe Canyon, approximately 5.7 million cubic yards of earthwork will be moved to Landmark through haul routes that coincide with existing agricultural roads. These are existing river crossings through Santa Clara River, which also crosses the SEA/SMA, which are currently permitted as operational agricultural river crossings permitted by the California Department of Fish and Game. Adobe Canyon is within the

Specific Plan boundary and offsite transport of materials is one of the factors eligible for a determination of substantial conformance, and being considered as part of the proposal. This borrow site is also within the boundaries of a pending subdivision known as Heritage (Vesting Tentative Tract Map No. 060678) currently being reviewed by the Los Angeles County Subdivision Committee ("Subdivision Committee"), and once approved and developed, will not remain as the graded condition depicted for the borrow site.

The Chiquito Canyon grading site proposes approximately 1 million cubic yards of cut and approximately 866,000 cubic yards of fill with no export proposed. Two debris basins are also depicted within the Chiquito Canyon area. This is also within a pending subdivision within the Specific Plan boundary within Heritage, and depicted as a future business park within the Specific Plan.

Grading is also proposed outside the boundaries of the subdivision, and within the Santa Clara River, as part of the project's mitigation and habitat restoration. The dirt that will be removed from the Santa Clara River, will be placed onto the property and the new 'edge' of the Santa Clara River would be created with the bank stabilization efforts.

Other offsite Improvements
The project also proposes offsite installation of utility extensions, including water, sanitary sewer, gravity sewer, irrigation, cable, gas, fiber optics and reclaimed water lines. Described as a utility corridor, these lines will extend east to the Valencia WRP (Los Angeles County Sanitation District No. 32) southwest of the SR-126/I-5 interchange, and extend west to the proposed Newhall WRP. Utility lines were approved as part of the Newhall Ranch CUP to be hung from the Long Canyon bridge to provide potable water, reclaimed water, etc. to areas south, and now as part of this project is proposed to be buried under the Santa Clara River to provide permanent utility connections.

The project design has been reviewed by the Los Angeles County Subdivision Committee for technical feasibility and recommended project conditions are attached.

SPECIFIC PLAN CONSISTENCY

The Newhall Ranch Specific Plan was adopted by the Board on May 27, 2003 which authorized the development of the approximately 11,963-acre property for residential, mixed use, commercial business park, visitor-serving, open area, parks, trails, schools, library, fire stations and infrastructure including roads, bridges and a water reclamation plant. The Specific Plan locates the Landmark Village subdivision within its Riverwood Village, and identifies land uses within each Village with associated acreage, density and/or nonresidential square footage. The Specific Plan also includes exhibits for trails, circulation, resource management, drainage and water quality, water and sewer as well as its land use plan.

The applicant has provided a booklet, titled "Landmark Planning Notebook" ("Notebook") which staff will refer to in discussion of consistency . This Notebook provides the detailed exhibits and tables that update the Specific Plan within the Landmark subdivision boundary, and identify goals and objectives within the Specific Plan that these project features achieve.

Affordable Housing (Notebook Section 1.7, Page 19)
The Specific Plan also requires affordable housing, with a total of 2,200 affordable units through the Specific Plan area (Specific Plan Section 3.10). These include housing units for Very Low Income households (of which 440 are reserved for seniors), Low Income households, Low Income Affordable, and Moderate Income Affordable; and may be rental, for-sale and any units supported by state, local or private affordable housing assistance. An affordable housing monitoring program is required as the tentative map with the 5,000th unit has already been filed with the County.

Landmark Village proposes 296 affordable units: 144 for-safe homes for moderate income households, and 152 for-rent units for very low income seniors. While the Specific Plan states a reservation of seniors 62 years or older, the definition of "senior citizen" as defined in Civil Code Section 51.3 defines as a person 62 years of age or older, or 55 years of age or older in a senior citizen housing development.

Circulation (Notebook Section 2.1, Pages 21-26)
The applicant has requested amendments to the General Plan and Area Plan as well as the Specific Plan to redesgnate "A" Street/Wolcott Road as a local collector street rather than a secondary highway. Traffic studies were performed to indicate that the traffic volume can be accommodated with the main road as a collector, and regional circulation is still ensured despite this change.

"A" Street is depicted in illustrative terms on page 23 of the Notebook, and depict "A" Street with onstreet parking, bike lanes and trails along both sides of the street. Additional photo examples of other road features within Landmark are depicted on page 26 of the Notebook, including 'round points' or roundabouts, curb extensions and rear or alley access.

While the street cross-sections proposed for Landmark are different than what was approved by the Specific Plan, a determination of substantial conformance can be made (see section below for additional information) with respect to these street cross-section differences. These changes are intended to reduce design spee, eliminate cul-de-sacs, introduce traffic-calming features, reduce street widths as pedestrian crossings, and reduce curb cuts.

Trails (Notebook Section 2.2, Pages 27-28)
The Master Plan of Trails within the Specific Plan is general in nature, and detailed trail locations are identified on the subdivision tentative map. These include walkways and parkways along streets, paseos, community trails and the regional river trail, in a hierarchy of trail sizes and functionality. Access points are also identified from the project to the regional river trail system as well as locations for observation and interpretive nature points.

The regional river trail system is depicted in greater detail on the tentative map, and depict both an eight-foot wide County trail outside the subdivision boundary but on top of the bank stabilization, and a 16-foot wide riding and hiking trail that will also serve as the Los Angeles County Flood Control access road, and will be maintained by a Landscape Maintenance District ("LMD").

An interpretive trail is also depicted through private Recreation Lot No. 337 with a lookout point and interpretive nature station.

Resource Management (Notebook Section 2.3, Pages 29-32)
The Specific Plan also identifies viewsheds as a significant resource, and a viewshed exhibit is provided that demonstrates how the subdivision as designed is compatible with the exhibits presented to the Commission as part of the Specific Plan public hearings.

The exhibit on page 30 identifies the viewsheds unaltered by the project, substantially altered by the project development and transportation improvements, and partially altered by the project. The ares substantially altered by development, depicted in purple as B, reflect the Village Center on the western side of the development, and the single-family and mixed use development off of Wolcott Road on the eastern side. By comparison, the original viewshed exhibit depicted on page 29 reflects a larger purple area, indicating that the current analysis depicts a smaller area extent of viewshed impacts than first presented.

Additional viewshed exhibits on pages 31 and 32 depict sound attenuation walls and plexiglass walls that will also affect the viewshed from SR-126, with illustrations are provided on page 32.

The Specific Plan also includes Design Guidelines (Specific Plan Section 4.2) requirements for design review and guidelines for development along SR-126. While specific development details are not available at this time, the project will be required to undergo review for compliance, including design of the community park and building elevation reviews adjacent to SR-126.

Drainage and Water Quality Plan (Notebook Section 2.4, Pages 33-36)
The Specific Plan Master Drainage Plan has been updated to reflect innovative methodologies to meet NPDES (National Poltutant Discharge Elimination System) requirements, and reflects a comprehensive system of flood control and desilting basins to maintain water quality standards.

Open space that also double as open facility basins, are located adjacent to the subdivision boundary and the Santa Clara River to the south, as well as along SR-126 to the north. Additional water quality features such as grass swales and depressed roundabouts, provide additional area for water retention (example photos provided on page 36).

Water Plan (Notebook Section 2.5, Page 37-38)
The Master Water Plan was designed in the Specific Plan for this portion with water main and reclaimed water lines along "A" Street. The Potable and Reclaimed Water Plan on page 38 depictes in greater detail, the infrastructure lines to serve the development. The water mains still run generally along "A" Street, with connections now to residential neighborhoods north and south of "A" Street.

A 2.7 million gallon water tank that is depicted on the Master Water Plan, is depicted within the Chiquito Canyon area. Water tanks are being proposed north of Landmark at Chiquito Canyon within the Valencia Commerce Center, and Round Mountain. The potable tanks are anticipated to be approximately 32 feet high and 152 feet in diameter, with a capacity of 4 million gallons. The reclaimed tanks are anticipated to be 32 feet high, and 132 feet in diameter with a capacity of 3 million gallons.

Sewer Plan (Notebook Section 2.5, Pages 39-40)
The Master Sewer Plan also depicts sewer infrastructure anticipated , with the sewer line system connecting to the Newhall WRP. A detailed Sewer Plan was prepared for Landmark (page 40) that provides further refinement to the location of sewer main lines. Sewer service and connections is also proposed by two methods. Connection lines are proposed to extend east to the existing Valencia WRP near the SR-126/I-5 interchange if the Newhall WRP is not operational at the time Landmark requires connection. Eventual connection for the Landmark Village development will the be Newhall WRP, which is located further west. Connections for Landmark are shown with both options.

Land Use Plan (Notebook Section 3.1, Pages 41-44)
The Land Use Plan of the Specific Plan depict development by various land uses, and within the Riverwood Village for this property, is designated for Low-Medium Density, Medium Density, Mixed Use and Commercial as well as River Corridor. As described on page 42, flexibility was built into the Specific Plan to allow for adjustments, transfers and conversions of use, boundaries, square footage, etc. (Specific Plan Section 5.2-5, beginning Page 5-14).

The project proposes conversions as well as boundary adjustments. The Medium Density was adjusted with reduction of 1.3 acres, and the adjacent Low-Medium Density area increased by 12.1 acres. The Commercial area was reduced by 4.2 acres, while 5.8 acres of the Low-Medium Densty was converted to Mixed Use. All of these changes are described in a table format on page 44, with exhibits on pages 42 and 43, and reflect that these changes are within the 20 percent adjustment established by the Specific Plan.

The elementary school as well as the community park are part of land use overlays, and are 'flexible' within the Specific Plan with respect to location. The land use overaly adjustments are also permitted by Section 5.2-5 of the Specific Plan with respect to size, quantity and locatin of public service facilities like parks and schools.

The River Corridor allows for certain uses, with mitigation required as stated in Section 2.6-2 of the Specific Plan. These mitigation requirements include restoration as well as enhancement, and establish requirements for management of this area. Access to the SMA through hiking, equestrian and biking trails is permitted as limited to the trail system itself. Transition areas are also required from where development lies and the Santa Clara River, which is described in greater detail in Section 2.6-2.a.(3).(b), which provides standards for the design of these transition areas. These include provision of a trail between the River Corridor and development, ungrouted rock or buried bank stabilization where required to protect development areas, and minimum 100-foot buffers adjacent to the Santa Clara River. Uses permitted within this buffer include flood control access; sewer, water and utility easements; abutments; and trails and parks; all of which are subject to the CUP provisions for development in an SEA/SMA. Grading guidelines are also provided as well as a long-term management plan.

SUBSTANTIAL CONFORMANCE

Section 5.2-2 of the Specific Plan provides a process for making determinations of substantial conformance, with authority lying with the Planning Director and in some cases, the Director of Public

Works. This section also provides the Planning Director with discretion to refer such substantial conformance to a Commission public hearing.

The applicant requests determinations of substantial conformance for shared parking, street widths, front yard setbacks, and offsite transport of materials with conformance with grading and hillside management criteria.

Shared Parking
Parking is discussed in Section 3.7 of the Specific Plan under Development Regulations. Section 3.7-3 also identified parking programs, where joint use or shared parking plans can be requested as part of a substantial conformance review. Such a program was intended to reduce the total number of parking spaces required, and provides findings for such determination.

However, the Specific Plan does not directly address offsite, reciprocal parking, where spaces for a particular use may be provided in the number required, but may not be located on the same parcel of land as the use, and therefore would not meet the County standards for parking provision.

The applicant requests that reciprocal, offsite parking be included within the Joint Use or Shared Parking Plan option provided in the Specific Plan, with same requirements for making findings at such time when the uses are determined and actual parking requirements calculated.

Street Widths
The applicant has also requested a determination of substantial conformance for alternative street sections to reflect the intent of the development to be neotraditional, where emphasis is on pedestrian traffic as opposed to automobile traffic. Features in these alternative street sections include traffic calming devices, like chokers, curb extensions, roundabouts, etc.

Such features have been much discussed with Public Works and the Los Angeles County Fire Department ("Fire Department") as well as Regional Planning to ensure that traffic capacity and life/safety issues are still addressed with these alternative street features. These are proposed on "A" Street and internal streets.

Front Yard Setbacks
Within the development regulations of the Specific Plan, setbacks for the garage face are provided at 18 feet. The intent is for cars that are parked in the driveway, not block the sidewalk or travel lanes of the street. However, the Specific Plan did not provide in much detail, front yard setbacks for homes where the garage is oriented for a side entrance, or located in the rear of the lot for alley entrance. In these cases, the applicant is requesting that a determination of substantial conformance be made that in these cases, a minimum front yard setback of 10 feet be maintained since driveways will be such that cars parked will not block the street as the intent of the 18-foot setback.

This is a determination of substantial conformance that could apply to all area within the Specific Plan boundary.

Offsite Transport of Materials and Hillside Grading
The Landmark project also proposes offsite transport of materials from the Adobe Canyon borrow site to the Landmark subdivision site. This is proposed to raise the boundary to avoid flooding issues with proximity to the Santa Clara River, and would use two haul routes on an existing agricultural crossing.

Grading for subdivisions with slopes over 25 percent slope, are also required to be consistent with grading and hillside guidelines. The grading that is proposed both in the Adobe Canyon borrow site and Chiquito Canyon, are within areas of the Specific Plan where other development is proposed. Therefore, the grading that will result from that needed for Landmark, will be re-graded to accommodate that proposed for Homestead (TR 060678), a pending subdivision already filed and being reviewed by the County.

While this request for substantial conformance is associated with this project, such determinations for substantial conformance may apply to future projects within the Specific Plan boundary. Draft findings of substantial conformance as proposed by the applicant are attached.

GENERAL PLAN AMENDMENT / LOCAL PLAN AMENDMENT / SPECIFIC PLAN AMENDMENT

The applicant requests an amendment to the General Plan Master Plan of Highways to delete "A" Street/Wolcott Road as a secondary highway since local collector streets are not shown on this map, and amend the Area Plan Circulation Plan and and the Specific Plan Master Circulation Plan to redesignate "A" Street from a secondary highway to a local collector. Based on additional traffic analyses done for Landmark, it was determined that the traffic capacity necessary to serve Landmark Village, can be accommodated using local collector standards as opposed to wider, secondary highway standards, while ensuring a functional regional circulation system.

Within the Specific Plan, the redesignation of "A" Street/Wolcott Road would be modified on the Specific Plan Mobility Plan, Master Circulation Plan and on the accompanying cross-sections.

The applicant must meet the following burden of proof required for a plan amendment:

A. A need for the proposed General and Local Plan Amendment exists;
B. The particular amendment proposed is approximate and proper;
C. Modified conditions warrant a revision to the General Plan and Area Plan; and
D. Approval of the proposed General Plan Amendment will be in the interest of public health, safety and general welfare and in conformity with good planning practices.

The applicant's Burden of Proof responses are attached.

CONDITIONAL USE PERMIT

Pursuant to Table 3.4-2 Footnote 16, and Section 5.2-3 of the Specific Plan, and Section 22.56.215 of the Los Angeles County Code ("County Code"), the applicant has requested a CUP, and submitted an

Exhibit "A", to demonstrate compliance with requirements of development within a SEA, project grading (onsite and offsite), and offsite utilities, including water tanks.

Within the SEA/SMA, the project proposes the following improvements: Long Canyon Road bridge, trails and scenic vista points, bank stabilization, utilities, agricultural wells, riparian mitigation, and Metrolink right-of-way easements.

The Long Canyon Road bridge will cross the Santa Clara River, and is proposed to be 1,100 feet long and 100 feet wide. The bridge crossing itself was approved as part of the adoption of the Specific Plan, where the Board found that given various options for bridge alignments and bridge span alternatives, this was one of three bridge crossings that were approved.

In addition to the standard burden of proof required for a CUP, the applicant must also meet the following burdens of proof required for:

Development within an SEA:

A. That the requested development is designed to be highly compatible with the biotic resources present, including the setting aside of appropriate and sufficient undisturbed areas; and

B. That the requested development is designed to maintain water bodies, watercourses, and their tributaries in a natural state; and

C. That the requested development is designed so that wildlife movement corridors (migratory paths) are left in an undisturbed and natural state; and

D. That the requested development retains sufficient natural vegetative cover and/or open spaces to buffer critical resource areas from said requested development; and.

E. That where necessary, fences or walls are provided to buffer important habitat areas from development; and

F. That roads and utilities serving the proposed development are located and designed so as not to conflict with critical resources, habitat areas or migratory paths.

The applicant's Burden of Proof responses are attached.

OAK TREE PERMIT

Pursuant to Section 22.56.2050 of the County Code, an oak tree report was submitted by Impact Sciences, Inc. Of the 201 oak trees associated with the project and subject to the Oak Tree ordinance as identified in the June 2006 and updated September 2006 report, 82 trees are included in the associated Oak Tree Permit.

Sixty-seven (67) oak trees, including 10 heritage oaks are proposed to be removed as part of onsite and offsite improvements. Fourteen (14) oak trees, including three heritage oaks are proposed to be encroached within its protected zone due to potential impacts from construction.

Mitigation measures recommended by the County Forester/Fire Warden include replacement of oak tree removals at a rate of 2:1 (and 10:1 for heritage oaks) for a total of 214 mitigation trees. A contribution to the Los Angeles County Oak Forest Special Fund would also be required for any tree that dies within two years as a result of a permitted encroachment. The oak tree report also identified 26 trees which would be candidates for relocation within the Specific Plan boundaries.

Pursuant to Section 22.56.2100 of the County Code, the applicant must meet the following burden of proof:

A. That the proposed construction of proposed use will be accomplished without endangering the health of the remaining trees subject to this Part 16, if any, on the subject property; and

B. That the removal or relocation of the oak tree(s) proposed will not result in soil erosion through the diversion or increased flow of surface waters which cannot be satisfactorily mitigated; and

C. That in addition to the above facts, at least one of the following findings apply:
   1. That the removal or relocation of the oak tree(s) proposed is necessary as continued existence at present location(s) frustrates the planned improvement or proposed use of the subject property to such an extent that:
      a. Alternative development plans cannot achieve the same permitted density or that the cost of such alternative would be prohibitive, or
      b. Placement of such tree(s) precludes the reasonable and efficient use of such property for a use otherwise authorized; or
   2. That the oak tree(s) proposed for removal or relocation interferes with utility services or streets and highways, either within or outside of the subject property, and no reasonable alternative to such interference exists other than removal of the tree(s); or
   3. That the condition of the oak tree(s) proposed for removal with reference to seriously debilitating disease or danger of falling is such that it cannot be remedied through reasonable preservation procedures and practices; and

D. That the removal of the oak tree(s) proposed will not be contrary to or be in substantial conflict with the intent and purpose of the oak tree permit procedure.

The applicant's Burden of Proof responses are attached.

ENVIRONMENTAL DOCUMENTATION

The program-level Specific Plan EIR was certified along with adoption of the Specific Plan and a Statement of Overriding Considerations. The Board found that there were overriding public benefits, and included preservation of nearly 1,000 acres of the Santa Clara River and open areas; over 50 miles of trails including the Santa Clara River Trail; provision of improved parks, library and fire station which were 'above and beyond' mitigations required by CEQA; provision of 2,200 affordable homes; and preservation of the River Corridor to retain Santa Clara River's significant riparian vegetation and habitat. Within the Specific Plan EIR, six alternatives were discussed, and include project designs with reduction in 20, 39, and 68 percent of the development. While the development with 68-percent reduction was identified as the environmentally superior alternative, the Specific Plan was eventually

adopted by the Board with a revised project and mitigation measures along with certification of the EIR.

In accordance with State and County CEQA guidelines, a project-level Draft EIR, which is tiered from the certified Specific Plan program EIR, was prepared for Landmark Village. The Draft EIR concludes that certain potentially significant impacts are less than significant with implementation of the proposed mitigation measures in the Mitigation Monitoring Program. However, the Draft EIR concludes that the project design and/or suggested conditions will result in certain significant impacts are unavoidable, and cannot be mitigated to less than significant. Copies of the Draft EIR were distributed to the Commission.

Identified potential impacts found to be less than significant with project mitigation, include:

- Geology and Soils
- Hydrology
- Water Quality
- Floodplain Modification
- Traffic/Access
- Environmental Safety
- Cultural/Paleontological Resources
- Utilities
- Mineral Resources
- Water Resources
- Wastewater Disposal
- Sheriff Services
- Fire Protection/Hazards
- Education
- Libraries
- Parks and Recreation

Identified potentially impacts that cannot be mitigated to less than significant, and will result in significant residual and/or cumulative impacts, include:

- Biota
- Visual Quality
- Noise
- Agricultural Resources
- Solid Waste Disposal

Of these impacts that cannot be mitigated to less than significant, Noise is the only factor that was not previously identified and adopted with a Statement of Overriding Considerations as part of the certified Specific Plan program EIR. Noise impacts result from pile-driving of piers, the construction of the Long Canyon Road bridge, and potential impacts to future residents on Landmark Village if bridge construction begins after the subdivision is built and occupied.

Mitigation measures which have been incorporated into the project, and included in the Mitigation Monitoring Program ("MMP"), are listed in the Executive Summary of the Landmark Draft EIR, and include mitigation measures originally prescribed within the Specific Plan EIR.

Four alternatives to the Landmark project are also discussed in the Draft EIR as required by CEQA guidelines. These include: (1) No Project/No Development Alternative; (2) No Project/Future Development; (3) Floodplain Avoidance; and (4) Cluster Design. Each alternative is evaluated for potential impacts and the environmentally superior alternative is identified.

Within this Draft EIR, the Cluster Alternative No. 4 (Draft EIR dated November 2006, Pages 5.0-20 through 5.0-35) is identified as the environmentally superior alternative. This alternative retains the overall layout of the proposed Landmark Village, except for 106 acres in the most western portion of the property that is to remain for agricultural uses. This would result in a reduction of 507 dwelling units along with 828,000 square feet of commercial space. This Alternative would retain the elementary school and 16-acre community park, and bank stabilization would still be required along the edge of the Santa Clara River. This project would result in the same factors impacted by development, and would increase the impact to water service and water quality.

The technical appendices include geological and geotechnical reports, an air quality analysis, drainage concept, biota report, sensitive plant report, spadefoot toad habitat monitoring report, water supply analysis, noise report, water quality reports, cultural resources assessment, Santa Clara river fluvial study, an archeological survey, and other technical documents supporting the Draft EIR.

The formal public review period for the Draft EIR was for a period of 60 days, from November 20, 2006 to January 22, 2007. A Notice of Public Review Period Time Continuation was also distributed, which extended the Draft EIR public review period up until January 31, 2007 at this time.

All written comments received prior to the close of the public hearing will be considered in the Final EIR. Copies of written correspondence on the Draft EIR, including requests for additional review time, are attached.

COUNTY DEPARTMENT AND AGENCY COMMENTS AND RECOMMENDATIONS

Subdivision Committee consists of the Departments of Regional Planning, Public Works, Fire, Parks and Recreation, and Public Health. The Subdivision Committee has reviewed the Tentative Tract and Exhibit "A" maps dated November 7, 2005, and recommends the attached conditions.

Comments and recommendations from County Departments and other agencies consulted during the environmental review process include the California Department of Fish and Game ("Fish and Game"), Regional Water Quality Control Board, Native American Heritage Commission, California Highway Patrol ("CHP"), California Department of Transportation ("Caltrans"), Southern California Assocation of Governments ("SCAG") as well as City of Santa Clarita and County of Ventura. Other agencies that have provided correspondence include the Castaic Lake Water Agency, Sierra Club, California Water Network, Santa Clarita Organization for Planning and the Environment (SCOPE), Piru Neighborhood Council and Friends of the Santa Clara River.

Most comments received indicate that due to the volume of material associated with this EIR, an additional 30 to 60 days is requested as part of the public review period. The EIR was circulated with an original public review period of 60 days, and has been extended once for an additional nine days to coincide with the Commission public hearing date.

Comments were received from Audobon California that state that insufficient bird surveys were done as part of the Draft EIR along with mischaracterizations of the status, range and impacts to bird species, and lack of specific mitigation measures for maximum feasible mitigation. Comments were

also received from the SCAG indicating that the Draft EIR analysis is consistent with the Regional Comprehensive Plan and Guide (RCPG), as well as from CHP that indicate concerns with increased traffic flow where currently little development exists.

All comments received in response to the Draft EIR are attached and will be incorporated into the Final EIR.

LEGAL NOTIFICATION/COMMUNITY OUTREACH

Approximately five notices of public hearing were mailed to property owners within a 1,000-foot radius of the subject property as well as additional notices to those on the courtesty mailing list for projects in the Newhall and Castaic Canyon Zoned Districts. The public hearing notice was published in The Signal and La Opinion on November 20, 2006. The Draft EIR was available for review at the Newhall Library, Valencia Library and Canyon County Jo Anne Darcy Library beginningNovember 20, 2006. Project materials, including a tentative tract map, site plan, and recommended conditions, were received at the Newhall Library on December 29, 2006. One large public hearing notice, eight feet wide by four feet high, was posted on the subject property along SR-126 on December 29, 2006. Public hearing materials were also posted on the Department of Regional Planning's website.

The applicant has also presented theproject on several occasions to the Castaic Area Town Council. Comments have not yet been received from the Castaic Area Town Council regarding the project.

CORRESPONDENCE RECEIVED BEFORE PUBLIC HEARING

Most correspondence received to date, comment on the Draft EIR and request additional time for review. Some comments have been received, and are discussed in summary detail above. Comments have been received in opposition to this project, with several references to the timing of this project with an Environmental Impact Statement (a federal environmental document) for the Santa Clara River. One letter has also been received in favor of the project, with desire expressed to live within this community once developed.

All correspondence received to date has been attached as part of this package.

STAFF EVALUATION

The Newhall Ranch Specific Plan was adopted by the Board on May 27, 2003 after numerous public hearings before the Commission and Board, and through public participation from many organizations and community groups as well as interested individuals and through changes as a result of litigation. Within its boundary, the Specific Plan itself is the comprehensive document to guide future development, with plans, development regulations, design guidelines and implementation procedures.

An EIR was prepared for the Specific Plan, which indicated that certain impacts could not be mitigated to less than significant, and with adoption of the Specific Plan, the Board also adopted a Statement of

Overriding Considerations as there were overriding public benefits to approval of the project. These included that the project was designed to preserve over nine square miles, including the Santa Clara River; 'buried bank stabilization' as proposed by the City of Santa Clarita, has been incorporated into the project which is above and beyond the requirements of the County's General and Area Plan; the project uses 'livable community' concepts, including the mixed use category to combine commercial with residential and recreational, provide over 50 miles of pedestrian and bicycle trails, provide bus pull-ins, and a park-and-ride facility is planned; and new Water Reclamation Plant will be constructed.

The Specific Plan is adopted for a total maximum of 21,308 dwelling units as well as approximately 5.5 million square feet of nonresidential uses over 11,963.9 gross acres.

Landmark Village is the first subdivision within the Specific Plan, and proposes a maximum of 1,444 dwelling units and 1,033,000 square feet of nonresidential uses on 292 acres. The property proposes single-family, for sale and lease attached and detached multi-family units, mixed use, office and retail commercial, and open space, including trails, parks and neighborhood recreation areas. An elementary school is also proposed as well as fire station (not yet incorporated into the tentative map).

As an implementation tool of the Specific Plan, a subdivision is submitted and evaluated for compliance with the Title 21 of the County Code (Subdivision Ordinance) as well as the California Map Act. Subdivisions are also evaluated for consistency with the Specific Plan, including density within portions of the property, siting of streets and recreation, and parking as necessary to accommodate multi-family and commercial uses as well as other development standards.

In addition, the Specific Plan contains language for determinations of substantial conformance for changes, either approved, approved with conditions or denied, that based on whether it can be found that the request substantially conforms with all applicable provisions of the Specific Plan and County ordinances; will not adversely affect public health, safety and welfare; and will not adversely affect adjacent property. The project seeks determinations of substantial conformance related to offsite reciprocal parking, street widths, front yard setbacks, and offsite transport of materials with conformance with grading and hillside management criteria.

Adjustments to the land use designations are also permitted within the Specific Plan, including conversion of uses and adjustments of boundaries. The project proposes adjustment of the land use boundaries as well as conversion of Low-Medium Density to Mixed Use, which comply with the parameters for such adjustments and conversions as stated in the Specific Plan.

The project also proposed development with the SEA/SMA, the Santa Clara River, including grading, bank stabilization, haul routes, and Long Canyon Road bridge. Long Canyon Road bridge is one of the bridge crossings originally considered by the Board for the Specific Plan, and was approved as part of the Specific Plan in that location. Haul routes are proposed to use existing river crossings that are permitted by the Army Corps of Engineers for agricultural uses. Grading is proposed as habitat restoration as well as bank stabilization to revegetate with native vegetation. One hundred-foot buffers are required to be provided by the Specific Plan, and may include bank stabilization, water quality basins, trails and other public facility related uses.

While the EIR concluded that not all impacts from Landmark Village can be mitigated to less than significant, all but one factor was already identified as part of the Specific Plan, and the project was approved with the Statement of Overriding Considerations.

Additional time was requested by many organizations to allow time to further evaluate the project. These included requests for approval timing with an evaluation of an EIS for the Santa Clara River itself.

FEES/DEPOSITS

If approved as recommended by staff, the following shall apply:

California Department of Fish and Game:

1. Processing fee of $875.00 associated with the filing and posting of a Notice of Determination with the County Clerk, to defray the costs of fish and wildlife protection and management incurred by the California Department of Fish and Game.

Fire Department:

2. Cost recovery deposit of $5,000.00 to cover a preconstruction meeting, and subsequent monitoring over a five-year period to determine compliance with the Oak Tree Permit.

Department of Regional Planning, Impact Analysis:

3. Deposit of $3,000.00 to defray the costs of reviewing the subdivider's reports and verifying compliance with the information required by the Mitigation Monitoring Program.

Department of Regional Planning, Zoning Enforcement:

4. Cost recovery deposit of $1,500.00 to cover the cost of 10 recommended zoning enforcement inspections (recommend two a year for a five-year period). Additional funds would be required if violations are found on the subject property.

STAFF RECOMMENDATION

The following recommendation is subject to change based on oral testimony or documentary evidence submitted during the public hearing process.

Based on the number of requests for additional time, staff recommends that the Commission continue the public hearing to consider all testimony on the project, including the Draft EIR. Staff also recommends that the Commission formally continue the public review period of the EIR to coincide with the continued date.

Suggested Motion: "I move that the Regional Planning Commission continue the public hearing to allow time for interested parties as they have requested, to continue to allow additional time for review the project and provide comments, and to contine the public comment period for the Draft EIR to coincide with the continued public hearing date of _____, 2007."

Attachments:

- Draft Conditions
- Conditional Use Permit Burdens of Proof
- Oak Tree Permit Burden of Proof
- Vesting Tentative Tract Map No. 53108 - reduced size copy
- Conditional Use Permit Case Nos.001-96 and 2005-01121 Exhibit "A" – reduced size copy
- Land Use Map
- Correspondence
- From Applicant: Landmark Planning Notebook, January 2007

SMT:st
01/25/07

RP

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION – SUBDIVISION
TRACT NO. 53108 (Rev.)

TENTATIVE MAP DATED 11-07-2005
EXHIBIT MAP DATED 11-07-2005

The following reports consisting of 30 pages are the recommendations of Public Works.

The subdivision shall conform to the design standards and policies of Public Works, in particular, but not limited to the following items:

1. Details and notes shown on the tentative map are not necessarily approved. Any details or notes which may be inconsistent with requirements of ordinances, general conditions of approval, or Department policies must be specifically approved in other conditions, or ordinance requirements are modified to those shown on the tentative map upon approval by the Advisory agency.

2. Easements are tentatively required, subject to review by the Director of Public Works to determine the final locations and requirements.

3. Easements shall not be granted or recorded within areas proposed to be granted, dedicated, or offered for dedication for public streets, highways, access rights, building restriction rights, or other easements until after the final map is filed with the Registrar-Recorder/County Clerk's Office. If easements are granted after the date of tentative approval, a subordination must be executed by the easement holder prior to the filing of the final map.

4. In lieu of establishing the final specific locations of structures on each lot/parcel at this time, the owner, at the time of issuance of a grading or building permit, agrees to develop the property in conformance with the County Code and other appropriate ordinances such as the Building Code, Plumbing Code, Grading Ordinance, Highway Permit Ordinance, Mechanical Code, Zoning Ordinance, Undergrounding of Utilities Ordinance, Water Ordinance, Sanitary Sewer and Industrial Waste Ordinance, Electrical Code, and Fire Code. Improvements and other requirements may be imposed pursuant to such codes and ordinances.

5. All easements existing at the time of final map approval must be accounted for on the approved tentative map. This includes the location, owner, purpose, and recording reference for all existing easements. If an easement is blanket or indeterminate in nature, a statement to that effect must be shown on the tentative map in lieu of its location. If all easements have not been accounted for, submit a corrected tentative map to the Department of Regional Planning for approval.

HW

6. Adjust, relocate, and/or eliminate lot lines, lots, streets, easements, grading, geotechnical protective devices, and/or physical improvements to comply with ordinances, policies, and standards in effect at the date the County determined the application to be complete all to the satisfaction of Public Works.

7. Prior to final approval of the tract map submit a notarized affidavit to the Director of Public Works, signed by all owners of record at the time of filing of the map with the Registrar-Recorder/County Clerk's Office, stating that any proposed condominium building has not been constructed or that all buildings have not been occupied or rented and that said building will not be occupied or rented until after the filing of the map with the Registrar-Recorder/County Clerk's Office.

8. Place standard condominium/residential planned development/commercial planned development/Landscape Maintenance District notes on the final map to the satisfaction of Public Works. The formation of the Landscape Maintenance District for all median and parkway landscaping must be approved by the Department of Parks and Recreation.

9. Place standard lease purpose only notes on the final map to the satisfaction of Public Works.

10. Label driveways and multiple access strips as "Private Driveway and Fire Lane" and delineate on the final map to the satisfaction of Public Works.

11. Reserve reciprocal easements for drainage, ingress/egress, utilities, and maintenance purposes, etc., in documents over the private driveways and delineate on the final map to the satisfaction of Public Works.

12. If unit filing occurs, reserve reciprocal ingress and egress easements in documents over the private driveways and delineate on the final map to the satisfaction of Public Works.

13. Furnish Public Works' Street Name Unit with a list of street names acceptable to the subdivider. These names must not be duplicated within a radius of 20 miles.

14. A Mapping & Property Management Division house numbering clearance is required prior to approval of the final map.

15. Design t he boundaries of the unit final maps to the satisfaction of the Departments of Regional Planning and Public Works.

16. The first unit of this subdivision shall be filed as Tract No. 53108-01, the second unit, Tract No. 53108-02, ... and the last unit, Tract No. 53108.

17. A final tract map must be processed through the Director of Public Works prior to being filed with the Registrar-Recorder/County Clerk's Office.

18. Prior to submitting the tract map to the Director of Public Works for examination pursuant to Section 66442 of the Government Code, obtain clearances from all affected Departments and Divisions, including a clearance from the Subdivision Mapping Section of the Land Development Division of Public Works for the following mapping items; mathematical accuracy; survey analysis; and correctness of certificates, signatures, etc.

19. Quitclaim or relocate easements running through proposed structures.

20. A final guarantee will be required at the time of filing of the final map with the Registrar-Recorder/County Clerk's Office.

21. Show open space note and dedicate residential construction rights over the open space lots.

22. If all possible, modify the boundaries of the open space lots or add additional open space lots to include the airspace easements for sight distance to the satisfaction of the Department of Regional Planning and Public Works.

23. Permission is granted to record large lots (20-acre or more) parcel map as shown on the insert map provided full street right of way and slope easements are dedicated along the latest IEC approved alignments on Route 126 (Henry Mayo Drive) and Long Canyon Road to the satisfaction of the Department of Public Works. In addition, make an offer of private and future right of way and dedicate slope easements along all remaining interior streets on alignments to the satisfaction of Public Works. This permission is contingent on deletion of the secondary highway south of and parallel to SR 126 from the County Highway Plan.

24. Within 30 days of the approval date of this land use entitlement or at the time of first plan check submittal, the applicant shall deposit the sum of $2,000 (Minor Land Divisions) or $5,000 (Major Land Divisions) with Public Works to defray the cost of verifying conditions of approval for the purpose of issuing final map clearances. This deposit will cover the actual cost of reviewing conditions of approval for Conditional Use Permits, Tentative Tract and Parcel Maps, Vesting Tentative Tract and Parcel Maps, Oak Tree Permits, Specific Plans, General Plan Amendments, Zone Changes, CEQA Mitigation Monitoring Programs and Regulatory Permits from State and Federal Agencies (Fish and Game, USF&W, Army Corps, RWQCB, etc.) as they relate to the various plan check activities and improvement plan designs. In addition, this deposit will be used to conduct site field reviews and attend meetings requested by the applicant and/or his agents for the purpose of resolving technical issues on condition compliance as they relate to improvement plan design, engineering studies, highway alignment studies and tract/parcel map boundary, title and easement issues. When 80% of the deposit is expended, the applicant will be required to provide additional funds to restore the initial deposit. Remaining balances in the deposit account will be refunded upon final map recordation.

HW

Prepared by Henry Wong Phone (626) 458-4915 Date 12-29-2005

tr53108L-rev9.doc

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
SUBDIVISION PLAN CHECKING SECTION
DRAINAGE AND GRADING UNIT

TRACT NO. 53108

REV TENTATIVE MAP DATED 11/07/05
EXHIBIT MAP 11/07/05

DRAINAGE CONDITIONS

1. Provide drainage facilities to remove the flood hazard and dedicate and show necessary easements and/or right of way on the final map. This is required to the satisfaction of the Department of Public Works prior to the filing of the final map.

2. Place a note of flood hazard on the final map and delineate the areas subject to flood hazard. Show and label all natural drainage courses. Dedicate to the County the right to restrict the erection of buildings in the flood hazard area. This is required to the satisfaction of the Department of Public Works prior to the filing of the final map.

3. A hydrology study for design of drainage facilities is required. Hydrology study must be submitted and approved prior to submittal of improvement plans. This is required to the satisfaction of the Department of Public Works prior to the filing of the final map.

4. Provide fee title lot for debris basins/inlets to the satisfaction of the Department of Public Works.

5. A maintenance permit is required from the State Department of Fish and Game, the Corps of Engineers, and the State Water Resources Control Board for debris basins with a minimum capacity of 5,000 cubic yards. This is required to the satisfaction of the Department of Public Works prior to the filing of the final map.

6. Notify the State Department of Fish and Game prior to commencement of work within any natural drainage course. If non-jurisdiction is established by the Department of Fish and Game, submit a letter of non-jurisdiction to Public Works (Land Development Division).

7. Contact the State Water Resources Control Board to determine if a Notice of Intent (NOI) and a Storm Water Pollution Prevention Plan (SWPPP) are required to meet National Pollution Discharge Elimination System (NPDES) construction requirements for this site.

8. Contact the Corps of Engineers to determine if a permit is required for any proposed work within the major watercourse. Provide a copy of the 404 Permit upon processing of the drainage plans. If non-jurisdiction is established by the Corps of Engineers, submit a letter of non-jurisdiction to Public Works (Land Development Division).

9. This site is located in Zone "A" per the Federal Flood Insurance Rate Map. Public Works, Watershed Management Division (626) 458-4322, should be contacted to obtain procedures for revising the flood insurance rate map once the storm drain facilities are constructed. Encroachment into FEMA Zone "A" is not permitted prior to obtaining a Conditional Letter of Map Revision (CLOMR) from FEMA.

10. Comply with the requirements of the Drainage Concept / Standard Urban Stormwater Mitigation Plan (SUSMP) plan which was conceptually approved on 11/29/06 to the satisfaction of Public Works.

11. Prior to recordation of the final map, form an assessment district to finance the future ongoing maintenance and capital replacement of all SUSMP devices/systems. The developer shall cooperate fully with Public Works in the formation of the assessment district. SUSMP devices/systems may include, but are not limited to, catch basin inserts, debris excluders, biotreatment basins, vortex separation type systems, and other devices/systems for stormwater quality.

12. Prior to recordation of the final map, the developer shall deposit the first year's total assessment based on the engineers estimate as approved by Public Works. This will fund the first year's maintenance after the facilities are accepted. The second and subsequent years assessment will be collected through the property tax bill.

TRACT NO. 53108

REV TENTATIVE MAP DATED 11/07/05
EXHIBIT MAP 11/07/05

13. Portions of the County Adopted Floodway (maps 43-ML23, 43-ML24, 43-ML25, and 43-ML26) must be revised and/or rescinded by the Board of Supervisors prior to recordation of final map. The project will involve placement of earth fill within the existing Santa Clara River and result in relocating the River through the construction of the improvements. The proposed flood control improvements for this project affecting the County Adopted Floodways include (1) soil cement levee-lining for the fill associated with the development, (2) offsite soil cement levee-lining at south bank of the River, (3) WRP Utility Corridor soil cement levee-lining, (4) SR 126 Utility Corridor non-structural bank erosion protection with Turf Reinforced Mats, and (5) Long Canyon Bridge. The improvements within the existing river will result in relocating the floodplain and require revising the existing County Ordinanced Floodways.

14. The location of the alternative onsite debris basin as shown on the approved drainage concept is not necessarily approved. The location of the basin shall be determined in the hydrology study to the satisfaction of Public Works. Modification of the existing Caltrans culvert may be required. This may require a lot configuration change, a change in the number of lots, a revised drainage concept, a revised environmental document, and/or a revised tentative map.

15. The overflow of the existing Chiquito Landfill basin for the alternative onsite debris basin is not fully addressed in the approved drainage concept. This issue must be addressed in the hydrology study to the satisfaction of Public Works. This may require a lot configuration change, a change in the number of lots, a revised drainage concept, a revised environmental document, and/or a revised tentative map.

16. The sizing and design of the proposed non-structural SUSMP system is not fully addressed in the approved drainage concept. Centralized water treatment devices or equivalent may be used as an alternative to the proposed non-structural SUSMP. The sizing, design, and final locations of the proposed SUSMP mitigation shall be addressed in the hydrology study to the satisfaction of Public Works. This may require a lot configuration change, a change in the number of lots, a revised drainage concept, a revised environmental document, and/or a revised tentative map.

17. Locations of trails as shown on the approved drainage concept are not approved.

18. Maintenance of the trail/fill over buried bank stabilization is not a responsibility of L.A. County or LACFCD. Prior to recordation of the final map, an agreement memorializing the maintenance responsibilities must be in place to the satisfaction of Public Works.

19. The non-structural utility corridor embankment is not to be maintained by LACFCD. Prior to recordation of the final map, an agreement memorializing the maintenance responsibilities must be in place to the satisfaction of Public Works.

20. Comply with the requirements of "Newhall Ranch Santa Clara River HEC-RAS Modeling Report dated December 2005 (I-5 to Ventura County Line)" and "Newhall Ranch-Santa Clara River Phase 1 Fluvial Study dated March 6, 2006 (final date pending)" approved on 04/18/06 and the approval letter from Land Development Division of LACDPW.

21. Prior to final map recordation, the top and toe elevations for the levee-lining will require further analysis of the Newhall Ranch Development within the tributary drainage areas and the evaluation of the resulting fluvial impacts (if any) to the Santa Clara River as related to changes in tributary sediment delivery pre- versus post-development condition. The final design and permitting for this tract development requiring bank protection will be based upon the final results as concluded in the "HEC-RAS AND PHASE 1 FLUVIAL ANALYSIS" approved on 04/18/06 and the Phase 2 Fluvial Studies under process and yet to be finished.

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GRADING CONDITIONS:

1. A grading plan and soil and geology report must be submitted and approved prior to approval of the final map. The grading plans must show and call out the construction of at least all the drainage devices and details, the paved driveways, the elevation and drainage of all pads, and the SUSMP devices. The applicant is required to show and call out all existing easements on the grading plans and obtain the easement holder approvals prior to the grading plans approval.

Name Gary Guo GARY GUO Date 11/29/06 Phone (626) 458-4921

County of Los Angeles Department of Public Works
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION
GEOLOGIC REVIEW SHEET
900 So. Fremont Ave., Alhambra, CA 91803
TEL. (626) 458-4925

DISTRIBUTION
1 Geologist
__ Soils Engineer
1 GMED File
1 Subdivision

TENTATIVE TRACT MAP 53108
TENTATIVE MAP DATED 11/7/05 (Revision)
SUBDIVIDER Newhall Land & Farming Co. / Newhall Ranch Co.
LOCATION Newhall Ranch
ENGINEER Psomas
GEOLOGIST & SOILS ENGINEER Allan Seward
REPORT DATE 2/10/01, 9/27/00 (00-1702R-4)

[X] **TENTATIVE MAP FEASIBILITY IS RECOMMENDED FOR APPROVAL. PRIOR TO FILING THE FINAL LAND DIVISION MAP, THE FOLLOWING CONDITIONS MUST BE FULFILLED:**

[X] The final map must be approved by the Geotechnical and Materials Engineering Division (GMED) to assure that all geotechnical factors have been properly evaluated.

[X] A grading plan must be geotechnically approved by the GMED. This grading plan must be based on a detailed engineering geology report and/or soils engineering report and show all recommendations submitted by them. Reports must address grading shown on sheet 5 of the Tentative Map. It must also agree with the tentative map and conditions as approved by the Planning Commission. If the subdivision is to be recorded prior to the completion and acceptance of grading, corrective geologic bonds will be required.

[X] All geologic hazards associated with this proposed development must be eliminated,

or

delineate restricted use areas, approved by the consultant geologist and/or soils engineer, to the satisfaction of the Geology and Soils Sections, and dedicate to the County the right to prohibit the erection of buildings or other structures within the restricted use areas.

[ ] A statement entitled: "Geotechnical Note(s). Potential Building Site: For grading and corrective work requirements for access and building areas for Lot(s) No(s). _____ refer to the Soils Report(s) by _____ ,dated _____ ."

[X] The Soils Engineering review dated 12/28/05 is attached.

[ ] **TENTATIVE MAP IS APPROVED FOR FEASIBILITY. THE FOLLOWING INFORMATION IS APPLICABLE TO THIS DIVISION OF LAND:**

[ ] This project may not qualify for a waiver of final map under section 21.48.140 of the Los Angeles County Title 21 Subdivision Code.

[ ] The subdivider is advised that approval of this division of land is contingent upon the installation and use of a sewer system.

[ ] Geology and/or soils engineering reports may be required prior to approval of building or grading plans.

[ ] Groundwater is less than 10 feet from the ground surface on lots _____

[ ] The Soils Engineering review dated _____ is attached.

Prepared by _____ Geir R. Mathisen Reviewed by _____ Date 12/6/05

:\MyFiles\Geir\Geology Review\Review Sheets\District 8.2\Tracts\53108, TM10 APP.doc
/27/05

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION

SOILS ENGINEERING REVIEW SHEET

Address: 900 S. Fremont Ave., Alhambra, CA 91803
Telephone: (626) 458-4925
Fax: (626) 458-4913

District Office 8.2
Job Number LX001129
Sheet 1 of 1

DISTRIBUTION:
___ Drainage
___ Grading
___ Geo/Soils Central File
___ District Engineer
___ Geologist
___ Soils Engineer
___ Engineer/Architect

Tentative Tract Map	53108
Location	Newhall Ranch
Developer/Owner	Newhall Land and Farming Company
Engineer/Architect	Psomas
Soils Engineer	Allen E. Seward
Geologist	Same as above

Review of:

Revised Tentative Tract Map Dated By Regional Planning 11/7/05

Previous review sheet dated 8/31/05

ACTION:

Tentative Map feasibility is recommended for approval, subject to conditions below:.

REMARKS:

At the grading plan stage:

1. Provide geotechnical report addressing all the offsite grading shown on the Tentative Map.
2. Submit two sets of grading plans to the Soils Section for verification of compliance with County codes and policies.

NOTE TO PLAN CHECKER / APPLICANT:

ANY EXTENSIVE REVISIONS TO THE PROPOSED GRADING DETERMINED TO BE REQUIRED AT THE GRADING STAGE FOR THE OFFSITE AREA MAY REQUIRE A REVISED TENTATIVE TRACT MAP.

REGISTERED PROFESSIONAL ENGINEER AMIR M. ALAM No. C48738 Exp. 03.06 CIVIL STATE OF CALIFORNIA

Reviewed by _____ Amir M. Alam Date 12/28/05

NOTICE: Public safety, relative to geotechnical subsurface exploration, shall be provided in accordance with current codes for excavations, inclusive of the Los Angeles County Code, Chapter 11.48, and the State of California, Title 8, Construction Safety Orders.

P:\Amir\53108Tent

The subdivision shall conform to the design standards and policies of Public Works, in particular, but not limited to the following items:

1. A minimum centerline curve length of 100 feet shall be maintained on all local streets. A minimum centerline curve radius of 100 feet shall be maintained on all cul-de-sac streets. Reversing curves of local streets need not exceed a radius of 1,500 feet, and any curve need not exceed a radius of 3,000 feet.

2. The minimum centerline radius is 350 feet on all local streets with 64 feet of right of way and on all the streets where grades exceed 10 percent.

3. Compound curves are preferred over broken-back curves. Broken-back curves must be separated by a minimum of 200 feet of tangent (1,000 feet for multi-lane highways or industrial collectors). If compound curves are used, the radius of the smaller curve shall not be less than two-thirds of the larger curve. The curve length of compound curves shall be adjusted to exceed a minimum curve length of 100 feet, when appropriate.

4. Curves through intersections should be avoided when possible. If unavoidable, the alignment shall be adjusted so that the proposed BC and EC of the curve through the intersection are set back a minimum of 100 feet away from the BCR's of the intersection.

5. Reversing curves and compound curves through intersections should be avoided when possible. If unavoidable, the minimum centerline radius of reversing curves and compound curves through intersections shall comply with design speeds per the Subdivision Plan Checking Section's "Requirements for Street Plans" and sight distances.

6. The minimum centerline radius on a local street with an intersection street on the concave side shall comply with design speeds per the Subdivision Plan Checking Section's "Requirements for Street Plans" and sight distances.

7. The centerline of all local streets shall be aligned without creating jogs of less than 150 feet. A one-foot jog may be used where a street changes width from 60 feet to 58 feet of right of way.

8. Provide minimum landing area of 100 feet for local collectors, 50 feet for local access roads, and 25 feet for cul-de-sacs at a maximum 3 percent grade on all "tee" intersections.

9. The central angles of the right of way radius returns shall not differ by more than 10 degrees on local streets.

10. At tee intersections involving local streets, the maximum permissible grade of the through street across the intersection is 10 percent. For intersections involving multi-lane highways, the maximum permissible grade of the through street is three percent. For 4-legged intersections, the maximum permissible grade of the through street is 8 percent.

11. Provide intersection sight distance for a design speed of:

    a. 70 mph or to the satisfaction of Public Works and Caltrans on SR-126 (westerly direction) from Long Canyon Road;

    b. 60 mph (650 feet) on Long Canyon Road from the commercial driveway serving Lot 351/353 (northerly direction) and from the commercial driveway serving Lot 367/368(southerly direction);

    c. 45 mph (465 feet) on "A" Street from the commercial driveway serving lot 352 (easterly direction, looking towards the center of the through lane on the northerly side of "A" Street east of Long Canyon Road); from the commercial driveway serving lots 367/375 (easterly direction); from the commercial driveway serving lots 374/375 (westerly direction), if a left-turn movement is proposed; from the park driveway serving lot 344 (easterly direction); from the school driveway lot 345 (easterly direction); from "L" Street (westerly direction); from "N" Street (both directions);

    d. 30 mph (310 feet) on "C' Street from "D" Street (southwesterly direction); on "F' Street from "D" Street (easterly direction); on "J" Street from "K" Street (westerly direction); on "N" Street from the westerly intersection with "Q" Street (easterly direction); on "O" Street from "N" Street (southerly direction); on "O" Street from the easterly intersection with "Q" Street (southwesterly direction); on "Q" Street from the westerly intersection with "N" Street (northerly direction); and on "Q" Street from the easterly intersection with "N" Street (northwesterly direction).

Line of sight shall be within right of way or dedicate airspace easements to the satisfaction of Public Works. Additional grading may be required. With respect to the position of the vehicle at the minor road, the driver of the vehicle is presumed to be located 4 feet right of centerline and 10 feet back the top of curb (TC) or flow line (FL) prolongation. When looking left, we consider the target to be located at the center of the lane nearest to the parkway curb. We use 6 feet from TC as a conservative rule, in the case of pop outs we use 6 feet from TC of the travel lane. When looking right, the target is the center of the lane nearest to the centerline or from the median TC (when present). We use 6 feet from centerline or from the median TC as a conservative rule.

12. Provide standard property line return radii of 13 feet at all local street intersections, including intersection of local streets with planned highways (those on the County Highway Plan), 27 feet where all planned highways intersect or where one of the roads serves a commercial or industrial development, or to the satisfaction of Public Works.

13. Dedicate vehicular access rights on SR-126, unless the Department of Regional Planning requires the construction of a wall. In such cases, complete access rights shall be dedicated.

14. Dedicate right of way to the satisfaction of Public Works and Caltrans a minimum of 70 feet from the latest approved centerline on Henry Mayo Drive (SR-126). The proposed 140-foot typical section of Henry Mayo Drive (SR-126) is conditionally approved. Approval is contingent on the traffic study demonstrating that the projected traffic volumes do not exceed the capacity of this roadway. If so, provide additional right of way for additional lanes, exclusive left-turn lanes, exclusive right-turn lanes, and transition improvements to the satisfaction of Public Works and Caltrans. The cross sections and lane configurations as shown are not necessarily approved and are still subject to review and approval to the satisfaction of Public Works.

15. Make an offer of future right of way and provide slope easements at the future Henry Mayo Drive (SR-126) / Long Canyon Road Interchange and Henry Mayo Drive (SR-126) / Wolcott Road Interchange to the satisfaction of Public Works.

16. Design all affected intersections and driveway entrances along Long Canyon Road and Wolcott Road to be compatible with vertical approaches to the future grade separations at the Henry Mayo Drive (SR-126) interchanges and at the Santa Clara River to the satisfaction of Public Works.

17. The Newhall Ranch Specific Plan also included a secondary highway through this tract (south of and parallel to SR-126). The deletion of this future highway requires the filing of a highway plan amendment through the IEC. For more information, please contact Barry Witler at (626) 458-4351.

18. Dedicate right of way a minimum of 57 feet (no parking, on street bike lane) from the latest approved centerline on Long Canyon Road per P-265(PW) to the satisfaction of Public Works.

    a. Long Canyon Road within this tract is a major highway added to the County Highway Plan through the adoption of the Newhall Ranch Specific Plan. The applicant shall prepare an alignment for Long Canyon Road and obtain Public Works approval. An exception for a 60 mph design speed for Long Canyon Road within Tract 53108 must be approved by Public Works. For more information, please contact Barry Witler at (626) 458-4351.

    b. Approval is contingent on the traffic study demonstrating that the projected traffic volumes do not exceed the capacity of this roadway. If so, provide additional right of way for exclusive left-turn lanes, exclusive right-turn lanes, and transition improvements on Long Canyon Road.

    b. The cross sections and lane configurations as shown are not necessarily approved and are still subject to review and approval to the satisfaction of Public Works.

    c. Permission is granted to use modified street sections on Long Canyon Road subject to review and approval to the satisfaction of Public Works. The proposed 114-foot typical sections are conditionally approved with a median width of 14 feet and pavement on each side of the raised median at least 42 feet wide between curbs.

    d. Dedicate additional right of way on Long Canyon Road in the vicinity of the bridge to provide full-width sidewalk with 8 feet of clearance on the bridge."

    e. Maintain a minimum of 8 feet wide parkway on Long Canyon Road.

    f. Establish a landscape maintenance district, subject to the approval of the Department of Parks and Recreation, for the purpose of maintaining the landscaped medians and parkways (if applicable) on Long Canyon Road.

19. Dedicate 110 feet of right of way on "A" Street from Long Canyon Road to Wolcott Road for design speed of 45 mph to the satisfaction of Public Works.

    a. Approval is contingent on the traffic study demonstrating that the projected traffic volumes do not exceed the capacity of this two-lane roadway. If so, provide additional right of way for additional lanes, exclusive left-turn lanes, exclusive right-turn lanes, and transition improvements.

    b. The cross sections and lane configurations as shown are not necessarily approved and are still subject to review and approval to the satisfaction of Public Works.

    c. Permission is granted to use modified street sections along "A" Street from Long Canyon Road to Wolcott Road subject to review and approval to the satisfaction of Public Works. The proposed 110-foot typical sections of "A" Street are conditionally approved with a median width of 14 feet and pavement on each side of the raised median at least 30 feet wide between curbs to accommodate one travel lane, a striped bike lane, and a parking lane.

    d. Maintain a minimum of 12 feet wide parkway on "A" Street.

    e. The details of the sidewalks, landscaping, and swales in the parkway are not necessarily approved. Establish a landscape maintenance district, subject to the approval of the Department of Parks and Recreation, for the purpose of maintaining the landscaped medians and parkways on "A" Street.

20. Dedicate right of way 53 feet from the centerline on Wolcott Road from Henry Mayo Drive (SR-126) to "A" Street for design speed of 45 mph to the satisfaction of Public Works.

    a. Approval is contingent on the traffic study demonstrating that the projected traffic volumes do not exceed the capacity of this two-lane roadway. If so, provide additional right of way for exclusive left-turn lanes, exclusive right-turn lanes, and transition improvements.

    b. The cross sections and lane configurations as shown are not necessarily approved and are still subject to review and approval to the satisfaction of Public Works.

c. Permission is granted to use modified street sections on Wolcott Road. The proposed 106-foot street section on Wolcott Road is conditionally approved. Design the cross sections for Wolcott Road to provide lane configurations: with a median width of 14 feet and pavement on each side of the raised median at least 26 feet curb to curb (no parking, no bike lane), 32 feet curb to curb (on street parking, no bike lane), or 31 feet curb to curb (no parking, on street bike lane) and parkway width to the satisfaction of Public Works. Provide standard lane configurations based on cross sections for a secondary highway in accordance with Section 21.24.065 of the Subdivision Ordinance proposed cross sections and/or based on the approved traffic study to the satisfaction of Public Works.

d. The details of the sidewalks and landscaping in the parkway are not necessarily approved. Establish a landscape maintenance district, subject to the approval of the Department of Parks and Recreation, for the purpose of maintaining the landscaped medians and parkways on Wolcott Road.

21. Dedicate additional right of way at all proposed roundabout locations to the satisfaction of Public Works.

22. Dedicate the right to restrict vehicular access on Long Canyon Road, Wolcott Road and "A" Street. All proposed driveway locations, driveway widths, median setbacks, and median openings as shown on the tentative map are not necessarily approved and are still subject to review and approval to the satisfaction of Public Works.

23. Dedicate right of way 42 feet from centerline including a standard cul-de-sac bulb on "Y" Street for a design speed of 45 mph to the satisfaction of Public Works. If required, provide additional right of way at the intersection with Long Canyon Road to the satisfaction of Public Works.

24. Dedicate right of way 32 feet from centerline on "A" Street from Wolcott Road to "D" Street.

25. Dedicate right of way 29 feet from centerline on "A" Street from "D" Street to "C" Street, "B" Street, "C" Street, " D" Street, " E" Street, " F" Street, "G" Street, "H" Street, "I" Street, "J" Street, "K" Street, "L" Street, "M" Street, "N" Street, "O" Street, "Q" Street, and "Z" Street.

26. Permission is granted to use the 58-foot modified local street section with 34 feet in roadway width with parking allowed on both sides of the street.

27. Dedicate additional right of way for standard knuckles and standard cul-de-sac bulbs to the satisfaction of Public Works.

28. Construct curb, gutter, base, pavement, and sidewalk on all streets and highways (except SR-126.) to the satisfaction of Public Works.

29. Construct improvements along the property frontage on Henry Mayo Drive (SR-126) to the satisfaction of Caltrans.

30. Construct additional pavement on Henry Mayo Drive (SR-126) as may be determined necessary to mitigate project impacts to provide exclusive right-turn lanes, left-turn lanes, and transitions at entrance street intersections to the satisfaction of Public Works and Caltrans.

31. Obtain an encroachment permit from Caltrans for all improvements along Henry Mayo Drive (SR-126).

32. Plant street trees on all local streets and highways (except SR-126).

33. Construct the pedestrian bridge over Henry Mayo Drive (SR-126) to the satisfaction of Public Works and Caltrans. The foundation of the pedestrian bridge shall be located outside of the road right of way.

34. Construct a slough wall outside the street right of way when the height of the slope is greater than five feet above the sidewalk and the sidewalk is adjacent to the street right of way. The wall shall not impede any required line of sight.

35. Construct drainage improvements (and parkway drains, if needed) and offer easements needed for street drainage or slopes to the satisfaction of Public Works. Where streets or highways are located within flood hazard areas or subject to inundation, provide adequate freeboard and slope protection to the satisfaction of Public Works. Construct adequate embankment protection along any sections of highways or streets located within flood plain boundaries or subject to inundation. Adequate freeboard shall also be provided.

36. Underground all existing service lines and distribution lines that are less than 50 KV and new utility lines to the satisfaction of Public Works and Southern California Edison. Please contact Construction Division at (626) 458-3129 for new location of any above ground utility structure in the parkway.

37. Install postal delivery receptacles in groups to serve two or more residential lots.

38. Provide and install street name signs prior to occupancy of buildings.

39. Prior to final map approval, enter into an agreement with the County franchised cable TV operator (if an area is served) to permit the installation of cable in a common utility trench to the satisfaction of Public Works, or provide documentation that steps to provide cable TV to the proposed subdivision have been initiated to the satisfaction of Public Works.

40. Comply with the following street lighting requirements:

    a. Provide street lights on concrete poles with underground wiring within the tract boundaries on all streets and highways including Henry Mayo Drive (SR-126) to the satisfaction of Public Works and Caltrans. Submit street lighting plans as soon as possible for review and approval to the Street Lighting Section of the Traffic and Lighting Division. For additional information, please contact the Street Lighting Section at (626) 300-4726.

    b. The proposed development, or portions thereof, are not within an existing Lighting District. Annexation and assessment balloting are required. Upon tentative map approval, the applicant shall comply with conditions listed below in order for the Lighting District to pay for the future operation and maintenance of the street lights. The Board of Supervisors must approve the annexation and levy of assessment (should assessment balloting favor levy of assessment) prior to filing of the final subdivision maps for each area with the Registrar-Recorder/County Clerk.

        (1) Request the Street Lighting Section to commence annexation and levy of assessment proceedings.

        (2) Provide business/property owner's name(s), mailing address(es), site address, Assessor Parcel Number(s), and Parcel Boundaries in either Microstation or Auto CADD format of territory to be developed to the Street Lighting Section.

        (3) Submit a map of the proposed development including any roadways conditioned for street lights that are outside the proposed project area to Street Lighting Section. Contact the Street Lighting Section for map requirements and with any questions at (626) 300-4726.

c. The annexation and assessment balloting process takes approximately ten to twelve months to complete once the above information is received and approved. Therefore, untimely compliance with the above will result in a delay in receiving approval of the street lighting plans or in filing the final subdivision map for recordation. Information on the annexation and the assessment balloting process can be obtained by contacting Street Lighting Section at (626) 300-4726.

d. For acceptance of street light transfer of billing, the area must be annexed into the Lighting District and all street lights in the development, or the current phase of the development, must be constructed according to Public Works approved plans. The contractor shall submit one complete set of "as-built" plans. Provided the above conditions are met, all street lights in the development, or the current phase of the development, have been energized, and the developer has requested a transfer of billing at least by January 1 of the previous year, the Lighting District can assume responsibility for the operation and maintenance of the street lights by July 1 of any given year. The transfer of billing could be delayed one or more years if the above conditions are not met.

41. Prepare detailed 1" = 40' scaled signing and striping plans for Henry Mayo Drive (SR-126), Long Canyon Road, Wolcott Road, "Y" Street, and "A" Street within or abutting this subdivision to the satisfaction of Public Works and Caltrans.

42. Prepare detailed 1" = 40' scaled signing and striping plans for all off-site intersections affected by this subdivision as indicated in the attached letter dated December 9, 2004 from our Traffic and Lighting Division to the satisfaction of Public Works and Caltrans.

43. As indicated in the attached letter dated December 9, 2004 from our Traffic and Lighting Division, install traffic signals (both on-site and off-site) for all signalized intersections and prepare 1" = 20' scaled traffic signal plans to the satisfaction of Public Works. If required, provide additional right of way to the satisfaction of Public Works.

44. Comply with the mitigation measures (including off-site improvements) identified in the attached December 9, 2004 letter from our Traffic and Lighting Division to the satisfaction of Public Works. It shall be the sole responsibility of the subdivider to acquire the necessary off-site right of way and/or easements.

45. If needed, the location of the driveway to Lot 352 and the southerly driveway to Lot 354 on "Y" Street shall be relocated to reflect the conceptual plan to the satisfaction of Public Works.

46. Setback the raised median nose a minimum of 20 feet from the right of way within private driveway and fire lanes on all lots to the satisfaction of Public Works.

47. Setback the raised median noses a minimum of 20 feet on all streets to the satisfaction of Public Works.

48. Provide adequate spacing (minimum of 50 feet) on the northerly driveway to Lot 354 between the right of way and the first curb opening to the parking area for buildings A and B (shown on Exhibit Map Sheet 7 of 12) to the satisfaction of Public Works.

49. Permission is granted to record large lots (20 acre or more) parcel map as shown on the insert map provided full street right of way and slope easements are dedicated along the latest approved alignments on Henry Mayo Drive (SR-126) and Long Canyon Road to the satisfaction of Public Works. In addition, make an offer of private and future right of way and dedicate slope easements along all remaining interior streets (including Wolcott Road) on alignments to the satisfaction of Public Works. This permission is contingent on deletion of the secondary highway south of and parallel to SR-126 from the County Highway Plan.

50. Permission is granted to use modified street cross-sections as shown on the tentative map to the satisfaction of Public Works. However, the subdivider may elect to construct standard and/or alternate street cross section to the satisfaction of Public Works. If alternate street cross sections are proposed, construct additional sidewalk pop-out along the property frontage on all applicable streets in the vicinity of any above ground utilities to meet current ADA requirements to the satisfaction of Public Works.

51. All site plans shall be reviewed and approved by Public Works prior to final approval.

52. Additional comments/requirements:

- The street profiles along Long Canyon Road and Wolcott Road showing the vertical approach to the proposed interchanges, the at-grade intersections at SR-126 (Henry Mayo Drive), and at the Santa Clara River (Long Canyon Road only) as shown on the tentative map are not necessarily approved. The design and construction on Long Canyon Road and Wolcott Road must be compatible with the ultimate improvements on SR-126 and the Santa Clara River (Long Canyon Road only) to the satisfaction of Public Works.

HW
Prepared by Timothy Chen Phone (626) 458-4915 Date 12-29-2005
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COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
www.ladpw.org

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE. T-4

December 9, 2004

Mr. Daryl Zerfass
Austin-Foust Associates, Inc.
2020 North Tustin Avenue
Santa Ana, CA 92705-7827

Dear Mr. Zerfass:

RIVER VILLAGE
TENTATIVE TRACT NO. 53108
TRAFFIC IMPACT ANALYSIS (SEPTEMBER 28, 2004)
CASTAIC JUNCTION AREA

As requested, we have reviewed the above-mentioned document. The project is located in the unincorporated County of Los Angeles area of Castaic Junction. The project site is bounded by State Route (SR) 126 to the north, the Santa Clarita River to the south, and the Castaic Creek to the east.

The proposed project, River Village, is the first phase of the Newhall Ranch Specific Plan (NRSP). The NRSP has been approved for approximately 21,000 residential dwelling units. River Village consists of the development of 591 single-family detached dwelling units, 398 condominium units and 455 apartments units for a total of 1,444 residential dwelling units; a 750 student elementary school; a 20.9-acre public park; and 1,040,000 square feet of commercial uses. The project is estimated to generate approximately 41,880 vehicle trips daily, with 2,910 and 4,160 vehicle trips during the a.m. and p.m. peak hours, respectively. The document addresses the project in three development phases: 2007 for Phase I, 2008 for Phase II, and 2010 for Phase III. Phase I consists of 500 residential units. Phase II consists of the remaining residential units, the elementary school, 100,000 feet of commercial uses, and the public park. Phase III consists of the balance of the commercial uses for 940,000 square feet.

FILE COPY

We have received a separate technical report for the proposed west and east roundabouts for the intersections of Driveway – Tentative Tract No. 53018, Lots 373 and 374; and Wolcott Road; both at "A" Street – Tentative Tract No. 53108, respectively. We will provide additional comment on the roundabouts, as we complete our review of the submitted report.

We generally agree with the traffic impact analysis and require the following traffic impact mitigation measures with the project approval. The traffic impact analysis shall be revised to be consistent with mitigation measures contained in this letter.

- The main access for River Village will be provided from SR-126 via the existing intersections of Wolcott Way and Chiquito Canyon Road. Future phases of the NRSP will provide access to and from south via Long Canyon Road. Unless an updated long range study is prepared which demonstrates that the intersections will adequately handle the area buildout traffic as at grade intersections, adequate road right of way shall be reserved for future grade separated interchanges at these two locations, as approved in the NRSP.

- The study is based on the Santa Clarita Valley Consolidated Traffic Model and assumes the following roadway improvements will be in place with Phase I of the project. In accordance with our Traffic Impact Analysis Report Guidelines (TIARG), these improvements shall be made a condition of approval for the project to be in place prior to issuance of any building permit(s) for Phase I of the project.

  - Reconstruct the Golden State (I-5) Freeway/SR-126 Freeway interchange by adding access to eastbound SR-126 from southbound I-5, access to southbound I-5 from westbound SR-126, direct access to northbound I-5 from westbound SR-126, and widening bridge to 8 lanes.

  - Construct Newhall Ranch Road segment between Vanderbilt Way and Copper Hill Drive/Rye Canyon Road.

- The traffic signals shall be installed at the following intersections. The design and the construction of the traffic signals shall be the sole responsibility of the project. The signals shall be in place at their ultimate design locations prior to the issuance of any building permit(s) for the indicated phase of the project to the satisfaction of Public Works.

Phase I: Wolcott Way at Henry Mayo Drive (SR-126)

Phase II: Chiquito Canyon Road and Long Canyon Road (Future) at Henry Mayo Drive (SR-126)

Phase III: Long Canyon Road at "Y" Street and "A" Street (TT 53108)

- The traffic generated by the project alone will significantly impact the following intersections. The following improvements shall be the sole responsibility of the project and be a condition of approval to be in place prior to the issuance of any building permit(s) for the indicated phase. Detailed striping and signal modification plans must be submitted for review and approval.

PHASE I

Wolcott Way at Henry Mayo Drive (SR-126)

North approach: One left-turn lane, one through lane, and an exclusive right-turn lane (convert shared left-turn/through lane to through lane).

South approach (future): One left-turn lane, one through lane, and an exclusive right-turn lane (add one left-turn lane, convert shared left-turn/through/right-turn lane to through lane and add an exclusive right-turn lane).

Design and install traffic signals to the satisfaction of Public Works.

School Middle Driveway/"Y" Street at "A" Street (TT 53108)

The projects shall be responsible for the preparation of traffic signal design plans and securing adequate funds with Public Works for the full construction of the signals. The intersection will be monitored for the installation of the signals once the school is fully occupied with 750 students.

Chiquito Canyon Road and Long Canyon Road (Future) at Henry Mayo Drive (SR-126)

North approach: One left-turn lane and one shared through/right-turn lane (convert shared left-turn/through lane to left-turn lane and exclusive right-turn lane to shared through/right-turn lane).

East approach: One left-turn lane, two through lanes, and an exclusive right-turn lane (add one left-turn lane and convert shared left-turn/through lane to through lane).

South approach (future): One left-turn lane, one through lane, and an exclusive right-turn lane (add one left-turn lane, convert shared left-turn/through/right-turn lane to through lane and add an exclusive right-turn lane).

PHASE II

Wolcott Way at Henry Mayo Drive (SR-126)

East approach: Two left-turn lanes, two through lanes, and an exclusive right-turn lane (add second left-turn lane, convert shared through/right-turn lane to through lane and add an exclusive right-turn lane).

South approach (future): One left-turn lane, one through lane, and two exclusive right-turn lanes (add second exclusive right-turn lane from Phase I).

West approach: One left-turn lane, two through lanes, and an exclusive right-turn lane (convert through/right-tune to through lane and add an exclusive right-turn lane).

Modify traffic signals to the satisfaction of Public Works.

PHASE III

Golden State (I-5) Freeway Southbound Ramps at Henry Mayo Drive (SR-26)

East approach: Three through lanes and a free right-turn lane (add third through lane).

Modify traffic signals to the satisfaction of Public Works.

Wolcott Way at Henry Mayo Drive (SR-126)

West approach: One left-turn lane, three through lanes, and an exclusive right-turn lane (add third through lane).

Modify traffic signals to the satisfaction of Public Works.

Chiquito Canyon Road and Long Canyon Road (Future) at Henry Mayo Drive (SR-126)

North approach: One left-turn lane, one through lane, and an exclusive right-turn lane (convert shared through/right-turn lane to through lane and add an exclusive right-turn lane).

East approach: Two left-turn lanes, two through lanes, and an exclusive right-turn lane (add second left-turn lane).

South approach (future): One left-turn lane, two through lanes, and two exclusive right-turn lanes (add second through lane and second exclusive right-turn lane).

Modify traffic signals to the satisfaction of Public Works.

- The cumulative traffic generated by the project and other related projects will significantly impact the following intersections. The project shall contribute its proportionate share of the cost for the following mitigation measures. Detailed striping and/or signal modification plans must be prepared to determine the feasibility of the recommended mitigation measures and cost estimate of each mitigation measure.

Golden State (I-5) Freeway Southbound Ramps at Henry Mayo Drive (SR-126)

North approach: Two left-turn lanes, one shared left-turn/through lane, and an exclusive right-turn lane (add one shared left/right-turn lane).

East approach: Four through lanes and one free right-turn lane (add fourth through lane).

West approach: Four through lanes and one free right-turn lane (add third and fourth through lanes).

Modify traffic signals to the satisfaction of Public Works.

The project's total pro-rata share is 38.3 percent. The project may elect to pay by phase as each phase gets recorded: Phase I = 8.3 percent, Phase II = 8.1 percent and Phase III = 21.9 percent.

Golden State (I-5) Freeway Northbound Ramps at Henry Mayo Drive (SR-126)

East approach: Three through lanes and one free right-turn lane (add third through lane).

South approach: Three left-turn lanes and an exclusive right-turn lane (add third left-turn lane).

West approach: Four through lanes and one free right-turn lane (add third and fourth through lanes).

Modify traffic signals to the satisfaction of Public Works.

The project's total pro-rata share is 20.8 percent. The project may elect to pay by phase as each phase gets recorded: Phase I = 4.7 percent, Phase II = 4.0 percent, and Phase III = 12.1 percent.

Wolcott Way at Henry Mayo Drive (SR-126)

North approach: Two left-turn lanes, one through lane, and an exclusive right-turn lane (add second left-turn lane).

East approach: Two left-turn lanes, three through lanes, and an exclusive right-turn lane (add third through lane).

West approach: Two left-turn lanes, three through lanes, and an exclusive right-turn lane (add second left-turn lane).

Modify traffic signals to the satisfaction of Public Works.

The project's total pro-rata share is 62.1 percent. The project may elect to pay by phase as each phase gets recorded: Phase I = 12.2 percent, Phase II = 19.3 percent, and Phase III = 30.6 percent.

Commerce Center Drive at Henry Mayo Drive (SR-126) Interchange

Pay the project's total pro-rata share for the construction of interchange of 33.8 percent. The project may elect to pay by phase as each phase gets recorded: Phase I = 6.6 percent, Phase II = 9.1 percent, and Phase III = 18.1 percent.

- The developer shall coordinate with and notify the Castaic Union School District (CUSD) that traffic circulation plan and the drop-off/pick-up procedures shall be prepared and submitted to Traffic and Lighting Division for review and approval. We recommend a mechanism for enforcement and levying of noncompliance penalties be included in the plan. The CUSD shall prepare informational packets containing the approved drop-off/pick-up procedures and provide to the parents/guardians of students of the school. The recordation of the phase containing Lot 345 where the school is proposed shall be withheld until the student drop-off/pick-up procedures, the informational packets or brochures, and the revised school site plan have been received and approved by Public Works.

- A determination shall be made regarding whether the project has a significant impact on the adjacent I-5 Freeway. Caltrans shall be consulted to obtain their written concurrence with the California Environmental Quality Act level of significance determination. These written comments from Caltrans shall be submitted to Public Works for review and approval.

If you have any questions regarding the traffic analysis and mitigation measures, please contact Mr. Suen Fei Lau of our Land Development Review Section at (626) 300-4820; for questions regarding striping and signing plans, please contact Mr. Sam Richards of our Land Development Review Section at (626) 300-4842; for questions regarding parking restrictions and drop-off/pick-up procedures/program/plan, please contact Ms. Guita Sheik of our Traffic Investigation Section at (626) 300-4712.

Very truly yours,

DONALD L. WOLFE
Interim Director of Public Works

WILLIAM J. WINTER
Assistant Deputy Director
Traffic and Lighting Division

SFL:cn
.EIR04297.doc

cc: Castaic Union School District (Beverly W. Silsbee)
Department of Regional Planning (Daryl Koutnik)

bc: Building and Safety
Land Development (Witler)
Traffic and Lighting (Richards, Sheik)

The subdivision shall conform to the design standards and policies of Public Works, in particular, but not limited to the following items:

1. The subdivider shall install and dedicate main line sewers and serve each building/lot with a separate house lateral or have approved and bonded sewer plans on file with Public Works.

2. The outlet for the proposed sewer system for any unit map must be accepted for public use prior to recordation, otherwise the unit map in question must must have approved and bonded sewer plans for the outlet system extending downstream to public sewer on file with Public Works.

3. The tentative map must conform with the approved master sewer area study PC 11812as (currently in plancheck with Public Works). If the system appurtenances and maintenance responsibilities shown on the tentative map do not match those detailed in the approved study, a revised map is required to the satisfaction of Public Works.

4. Prior to recordation of the first unit map a new sanitation district must be formed to operate and maintain all regional sewer facilities associated with this project including but not limited to pump stations, forcemain and gravity trunk lines, and treatments plants. The subdivider shall provide the initial funding for the setup and operation of this district to the satisfaction of Public Works.

5. Prior to recordation of the first unit map the subdivider shall install and dedicate required regional sewer infrastructure or have approved and bonded sewer plans on file with the Newhall Ranch Sanitation District to the satisfaction of Public Works.

6. Prior to recordation of the first unit map the subdivider shall acquire all regulatory permits necessary for the construction of both local and regional sewer facilities.

7. The subdivider shall submit an area study to Public Works to determine if capacity is available in the proposed sewerage system servicing this land division. The approved sewer area study shall remain valid for two years after initial approval of the tentative map. After this period of time, an update of the area study shall be submitted by the applicant if determined to be warranted by Public Works.

8. If the proposed sewer system shown on the tentative map is found to have insufficient capacity, upgrade the proposed sewerage system (both on and off-site) to the satisfaction of Public Works.

9. Construct regional sewer pump stations to the satisfaction of the Newhall Ranch Sanitation District.

10. Easements are required, subject to review by Public Works to determine the final locations and requirements.

11. Provide any necessary off-site easements to construct the off-site sewer improvements to the satisfaction of the Newhall Ranch Sanitation District. It shall be the sole responsibility of the subdivider to acquire the necessary easements.

HW

Prepared by Nathan Howells Phone (626) 458-4921 Date Rev. 06-19-2006

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COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION - WATER
TRACT NO. 053108 (Rev.)

TENTATIVE MAP DATED 11-07-2005

The subdivision shall conform to the design standards and policies of Public Works, in particular, but not limited to the following items:

1. A "Written Verification" and supporting documents from the water supplier to indicate the availability of a "Sufficient Water Supply" as required per Section 66473.7 of the Subdivision Map Act (SB 221) shall be provided to the satisfaction of the Department of Regional Planning and Public Works prior to filing any map.

2. A water system maintained by the water purveyor, with appurtenant facilities to serve all buildings/lots in the land division, must be provided. The system shall include fire hydrants of the type and location (both on-site and off-site) as determined by the Fire Department. The water mains shall be sized to accommodate the total domestic and fire flows.

3. There shall be filed with Public Works a statement from the water purveyor indicating that the water system will be operated by the purveyor, and that under normal conditions, the system will meet the requirements for the land division, and that water service will be provided to each building/lot.

4. Easements shall be granted to the County, appropriate agency or entity for the purpose of ingress, egress, construction and maintenance of all infrastructures constructed for this land division to the satisfaction of Public Works.

5. Submit landscape and irrigation plans for each open space in the land division, with landscape area greater than 2,500 square feet, in accordance with the Water Efficient Landscape Ordinance.

6. Depict all line of sight easements on the landscaping and grading plans.

HW

Prepared by Zach Hartjes Phone (626) 458-4921 Date 12-27-2005

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COUNTY OF LOS ANGELES
FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

WATER SYSTEM REQUIREMENTS - UNINCORPORATED

Subdivision No. 53108 Tentative Map Date 7-November-05, Ex. A

Revised Report yes

☐ The County Forester and Fire Warden is prohibited from setting requirements for water mains, fire hydrants and fire flows as a condition of approval for this division of land as presently zoned and/or submitted. However, water requirements may be necessary at the time of building permit issuance.

☒ The required fire flow for public fire hydrants at this location is **5000** gallons per minute at 20 psi for a duration of 5 hours, over and above maximum daily domestic demand. 3 Hydrant(s) flowing simultaneously may be used to achieve the required fire flow.

☐ The required fire flow for private on-site hydrants is ____ gallons per minute at 20 psi. Each private on-site hydrant must be capable of flowing ____ gallons per minute at 20 psi with two hydrants flowing simultaneously, one of which must be the furthest from the public water source.

☒ Fire hydrant requirements are as follows:

Install 91 public fire hydrant(s). Upgrade / Verify existing ____ public fire hydrant(s).

Install ____ private on-site fire hydrant(s).

☒ All hydrants shall measure 6"x 4"x 2-1/2" brass or bronze, conforming to current AWWA standard C503 or approved equal. All on-site hydrants shall be installed a minimum of 25' feet from a structure or protected by a two (2) hour rated firewall.
☒ Location: As per map on file with the office.
☐ Other location: ____

☒ All required fire hydrants shall be installed, tested and accepted or bonded for prior to Final Map approval. Vehicular access shall be provided and maintained serviceable throughout construction.

☐ The County of Los Angeles Fire Department is not setting requirements for water mains, fire hydrants and fire flows as a condition of approval for this division of land as presently zoned and/or submitted.

☐ Additional water system requirements will be required when this land is further subdivided and/or during the building permit process.

☐ Hydrants and fire flows are adequate to meet current Fire Department requirements.

☐ Upgrade not necessary, if existing hydrant(s) meet(s) fire flow requirements. Submit original water availability form to our office.

Comments: Detached condo's. The required fire flow for, public fire hydrants at this location is 1500 gallons per minute at 20 psi for a duration of 2 hours, over and above maximum daily domestic demand. 2 Hydrant(s) flowing simultaneously may be used to achieve the required fire flow.
Single family dwellings. The required fire flow for public fire hydrants at this location is 1250 gallons per minute at 20 psi for a duration of 2 hours, over and above maximum daily domestic demand. 1 Hydrant(s) flowing simultaneously may be used to achieve the required fire flow.

All hydrants shall be installed in conformance with Title 20, County of Los Angeles Government Code and County of Los Angeles Fire Code, or appropriate city regulations. This shall include minimum six-inch diameter mains. Arrangements to meet these requirements must be made with the water purveyor serving the area.

Inspector Jenna Mosi Date 21-Mar-06

COUNTY OF LOS ANGELES

FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

CONDITIONS OF APPROVAL FOR SUBDIVISION - UNINCORPORATED

Subdivision: 53108 Map Date 7-November-05, Ex. A

C.U.P. 00-196 Vicinity Salt Canyon

☒ **FIRE DEPARTMENT HOLD** on the tentative map shall remain until verification from the Los Angeles County Fire Dept. Planning Section is received, stating adequacy of service. Contact (323) 881-2404.

☒ Access shall comply with Title 21 (County of Los Angeles Subdivision Code) and Section 902 of the Fire Code, which requires all weather access. All weather access may require paving.

☒ Fire Department access shall be extended to within 150 feet distance of any exterior portion of all structures.

☒ Where driveways extend further than 150 feet and are of single access design, turnarounds suitable for fire protection equipment use shall be provided and shown on the final map. Turnarounds shall be designed, constructed and maintained to insure their integrity for Fire Department use. Where topography dictates, turnarounds shall be provided for driveways that extend over 150 feet in length.

☒ The private driveways shall be indicated on the final map as "Private Driveway and Firelane" with the widths clearly depicted. Driveways shall be maintained in accordance with the Fire Code.

☒ Vehicular access must be provided and maintained serviceable throughout construction to all required fire hydrants. All required fire hydrants shall be installed, tested and accepted prior to construction.

☒ This property is located within the area described by the Fire Department as "Very High Fire Hazard Severity Zone" (formerly Fire Zone 4). A "Fuel Modification Plan" shall be submitted and approved prior to final map clearance. (Contact: Fuel Modification Unit, Fire Station #32, 605 North Angeleno Avenue, Azusa, CA 91702-2904, Phone (626) 969-5205 for details).

☒ Provide Fire Department or City approved street signs and building access numbers prior to occupancy.

☐ Additional fire protection systems shall be installed in lieu of suitable access and/or fire protection water.

☐ The final concept map, which has been submitted to this department for review, has fulfilled the conditions of approval recommended by this department for access only.

☐ These conditions must be secured by a C.U.P. and/or Covenant and Agreement approved by the County of Los Angeles Fire Department prior to final map clearance.

☐ The Fire Department has no additional requirements for this division of land.

Comments: **See additional comment sheets.**

By Inspector: Jonas Maoi Date 21-Mar-06

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

5823 Rickenbacker Road
Commerce, California 90040

LAND DEVELOPMENT UNIT REQUIREMENTS

ADDITIONAL PAGE

SUBDIVISION NO. 53108 **PAGE NO. 1**

1 Tentative map page 1
A. A second means of vehicular access shall be provided to Highway 126 prior to the building permit issuance of the 150 unit.

2 Exhibit "A", All structures shall be places such that, vehicular access is provided to within 150' of all exterior walls. Said access shall be verified during further design review and / or architectural plan review for building permit clearance.

3 Exhibit "A", sheet 4
A. The retail / commercial associated with the Village Green access shall not exceed a maximum height of 35', as measured to the top of the roof structure.

4 Exhibit "A", sheet 9, The School and Park sites access shall be further reviewed for compliance at which time the final design plans are submitted for building permit clearances or C.U.P. review.

By Inspector: Jenna Mori Date: 21-Mar-06

COUNTY OF LOS ANGELES
DEPARTMENT OF PARKS AND RECREATION
"Creating Community Through People, Parks and Programs"
Russ Guiney, Director

December 28, 2005

Mr. Paul McCarthy
Supervising Regional Planner
Land Divisions/Research
Department of Regional Planning
320 West Temple Street, Room 1346
Los Angeles, California 90012

Dear Mr. McCarthy:

RIVER VILLAGE - VESTING TENTATIVE TRACT MAP (VTTM) 53108
CONDITIONS OF MAP APPROVAL
Regional Planning Map dated November 7, 2005
December 29, 2005 Subdivision Committee Meeting

The Department's Conditions of Map Approval are listed below for the 1,444-residential unit River Village subdivision ("the project").

1. The basic Quimby park land obligation is **11.34** net acres of park land. This obligation will be fulfilled by the Developer conveying fee title to Lot 344 to the County as an improved "public park" (9.74-acre community park) in accordance with the conceptual plan and cost estimate enclosed in Developer's February 23, 2004, submittal to the Department; a 6.39-acre private park in Lot 337; recreational centers in lots 330 (0.82 net acres), 336 (3.44 net acres), and 3.40 (0.97 net acres), and a 3.10 net acre trail easement. If a shared recreational use arrangement for the public park is sought by Castaic School District (District), the recreational improvements on the shared use area (either park property or school district property) shall be visible from 'A' Street (River Village Drive) and the parking lot perpendicular to 'A' Street for the Department to approve the shared use area.

2. Developer may elect to receive Quimby credit for *Specific Plan* park improvements to the public park by giving the Department written notification thirty (30) days prior to Developer's Notice of Construction Commencement for the public park, in which case Developer shall pay prevailing wage to construct the park improvements and submit quarterly statements of costs for the Department's review and approval following the same submittal schedule specified for submitting building permit reports.

3. Developer shall receive a **24.46** Quimby land credit for the net acreage provided for the public park and private parks/recreational areas, and other recreational acreage permitted by the *Specific Plan* as shown in attached Specific Plan Table 5.4-2 ("Park and Recreation Improvement Summary") and sub-table for Local Park Acres Provided (Column D) prepared for Tract 53108. No Quimby credit will be given for improvements to private parks/recreational areas.

4. A carry forward of the **13.12**-acre surplus Quimby credit from River Village to any other approved subdivision within the Newhall Ranch *Specific Plan* Area shall not result in a reimbursement to developer from County's Quimby funds or a return by County to developer of any public park land previously conveyed to County for developer's Newhall Ranch *Specific Plan* Area Quimby obligation.

5. Developer shall complete construction of the public park and convey it to the County by the time building permits are obtained for two-thirds of the residential units within the River Village subdivision (i.e., when 963 residential units are permitted). Developer shall submit quarterly reports to the Department that identify for each unit map within River Village the number of residential units for which building permits were issued for the quarter and cumulative to date, and which relate the number of residential units to owner, building number, building type (e.g., single family home, condominium, apartment) and lot number. The quarterly reports are due on the first County business day of January, April, July, and October of each year building permits are issued for River Village. This reporting requirement applies for the actual number and type of dwelling units constructed and for the duration of build out permitted by the approved tentative map. Failure to provide the Department with a report will result in the Department requesting the Department of Public Works to withhold further issuance of building permits for River Village until the respective report is received.

6. Prior to the Department clearing the final map for River Village, Developer shall enter into a Multiple Agreement and post Faithful Performance and Labor & Materials bonds with the Department for Developer's *Specific Plan* park improvements in accordance with updated cost estimates for said improvements.

7. Prior to County accepting title to the public park, a Landscape Lighting and Assessment District (LLAD) shall be created for the mutual benefit of Developer and the County to maintain and operate the park. When LLAD maintenance areas are planned on private, fee simple lots, LLAD easements must be recorded prior to clearance of final (unit) maps by the Department.

8. Developer is responsible for developing the public park in accordance with the *Specific Plan* park improvement plans approved by the Department, at no cost to the County, using standard construction activities and responsible contractors licensed by the State of California to perform this type of work. Sole responsibility for completion of the park improvements, and payment of all costs incurred, lies with Developer.

9. Developer shall obtain, coordinate and pay for all studies, permits, fees and agency inspections required to design and build the park and shall provide one (1) copy of all studies, permits, inspection reports, and written approvals to the Department's representative. Design and construction of the parks shall comply with all applicable federal, state, and local laws, rules, and regulations.

10. Developer shall provide County with certification that all public park playgrounds within River Village meet American Society for Testing and Materials (ASTM) and United States Consumer Product Safety Commission (USCPSC) standards.

11. Developer (or developer's design consultant) shall submit to the Department, public park plans and specifications for review and approval during the design development stage, fifty percent (50%), ninety percent (90%), and one hundred percent (100%) stages of completion of construction documents and, concurrent with the final grading plan submittal to the Department of Public Works, a grading plan (scale: 1 inch = 40 feet or as required by the Department) and specifications, including all grading, drainage, irrigation and planting improvements, utility locations and sizes required under County ordinances. The respective stage of each submittal shall be clearly labeled on the drawings. Plan submittals shall be made by giving the Department three (3) sets of drawings and a CD-ROM containing the drawings in AutoCad 2000 format. The Department shall have twenty-one (21) County business days from receipt of any construction document submittal to review and approve it; if the Department does not respond within said time period, the submittal shall be deemed approved by the Department. Any corrections or changes made by County during review of one stage shall be incorporated into a revision of the current drawings and specifications and resubmitted for County's approval of said stage prior to permission by County for Developer to proceed with the next stage.

12. Developer shall provide the Department with written Notice of Construction Commencement for the park site. The Construction Phase is defined as the period of time from said notice to the date the Department issues its Notice of Acceptance of Completed Park Improvements, inclusive of the 90-day plant establishment period.

13. Developer shall designate and identify a construction manager who will oversee construction of the public park. Developer's construction manager shall communicate by providing written documentation via facsimile or mail to County's representative and abide by County's requirements and direction to ensure acceptable park completion. The construction manager shall provide County with reasonable access to the public park sites and the park improvements for inspection purposes and at a minimum, shall initiate and coordinate the following inspections and approvals during the course of construction with not less than two County business days advanced notice of any request for inspection or approval: (1) contractor orientation/pre-construction meeting; (2) construction staking and layout; (3) progress/installation inspections to be scheduled on a weekly basis or as required to insure conformance with construction documents; (4) any and all required permit inspections; (5) irrigation mainline and equipment layout; (6) irrigation pressure test; (7) irrigation coverage test; (8) weed abatement after abatement cycle, to review degree of kill; (9) plant material approval; (10) plant material/Hydroseed/pre-maintenance inspection; (11) substantial completion and commencement of maintenance period; (12) final walk through and acceptance. Continued work without inspection and approval shall make Developer and its subcontractors solely responsible for any and all expenses incurred for required changes or modifications. County reserves the right to reject all work not approved in conformance with this condition.

14. During the construction period, the construction manager shall maintain a critical path method (CPM) schedule that shall be updated on a biweekly basis and available to the County for review.

15. Upon completing public park construction, Developer shall notify the Department in writing by submitting a Notice of Completion of Park Construction. Within thirty (30) days after receipt of said notice, County shall inspect the park and reasonably determine whether or not the park improvements have been constructed in accordance with the construction documents, and to a level of quality and workmanship for the Department to issue its Notice of Acceptance of Completed Park Improvements. If park construction is unacceptable, within fifteen (15) County business days after inspection, County shall provide Developer with a list of items that need to be corrected, after receipt of said list, in order for Department to issue its Notice of Acceptance of Completed Park Improvements, or issuance of said notice will be delayed until the items on the list are corrected.

16. Developer shall provide Department with two (2) sets of record drawings, maintenance manuals, and irrigation controller charts upon Department's Notice of Acceptance of Completed Park Improvements. These documents shall also be submitted on CD-ROM with the drawings in AutoCad 2000 format.

17. Developer shall convey the public park by recordable grant deed showing the fee vested with the County of Los Angeles, and free of all encumbrances except those that do not interfere with the use of the property for park or recreational purposes. Developer's designated title company shall provide the County with an ALTA title policy and shall record the park deed simultaneously to County's execution of a Certificate of Acceptance, and shall deliver the recorded deed to the Chief Administrative Office Real Estate Division, Property Management Section, 222 South Hill Street, Third Floor, Los Angeles, CA 90012.

18. Any major change proposed by the Developer to the public park location, shape, or size (not more than 2 acres variance) from the approved tentative tract or parcel map, shall be deemed a revision of the tentative tract or parcel map and shall require the filing of an amended or a revised map, as described in subsection B of Section 21.62.030 of the Los Angeles County Code.

Sincerely,

Larry Hensley, Chief
Planning Division

LH:JB (Newhall Ranch: 53108 River Village_12.28.05 rpd)

Attachments (2)

c: Keith Herren, Newhall Land
Carlos Brea, CAO Real Estate Division
Parks and Recreation (Gil Lopez, Larry Hensley, Kathleen Ritner, Les Seidman)

LOS ANGELES COUNTY
DEPARTMENT OF PARKS AND RECREATION

PARK OBLIGATION REPORT

Tentative Map # 53108	DRP Map Date: 11/07/2005	SCM Date: / /	Report Date: 12/29/2005
Park Planning Area # 35A	NEWHALL / VALENCIA		Map Type: REV. (REV RECD)

Total Units 1,444 = Proposed Units 1,444 + Exempt Units 0

Sections 21.24.340, 21.24.350, 21.28.120, 21.28.130, and 21.28.140, the County of Los Angeles Code, Title 21, Subdivision Ordinance provide that the County will determine whether the development's park obligation is to be met by:

1) the dedication of land for public or private park purpose or,
2) the payment of in-lieu fees or,
3) the provision of amenities or any combination of the above.

The specific determination of how the park obligation will be satisfied will be based on the conditions of approval by the advisory agency as recommended by the Department of Parks and Recreation.

Park land obligation in acres or in-lieu fees:

ACRES:	11.34
IN-LIEU FEES:	$2,977,215

Conditions of the map approval:

See attached December 29, 2005 letter to Paul McCarthy, Supervising Regional Planner, Land Division Research, Department of Regional Planning for Conditions of Tentative Map Approval.

The park obligation for this development will be met by:

The dedication of 9.74 acres for public park purposes.
Provide 14.72 acres for private park purposes.

Trails:

See also attached Trail Report. CASTAIC CREEK AND SANTA CLARA RIVER TRAILS.

See Conditions of the map approval above.

Contact Patrocenia T. Sobrepeña, Departmental Facilities Planner I, Department of Parks and Recreation, 510 South Vermont Avenue, Los Angeles, California. 90020 at (213) 351-5120 for further information or an appointment to make an in-lieu fee payment.

For information on Hiking and Equestrian Trail requirements contact Trail Coordinator at (213) 351-5135.

By: James Barber

James Barber, Advanced Planning Section Head

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LOS ANGELES COUNTY
DEPARTMENT OF PARKS AND RECREATION

PARK OBLIGATION WORKSHEET

Tentative Map # 53108	DRP Map Date: 11/07/2005	SMC Date: / /	Report Date: 12/29/2005
Park Planning Area # 35A	NEWHALL / VALENCIA		Map Type: REV. (REV RECD)

The formula for calculating the acreage obligation and or in-lieu fee is as follows:

(P)eople x (0.003) Goal x (U)nits = (X) acres obligation

(X) acres obligation x RLV/Acre = In-Lieu Base Fee

Where: P = Estimate of number of People per dwelling unit according to the type of dwelling unit as determined by the 2000 U.S. Census*. Assume * people for detached single-family residences; Assume * people for attached single-family (townhouse) residences, two-family residences, and apartment houses containing fewer than five dwelling units; Assume * people for apartment houses containing five or more dwelling units; Assume * people for mobile homes.

Goal = The subdivision ordinance allows for the goal of 3.0 acres of park land for each 1,000 people generated by the development. This goal is calculated as "0.0030" in the formula.

U = Total approved number of Dwelling Units.

X = Local park space obligation expressed in terms of acres.

RLV/Acre = Representative Land Value per Acre by Park Planning Area.

Total Units **1,444** = Proposed Units **1,444** + Exempt Units **0**

	People*	Goal (3.0 Acres / 1000 People)	Number of Units*	Acre Obligation
Detached S.F. Units	3.23	0.0030	590	5.72
M.F. < 5 Units	2.29	0.0030	403	2.77
M.F. >= 5 Units	2.11	0.0030	451	2.86
Mobile Units	1.74	0.0030	0	0.00
Exempt Units			0	
			Total Acre Obligation =	11.34

Park Planning Area = **35A NEWHALL / VALENCIA**

Goal	Acre Obligation	RLV / Acre	In-Lieu Base Fee
@(0.0030)	11.34	$262,541	**$2,977,215**

Lot #	Provided Space	Provided Acres	Credit (%)	Acre Credit	Land
	Trails	3.10	100.00%	3.10	Private
330	Private Rec. Center	0.82	100.00%	0.82	Private
336	Private Rec. Center	3.44	100.00%	3.44	Private
337	Private Park	6.39	100.00%	6.39	Private
340	Private Rec. Center	0.97	100.00%	0.97	Private
344	Park Area	9.74	100.00%	9.74	Public
			Total Provided Acre Credit:	**24.46**	

Acre Obligation	Public Land Crdt.	Priv. Land Crdt.	Net Obligation	RLV / Acre	In-Lieu Fee Due
11.34	9.74	14.72	(13.12)	$262,541	($3,444,536)

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TABLE 2.8-1

PRELIMINARY PARK PROGRAM
Newhall Ranch Specific Plan

ESTIMATED QUIMBY REQUIREMENTS

Description/Category	Units		Avg. Household Size		Assessment Factor		Obligation in Acres
Detached	9,305	x	3.17	x	0.003	=	88
Attached	11,580	x	2.38	x	0.003	=	83
Second Units	423	x	2	x	0.003	=	3
Total:	21,308						174

ESTIMATED QUIMBY CREDITS

	Land			Improvements			
Description/Category	Acres	Credit %	Quimby Acres	Imp Cost PSF	Improv. Costs	Acre Equiv.	Total Acreage
Parks:							
Neighborhood Parks[1]	50	100%	50	2.50	5,445,000	45	95
Community Parks[1]							
Active Area	58	100%	58	2.50	8,316,200	52	110
Passive Area	123	50%	62				62
Lake[1]	15	100%	15				15
Subtotal, Parks[1] [2]	246		185		11,761,200	97	282
Trails:							
Regional River Trail	16	100%	16				16
Community Trails	39	100%	39	2.50	4,247,100	35	74
Local Trails (in *Open Area*)	13	(acreage included below)		1.00	566,280	6	5
Unimproved Trails (in High Country)	13	(acreage included below)		1.00	561,792	5	5
Subtotal, Trails	81		55		5,375,172	46	100
Major Open Areas:							
Golf Course	180	0%	0			0	0
High Country SMA[3]	4,185	50%	2,093			0	2,093
River Corridor SMA[3]	975	10%	98			0	98
Community Open Area[3] (Excl. Oak Valley Community Park)	866	10%	87			0	87
Subtotal, Major Open Areas	6,209		2,278			0	2,278
			TOTAL CREDIT PROVIDED				2,660
			Quimby Requirements				174
			Excess				2,486

[1] County ordinance allows credit for improvements, land or a combination of both.

[2] Parks such as private recreation centers (including improvements) within neighborhoods are also eligible for credit but cannot be quantified at this level of planning.

[3] Credit for the *River Corridor SMA* and *Open Area* is calculated using a worst-case factor of 10%, which is lowest percent specified in the County ordinance. The County ordinance provides for a greater level of credit pending on slope ranging from a low of 10% to a high of 100%. In order to receive credit for land which has slope greater than 3%, the Director of Parks and Recreation must find that special circumstances exist that would make the acceptance of such land in the public interest. The Director may also give more credit than specified in the ordinance if it is found that a site contains exceptional visual, biotic or other natural resources. Such a case is the *High Country SMA*, which is exceptionally rich in both natural resources and recreational opportunities, and has been calculated at 50% credit

TABLE 5.4-2
PARK AND RECREATION IMPROVEMENTS SUMMARY

RIVERWOOD	DEDICATION REQUIREMENTS			LOCAL PARK IMPROVEMENTS			Surplus (Deficit) (F - C)
	A Total Units	B Population Factor	C Local Park Requirement (A x B x .003)	D Local Park Acres Provided	E Local Park Improvements ($)	F Total Acres Provided D+(E/126,000)	
1. Tract No. 53108 (River Village)							
A. Single-Family Detached Residences	590	3.23	5.72				N/A
B. Single-Family Attached Residences and Multi-Family with less than 5 Units/Building	403	2.29	2.77				N/A
C. Multi-Family with 5 or more Units/Building	451	2.11	2.85				N/A
Tract No. 53108 Total	**1,444**		**11.34**	**24.46**	**$0.00**	**24.46**	**13.12**
VILLAGE TOTAL	**1,444**		**11.34**	**24.46**	**$ 0.00**	**24.46**	**13.12**

TRACT NO. 53108 (RIVER VILLAGE) COLUMNS "D" AND "E" DETAIL

Lot No.	Unit Map	Phase No.	Category	Local Park Acres	Percent Credit	Local Park Acres Provided	Local Park Improvements ($)
337			Private Park	6.39	100%	6.39	
344			Community Park	9.74	100%	9.74	
336			River Recreational Area	3.44	100%	3.44	
340, 330			Private Recreational Area	1.79	100%	1.79	
			West Recreation Center	0.97		0.97	
			East Recreation Center	0.82		0.82	
310-317, 392-402			River Trail	3.10	100%	3.10	
TOTAL				**24.46**		**24.46**	**$0.00**

COUNTY OF LOS ANGELES
DEPARTMENT OF HEALTH SERVICES
Public Health

THOMAS L. GARTHWAITE, M.D.
DIRECTOR and CHIEF MEDICAL OFFICER

FRED LEAF
CHIEF OPERATING OFFICER

JONATHAN E. FIELDING, M.D., M.P.H.
Director of Public Health and Health Officer

Environmental Health
ARTURO AGUIRRE, Director

Bureau of Environmental Protection
Mountain & Rural/Water, Sewage & Subdivision Program
5050 Commerce Drive, Baldwin Park, CA 91706-1423
TEL (626)430-5380 · FAX (626)813-3016
www.lapublichealth.org/eh/progs/envirp.htm

BOARD OF SUPERVISORS

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Fifth District

December 28, 2005

RFS No. 05-0031528

Tract Map No: 53108

Vicinity: Del Valle

Tentative Tract Map Date: November 7, 2005 (9th Revision)

The Los Angeles County Department of Health Services' conditions of approval for **Vesting Tentative Tract Map 53108** are unchanged by the submission of the revised map. The following conditions still apply and are in force:

1. Potable water will be supplied by the **Valencia Water Company**, a public water system, which guarantees water connection and service to all lots.

2. Sewage disposal will be provided through the public sewer and wastewater treatment facilities of the **Newhall Ranch Water Treatment Plant** as proposed.

If you have any questions or need additional information, please contact me at (626) 430-5380.

Respectfully,

Becky Valenti, E.H.S. IV
Mountain and Rural/Water, Sewage, and Subdivision Program

COUNTY OF LOS ANGELES

FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294
(323) 890-4330

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN

RECEIVED
DEC 07 2006

December 4, 2006

Daniel Fierros, Regional Planning Assistant
Los Angeles County Department of Regional Planning
Impact Analysis Section
320 West Temple Street
Los Angeles, CA 90012

Dear Mr. Fierros:

OAK TREE PERMIT #00-196, LANDMARK VILLAGE (RIVER VILLAGE) PROJECT, TM #53108

We have reviewed the "Request for Oak Tree Permit #00-196. The project is located south of State Route 126 near the intersection of Chiquito Canyon Rd., north of the Santa Clara River and west of Interstate 5. The Oak Tree Report is accurate and complete as to the location, size, condition and species of the Oak trees on site. The term "Oak Tree Report" refers to the document on file by Impact Sciences the consulting arborist, dated June, 2006.

We recommend the following as conditions of approval:

OAK TREE PERMIT REQUIREMENTS:

1. This grant shall not be effective until the permittee and the owner of the property involved (if other than the permittee), have filed at the office of the Department of Regional Planning their affidavit stating that they are aware of and agree to accept all conditions of this grant.

   Unless otherwise apparent from the context, the term "permittee" shall include the applicant and any other person, corporation or other entity making use of this grant.

2. The permittee shall, prior to commencement of the use authorized by this grant, deposit with the County of Los Angeles Fire Department a sum of $5000. Such fees shall be used to compensate the County Forester to cover expenses incurred while inspecting the project to determine the permittee's compliance with the conditions of approval.

   The above fees provide for one (1) pre-construction meeting required to determine fencing placement in order to secure the protected zone of all remaining Oak trees, inspection of temporary fencing prior to the commencement of any construction and a subsequent five (5) year monitoring period requiring inspections until the conditions of approval have been met.

   The Director of Regional Planning and the County Forester shall retain the right to make regular and unannounced site inspections.

3. Before commencing work authorized or required by this grant, the consulting arborist shall submit a letter to the Director of Regional Planning and the County of Los Angeles Fire Department, Forestry Division stating that he or she has been retained by the permittee to perform or supervise the work, and that he or she agrees to report to the Director of Regional Planning and the County Forester any failure to fully comply with the conditions of the grant.

   The arborist shall submit at the end of each year an annual monitoring report. The report shall include a diagram showing the exact number and locations of all mitigation trees planted and describe their health, planting dates, any mortality and mitigation timeframe relating to permit compliance.

4. The permittee shall arrange for the consulting arborist or a similarly qualified person to maintain all remaining Oak trees on the subject property that are within the zone of impact as determined by the County Forester for the life of the Oak Tree Permit or the Conditional Use Permit.

5. The permittee shall install temporary chain-link fencing, not less than four (4) feet in height, to secure the protected zone of all remaining Oak trees on site to be determined prior to any grading. The fencing shall be determined and installed prior to grading or tree removal, and shall not be removed without approval of the County Forester. The term "protected zone" refers to the area extending five (5) feet beyond the dripline of the Oak tree (before pruning), or fifteen (15) feet from the trunk, whichever is greater.

6. Copies of the Oak Tree Report, Oak tree map, mitigation planting plan and conditions of approval shall be kept on the project site and available for review. All individuals associated with the project as it relates to the Oak resource shall be familiar with the Oak Tree Report, Oak tree map, mitigation planting plan and conditions of approval.

PERMITTED OAK TREE REMOVAL AND ENCROACHMENT:

7. This grant allows the removal of a total of sixty-seven (67) Oak trees. Sixty-three (63) trees are of the Oak genus (*Quercus agrifolia*) numbered : 8, 9, 10, 51, 60, 61, 63, 64, **83***, 84, 248, 249, 250, 335, 336, 337, **338***, 339, 340, 341, 342, 343, **344***, 345, 346, 347, 348, **349***, 350, 351, **352***, 354, 355, 356, **357***, 396, 397, 398, 400, 401, **492***, 594, 1588, 1589, 1590, 1592, 1594, 1596, 1598, 3073, **4003***, 4016, 4017, 4018, 4019, 4022, 4025, 4026, 4027, 4028, 4055, 4056, 4057. Four (4) trees are of the of the genus (*Quercus lobata*) numbered **87***, 1587, **1597***, and 1591 on the applicants site plan and Oak tree report. A total of ten (10) of these trees to be removed are identified as **Heritage*** (in bold with an asterisk*), having a diameter greater than 36 inches.

   This grant allows encroachment within the protected zone of fourteen (14) trees of the Oak genus identified as Tree Numbers: 92, 93, 98, 99, 100, 439, 448, **488***, **489***, 498, **503***, 592, 1605, 4007 on the applicant's site plan map and Oak Tree Report. Three (3) of these trees are identified as **Heritage***. Trenching, excavation, or clearance of vegetation within the protected zone of an Oak tree shall be accomplished by the use of hand tools or small hand-held power tools. Any major roots encountered shall be conserved to the extent possible and treated as recommended by the consulting arborist.

8. In addition to the work expressly allowed by this permit, remedial pruning intended to ensure the continued health of a protected Oak tree or to improve its appearance or structure may be performed. Such pruning shall include the removal of deadwood and stubs and medium pruning of branches two (2) inches in diameter or less in accordance with the guidelines published by the National Arborist Association. Copies of these guidelines are available from the County of Los Angeles Fire Department, Forestry Division. In no case shall more than 20% of the tree canopy of any one (1) tree be removed.

9. Except as otherwise expressly authorized by this grant, the remaining Oak trees shall be maintained in accordance with the principles set forth in the publication, "Oak Trees: Care and Maintenance", prepared by the County of Los Angeles Fire Department, Forestry Division. A copy of the publication is enclosed with these conditions.

MITIGATION TREES:

10. The permittee shall provide mitigation trees of the Oak genus at a rate of two to one (2:1) trees for each tree removed and at a rate of ten to one (10:1) for each Heritage tree removed for a total of 214 mitigation trees.

11. Each mitigation tree shall be at least a 15-gallon specimen in size and measure one (1) inch or more in diameter one (1) foot above the base. Free form trees with multiple stems are permissible; the combined diameter of the two (2) largest stems of such trees shall measure a minimum of one (1) inch in diameter one (1) foot above the base.

12. Mitigation trees shall be at a ratio consistent with the species of Oaks removed for a total of one hundred ninety (190) *Quercus agrifolia* and twenty four (24) *Quercus lobata* of indigenous varieties grown from a local seed source.

13. Mitigation trees shall be planted within one (1) year of the permitted Oak tree removals. Additional mitigation trees shall be planted within one (1) year of the death of any tree, which results from its permitted encroachment. Mitigation trees shall be planted either on site or at an off-site location approved by the County Forester. Alternatively, a contribution to the County of Los Angeles Oak Forest Special Fund may be made in the amount equivalent to the Oak resource loss. The contribution shall be calculated by the consulting arborist and approved by the County Forester according to the most current edition of the International Society of Arboriculture's "Guide for Plant Appraisal."

14. The permittee shall properly maintain each mitigation tree and shall replace any tree failing to survive due to a lack of proper care and maintenance with a tree meeting the specifications set forth above. The five-year maintenance period will begin upon receipt of a letter from the permittee or consulting arborist to the Director of Regional Planning and the County Forester indicating that the mitigation trees have been planted. The maintenance period of the trees failing to survive five (5) years will start anew with the new replacement trees. Subsequently, additional monitoring fees shall be required.

15. All mitigation Oak trees planted as a condition of this permit shall be protected in perpetuity by the Los Angeles County Oak Tree Ordinance once they have survived the required maintenance period.

NON-PERMITTED ACTIONS AND VIOLATIONS:

16. Encroachment within the protected zone of any additional tree of the Oak genus on the project site is prohibited.

17. Should encroachment within the protected zone of any additional tree of the Oak genus on the project site not permitted by this grant result in its injury or death within two (2) years, the permittee shall be required to make a contribution to the Los Angeles County Oak Forest Special Fund in the amount equivalent to the Oak resource damage/loss. Said contribution shall be calculated by the consulting arborist and approved by the County Forester according to the most current edition of the International Society of Arboriculture's "Guide for Plant Appraisal."

18. No planting or irrigation system shall be installed within the dripline of any Oak tree that will be retained.

19. Utility trenches shall not be routed within the protected zone of an Oak tree unless the serving utility requires such locations.

20. Equipment, materials and vehicles shall not be stored, parked, or operated within the protected zone of any Oak tree. No temporary structures shall be placed within the protected zone of any Oak tree.

21. Violations of the conditions of this grant shall result in immediate work stoppage or in a notice of correction depending on the nature of the violation. A time frame within which deficiencies must be corrected will be indicated on the notice of correction.

22. Should any future inspection disclose that the subject property is being used in violation of any one of the conditions of this grant, the permittee shall be held financially responsible and shall reimburse the County of Los Angeles Fire Department, Forestry Division for all enforcement efforts necessary to bring the subject property into compliance.

If you have any additional questions, please contact this office at (323) 890-4330.

Very truly yours,

DAVID R. LEININGER, CHIEF, FORESTRY DIVISION
PREVENTION BUREAU

DRL:es

Enclosure

OAK TREES:
Care and Maintenance

This Oak Tree Care and Maintenance Guide offers basic information and practical guidelines aimed at the preservation and continued health and survival of oak trees in the residential landscape.

Increasing pressure for development is changing the oak woodland of Los Angeles County. Heritage oaks which once survived in open rolling hills are now being preserved or replanted and incorporated into the community.

How do we protect these trees during the planning and development process, and ensure their survival once they are in the home garden?

The Oak Tree

Oak Trees in the residential landscape often suffer decline and early death due to conditions that are easily preventable. Damage can often take years to become evident, and by the time the trees show obvious signs of disease it is usually too late to help.

Improper watering, especially during the hot summer months, and disturbance to critical root areas are most often the causes. This booklet will provide guidelines on where these critical areas lie and ways to avoid disturbing them, as well as information on long-term care and maintenance of both natural and planted oaks. Lists of additional resources for more information and demonstration areas to visit are also included.

The Oak Tree Ordinance

The Los Angeles County Oak Tree Ordinance has been established to recognize oak trees as significant historical, aesthetic, and ecological resources. The goal of the ordinance is to create favorable conditions for the preservation and propagation of this unique and threatened plant heritage. By making this part of the development process, healthy oak trees will be preserved and maintained.

The Los Angeles County Oak Tree Ordinance applies to all unincorporated areas of the County. Individual cities may have their own ordinances, and their requirements may be different.

Permit Requirements:

Under the Los Angeles County Ordinance, a person shall not cut, destroy, remove, relocate, inflict damage, or encroach into the *protected zone* (see text) of any ordinance sized tree of the oak tree genus without first obtaining a permit.

Damage includes but is not limited to :

- Burning
- Application of toxic substances
- Pruning or cutting
- Trenching
- Excavating
- Paving
- Operation of machinery or
- equipment
- Changing the natural grade

Chapter 22.56.2050: Oak Tree Permit Regulations, Los Angeles County, Adopted: August 20, 1982. Amended: September 13, 1988.

For more information about the County Oak Tree Ordinance, visit the Forestry Division's website at:

http://lacofd.org/Forestry_folder/otordin.htm

Or contact:

Department of Regional Planning
320 W. Temple Street, 13th floor
Los Angeles, CA 90012-3284
(213) 974-6411
TDD: (213) 617-2292
http://planning.co.la.ca.us

Types of oaks commonly found in Los Angeles County:

Many kinds of oak trees are native to Los Angeles County. A few of the more common ones are shown below, but *all* oak trees are covered by the Oak Tree Ordinance.

Older oaks which have thrived under the natural rainfall patterns of dry summers and wet winters often can't handle the extra water of a garden setting. These trees must be treated with special care if they are to survive.

Those oaks that have been planted into the landscape or sprouted naturally tend to be more tolerant of watered landscapes. These vigorous young trees may grow 1½ to 4 feet a year in height under good conditions. Once established these trees would benefit from the same special care outlined in this guide.

Valley Oak
QUERCUS LOBATA

LARGE DECIDUOUS TREE 60'-75' HIGH, BROADLY SPREADING 50'-80' WIDE.

LEAVES : DEEP GREEN, 3"-4" LONG : PAPER-LIKE TEXTURE WITH DEEP ROUNDED LOBES ON THE LEAF EDGE.

TENDS TO FAVOR VALLEY BOTTOMS : FOR THIS REASON THE VALLEY OAK HAS DISAPPEARED FROM THE LANDSCAPE MORE RAPIDLY, IMPACTED SEVERELY BY AGRICULTURE and URBAN DEVELOPMENT.

Coast Live Oak
QUERCUS AGRIFOLIA

LARGE EVERGREEN TREE WITH A BROAD, ROUND SHAPE AND LARGE LIMBS. 50'-70' HIGH, 35'-80' WIDE.

LEAVES : GLOSSY GREEN, 1"-3" LONG : SPINY, ROUNDED, AND HOLLY LIKE : BUT DISTINCTLY CUPPED OR CURLED UNDER AT THE EDGES.

Interior Live Oak
QUERCUS WISLIZENII

EVERGREEN TREE 50'-75' HIGH OR A SHRUB 8'-10' HIGH IN CHAPARRAL AREAS. HAS A FULL, DENSE ROUNDED SHAPE, NOT BROAD AS WITH LARGE LIMBS LIKE A COAST LIVE OAK. THEY TEND TO GROW IN CLUMPS RATHER THAN AS A SINGLE TREE.

LEAVES : DARK GREEN, 1"-4" LONG. EDGES EITHER SMOOTH OR SPINY, BUT ALWAYS FLAT — NOT CURLED UNDER.

OTHER COMMON OAKS :
CALIFORNIA BLACK OAK : QUERCUS KELLOGGII
CANYON LIVE OAK : QUERCUS CHRYSOLEPIS
ENGELMANN OAK : QUERCUS ENGELMANNII

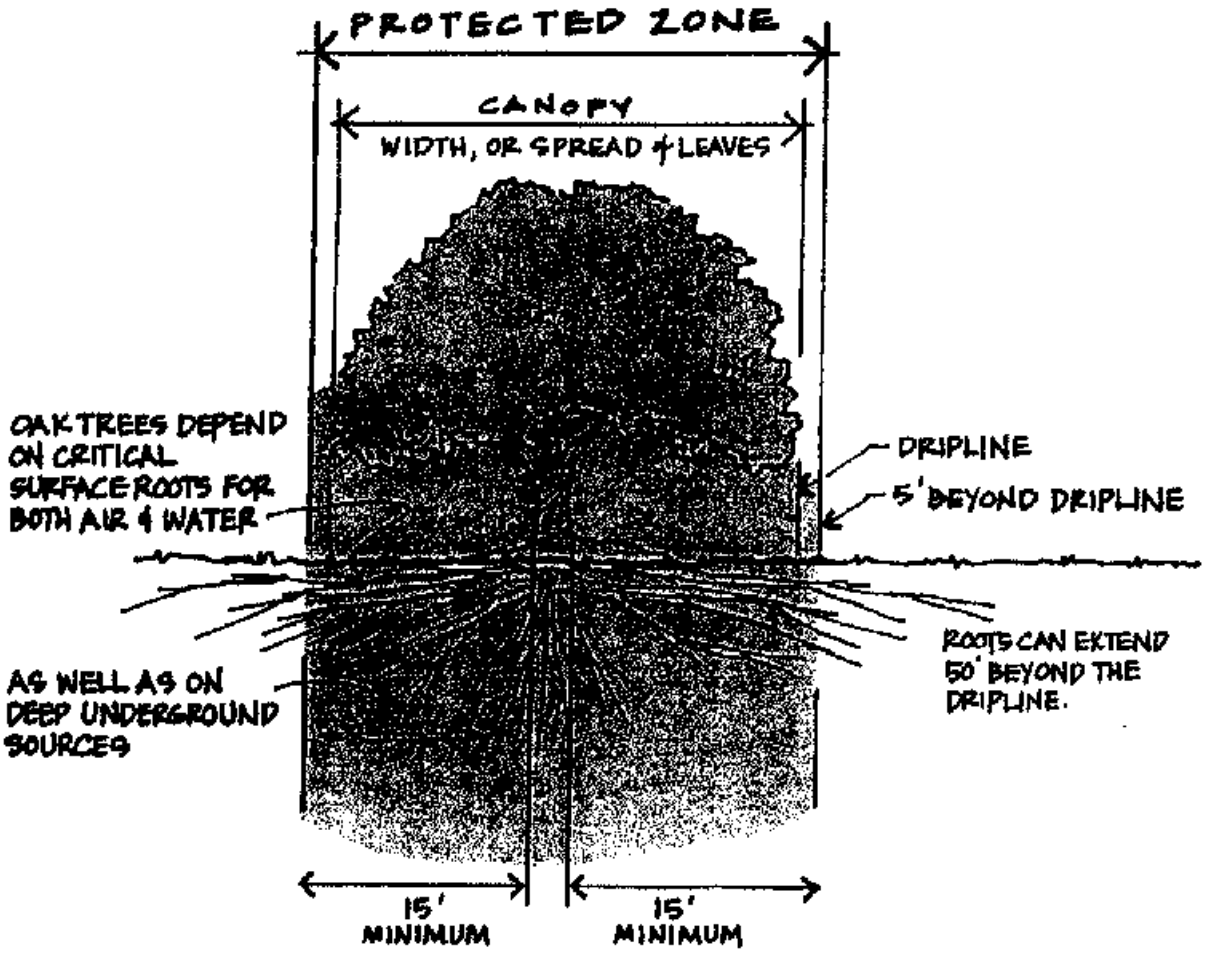
THE PROTECTED ZONE

The ***protected zone*** defines the area most critical to the health and continued survival of an oak tree. Oaks are easily damaged and very sensitive to disturbances that occur to the tree or in the surrounding environment.

The root system is extensive but surprisingly shallow, sometimes radiating out as much as 50 feet beyond the spread of the tree leaves, or canopy. The ground area at the outside edge of the canopy, referred to as the *dripline*, is especially important: the tree obtains most of its surface water and nutrients here, and conducts an important exchange of air and other gases.

The protected zone is defined in the Oak Tree Ordinance as follows:

> "The Protected Zone shall mean that area within the dripline of an oak tree and extending there from to a point at least 5 feet outside the dripline or 15 feet from the trunk, whichever distance is greater."



CONSTRUCTION ACTIVITY WITHIN THE PROTECTED ZONE

Changes In Grade

Any change in the level of soil around an oak tree can have a negative impact. The most critical area lies within 6' to 10' of the trunk: no soil should be added or scraped away. Water should drain away from this area and not be allowed to pond so that soil remains wet at the base.

Retaining walls designed to hold back soil above or below an existing tree should avoided if at all possible, especially within the protected zone. These types of structures cause critical areas at the dripline to be buried, or require that major roots be severed. Water trapped at the base of the tree could lead to root rot or other impacts, and to the decline and premature death of a highly valued landscape tree.

Construction activities outside the protected zone can have damaging impacts on existing trees. Underground water sources can be cut off due to falling water tables, or drainage may be disrupted.

Trenching

Digging of trenches in the root zone should be avoided. Roots may be cut or severely damaged, and the tree can be killed.

If trenches must be placed within the protected zone, utilities can be placed in a conduit, which has been bored through the soil, reducing damage to the roots. Insist that as many utilities as allowed be placed in a single trench, instead of the common practice of digging a separate trench for each individual line.

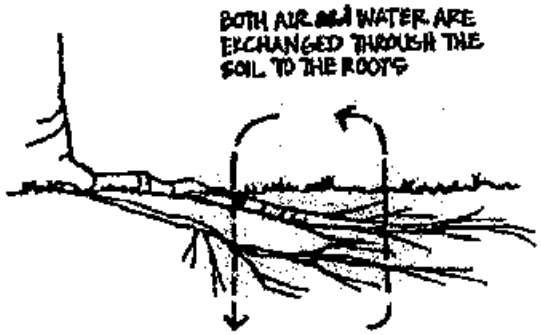
Trenching can also be accomplished using hand tools or small hand held power equipment to avoid cutting roots. Any roots exposed during this work should be covered with wet burlap and kept moist until the soil can be replaced.

Soil Compaction and Paving

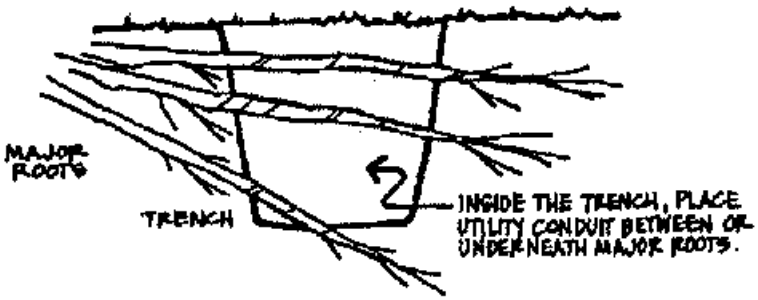
The roots depend upon an important exchange of both water and air through the soil within the protected zone. Any kind of activity that compacts the soil in this area blocks this exchange and can have serious long-term negative effects on the tree.

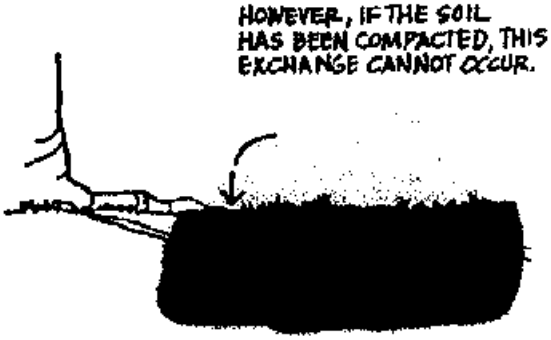
If paving material must be used, some recommended surfaces include brick paving with sand joints, or ground coverings such as wood chips (note the advantages of natural materials for providing nutrients under *mulching*).

SOIL COMPACTION



TRENCHING





MAINTENANCE

Watering

The key is prevention – **do not over water**. Improper watering is often overlooked as the cause of tree death because it can take years for the damage to show. Once the tree shows obvious signs of decline, it is often too late to correct the problem.

The seasonal weather pattern for this region is one of dry summers and winter rain. Oak trees are naturally drought tolerant and adapted to this cycle. If the tree is vigorous and thriving it should not require any additional water.

If the natural source of surface or underground water has been altered, some supplemental water may be necessary, but proceed with caution. The goal of any watering schedule for oak trees should be to supplement natural rainfall and it should occur only when the tree would normally receive moisture. This might be in the winter, if rains are unusually late, or in spring if rainfall has been below normal levels.

Over watering, especially during the summer months, causes a number of problems which can lead to decline and eventual death of the tree. It creates ideal conditions for attacks of Oak Root Fungus by allowing the fungus to breed all year. In addition, both evergreen and deciduous oaks grow vigorously in the spring and naturally go dormant in the summer. Extra water only encourages new tip growth which is subject to mildew. Oaks need this period of rest.

Newly planted oaks may need supplemental watering during their first few summers. After they become established water should be applied according to the previous guidelines.

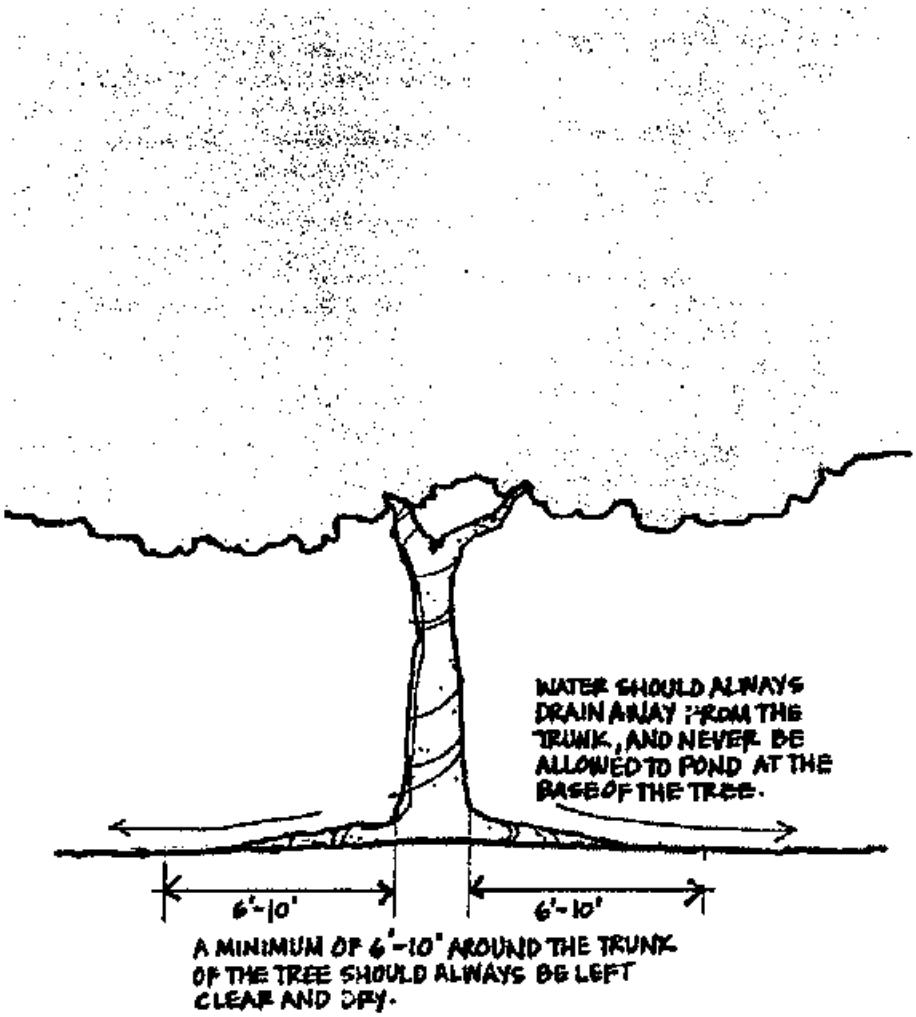
Pruning

For oak trees the periodic removal of dead wood during periods of tree dormancy should be the only pruning needed. Any cutting of green wood opens scars that could allow the entry of organisms or disease.

Before pruning obtain the advice of a certified arborist or other professional and consult the local city or county where the tree is located to find out what regulations apply. Pruning of both live and dead wood can sometimes require a permit.

Mulching

Leaf litter from the tree is the best mulch and should be allowed to remain on the ground within the protected zone. Crushed walnut shells or wood chips can be used, but the oak leaves that drop naturally provide the tree with a source of nutrients. Avoid the use of packaged or commercial oak leaf mulch which could contain Oak Root Fungus. Redwood chips should not be used due to certain chemicals present in the wood.



Disease and Pests

Trees that are stressed, especially because of improper watering practices, are prone to certain diseases and attacks by pests.

The most damaging of these diseases is the Oak Root Fungus *Armillaria mellea*. Occurring naturally in the soil, the fungus thrives under wet conditions and dies back in the summer when soils dry out. This is why summer watering of oaks can be a deadly practice. As noted in the watering guidelines, wet soil in the summer allows the fungus to grow all year. As the population grows, their natural food sources are depleted and they begin feeding on oak tree roots. The fungus does not require an open wound in the tree to gain entry.

Indications of the fungus include:

- die back of branches or tips.
- honey colored fungus at or near the root crown.
- white fan-like fungus between wood and bark.
- the presence of black, shoestring-like growths in the soil.

Once the tree begins to show obvious signs of infection treatment is generally ineffective. The best treatment is to *avoid* the conditions that lead to Oak Root Fungus infections.

Pit Scale, Oak Moth, and other pests: any significant changes in leaf color, branch die back, presence of black sooty materials on leaves or other changes should be noted. Seek the advice of a professional forester, arborist, farm advisor or other expert before the application of any pesticides on an oak tree.

Planting Underneath Oaks

The natural leaf litter is by far the best ground cover within the protected zone. If plants must be placed, the following guidelines should be followed:

There should be no planting within a minimum 6 to 10 feet of the trunk.

Avoid plants that require any supplemental water once established.

Choose plants suited for "dry shade." Those listed in the box below offer some good choices. To see some examples of how these plants have been used under oaks refer to the Additional Resources section on the following page.

PLANTS TO CONSIDER:

Plant Name	Description
Arctostaphylos densiflora 'Howard McMinn' Manzanita	3' high, 6' wide. Toughest of available forms. Whitish-pink flowers.
Arctostaphylos edmundsii Little Sur Manzanita	1-2' high, 4-5' wide. Tolerant of full shade.
Arctostaphylos hookeri Monterey Carpet Manzanita	1-2' high, spreading to 12' wide by rooting branches. White to pink flowers.
Ceanothus griseus horizontalis Carmel Creeper	Less than 2 1/2' tall, low & creeping. Clusters of small blue flowers.
Heuchera spp. Coral Bells	2-4' mound. Flowers on an upright stem 2-3" high and spotted with red or pink.
Mahonia aquifolium compacta Oregon Grape	2-4' high, spreading by underground roots. Bright yellow flower clusters.
Ribes viburnifolium Evergreen or Catalina Currant	2-3' high, spreading to 12' wide. Flowers pink to red in small clusters.

NOTES:

Before deciding on plants, check a source such as the *Sunset Western Garden Book* to determine which plants will grow in your area.

When choosing shade tolerant plants, consider that the ground under the south side of the tree will get more sunlight while the northern side will tend to remain more deeply shaded.

ADDITIONAL RESOURCES and Places to Visit

Public Agencies

County of Los Angeles Fire Department
Prevention Bureau, Forestry Division
5823 Rickenbacker Road, Rm #123
Commerce, CA 90040-3027
(323) 890-4330
http://lacofd.org/forestry.htm

University of California
Integrated Hardwood Range Management Program
163 Mulford Hall, Berkeley, CA 94720-3114
http://danr.ucop.edu/ihrmp

Private Organizations

The Theodore Payne Foundation
10459 Tuxford Street
Sun Valley, CA 91352-2126
(818) 768-1802
www.theodorepayne.org

California Native Plant Society
1722 J Street, Suite 17
Sacramento, CA 95814-3033
(916) 447-2677
www.cnps.org

The California Oak Foundation
1212 Broadway, Suite 810
Oakland, CA 94612-1810
(510) 763-0282
www.californiaoaks.org

Arboretums and Botanic Gardens

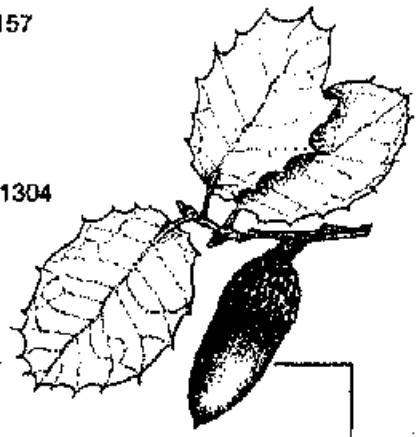
Los Angeles County Arboreta and Botanic Gardens
301 N. Baldwin Ave.
Arcadia, CA 91007-2697
(626) 821-3222
www.arboretum.org

Los Angeles County South Coast Botanic Garden
26300 Crenshaw Blvd.
Palos Verdes Peninsula, CA 90274-2515
(310) 544-6815
www.southcoastbotanicgarden.org

Los Angeles County Descanso Gardens
1418 Descanso Drive
La Canada-Flintridge, CA 91011-3102
(818) 949-4200
www.descansogardens.org

Rancho Santa Ana Botanic Garden
1500 North College
Claremont, CA 91711-3157
(909) 625-8767
www.rsabg.org

The Lummis Home
200 E. Avenue 43
Los Angeles, CA 90031-1304
(213) 222-0546



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Compatible Plants Under and Around Oaks. Bruce W. Hagen... [et al]. The California Oak Foundation. 2000.

Growing California Native Plants. Marjorie G. Schmidt, Univ. California Press. 1981.

Illustrated Guide to the Oaks of the Southern Californian Floristic Province. Fred M. Roberts. FM Roberts Publications. 1996.

Living Among the Oaks: A Management Guide for Landowners. University of California Integrated Range Management Program. 1995.

Oaks of California. Bruce M. Pavlik...[et al]. Cachuma Press & the California Oak Foundation. 1995.

Proceedings of the Fifth Symposium on Oak Woodlands: Oaks in California's Changing Landscape. GTR PSW-GTR-184. Forest Service, U.S. Department of Agriculture. 2001.
Available from the University of California Integrated Hardwood Range Management Program.

Regenerating Rangeland Oaks in California. University of California Integrated Range Management Program. 2001.

County of Los Angeles Fire Department
Forestry Division

County of Los Angeles
Board of Supervisors

Gloria Molina, First District
Yvonne Brathwaite Burke, Second District
Zev Yaroslavsky, Third District
Don Knabe, Fourth District
Michael D. Antonovich, Fifth District

County of Los Angeles Fire Department

P. Michael Freeman, Fire Chief

Brush Clearance Unit
605 N. Angeleno Avenue
Azusa, CA 91702-2904
(626) 969-2375

Camp 17
6555 Stephens Ranch Road
La Verne, CA 91750-1144
(909) 593-7147

Environmental Review Unit
12605 Osborne Street
Pacoima, CA 91331-2129
(818) 890-5719

Fire Plan/Interpretive Unit
12605 Osborne Street
Pacoima, CA 91331-2129
(818) 890-5783

Fuel Modification Unit
605 N. Angeleno Avenue
Azusa, CA 91702-2904
(626) 969-5205

Henninger Flats Forestry Unit
2260 Pinecrest Drive
Altadena, CA 91001-2123
(626) 794-0675

Lake Hughes Forestry Unit
42150 N. Lake Hughes Road
Lake Hughes, CA 93532-9706
(661) 724-1810

Malibu Forestry Unit
942 N. Las Virgenes Road
Calabasas, CA 91302-2137
(818) 222-1108

San Dimas Forestry Unit
1910 N. Sycamore Canyon Road
San Dimas, CA 91773-1220
(909) 599-4615

Saugus Forestry Unit
28760 N. Bouquet Canyon Road
Saugus, CA 91390-1220
(661) 296-8558

Vegetation Management Unit
12605 Osborne Street
Pacoima, CA 91331-2129
(818) 890-5720

GENERAL PLAN, SANTA CLARITA VALLEY AREA AND SPECIFIC PLAN AMENDMENT
BURDEN OF PROOF

Request

Newhall Land is requesting an amendment to the Los Angeles County General Plan, the Santa Clarita Valley Area-wide Plan (SCVAP), and the Newhall Ranch Specific Plan to modify the existing "secondary highway" designation for the "A" Street/Wolcott Road (also referred to as the Franklin Avenue extension), located between Long Canyon Road and SR-126, within the Newhall Ranch Specific Plan, which was approved by the County on May 27, 2003. The proposed amendment would reclassify "A" Street/Wolcott Road from a secondary highway to a collector street, and result in the removal of "A" Street/Wolcott Road from the General Plan's "Master Plan of Highways," since collector streets are not shown on this policy map. The proposed amendment would also result in the removal of "A" Street/Wolcott Road from the Circulation Plan of the SCVAP and would modify the street's designation on the approved Newhall Ranch Specific Plan's "Mobility Plan," on the Specific Plan's "Master Circulation Plan" exhibit, and on accompanying cross-sections.

The requested amendment is necessary to achieve a street designation that is safest, most consistent with, and most appropriate for the level of permitted development and anticipated circulation requirements under the "Traditional Neighborhood Development" (TND) land-use plan for the Landmark Village development within the Newhall Ranch Specific Plan. Since the street's original classification as a secondary highway, changes in circumstances have occurred to render the existing street classification inappropriate, unnecessary, and potentially unsafe for the current type and level of development proposed.

Background

In 1994, Newhall Land filed its entitlement application for the future development of Newhall Ranch, including the Newhall Ranch Specific Plan (NRSP), with the Department of Regional Planning (DRP). Among the entitlement applications submitted concurrently with the NRSP were requests for amendments to the Los Angeles County General Plan, the SCVAP, and the Newhall Ranch Specific Plan, to establish what is now referred to as "A" Street/Wolcott Road as a secondary highway within the future Landmark Village community. At the time, the secondary highway designation was appropriate based on the projected future traffic demands on this street segment. The Specific Plan proposed a maximum of 24,700 residential dwelling units and a total of approximately 5.7 million square feet (sf) of non-residential development within Newhall Ranch. Of those totals, 1,750 dwelling units and 1 million sf of non-residential floor-area were proposed for the portion of Newhall Ranch adjacent to and containing the proposed "A" Street and Wolcott Road. This Newhall Ranch community, referred to as "Landmark Village," is the area within Vesting Tentative Tract Map No. 53108.

Based on the proposed development for Landmark Village (1,750 dwelling units and 1 million sf of non-residential uses) and Newhall Ranch overall, future traffic volumes on "A" Street/Wolcott Road were projected to equal approximately 30,000 average daily trips (ADTs). (Austin-Foust

Associates, *Newhall Ranch Traffic Analysis*, July 1996.) This level of traffic warranted designation of the street as a secondary highway, which provides traffic capacities of 32,000 ADT's.

In October 1996, the Regional Planning Commission held its first meeting regarding the Newhall Ranch Specific Plan and directed Newhall Land to reduce the overall scale and intensity of proposed development. Newhall Land revised the Specific Plan to provide for a reduced number of proposed dwelling units and a lower level of non-residential development. In December 1997, the Regional Planning Commission approved the NRSP with the scaled-back development proposal. The Board of Supervisors further reduced the level of development permitted by the Specific Plan during its reviews in 1998 and 2003.

As a result of these changes to Newhall Ranch, the approved Specific Plan now permits a maximum of up to 20,885 residential dwelling units and a maximum of 5.5 million square feet of non-residential uses. This represents a reduction of approximately 15 percent from the 24,700 dwelling units originally proposed, and a decrease of approximately 3 percent in permitted non-residential development from that originally requested in 1994. For the Landmark Village community of Newhall Ranch, the maximum number of residential units was reduced from 1,750 dwelling units to a maximum of up to 1,444 dwelling units. This represents a reduction of approximately 17 percent in permitted residential development. (There was no change to the permitted non-residential development at Landmark Village.)

In addition to the general reduction in the scale of development and number of permitted residential units and non-residential floor-area, another significant change in circumstances has occurred since the development plan was first submitted in 1994 that warrants a "downgrading" of "A" Street/Wolcott Road from a secondary highway to a collector street classification. In its more detailed development plan for Landmark Village prepared following approval of the Specific Plan, Newhall Land has chosen a TND land-use plan for Landmark Village, which emphasizes pedestrian safety, comfort and the concept of "walkability." In summary, the land plan has been developed so that key community features, such as parks, schools and shopping, are within a reasonable walking distance from most homes. In order for the land plan to be effective, streets must be designed to promote pedestrian safety and prevent excessive traffic (including "cut-through" traffic) and unsafe vehicle speeds. In fact, the failure to appropriately match street design to the land plan could result in increased risk of accidents, greater public liability, and degraded pedestrian safety.

As part of this TND approach, the intended function and design of "A" Street/Wolcott Road, has changed over the years. "A" Street/Wolcott Road was originally conceived as an arterial highway extension of Franklin Avenue, in the Commerce Center area northeast of Landmark Village, connecting with Long Canyon Road. Under the TND approach, the function of "A" Street/Wolcott Road would be limited to providing connectivity between Landmark Village neighborhoods and from the local streets to the arterial highway system. In this way, "A" Street/Wolcott Road would discourage "cut-through" traffic as an alternative to SR-126. The street design was adjusted to match this shift in intended function. The alignment was made curvilinear, lengthening the total roadway distance; traffic-calming design features such as a

periodic landscaped median, curb bulb-outs, and on-street parking were incorporated; and modern roundabouts are proposed.

With the reduced scale of development permitted by the revised NRSP and the shift in the street's intended function as part of the TND land plan, projected traffic volumes on "A" Street/Wolcott Road may now be accommodated by a collector street, which has a capacity of approximately 10,000 ADT. Traffic volumes on "A" Street/Wolcott Road are projected to be less than 10,000 ADT's for all but a short segment on the west end, which is proposed to be served by a higher-capacity, four-lane section providing adequate capacity. (Austin-Foust Associates, *Landmark Village Traffic Impact Analysis*, October 2003.)

In summary, a change in street classification for "A" Street/Wolcott Road from a four-lane secondary highway to a collector street is appropriate and warranted because of the reduction in proposed development, the implementation of a TND land-use plan, and the resulting decrease in projected traffic volumes. Projected traffic volumes would be adequately served by a collector street designation, and the existing secondary highway designation would provide unnecessarily excessive capacity. Furthermore, requiring the secondary highway could result in the potential for increased vehicular speeds under the proposed TND land plan, while the collector street would be the appropriate context-sensitive designation.

Justification

Due to the changes in circumstances since the Newhall Ranch Specific Plan and accompanying entitlements were first filed and approved, as detailed above, the existing secondary highway street classification is no longer appropriate for "A" Street/Wolcott Road. In addition to the justification provided above, the following four responses must be demonstrated in the affirmative in support of this request for a General Plan/Specific Plan Amendment.

Response No. 1

A need for the proposed General Plan Amendment exists because:

The proposed General Plan/Specific Plan Amendment is necessary and appropriate to provide a street classification that corresponds with the projected level of traffic demand, while at the same time providing a safe pedestrian environment consistent with the adjacent land-use plan. Without the requested General Plan/Specific Plan amendment, the street classification would require that "A" Street/Wolcott Road be improved to provide excessive capacity, with more than three times the capacity (32,000 ADT's) of the projected future volumes (fewer than 10,000 ADT's). In addition, requiring "A" Street/Wolcott Road to be built to secondary highway standards while its functional use is as a collector street providing connectivity between neighborhoods and the local street system would result in the potential for unsafe conditions, including increased frequency of accidents, increased severity of injury and property damage/loss, and the potential for increased public liability. These safety and liability risks of maintaining the secondary highway designation in lieu of the requested collector street classification are discussed in more detail in Response No. 4, below.

Response No. 2

The particular amendment proposed is appropriate and proper because:

As noted above, the requested collector street designation, with a capacity of approximately 10,000 ADT's, is appropriate for the projected traffic demand of fewer than 10,000 ADT's. In addition, the collector street designation is the most appropriate choice in the context of the proposed TND land-use plan for Landmark Village. The TND land-use plan places importance on pedestrian safety and comfort, as community uses, such as schools, recreation, and shopping, are located within walking distance of most residences. The higher-speed, higher-volume secondary highway would be inconsistent with the land-use plan as well as providing traffic capacity far in excess of projected demand.

Response No. 3

Modified conditions warrant a revision to the County of Los Angeles General Plan because:

As discussed above, the following are the key changes in circumstances that result in the need for the requested General Plan/Specific Plan Amendment:

1. The level of permitted development, including the number of homes and the amount of proposed non-residential floor-area, has been scaled back significantly from the original Newhall Ranch proposal, in general, and in Landmark Village, specifically.

2. Following approval of the Newhall Ranch Specific Plan, Newhall Land selected a "Traditional Neighborhood Development" land-use plan for Landmark Village, which would change the intended function of "A" Street/Wolcott Road from a secondary highway – as originally planned, providing a connection from Commerce Center, on the northeast, to the western portion of Landmark Village and areas of Newhall Ranch to the south – to a collector street intended to provide internal connectivity within Landmark Village only, between neighborhoods and connecting to the local street system. The change in intended street function, as implemented in the curvilinear street design with traffic-calming features, would eliminate "cut-through" traffic. The TND land-use plan would also reduce the number of vehicle trips generated from the project, by encouraging residents to walk to near-by destinations.

3. The reduced level of permitted development, combined with the selection of a "TND" land-use plan, have significantly reduced the projected traffic levels on "A" Street/Wolcott Road. The projected traffic levels on "A" Street/Wolcott Road were originally estimated at approximately 30,000 ADT's, which required a secondary highway classification. Under the proposed Landmark Village development, the projected traffic levels have been significantly reduced to approximately 10,000 ADT's or less, which justifies the change in classification from a secondary highway to a collector street.

Response No. 4

Approval of the proposed General Plan Amendment will be in the interest of public health, safety, and general welfare and in conformity with good planning practices because:

Approval of the requested General Plan/Specific Plan Amendment will result in significant contributions to the public health, safety and general welfare, including the following:

1. The requested collector street classification will result in safer conditions when compared to the existing secondary highway designation.

   a. Based on research compiled by Newhall Land (*Traditional Neighborhood Development at Landmark Village, Newhall Ranch: The Role of Alternative Street Design in Traditional Neighborhood Development, Volumes I and II,* November, 2001; March, 2002), the number of traffic accidents would be reduced with the requested street designation, as demonstrated below.

   b. In addition, as noted in the research referenced above, accident severity would also be diminished. Injuries to both motorists and pedestrians would be less severe under the requested street classification, generating fewer fatalities and less-severe injuries.

      i. Motor vehicle accidents are the leading cause of accidental death in California, and 20 percent of accidents involve pedestrians. (*Dangerous by Design: Pedestrian Safety in California,* Surface Transportation Policy Project, and September 2000.)
      ii. The second-leading cause of death for California children (ages 5-12) is pedestrian fatality. (*Ibid.*)
      iii. There is a direct correlation between roadway width and vehicle speeds. (*Residential Street Typology and Injury Accident Frequency,* Swift, 2001.)
      iv. Slower vehicle speeds result in greater stopping distance, a lower frequency of accidents, and reduced severity of injury from the smaller number of resulting accidents. (*Traditional Neighborhood Development Street Design Guidelines,* Institute of Transportation Engineers, October, 1999.)

2. By enhancing the pedestrian environment, the requested street classification would promote a healthier community.

   a. The less-intrusive collector street classification would contribute toward the TND's goal of promoting walking as an alternative to driving to community destinations. For example, safe streets would allow children to walk to neighborhood schools. Studies show that walkable communities promote their residents' health. ("Healthy Neighborhood Streets – The Key to Stronger Communities", *On Common Ground,* Winter 2002.)

   b. The safer, more comfortable pedestrian environment would also promote walking, jogging, bicycling and other recreational opportunities.

3. The requested street classification would promote the general welfare with enhanced property benefits:

   a. Property owners would benefit from less property damage and fewer injuries associated with motor-vehicle accidents, as noted above.

   b. Property owners could benefit from alternative financing programs provided to TND communities; such as the "location-efficient mortgage"[1] that recognizes the benefits of a safe and walkable community.

   c. Studies show that property values are enhanced in "smart growth" communities such as a TND, when compared with the values of homes in conventional subdivisions. (Smart Growth Gateway, www.smartgrowthgateway.org.)

4. The requested amendment is consistent with good planning practices.

   a. This request is consistent with the following American Planning Association's "Principals for Smart Growth:"
      i. Create walkable neighborhoods;
      ii. Foster distinctive, attractive places with a strong sense of place;
      iii. Provide a variety of transportation choices; and
      iv. Take advantage of compact building design.

   b. This request is consistent with the following "Ahwahnee Principles," developed by the Local Government Commission to promote livable communities:
      i. Community size should be designed so that housing, jobs, daily needs and other activities are within easy walking distance of each other;
      ii. As many activities as possible should be located within easy walking distance of transit stops;
      iii. Streets, pedestrian paths and bike paths should contribute to a system of fully-connected and interesting routes to all destinations. Their design should encourage pedestrian and bicycle use by being small and spatially defined by buildings, trees and lighting; and by discouraging high speed traffic; and
      iv. The community design should help conserve resources and minimize waste.

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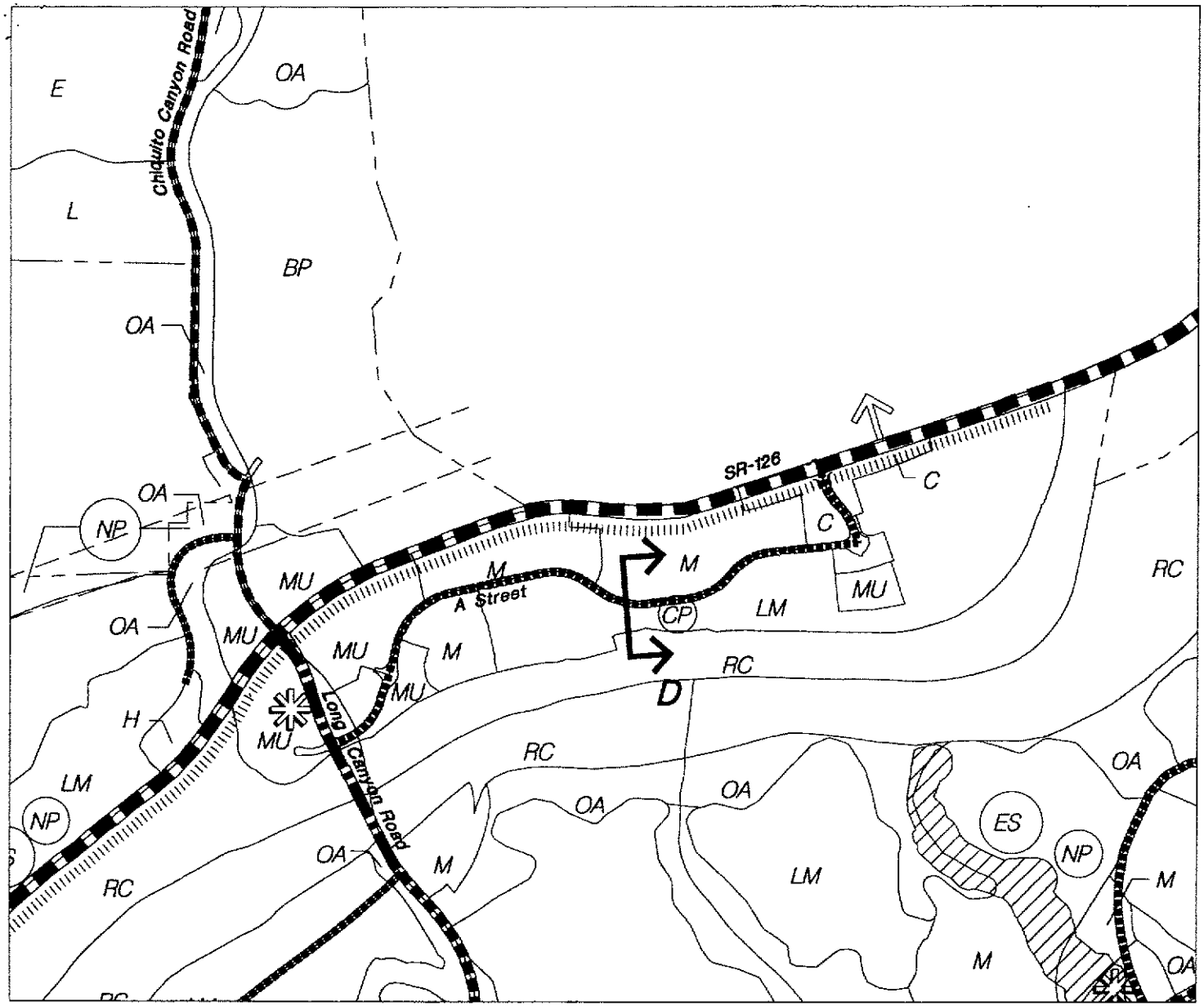
[1] The Location Efficient Mortgage®, (LEM) is a mortgage that helps people become homeowners in location efficient communities. These are convenient neighborhoods in which residents can walk from their homes to stores, schools, recreation, and public transportation. People who live in location efficient communities have less need to drive, which allows them to save money (with greater financial resources available for housing costs) and improves the environment for everyone. The LEM combines a low down payment, competitive interest rates, and flexible criteria for financial qualification to allow more people to own the home of their dreams. For additional information, please refer to www.locationefficiency.com.



NEWHALL RANCH.
SPECIFIC PLAN

Prepared For Newhall Ranch Company

LEGEND

- STATE HIGHWAY
- MAJOR HIGHWAY
- SECONDARY HIGHWAY
- COLLECTOR
- POSSIBLE FUTURE COLLECTOR ALIGNMENT
- BUS PULL-IN

Note:
'A' Street is proposed to be downgraded to a Collector Street as shown on Tentative Tract Map 53108 (see Typical Street Section).

0 1000' 2000'

NORTH

Computer Mapping by KIRMA Systems

LANDMARK VILLAGE - A STREET
PROPOSED MASTER CIRCULATION PLAN

JANUARY 2006

CONDITIONAL USE PERMIT
BURDEN OF PROOF
FOR (1) DEVELOPMENT WITHIN
A SIGNIFICANT ECOLOGICAL AREA
AND (2) UTILITIES
VTTM 053108

I. Background

Newhall Land is proposing to develop Landmark Village (formerly River Village), a 291-acre master planned neo-traditional community, located within the "Riverwood" village of the Newhall Ranch Specific Plan. The Specific Plan was approved by the County's Board of Supervisors on May 27, 2003. The Landmark Village project is designed to include a broad spectrum of residential housing, commercial development, institutional services, a community park, and other open space areas, consistent with the approved Specific Plan. The proposed project will implement a portion of the approved Specific Plan through development of 1,444 dwelling units and approximately 1,000,000-square feet of non-residential uses.

Newhall Ranch Program-Level SEA CUP No. 94-087-(5)

The County's Board of Supervisors approved a program-level Significant Ecological Area Conditional Use Permit ("SEA CUP"), SEA CUP No. 94-087-(5), in conjunction with the Board's approval of the Newhall Ranch Specific Plan on May 27, 2003.

CUP No. 94-087-(5) approved: (a) adjustments to the existing boundaries of SEA 23, consistent with General Plan policies requiring the protection of natural resources within SEAs; and (b) Specific Plan development within SEA 23 boundaries. The approved SEA boundary adjustments were found to be consistent with the adopted Specific Plan, which established a Specific Plan designation of "Special Management Area" ("SMA") over the adjusted SEA 23 boundaries. Although the adjusted boundaries within SEA 23 were identified as the "River Corridor SMA" in the adopted Specific Plan, the underlying SEA 23 designation remains in effect.

In approving CUP No. 94-087-(5), the Board specifically found that the proposed development under the approved Specific Plan was consistent with the adopted General Plan for the area (CUP, 43). The Board also found that the Specific Plan adjusted the existing SEA 23 boundaries by removing a limited amount of acreage for development from the existing SEA; however, the existing SEA nevertheless remained in a viable and largely natural condition (CUP, 18-21, 43). In addition, the Board found that the proposed development within SEA 23 conformed to the General Plan SEA "design compatibility criteria" (CUP, 21-36, 43).

Furthermore, the Board found that the Specific Plan is sensitive to, and compatible with, the biotic resources of SEA 23 (CUP, 43). In addition, the Board found that the Specific Plan development will not:

(a) Adversely affect the health, peace, comfort, or welfare of persons residing or working in the surrounding area; or

(b) Be materially detrimental to the use, enjoyment, or valuation of property of other persons located in the vicinity of the site; or

(c) Jeopardize, endanger, or otherwise constitute a menace to the public health, safety, or general welfare (CUP, 43-44).

The Board also found that the Specific Plan site is adequate in size and shape to accommodate the yards, walls, fences, parking and loading facilities, landscaping, and other development features prescribed in the Zoning Ordinance, or as otherwise required in order to integrate said uses within the uses in the surrounding areas (CUP, 44).

Finally, the Board found that the Specific Plan site is adequately served:

(a) By highways or streets of sufficient width and improved as necessary to carry the kind and quantity of traffic such use would generate; and

(b) By other public or private service facilities as are required (CUP, p. 44).

Based on the above findings, the Board approved CUP No. 94-087-(5) subject to various adopted conditions (CUP, 45).

Landmark Village Project-Level SEA CUP

As part of the Landmark Village project approvals, Newhall Land is requesting a project-level SEA CUP for proposed development associated with Landmark Village within SEA 23 in order to ensure consistency with both the adopted Specific Plan and approved program-level CUP No. 94-087-(5).

The proposed Landmark Village project site is approximately 291 acres in size. Of the 291 acres about 14 acres lie within SEA 23 and is designated as Open Area. Except for a portion of the approved Long Canyon Road Bridge alignment, the acreage within the SEA (14 acres) is designated as Open Area. Although some of SEA 23 contains sensitive riparian habitat, none of the proposed development areas is within this habitat.

Overview of the County's Significant Ecological Areas

This section provides information regarding the general background of the County's designated SEAs, and the constraints imposed by the County on development within SEAs, including the Newhall Ranch SEA 23.

The "Significant Ecological Area" designation is one of several land use classifications set forth in the Land Use Element of the Los Angeles County General Plan. SEA classification generally identifies lands having important biological resources. The classification includes habitats of rare and endangered species, sites with critical fish and wildlife values, relatively undisturbed areas of typical natural habitat and regionally scarce biotic resources. The intent of the General Plan is to preserve and enhance SEAs, to the extent possible, for the benefit of present and future County residents.

The purpose underlying SEA land use classification is to preserve SEA resources in an ecologically viable state. Several General Plan policies reflect that intent.

Other factors governing implementation of the General Plan's SEA goals and objectives include the County's ability to accurately identify areas of SEA resource value, the availability of financial and other resources necessary to support preservation, restoration and enhancement efforts, and the competing priorities between resource preservation and other critical public needs. The County's Zoning Ordinance further acknowledges that it is not the purpose of SEA designation to preclude development within SEAs, but rather to ensure, to the extent possible, that such development maintains and, where possible, enhances SEA biotic resources while allowing limited controlled development within SEAs.

SEA General Plan Development Process

Recognizing the resource values at stake and the constraints imposed by competing priorities and objectives, the General Plan seeks to provide a process for reconciling specific conflicts between proposed land uses and the preservation of identified SEAs. The General Plan does not, however, suggest that this can be accomplished by applying a single set of regulatory standards to all SEAs. Instead, the General Plan recognizes that measures necessary to preserve and enhance SEAs will vary depending upon the nature of the resource values present and the degree of threat implied by potential incompatible development. Within this context, the General Plan sets forth SEA compatible land uses and identifies SEA design compatibility criteria to guide specific land use decisions.

As stated above, the General Plan identifies certain uses, which are compatible with SEAs by definition, and certain uses that may be compatible. However, the General Plan notes that it "has not attempted to identify, in other than the most general terms, appropriate use types and intensities within significant ecological areas." Therefore, in order to determine whether a development proposal, in fact, is compatible with a particular SEA, the General Plan requires that the proposal be reviewed for compliance with certain "design compatibility criteria." The design criteria are as follows:

(a) That the requested development is designed to be highly compatible with the biotic resources present, including the setting aside of appropriate and sufficient undisturbed areas;

(b) That the requested development is designed to maintain waterbodies, watercourses, and their tributaries in a natural state;

(c) That the requested development is designed so that wildlife movement corridors (migratory paths) are left in an undisturbed and natural state;

(d) That the requested development retains sufficient natural vegetative cover and/or open areas to buffer critical resource areas from said requested development;

(e) That where necessary, fences or walls are provided to buffer important habitat areas from development; and

(f) That roads and utilities serving the proposed development are located and designed so as not to conflict with critical resources, habitat areas or migratory paths.

Newhall Ranch Specific Plan

The Newhall Ranch Specific Plan requires that a conditional use permit be filed pursuant to Section 22.56.215 (A)(1) of the County Zoning Code for all development proposed within an SMA (SEA).

Zoning Ordinance SEA Development Process

The General Plan requirement that development proposed within an SEA comply with the foregoing "design compatibility criteria" is implemented through provisions of the Los Angeles County Zoning Code. Pursuant to Section 22.56.215(A)(1) of the Code, an applicant must obtain a conditional use permit "prior to the issuance of any building or grading permits, approval of a minor land division or subdivision, or the commencement of any construction or enlargement

of any building or structure on a lot or parcel, which is in or partly in an area designated in the County General Plan and related maps as a significant ecological area."

The General Plan also requires that an application for a SEA conditional use permit undergo an "SEA Performance Review." This process involves review of the application by an appointed Significant Ecological Area Technical Advisory Committee ("SEATAC"). SEATAC reviews the application and accompanying biological resources report for its adequacy, and recommends conditions and guidelines for final project design. Considering the recommendations of SEATAC, the Los Angeles County Regional Planning Commission then takes action upon the proposed development plan.

Pursuant to the General Plan, the Regional Planning Commission recommendation for approval of proposed development within an SEA must be accompanied by a finding that the proposed development is sensitive to, and compatible with, the biotic resources identified in the permit application materials. If the Commission cannot make such a finding, it may deny the project, request a revised development plan, or approve and forward the proposal, together with a statement of overriding considerations, to the Board of Supervisors for further review and action.

Description of SEA 23

The Specific Plan River Corridor SMA (SEA 23) was approved in consideration of the resource values present in the Santa Clara River. The value of the SEA 23 is derived from the riparian habitats and associated species located within its boundaries, and the function of the SEA 23 as a regional wildlife corridor. The SEA 23 also includes habitat for the unarmored threespine stickleback, a state and federally listed endangered species, and other sensitive aquatic and riparian species known to occur within the Specific Plan site. Under the Specific Plan, some development is allowed within the boundaries of SEA 23, including but not limited to trails, wildlife preserves, scenic turnouts, agricultural operations, utilities necessary for public health and welfare, interpretive displays, vista points, and oil and gas operations. Under CUP No. 94-087-(5) three bridge crossings over the river were approved, including the Long Canyon Road Bridge, bank stabilization along portions of the SEA 23, and development on mostly agricultural land within the SEA 23.

II. Proposal

Consistent with the approved Specific Plan and program-level CUP No. 94-087-(5), Newhall Land proposes project-level improvements within SEA 23. The proposed improvements requested are as follows:

(a) Long Canyon Road Bridge;

(b) Trails and scenic vista path;

(d) Bank stabilization;

(e) Utilities (storm drain outlets, water quality basins, and utilities);

(f) Agricultural wells;

(g) Riparian mitigation sites;

(h) Off-site transport of materials associated with grading; and

(i) Metrolink right-of-way easement

Long Canyon Road Bridge

In conjunction with the Specific Plan approvals, CUP No. 94-087-(5) approved three elevated highway bridge crossings over the Santa Clara River, including the general alignment for Long Canyon Road Bridge (as well as Commerce Center Drive and San Martinez Grande Road). The number and general location of the bridge crossings were established in order to minimize impacts to sensitive habitat and species within SEA 23, and to minimize major access points to SR-126. Each of the bridge crossings is an extension of an existing road, creating a functional regional circulation system.

As part of the approval of CUP No. 94-087-(5), the County's Board of Supervisors found that the three bridge crossings were essential for a functional circulation system to serve the Specific Plan area and the region, and that the bridges were necessary to advance many of the County's goals and policies related to transportation, land use, and other issues of public interest (CUP, 33-34). The Board also considered and rejected a series of bridge alignment and bridge span alternatives in approving the three crossings via the Specific Plan and related CUP No. 94-087-(5). Each bridge crossing was found to comply with the County's engineering requirements, and to be strategically located and designed to provide maximum transportation effectiveness, while minimizing impacts to critical resources, habitat areas and animal movement paths in riparian corridor areas (CUP, 36-37).

Newhall Land is proposing to construct the Long Canyon Road Bridge component of the approved Specific Plan, as part of the Landmark Village project. Long Canyon Road Bridge will span the width of the Santa Clara River, equating to a roadway segment of approximately 1,100 feet in length and 100 feet in width. The highway bridge crossing is designated as a major

highway until it reaches the south side of the bridge, pursuant to the approved Specific Plan and the County Master Plan of Highways (south of the Santa Clara River, Long Canyon Road is designated as a secondary highway.)

Long Canyon Road Bridge will have 3 lanes of traffic in each direction. It will be designed to meet Department of Public Works standards and include curbs, gutters, sidewalks and a median. Support for the bridge will involve construction of concrete piers to be located within SEA 23. Abutments will be constructed on each side of the river.

Bank stabilization to reduce scour potential of the bridge is proposed along the perimeter of the abutments. The areas of bank stabilization are within SEA 23. Bridge construction will temporarily disturb the riverbed during grading, recompaction and construction. Vegetation along the riverbank and within the river itself will be removed and replaced. After construction, the riverbed will be returned to its natural state with the exception of the concrete supports and bridge abutments. Excavations will be designed to minimize riverbed disturbance, while satisfying the structural requirements of construction. The abutments have been designed to avoid significant riparian impacts.

The introduction of the bridge abutments into the Santa Clara River would have some restriction on flows during a capital flood. The placement of stabilization along the bridge abutments would reduce vegetation and, combined with the restriction of flows by the presence of the abutments, would increase the velocities of water traveling under the bridge. These increases are local in nature and are found immediately at the bridge abutments. Within 200 feet downstream of the bridge, capital storm velocities return to that experienced under the existing conditions of the river.

Newhall Land is authorized to continue the maintenance and operation of existing agricultural river crossings by the California Department of Fish and Game under an "*Agreement for Routine Maintenance Activities.*" As part of the Landmark Village development, highway crossings over the Santa Clara River will be restricted to one location (Long Canyon Road Bridge), significantly less than the number of existing agricultural crossings, which are permitted to continue under applicable regulations. In addition, by elevating each bridge crossing, impacts to biotic resources within the SEA 23 are substantially minimized.

<u>Trails</u>

As part of the approved Specific Plan, the County's Board of Supervisors adopted the Newhall Ranch Master Trails Plan, Exhibit 2.4-5, which encompasses a comprehensive system of trails throughout the Specific Plan area, and provides potential connection points to regional trail systems within

the Santa Clarita Valley. The approved Master Trails Plan includes the following hierarchy of trails:

(a) Regional River Trail;

(b) Community Trails;

(c) Local Trails;

(d) Pathways; and

(e) Unimproved Trails.

Of the approved trails, the Regional River Trail, located on the north side of the Santa Clara River and extending from the Castaic Creek to the western Specific Plan boundary, represents an important recreational feature of the approved Specific Plan, allowing both active and passive enjoyment of the Santa Clara River through the design of a combined pedestrian/bicycle/equestrian trail.

At the project-level, the Landmark Village development proposes several trails, consistent with the approved Specific Plan. The first includes a portion of the Regional River Trail, which spans and follows the southern boundary of the Landmark Village site. The Regional River Trail includes an improved pedestrian and bicycle route which offers view opportunities along the edge of the river. An equestrian trail will also be provided as a separate dirt trail approximately 3-5 feet from the improved trail. Newhall Land is also proposing a scenic vista path, permitted under the Specific Plan that consists of a 2,500-linear foot loop of nature path below the central portion of the Landmark Village site. The exact location, width, and construction material of the path will be determined after biological surveys have been conducted and the Department of Fish and Game as well as other resource agencies have been consulted.

<u>Utilities</u>

- *Utility Lines*

Landmark Village is an area disconnected from existing developable areas making utility extensions necessary. Utilities planned to serve the Landmark Village project may include, but not be limited to, water, sanitary sewer, gravity sewer, force main, irrigation, cable, gas, fiber optics and reclaimed water lines.

The utility courses will stretch from Los Angles County Sanitation District No. 32, located directly southwest of the SR-126/I-5 Interchange, to the proposed

Water Reclamation Plant to be located approximately 1.6 miles west of the proposed project. It is unknown at this time the exact route the utilities will take across Landmark Village. However, it is necessary that the utility easements cross SEA 23 at two points beyond the geographic limits of Landmark Village: both east and west of the project directly south of the SR-126 right of way.

Utility lines including potable water, reclaimed water, communications systems ducts, electrical power, natural gas and sanitary sewer lines may also be hung from the Long Canyon Road Bridge, which crosses the SEA, to provide water to areas south of Landmark Village.

- *Water Quality Basins*

Consistent with the program-level CUP No. 94-087-(5), the Landmark Village project proposes installation of water quality basins and vegetated treatment swales located within the project and along the southern portion of the site. These basins and swales will be designed to capture first flush storm water (i.e., the first 0.75 inches of runoff) and non-storm water urban runoff from the developed areas within the Landmark Village project. These water quality basins and swales will be designed to the specifications of the County's Department of Public Works and the state Regional Water Quality Control Board. After treatment, water run-off will be conveyed through a closed or open channel to the river. This conveyance system will be within SEA 23. Water quality basins and swales will either be maintained by the Department of Public Works or a Landscape Maintenance District.

Clean sediment, periodically removed from debris basins located at the interface of undeveloped land areas where drainages have not entered the developed portions of the site, may be placed into the river area as approved by the various regulatory agencies. Necessary permits from the U.S. Army Corps of Engineers, State Department of Fish and Game, and the Regional Water Quality Control Board to allow for such placement of sediment, prior to construction of any development that contemplates debris basins or bank stabilization.

- *Storm Drain Outlets*

There are five proposed storm drain outlets to be installed within SEA 23. Each storm drain easement is approximately 25 feet in width and lies along the southern VTTM boundary. The easements barely jut out southerly from the VTTM into SEA 23 buffer zone. The easements do not extend beyond the width of the swath proposed for bank stabilization.

Bank Stabilization

The approved Specific Plan contemplated installation of bank stabilization along the Santa Clara River. The environmental effects of the bank stabilization were thoroughly assessed at the program level in the Newhall Ranch Final Additional Analysis, which was certified by the County's Board of Supervisors on May 27, 2003. At the project-level, the Landmark Village development includes limited bank stabilization to protect the project from erosion during capital storm events.

The design of the bank stabilization will be required to conform to the standards of the Department of Public Works. A total of approximately 10,620 lineal feet of bank stabilization will be required as part of the proposed project. The stabilization material will consist primarily of buried soil cement to minimize visual intrusion and to resist scouring. In limited instances, grouted rip-rap or concrete gunite will be installed at bridge abutments and other transition areas.

The bank stabilization along portions of the southern boundary of the project site will be designed and constructed to retain the river's significant riparian vegetation and habitat, to allow the river to continue to function as a regional wildlife corridor, and to provide flood protection pursuant to Los Angeles County standards.

Agricultural Wells

There are eleven existing agricultural wells. As a part of Landmark Village development, six (6) are proposed to remain although some may be relocated. Each water well will be 10,000 square-feet in land area.

Potential Riparian Mitigation Sites

Mitigation for impacts as a result of the Landmark Village development on riparian resources will include restoration of riparian habitat and may include enhancement activities. The general areas in which riparian mitigation activities may take place are shown on attached Newhall Ranch Specific Plan Exhibit 2-6.3, Candidate Riparian Restoration/Enhancement Areas.

Under the Specific Plan "Wildlife, nature, forest and marine preserves" use type is a permitted land use designation within SEA 23. Habitat restoration and enhancement associated with the Landmark Village development may consist of revegetation and/or rehabilitation of native plant communities on sites that have had the habitat removed due to past activities such as agricultural or oil and natural gas operations. Unavoidable impacts to riparian resources shall be minimized through project design, and then mitigated by the implementation of a revegetation and/or rehabilitation plan.

The restoration mitigation areas located within SEA 23 shall be in areas that have been disturbed by previous uses or cases. Mitigation shall be conducted only on sites where soils, hydrology, and microclimate conditions are suitable for riparian habitat. The candidate areas are comprised almost entirely of disturbed areas; therefore, after restoration, the sites can be considered "new" sensitive habitat within SEA 23. The goal is to increase habitat patch size and connectivity with other existing habitat patches while restoring habitat values that will benefit sensitive species.

Restoration of riparian habitats within SEA 23 shall use plant species native to the Santa Clara River. Cuttings or seeds of native plants shall be gathered within SEA 23 or purchased from nurseries with local supplies to provide good genetic stock for the replacement habitats.

Per the Specific Plan, four sites associated with the Landmark Village development have been determined to be conceivable "Candidate Riparian Restoration areas". One is located adjacent to the northeast corner of the project, just south of SR-126 and is approximately two acres in size. The second area and the largest of the four sites, approximately 16 acres and is located south of the western portion of the project. A potential 2.4-acre site lies south of the eastern portion of the project. These sites generally hug the boundary of the VTTM resulting in no obtrusion to the riverbed. A last site lies just west of the project and continues to run west, south of SR-126.

Off-site Transport of Materials in Conjunction with Permitted Grading

There are two transport routes that are proposed to cross SEA 23, both of which coincide with operational agricultural river crossings permitted by the California Department of Fish and Game. Off-site transport of materials shall comply with all applicable requirements of other County departments and other governmental agencies.

Metrolink Right-of-Way Easement

In order to provide future residents in the Santa Clarita Valley (including Newhall Ranch) with alternative modes transportation, a Metrolink rail system line is proposed. The right-of-way easement for the line will vary from 35 feet to 50 feet in width and will run parallel to SR-126 extending east and west from the project. The easement will cross SEA 23 at two points beyond the geographic limits of Landmark Village: both east and west of the project directly south of the SR-126 right of way.

CONDITIONAL USE PERMIT
BURDEN OF PROOF

As part of the program CUP No. 94-087-(5), which was approved on May 27, 2003, the County's Board of Supervisors already determined that development within the Specific Plan SEA 23 met the County's requirements for issuance of a conditional use permit within a significant ecological area. Accordingly, the purpose for this section of the application is to show that the Landmark Village development is consistent with the approved Newhall Ranch Specific Plan, including the previously approved program CUP No. 94-087-(5). These uses specifically include trails, riparian restoration areas, storm drain outlets, water quality basins, utilities, proposed agricultural wells, Long Canyon Road Bridge, bank stabilization, the off-site transport of grading material, and the Metrolink easement. In addition, the applicant is concurrently requesting under this application, that the County permit publicly-owned and maintained uses necessary for the maintenance of the public health, convenience or general welfare ("public improvements") within the SEA 23 land designation. Substantiation is demonstrated by the following facts:

A. *That the requested use at the location will not:*

1. *Adversely affect the health, peace, comfort or welfare of persons residing or working in the surrounding area, or*

The County's Board of Supervisors already determined that the approved Specific Plan, including CUP No. 94-087-(5), will not "adversely affect the health, peace, comfort or welfare of persons residing or working in the surrounding area." Therefore, at the project-level, the pertinent question is whether the Landmark Village development is consistent with the approved Specific Plan and CUP No. 94-087-(5). If consistent, and absent any significant change in the Specific Plan or its circumstances, the Landmark Village development should necessarily satisfy the above SEA CUP requirement.

As part of the Landmark Village development, the Long Canyon Road Bridge component of the approved Specific Plan will be constructed. By allowing construction of the Long Canyon Road Bridge, a component of the Specific Plan's traffic circulation system will be implemented. This component will provide another traveling route for automobile traffic, which minimizes congestion and reduces traffic trip time for residents and visitors of the Newhall Ranch community. Under the Specific Plan, the Long Canyon Road Bridge was contemplated to be the primary elevated bridge crossing for the central portions of the Newhall Ranch community. It will provide the

necessary connection to SR-126 and direct access to the business park uses north of SR-126. As a result, the bridge will provide an important link between future residential areas south of the river and employment opportunities to the north. In addition, the bridge will provide an alternate route for residents and others to reach destinations both within and outside of the Specific Plan.

The Newhall Ranch land uses have been designed using a village concept, with higher intensity uses clustered into village centers. This land use arrangement promotes the reduction of vehicle miles traveled by permitting more people to live near shopping, services and recreation. Bridge crossings significantly reduce the travel distances between these village centers and the other commercial uses north of the river. As a result, the bridges improve traffic flow and efficiency and reduce automobile vehicle miles traveled. The Landmark Village development and the proposal to construct the Long Canyon Road Bridge are consistent with the above Specific Plan design objectives.

Specifically, Landmark Village will be designed utilizing compact development, which will minimize impacts on the environment when compared to lower density, scattered development. A significant environmental benefit associated with traditional neighborhood design is that it consumes less land than conventional suburban development, but it accommodates roughly the same amount of development. By focusing the proposed development within Landmark Village in less sensitive areas, the proposed development will avoid or minimize impacts on sensitive habitat associated with the river than may occur under a low density development alternative. It also prevents the fragmentation of wildlife habitat, reduces stormwater runoff, and conserves open space areas.

The Landmark Village development will also implement a portion of the Regional River Trail, along with other local trails contemplated by the approved Specific Plan. The location of the Regional River Trail and the other local trails is consistent with the Specific Plan, minimizes impacts to SEA 23, avoids conflicts with vehicles and is consistent with existing trail alignments in the Santa Clarita Valley.

The Specific Plan approved bank stabilization within SEA 23. The Landmark Village development would implement a portion of the approved bank stabilization along the southern boundary of the project site. The bank stabilization would be constructed, consistent with the requirements of the approved Specific Plan. The portion of the bank stabilization that will be part of the Long Canyon Road Bridge abutment represents a health and safety benefit to the public as it provides a base for the elevated bridge, which is designed to accommodate Long Canyon Road, a major highway designated

on the Mobility Plan of the approved Specific Plan and on the County's Master Plan of Highways.

The Landmark Village development will include installation of water quality basins, storm drain outlets and utility crossings (collectively, public improvements). These proposed improvements will be designed to minimize impacts to sensitive habitat and resources associated with the river. The improvements will also be designed to promote the health, safety and welfare of persons residing or working in the Landmark Village development.

The proposed restoration mitigation areas located within SEA 23 shall be in areas that have been disturbed by previous uses or activities. Candidate areas are comprised almost entirely of disturbed area; therefore, after restoration, the sites can be considered "new" sensitive habitat with SEA 23. The goal is to increase habitat patch size and connectivity with other existing habitat patches while restoring habitat values that will benefit sensitive species.

2. *Be materially detrimental to the use, enjoyment or valuation of property of other persons located in the vicinity of the site, or*

The County's Board of Supervisors already determined that the approved Specific Plan, including CUP No. 94-087-(5), will not "be materially detrimental to the use, enjoyment or valuation of property of other persons located in the vicinity of the site." The Landmark Village development implements a portion of the approved Specific Plan. The project-level development proposed within SEA 23 as part of the Landmark Village development is considered consistent with the approved Specific Plan. Accordingly, the Landmark Village development is not anticipated to be "detrimental" to the use, enjoyment or valuation of property or persons located in the vicinity of the project site. In fact, the proposed Landmark Village development would promote healthy living by offering an environment and infrastructure that would entice people outdoors. The interconnectivity of walking, hiking, equestrian and biking trails will allow residents to enjoy Newhall Ranch's topographic variety, mountain ranges, open vistas, and valleys.

3 *Jeopardize, endanger, or otherwise constitute a menace to the public health, safety or general welfare; and*

The County's Board of Supervisors already determined that the approved Specific Plan, including CUP No. 94-087-(5), will not "jeopardize, endanger, or otherwise constitute a menace to the public health, safety or general welfare." The Landmark Village development will provide improvements within SEA 23, consistent with the approved Specific Plan. The proposed project site is adequate to accommodate the improvements requested within

SEA 23, as discussed above. The proposed improvements are adequate in size and shape to accommodate all development features and standards required by the County.

B. *That the proposed site is adequate in size and shape to accommodate the yards, walls, fences, parking, and loading facilities, landscaping and other development features prescribed in this Title 22, or as is otherwise required in order to integrate said use with the uses in the surrounding area;*

The County's Board of Supervisors already determined that the approved Specific Plan, including CUP No. 94-087-(5), satisfied the above requirements. The Landmark Village development will provide improvements within SEA 23, consistent with the approved Specific Plan. The proposed site is adequate for the improvements requested within SEA as discussed above. The applicant is not seeking any variances or exceptions to the County's development standards that may affect SEA 23.

C. *That the proposed site is adequately served:*

1. *By the highways or streets of sufficient width, and improved as necessary to carry the kind and quantity of traffic such use would generate, and*

The County's Board of Supervisors already determined that the approved Specific Plan, including CUP No. 94-087-(5), is adequately served by highways and streets of sufficient width, and improved as necessary to carry the kind and quantity of traffic contemplated by the approved Specific Plan land uses. Consistent with the Specific Plan, the Landmark Village development will include a project-level circulation plan depicting the streets and highways required to accommodate the traffic generated by the proposed project. This project-level circulation plan is an integral part of the overall Landmark Village development, and has been designed to implement a number of the Specific Plan's circulation objectives. These objectives include improving the internal and external trips by future residents; providing opportunities for using alternative modes of transportation; and providing an aesthetically pleasing environment, while achieving the above mobility/circulation objectives.

Residents, bicyclists, hikers, equestrians, visitors and others will have close view of SEA 23. However, as noted above, mitigation measures and conditions of approval are in place to prevent harmful intrusion within SEA 23, thereby protecting its unique habitat value. No public or private service facilities are required or associated with development that will occur within the SEA 23.

2. *By other public or private service facilities as are required.*

The County's Board of Supervisors already determined that the Specific Plan site is adequately served by other public improvements and private service facilities, and that the Specific Plan itself will provide additional public and private service facilities as part of the Newhall Ranch community. Accordingly, the Board approved both the Specific Plan and CUP No. 94-087-(5). At the project level, as part of the Landmark Village development, the applicant will verify that capacity is available for all appropriate public and/or private service facilities to meet the needs of the proposed project. If deficiencies are identified, it is expected that, as part of the project, the applicant would be required to mitigate such impacts. Therefore, it is expected that, with appropriate conditions of approval, the proposed site will be adequately served by all required public and/or private service facilities.

ADDITIONAL BURDEN OF PROOF FOR SEA FINDINGS SECTION 22.56.215 F.2

The County's Board of Supervisors already determined that the approved Specific Plan, including CUP No. 94-087-(5), conformed with the General Plan's SEA six "design compatibility criteria." Presented below are the six design compatibility criteria, along with a summary substantiating both the Specific Plan's conformity with such criteria, as well as Landmark Village's conformity at the project level.

1. **That the requested development is designed to be highly compatible with the biotic resources present, including the setting aside of appropriate and sufficient undisturbed areas.**

Specific Plan Summary

The County's Board of Supervisors already found that the Specific Plan and CUP No. 94-087-(5) met Design Compatibility Criterion No. 1, above. In summary, the Board found that the Specific Plan is considered highly compatible with the biotic resources present within the boundaries of the SEA 23 for the following reasons:

(a) The Specific Plan set aside appropriate and sufficient undisturbed sensitive habitat areas within the existing boundaries of SEA 23;

(b) The Specific Plan retained SEA 23 in a largely natural state;

(c) Only a relatively small amount of sensitive habitat (*i.e.*, one acre, or 0.08 percent of the existing SEA) was redesignated for non-residential land uses;

(d) The impacted areas would be fully mitigated;

(e) The river would still be sufficiently wide (and in certain locations widened) to accommodate the County's Capital Flood and still retain the sensitive riparian vegetation;

(f) Winter storm runoff would still continue to open its own channels through the river vegetation, flowing in a natural, non-invasive manner and preserve the meandering characteristics of the streambed;

(g) The tributary canyons and bluffs on the south side of the river would still be preserved and provide an additional 444 acres (including 415 acres of undisturbed land), which would be dedicated to Open space areas adjacent to the river; and

(h) Due to implementation of the Specific Plan, the amount of sensitive riparian habitat found in the existing SEA 23 would increase by approximately five acres and an additional 192 acres of additional sensitive habitat areas adjacent to the SEA 23 would be permanently preserved.

The Newhall Ranch Final Additional Analysis, Section 2.3, also addressed potential impacts due to channelization and bank hardening. Based on that analysis, the Board of Supervisors found that no significant increases in velocity, erosion or sedimentation would occur in the river; and, therefore, biotic resources present within the existing boundaries of SEA 23 would not be significantly impacted.

Landmark Village Summary

At the project level, the Landmark Village development within SEA 23 is designed to be highly compatible with biotic resources present within that corridor, including setting aside an appropriate and sufficient amount of undisturbed area, consistent with the approved Specific Plan. The project-level development proposed within SEA 23 includes the planned and approved Long Canyon Road Bridge abutments and piers. In addition, the project proposes to implement a portion of the approved Regional River Trail and other planned local trails. The proposed project will also include water quality basins and associated conveyance lines, utility crossings, storm drain outlets, and riparian mitigation sites. These proposed improvements were contemplated by the approved Specific Plan. The vast majority of SEA 23 will be left in a natural state, consistent with the Specific Plan.

2. That the requested development is designed to maintain water bodies, watercourses, and their tributaries in a natural state.

Specific Plan Summary

The County's Board of Supervisors already found that the Specific Plan and CUP No. 94-087-(5) met Design Compatibility Criterion No. 2, above. In summary, the Board found that the Specific Plan has been designed to maintain waterbodies, watercourses, and their tributaries in a natural state. As indicated above, the Board also found that no significant increases in velocity, erosion, or sedimentation would occur in the river because of the Specific Plan. During most storm events, the velocity and depth of the river would remain unchanged from current conditions, since the course of the river is able to meander without being constrained by bridge abutments or bank protection. It is only in the infrequent, 50- to 100-year event where small increases in depth or velocity will occur at certain locations along the river. In making these findings, the Board

relied on the Newhall Ranch Final Additional Analysis, Section 2.3, which provided a detailed analysis of the Specific Plan impacts to the floodplain areas within the site, including the depth and velocity of water flow in the Santa Clara River. Based on that analysis, the Board found that the Specific Plan's projected river flow increases did not significantly affect the water flow in the river.

Landmark Village Summary

As contemplated by the approved Specific Plan, Long Canyon Road Bridge will require the placement of abutments and piers in the river area; however, the effect of each bridge crossing, including Long Canyon Road Bridge, was thoroughly assessed in the Newhall Ranch Final Additional Analysis, Section 2.3, Floodplain Modifications. At the project level, the environmental analysis will further address the bridge abutments and piers to further assess impacts, if any, to the river corridor.

As contemplated by the approved Specific Plan, the Landmark Village development will include bank stabilization, but only where necessary to protect development from erosion. Bank stabilization is proposed to be ungrouted rock in all areas except at outlet structures, access ramps, and bridge abutments where it is expected that grouted rock or reinforced concrete will be required to meet Los Angeles County Department of Public Works standards. Alternative materials to rip rap for bank stabilization, including buried soil cement, will be considered by the Department of Public Works Flood Control section. Bank stabilization specifications will be further developed as part of the environmental review process for the Landmark Village development.

3. That the requested development is designed so that wildlife movement corridors (migratory paths) are left in an undisturbed and natural state.

Specific Plan Summary

The County's Board of Supervisors already found that the Specific Plan and CUP No. 94-087-(5) met Design Compatibility Criterion No. 3, above. In summary, the Board found that under the Specific Plan, SEA 23 would continue to function as a wildlife movement corridor because the Specific Plan design retained both the riparian vegetation in the river and the natural flow of the water without the need for periodic vegetation clearing. The Board also found that the Specific Plan showed a substantially reduced level of impact to sensitive riparian habitat along the Santa Clara River (the originally proposed 103 acres of impact was reduced to approximately one acre). The Board further found that the Specific Plan resulted in an increase of five acres in the amount of sensitive riparian

habitat along the river, and that the Specific Plan established transition areas to separate SEA 23 from the urban uses identified in the Land Use Plan. In addition, the Board found that the three bridges over the river would be sufficiently high as to allow the continued use of the river by animals for movement east to west along and within the river route, and that lighting controls would ensure that SEA 23 would continue to function as a wildlife movement corridor. The Board also found that Section 2.5 (Public Services and Facilities Plan) and Section 2.6 (Resources Management Plan) of the Specific Plan provide objectives and conceptual plans for preserving the river and Salt Canyon in a natural and undisturbed state. Finally, the Board found that the Newhall Ranch Final EIR and Additional Analysis addressed impacts and imposed mitigation measures for the identified impacts that would occur. As a condition of approval, the Board also required the applicant to conserve in perpetuity approximately 1,517 acres of the Salt Creek watershed in Ventura County, adjacent to the Specific Plan site, which enhances the Specific Plan's compatibility with animal movement in the region.

Moreover, the Board found that the tributaries (Castaic, San Martinez, and Chiquito Canyon Creeks) to the Santa Clara River within SEA 23 would all be maintained and preserved in a largely natural state with soft bottoms pursuant to Section 2.5 (Public Services and Facilities Plan) and Section 2.6 (Resources Management Plan) of the Specific Plan. Furthermore, the Board found that the remainder of these tributaries outside SEA 23 but within the Specific Plan were designated open space areas and preserved in a largely natural state.

The Board also found that the Salt Canyon area of the Specific Plan served as a wildlife movement corridor, and that the limited development proposed within SEA 23 would not have any impact upon this wildlife movement area. As indicated above, the Board required the applicant to dedicate 1,517 acres of the Salt Creek watershed in Ventura County, adjacent to the Specific Plan site, in perpetuity, thereby enhancing the Specific Plan's compatibility with animal movement in the region.

In addition, the Board noted that Caltrans had completed the widening of SR-126 from Fillmore in Ventura County to the I-5 freeway in Los Angeles County. As part of that widening project, major north/south animal movement undercrossings were installed under SR-126 at three locations. In addition, three additional larger undercrossings exist along SR-126 within the Specific Plan area at locations where bridges and culverts were constructed over secondary tributary stream courses. Because the undercrossings were designed to facilitate north/south wildlife movement, and because the three undercrossings within the Specific Plan site are of sufficient size to accommodate north/south wildlife movement, the Board found that north/south connectivity across the Santa Clara River will not

be significantly impacted. The Board's findings were supported by the Newhall Ranch Final Additional Analysis, Section 2.2, Salt Creek Corridor.

Landmark Village Summary

Consistent with the approved Specific Plan, for the most part, animal migratory paths within the SEA 23 will be left in an undisturbed, natural state. Again, the exception will be at the Long Canyon Road Bridge abutment and pier locations. All construction-related impacts of proposed development within the SEA 23 will be further assessed as part of the environmental review process for the Landmark Village development with mitigation measures imposed as appropriate.

Other proposed development within SEA 23 – (trails, storm drain outlets, water quality basins, utility lines, agricultural wells, Long Canyon Road Bridge, bank stabilization, and off-site transport of grading materials) – will have a de minimus impact on migratory pathways, and the riparian mitigation areas will actually prove to provide beneficial cover for migratory animals.

4. **That the requested development retains sufficient natural vegetative cover and/or open spaces to buffer critical resource areas from said requested development.**

Specific Plan Summary

The County's Board of Supervisors already found that the Specific Plan and CUP No. 94-087-(5) met Design Compatibility Criterion No. 4, above. In summary, the Board found that the Specific Plan retained sufficient natural vegetative cover and open space areas to buffer critical resources found in SEA 23 from the proposed development shown in the Specific Plan. Furthermore, the Board found that implementation of the Specific Plan would result in the direct preservation of 1,390 acres of land along the Santa Clara River Corridor within the boundaries of the Specific Plan area. In addition, the Board found that the Specific Plan incorporated an extensive buffer area to protect critical resources within SEA 23.

Landmark Village Summary

Consistent with the approved Specific Plan, the requested development within Landmark Village will retain sufficient natural vegetative cover and/or open space areas to complement SEA 23. As part of the Landmark Village development, a setback or buffer zone will be established along the southern boundary of the project site to protect sensitive habitat along the SEA 23. Furthermore, the vegetation within

portions of the setback or buffer zone will be restored and/or enhanced to increase habitat values when compared to existing conditions.

5. **That where necessary, fences or walls are provided to buffer important habitat areas from development.**

Specific Plan Summary

The County's Board of Supervisors already found that the Specific Plan and CUP No. 94-087-(5) met Design Compatibility Criterion No. 5, above. In summary, the Board found that the discussion of Design Compatibility Criterion No. 4, above, described how the Specific Plan incorporated vegetative cover and open space areas to buffer critical resources from the proposed uses in the Specific Plan. In addition to these features, the Board found that the Specific Plan also buffered habitat from proposed uses through development regulations and design guidelines. As indicated in Chapter 4 of the Specific Plan, future residential subdivisions and commercial development constructed within the Specific Plan area must include fences or walls that will preclude access to sensitive resources within SEA 23. As each tract or parcel map is submitted to the County, it must be reviewed to determine whether proposed uses substantially comply with the standards, regulations, and guidelines of the Specific Plan, including those pertaining to fencing and walls to ensure that they buffer important SEA 23 habitat areas from development.

Landmark Village Summary

Consistent with the approved Specific Plan, the Landmark Village development proposes fences and walls to protect significant habitat within the SEA 23. In addition, other mitigation measures and conditions of approval will be adopted to ensure the protection of sensitive biotic resources within the SEA 23 (e.g., shielding of illumination). The locations of the designated fences and walls and their relation to the SEA 23 will be further assess during the environmental review process for the Landmark Village development.

6. **That roads and utilities serving the proposed development are located and designed so as not to conflict with critical resources, habitat areas or migratory paths.**

Specific Plan Summary

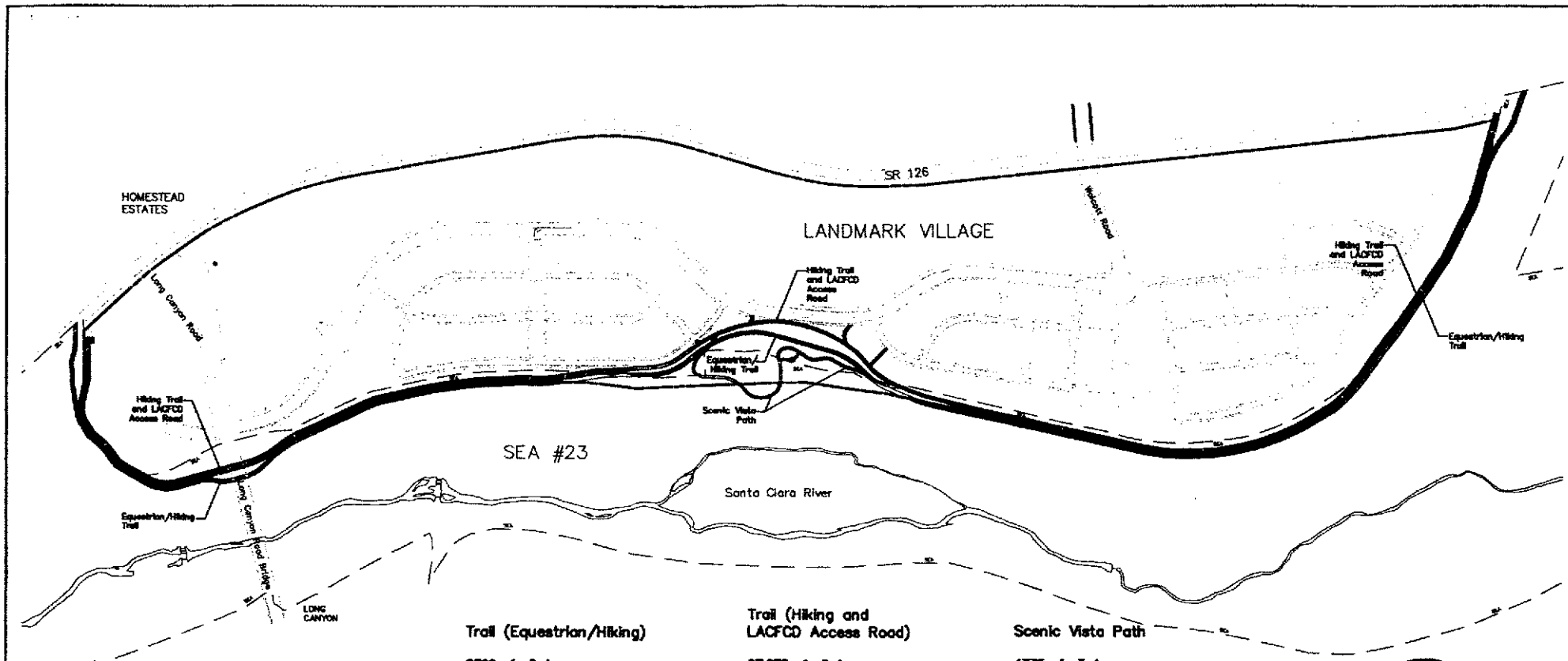
The County's Board of Supervisors already found that the Specific Plan and CUP No. 94-087-(5) met Design Compatibility Criterion No. 6, above. In summary, the Board found that the Specific Plan proposed the construction of three bridges and several utility lines across the Santa

Clara River, within the existing SEA 23. Utilities serving the proposed Specific Plan, where feasible, would be incorporated with the river bridges.

The Board also found that the bridge crossings would have support columns in the riverbed, but the crossings are elevated structures so as to reduce impacts on river vegetation and sensitive species and to allow species that move along the river course to continue to use existing resources. Moreover, the Board found that the elevated bridge crossings would ultimately replace the existing at-grade agriculture crossings, which would minimize the amount of direct disturbance to the riverbed and its environs. Based on the assessment provided in the Newhall Ranch Final Additional Analysis, Section 2.4, SEA General Plan Consistency, the Board concluded that the roads and utilities serving the Specific Plan were located and designed so as not to conflict with critical resources, habitat areas or migratory paths.

Landmark Village Summary

Consistent with the approved Specific Plan, at the project level, the Landmark Village development will design and locate project roads and utilities so as not to conflict with critical resources, habitat areas or migratory paths. The vast majority of roadways and utilities serving Landmark Village are removed far to the north of SEA 23 and has no impacts on it. The number and location of the bridge crossings were established by the Specific Plan in part to minimize impacts on SEA 23 and other sensitive resources. As part of the Landmark Village development, the Long Canyon Road Bridge crossing will be implemented. All other roads within the Landmark Village development are designed to parallel SEA and loop back to the planned Long Canyon Road Bridge crossing, or to SR-126. All roads used by daily vehicular traffic are outside SEA 23. Only minor encroachment from trails and public improvements encroach within the SEA. The roads and utilities serving the Landmark Village development will be further assessed as part of the environmental review process for the proposed project.



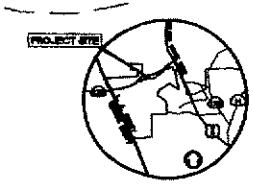
Legend

- Project Boundary
- SEA #23 Boundary – 2003
- Santa Clara River

	Trail (Equestrian/Hiking)	Trail (Hiking and LACFCD Access Road)	Scenic Vista Path
	8300 sf 2 Areas Inside SEA/Inside Tract	97,275 sf 2 Areas Inside SEA/Inside Tract	4775 sf 3 Areas Inside SEA/Inside Tract
	104,150 sf 2 Areas Inside SEA/Outside Tract	No Areas Inside SEA/Outside Tract	2835 sf 1 Area Inside SEA/Outside Tract
	21,320 sf 2 Areas Outside SEA/Inside Tract	68,700 sf 3 Areas Outside SEA/Inside Tract	5805 sf 2 Areas Outside SEA/Inside Tract
	4,220 sf 1 Area Outside SEA/Outside Tract	625 sf 1 Area Outside SEA/Outside Tract	No Areas Outside SEA/Outside Tract

Note: Trail and path widths as shown are exaggerated and not to scale. Boundaries and Rights of Way are for illustrative Purposes only. Area calculations are approximate. Location which is shown is meant to be illustrative and not precise. The exact location will be determined at a later date after additional biological studies are conducted and in consultation with DFG and other resource agencies.

Landmark Village at NEWHALL RANCH.



VICINITY MAP

VTTM 53108

SEA ENCROACHMENT EXHIBIT TRAILS AND PATHS

PSOMAS

DATE: 03-20-04 REVISED ON: 03/21/05
JOB No: 1NRC010700 SHEET 1 OF 7

RV056-01

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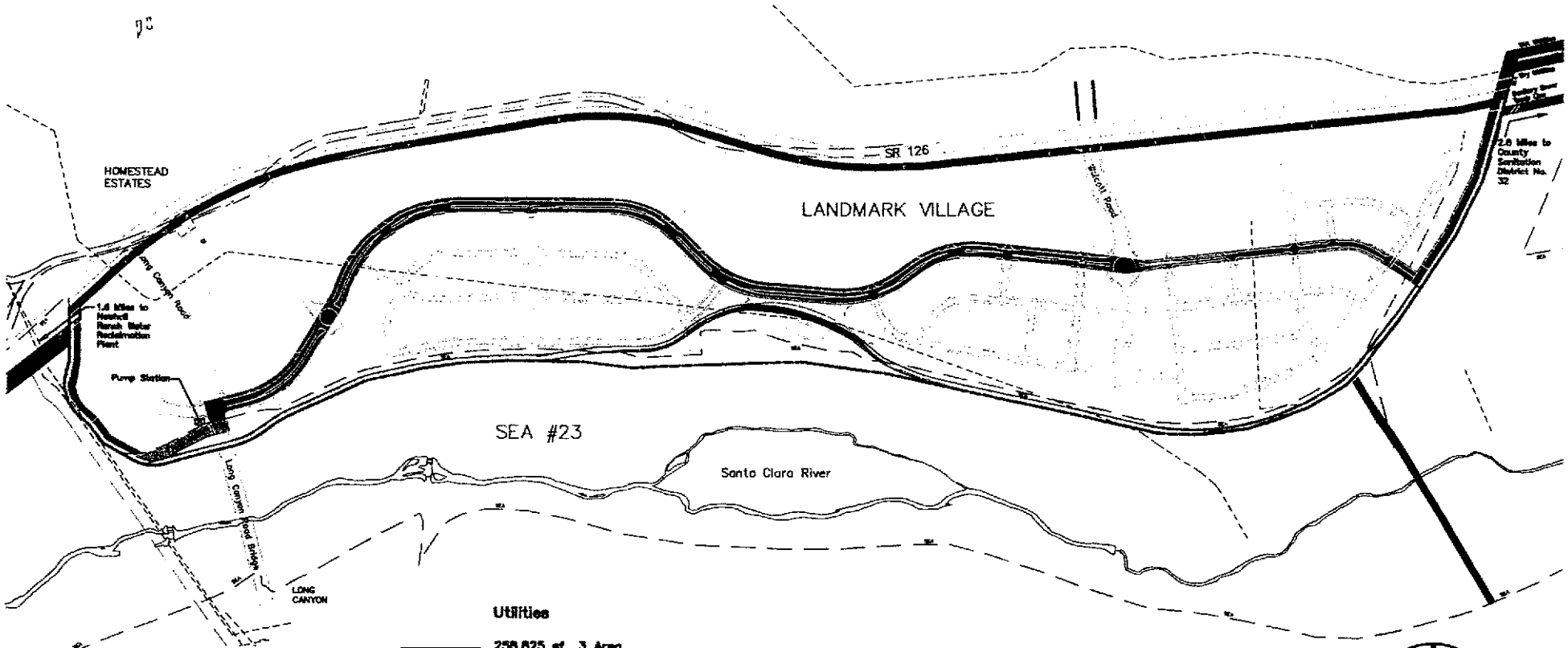


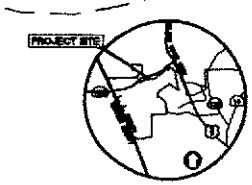
Legend

- Project Boundary
- SEA #23 Boundary – 2003
- Santa Clara River

Utilities

- 258,625 sf 3 Areas Inside SEA/Inside Tract
- 5 Areas Inside SEA/Outside Tract
- 1,282,225 sf 5 Areas Outside SEA/Inside Tract
- 4 Areas Outside SEA/Outside Tract

Note: Boundaries and Rights of Way are for Illustrative Purposes only.
Area calculations are approximate. Area acreages outside the limits of this drawing are not included.
Utility locations shown are potential locations and meant to be illustrative and not precise.
Utilities may include, but not limited to, water, sewer, storm drains, electrical, gas, cable, and fiber optics lines.



Landmark Village at NEWHALL RANCH.

VTTM 53108

SEA ENCROACHMENT EXHIBIT LOCATION OF UTILITIES

PSOMAS

DATE: 03-20-04 REVISED DN: 03/21/05
JOB No: 1NR0010700 SHEET 2 OF 7

RV056-02

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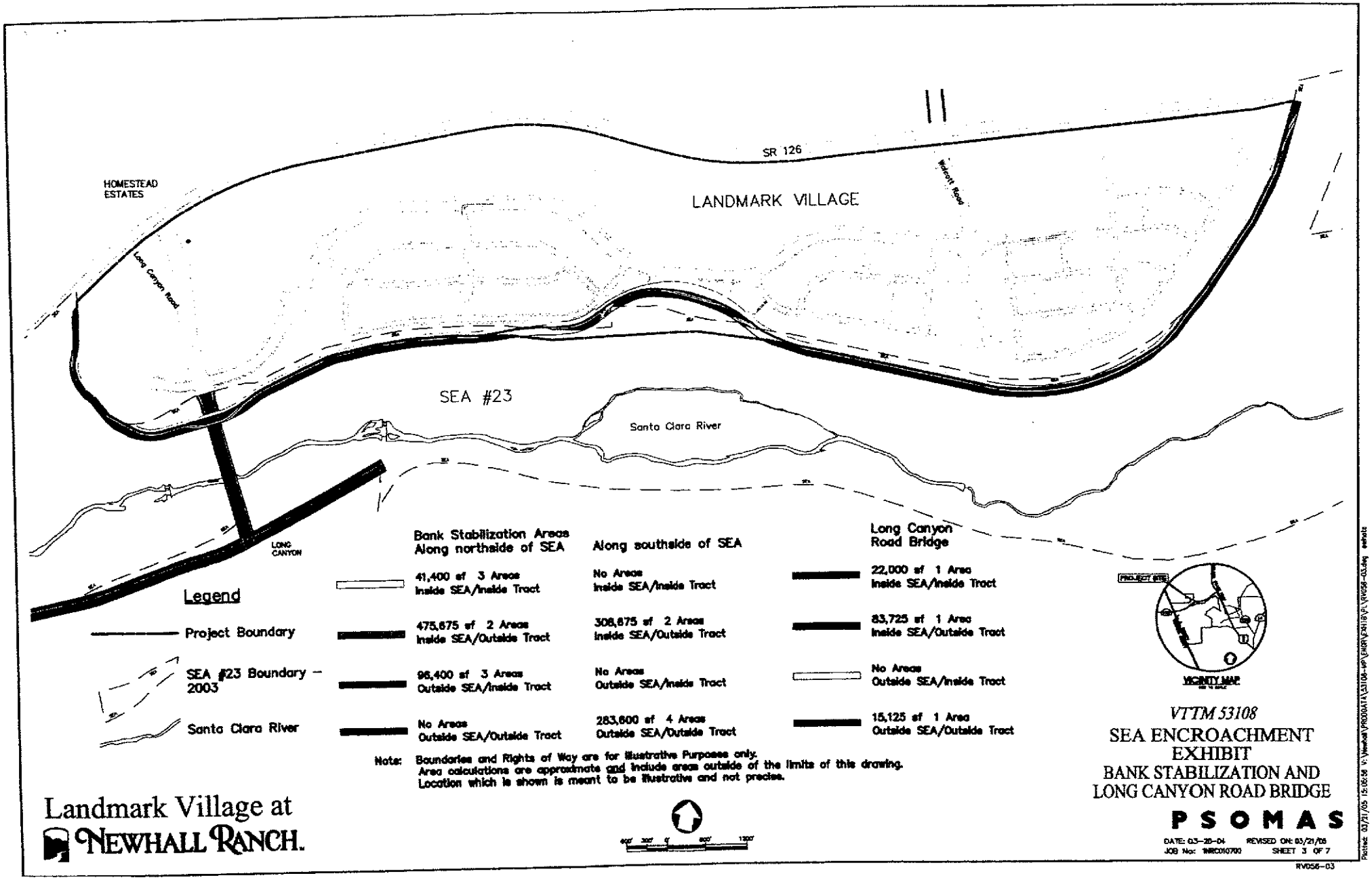
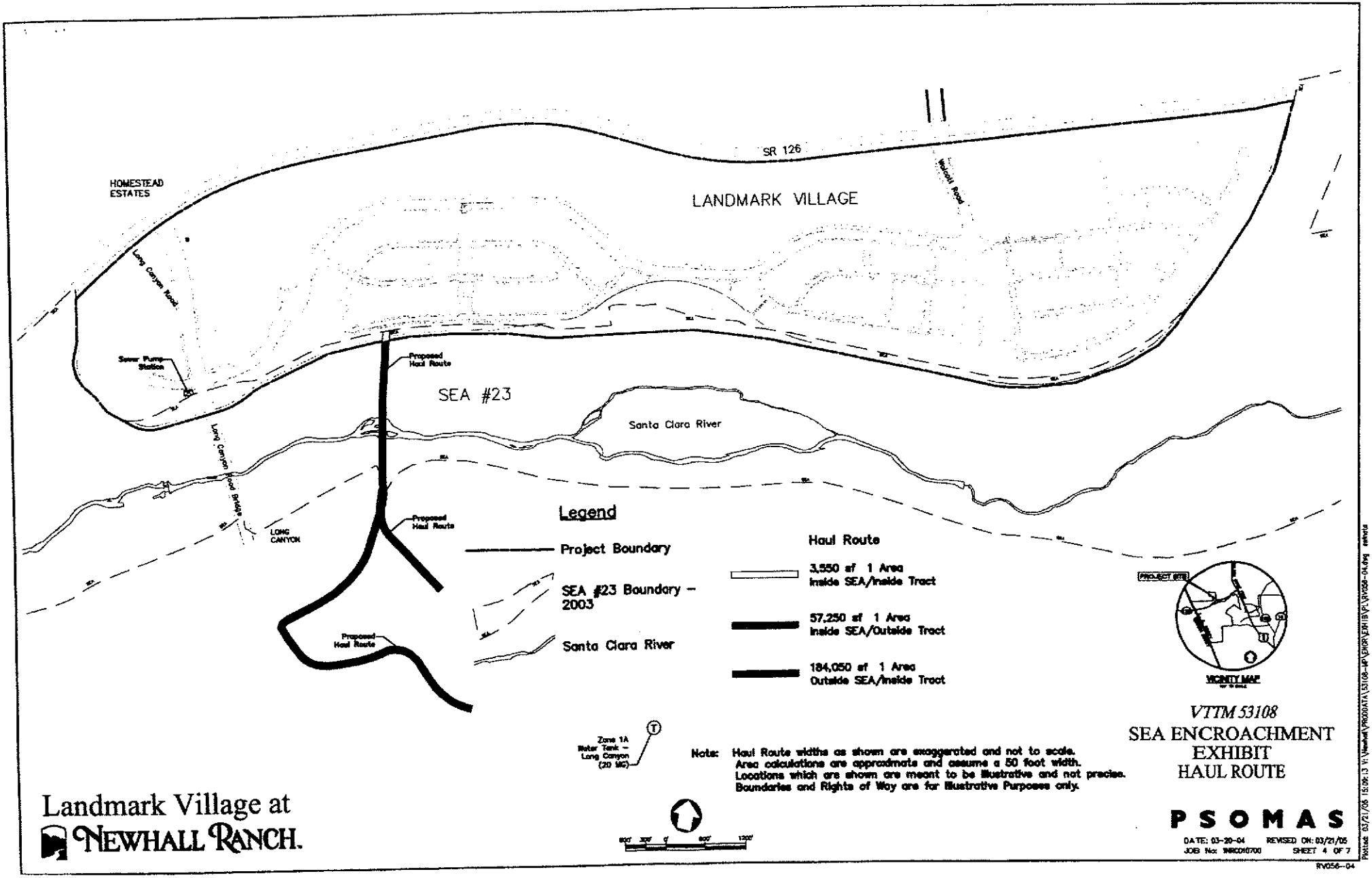

HOMESTEAD ESTATES
SR 126
LANDMARK VILLAGE
Wolcott Road
Long Canyon Road
SEA #23
Santa Clara River
LONG CANYON
Legend
Project Boundary
SEA #23 Boundary – 2003
Santa Clara River
Bank Stabilization Areas Along northside of SEA
41,400 sf 3 Areas Inside SEA/Inside Tract
475,675 sf 2 Areas Inside SEA/Outside Tract
96,400 sf 3 Areas Outside SEA/Inside Tract
No Areas Outside SEA/Outside Tract
Along southside of SEA
No Areas Inside SEA/Inside Tract
308,875 sf 2 Areas Inside SEA/Outside Tract
No Areas Outside SEA/Inside Tract
283,600 sf 4 Areas Outside SEA/Outside Tract
Long Canyon Road Bridge
22,000 sf 1 Area Inside SEA/Inside Tract
83,725 sf 1 Area Inside SEA/Outside Tract
No Areas Outside SEA/Inside Tract
15,125 sf 1 Area Outside SEA/Outside Tract
PROJECT SITE
VICINITY MAP
Note: Boundaries and Rights of Way are for illustrative Purposes only.
Area calculations are approximate and include areas outside of the limits of this drawing.
Location which is shown is meant to be illustrative and not precise.
400' 200' 0' 600' 1200'
Landmark Village at
NEWHALL RANCH.
VTTM 53108
SEA ENCROACHMENT EXHIBIT
BANK STABILIZATION AND LONG CANYON ROAD BRIDGE
PSOMAS
DATE: 03-26-04 REVISED ON: 03/21/05
JOB No: 1NRC010700 SHEET 3 OF 7
RV056-03



Landmark Village at NEWHALL RANCH.

VTTM 53108

SEA ENCROACHMENT EXHIBIT
HAUL ROUTE

PSOMAS

DATE: 03-20-04 REVISED ON: 03/21/05
JOB No: NRC010700 SHEET 4 OF 7

RV056-04

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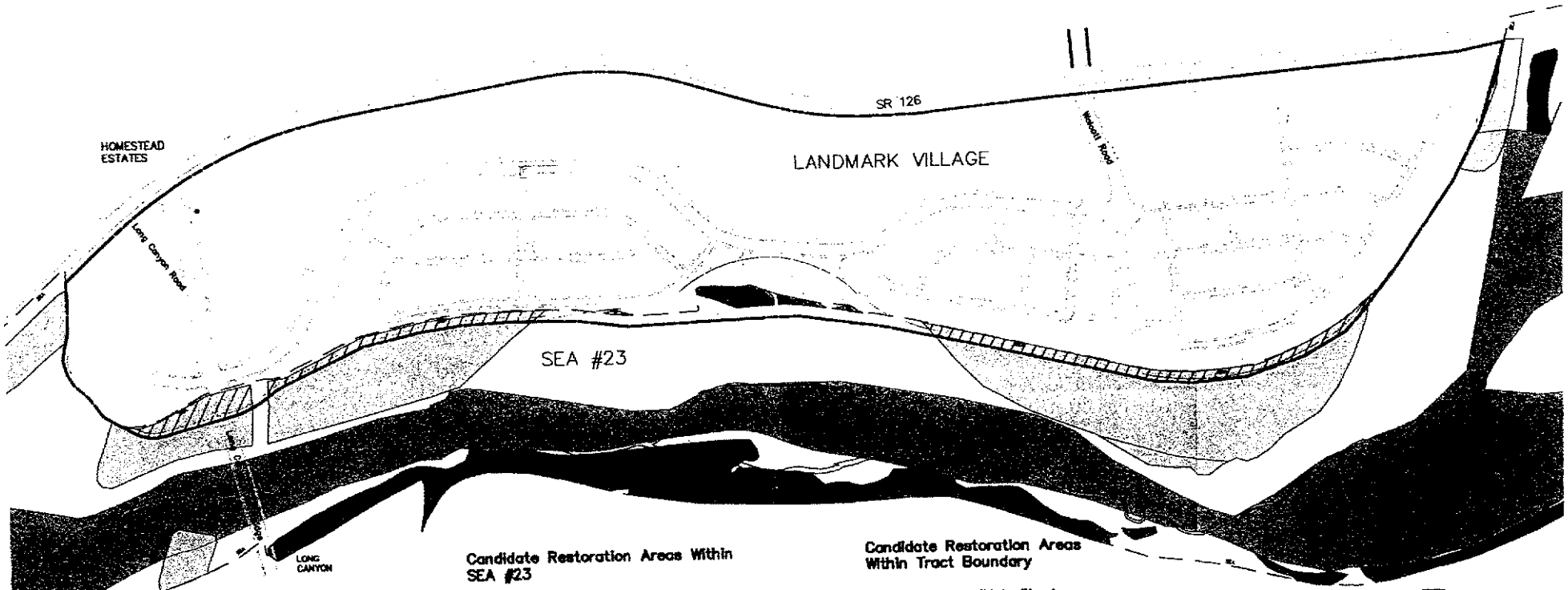


Legend

- Project Boundary
- SEA #23 Boundary – 2003
- Santa Clara River

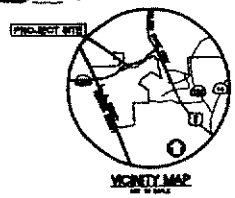
Candidate Restoration Areas Within SEA #23

- 87 Acres of Candidate Riparian Restoration/Enhancement Areas
- 108 Acres of Sensitive Habitat Redesignated from Residential and Non-Residential Land Uses to Proposed SEA #23
- 14 Acres of Sensitive Habitat Added to Proposed SEA #23
- Water Course

Candidate Restoration Areas Within Tract Boundary

- 8.6 Acres of Candidate Riparian Restoration/Enhancement Areas Within Tract Boundary
- 1.5 Acres of Sensitive Habitat Redesignated from Residential and Non-Residential Land Uses to Proposed SEA #23 Within Tract Boundary
- No Areas of Sensitive Habitat Added to Proposed SEA #23 Within Tract Boundary

Note: Not all of Candidate Restoration Areas outside of the Tract Boundary are shown. Boundaries and Rights of Way are for Illustrative Purposes only. Area calculations are approximate and include Candidate Restoration Areas outside of the limits of this drawing. Locations of Candidate Restoration Areas are meant to be illustrative and precise location may shift based on more detailed, future biological surveys.



VTTM 53108

SEA ENCROACHMENT EXHIBIT CANDIDATE RESTORATION AREAS

PSOMAS

DATE: 03-20-04 REVISED ON: 03/21/05
JOB No: WRC010700 SHEET 5 OF 7

Landmark Village at NEWHALL RANCH.

RV058-05

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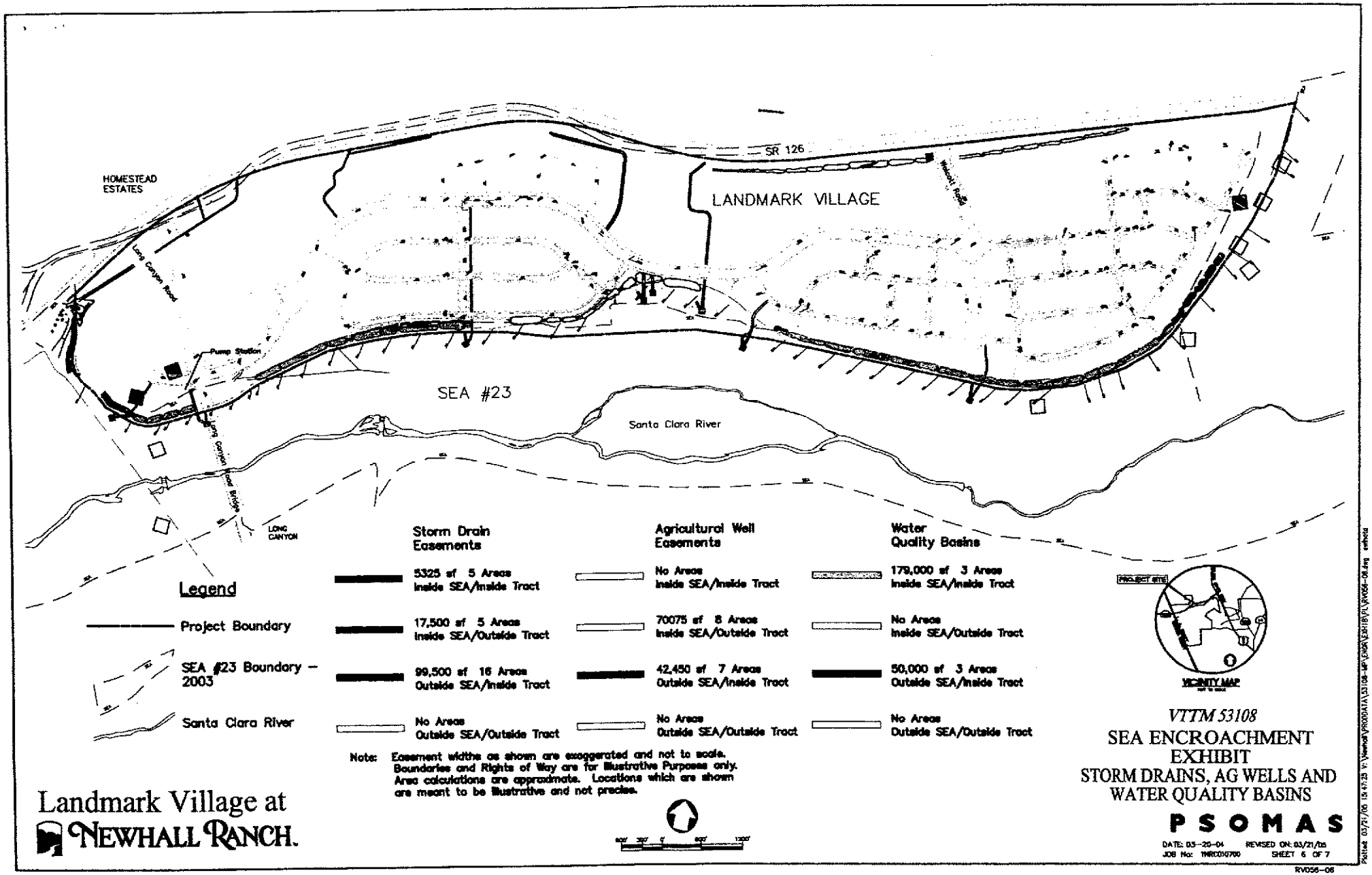
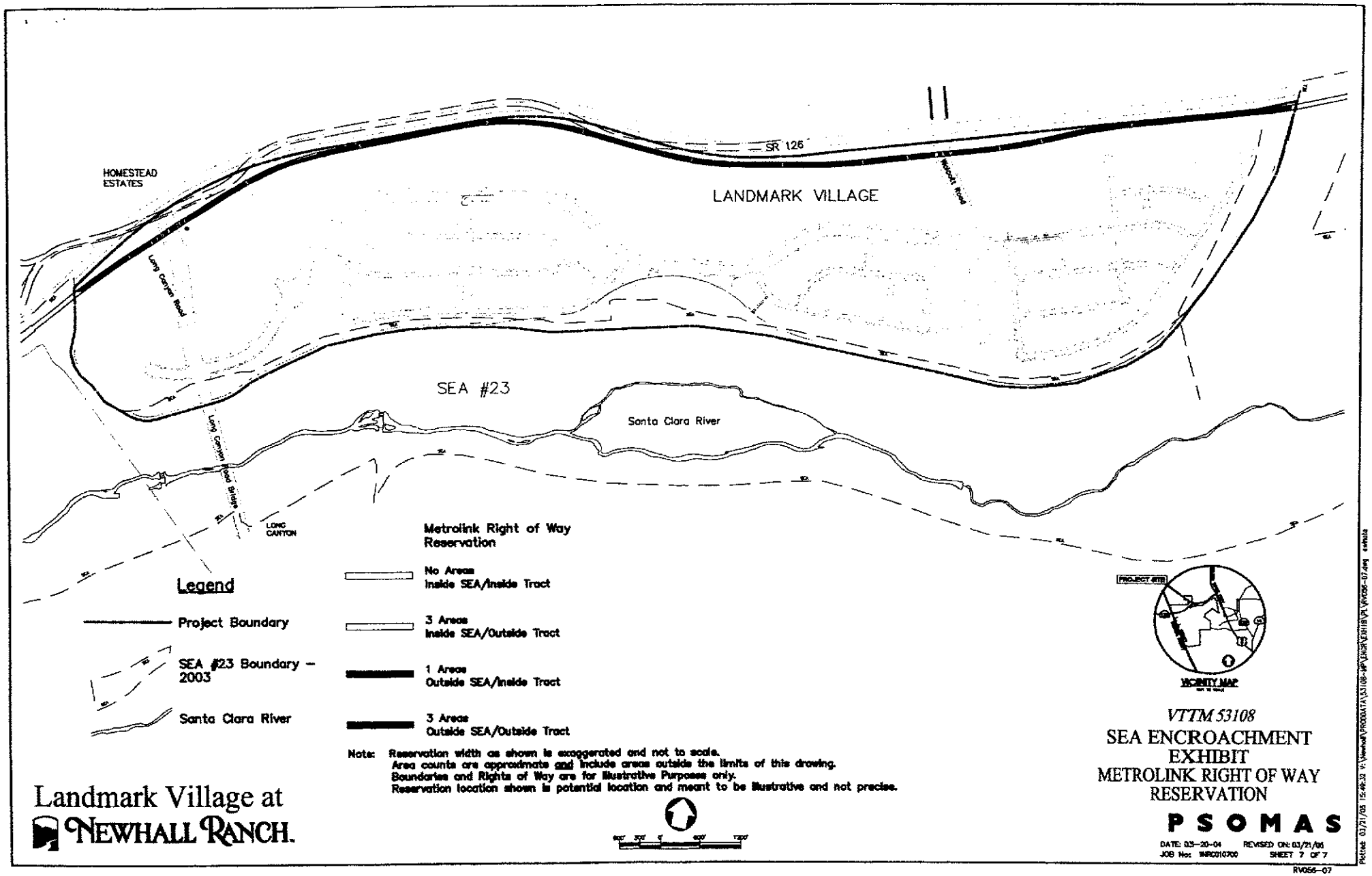

HOMESTEAD ESTATES
SR 126
LANDMARK VILLAGE
Long Canyon Road
Pump Station
SEA #23
Santa Clara River
Long Canyon Road Bridge
LONG CANYON
Legend
Project Boundary
SEA #23 Boundary – 2003
Santa Clara River
Storm Drain Easements
5325 sf 5 Areas Inside SEA/Inside Tract
17,500 sf 5 Areas Inside SEA/Outside Tract
99,500 sf 16 Areas Outside SEA/Inside Tract
No Areas Outside SEA/Outside Tract
Agricultural Well Easements
No Areas Inside SEA/Inside Tract
70075 sf 8 Areas Inside SEA/Outside Tract
42,450 sf 7 Areas Outside SEA/Inside Tract
No Areas Outside SEA/Outside Tract
Water Quality Basins
179,000 sf 3 Areas Inside SEA/Inside Tract
No Areas Inside SEA/Outside Tract
50,000 sf 3 Areas Outside SEA/Inside Tract
No Areas Outside SEA/Outside Tract
Note: Easement widths as shown are exaggerated and not to scale. Boundaries and Rights of Way are for Illustrative Purposes only. Area calculations are approximate. Locations which are shown are meant to be illustrative and not precise.
PROJECT SITE
VICINITY MAP
VTTM 53108
SEA ENCROACHMENT EXHIBIT
STORM DRAINS, AG WELLS AND WATER QUALITY BASINS
PSOMAS
DATE: 03-20-04 REVISED ON: 03/21/05
JOB No: 1NRC010700 SHEET 6 OF 7
RVD56-06
Landmark Village at NEWHALL RANCH.


HOMESTEAD ESTATES
SR 126
LANDMARK VILLAGE
Newhall Road
Long Canyon Road
SEA #23
Santa Clara River
Long Canyon Road Bridge
LONG CANYON
Metrolink Right of Way Reservation
No Areas Inside SEA/Inside Tract
3 Areas Inside SEA/Outside Tract
1 Areas Outside SEA/Inside Tract
3 Areas Outside SEA/Outside Tract
Legend
Project Boundary
SEA #23 Boundary – 2003
Santa Clara River
Note: Reservation width as shown is exaggerated and not to scale.
Area counts are approximate and include areas outside the limits of this drawing.
Boundaries and Rights of Way are for Illustrative Purposes only.
Reservation location shown is potential location and meant to be illustrative and not precise.
PROJECT SITE
VICINITY MAP
Landmark Village at
NEWHALL RANCH.
VTTM 53108
SEA ENCROACHMENT EXHIBIT
METROLINK RIGHT OF WAY RESERVATION
PSOMAS
DATE: 03-20-04 REVISED ON: 03/21/05
JOB No: NRC010700 SHEET 7 OF 7
RV056-07

CONDITIONAL USE PERMIT
BURDEN OF PROOF
FOR (1) OFF-SITE TRANSPORT OF MATERIALS,
(2) GRADING OF DEBRIS BASINS, AND
(3) GRADING FOR THE WIDENING OF SR-126.
VTTM No. 053108

Background

In order to implement the development of Landmark Village (formerly River Village), it will be necessary to import fill material from Adobe Canyon. It will also be necessary to grade for debris basins in Chiquito Canyon and grade for the widening of SR-126.

Newhall Land Company will need a net import of 6 million cubic yards of fill material from a potential borrow site (see "Proposed Adobe Canyon Borrow Site Haul Route" exhibit). The borrow site that has been identified, is located at Adobe Canyon about 4,000 feet south of SR 126, which is south of Landmark Village, south of the Santa Clara River, and east of the planned future Long Canyon Road.

There are two proposed haul routes for exporting the fill material from Adobe Canyon (see *Proposed Borrow Site Haul Route* exhibit). Newhall Land would arrange for the material to be exported via truck or scraper from two distinct locations within the borrow site. The two haul routes would then merge onto an existing agricultural crossing that would cross the Santa Clara River and enter Landmark Village. The first proposed haul route begins toward the center of the borrow site and travels west to the existing agricultural crossing. The second proposed haul route begins in the northwest corner of the borrow site and merges on to the existing agricultural crossing, which then heads north into Landmark Village (see exhibit).

It will also be necessary to grade the debris basins in Chiquito Canyon north of SR-126 concurrently with the grading required for the widening of SR-126 so as to avoid wiping out the debris basins within Chiquito Canyon from the grading of SR-126 that would occur in the future (see "Chiquito Canyon/SR-126 Grading" exhibit). The grading for the debris basins in Chiquito Canyon and the widening of SR-126 combined will involve 1,019,000 cubic yards of raw cut. The net volume (after shrinkage) of 866,000 cubic yards will be placed as fill in accordance with County Ordinance requirements in three designated locations as indicated on the exhibit.

Under the Implementation Procedures of the Newhall Ranch Specific Plan (Section 5.2 g), the "off-site transport of materials" is addressed through the Substantial Conformance process. As such, the following information is required:

- *Name and address of all persons owning all or any part of the property from which such material is proposed to be removed and to which it is proposed to be transported:*

  The property owner of the borrow site and fill site is Newhall Land Company. The property owner's mailing address is:
  23823 Valencia Boulevard,
  Valencia, CA 91355-2194,

- *The names and address of the person or person who will be conducting the operations proposed:*

  No grading contractor has been selected by Newhall Land Company.

- *The ultimate use of the property:*

  As more fully described in other entitlement applications, Landmark Village is planned as a mixed-use, neo-traditional development.

  Section 5.2 d of the Newhall Ranch Specific Plan requires that the Planning Director make the following findings in approving a request for Substantial Conformance:

- *The request substantially conforms with all applicable provisions of the Specific Plan and Los Angeles County ordinances which do not conflict with the Specific Plan.*

  The Landmark Village site must be elevated in order to avoid flood issues. Raising the site will occur by importing fill material from the borrow site location. The request to transport material to Landmark Village in order to implement the project is consistent with the mixed-use development planned for Landmark Village as articulated in the Newhall Ranch Specific Plan. By making the site ready for development, the importation of fill will allow Landmark Village to be developed in a manner consistent with all requirements of the Specific Plan (e.g., planned uses, densities, infrastructure, parks, trails, etc.).

  The (revised) Specific Plan was approved by the Board of Supervisors in 2003. The proposed grading operation is consistent with planned grading operations as depicted in the Specific Plan [see enclosed exhibit – Figure 1.0-14 (Conceptual Grading Plan)].

- *The request will not adversely affect public health and safety.*

  Inasmuch as the borrow site (Adobe Canyon), import site (Landmark Village), grading sites, and transport routes are not located in any inhabitable area, there will be no adverse impacts on the public's health or safety. Before material is physically removed from the borrow site location, a soils engineer will be engaged to ensure that no slope failures will occur due to the removal of material.

- *The request will not adversely affect adjacent property.*

  Adjacent property is all owned by Newhall Land Company, so no other property owner would be adversely impacted by the grading operation or transportation of fill material. Even so, there will be an on-site engineer during operations to ensure that grading does not negatively affect Newhall Land Company's adjacent ownership (e.g., causing unanticipated landslides). When the Board of Supervisors approved the (revised) Newhall Ranch Specific Plan in 2003, many grading mitigation measures were adopted that addressed aesthetics, noise, air quality (fugitive dust), re-compaction and stabilization (buttress fills, shear keys) to ensure that no property would be adversely affected.

A. *That the requested use at the location proposed will not:*
   1. *Adversely affect the health, peace, comfort or welfare of persons residing or working in the surrounding area.*

      Ultimately, the use of the property is the development of the community of Landmark Village. This development requires a net importation of 6 million cubic yards of fill material in order to protect the future inhabitants from potential flooding. The development will also require the grading for the debris basins in Chiquito Canyon, north of SR-126. Along with the grading for the debris basins, it will be necessary to assume the required grading for the widening of SR-126 concurrently so as to not have conflicting grading operations. The grading that is required for the widening of SR-126 is necessary to accommodate the increased traffic capacity that will result from the development of Landmark Village. Therefore, contrary to having an adverse impact, the proposed grading operations will be beneficial to the future residents and businesses at Landmark Village.

      The (revised) Specific Plan was approved by the Board of Supervisors in 2003. The proposed grading operation is consistent with planned grading operations as depicted in the Specific Plan (see enclosed exhibit – Figure 1.0-14 (Conceptual Grading Plan)).

Operationally, any potential adverse effects that may arise at the grading sites, borrow site or transport routes will be addressed by incorporating recommendations from the soils engineer that address unstable slope conditions, and flag-men to facilitate truck traffic.

2. *Be materially detrimental to the use, enjoyment or valuation of property of others persons located in the vicinity of the site.*

   The grading operations will be temporary in nature. Potential noise and traffic conflicts will be addressed in the Landmark Village environmental impact report, and measures will be proposed to mitigate these impacts. Properties most likely to be impacted – those adjacent to the borrow sites - are owned by the project proponent, Newhall Land Company. The applicant's soils engineer and the County Department of Public Works will ensure that slopes at the borrow sites are engineered for stability and that appropriate erosion control measures are in place.

3. *Jeopardize, endanger or otherwise constitute a menace to the public health, safety or general welfare.*

   The off-site transport of fill material necessary for Landmark Village will not be a menace to the community because mitigation measures (e.g., flag-men) will be required to ensure the safe flow of traffic. The placement of the fill material at Landmark Village has been reviewed by the Department of Public Works (DPW) in connection with the review of grading and geotechnical report filed with VTTM No. 53108. DPW is satisfied that there is no danger to the public health, safety or general welfare. That is, grading is consistent with County ordinances and the recommendations and design requirements of County approval of the aforementioned geotechnical report.

   When the Board of Supervisors approved the (revised) Newhall Ranch Specific Plan in 2003, many grading mitigation measures were adopted that addressed aesthetics, noise, air quality (fugitive dust), re-compaction and stabilization (buttress fills, shear keys) to ensure that no property would be adversely affected.

B. *That the proposed site is adequate in size and shape to accommodate the yards, walls, fences, parking and loading facilities, landscaping and other development features prescribed in this Title 22, or as is otherwise required in order to integrate said use with the uses in the surrounding area.*

The borrow site is adequate in size to allow for the removal and export of fill material without incurring any physical constraints. The location is not for

development purposes and, therefore, there is no issue relative to yards (setbacks), walls, fences, parking and loading facilities. Grading operations sites will conclude with adequate erosion control (to include landscaping) to ensure that the site is not left in a state that would otherwise be unsafe.

The recipient site – Landmark Village – will be in compliance with all the development standards required by the Newhall Ranch Specific Plan.

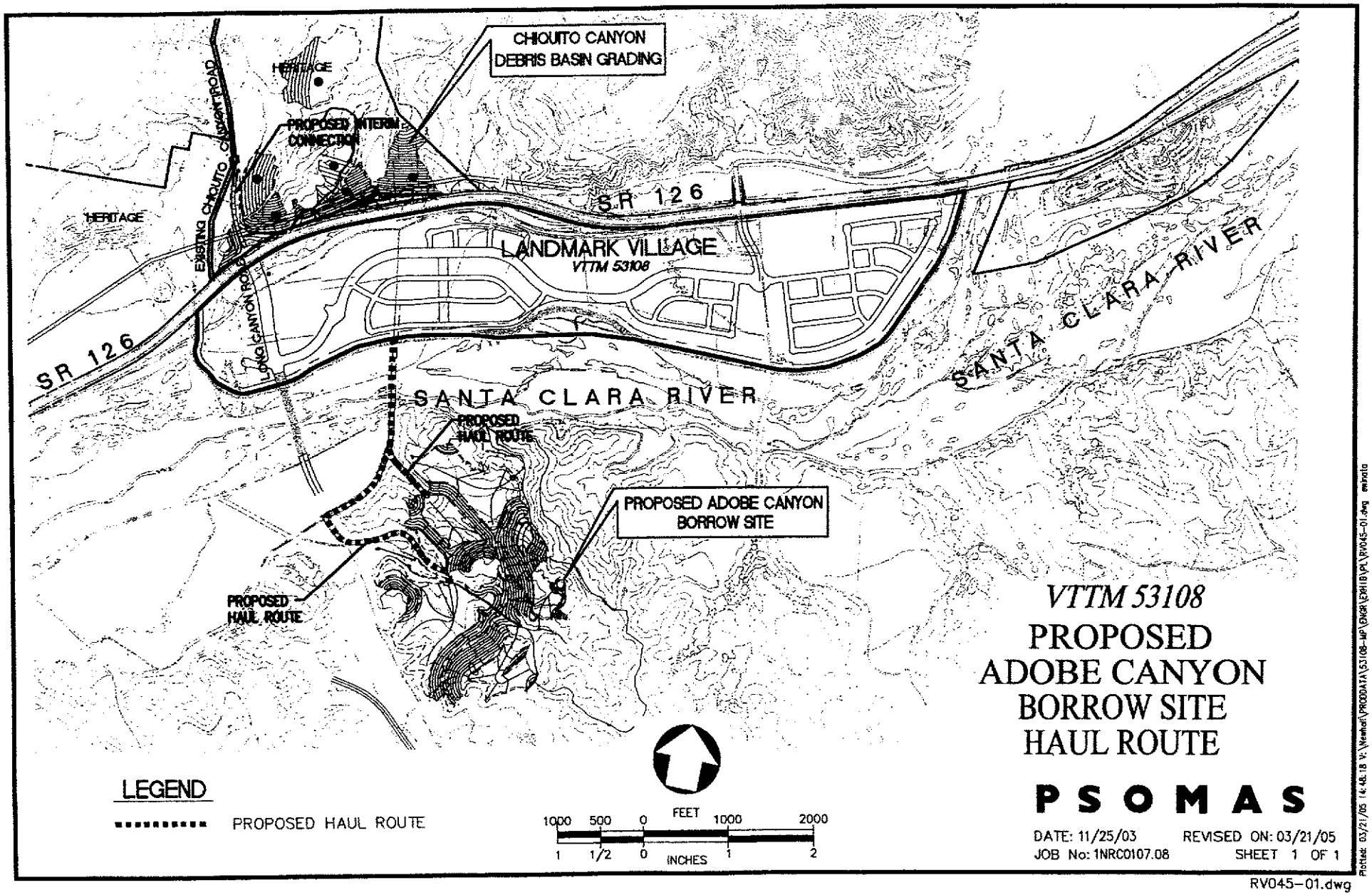
C. *That the proposed site is adequately served:*

1. *By highways or streets of sufficient width and improved as necessary to carry the kind and quantity of traffic such use would generate.*

   The borrow site will be adequately served by the two haul routes between the proposed Adobe Canyon borrow site and Landmark Village as shown in "Proposed Adobe Canyon Borrow Site Haul Route" exhibit and by the proposed interim connection between SR-126 and existing Chiquito Canyon Road. Landmark Village will have a sufficient circulation network to meet the operational demands of the future community.

2. *By other public or private service facilities as are required.*

   No service facilities are required at the borrow site. Landmark Village will be adequately served by public and/or private facilities. These will include not only traditional infrastructure such as sewers, storm drains, and streets, but also an elementary school, parks, and shopping.



VTTM 53108

PROPOSED ADOBE CANYON BORROW SITE HAUL ROUTE

PSOMAS

DATE: 11/25/03 REVISED ON: 03/21/05
JOB No: 1NRC0107.08 SHEET 1 OF 1

RV045-01.dwg

Plotted: 03/21/05 14:48:18 V:\Weehart\PROBATA\53108-MP\ENGR\E9118\PL\PV045-01.dwg

CONDITIONAL USE PERMITS
Burden of Proof
Off-site Water Tanks
VTTM 53108

Background

The proposed project, Landmark Village, is a master planned residential community located within the Newhall Ranch Specific Plan area. The community primarily consists of single-family and multi-family residences (including condominiums, duplexes and apartments), mixed-use/commercial development, parks, and open space. Facilities and infrastructure to support the proposed project consist of roads, trails, drainage improvements and flood protection (including buried bank stabilization within the Santa Clara River), potable and reclaimed water systems - including water tanks - and a sanitary sewer system.

To serve Landmark Village, there are two (2) proposed water tanks for reclaimed water and two (2) tanks for potable water located outside the Landmark Village project boundary (but within the NRSP area). These proposed tanks are subject to conditional use permits per Section 22.24.150 of the Los Angeles County Municipal Code.

The proposed potable and reclaimed water tank system is consistent with, and implements the Newhall Ranch Specific Plan's approved Conceptual Backbone Water Plan (Exhibit 2.5-2 of the Draft EIR). Consistent with the NRSP, the retail potable water will be provided by the Valencia Water Company. The proposed tanks will be located on three separate sites, outside the boundaries depicted on the Landmark Village tentative tract map. The sites have been selected based on the water pressure zones that have been established near the project site. The multiple tank system is necessary to ensure an adequate source of supply and storage to maintain the system's reliability, safety, and efficiency and it also provides for flexibility in the ultimate location of necessary tanks.

Two of the proposed water tanks for reclaimed water are to be located north of Landmark Village in Chiquito Canyon. This location was selected due to its natural elevation and remoteness to the project area. This area will be able to accommodate the two water tanks that would also be able to share water lines. The site would require approximately a one-acre pad to be graded for each tank. The tanks are anticipated to be 32' in height, and 132' in diameter with a capacity of 3 million gallons. The treated water will be pumped from the existing County Water Reclamation Plant (WRP) 32 located near Interstate-5 just south of Highway SR-126. The reclaimed water to be stored in the proposed tanks will be available to the community of Landmark Village and beyond for specified irrigation and firefighting purposes. In addition to the two proposed new tanks, there is a third possible reclaimed water tank location. An existing water tank located near the treatment plant by Interstate-5 just south of Highway SR-126 may be determined to be an appropriate location for the future reclaimed tank. Although it is an existing tank

originally intended for potable water, minor improvements will be necessary in order to upgrade the waterline system that connects to it.

The two water tanks for potable water are proposed to be located north of Landmark Village as well. The first tank is proposed to be located in Chiquito Canyon just south of the two proposed reclaimed water tanks mentioned above. The second tank is proposed to be located west of Commerce Center Drive, just north of an existing potable water tank that currently serves the Valencia Commerce Center located nearby. These locations were selected due to it natural elevation and remoteness to the project area. The tanks will each require approximately a one-acre graded pad area. The tanks are anticipated to be approximately 32' in height and 152' in diameter with a capacity of 4 million gallons.

Findings

A. That the requested use at the location proposed will not:
1) Adversely affect the health, peace, comfort or welfare of persons residing or working in the surrounding area, or
2) Be materially detrimental to the use, enjoyment or valuation of property of other persons located in the vicinity of the site, or
3) Jeopardize, endanger or otherwise constitute a menace to the public health, safety or general welfare.

The proposed water tanks in Landmark Village will not adversely affect the health, peace, comfort or welfare of persons residing or working in the surrounding area. Rather, the proposed water tanks will serve the needs of residents of Landmark Village as well as other surrounding Newhall Ranch developments. The potable water tanks will be able to service the communities with safe and quality drinking water. Even more, the reclaimed water will significantly contribute to water conservation as it will be able to offer treated water for irrigation and firefighting purposes.

The proposed water tanks will not be materially detrimental to the use, enjoyment or valuation of property of other persons located in the vicinity of the site. The two locations for the proposed potable water tanks have been strategically selected to consider a natural elevation that would provide adequate water service in an efficient manner as well as minimize any possible negative impacts from the communities. The locations are located so that they may adequately serve Landmark Village in addition to its surrounding communities. In addition, the proposed site for the second potable water tank located west of Commerce Center Drive already contains an existing water tank that serves the Valencia Commerce Center. The sites for the reclaimed water tanks have also been selected to consider efficiency of service as well as the visual impacts from the residents in the community. The two new reclaimed water tanks are to be located in Chiquito Canyon just north of the proposed potable water tank.

The proposed water tanks will not jeopardize, endanger or otherwise constitute a

menace to the public health, safety or general welfare. Rather, they are necessary for provision of a necessary resource. The potable tanks will provide quality drinking water, a necessary resource and the reclaimed water tanks will assist in potable water conservation by using reclaimed water for irrigation and other purposes.

B. That the proposed site is adequate in size and shape to accommodate the yards, walls, fences, parking and loading facilities, landscaping and other development features prescribed in this Title 22, or as is otherwise required in order to integrate said use with the uses in the surrounding area.

The three sites for the proposed tanks are adequate in size and shape to accommodate the two water tanks. As mentioned above, the sites have been selected after careful consideration of impacts to neighboring communities as well as taking advantage of the natural elevation that provide for an efficient delivery system minimizing the aid of pumps and other machinery. Each site will require a one-acre graded pad, approximately. The requests for the necessary off-site grading and improvements related to the water tanks have been included in an accompanying request for a conditional use permit. The tanks do not require any parking or loading spaces, although there will be vehicular access to the tanks should any future maintenance be required. The tanks will be hidden from view by a 30-foot berm surrounding them. By sinking the tanks into the landscape and berming the edge, the water tanks will be fully integrated with the surrounding area and have minimal visual impact.

The water tank options have been discussed in the Environmental Impact Report (EIR) and are depicted on the tentative tract map (VTTM) 53108. The proposed project would be developed in conformance with all applicable County Codes including, but not limited to, the Subdivision Code, Grading Code, Building Codes and all required mitigation measures.

C. That the proposed site is adequately served:
1) By highways or streets of sufficient width and improved as necessary to carry the kind and quantity of traffic such use would generate, and
2) By other public or private service facilities as are required.

The three sites will take access from public/private streets. Since two of the three sites – west of Commerce Center Drive and the site near the County WRP 32 – contain existing tanks, minor improvements will be necessary to upgrade access from public/private roads to the graded across for each tank.. The proposed site for the one proposed potable and two proposed reclaimed tanks in Chiquito Canyon will require new construction vehicular access to each of the graded pad areas.

Landmark Village has been designed to be in conformance with the approved the Mobility Plan (Section 2.4) of the Newhall Ranch Specific Plan, which provides for a hierarchy of highways and streets that will provide a safe and efficient circulation system. The residential communities will be directly served by a system of public,

"private and future" streets and private drives, which meet Department of Public Works and Fire Department access criteria.

Highway and street widths and standards will be reviewed and approved by the County's Subdivision Committee, which would specify conditions of approval for the subdivision. In addition, a traffic modeling study will be completed using the methodology and standards specified by Los Angeles County, and utilizing the Los Angeles County/City of Santa Clarita Consolidated Traffic Model. The traffic studies for the project will be incorporated into the Draft EIR. The project would conform to all conditions of approval for VTTM 53108, as well as to all required mitigation measures.

No other public or private services are necessary for the tanks.

Request for
OAK TREE PERMIT

Los Angeles County DEPARTMENT OF
320 West Temple Street, Los Angeles, Ca, 90012 **Regional Planning**

NOTE: It is the applicant's responsibility to notify the Planning Director of any change of the principals involved in this case prior to the completion of processing

CONCURRENT CASES: VTTM 53108 / Oak Tree Permit 00-196

APPLICANT

Name
Newhall Land
Address
23823 Valencia Blvd.
City
Valencia, CA 91355
Telephone
(661) 255-4217

PROPERTY OWNER

Name
Newhall Land
Address
23823 Valencia Blvd.
City
Valencia, CA 91355
Telephone
(661) 255-4217

OWNER'S AUTHORIZATION:
I certify that I am the owner of the herein described property and permit the application to file this request.

Location (i.e. address or general description of location) and legal description of property in question: (use additional sheets as necessary) Generally south of State Route 126 & north of the Santa Clara River.
Legal description: PARCELS 14, 15, 16, 17 OF PARCEL MAP 24500-01 PMB 29.3-34 / 67, RECORDS OF LOS ANGELES COUNTY.

How many oak trees will be cut, removed, relocated, damaged or will have encroachments into their protected zone? 67 will be removed and 14 may be subject to damage. (81 trees total will require an Oak Tree Permit
How many oak trees will remain? 120
Will trees be replaced? Yes If yes, indicate the proposed size, type, location (indicate on site plan) and schedule planting. Oak trees removed will be replaced by a tree of the same species at a ratio of 2:1.

Schedule of planting is to be determined.

BURDEN OF PROOF

Submit additional sheets describing how the following findings will be satisfied.

A That the proposed construction or proposed use will be accomplished without endangering the health of the remaining trees subject to this Part 16, if any, on the subject property, and
B That the removal or relocation of the oak tree(s) proposed will not result in soil erosion through the diversion or increased flow of surface waters which can not be satisfactorily mitigated, and
C That in addition to the above facts at least one of the following findings apply:
1. That the removal of oak tree(s) proposed is necessary as continued existence at present location(s) frustrates the planed improvement or proposed use of the subject property to such an extent that::
   a Alternate development plans cannot achieve the same permitted density or that the cost of such alternative would be prohibitive, or
   b Placement of such tree(s) precludes the reasonable and efficient use of such property for a use otherwise authorized, or
2. That the oak tree(s) proposed for removal or relocation interfere with utility service or streets and highways either within or outside of the subject property and no reasonable alternative to such interference exists other than removal of the tree(s), or
3. That the oak tree(s) proposed for removal, with reference to seriously debilitating disease or danger of falling, is such that it cannot be remedied through reasonable preservation procedures and practice.
4. That the removal of the oak tree(s) proposed will not be contrary to or be in substantial conflict with the intent and purpose of the oak tree permit procedure.

Oak Tree Permit 00-196
Project Description and Burden of Proof
VTTM No. 53108
Landmark Village

In connection with Vesting Tentative Tract Map 53108, an oak tree permit is requested to remove or possibly impact a total of 81 oak trees. There are a total of 201 oak trees within the Landmark Village Planning Area (which includes Landmark Village VTTM 53108, all proposed grading limits and the area within 200 feet of the proposed grading line). Of the total 201 oak trees that were surveyed, 67 trees are proposed to be removed, 14 may be impacted from operations occurring within the protective zone of the tree, and the remaining 120 oak trees will not be impacted.

The following matrix summarizes the number, location and proposed action for each tree:

Oak Tree Survey Matrix

Landmark Village				
	Removed	Impacted	No Impacts	Total
Heritage Oaks	10	3	15	28
Non-Heritage Oaks	57	11	105	173
Total	67	14	120	201

A. That the proposed construction or proposed use will be accomplished without endangering the health of the remaining trees subject to this Part 16, if any, on the subject property.

Implementation of Vesting Tentative Tract Map No. 53108 will not endanger the health of the 120 remaining oak trees (15 of which are heritage oak trees) located within the Landmark Village Planning Area. Mitigation measures and preservation guidelines have been established for the 14 oak trees proposed to be subject to temporary impacts, as well as for the 120 trees that will remain (e.g. fencing).

The applicant proposes to preserve and protect the remaining 120 oak trees within the impacted area. Protective fencing will be provided and placed at the limits of the protective zone for individual or group of oak trees within the Landmark Village Planning Area. This protective measure will remain in place until construction is completed. To ensure full protection of the health of these trees, no encroachment will occur within the protected zones per §22.56.2060 of Los Angeles County Code.

In addition, equipment damage to any parts of the remaining trees shall be avoided during project construction and development. No storage, dumping or temporary structures shall be permitted within the protective zone of any remaining oak tree.

B. That the removal or relocation of the oak tree(s) proposed will not result in soil erosion through the diversion or increased flow of surface waters which can not be satisfactorily mitigated.

The proposed removal of 67 oak trees and the impact to 14 oak trees will not result in any additional soil erosion through diversion or increased flow of surface waters, which cannot be satisfactorily mitigated through on-site drainage control measures that shall be implemented with the project.

The proposed project incorporates the Landmark Village drainage and water quality plan which is designed to both protect development and control the drainage and pollutants. The features of this plan are intended to blend into the community as an extension of the landscaping. All drainage entering and originating within the project area will be collected and controlled by the constructed drainage system to ensure no increase in site erosion.

Any grading that will occur beyond the actual tract map border in association with grading to yield import material for the development will follow the recommendations of the soils engineer to avoid soil erosion.

C. That in addition to the above facts at least one of the following findings apply:

1) That the removal of oak tree(s) proposed is necessary as continued existence at present location(s) frustrates the planned improvement or proposed use of the subject property to such an extent that:
   a. Alternate development plans cannot achieve the same permitted density or that the cost of such alternative would be prohibitive and,
   b. Placement of such tree(s) precludes the reasonable and efficient use of such property for a use otherwise authorized.

      Most of the trees proposed for removal and to be impacted are located in areas where fill will be taken for importation to Landmark Village. The project applicant identified these sites as a source of fill material because the impacts to oak trees were less than alternative locations.

2) That the oak tree(s) proposed for removal or relocation interfere with utility service or streets and highways either within or outside of the subject property and no reasonable alternative to such interference exists other than removal of the tree(s).

   Not applicable.

3) That the oak tree(s) proposed for removal, with reference to seriously debilitating disease or danger of falling, is such that it cannot be remedied through reasonable preservation procedures and practice.

Not applicable.

4) That the removal of the oak tree(s) proposed will not be contrary to or be in substantial conflict with the intent and purpose of the oak tree permit procedure.

The proposed removal of 67 trees and impact to 14 trees will not be contrary to, or be in substantial conflict with, the intent and purpose of the oak tree permit procedure as mitigation measures will be implemented to offset the removals. The grading required for geotechnical stability, access and site balance is necessary to develop the property in the most efficient manner. Without the grading and fill import, the site cannot be developed to the density permitted by the Newhall Ranch Specific Plan. No reasonable alternative to such interference exists other than the removal of the trees.

The applicant has taken great care in identifying export sites to minimize the number of trees which need to be removed in the development process. The applicant recognizes the significance of oak trees as historical, aesthetic and ecological resources that enhance the value of property and character of the communities in which they exist.

The applicant is committed to maintaining the healthy condition of all oak trees to be retained. For each tree removed, a minimum of two (2), 15-gallon replacement trees will be planted, resulting in a greater number of oak trees on site. These replacement trees shall be located at areas consistent with the proposed design plan and as directed by the County Forester. The project proposes to provide several areas designated for tree replacement.

The Landmark Village Planning Area Oak Tree Report
Los Angeles County, California

Prepared for:

The Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, California 91355

Prepared by:

Impact Sciences, Inc.
803 Camarillo Springs Road, Suite A
Camarillo, California 93012
(805) 437-1900

September 2006

1.0 EXECUTIVE SUMMARY

➢ Total Number of Ordinance-Size Oak Trees Surveyed	201
➢ Total Number of Oak Trees Planned for Removal	67
➢ Total Number of Oak Trees That May be Encroached Within the Protective Zone	14
➢ Total Number of Oak Trees That Would Not be Removed or Encroached, but Occur within 200 Feet from Grading Limit Line	120
➢ **Total Number of Oak Trees That Would Require a Los Angeles County Oak Tree Permit (Removed + Encroached)**	81

All oak trees surveyed within the Landmark Village Planning Area are displayed on attached engineering plans prepared by Psomas Engineering (Sheets 1, 2, and 3) and an aerial photograph showing the limits of the Onion Field Bank Stabilization prepared by Impact Sciences. All exhibits show oak trees occurring within the proposed grading limits and within 200 feet of the grading limit line. **Table 2** on page 14 of this report lists the type of project-related impact that may occur to each oak tree, and identifies on which sheet each tree is located.

2.0 INTRODUCTION

Pursuant to the Los Angeles County Oak Tree Ordinance, removal or damage of any tree of the oak genus (*Quercus*) that is 25 inches in circumference (8 inches in diameter), or has a combined trunk circumference of any two trunks of at least 38 inches (12 inches in diameter), as measured 4.5 feet above the mean natural grade (i.e., diameter at breast height [dbh]), is unlawful without a permit (Ordinance 88-0157 1, 82-0168 2, Section 22.56.2050, 1988). Damage is defined as any act causing or tending to cause injury to the root system or other parts of an oak tree, including, but not limited to, burning, application of toxic substances, operation of equipment or machinery, paving, changing of natural grade, and trenching or excavating (i.e., encroached) within the protective zone (the area within the dripline of an oak tree and extending therefrom to a point at least 5 feet outside the dripline, or 15 feet from the trunk[s] of a tree, whichever distance is greater) of an oak tree.

2.1 Purpose

As required by the County of Los Angeles and pursuant to Section 22.56.2090 of the Los Angeles County Code, the purpose of this oak tree report is to provide information to the County on oak trees that may be removed or damaged by the development of the Landmark Village Planning Area. The parameters used to evaluate each tree that was surveyed are described on the following pages under heading **2.0, METHODS**. A spreadsheet showing data collected for each oak tree surveyed is provided in **Appendix A**.

Offsite Improvements
Vesting Tentative Tract Map 53105
(Newhall Ranch - Landmark Village)

1. Los Angeles County Sanitation District trunk sewer located westerly to connect with Newhall Ranch Water Reclamation Plant
2. Water main extension to Valencia Water Company storage tanks and existing pipe system
3. Sewer force main easterly to Los Angeles County Sanitation District 32 Water Reclamation Plant
4. Borrow site in Adobe Canyon in order to import earth per Conditional Use Permit 200500112
5. Pedestrian Bridge located at SR-126 (northwest of project)
6. Debris Basin north of SR-126 located in Chiquito Canyon

Note: Specific details of offsite improvements may be found in the applications, Planner's Notebook or Newhall Ranch Specific Plan.

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MEMORANDUM

TO: Newhall Ranch Specific Plan Project File

FROM: James E. Hartl, AICP, Director of Planning

SUBJECT: Substantial Conformance Interpretation Pertaining to Alternate Street Sections

DATE: (_____)

Approved: _____ _____
Initial *Date*

Background

Section 2.4 (Mobility Plan) of the Newhall Ranch Specific Plan addresses the required street cross-sections for the hierarchy of the Newhall Ranch roadway system. Specifically, Section 2.4 requires that local street cross-sections shall be consistent with Chapter 21 of the County Subdivision Code, and that collector street cross-sections be consistent with Exhibit 2.4-4 of the Specific Plan.

Specific Issue: ***Alternate Street Sections in Landmark Village***

Within Landmark Village, Newhall Land Company proposes to create a neo-traditional development (TND). Unlike more conventional subdivisions, TND communities reflect a return to traditional neighborhoods that pervaded the urban landscape prior to World War II, and before new suburban developments became automobile dependent.

TNDs are designed for walkability and mixed-use, and they typically have a main street, rectangular street grid section, and common open space. Because TNDs stress pedestrian orientation over automobile usage, the streets in these communities are narrower in width than conventional subdivisions and have other traffic calming features (e.g., chokers, neck-downs, traffic circles, speed tables).

In order to implement the TND street design criteria, beginning in 2000, Newhall Land Company began a dialogue with representatives of the Regional Planning Department, Public Works Department and Fire Department to ensure that the proposed alternative street cross-section design for the low-volume local streets and Landmark Village's one collector street ("A" Street) would continue to meet the needs of these departments, particularly as the proposed design related to traffic capacity and life/safety issues. In the ensuing period of time, a number of meetings have occurred, and an agreement between Newhall Land Company and the aforementioned County departments has been reached

DRAFT

with is reflected in the alternative local street and collector street cross-sections which are illustrated as an attachment to this memorandum.

Conclusion

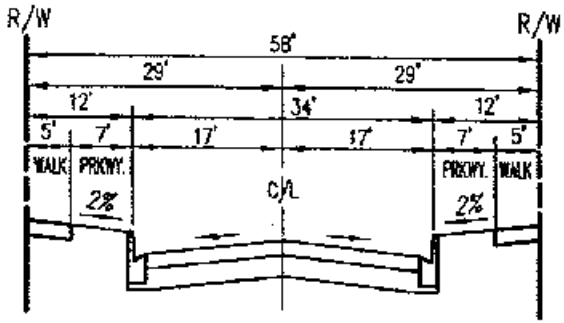
Under the provisions of Substantial Conformance (Section 5.2) of the Newhall Ranch Specific Plan, "Adjustments to the plans contained in Chapter 2, Development Plan, such as the Master Circulation Plan, any of the **roadway sections** (emphasis added), the Master Trails Plan, any of the trails sections, the Conceptual Backbone Water, Sewer, and Drainage Plans the Conceptual Grading Plan, or the Recreation/Open Area Plan which do not change the requirements of providing adequate infrastructure"...are eligible for the Substantial Conformance entitlement process.

Inasmuch as the affected County departments have concluded that the alternative street sections are comparable to those street sections that would otherwise be required by the Specific Plan, or by reference the County Subdivision Code, as the Planning Director, I have determined, pursuant to Section 5.2.d of the Newhall Ranch Specific Plan that:

(1) The proposed alternative street sections substantially conform with all applicable provisions of the Specific Plan and the County ordinances which do not conflict with the Specific Plan, and
(2) The proposed sections will not adversely affect public heath and safety and will not adversely affect adjacent property.

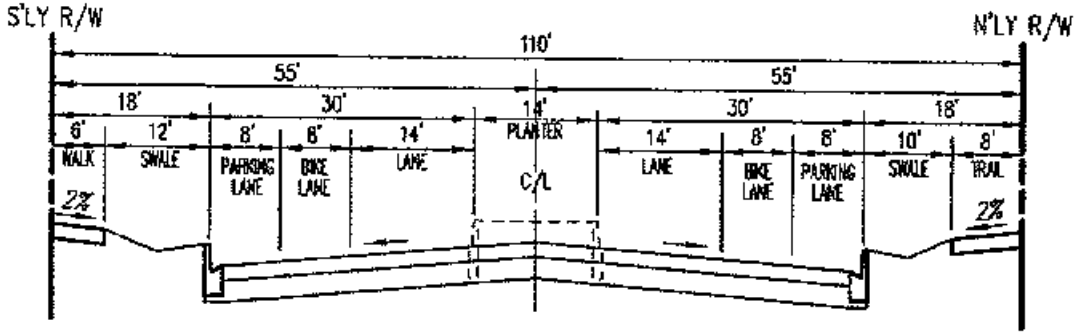
The abovementioned determination shall be applicable to Landmark Village only.

Enclosures: (1) Alternative (proposed) street cross sections
(2) Memorandum summarizing the agreement with the Fire Department and the Department of Public Works



TYPICAL LOCAL STREET SECTION (58' R/W)

Local Access - 30 MPH Design Speed



TYPICAL STREET SECTION (110' R/W)

"A" STREET (Spine Road Collector)
From 1st Roundabout to Wolcott Road
Local Access - 45 MPH Design Speed

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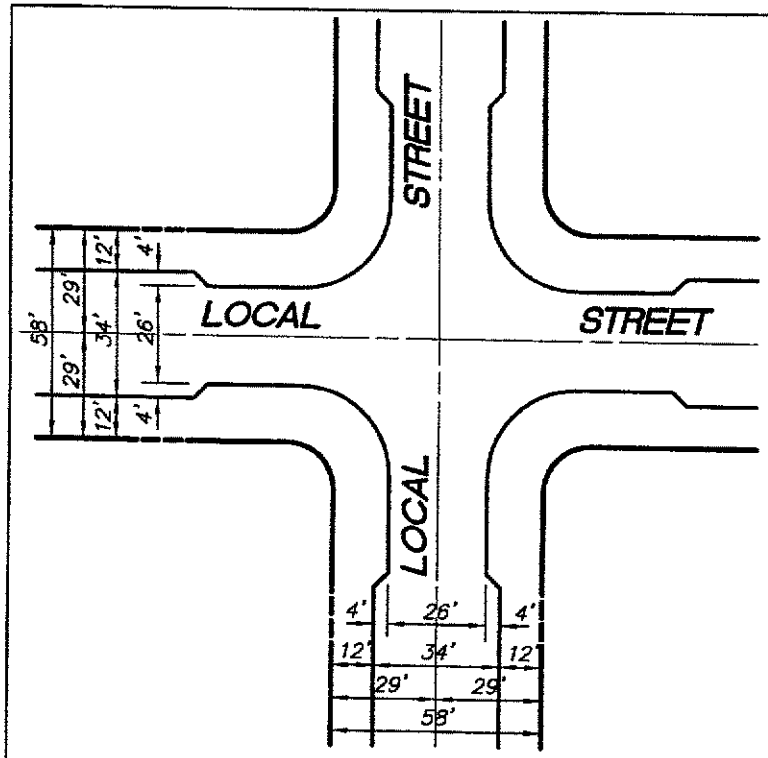
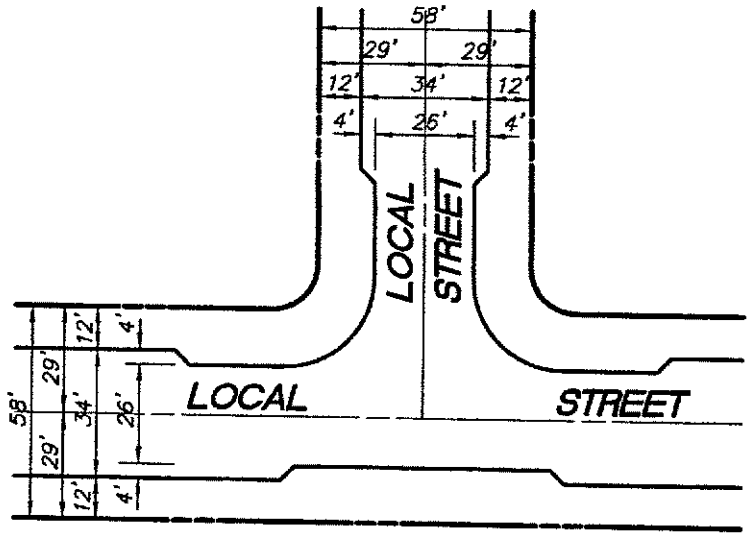
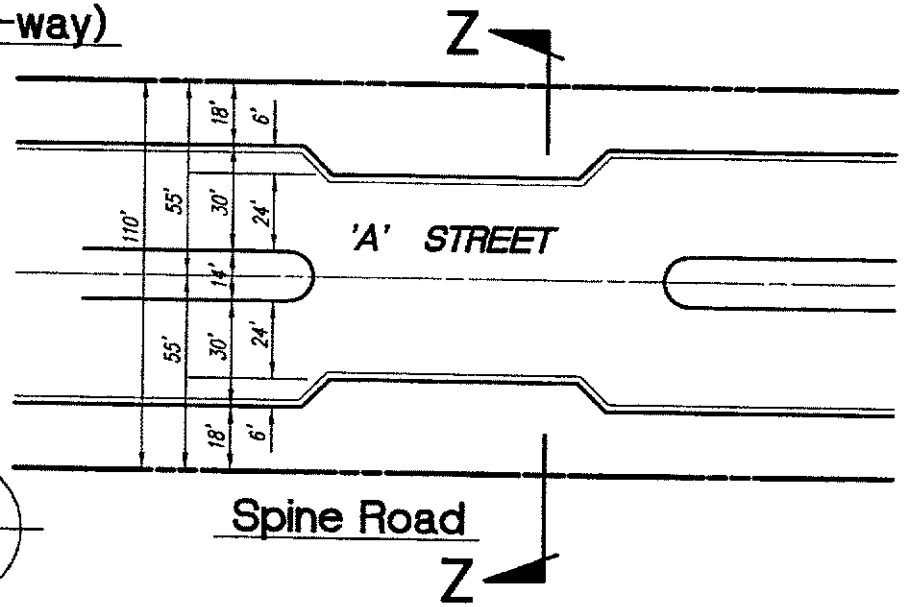


Local Street Intersection (4-way)



Local Street Intersection (3-way)



Spine Road

TYPICAL DETAIL

NOT TO SCALE

6
-

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MEMORANDUM

TO: Newhall Ranch Specific Plan Project File

FROM: Bruce McClendon FAICP, Director of Planning

SUBJECT: Substantial Conformance Interpretation Pertaining to Shared Parking

DATE: January 23, 2007

Approved: _____ _____
Initial *Date*

Background

Section 3.7 (Parking Regulations) of the Newhall Ranch Specific Plan specifies the regulations which govern motor vehicle parking. These regulations require parking facilities of sufficient capacity to discourage traffic congestion and provide safe and convenient facilities for motorists and pedestrians. Section 3.7 (3) (a) and (b) describe the provisions for Joint Use and Shared Parking Plan and Senior Community and/or Handicapped Parking Plans.

Specific Issue: *Interpretation of the provisions of Section 3.7 pertaining to shared parking to include off-site and reciprocal parking*

Off-Site, Reciprocal Parking

Development within the boundaries of the Specific Plan will include a variety of multi-family residential units expected to be designed to incorporate parking to serve residents and guests in convenient locations. The specific design may show parking which is not located on the same lot as the residential unit it serves, but instead on an adjacent lot or in a nearby parking structure or lot.

Development within the boundaries of the Specific Plan will also include commercial development designed in a variety of ways. Commercial development is anticipated to include mixed use areas, commercial centers and individual commercial lots. The specific design for the commercial uses may depict parking on adjacent lots or within parking structures.

Allowing flexibility in parking location will result in the conservation of land and promotion of efficient land use and provide convenience for future residents and patrons.

Parking Program

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Section 3.7 of the Specific Plan establishes regulations for the preparation of a Parking Program to provide an alternative to standard parking requirements. Provisions for enforcement of parking requirements and reciprocal agreements for ensuring off-site reciprocal parking be permanently maintained would be included in the Parking Program to be approved prior to the issuance of building permits.

Conclusion

Under the provisions of Substantial Conformance (Section 5.2) of the Newhall Ranch Specific Plan, "approval of a parking program, pursuant to Section 3.7 of paragraph 3" is eligible for the Substantial Conformance review process.

Inasmuch as the requested interpretation of shared parking is consistent with the provisions found in Title 22 for approval of a parking permit and as the approval of a parking program will provide the same assurances as conditions of approval typically applied to parking permits, as the Planning Director, I have determined, pursuant to Section 5.2.d of the Newhall Ranch Specific Plan that:

(1) The interpretation of shared parking is applicable to off-site and reciprocal parking designs and substantially conforms with all applicable provisions of the Specific Plan and the County ordinances which do not conflict with the Specific Plan, and
(2) The interpretation of shared parking will not adversely affect public heath and safety and will not adversely affect adjacent property.

The abovementioned determination shall be applicable to development within the boundaries of the Specific Plan.

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MEMORANDUM

TO: Newhall Ranch Specific Plan Project File
County of Los Angeles

FROM: James E. Hartl, AICP, Director of Planning

SUBJECT: Substantial Conformance Interpretation pertaining only to
Front Setback for Single-Family Residences
Newhall Ranch Specific Plan Area

DATE: September 23, 2003

Approved: _____ _____
Initial *Date*

Background

As Newhall Ranch Company is proceeding with design of its initial Tract Map, an interpretation issue relative to setbacks has arisen and they have requested early input as it is fundamental to their planning and lotting. Although the Specific Plan is the broad governing document for the implementation of specific Tract Map level details, much is left to the Planning Director's discretion in interpreting the intent of the Plan's development standards, and allowing for progressive product innovation.

Specific Issue: ***Front Setbacks for Single-Family Detached Homes in Low (L), Low Medium (LM), and Medium (M)***

Front Yard Setbacks

The Newhall Ranch Development Standards are set forth on Table 3.4-1 of the Specific Plan (see attached). The intent of the required minimum 18-foot front yard setback is to avoid blocking of sidewalks by vehicles parked in driveways. (The Specific Plan requires 18-foot garage setback for front entry garage and 10-foot garage setback for side entry garages.)

Consistent with this intent is a standard 10-foot main structure front yard setback and a variable garage setback per the individual conditions set forth below:

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Front Entry and Side Entry Garage Setbacks

The Specific Plan is explicit in requiring an 18-foot minimum front setback for a conventional front entry garage (see Note 4 on Site Development Standards Matrix, Table 3.4-1) and requiring a 10-foot minimum front setback for a side entry garage. Exhibits 'A' and 'B' respectively demonstrate those front setbacks specified by the Specific Plan for Low, Low Medium, and Medium detached residences.

The Specific Plan is silent, however, on front yard setbacks for detached residential products featuring recessed garages and alley-loaded garages.

Recessed Garage Setbacks

Since the 18-foot front yard setback was intended to provide an adequate area for parking a vehicle in the driveway access to a garage in order to prevent the blocking of the sidewalk, it seems logical that the 18-foot setback should be applied to all front loading garages (flush conventional or recessed). Exhibit 'C' demonstrates this type product. Note that to de-emphasize the garage door, only the garage structure is subject to the 18-foot setback and the living area may remain at the 10-foot front yard setback as required by the Specific Plan. This encourages port cochere type products which improve the streetscape.

Alley Loaded Garage Setbacks

Due to the fact that no blockage of the sidewalk is in question the intent of the Specific Plan is clear that the front yard setback should be 10-feet in this case (see Exhibit 'D'). Although a rear yard setback is not required for garages with alley access, a minimum distance of 26 feet is required between the garage entrance and the opposite side of the alley.

Site Development Standards Matrix

The attached Table 3.4-1 Site Development Standards Matrix (Revised) has been amended by adjusting the matrix and notes to include the clarifications to front setbacks as discussed and demonstrated above. Namely, a 10-foot minimum front yard setback for the main structure and a garage setback determined by product type which is set forth in Notes to Table 3.4-1.

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Conclusion

Under the provisions of Substantial Conformance (Section 5.2) of the Newhall Ranch Specific Plan, " modification of development standards contained in Table 3.4 (Site Development Standards)" are eligible for the Substantial Conformance review process.

Inasmuch as this analysis has described the instances where interpretation of the front setback requirement as it pertains to recessed and alley-loaded garages clarifies the intent of the Specific Plan and will facilitate the processing of individual Tentative Tract Maps and is in conformance with the intent of the Specific Plan, as the Planning Director, I have determined, pursuant to Section 5.2.d of the Newhall Ranch Specific Plan that:

(1) The proposed front setbacks for single family detached homes in Low (L) , Low Medium (LM) and Medium (M) designations substantially conform with all applicable provisions of the Specific Plan and the County ordinances which do not conflict with the Specific Plan, and
(2) The proposed setbacks will not adversely affect public heath and safety and will not adversely affect adjacent property.

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TABLE 3.4-1
REVISED SITE DEVELOPMENT STANDARDS MATRIX
Newhall Ranch Specific Plan

RESIDENTIAL SITE DEVELOPMENT STANDARDS

LAND USE DESIGNATIONS[1]		MINIMUM LOT AREA (Sq. Ft.)	REQUIRED SETBACKS[2, 17] Front Yard[2] (Main Structure)	Side Yard[2] (Each Side)	Rear Yard[2]	MAXIMUM BUILDING HEIGHTS[2]
ESTATE (E)		20,000	30' Min[3]	15' Min	30' Min	35'
LOW RESIDENTIAL (L)		7,500	18' Min[4]	5' Min[11]	20' Min[6, 7]	35'
LOW-MEDIUM RESIDENTIAL (LM)	Detached	2,500	18' Min[4, 14]	5' Min[5, 8, 11, 15, 16]	10' Min[6,7]	35'
	Attached	2,500	18' Min[4, 14]	0[9, 11, 15, 16]	10' Min[6,7]	35'
MEDIUM RESIDENTIAL (M)	Detached	2,500	18' Min[4, 14]	5' Min[5, 8, 11, 15, 16]	10' Min[6,7]	45'
	Attached	N/A	10' Min[14]	0[9, 11, 15, 16]	10' Min[6,7]	45'
HIGH RESIDENTIAL (H) AND MIXED-USE (MU) RESIDENTIAL		N/A	10' Min	0[9, 11]	10' Min[6,7]	55'

NON-RESIDENTIAL SITE DEVELOPMENT STANDARDS

LAND USE DESIGNATIONS[1]	LOT REQUIREMENTS[12] Maximum Site Coverage[10]	Minimum Front Setback	MAXIMUM BUILDING HEIGHT[2]
MIXED-USE (MU) COMMERCIAL	No Max	No Min[13]	55'
COMMERCIAL (C)	50%	20'	45'
BUSINESS PARK (BP)	50%	20'	45'
VISITOR SERVING (VS)	50%	20'	35'

MAJOR OPEN AREAS SITE DEVELOPMENT STANDARDS

LAND USE DESIGNATIONS[1]	REQUIRED MINIMUM SETBACKS FROM PROPERTY LINE	MAXIMUM BUILDING HEIGHT[2]
OPEN AREA (OA)	50'	35'
RIVER CORRIDOR SPECIAL MANAGEMENT AREA (RC)	50'	25'
HIGH COUNTRY SPECIAL MANAGEMENT AREA (HC)	50'	25'

NOTES

1. Other uses including *land use overlays* such as schools, churches, park facilities, non-residential public or private facilities, and residential/commercial conversions are subject to the site development standards of the *land use designation* in which they are found.
2. A defined term — see glossary definition and/or related exhibit for full description of requirement.
3. Front Entry Garage: 30' min.
   Side Entry Garage: 15' min.
4. Front Entry Garage: 18' min.
   Side Entry Garage: 10' min.
5. Zero Side Yard Lot configuration is permitted.
6. Except where there is a detached *Second Unit*, structure, and/or garage, where 5' minimum setback is allowed from this structure.
7. No garage setback requirement for alley access.
8. 10' minimum aggregate for two adjacent lots (e.g., 5' and 5', or 3' and 7', or 0 and 10').
9. 10' minimum building to building separation.
10. A minimum of 10 percent of the lot area excluding required parking shall be landscaped.
11. 10' minimum adjacent to public street.
12. 20' minimum side and rear yard setback is required when building is adjacent to a different *land use designation* or a public road.
13. 20' minimum is required when building fronts on a public road.
14. 15' minimum for clustered single-family detached and attached buildings.
15. 6' minimum for clustered single-family detached and attached buildings when one side of two adjacent buildings has no windows.
16. 12' minimum for clustered single-family detached and attached buildings when kitchen/family area faces toward zero lot line building with no windows.
17. If at the time building permits are issued, the County's setback standards in place at that time are more stringent than those contained in the Site Development Standards Matrix, the more stringent standards shall apply.

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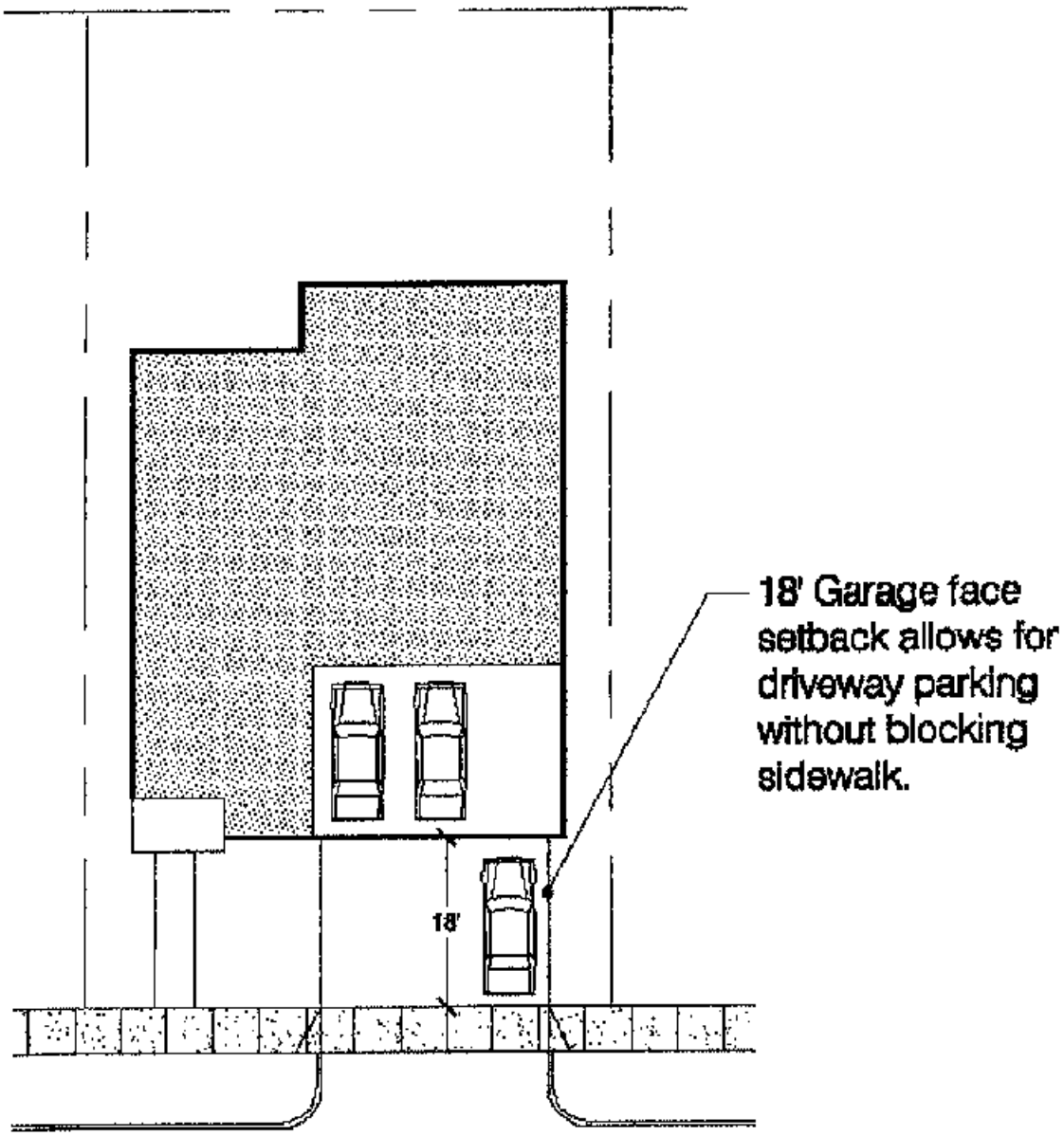
18' Garage face setback allows for driveway parking without blocking sidewalk.
18'

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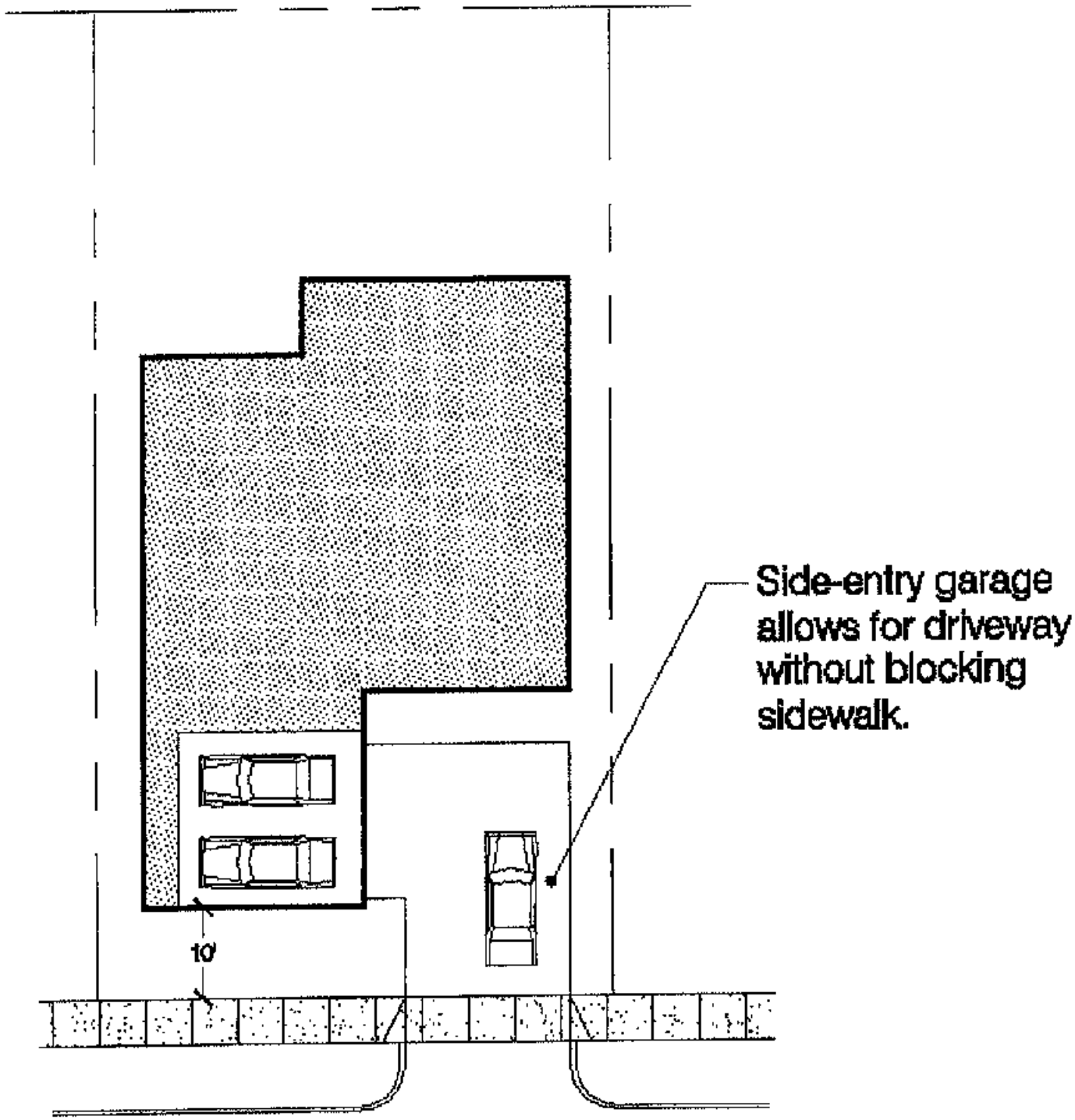
Side-entry garage allows for driveway without blocking sidewalk.
10'

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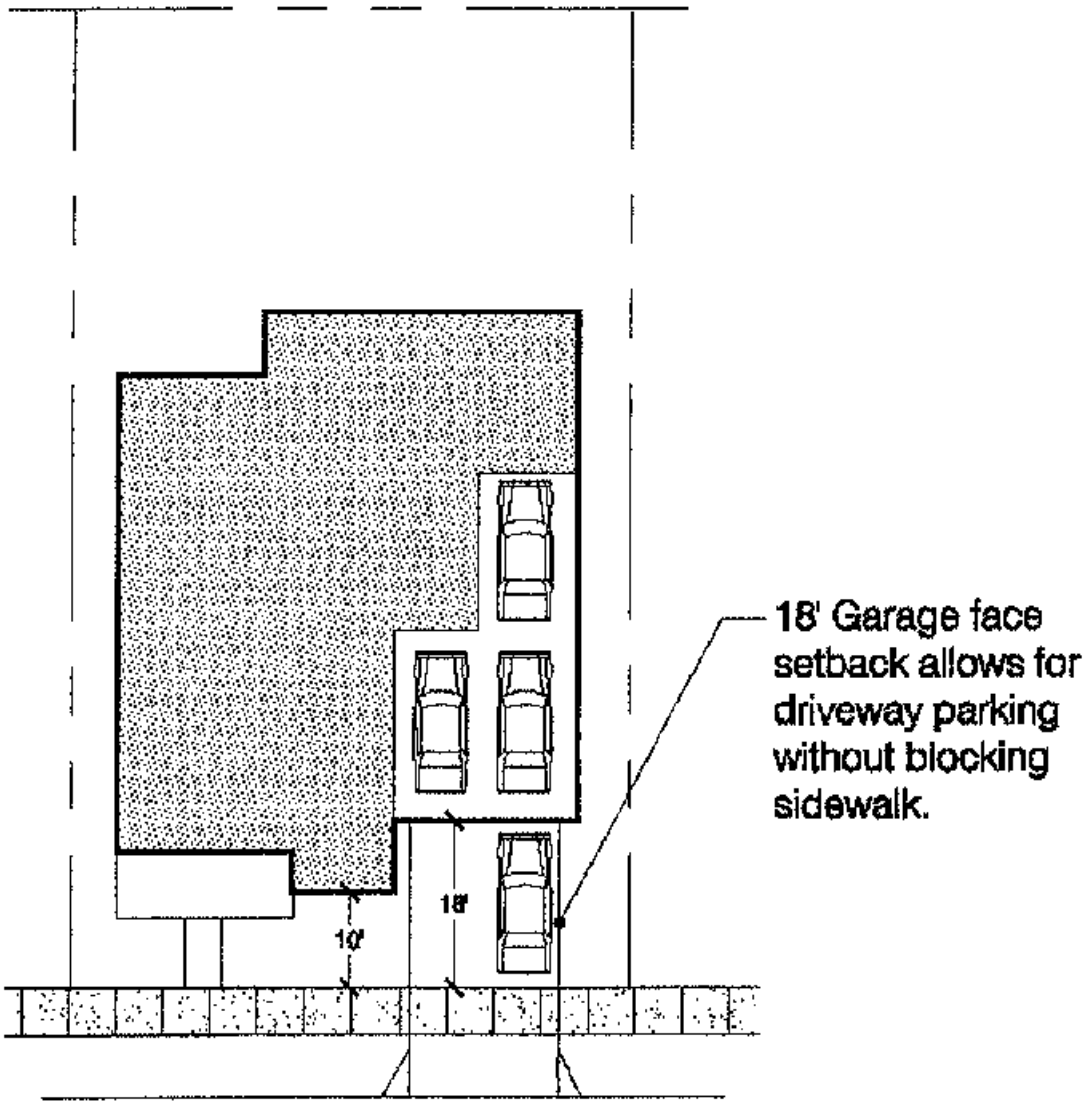
18' Garage face setback allows for driveway parking without blocking sidewalk.
18'
10'

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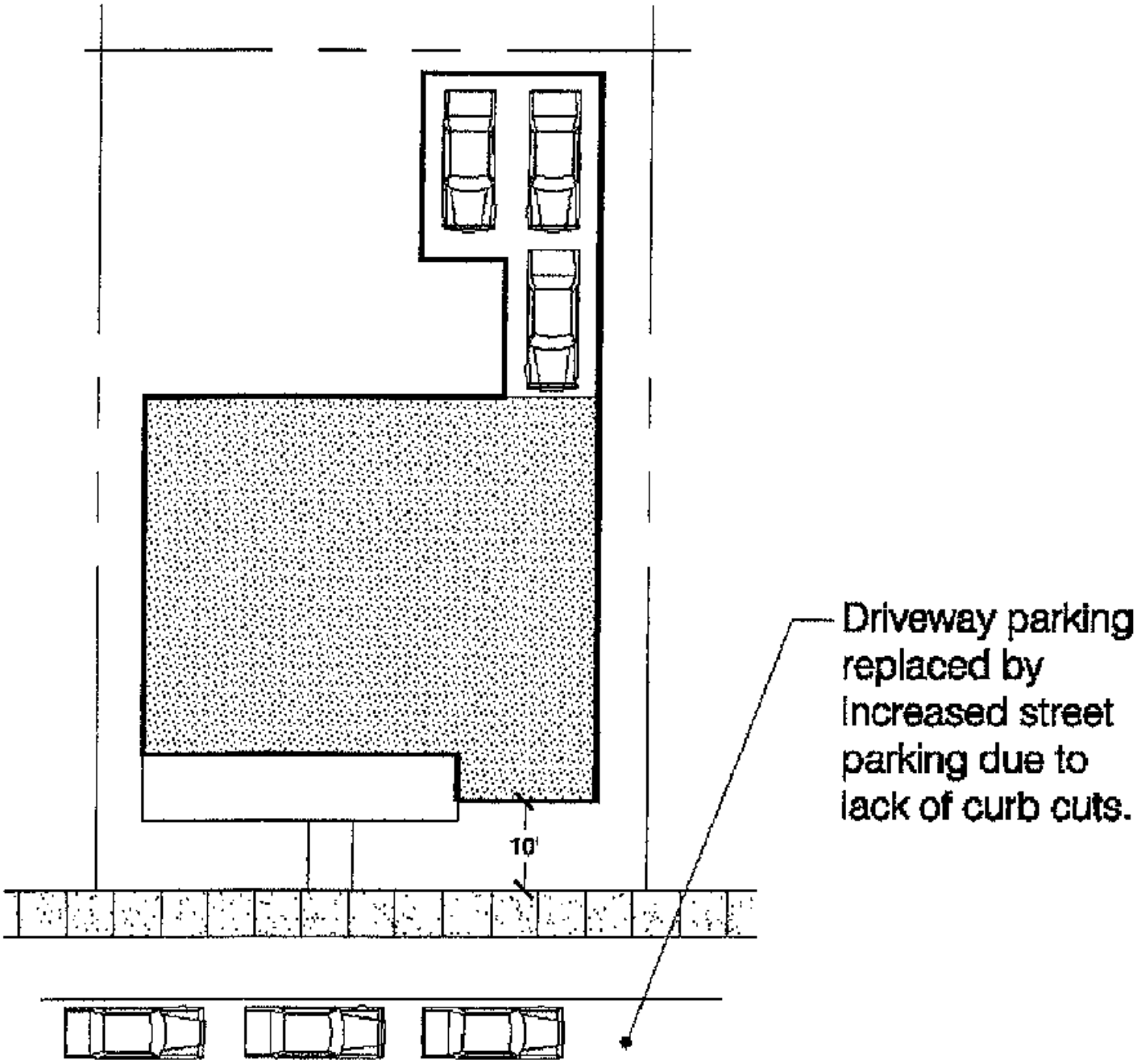
10'
Driveway parking replaced by increased street parking due to lack of curb cuts.

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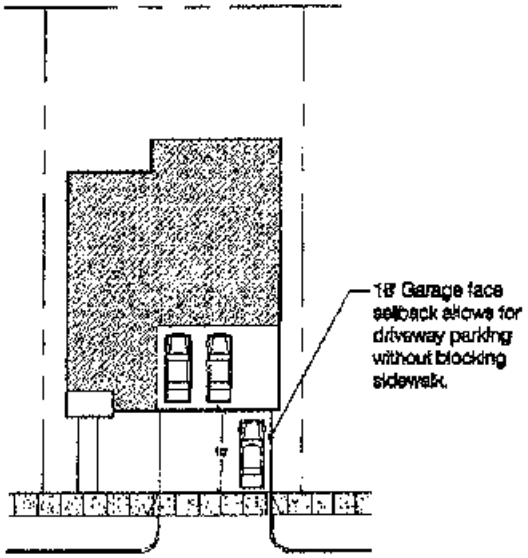
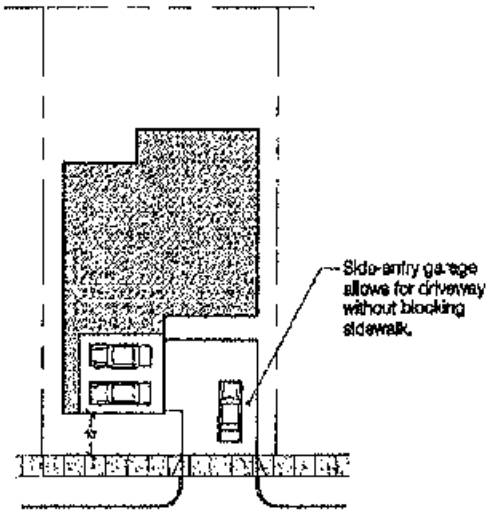
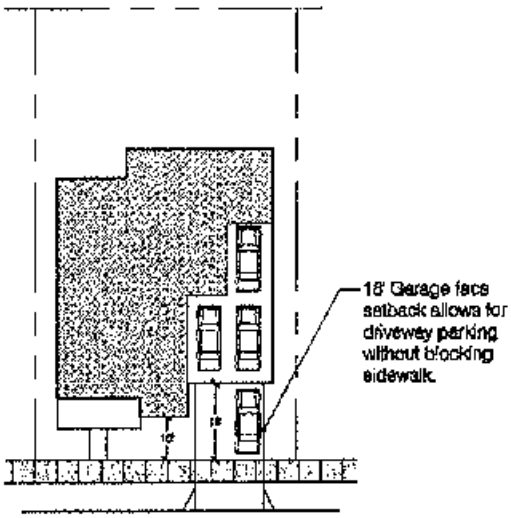


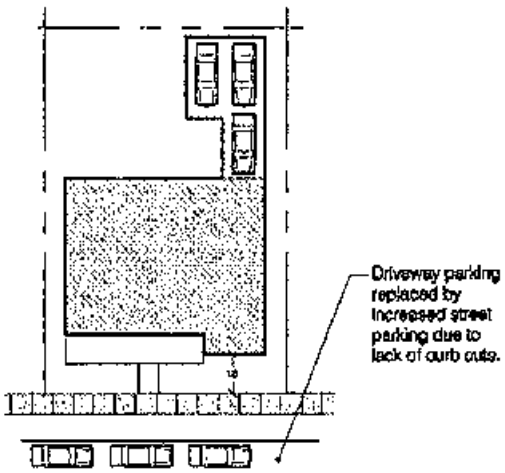
Conventional Front Entry Garage



Side Entry Garage



Recessed Front-Loading Garage



Alley-Loaded Garage

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MEMORANDUM

TO: Newhall Ranch Specific Plan Project File

FROM: Bruce McClendon, FAICP, Director of Planning

SUBJECT: Substantial Conformance Interpretation Pertaining to Off-Site Transport of Materials in Conjunction with Permitted Grading Projects and Conformance with Grading and Hillside Management Guidelines

DATE: (_____)

Approved: _____ _____
Initial *Date*

Background

Section 5.2(Implementation Procedures) of the Newhall Ranch Specific Plan provides for a determination of substantial conformance for transport of materials within the boundaries of the Specific Plan in conjunction with a permitted grading operation and also for determination of conformance with grading and hillside management guidelines for subdivisions having an average slope of 25% or greater in those areas to be graded .

Specific Issue: Transport of Grading Materials from the identified borrow site of Adobe Canyon to Landmark Village and Determination of Conformance with Grading and Hillside Management Criteria.

In order to implement the development of Landmark Village it will be necessary to import fill material from Adobe Canyon to elevate the site and avoid flooding issues. Newhall Land Company will need a net import of 6 million cubic yards of fill material from the identified Adobe Canyon borrow site.

There are two proposed haul routes for exporting the fill material from Adobe Canyon The two haul routes would then merge onto an existing agricultural crossing that would cross the Santa Clara River and enter Landmark Village. The first proposed haul route begins toward the center of the borrow site and travels west to the existing agricultural crossing. The second proposed haul route begins in the northwest corner of the borrow site and merges on to the existing agricultural crossing, which then heads north into Landmark Village.

The grading operations in Adobe Canyon and Landmark Village have been designed to minimize impacts to the extent feasible. Oak trees which are removed by grading operations will be mitigated. Any erosion control requirements will be met and significant ridgelines are not impacted.

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Conclusion

Under the provisions of Substantial Conformance (Section 5.2) of the Newhall Ranch Specific Plan, "subdivisions having an average slope of 25% or greater in those areas to be graded for determination of conformance as to grading and hillside guidelines and approval of transport materials within the boundaries of the Specific Plan"...are eligible for the Substantial Conformance entitlement process.

Inasmuch as the grading operations have been designed to minimize impacts to the extent feasible and that the transport routes for hauling of grading materials from the Adobe Canyon borrow site to Landmark Village follow existing agricultural roads to limit impacts to the Santa Clara River, as the Planning Director, I have determined, pursuant to Section 5.2.d of the Newhall Ranch Specific Plan that:

(1) The proposed haul routes to transport grading materials from Adobe Canyon to Landmark Village are in substantial conformance with all applicable provisions of the Specific Plan and the County ordinances which do not conflict with the Specific Plan, grading has been designed to minimize impacts; and
(2) The proposed haul routes and grading operations which are not located near existing residences or occupied properties will not adversely affect public heath and safety and will not adversely affect adjacent property.

The abovementioned determination shall be applicable to Landmark Village only.

Enclosures: (1) Haul Route Exhibits

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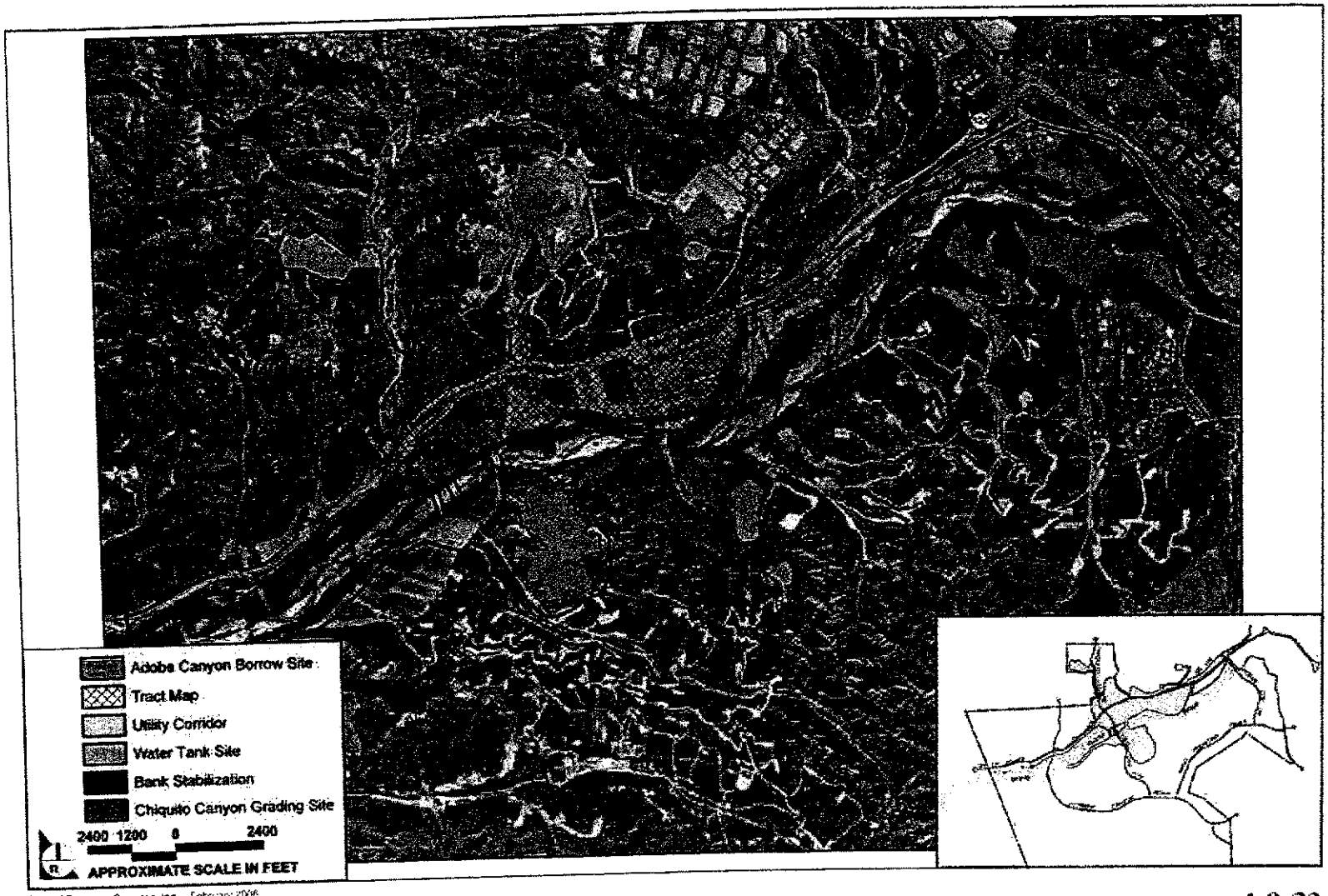

SOURCE: Impact Sciences Inc February 2006

FIGURE 1.0-33

Off-Site Improvements

32-92-05:06

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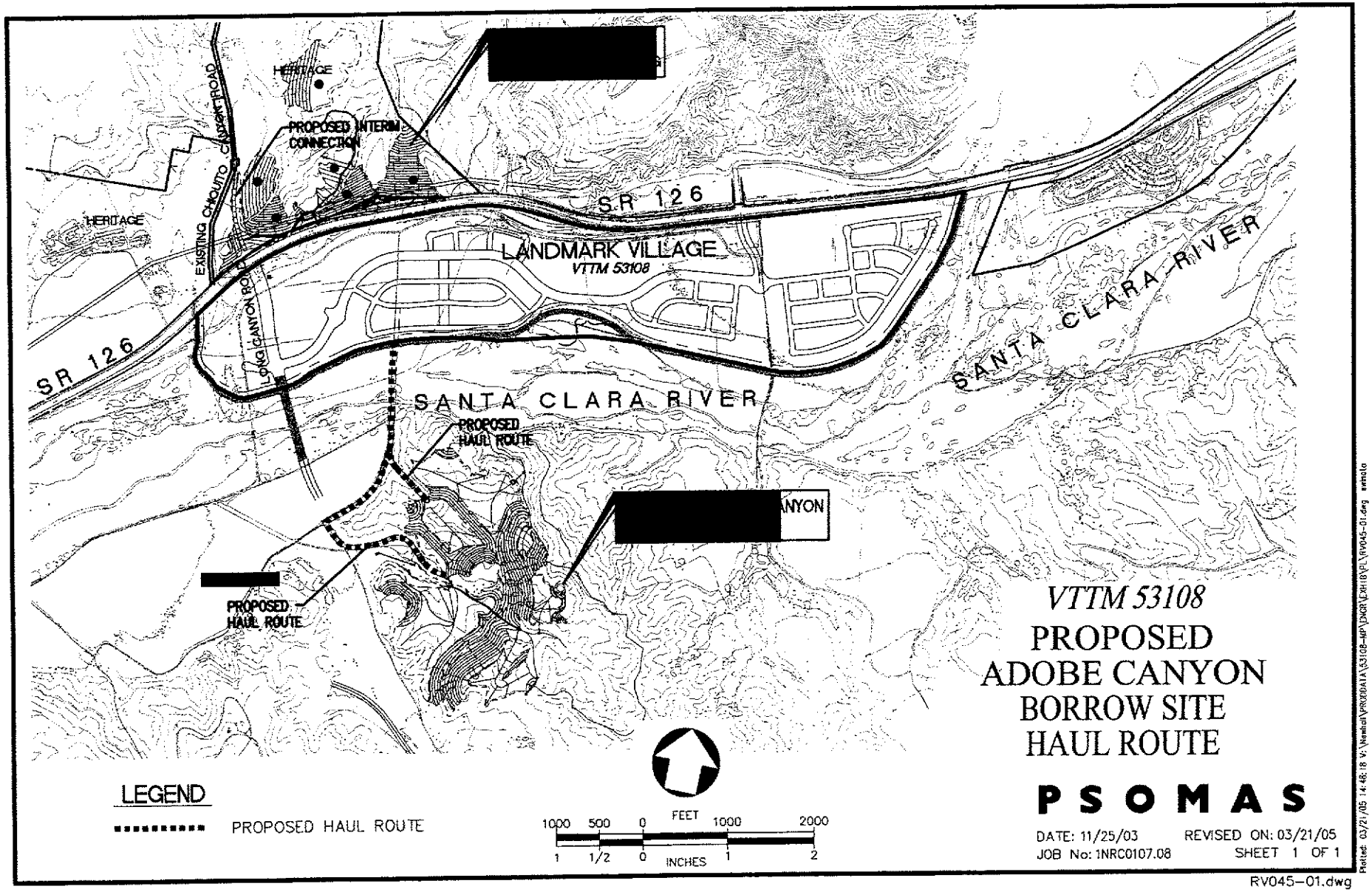

VTTM 53108

PROPOSED ADOBE CANYON BORROW SITE HAUL ROUTE

PSOMAS

DATE: 11/25/03 REVISED ON: 03/21/05
JOB No: 1NRC0107.08 SHEET 1 OF 1

RV045-01.dwg

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February 22, 2007 Staff Report

Los Angeles County
Department of Regional Planning

Planning for the Challenges Ahead

Bruce W. McClendon FAICP
Director of Planning

February 22, 2007

TO: Esther L. Valadez, Chair
Harold V. Helsley, Vice Chair
Leslie G. Bellamy, Commissioner
Wayne Rew, Commissioner
Pat Modugno, Commissioner

FROM: Susan Tae, AICP, Section Head SMT
Land Divisions Section

SUBJECT: "LANDMARK VILLAGE"
GENERAL/LOCAL/SPECIFIC PLAN AMENDMENT CASE NOS. 00-196-(5)
VESTING TENTATIVE TRACT MAP NO. 53108-(5)
CONDITIONAL USE PERMIT CASE NOS. 00-196-(5) AND 2005-01121-(5)
OAK TREE PERMIT CASE NO. 00-196-(5)
AGENDA ITEM NO. 6 a, b, c, d, e, f, g; FEBRUARY 28, 2007

PROJECT BACKGROUND

As you may recall, Landmark Village is the first subdivision proposal within the adopted Newhall Ranch Specific Plan ("Specific Plan"), and proposes to create a maximum of 1,444 dwelling units and 1,033,000 square feet of nonresidential uses as well as 45 acres of open space, including a 16-acre community park, trail system, and elementary school on 292.6 gross acres. The project is within the "Riverwood" Village of the Specific Plan, and located north of the Santa Clara River, south of State Route 126 ("SR-126"), east of the Ventura County boundary, and west of Interstate 5 Freeway. A Draft Environmental Impact Report ("EIR") was prepared for the project as a tiered document from the certified Specific Plan EIR, and concluded that impacts could not be mitigated to less than significant, include Biota, Visual Qualities, Noise, Air Quality, Solid Waste Disposal and Cumulative Agricultural Resources; Noise is the only impact factor for this project that was considered significant different than the certified Specific Plan EIR.

On January 31, 2007, after opening the public hearing and taking public testimony with concerns or in opposition to the project, the public hearing was continued to allow for additional time as requested by various agencies and individual citizens, to comment on the project and EIR. The public hearing was continued to February 28, 2007, and the public comment period for the EIR was continued to February 20, 2007 (total 90-day public comment period). An initial list of comments on the proejct was also provided by the Regional Planning Commission ("Commission") for the applicant to respond at the February public hearing.

PROJECT COMMENTS

The applicant has submitted a letter dated February 15, 2007, which provides responses to the comments provided at the January 31, 2007 public hearing (please see attached).

The following is the list of comments as well as a summary of the applicant's responses:

- **Potential incorporation of wireless technology within the project**

The applicant was requested to evaluate the potential for providing wireless technology within this project and the overall Newhall Ranch project. The applicant has responded that Newhall Land has an affiliation with SBC (AT&T) and that given the nature of constantly evolving technology, the project would be best able to incorporate highspeed wireless technology (e.g. WiFi or its future equivalent) in commercial and mixed use areas, and public spaces (e.g. parks, libraries, private community centers). Individual single-family homes would have various means for internet service.

- **Interim elementary school plan**

The Commission requested additional information for an interim school plan until enough students are generated from the project to open the elementary school. The applicant has responded that they have been working with the Castaic School District ("School District"), and anticipate that the first occupancies would arrive in mid to late 2009. The elementary school is anticipated to be open in fall of 2010, therefore leaving a nine to 12 month period where children from theproject will be bussed to an existing school.

- **Community sustainability/smart growth**

The Commission also requested additional information regarding sustainability and smart growth elements within the Landmark Village project. The applicant has responded with various elements of the project that meet community sustainability and smart growth elements, including provision of jobs; provision of transit; open space, recreation and preservation of sensitive resource areas; reduction of impermeable surfaces; and water conservation and reuse.

The project is proposed in a Traditional Neighborhood Design, and proposes a mix of uses, including housing types, commercial, office and public facility uses within the project. The project is also designed to place residential near commercial services and/or public spaces, to promote walkability and more 'vibrant' neighborhoods.

Other components of sustainable development, including energy conservation, alternative energy sources, and 'green building.' The applicant has indicated that they are in the process of preparing a formal Sustainability Plan that will incorporate and in more detail, define energy conservation techniques, potential alternative energy sources and incorporation of green building designs within the entire Specific Plan area. This Sustainability Plan is currently being prepared, and will be completed before final approval of the project. The applicant indicated that they will be providing additional information during the February 28, 2007 continued hearing.

- **Ownership and maintenance of passive park**

The Commission requested clarification of ownership and maintenance of the passive park, which is located in the center of the project across "A" Street from the public park and elementary school. The applicant has stated that the passive park, which includes the interpretive trail and river lookout, will be maintained by the project's homeowners association but open to the public.

- **Potential revisions to elementary school and public community park design**

The Commission provided comments and direction regarding the design of the elementary school and public park site, specifically with respect to uses adjacent to SR-126 and the circulation and parking design for the school. At the Commission's direction, the applicant has worked with the School District and Los Angeles County Department of Parks and Recreation ("Parks and Recreation"), and has prepared a revised conceptual plan (attached) that depicts a nine-acre school site more centrally located, and the public park 'wrapped' around the school with roadway provided in between. By revising the original design of park and school side-by-side, this creates an additional buffer from SR-126-related impacts to the school and provides additional stacking space for the school.

A pedestrian bridge is also depicted crossing "A" Street, which may or may not be incorporated into the final project design. At this time, it is still being determined whether traffic signals will be required at the two intersections of the roads with "A" Street as they wrap around the school site. If traffic signals are to be installed at those locations, a separate pedestrian bridge will be not be necessary.

- **Waste-to-energy facility**

The Commission had requested additional information regarding a waste-to-energy incinerator facility and the feasibility of incorporating one within the project or vicinity. Newhall Land has met with the Los Angeles County Sanitation District ("Sanitation District"), and was informed that while an existing facility is being operated by the Sanitation District in the City of Commerce, a new waste-to-energy facility has not been proposed in California since 1990, and are no longer feasible considering policy changes and environmental regulations, including those from the Air Quality Management District.

- **Concerns regarding the Native American Tataviam tribe**

Testimony was taken on January 31, 2007 regarding the Cultural Resources Report prepared for the Draft EIR. The testifier objected to language within the report that described the Tataviam tribe as culturally extinct. The Tataviam tribe is not extinct, and the consultants have already personally apologized to the Tataviam tribe. Newhall Land has also worked with the Fernandeño Tataviam tribe on other projects in the Santa Clarita Valley, and will continue to work with them through the development of Newhall Ranch.

- **Trailhead and trail connections**

The Commission requested additional information regarding trails and in particular, the potential inclusion of a trailhead within the project. The applicant has agreed to work with Parks and Recreation for the siting of a trailhead location, and will likely be within the commercial area directly west of Long Canyon Road with direct access to the Santa Clara River Regional Trail.

Additional information was also requested regarding the trail connection across the river, and across SR-126. The main equestrian trail connection across SR-126 is located west of this project, within the adjacent pending subdivision known as Homestead (Vesting Tentative Tract Map No. 060678). The trail connection is proposed under a box culvert that is approximately 14 feet high, and at minimum height to travel through without dismounting a horse.

- **Cul-de-sacs along the western side of the project site**

The Commission requested clarification regarding the cul-de-sacs that were proposed on the west side of the project. The cul-de-sacs that were identified are in fact trail connections, and provide access from the development to the trails that run parallel to the Santa Clara River.

- **Setbacks from riparian area**

Setbacks or minimum distances between development and the Santa Clara River, are described in the Specific Plan. The Commission requested that the applicant clarify what was required, and what is being provided by the project. A letter has been provided by Impact Sciences, dated February 15, 2007 (attached) that discusses the riparian buffer and the various iterations through the public hearing process for the original Specific Plan. The Specific Plan was adopted with a minimum 100-foot buffer from top of river-side of the bank stabilization and project development, with provisions for a lesser buffer if riparian resources are still adequately protected. The tentative map and Draft EIR include a minimum 100-foot buffer, within which trails and open space/detention basins may be permitted, along the Santa Clara River Special Management Area. In one portion of the project , the riparian buffer is reduced from 100 feet to 70 feet, which is along Chiquito Canyon Road/Long Canyon Road, adjacent to SR-126 and heavily disturbed. A more detailed, written response will be provided in the Final EIR as part of response to comments.

- **Comments regarding studies from The Nature Conservancy and Santa Clarita Valley Preservation funds**

Testimony was given during the January 31, 2007 public hearing that studies from the Nature Conservancy and Santa Clarita Valley Preservation regarding funds to purchase property, should be evaluated. There are no additional comments regarding this comment at this time.

- **Perchlorate contamination and status of clean-up**

Ammonium perchlorate has been detected in groundwater basins underlying the Santa Clarita Valley, and testimony was received during the January 31, 2007 public hearing regarding this concern. The EIR consultant, Impact Sciences, has submitted a letter dated February 15, 2007 (attached) that states the Draft EIR includes discussion for remediation planning already underway for perchlorate contamination and restoration of the impacted well capacity. The Castaic Lake Water Agency together with local water purveyors, is proceeding with a two-prong perchlorate contamination remediation program (Interim Remedial Action Plan) with action program. Substantial progress has been made towards full implementation of the program. A more detailed, written response will be provided in the Final EIR as part of response to comments.

- **United Water Conservation District comments**

The Commission requested that additional information be provided from the United Water Conservation District ("United Water") regarding the project. A letter from United Water dated February 7, 2007, was received by staff, and included in this package. The letter states that United Water has reviewed the Draft EIR, and finds that it complies with the terms established in the settlement agreement.

- **Comments from the Audobon Society**

Detailed comments were received for the January 31, 2007 public hearing from the Audobon Society regarding the Draft EIR, and specifically the analysis and studies related to birds. The applicant was asked to respond, and Impact Sciences, the EIR consultant, has provided a letter dated February 15, 2007 (attached). In this letter, Impact Sciences responded with a discussion of the methodology used in the Draft EIR, and from the methodology focused on special-status species that have been observed, known to occur, or that have the potential based on habitat or known range. The birds cited by the Audobon Society as been omitted from the studies, for example the California condor and two owl species, are not considered special-status birds and therefore were not included. Prior to disturbance on the property, surveys would be required for native birds nesting. A more detailed, written response will be provided in the Final EIR as part of response to comments.

STAFF EVALUATION

Additional minor changes or corrections are required to the tentative map, which include those discussed during the public hearing process. These include:

- Minor grading elevation adjustments to match approved drainage concept;
- Inclusion of 11,000-square foot fire station within commercial area east of Long Canyon Road, south of "Y" Street, already analyzed in the Draft EIR, and location confirmed with Los Angeles County Fire Department, to be located outside river corridor buffer;
- If given direction by your Commission, change of school and park configuration
- Correct depiction of offsite improvements, including proposed water tank locations;
- Inclusion of five bus stops, including two pull-in areas, as confirmed with Santa Clarita Transit;
- More clear delineation of Metrolink right-of-way to be reserved by project; and
- Inclusion of trailhead location, based on further discussions with Parks and Recreation.

The updated tentative map will be circulated for Los Angeles County Subdivision Committee, with updated conditions and map presented to your Commission before final action on the project.

California Department of Fish and Game fees have also increased, effective January 1, 2007. Therefore, at this time the fees required for this project are $2,500 plus a $50 recording fee. As fees are in effect at time of paying, this number may also increase subject to changes by the State. No project is considered approved and/or vested without payment of these fees.

Additional correspondence received to time of writing, have been included for your Commission's consideration. The public comment period for the Draft EIR was continued from January 31, 2007 to February 20, 2007 (total 90 days) and no other public comments received after February 20, 2007 will be included in the response to comments portion of the Final EIR. However, the one EIR comment letter received after close of the public comment period, has been provided as part of comments on the project.

Staff feels that the project, including the changes to the tentative map discussed above, is consistent with adopted Specific Plan (see Staff Evaluation section of the January 31, 2007 staff analysis). While the EIR concluded that not all impacts from Landmark Village can be mitigated to less than significant, all but one factor was already identified as part of the Specific Plan, and the project was approved with the Statement of Overriding Considerations.

STAFF RECOMMENDATION

The following recommendation is subject to change based on oral testimony or documentary evidence submitted during the public hearing process.

If the Regional Planning Commission agrees with staff's evaluation, staff recommends that the Commission close the public hearing; indicate its intent to approve Vesting Tentative Tract Map No. 53108, Conditional Use Permits 00-196 and 2005-01121, and Oak Tree Permit No. 00-196; indicate its intent to recommend approval of General, Local and Specific Plan Amendments 00-196 to the Board of Supervisors; and direct staff to prepare the final conditions, findings for approval and resolutions as well as Final EIR including response to comments and statement of overriding considerations.

The project will return at a future date for Commission final action on the Final EIR and the project findings and conditions.

Suggested Motion: "I move that the Regional Planning Commission close the public hearing; indicate its intent to approve Vesting Tentative Tract Map No. 53108, Conditional Use Permits 00-196 and 2005-01121, and Oak Tree Permit No. 00-196; indicate its intent to recommend approval of General, Local and Specific Plan Amendments 00-196 to the Board of Supervisors; and direct staff to prepare the final conditions, findings for approval and resolutions as well as Final EIR including response to comments and statement of overriding considerations."

SMT:st
02/22/07

NEWHALL LAND

A LENNAR/LNR COMPANY

February 15, 2007

Ms. Susan Tae, AICP
Los Angeles County Department of Regional Planning
320 West Temple Street
13th Floor
Los Angeles, CA 90012

RE: Newhall Land Responses to Commission Comments from the January 31, 2007 Landmark Village Public Hearing

Dear Ms. Tae:

This letter serves to address the comments directed to Newhall Land from the Regional Planning Commission at the January 31, 2007 public hearing on Landmark Village. The comments have been underlined with Newhall Land's responses directly below.

Potential Incorporation of Wireless Technology into Newhall Ranch

Newhall Land currently has an alliance with SBC for introduction of new technology into our communities. This could include the potential incorporation of wireless technology in portions of Newhall Ranch. The portions of Newhall Ranch that are being explored for this coverage would include commercial areas and public spaces (parks, library, and private community centers). It should be noted that each of the homes and commercial businesses within Newhall Ranch will incorporate the best available technology into their design.

Interim Elementary School Plan

Newhall Land is currently working with the Castaic School District on a plan that could include the initial bussing of Landmark generated elementary school students to an existing school within the District until such time that Landmark generates enough students to open the Landmark Village Elementary School. As indicated at the last Commission hearing, the first occupancies in Landmark are anticipated in mid to late 2009. The anticipated opening of the Landmark Village elementary school is fall 2010. In summary, there will likely be a 9-12 month period where elementary students generated in Landmark would be bussed to an existing school within the Castaic District.

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Community Sustainability/Smart Growth

There are many different components that make a community sustainable or qualify it as a smart growth project. These include a proper mix of land use, provision of jobs, design for future transit uses in the plan, provision of open space and recreation, connectivity (trails), preservation of natural areas, the reduction of impermeable surfaces, water conservation and re-use, energy conservation - potentially including the use of alternative energies (solar, wind, cogeneration, etc.), and the incorporation of green building techniques.

As is evidenced below, Landmark Village, as with all of Newhall Ranch, incorporates the components of a sustainable or smart growth community. Furthermore, the Landmark Village Planning Booklet clearly identifies additional Traditional Neighborhood Design features that have been incorporated into Landmark. Components of a sustainable or smart growth community include:

- Mix of Land Uses – Landmark Village, along with the other villages in Newhall Ranch will include a broad range of housing types, including affordable housing, along with commercial, office and public facilities.
- Provision of Jobs – Landmark Village combined with the other villages of Newhall Ranch will create approximately 20,000 permanent jobs in the Santa Clarita Valley. Newhall Ranch is adjacent to Valencia Gateway, which presently provides 50,000 jobs. Additional development within Valencia Gateway will create an additional 30,000 jobs. When completed, the job centers in Newhall Ranch and Valencia will have resulted in the creation of approximately 100,000 jobs in the Santa Clarita Valley.
- Locating of Residential Uses in Close Proximity to Commercial Services/Public Spaces - Nearly 60% of the residential units in Newhall Ranch will be located within walking distance of village or commercial centers. This is clearly documented by the Landmark Village land plan. Residents within Landmark Village will be able to utilize paseos and/or the Santa Clara River Regional Trail to walk to commercial centers, private recreational facilities, the elementary school and a community park.
- Provision of Transit - Newhall Ranch, including Landmark Village, will be part of the Santa Clarita Transit system and will pay its fair share for transit service to the community. Transit improvements within the Ranch will include a park-and-ride lot, future transit station, transfer station, bus stops and preservation of light rail right-of-way. Landmark Village will include a total of five bus stops, a park-and-ride lot and the preservation of light rail right-of-way along SR 126.
- Open Space, Recreation and Preservation of Sensitive Resource Areas - Newhall Ranch, of which Landmark Village is a part, includes the preservation of the High Country, Salt Creek Corridor and the Santa Clara River – a total of nearly 6,700 acres. A total of three community parks (Landmark includes the first) and

up to ten neighborhood parks will be provided as part of Newhall Ranch. Finally, private recreation facilities will be provided throughout the entire Ranch providing additional recreational opportunities to residents.

- Hierarchy of Trails – Newhall Ranch will include over 50 miles of trails to encourage pedestrian mobility. Landmark Village includes a two-mile extension of the Santa Clara River trail, with direct connections to residential, commercial and park uses, and various paseos including the paseo running along "A" Street or the Landmark Village Spine Road.
- Reducing Impermeable Surfaces - Newhall Ranch, including Landmark Village, will utilize smaller street sections where possible, increased native landscape areas, and non-structural water quality treatment improvements.
- Water Conservation and Re-Use – Newhall Ranch, including Landmark Village, will utilize native, drought tolerant species, evapotransporation controllers, and reclaimed water.

Other components associated with smart growth and sustainability include the use of energy conservation techniques or alternative energy sources and green building design. Newhall Land is working on a formal "Sustainability Plan" that will incorporate and define in more detail the use of energy conservation techniques, potential alternative energy sources and the incorporation of green building designs into the entire Newhall Ranch community. Newhall Land will provide additional detail on this subject at the Commission hearing on February 28.

Ownership and Maintenance of the Passive Park

Landmark Village includes a community park that would be utilized for both active and passive recreation. The passive area of the park is located south of the active portion of the park and directly south of the Spine Road ("A" Street). This passive portion of the park will be owned and maintained by the Homeowners Association and will be open to the public.

Potential Revisions to the Elementary School/Community Park Design

Per the Commission's direction, Newhall Land has worked with the Castaic School District and County Parks to prepare a conceptual revised school/park plan. If supported by the Commission, we would work with both agencies to finalize this conceptual plan and incorporate it into the tract map. This plan is attached to this letter.

The Landmark Village tract map presently places the school and park side-by-side with the school being the easterly parcel and the park being the westerly parcel. The revised conceptual plan would move the school away from SR 126, utilizing the park as a buffer along SR 126 and the adjacent residential areas. This design also provides additional stacking space for dropping off and picking up students at the school.

Waste- To-Energy Facility

Pursuant to the Commission's direction, Newhall Land had several discussions with the Los Angeles County Sanitation District in an effort to gather more information on a waste-to-energy incinerator. The Sanitation District presently operates this type of facility in the City of Commerce. The facility was built in 1986 and provides power for up to 20,000 homes. The facility includes a large incinerator with a smoke stack approximately 150 feet tall. According to the Sanitation District, there has not been a waste-to-energy facility proposed in California since 1990. There are presently a total of three in the State.

Policy changes and environmental regulations have made it extremely difficult to build new waste-to-energy facilities within the State. State and Federal regulations no longer consider these facilities as a safe and environmentally sound alternative to landfills. Federal incentives, investment tax credits, favorable tax treatment and reasonable permitting no longer exist for these facilities. An example is that these facilities are no longer eligible for emission offset credits by the AQMD. Finally, several environmental organizations argue that these facilities not be considered as a renewable energy source.

As indicated earlier in the letter, we are exploring other potential alternative energy sources and believe those sources are more desirable than a waste-to-energy facility. These other sources could include cogeneration, wind and solar opportunities.

Landmark Village Cultural Resources Report

A speaker at the January 31 hearing cited a concern with language contained within the Landmark Village Cultural Resources Report prepared by W & S Consultants. This language indicates that the Tataviam Tribal community was culturally extinct. This statement is not accurate and W & S Consultants has personally apologized to the Tataviam Tribe, via a letter dated February 15, 2007, for this inaccurate statement. Additionally, W & S will amend the Landmark Village Cultural Resources Report to remove this language and replace it with language that reflects the existence of the Tataviam Tribe as documented by the Ethnographic Overview of the Angeles National Forest, Tataviam and San Gabriel Mountain Serrano Ethnohistory (2004).

Newhall Land has worked with the Fernandeño Tataviam Band of Mission Indians on projects within the City of Santa Clarita and in the Valencia Commerce Center. We value our relationship with them and will continue to consult and work with the Fernandeño Tataviam during the buildout of Newhall Ranch.

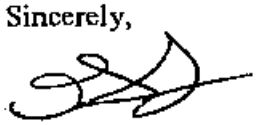
Trailhead

Newhall Land will work with the County of Los Angeles Department of Parks and Recreation on the locating of a trailhead within the Landmark Village project. This trailhead will likely be located within the commercial/mixed use area directly west of

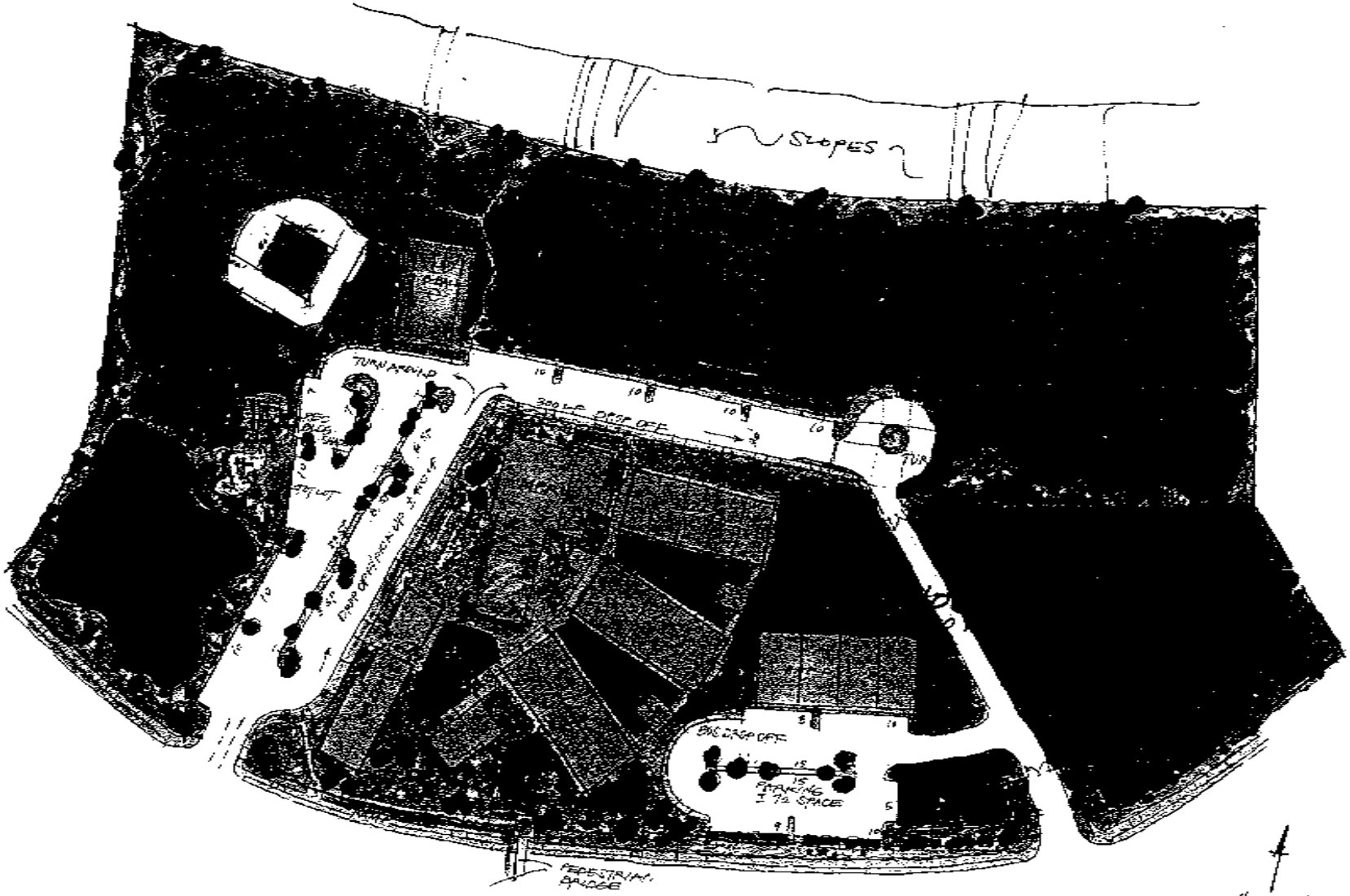
Long Canyon Road and would be placed in a location with direct access to the Santa Clara River Regional Trail.

I want to thank you for your consideration of these responses. If you have any questions regarding this letter please feel free to contact me at (661) 255-4003. We look forward to the hearing on February 28, 2007.

Sincerely,



Glenn Adamick
Vice President, Planning and Entitlements



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MEMORANDUM

TO: Susan Tae and Daniel Fierros **Job. No.** 32-092

FROM: Susan Tebo, Associate Principal

DATE: February 15, 2007

SUBJECT: Landmark Village-Perchlorate Containment

At the January 31, 2007 Planning Commission Hearing various comments were raised by the Commission, one being associated with the issue of perchlorate containment.

At the direction of County Department of Regional Planning Staff, Impact Sciences prepared the following initial update on ammonium perchlorate containment in the Santa Clarita Valley.

The detection of ammonium perchlorate ("perchlorate") in the groundwater basin underlying the Santa Clarita Valley has raised concerns over groundwater contamination and the overall reliability of groundwater supplies. As discussed in both the Landmark Village Draft EIR and the 2005 Urban Water Management Plan ("UWMP"), planning for remediation of perchlorate and restoration of the impacted well capacity is substantially underway. While the remediation work is being completed, non-impacted wells can be relied upon for the quantities of water projected to be available from the groundwater basin during the time necessary to restore the remaining perchlorate-impacted wells. Castaic Lake Water Agency ("CLWA"), the local retail water purveyors, the Department of Toxic Substances Control ("DTSC"), and the U.S. Army Corps of Engineers ("Corps") continue to monitor and work closely on the remediation of the perchlorate-impacted wells. The following summarizes the status of perchlorate remediation and restoration of perchlorate-impacted groundwater supplies. The discussion illustrates that work toward the ultimate remediation of the perchlorate contamination, including reactivation of impacted groundwater supply wells, has progressed on several integrated fronts over the past several years.

As discussed in the Draft EIR, perchlorate was detected in four Saugus Formation wells near the former Whittaker-Bermite site in 1997. This site was formerly used to manufacture rocket fuel and other munitions and has been identified for many years as the source of perchlorate contamination. As a result, the four Saugus wells (Santa Clarita Water Division's wells Saugus 1 and 2, Newhall County Water District's well NC-11, and Valencia Water Company's well V-157) were removed from service. In 2002, perchlorate was detected in Santa Clarita Water Division's Stadium Well, located in the Alluvial aquifer, directly adjacent to the former Whittaker-Bermite site. This Alluvial well was removed from service as well. Since that time, CLWA and others have been conducting regular monitoring of active wells near the former Whittaker-Bermite site. In April 2005, that monitoring detected perchlorate in Valencia Water Company's well Q2, an Alluvial well. Valencia Water Company removed well Q2 from active service and pursued permitting and installation of wellhead treatment in order to return the well to water supply service. In October 2005, Valencia Water Company restored the pumping capacity of well Q2 with the start-up of wellhead treatment that effectively removes perchlorate from the water.

Valencia Water Company also permanently closed well V-157 and, in the fall of 2005, completed the construction of new Saugus well V-206, located in an area of the Saugus Formation not impacted by perchlorate. Valencia Water Company's well V-206 is operational and replaces the pumping capacity temporarily impacted by the detection of perchlorate at former well V-157. In summary, three Saugus wells (Saugus 1 and 2 and NC-11) and one Alluvial well (SCWD Stadium well) remain off-line due to perchlorate contamination. Perchlorate was recently detected in a new well operated by Newhall County Water District, but this detection is not a further indication of the continued spread of the perchlorate pollution. This perchlorate detection was at a "minimal" level (from undetectable to up to 1.9 parts per billion), well below the state-recommended limit of 6 parts per billion. This well is also located within 1,000 feet of another Saugus well that was capped due to perchlorate contamination since approximately 1997. However, the Corps has drilled new monitoring wells and commenced a focused study of the Saugus Formation near this latest detection. Results of this study and any subsequent recommended actions will be incorporated in the overall groundwater remedial investigation and removal actions submitted by Whittaker and currently under review by DTSC.

CLWA, in conjunction with local retail water purveyors, is proceeding with a two-prong perchlorate contamination program. The first prong is to protect non-impacted wells by pumping contaminated groundwater near the former Whittaker-Bermite site and treating this water thus preventing further migration within the aquifer and recovering costs incurred in responding to the perchlorate contamination. The second prong is to restore the production capacity and water supply from wells that have been temporarily closed due to the detection of perchlorate. CLWA's containment and water supply restoration program is well underway.

Specifically, CLWA developed an Interim Remedial Action Plan (IRAP) to address the groundwater perchlorate contamination and that action plan was approved by DTSC in January 2006. CLWA also completed CEQA review of its IRAP in the same time frame, and neither the IRAP nor the CEQA review has been subject to any judicial challenge. The final design for treatment facilities and pipelines is nearly complete; a groundbreaking ceremony occurred in August 2006; monitoring wells required for the project have been constructed; the major construction work is scheduled to be put out for bid in February 2007, with construction on this stage to be underway by mid-2007. Funding to cover all remedial work has been secured by a settlement between Whittaker and its insurance carriers, with several millions of dollars currently held in escrow. A settlement of claims by CLWA and other water purveyors is pending, and is expected to result in the assignment of the escrowed funds for implementation of CLWA's approved IRAP. In summary, the perchlorate containment program has made substantial progress toward full implementation.

The quality of the groundwater available from the Alluvial aquifer near the Landmark Village project site has been tested. Results from laboratory testing conducted for Valencia Water Company wells expected to serve the project site are provided in the Draft EIR. The wells expected to be used are already approved by the Department of Health Services for use, and are located just northeast of the Newhall Ranch Specific Plan site in the Valencia Commerce Center. Laboratory testing indicates that all constituents tested were at acceptable levels for drinking water under Title 22. Tests conducted for perchlorate indicated "non-detect." Valencia Water Company also investigated the future risk of perchlorate contamination on its new wells. Based on a technical report prepared by Luhdorff & Scalmanini (groundwater consultants), it was found that, given that the groundwater resources from the Alluvial aquifer for Landmark Village would be produced from wells located along Castaic Creek and over four miles west of the area known to be perchlorate-contaminated (*i.e.*, the former Whittaker-Bermite site), the groundwater supplies for the project are not considered at risk. In any event, there are now established wellhead treatment facilities that effectively remove perchlorate and restore well

capacity without the need for a brine line. Valencia Water Company's well Q2 illustrates the effectiveness of such facilities.

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MEMORANDUM

TO: Susan Tae and Daniel Fierros **Job. No.** 32-092

FROM: Susan Tebo, Associate Principal SAT

DATE: February 15, 2007

SUBJECT: Landmark Village-Comments Submitted by the Audubon California

At the January 31, 2007 Planning Commission Hearing various comments were raised by the Commission, one being a comment regarding the letter dated January 19, 2007 submitted by Audubon California in response to the Landmark Village Draft EIR.

At the direction of County Department of Regional Planning Staff, Impact Sciences prepared the following initial response to the Audubon letter. A more detailed response will be provided as part of the formal "Responses to Comments" which will be included in a Final Draft EIR. All other comment letters on Landmark Village will also be responded to as part of the above process.

In its letter, Audubon states that the Landmark Village EIR's analysis of biological resources, specifically sensitive bird species, is not adequate for: (a) not analyzing all sensitive bird species in the project area; (b) not conducting adequate bird surveys or not performing enough surveys; (c) not accurately portraying the status of various sensitive bird species; and (d) not mitigating for such impacts.

The methodology used in the Landmark Village EIR for assessing the project's environmental impacts on biological resources, including special-status species, consisted of:

- A review of the literature applicable to the biological resources in the project area. In addition, a review was conducted of recent and historical reports and surveys documenting the existence of sensitive habitat, plant, animal, and bird resources on Newhall Ranch, including the Landmark Village project site and surrounding areas.

- A review and compilation of recorded occurrences of federal and state special-status species in the project vicinity was conducted, utilizing the most recent versions of the Department of Fish and Game's California Natural Diversity Data Base (CNDDB) and the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants for the project site and the surrounding areas.

- Field surveys were then conducted of the project site and surrounding areas by biologists qualified and/or permitted to conduct such surveys. Habitat and species observations were noted, photographed, and mapped. Specific information concerning any special-status species observed on-site was recorded, and the surveys were conducted in accordance with published resource agency survey protocols where they exist, or consistent with accepted survey methodologies for a particular species where published protocols did not exist.

The literature review, database search, and field surveys identified a total of 26 bird species observed, having the potential to occur, not expected to occur, or rarely occurring on the project site. Of these 26 bird species, nine were observed on the project site during the 14 years of bird surveys that were conducted annually on Newhall Ranch, including on the Landmark Village site and its immediate vicinity, since 1993 (*see*, Draft EIR, Tables 4.4-3, 4.4-5, 4.4-6, and 4.4-7).

Based on the above methodology, the Draft EIR focused on special-status species that have been observed, that are known to occur, or that have the potential for occurring in the project area, because the site is included in the breeding or wintering range of the species, or because suitable habitat exists on the project site or its vicinity. Such is the case for the species listed in Tables 4.4-5, 4.4-6, and 4.4-7 of the Draft EIR. The Draft EIR then analyzed the potential impacts on all of these species, including special-status bird species, and identified measures to mitigate those impacts considered significant under CEQA. For example, Mitigation Measure LV-4.8-8 of the Draft EIR includes provisions for pre-grading and pre-construction surveys to be conducted to locate active nests of bird species that potentially would be impacted by grading/construction. If such nests are found, measures are included that will ensure that adult birds, young, or eggs will not be impacted. Therefore, the methodology utilized in the Draft EIR is sufficient to identify special-status bird species expected to occur in the project area, and to assess and mitigate impacts on such species.

Nonetheless, Audubon states, for example, that the California condor and two owl species were not identified. The literature review, database search, and field surveys conducted over the past several years on or near the project site indicate that neither the California condor nor the two owl species have been observed on the project site. This is because the project site contains no roosting or nesting habitat for these species, and very little, if any, suitable foraging habitat. Consequently, the species are not expected to occur on-site and no adverse impacts to the species are expected to occur. However, the species will be added to the Draft EIR in Table 4.4-7 as special-status species not expected to occur or rarely occurring on the project site.

Audubon also states, for example, that eight species listed by Audubon are not addressed in the Draft EIR (*e.g.*, ferruginous hawk, long-billed curlew, purple martin, *etc.*). The Draft EIR relied on the most recent version of the Department of Fish and Game's List of Special Animals, dated February 2006, as the most credible source of special-status species in California. Of the eight species listed by Audubon, only three (ferruginous hawk, long-billed curlew, purple martin) are considered of "special concern" by the Department of Fish and Game. As to the ferruginous hawk, in fact the hawk is listed in Table 4.4-7 of the Draft EIR, and is acknowledged as an "infrequent migrant" to the region and a species that potentially could forage or otherwise occur on the project site in grasslands, agricultural fields, and open scrublands. As such, the ferruginous hawk has been appropriately considered. As to the long-billed curlew, it only breeds in the northeastern portion of the state, and, therefore, the life-cycle stage that is considered sensitive would not be expected to occur on the project site. As to the purple martin, very few records exist of purple martins breeding in Los Angeles County. As noted by Audubon, most of the breeding colonies exist to the north in the Tehachapi Mountains. Nonetheless, Table 4.4-7 (species not expected or rarely occurring on the site) will be revised to add the long-billed curlew and purple martin to the EIR.

The remaining bird species listed by Audubon are not considered special-status bird species by federal or state wildlife agencies. Because of the lack of a recognized sensitivity status, any impacts to such species, should they occur on the site, would not be considered significant under CEQA. In any event, mitigation in the Draft EIR includes pre-grading and pre-construction surveys for all native bird species

that potentially would be impacted by grading/construction. If any such nests are found, measures are in place to ensure protection of the species.

Audubon further states, for example, that the surveys which were conducted for the Coastal California gnatcatcher were not completed according to protocol. Audubon also states that the project will result in the removal of 1,820 acres of coastal sage scrub (the habitat of the gnatcatcher), and criticizes the adequacy of the completed gnatcatcher surveys. In fact, only 271 acres of coastal sage scrub occur on the project site (as opposed to the 1,820 acres stated by Audubon). In addition, surveys for gnatcatcher were conducted following U.S. Fish and Wildlife Service Guidelines for protocol surveys for non-NCCP (Natural Community Conservation Plan) areas, and the completed gnatcatcher surveys were adequate for impact assessment purposes.

Audubon also calls for winter, nighttime, and other special surveys for various bird species. In response, CEQA does not require that a lead agency require that every recommended test, report, or survey be performed in order to adequately evaluate the impacts of a proposed project. In addition, in this case additional surveys for each of Audubon's referenced species are neither practical nor useful, because such surveys do not establish, with a high degree of confidence, the presence or absence of such species on the project site (particularly for elusive species, such as nocturnal owls). Under such circumstances, the better practice is to follow the methodology used in the Draft EIR. Specifically, based on the literature review, database search, and field surveys, the Draft EIR identified those special-status species that were observed, or that potentially would be observed on the site, because of the breeding or wintering range of the species, or because of the suitability of the habitat on the project site or in its vicinity. The Draft EIR then conducted an impact assessment on all sensitive biological resources, including special-status bird species, and adopted feasible mitigation, including pre-grading and pre-construction bird surveys. In addition, the overall net loss of sensitive habitat on the Newhall Ranch site, including Landmark Village, already has been identified as a significant unavoidable impact at the Specific Plan level, and the Board of Supervisors already took those impacts into account when the approving Newhall Ranch Specific Plan and the significant overriding public benefits associated with the Newhall Ranch community.

Finally, Audubon questions the mitigation measures and associated conservation strategies that will minimize impacts to sensitive biological resources within Newhall Ranch, including the Landmark Village site. As described in both the previously certified Newhall Ranch Specific Plan Program EIR and the Landmark Village EIR, essentially the entire Santa Clara River corridor within Newhall Ranch, including the southern boundary of the Landmark Village site, will be preserved. The diversity of the various riparian and aquatic vegetation communities in the Santa Clara River corridor provides habitat for a variety of wildlife species, including a number of special-status bird species. Newhall Ranch, including the Landmark Village project site, also will maintain a riparian resource setback or buffer that runs the length of the Santa Clara River. The Board of Supervisors already has determined that the riparian buffer is sufficient to maintain the functions and values of the adjacent riparian habitat, and to protect the diversity of riparian-associated species occurring within this area.

Finally, the adopted Specific Plan's Resource Management Plan provides for the dedication, ownership, and management of the Open Area, totaling approximately 1,010 acres, and the two Specific Plan Special Management Areas (SMAs), namely the approximately 1,000 acre River Corridor SMA/SEA 23, and the 4,184-acre High Country SMA/SEA 20. The two SMA/SEA areas preserve regionally significant biological and other natural resources within Newhall Ranch, including the Landmark Village site. In addition, as part of the approval of the Specific Plan in May 2003, the Board of Supervisors imposed an off-site condition, requiring the applicant to dedicate to the public, the

remaining 1,518-acre portion of the Salt Creek watershed in Ventura County, adjacent to the Specific Plan site. These large areas of sensitive native habitats are generally associated with the natural drainages and major landforms within the Specific Plan site. They also provide connectivity with regional open space adjacent to the Specific Plan site. The over 6,700 acres of land to be preserved and protected (*i.e.*, High County, River Corridor, Salt Creek) provide significant on-site and adjacent mitigation and management opportunities to reduce impacts to sensitive biological resources, including special-status bird species.

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MEMORANDUM

TO: Susan Tae and Daniel Fierros **Job. No.** 32-092

FROM: Susan Tebo, Associate Principal

DATE: February 15, 2007

SUBJECT: Landmark Village-Setback from Riparian Resources

At the direction of Regional Planning staff, Impact Sciences is providing the following response to testimony received at the January 31, 2007 Regional Planning Commission public hearing. The testimony related to the adequacy of the previously approved riparian buffer along the Santa Clara River within the Newhall Ranch Specific Plan boundaries. More detailed information will be provided in the Final Draft Landmark Village EIR as part of the responses to comments.

The Santa Clara River riparian buffer was heavily debated during the Specific Plan and environmental documentation approval process. It was discussed in detail in at least 30 comments, which were the subject of thoroughly prepared written responses. Furthermore, prior to final Specific Plan approval, the Board of Supervisors required that the Specific Plan design be revised to incorporate the 100-foot wide buffer to protect riparian habitat and special-status species within the River Corridor SMA/SEA 23 boundaries. This finding was arrived at after evaluating the potential impacts of proposed land uses along the entire length of the River, coupled with the existing habitat protection and enhancement provisions contained in the Specific Plan's Resource Management Plan and Design Guidelines. The overall buffer area is comprised of several different components: (a) the Salt Creek wildlife corridor connection and the High Country half mile wide buffer at the west end of the Specific Plan on the south side of the river; (b) native upland habitats in the Open Area along the south side of the river; (c) disturbed areas within the River corridor that will be restored or enhanced as riparian habitat; (d) buried bank stabilization that will be revegetated with native riparian and upland plant species; and (e) landscaped open space areas such as community parks, the Regional River Trail and community trails.

In approving the Specific Plan and Conditional Use Permit 94-087, the Board of Supervisors found that the Specific Plan retained sufficient natural vegetative cover and open space to buffer critical resources in the River Corridor SMA/SEA 23 from the development shown in the Specific Plan. The Board of Supervisors further found that the Specific Plan incorporated an extensive buffer area to protect critical resources within the Santa Clara River. The Specific Plan's adopted Resource Management Plan requires a minimum 100-foot wide buffer adjacent to the Santa Clara River between the top river-side of the bank stabilization and development within certain specified land use designations (including those on the Landmark Village project site) unless, through Planning Director review, in consultation with the County staff biologist, it is determined that a lesser buffer would adequately protect the riparian resources within the River Corridor SMA/SEA 23, or that a 100-foot wide buffer is infeasible for physical infrastructure planning. The Specific Plan's Resource Management Plan provides standards by which biological resources will be managed during construction and thereafter for the life of the community. It contains: (a) provisions for restoration and enhancement of disturbed areas such as agricultural fields; (b) restrictions on pedestrian and vehicular access to the river corridor; (c) design

standards for transition areas between development and the river; (d) conveyance of conservation easements; and (e) preparation of a financial plan for the long term management of the riparian resources by the Center for Natural Lands Management. In addition, the Specific Plan's Design Guidelines contain provisions restricting the manner in which developed areas relate to the River Corridor, including site planning, fencing, landscape design, grading and lighting. All of these measures were previously found by the Board of Supervisors to satisfy the General Plan SEA design compatibility criteria as means to protect sensitive habitat and special-status species in and adjacent to the Santa Clara River.

Page 4.4-61 of the Landmark Village Draft EIR states that a minimum 100-foot wide buffer is present along the vast majority of the Landmark Village project; this buffer is reduced to a 70-foot width in a limited area along Chiquito Canyon Creek on the project's westerly boundary -- an area that is adjacent to SR-126 and heavily disturbed. Based on the site-specific analysis conducted in the Landmark Village Draft EIR, the Landmark Village buffer is consistent with the approved Specific Plan.