5.0 ENVIRONMENTAL IMPACT ANALYSIS

9. HYDROLOGY AND WATER QUALITY—HYDROLOGY

1. INTRODUCTION

This section of the Draft Environmental Impact Report (EIR) analyzes the Project's potential impacts related to hydrology, flood control, and drainage. The analysis is based on the *Drainage Concept, Hydrology Study, LID/Water Quality Report* (Hydrology Study) prepared by Alliance Land Planning & Engineering, Inc. in December 2013 and approved by the Los Angeles County (County) Department of Public Works (Public Works), Land Development Division, on January 16, 2014, provided in **Appendix 5.9** of this Draft EIR.

a. References

In addition to the Hydrology Study, the following reference documents were used in this analysis. Documents referred to, referenced, or cited in this Draft EIR section are available for public review at the County of Los Angeles, Department of Regional Planning, 320 West Temple Street, Los Angeles, California:

- Los Angeles County Department of Public Works, Level of Flood Protection and Drainage Protection Standards, 1986.
- Los Angeles County Department of Public Works, Hydrology Manual (January 2006) and Sedimentation Manual (2nd Edition, March 2006).
- Los Angeles County Department of Public Works, Low Impact Development (LID) Standards Manual (February 2014).
- California Regional Water Quality Control Board, Los Angeles Region, Water Quality Control Plan (Basin Plan) for the Coastal Watersheds of Los Angeles and Ventura Counties (June 1994, approved February 1995, as amended).
- California Regional Water Quality Control Board, Los Angeles Region, Order No. R4-2012-0175, National Pollutant Discharge Elimination System (NPDES) Permit No. CAS004001, Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds Los Angeles County, Except for Those Discharges Originating from the City of Long Beach MS4.

- State Water Resources Control Board, NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ (amended by 2010-0014-DWQ and 2012-0006-DWQ), NPDES No. CAS000002.

b. Design Hydrology Factors

Hydrology is dependent on characteristics affecting water runoff, such as soil types; capital storm factors (a capital storm is a theoretical storm event with defined rainfall and other characteristics and is used for design purposes); and imperviousness associated with development. The following discussion provides background information regarding the primary factors that influence hydrological conditions.

(1) Effects of Soil Type on Runoff Rates

Surface water runoff rates are directly related to soil type. Different soil types have very different water infiltration or absorption rates. For example, if a sandy soil (highly permeable) is paved over, the runoff coefficient or flow rate would greatly increase, whereas if a clay soil (not highly permeable) is paved over, runoff values would increase, but not as much. In small storms, some soils can absorb 100 percent of rainfall. Accordingly, the types of soils present on a given site are factored into runoff calculations.

(2) Effects of Burning and Bulking

In an undeveloped watershed, the capital storm flow rate (discussed below) assumes a burned condition (i.e., a recent fire event that destroys much of the vegetation that would otherwise absorb storm runoff), which increases the runoff coefficient. The flow rate is then multiplied by a bulking factor, which accounts for the amount of mud and debris contained within the flow from the burned watershed. The resulting flow rate or runoff coefficient is referred to as “burned/bulked.”

(3) Effects of Development

With the development of impervious materials placed over natural, exposed soils, little direct infiltration can occur and runoff discharges increase. Because development does not typically completely cover the ground surface, portions of each developed parcel (e.g., yards, landscaping, open space, etc.) remain pervious to infiltration by stormwater. Imperviousness rates (expressed as percentages) are therefore applied to any given land use, as discussed further below.

(4) Hydraulic Parameters

The engineering term for the methods used to properly size pipes and channels is hydraulic analysis. Pipes and channels are designed for a rate of flow (measured in cubic feet per second (cfs)), not a runoff volume (typically measured in acre-feet (af)). While a dam or lake is designed to contain a fixed volume of water, a pipe of a fixed size can carry different flow rates depending on water pressure. Determining the proper sizes of pipes and channels requires certain assumptions regarding the frequency and amount of rainfall to design for, as well as how often that amount of rainfall could be surpassed.

(5) Storm Exceedance Probability

The frequency with which a specified amount of rainfall could be surpassed is referred to as the event exceedance probability, or its reciprocal value, return period. For example, a storm that has a 10 percent exceedance probability is a storm that has a 10-percent chance of exceeding a particular rainfall runoff in any given year. The reciprocal value of this number is known as a 10-year return period storm, or 10-year storm (i.e., a storm that can be expected to occur once every approximately ten years).

2. ENVIRONMENTAL SETTING

a. Regulatory Setting

(1) Federal Regulations

(a) Clean Water Act

Although no “waters of the United States” are located within the Project Site, within the Project vicinity, the Santa Clara River (River) and segments of various other drainages are designated as “waters of the United States.” Accordingly, the Project would be subject to permit requirements under the Federal Water Pollution Control Act (33 U.S.C. Sections 1251 et seq.), referred to as the Clean Water Act (CWA), as discussed further below.

Section 401 of the Clean Water Act. Under Section 401 of the Clean Water Act (33 U.S.C. Sections 1251, et seq.), every applicant for a federal permit for any activity that may result in a discharge of dredge or fill material to a water body must obtain a state water quality certification verifying that the proposed activity will comply with state water quality standards (i.e., beneficial uses, water quality objectives, and anti-degradation policy). The Los Angeles Regional Water Quality Control Board (LA Regional Water Board) issues Section 401 water quality certifications for the Los Angeles region.

Section 402 of the Clean Water Act. The Clean Water Act prohibits the discharge of pollutants to "waters of the United States" from any point source unless the discharge is

in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. The Clean Water Act, Section 402, requires a NPDES permit for: the discharge of stormwater from municipal separate storm sewer systems (MS4) serving urban areas with a population greater than 100,000; construction sites that disturb one acre or more; and industrial facilities. The LA Regional Water Board administers these permits with oversight by the State Water Resources Control Board (State Water Board) and the U.S. Environmental Protection Agency (USEPA) Region IX. Compliance with Clean Water Act Section 402 is discussed in **Section 5.10**, Hydrology and Water Quality—Water Quality, of this Draft EIR.

Section 404 of the Clean Water Act. Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (Corps) is authorized to permit the discharge of dredged and/or fill materials to "waters of the United States," which includes both wetland and non-wetland aquatic habitats within the jurisdictional extent of rivers and streams defined by the ordinary high water mark and wetlands adjacent to “waters of the United States.” Section 404 permits can be issued as individual or general (nationwide or regional) permits. A Clean Water Act Section 404(b)(1) alternatives analysis is required for all individual permits.

(b) Federal Emergency Management Agency and the National Flood Insurance Act

In accordance with the National Flood Insurance Act, the National Flood Insurance Program is administered by the Federal Emergency Management Agency (FEMA). The intent of this program is to reduce future flood damage through community floodplain management ordinances and to provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for protection. Through this program, hydrologic analyses are conducted to determine the magnitude of flood risk that exists in various communities throughout the country. FEMA identifies flood zones or areas subject to flooding through its Flood Insurance Rate Maps. The standard for flood protection established by FEMA and referenced in the State CEQA Guidelines (California Code of Regulations, Title 14, Sections 15000 et seq.) (CEQA Guidelines) is the 1-in-100 annual exceedance probability, commonly referred to as the 100-year flood event.

The County entered into FEMA’s National Flood Insurance Program in 1980, and its participation makes flood insurance available to unincorporated County residents and allows them to obtain direct federal relief loans after federally-declared flood hazards. The National Flood Insurance Program set the 100-year flood as the standard for flood insurance protection. In flood hazard areas, the federal standard requires the finished floor

elevation of proposed dwellings to be at least one foot above the water surface elevation of the 100-year flood.[1]

For areas where the location of the FEMA-defined floodplain would be altered by a project, a Conditional Letter of Map Revision (CLOMR) must be submitted to County Public Works for review and subsequent submittal to FEMA. FEMA then reviews the CLOMR, and, if it concurs, validates the map revision. The CLOMR indicates whether FEMA would recognize the modification following project implementation. Once the project is complete, a Letter of Map Revision (LOMR) request is submitted to officially change the Flood Insurance Rate Map (FIRM).

(2) State Regulations

(a) Cobey-Alquist Flood Plain Management Act

The Cobey-Alquist Flood Plain Management Act (California Water Code Sections 8400, et seq.) acknowledges that a portion of the State is subject to recurrent flooding by the overflow of streams and watercourses. The Act indicates that the public interest necessitates sound development of land and that state floodplains represent a land resource to be developed in a manner which, in conjunction with economically justified structural flood control measures, will prevent human and economic losses caused by excessive flooding. The Act encourages local governments to adopt and enforce land use regulations to accomplish floodplain management.

County Public Works oversees the County's ongoing floodplain management program, which includes mapping flood hazard areas, adopting associated ordinances, and regulating and enforcing safe building practices. These activities promote flood protection in the County and maintain the County's eligibility to participate in FEMA's National Flood Insurance Program.

(b) California Fish and Game Code

Per California Fish and Game Code Sections 1600–1607, the California Department of Fish and Wildlife (CDFW) regulates activities that alter the flows, beds, channels, or banks of streams and lakes.[2,3] Further discussion of applicable CDFW permits and requirements is provided in **Section 5.4**, Biological Resources, of this Draft EIR.

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[1] *National Flood Insurance Program, Flood Insurance Manual, FEMA, October 2004; and County of Los Angeles Department of Public Works, Hydrology Manual, Chapter 4, p. 33, January 2006.*

[2] *Effective January 1, 2013, the California Department of Fish and Game became known as the California Department of Fish and Wildlife. The name of the California Fish and Game Code has not changed, however.*

(c) Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1970 (California Water Code Sections 13000 et seq.; Porter-Cologne Act) authorizes the State Water Board, through each Regional Water Quality Control Board (Regional Water Board), to regulate and control discharges into "waters of the State." Each Regional Water Board must formulate and adopt a water quality control plan for its region, which must conform to the policies set forth in the Porter-Cologne Act and established by the State Water Board in its state water policy. The LA Regional Water Board has developed the Water Quality Control Plan (Basin Plan) for the Los Angeles region, which guides conservation and enhancement of water resources and establishes beneficial uses for surface waters within the region. Beneficial uses and water quality objectives necessary to sustain those beneficial uses are designated for receiving waters (including both groundwater and surface waters).[4] Please refer to **Section 5.10**, Hydrology and Water Quality—Water Quality, of this Draft EIR for further discussion of the Porter-Cologne Act and associated requirements.

(3) County Regulations

(a) County of Los Angeles General Plan

As discussed in greater detail in **Section 5.11**, Land Use and Planning, of this Draft EIR, the County General Plan directs future growth and development in the County's unincorporated areas and establishes goals, policies, and objectives that pertain to the entire County. The current General Plan, adopted in 1980, includes a Conservation and Open Space Element that sets policy direction for the open space resources of the County, including water resources, and a Safety Element that addresses hydrology-related issues such as flooding. Relevant policies focus on watershed protection and minimizing injury, loss of life, property damage, and economic and social disruption caused by flooding and inundation hazards.

As also discussed further in **Section 5.11**, Land Use and Planning, the County circulated a draft General Plan update, entitled Los Angeles County General Plan 2035 (Draft General Plan), in January 2014 and a Draft EIR addressing the Draft General Plan in June 2014. This Draft General Plan contains a new Safety Element that includes a section on flood and inundation hazards with a similar stated goal of preventing or minimizing

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[3] *The term "stream" can include intermittent and ephemeral streams, rivers, creeks, dry washes, sloughs, blue line streams and watercourses with subsurface flows.*

[4] *Water Quality Control Plan for the Los Angeles Region, California Regional Water Quality Control Board, Los Angeles Region 4, February 23, 1995.*

personal injury, loss of life, and property damage due to flood and inundation hazards through an effective regulatory system.

The General Plan policy consistency analysis provided in **Section 5.11**, Land Use and Planning, indicates the Project would be consistent with relevant General Plan polices related to hydrology.

(b) Santa Clarita Valley Area Plan: One Valley One Vision 2012

As discussed in greater detail in **Section 5.11**, Land Use and Planning, of this Draft EIR, the recently updated Santa Clarita Valley Area Plan: One Valley One Vision 2012 (Area Plan) serves as a long-term guide for development in the Santa Clarita Valley (Valley) Planning Area over the next 20 years. The Area Plan ensures consistency between the General Plans of the County and the City of Santa Clarita (City) in order to achieve common goals and encourages the coordination of land use plans with public services and other departments or agencies. The Area Plan depicts the 100-year flood event boundaries for the major watercourses in the Valley Planning Area, which are generally located within and directly adjacent to the Santa Clara River and its tributary drainages. Relevant polices address the protection of public safety and property from flood risks, including through watershed management and the provision of adequate drainage and flood control infrastructure.

The Area Plan policy consistency analysis provided in **Section 5.11**, Land Use and Planning, indicates the Project would be consistent with applicable Area Plan polices related to hydrology.

(c) County Development Monitoring System

The County General Plan includes provisions known as the Development Monitoring System (DMS) to give the County planning agency—the Regional Planning Commission and/or Department of Regional Planning—information about the existing capacity of available specified public services in the four major Urban Expansion Areas of the General Plan (Antelope Valley, Santa Clarita Valley (which includes the Project Site), Malibu/Santa Monica Mountains, and East San Gabriel Valley).[5] The primary purpose of the DMS is to ensure that new development in Urban Expansion Areas will occur in a manner consistent with stated DMS policies and will pay for the expansion costs that it generates. To accomplish this purpose, the DMS is used to assess the potential for certain environmental

[5] *See Resolution of the Board of Supervisors of the County of Los Angeles Relating to Plan Amendment Case No. SP 86-173, adopted on March 21, 1987.*

hazards, including flood and erosion hazards, on an individual and cumulative basis; analyze the expansion costs to certain public service providers as well as the costs to reduce environmental hazards; and work towards ensuring that the expansion costs of new development are paid for by that development. For further information with regard to the DMS, please see **Section 4.1**, Environmental and Regulatory Setting, of this Draft EIR.

(i) Project Subject to DMS

The Project is located within the Santa Clarita Valley, an Urban Expansion Area within the DMS, and includes a subdivision map application (Vesting Tentative Tract Map (VTTM) 53295). Therefore, the Project is subject to a County DMS analysis or its equivalent.

(ii) DMS Environmental Provisions

The Project's Initial Study, included as **Appendix 1A** of this Draft EIR, provided general information concerning flood hazards and determined that an EIR would be required. The Hydrology Study provided in **Appendix 5.9** supports this hydrology section of the EIR. The Hydrology Study and, to a lesser extent, the Water Quality Technical Report provided in **Appendix 5.10**, as well as information from the aforementioned County, Regional Water Board, and State Water Board reference documents provide current information regarding drainage courses within the Project Site and the potential for flooding, erosion, debris production, and mudflows.

(iii) DMS Access Provisions

As stated above, the DMS includes analysis of the access factors associated with a development project in an Urban Expansion Area. Under the DMS, where applicable, a project must be located within reasonable proximity to commercial development and job opportunities (generally within five miles) and served by an acceptable level of road service (including associated public transit). If it is determined that the project is not located in proximity to commercial and employment facilities, mitigation measures set forth in the DMS must be considered and applied prior to any approval of the project.

As applied, the Project satisfies the DMS access requirements because the Project Site is located nearly adjacent to Six Flags Magic Mountain, within 0.25 mile from Castaic Junction and Valencia Commerce Center, and approximately 0.25 mile from Valencia Industrial Park. All of these existing development areas are served by County or other public service systems and provide substantial commercial services and job opportunities.

(iv) DMS Data and Criteria

The DMS scenario would entail buildout of the near-term subdivision projects listed in the County's DMS plus the Project. However, for purposes of this analysis, this EIR relies on more current and precise growth projections that account for cumulative development in the Santa Clarita Valley through 2024 (i.e., the anticipated Project buildout year), including growth forecasted in the 2012 Area Plan, as well as those few known planned, approved, or pending projects, referred to as related projects, that are not already accounted for within the growth forecasts. Additionally, this analysis is based on site-specific data provided in the Hydrology Study and, to a lesser extent, the Water Quality Technical Report, as well as information from the aforementioned County, Regional Water Board, and State Water Board reference documents. The methodology and calculations contained within the Hydrology Study adhere to County standards and guidance, in particular those set forth in the Public Works Hydrology Manual. Collectively, this data is used as the equivalent of a DMS buildout scenario because:

(1) The data presents the specific hydrologic and hydraulic conditions within and adjacent to the Project Site, including tributary areas, drainage course conditions, drainage subareas and patterns, and runoff calculations for both pre- and post-development scenarios;

(2) The data is considered current and the best available information based on County standards and guidance, in particular the methodology set forth in the Public Works Hydrology Manual;

(3) The data provides appropriate information regarding flood hazards, and County staff considers the information to be equivalent to the data identified in the County's DMS with respect to drainage courses and the potential for flooding, erosion, debris production, and mudflows;

(4) The data encompasses a broader cumulative development scenario than is provided by the County's DMS data. This more conservative approach ensures that all cumulative development in the Valley is accounted for when assessing flood hazards.

As it relates to flood hazards, the DMS criteria provide that the County planning agency (Regional Planning Commission and/or Department of Regional Planning) must determine if a project will have a significant environmental impact based on whether the project is located on land having a major drainage course, a flood prone area, high erosion potential, a high rate of debris production, or high mudflow potential.

(d) County of Los Angeles Department of Public Works

Drainage and flood control in the Project vicinity is regulated by Public Works, which has jurisdiction over both regional and local drainage facilities throughout the unincorporated portions of the County.

(i) Flood Control District

Any proposed drainage improvements of County-owned storm drain facilities, such as catch basins and storm drains lines, require review and approval from the County Flood Control District. This division of Public Works is responsible for collecting and analyzing hydrologic data to support the design, operation, and maintenance of flood control facilities within the County. Among other duties, the Flood Control District performs hydrology and sedimentation studies; collects stream flow, precipitation, and evaporation data; forecasts rainfall runoff; and analyzes flood flows. The Flood Control District uses site-specific data to prepare maps of watersheds burned by brush fires, potential mudflow areas, and debris flow zones. Additionally, hydrologic and topographic information is used to prepare detailed flood hazard zone maps. These maps are more detailed than FEMA's rate maps, because impervious and burned surfaces (which can increase flood flows) are taken into account. The data collected is used in conjunction with design standards developed by Public Works to ensure flood control facilities are adequately sized, maintained, and operated. The Flood Control District operates and maintains County flood control facilities, including open flood control channels, underground storm drains, catch basins, debris retaining structures, and streambed stabilization structures.

(ii) Public Works Hydrology Manual[6]

The Public Works Hydrology Manual requires a storm drain conveyance system to be designed for a minimum 25-year storm event, and the combined capacity of a storm drain and street flow system must accommodate flows from a 50-year storm event. Areas with sump conditions are required to have a storm drain conveyance system capable of conveying flows from a 50-year storm event. The County also limits the allowable discharge into existing storm drain facilities. The Public Works Hydrology Manual also provides various analysis tools and calculation methodologies required for hydrologic evaluations.

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[6] *The information in this section is derived from the Los Angeles County Department of Public Works Hydrology Manual, January 2006, http://ladpw.org/wrd/Publication/engineering/2006_Hydrology_Manual/2006%20Hydrology%20Manual-Divided.pdf, accessed October 28, 2014.*

The design flow rate of Public Works' 50-year capital storm event (capital storm), exceeds FEMA's 100-year flow rate. This 50-year capital storm (or Qcap) hydrology is based on a theoretical or "design" storm event derived from 50-year frequency rainfall values and is patterned after actual major storms observed in the Los Angeles region. The 50-year capital storm is assumed to occur over a period of four days, with the maximum rainfall falling on the fourth day on a watershed that has experienced a fire event.

Analysis of recorded major storms reveals that during the 24-hour period of maximum rainfall, rainfall intensity typically increases during the first 70 to 90 percent of the period and decreases during the remaining time. Furthermore, approximately 80 percent of the amount of this 24-hour rainfall occurs within the same 70 to 90 percent of the period. In developing the capital storm methodology, the 50-year frequency design storm is assumed to fall on saturated soils. In converting rainfall to runoff, rainfall that is not lost due to the hydrologic processes of interception, evaporation, transpiration, depression storage, infiltration, or percolation is assumed to be surface runoff.

Another assumption regarding the capital storm flow rate is that natural portions of the watershed have been burned by fire. When a watershed burns, the soil infiltration rate decreases due to the loss of vegetation and physical changes in the soil. The County has tested and quantified the effect of burning on runoff coefficients and determined that burning the watershed can increase the design runoff rate by 10 to 20 percent.

The final factor in adjusting the capital storm design flow rate is referred to as a bulking factor. In a watershed that has burned, runoff carries with it a layer of eroded topsoil. This sediment, along with the associated burned trees and brush, is referred to as debris. To account for debris, the design flow rate is artificially increased using a prescribed bulking factor, which is a function of soil type, steepness of the terrain, and size of the drainage basin. The bulking factors for large drainage basins range from about 20 to 50 percent over the burned flow rate.

In summary, the County's capital storm (or Qcap) is based on a theoretical four-day storm event occurring right after the watershed has been burned, with the resulting flow rate being increased again by a bulking factor that accounts for debris generated in burned areas, thereby yielding a peak flow rate that is greater than a 50-year storm over an unburned/unbulked drainage basin. The probability of all of these theoretical assumptions occurring at the same time is extremely small and yields greater design flows than FEMA's method for calculating 100-year and 500-year floods. As a result, the County's methodology is more conservative than the FEMA 100-year flow rate. A summary of Public Works Hydrology Manual standards for various types of drainage conditions is provided below.

- **Urban Flood Protection.** All facilities in developed areas that are not covered under the capital storm protection conditions described above must be designed for the urban flood. The urban flood is defined as runoff from a 25-year frequency design storm falling on a saturated watershed.[7] Like the capital storm, this design storm is a four-day event with the maximum rainfall occurring on the fourth day. Per the Public Works Hydrology Manual, urban flood runoff flowing within the street right-of-way may not exceed the private property line elevation. When flows exceed the street capacity, runoff can be conveyed both on the street surface and in storm drains under the street.

- **Urban Drains.** Urban drains typically are designed to carry runoff from a 10-year frequency storm. The runoff resulting from the 25-year frequency design storm must be carried within the drain and within the street right-of-way, below the private property line elevation.

- **Sumps.** Sumps are structures used to capture runoff that must be designed for the capital storm in urban areas. Drains leaving the sump must have capacity to carry the runoff resulting from a 50-year frequency rainfall event.[8]

- **Multiple Levels of Flood Protection.** Public Works has established policies for multiple levels of flood protection for instances where a drainage system needs to provide more than a single type of flood protection. An example is a natural canyon that drains to a proposed urban drain or sump. In this case, the drainage system must protect the developed area from an urban flood and must capture debris and stormwater from the natural canyon, thus requiring additional capacity.

- **Debris Production Zones.** Within the Project Site, debris production zones have been mapped by the Hydraulic/Conservation Division of Public Works. Specific debris production maps are provided in Appendix A of the Public Works 1991 Hydrology Manual. Public Works has constructed and maintains several debris control structures within the Santa Clara River watershed to minimize the chance of channels clogging with debris (for example, an existing debris basin is located in the eastern portion of the Project Site within Planning Area 14). Debris control structures, volumes, and transportation rates are provided in the Public Works Sedimentation Manual.

(e) Low Impact Development

Title 31 of the County Code, known as the Green Building Standards Code, adopts by reference the 2013 California Green Building Standards Code (CALGreen Code), which is

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[7] *Los Angeles County Flood Control District Design Standards, January 2009.*

[8] *Los Angeles County Flood Control District Design Standards, January 2009.*

designed to improve public health, safety, and general welfare by utilizing design and construction methods that reduce the negative environmental impact of development and encourage sustainable construction practices. Title 31 references County Code Chapter 12.84, which provides LID requirements that focus on the control of stormwater at its source to mimic the drainage conditions of an undisturbed (undeveloped) site. Please refer to **Section 5.10**, Hydrology and Water Quality—Water Quality, of this Draft EIR for further discussion of the County's LID requirements.

(f) Santa Clara River and Major Tributaries Drainage Policy

Public Works has determined the Santa Clara River basin is a major source of sediment for coastal beaches, and groundwater basins that underlie the River are an important source of water for the Valley; therefore, it is important that the groundwater basins continue to be recharged by streambed percolation.[9] Accordingly, Public Works has adopted a specified drainage policy and design criteria for flood protection facilities for the River and its major tributaries, as set forth in its Sedimentation Manual. Further discussion of sediment transport, particularly with respect to hydromodification, and groundwater is provided in **Section 5.10**, Water Quality, of this Draft EIR.[10]

(3) Previously Adopted Plans and Mitigation

(a) Newhall Ranch RMDP/SCP and EIS/EIR

The Project Site is included in the project area for the Applicant's Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan (RMDP/SCP), shown in **Figure 3-5**, RMDP/SCP Project Area, in **Section 3.0**, Project Description, of this Draft EIR, which covers certain aspects of resource management for the Project and other nearby developments. As discussed in greater detail in **Section 4.1**, Environmental and Regulatory Setting, the RMDP component of the Newhall Ranch RMDP/SCP project is a conservation, mitigation, and permitting plan for the long-term management of sensitive biological resources and development-related infrastructure in the River and tributary drainages within the 11,999-acre Newhall Ranch Specific Plan (Specific Plan) area and along the extension of Magic Mountain Parkway through the Project Site. The SCP component of the Newhall Ranch RMDP/SCP project is a conservation and management plan to permanently protect and manage a system of preserves designed to

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[9] *County of Los Angeles Department of Public Works, Sedimentation Manual, Section 2.2, March 2006.*

[10] *Hydromodification refers to the alteration of watershed hydrology, such as increased runoff volumes, frequency of runoff events, long-term cumulative duration, and peak flows or the introduction of dry weather flows where only wet weather flows existed prior to development, which results in impacts to stream flows or the beds or banks of rivers, streams, creeks, or ephemeral washes.*

maximize the long-term persistence of the San Fernando Valley spineflower (*Chorizanthe parryi ssp. Fernandina*) (spineflower), a federal candidate and state-listed endangered plant species. The SCP encompasses the Specific Plan area, the Valencia Commerce Center planning area, and the Project Site, in order to conduct conservation planning and preserve design on the Project Applicant's land holdings in Los Angeles County that contain known spineflower populations.

The Newhall Ranch RMDP/SCP project was the subject of a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) (SCH No. 2000011025) by the U.S. Army Corps of Engineers (Corps) and the California Department of Fish and Wildlife (CDFW).[11,12] At the time CDFW certified the EIR portion of the EIS/EIR in December 2010, it also adopted the Mitigation Monitoring and Reporting Plan (MMRP) for the RMDP/SCP project. This regulatory plan, required under CEQA, describes the mitigation measures, monitoring, and/or reporting plan for the Newhall Ranch RMDP/SCP project (including the Entrada South Project Site). CDFW adopted mitigation measures to reduce potential impacts to hydrology resulting from implementation of the Newhall Ranch RMDP/SCP project (see Mitigation Measures (MM) RMDP/SCP HY-1 through HY-7 and GRR-1 through GRR-8 in **Appendix 2A**).

(i) Newhall Ranch Section 404 Permit

The Corps issued the Applicant the final Clean Water Act (CWA) Section 404 permit (Permit No. SPL-2003-01264-AOA) for the Newhall Ranch RMDP/SCP project on October 17, 2012.[13] As part of that permit, the Corps imposed special conditions requiring the Applicant to record a restrictive covenant for floodplain protection over 119 acres, including 89 acres of waters of the United States immediately downstream of the Specific Plan area, as shown on Exhibit 1 attached to the Section 404 permit.[14] The restrictive covenant prohibits any development (as defined) within the area shown in purple on Exhibit 1. (For purposes of the restrictive covenant, the term “development” means any man-made change to improved or unimproved land including buildings, other structures, mining, dredging, filling, grading, paving, excavation or grading operations, and storage of

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[11] *Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan, Final Joint Environmental Impact Statement and Environmental Impact Report, June 2010.*

[12] *The California Department of Fish and Game was officially renamed the California Department of Fish and Wildlife as of January 1, 2013.*

[13] *See **Appendix 2F** of this Draft EIR for a copy of Newhall’s final Section 404 permit and associated Record of Decision (August 2011).*

[14] *See final Section 404 permit (October 17, 2012), Special Condition Nos. 2 and 29.*

equipment or materials. Agricultural activities, including farming, ranching, orchards, and vineyards are expressly excluded from the term "development.")[15]

(ii) Newhall Ranch Section 401 Water Quality Certification

By federal law, no Section 404 permit can be issued until a CWA Section 401 water quality certification has been issued or waived by the Regional Water Quality Control Board (Regional Water Board). On September 14, 2012, the LA Regional Water Board approved Order No. R4-2012-0139, which includes the CWA Section 401 water quality certification and waste discharge requirements for the Newhall Ranch RMDP/SCP project.[16]

As part of both the Newhall Ranch Section 401 water quality certification and the Newhall/California Coastal Conservancy Agreement (August 6, 2012) entered into in conjunction with the Section 401 process, the Applicant must: (i) comply with applicable water quality objectives, prohibitions, policies, and permit requirements; (ii) implement Best Management Practices (BMPs) to prevent or reduce erosion and the transport of sediment and other potential pollutants from the Project Site; and (iii) prepare and submit a Project Water Quality Technical Report and Drainage Concept Report containing LID standards for development. Additionally, all surface waters shall be diverted away from areas undergoing grading, construction, excavation, vegetation removal, and/or any other activity which may result in a discharge to the receiving water. If surface water diversion is anticipated, the Applicant is required to develop and submit a Project-specific Surface Water Diversion Plan. Refer to **Section 5.10**, Hydrology and Water Quality—Water Quality, of this Draft EIR for further discussion of relevant aspects of the CWA Section 401 water quality certification and waste discharge requirements for the Newhall Ranch RMDP/SCP project.

b. Existing Conditions

(1) Santa Clara River

The Project Site is located within the Santa Clara River basin, with the River located just north of the Project Site. The River has a Qcap of 116,236 cfs at a point just upstream (east) of Castaic Creek, and a Qcap of 140,776 cfs just downstream (west) of the confluence of Castaic Creek and the River (values based on 2005 revised capital storm flow rates issued by Public Works).[17]

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[15] *See final Section 404 permit (October 17, 2012), Special Condition No. 29.*

[16] *See **Appendix 2E** of this Draft EIR for a copy of Newhall's final Section 401 Water Quality Certification (September 2012).*

[17] *PACE, Santa Clara River Fluvial Study, March 2006.*

The River watershed comprises a total of 1,634 square miles and drains portions of Los Padres National Forest, Angeles National Forest, and the Santa Susana Mountains. Near the Ventura County line, the River's drainage area encompasses approximately 640 square miles, of which the 501.4-acre Project Site represents approximately 0.12 percent.[18]

As with most southern California streams, flows in the River are highly episodic. For the gauged period between 1953 and 1996, annual flow at the Los Angeles County/Ventura County line gauge ranged between 253,000 af (1969) and 561 af (1961). Peak flows at the County line during the same period ranged from 68,800 cfs (1969) to 109 cfs (1960). The second highest peak flow of 32,000 cfs in 1966 was less than half of the highest peak flow of 68,800 cfs in 1969.[19]

The reach of the River north of the Project Site has multiple channels, which is referred to as braided. High sediment loads, bank erodibility, and intense and intermittent runoff conditions characterize this kind of system. The River also has the potential for aggradation (sediment deposition) and degradation (scouring or sediment removal) in various locations based upon localized hydraulic conditions. Velocities and water surface elevations vary from section to section based on a number of hydraulic and hydrologic parameters. In general, velocity and water depth increase with higher discharge; however, under flood conditions the wide River channel allows flows to spread across the River's cross-section, thus limiting the increases in velocity and depth.[20]

(2) Tributary Drainages

Portions of four tributary drainages to the Santa Clara River are located within the Project Site: Magic Mountain Canyon, Unnamed Canyon 1, Unnamed Canyon 2, and Unnamed Canyon 3. Of these, Magic Mountain Canyon is a major drainage course depicted on the Newhall, CA 7.5-minute topographic quadrangle map. The location of these tributary drainages is depicted on **Figure 5.9-1**, Existing Tributary Drainage Features, on page 5.9-17.

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[18] *Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan, Final Joint Environmental Impact Statement and Environmental Impact Report, revised_Section 4.1, pp. 4.1-6 through 4.1-8, June 2010.*

[19] *Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan, Final Joint Environmental Impact Statement and Environmental Impact Report, revised Section 4.1, p. 4.1-19, June 2010.*

[20] *Mission Village Draft EIR, Section 4.2, pp. 4.2-19 and 4.2-20, October 2010.*

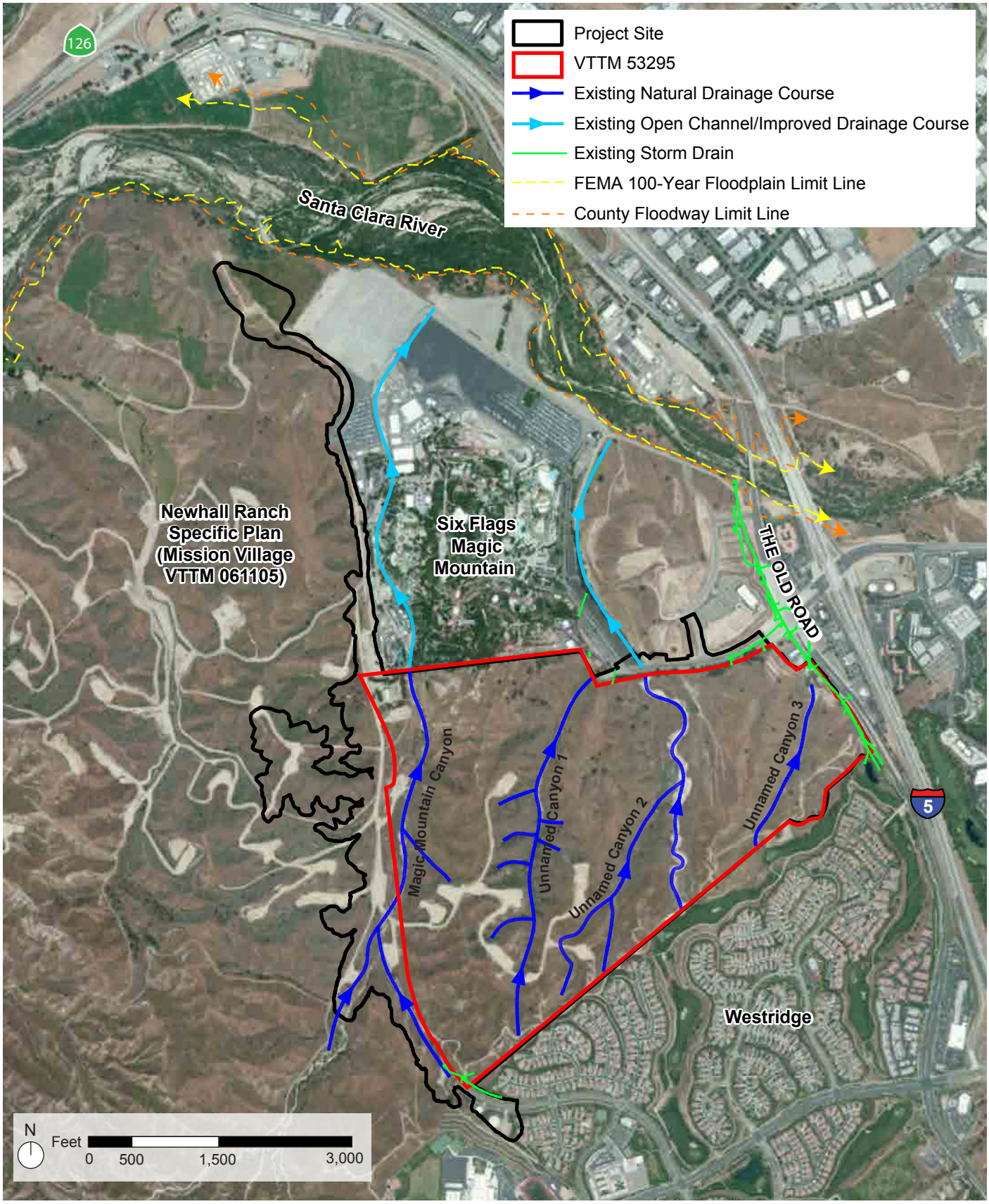

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Figure 5.9-1
Existing Tributary Drainage Features

Source: Alliance Land Planning & Engineering, 2015; Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX,Getmapping, Aerogrid, IGN, IGP, swisstopo, 2014.

(a) Magic Mountain Canyon

The 1.32-square-mile (847-acre) Magic Mountain Canyon watershed is a tributary drainage to the southern bank of the River. Approximately 178 acres or about 21 percent of the watershed area is located within the western portion of the Project Site. The watershed is aligned generally in a south to north direction, with a length of approximately 4,810 feet and an average slope of 3.4 percent. The origin of this canyon has been impacted by existing development to the south, and after traversing a portion of the Project Site, the drainage enters the southwest corner of Six Flags Magic Mountain and runs in an open concrete channel northerly to the River. The canyon's middle portion consists of gently sloping valley, approximately 400 feet in width. Approximately 90 percent or more of the watershed consists of rugged foothill topography with the remainder as narrow valley floor. Generally, the soils in the watershed are characterized as Castaic and Saugus soils and Castaic-Balcom silty clay loams and are classified as hydrology soil group "C" (higher runoff potential). The associated vegetative cover within the watershed varies, but includes California sagebrush scrub and disturbed land.[21]

(b) Unnamed Canyon 1

Unnamed Canyon 1 lies within the western portion of the Project Site and conveys drainage from the Westridge community to the south through the Project Site and into an existing concrete open channel along the east side of Six Flags Magic Mountain that conveys flows to the River. The 0.16-square-mile (103-acre) Unnamed Canyon 1 watershed is a tributary drainage to the River's southern bank. The total length of the mainstem channel is approximately 2,020 feet, with an average overall slope of 2.7 percent. Approximately 90 percent of the watershed consists of rugged foothill topography, with the remainder comprising a narrow valley floor. The watershed's topography varies from a maximum elevation of 1,427 feet in the headwaters 1,160 feet near the River. Generally, the watershed soils are characterized as Castaic-Balcom silty clay loams and classified as hydrologic soil group "B" (lower runoff potential). The associated vegetative cover within the watershed varies, but includes California sagebrush scrub.[22]

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[21] *Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan, Final Joint Environmental Impact Statement and Environmental Impact Report, revised Section 4.1, p. 4.1-23, June 2010.*

[22] *Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan, Final Joint Environmental Impact Statement and Environmental Impact Report, revised Section 4.1, p. 4.1-28, June 2010.*

(c) Unnamed Canyon 2

Unnamed Canyon 2 lies within the central portion of the Project Site and conveys drainage from Westridge and Stevenson Ranch through the Project Site and into the same existing concrete open channel along the east side of Six Flags Magic Mountain that conveys flows from Unnamed Canyon 1. Current conditions within Unnamed Canyon 2 include a deep channel incision as a result of stormwater runoff from existing development in the off-site, upstream communities which were built before hydromodification control was required. The 0.6-square-mile (401-acre) Unnamed Canyon 2 watershed is a tributary drainage to the River's southern bank. The total length of the mainstem channel is approximately 3,120 feet, with an average overall slope of 3.1 percent. Approximately 90 percent of the watershed consists of rugged foothill topography, with the remainder as a narrow valley floor. The topography varies from a maximum elevation of 1,858 feet in the headwaters to 1,161 feet near the River. Generally, the watershed's soils are characterized as Saugus loam and classified as hydrologic soil group "B" (lower runoff potential). The associated vegetative cover varies, but includes developed and disturbed land.[23]

(d) Unnamed Canyon 3

Unnamed Canyon 3 lies within the eastern portion of the Project Site where runoff is conveyed via a natural valley to an existing debris basin and box culvert along the west side of The Old Road near Magic Mountain Parkway. The 0.13-square-mile (85-acre) Unnamed 3 Canyon watershed is a tributary drainage to the southern bank of the River. The watershed's total length is approximately 2,910 feet, with an average overall slope of 5.3 percent. Approximately 90 percent of the watershed consists of rugged foothill topography, with the remainder as a narrow valley floor. The topography varies from a maximum elevation of 1,275 feet in the headwaters to 1,100 feet near The Old Road, where flows enter a local storm drain that is tributary to the River. Generally, the soils in the watershed are characterized as Saugus loam and classified as hydrologic soil group "C" (higher runoff potential). The associated vegetative cover varies, but includes California sagebrush scrub and disturbed land.[24]

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[23] *Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan, Final Joint Environmental Impact Statement and Environmental Impact Report, revised Section 4.1, p. 4.1-28, June 2010.*

[24] *Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan, Final Joint Environmental Impact Statement and Environmental Impact Report, revised Section 4.1, p. 4.1-28, June 2010.*

(3) On- and Off-Site Drainage Areas

The four tributary watersheds described above encompass three primary drainage areas that together comprise approximately 1,500 acres. **Figure 5.9-2**, Existing Drainage Areas and Basins, on page 5.9-21 shows the existing drainage areas and patterns associated with the tributary watersheds. As shown, the Unnamed Canyon 3 watershed or the eastern drainage area is comprised of Drainage Basins A and B, which drain to a storm drain in Magic Mountain Parkway that connects to the box culvert within The Old Road. Unnamed Canyons 1 and 2 together comprise the central drainage area and correspond to Drainage Basins C, D, and E, all of which drain to the concrete open channel along the east side of Six Flags Magic Mountain. Finally, the Magic Mountain Canyon watershed or western drainage area corresponds to Drainage Basins F and G, which flow to the existing storm drain system within Six Flags Magic Mountain.

Annual rainfall in the Project area is typically low and primarily occurs in the winter months. Runoff sources exist both on- and off-site, with stream headwaters located in upper canyons near the ridgelines of off-site natural areas, as well as within the existing developed communities of Westridge and Stevenson Ranch (south of the Project Site). The combination of soil characteristics and high magnitude/low frequency storms, which are typical of the region, produce conditions conducive to rapid accumulation of surface water and high storm peak runoffs.

Capital storm runoff quantities for the three primary drainage areas are provided in **Table 5.9-1**, Existing Drainage Basins and Runoff Discharges, on page 5.9-22. In accordance with Public Works requirements, the burned/bulked storm event (i.e., the capital storm) was used to calculate the discharge rates. Under existing conditions, burned/bulked flows from the three primary drainage areas total approximately 3,586 cfs. The calculated total debris volume during a capital storm is approximately 57,710 cubic yards.

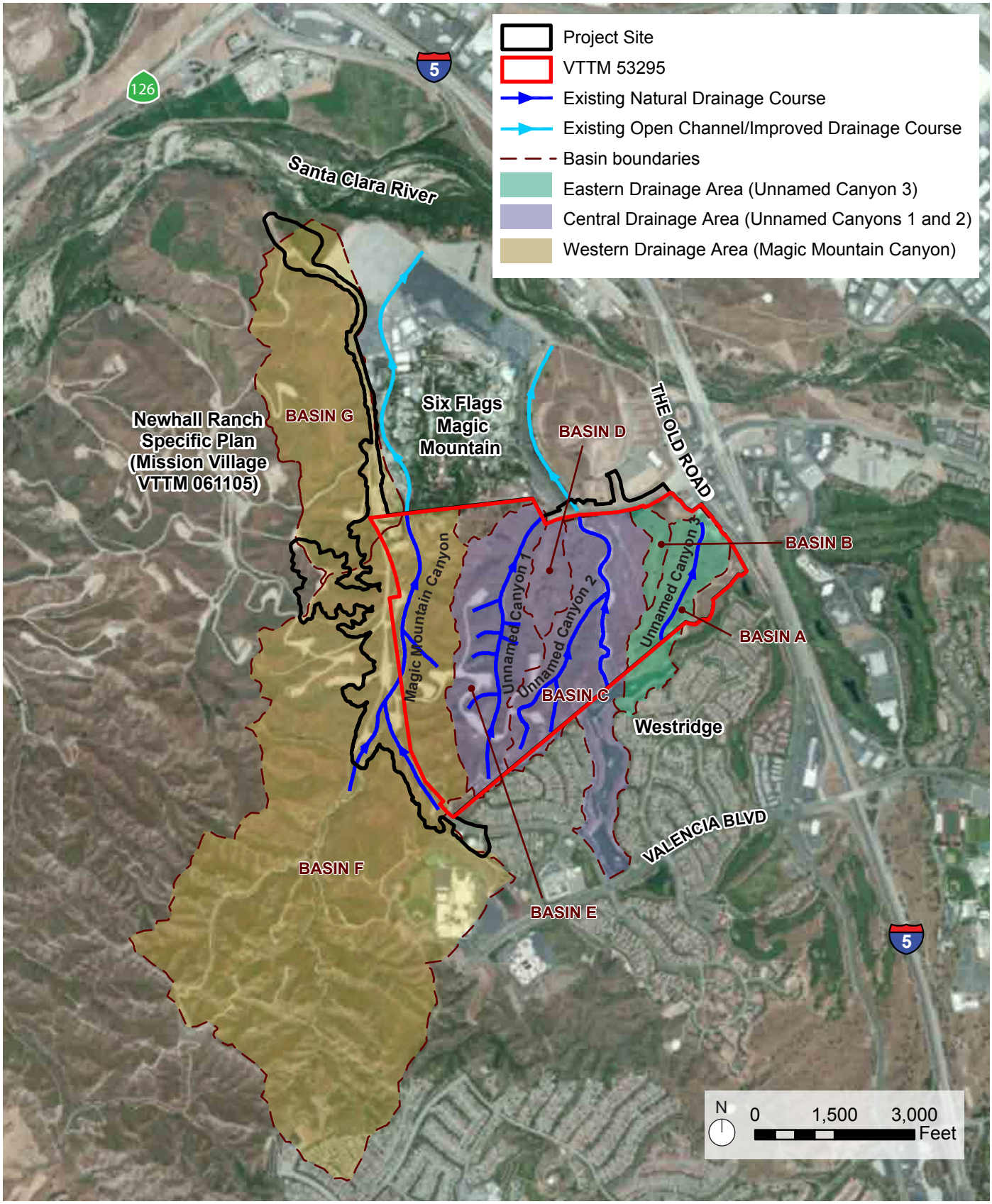

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Figure 5.9-2
Existing Drainage Areas and Basins

Source: Alliance Land Planning & Engineering, 2015; Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community, 2014.

Table 5.9-1
Existing Drainage Basins and Runoff Discharges

Drainage Basins	Acreage	Debris-Producing Acreage	Q50c[a] (cfs)	Q50bb[b] (cfs)	Debris Volume[c] (cy)
A, B	61.4	61.4	139	190	2,825
C, D, E	497.3	249.7	1,118	1,303	13,734
F, G	923.3	895	1467	2093	41152
Totals	**1,482.0**	**1,206**	**2,724**	**3,586**	**57,710**

[a] *Q50c—50-year rainfall intensity clear and burned flow.*

[b] *Q50bb—50-year rainfall intensity burned/bulked flow.*

[c] *Debris Volume—Cubic yards are determined by using a debris-producing rate (range: 30–55 cy/acre), which is specific for this area, applied to undeveloped conditions (see the Hydrology Study provided in **Appendix 5.9** for debris production area ratio calculations).*

Source: Alliance Land Planning & Engineering, Inc., 2013.

(4) County Development Monitoring System

The summary of existing conditions provided above, which includes the specific hydrologic and hydraulic conditions within and adjacent to the Project Site, including tributary areas, drainage course conditions, drainage subareas and patterns, and runoff calculations for existing (pre-development) conditions, responds to DMS criteria regarding flood hazards.

3. ENVIRONMENTAL IMPACTS

a. Methodology

In accordance with the Public Works Hydrology Manual, described above, this analysis employs the 50-year capital storm methodology to evaluate the Project's potential hydrology impacts and to size the proposed drainage system. As previously indicated, the County's methodology is more conservative than FEMA's 100-year flow rate. The hydrologic and hydraulic calculation methods used to assess both existing and proposed conditions are summarized herein to provide background information regarding the calculation of pre- and post-development runoff quantities, the capacities of proposed improvements, and the effects of development on adjacent infrastructure and waterways. The runoff calculations for both pre- and post-development conditions take into account the soil types present on-site, which are mapped in **Figure 5.2-3**, Soil Types On-Site, in **Section 5.2**, Agricultural and Forest Resources, of this Draft EIR and discussed in relation to their infiltration capability within the Water Quality Technical Report included as

Appendix 5.10. Imperviousness rates were applied to the proposed land uses to account for those portions of each developed parcel (e.g., yards, landscaping, open space, etc.) that would remain pervious to infiltration by stormwater. **Table 5.9-2**, Imperviousness Percentages for Project Land Uses, below lists the assumptions made for the proposed uses. For proposed runoff conditions, this analysis considers burned hydrology but uses no additional bulking factors because any post-development debris would be retained within proposed debris basins (described below).

Table 5.9-2
Imperviousness Percentages for Project Land Uses

Land Use	Percent Imperviousness
Single Family Residential	60%
Multi-Family Residential	80%
School	80%
Commercial	91%
Park	10%
Roadway	91%
Open Space/Site Grading	1%

Source: Alliance Land Planning & Engineering, Inc., 2013.

Public Works requires exceedance probability calculations for the design and analysis of all drainage infrastructure. By employing this methodology, the impact analysis presented below meets County design standards.

b. Proposed Design Elements/Project Design Features

The Project would meet or surpass the requirements of Public Works and all applicable NPDES permits by providing drainage, flood control, and water quality improvements such as storm drains, debris basins, water quality facilities, and inlet and outlet structures. **Figure III-15**, Project Drainage and Water Quality Plan, in **Section 3.0**, Project Description, of this Draft EIR depicts the Project's drainage infrastructure. As shown, the plan includes a comprehensive series of improvements designed to protect Project development within the 382.3-acre Vesting Tentative Tract Map No. 53295 (VTTM 53295). As also shown, drainage infrastructure would be located within the adjacent 119.1-acre External Map Improvements area as well.

As discussed in greater detail below and as required by state and County standards, the Project's drainage system would ensure that post-development peak flow rates would not exceed pre-development peak, burned/bulked flow rates and would prevent off-site

downstream flooding. On-site surface runoff would be intercepted by curb inlets, debris basins, and/or desilting basins and conveyed to a network of storm drains that would lead to a series of water quality facilities, including water quality basins, prior to discharge into existing drains that outlet to the River. Additional drainage-related improvements would include underground pipes and energy dissipaters. Debris basins also are proposed at the downstream ends of natural areas to intercept runoff and debris flows from undeveloped upland areas prior to runoff discharge into the on-site storm drain system.

Proposed modifications to the primary drainage areas within the Project Site and associated drainage improvements are described below, and a detailed set of drainage plans is provided in the Hydrology Study. As required by Public Works, all on-site drainage infrastructure carrying runoff from developed areas, storm drains under major and secondary highways, open channels (main channels), debris carrying systems, and sumps would be designed for the capital storm. None of the proposed Project development would be placed within the 50-year capital floodplain or would be subject to flood hazard. In particular, habitable structures on the Project Site would be located a minimum of one foot above the 100-year flood hazard area. Following Project completion, approximately 44 percent of the Project Site would be covered with impermeable surfaces, while the remaining 56 percent would consist of non-erodible surfaces, landscaping, and undeveloped areas.

(1) Project Site Primary Drainage Areas

As previously discussed, the four tributary watersheds present within the Project Site (i.e., Magic Mountain Canyon, Unnamed Canyons 1 and 2, and Unnamed Canyon 3) encompass three primary drainage areas (i.e., the western, central, and eastern drainage areas, respectively), each of which is comprised of two or more subareas (i.e., Drainage Basins A and B; Drainage Basins C, D, and E; and Drainage Basins F and G) under existing conditions. As illustrated in **Figure 5.9-3**, Future Drainage Areas and Basins, on page 5.9-25, under Project conditions, the boundaries of each primary drainage area would be modified due to site grading, while the general drainage patterns within each primary drainage area (i.e., northerly towards the River) would remain unchanged; the boundaries of the individual drainage basins that make up each primary drainage area would change substantially, and associated drainage patterns would be modified to accommodate proposed development. The following is a summary of the proposed drainage patterns and improvements within each primary drainage area. Details regarding the types of infrastructure proposed are provided further below.

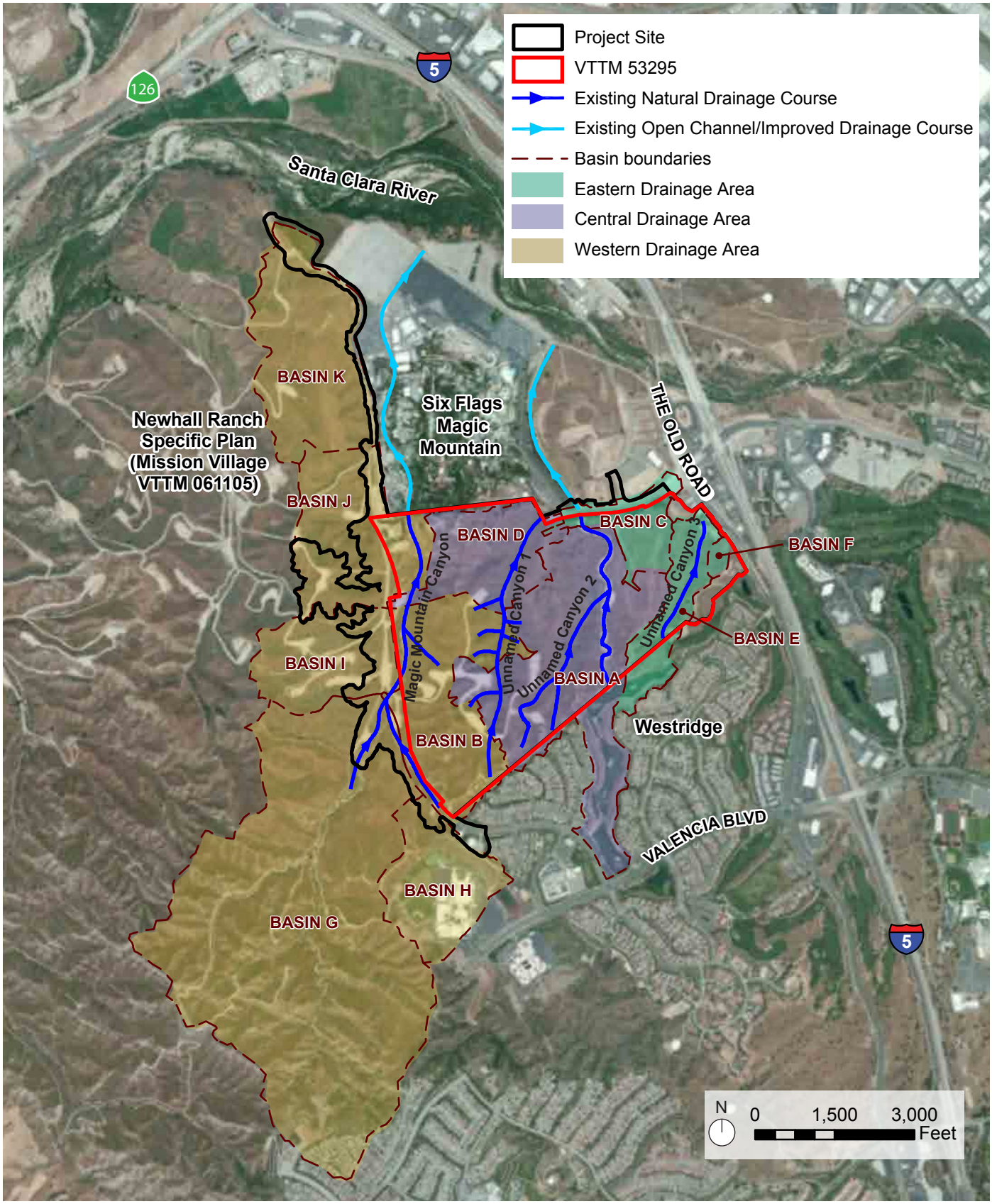

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Figure 5.9-3
Future Drainage Areas and Basins

Source: Alliance Land Planning & Engineering, 2015; Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community, 2014.

(a) Eastern Drainage Area (Drainage Basins C, E, and F)

Runoff from the eastern drainage area would be collected by proposed storm drains connecting to the existing drains within Magic Mountain Parkway and The Old Road. The existing box culvert within The Old Road runs northerly to the River and has sufficient capacity to accommodate post-development flows from the Project Site.[25] The eastern portion of the subarea (Drainage Basins E and F) would remain mostly undeveloped. Additionally, the entire tributary would be channelized.

(b) Central Drainage Area (Drainage Basins A and D)

Runoff from the central drainage area would be collected by a series of on-site storm drain lines, including a proposed storm drain within Magic Mountain Parkway. A portion of the commercial/office site (Planning Areas 1-3) located north of the proposed extension of Magic Mountain Parkway would also drain to the proposed Magic Mountain Parkway storm drain line, which would be sized to accommodate post-development flows from the Project Site. The central drainage area storm drain lines would then connect to the existing open concrete channel near the entrance to Six Flags Magic Mountain. This open channel runs along the east side of Six Flags Magic Mountain and outlets to the River. Within the easterly portion of Drainage Basin A, approximately 1,400 linear feet of the drainage corridor would have a soft bottom before entering a closed pipe system.

(c) Western Drainage Area (Drainage Basins B, G, H, I, J, and K)

Runoff from the western drainage area would be collected by a series of proposed storm drain lines that would run northerly along the west edge of Six Flags Magic Mountain and into a water quality basin located northwest of the Six Flags Magic Mountain within the External Map Improvements area. The water quality basin, described further below, would outlet to the River. Prior to entering the storm drain lines, approximately 1,800 linear feet of the tributary would have a soft bottom.

(2) Storm Drains

On-site surface runoff would be intercepted and conveyed to a network of on-site storm drains that would lead to a series of treatment structures, including water quality basins, prior to discharge into the River. Storm drains (pipes and reinforced concrete boxes) designed for a capital storm would consist of both privately and publicly maintained systems (i.e., maintained by Homeowner Associations, Assessment Districts, or the County

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[25] *Alliance Land Planning & Engineering, Inc., Drainage Concept, Hydrology Study, LID/Water Quality Report, December 2013.*

of Los Angeles, as applicable). The minimum publicly maintained mainline pipes would be 18-inch connector pipes for clear flows. The sizing of all pipes would be in accordance with County requirements.

(3) Open Channels

Where appropriate, small open channels would consist of rectangular and trapezoidal concrete channels designed for a capital storm, similar to the existing open channels into which portions of the Project Site currently drain. Within Unnamed Canyon 2, a geomorphic channel design is proposed in order to stabilize the channel incision and restore the drainage course. A portion of this drainage corridor would incorporate a series of grade control structures to maintain a stable bed slope, which would reduce both flow velocities within the channel as well as the potential for erosion of the channel bed. Additionally, bank stabilization measures would be provided along the channel banks to prevent the potential for lateral erosion of the channel. (See Appendix C of the Water Quality Technical Report in **Appendix 5.10** of this Draft EIR for further design details).

(4) Catch Basins

Catch basins would be provided to intercept flows larger than the 10-, 25-, and 50-year storms at strategic locations to minimize flooding at street intersections and sump locations.

(5) Debris Basins

To reduce debris generated within the Project Site as well as that generated off-site and conveyed through the site, 12 debris basins are proposed at the downstream ends of natural areas. The basins would intercept flows from undeveloped upland areas prior to discharge into the on-site storm drain system. A majority of these debris basins would be located near the southern and western edges of the Project Site, where the Project Site abuts natural land. The locations of these debris basins are illustrated in **Figure 3-16**, Project Drainage and Water Quality Plan, in **Section 3.0**, Project Description, of this Draft EIR. As part of this infrastructure, the existing debris basins on-site (e.g., within Planning Area 14) would be modified and/or relocated. Of the five basins proposed along the western Project Site boundary within the External Map Improvements area, three would be used on an interim basis until Mission Village (VTTM 61105) within the Newhall Ranch Specific Plan area is constructed; however, should development of Mission Village occur prior to Project development, these three debris basins would not be needed and, therefore, would not be constructed, as they would be replaced by the Mission Village drainage system.

The proposed debris basins would be designed and sized to capture debris from upstream runoff during a capital storm before discharging the clear runoff to the proposed downstream storm drain system. Public Works would maintain the debris basins, which would be cleaned per County standards. It is expected that the debris removed from the basins would be taken to a composting facility at a County landfill or used as daily cover.

(6) Erosion Control

In addition to implementation of BMPs during construction, erosion control devices proposed as part of the Project include debris basins, energy dissipaters, and slope planting. Erosion and sedimentation control would include the revegetation and landscaping of manufactured slopes. As previously discussed, the proposed debris basins would also capture debris and sediment from runoff from natural areas before discharge to the storm drain system and eventually into the River. Please refer to **Section 5.10**, Hydrology and Water Quality—Water Quality, of this Draft EIR for further discussion of erosion control during construction.

(7) Water Quality Facilities

As shown in **Figure 3-16**, Project Drainage and Water Quality Plan, in **Section 3.0**, Project Description, of this Draft EIR and as described further in **Section 5.10**, Hydrology and Water Quality—Water Quality, water quality facilities that would be constructed as part of the Project include parcel-based infiltration and biofiltration BMPs; biofiltration BMPs within the roadway rights-of-way; and regional infiltration/biofiltration basins. One regional biofiltration basin would be constructed adjacent to the River to treat runoff from portions of the Project Site and the immediately surrounding area. A paved access road would pass along the west side of Six Flags Magic Mountain to this basin. A series of smaller infiltration basins also would be developed within the central portion of the Project Site, where runoff would be treated before discharging to the existing open concrete channel located along the east side of Six Flags Magic Mountain. The water quality facilities proposed as part of the Project are described further in **Section 5.10**, Hydrology and Water Quality—Water Quality.

(8) Energy Dissipaters

To reduce storm flow velocities and prevent erosion at stormwater discharge points into the River, energy dissipation consisting of either rip-rap or energy dissipaters would be constructed at storm system outlets. The energy dissipaters would slow the rate of flow of runoff into the River to prevent erosion of the stream channel. Dissipaters would be designed based upon storm drain outlet hydraulic conditions, such as discharge, velocity and pipe size, and location within the River.

(9) Regulatory Compliance Measures and Project Design Features

As indicated, the proposed drainage system would be designed in accordance with the Public Works Hydrology Manual. In addition, based on the applicable regulations and requirements previously discussed, the following compliance measures would be implemented as part of the Project:

- Storm drains (pipes and reinforced concrete boxes) and open channels shall be designed and constructed pursuant to Public Works requirements: for 50-year capital storms in sump areas and for 25-year urban storm in non-sump areas.

- Debris basins shall be constructed pursuant to Public Works requirements to intercept storm flows from undeveloped areas before they discharge into the developed portions of VTTM 53295.

- Energy dissipation consisting of either rip-rap or energy dissipaters shall be installed along the Santa Clara River as required by Public Works at outlet locations to reduce runoff velocities into the channel to prevent erosion.

- A final developed condition hydrology analysis (Public Works Drainage Concept Report and Final Design Report) shall be prepared in conjunction with final Project design plans when precise engineering occurs. This report shall confirm the final Project design is consistent with the hydrology analysis within the *Drainage Concept, Hydrology Study, LID/Water Quality Report* and that the design and sizing of all hydrologic and water quality control BMPs are in accordance with County requirements. All elements of the storm drain system shall conform to the policies and standards of the Public Works, Flood Control Division, as applicable.

- Ultimate Project hydrology and debris production calculations shall be prepared by a Project engineer during final Project design to verify the requirements for debris basins and/or desilting inlets.

- All necessary permits, agreements, and/or letters of exemption from the U.S. Army Corps of Engineers (Corps) and/or CDFW for Project-related development within their respective jurisdictions must be obtained prior to issuance of grading permits. (Please refer to **Section 5.4**, Biological Resources, of this Draft EIR for further discussion of applicable Corps and CDFW permits and requirements.)

These regulatory compliance measures, combined with additional compliance measures listed in **Section 5.10**, Hydrology and Water Quality—Water Quality, are generally consistent with and implement the hydrology-related mitigation measures (MM) specified within the Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan (RMDP/SCP), specifically MM RMDP/SCP HY-1 through MM RMDP/SCP HY-7.

An extensive list of BMPs to be implemented during both construction and operation of the Project also is provided in **Section 5.10**, Hydrology and Water Quality—Water Quality. As discussed therein, such measures would include erosion and sediment control BMPs to be implemented during the Project construction phase, and site design, source control, LID, treatment control, and hydromodification control BMPs to be implemented during the post-development (operational) phase.

Beyond the proposed drainage and water quality plan and associated improvements, in addition to the above-referenced regulatory compliance measures and BMPs, no specific Project design features (PDFs) are proposed with respect to hydrology. However, refer to **Section 5.10**, Hydrology and Water Quality—Water Quality, for PDFs addressing the BMPs to be implemented.

(10) County Development Monitoring System

The discussion above regarding the Project's design elements supports the DMS analysis contained herein. In particular, the discussion describes proposed (post-development) conditions, including changes to the on-site drainage courses, drainage subareas and patterns, as well as the proposed drainage infrastructure, which has been designed in accordance with the Public Works Hydrology Manual and Sedimentation Manual.

c. Significance Thresholds

Based on Appendix G of the CEQA Guidelines and other relevant criteria, the Los Angeles County Department of Regional Planning has determined that a project would have a potentially significant impact related to hydrology based on the following criteria:

Threshold 5.9-1: Would the Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

Threshold 5.9-2: Would the Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

Threshold 5.9-3: Would the Project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems?

Threshold 5.9-4: Would the Project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood

Insurance Rate Map or other flood hazard delineation map or within a floodway or floodplain?

Threshold 5.9-5: Would the Project place structures, which would impede or redirect flood flows, within a 100-year flood hazard area, floodway, or floodplain?

Threshold 5.9-6: Would the Project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

Threshold 5.9-7: Would the Project place structures in areas subject to inundation by seiche, tsunami, or mudflow?[26,27]

Threshold 5.9-8: Would the Project create drainage system capacity problems, or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Although the proposed drainage and water quality infrastructure would function as a single system, the impact analysis herein focuses on the potential hydrological and flood-related impacts of the Project associated with stormwater runoff. The Project's potential impacts on water quality, including erosion, sedimentation, and related hydromodification impacts, are addressed in **Section 5.10**, Hydrology and Water Quality—Water Quality, of this Draft EIR. Additionally, the Project's potential impacts on biological resources within and around drainages, including jurisdictional drainage courses, are addressed in **Section 5.4**, Biological Resources, of this Draft EIR.

As previously indicated, the 100-year flood event boundaries within the Project area are generally located within and directly adjacent to the River and certain of its tributary drainages. None of the Project's proposed development would be placed within the County's 50-year capital floodplain; therefore, the development would not be subject to flood hazards. (The County's 50-year capital storm methodology is more conservative than FEMA's 100-year flow rate.) Additionally, all future habitable structures on the Project Site would be constructed a minimum of one foot above the water surface elevation of FEMA's 100-year flood. Accordingly, no housing would be placed within a 100-year flood hazard

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[26] *A seiche (pronounced say'sh) is a wave on the surface of a lake or landlocked bay caused by atmospheric or seismic disturbances. The effect of a seiche may also be referred to as "sloshing," which occurred to many swimming pools in the San Fernando Valley during the 1994 Northridge earthquake.*

[27] *A tsunami (pronounced soo-NAH-mee) is a series of waves of extremely long wave length and long period, generated in a body of water by an impulsive disturbance that displaces the water such as an earthquake, landslide, or sub-marine volcanic eruption.*

area, nor would any structures have the potential to impede or redirect flows within a flood hazard area. No further discussion of Thresholds 5.9-4 and 5.9-5 is provided herein.

There are no major levees or dams within the Project Site's watershed that could expose people or structures to a significant risk of loss associated with flooding due to structure failure. (Castaic Dam is located on Castaic Lake north of the Project Site; in the event of dam failure, inundation waters would flow southerly along Castaic Creek to the north bank of the River and thus would not affect the Project Site south of the River.) Similarly, the Project Site is not located near any body of water large enough to potentially create seiches during seismic activity, nor is the Pacific Ocean close enough to pose a tsunami risk to the Project Site. Therefore, no further discussion of Threshold 5.9-6 or Threshold 5.9-7 (with respect to seiche and tsunami hazards) is provided herein.

d. Project Impacts

Threshold 5.9-1: Would the Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

Threshold 5.9-2: Would the Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

Threshold 5.9-3: Would the Project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems?

Threshold 5.9-8: Would the Project create drainage system capacity problems, or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Project impacts with respect to Thresholds 5.9-1 through 5.9-3 and Threshold 5.9-8 are addressed in the following combined analysis since these criteria all relate to surface water runoff, drainage patterns, and storm drain systems. The discussion that follows also supports the DMS analysis with respect to flood hazards, as addressed further below.

(1) Construction

The primary hydrological concern during Project construction would be potential erosion and sedimentation impacts during site clearing and grading. Erosion and sedimentation caused by construction activities are dependent upon climatic and site

conditions, as well as the degree of soil disturbance during construction. Site clearing and grading operations, in particular, would have the greatest potential for discharging sediment downstream during storm events. Increases in sedimentation and debris production on the site during construction would be temporary and limited through implementation of the construction BMPs specified in **Section 5.10**, Hydrology and Water Quality—Water Quality, of this Draft EIR. Please refer to the analysis therein for a more detailed discussion of potential erosion and sedimentation impacts, including further discussion of Threshold 5.9-1. As indicated therein, construction impacts would be less than significant with compliance with applicable regulatory requirements and implementation of appropriate BMPs.

(2) Operation

Because stormwater runoff and debris generated off-site are conveyed on-site and would enter the Project's drainage system, runoff from the entire approximately 1,500-acre tributary watershed is addressed in the following analysis.

As previously discussed, the proposed drainage system would collect and convey runoff from the Project Site as well as from upstream off-site locations within the tributary watershed through the Project Site via a series of storm drains and open channels flowing to the River, with overall drainage patterns similar to existing conditions. Runoff within the four on-site tributary drainages (i.e., Magic Mountain Canyon and Unnamed Canyons 1, 2, and 3) would be conveyed through both channels and underground stormwater conveyance infrastructure. As calculated in the Hydrology Study, the channels and storm drains have been conceptually designed to contain and convey flows associated with the County's 50-year capital storm event in accordance with Public Works requirements.

Per County requirements, the adequacy of the final engineered channel flow capacity will be assessed and approved by Public Works. For approval, the final channel design must meet the requirements of the Public Works Sedimentation Manual; required supporting analysis will include hydraulic modeling and calculations and will incorporate the required freeboard and an acceptable factor of safety to prevent impacts from overtopping and flooding. Final design also will comply with requirements for storm drains and urban flood protection, as detailed in the Public Works Hydrology Manual. Since proposed channels and buried storm drains will be designed to convey the required capital storm event, the Project would not be expected to result in a significant flooding hazard.[28]

(Footnote continued on next page)

As previously indicated, the runoff discharge calculations for the Project Site under existing conditions are shown in **Table 5.9-1**, Existing Drainage Basins and Runoff Discharges. Project implementation would increase the impervious surface area within the Project Site from roads, buildings, paved parking areas, and other relatively impermeable or impervious features (see **Table 5.9-2**, Imperviousness Percentages for Project Land Uses, for the impervious rates assumed for the proposed land uses). The introduction of impervious surfaces would increase the amount of clear flow runoff from and through the site due to the associated reduction in infiltration, while burned/bulked runoff and debris flow rates would be reduced since the developed portions of the site would be covered with impervious surfaces and non-erodible vegetation. Additionally, the 12 proposed debris basins would reduce the amount of debris and sediment in runoff. Further, the Project's ultimate hydrology and debris production calculations would be prepared by a Project engineer during final Project design to verify the requirements for the debris basins and/or desilting inlets. Post-development runoff rates and debris volumes are presented in **Table 5.9-3**, Post-Development Drainage Basins and Runoff Discharges, on page 5.9-35. As shown, the post-development burned/bulked discharge quantities would total 2,886 cfs for the entire tributary area during a capital storm.

A comparison of existing peak discharges and post-development peak discharges is provided in **Table 5.9-4**, Comparison of Acreage and Discharge—Existing and Proposed Project, on page 5.9-36. As shown, clear flows would increase by 162 cfs or 6 percent, but there would be a 700 cfs or 20 percent reduction in burned/bulked discharge from the tributary watershed under post-development conditions. This reduction would occur as a result of reduced erosion on the Project Site due to the introduction of pavement, buildings, vegetation, and other non-erosive surfaces, as well as the proposed debris basins that would capture sediment and debris from upstream runoff, allowing settlement before clear runoff discharges to the storm drain system on-site. With these improvements in place, the Project would reduce current runoff flow rates through the site. The existing storm drain systems in The Old Road and adjacent to Six Flags Magic Mountain would be able to adequately handle such flows since the developed condition clear flows (as well as the equivalent developed condition burned/bulked flows) would be less than the existing condition burned/bulked flows. Furthermore, since storm flows from upstream areas would be channeled through the Project Site in facilities designed for the capital storm, and since on-site runoff would be accommodated in facilities designed for the 25-year urban design storm, pursuant to Public Works requirements, no on-site or upstream flooding due to inadequately designed storm drainage facilities would occur.

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[28] *Alliance Land Planning & Engineering, Inc., Drainage Concept, Hydrology Study, LID/Water Quality Report, December 2013.*

Table 5.9-3
Post-Development Drainage Basins and Runoff Discharges

Primary Drainage Area	Drainage Basins	Acreage	Debris-Producing Acreage	Q50c[a] (cfs)	Q50bb[b] (cfs)	Debris Volume[c] (cy)
Eastern	C, E, F	83.7	47.2	184	184	2,597
Central	A, D	479.7	35.8	1,150	1,150	2,520
Western	B, G, H, I, J, K	943.0	800.8	1,553	1,553	39,814
Total		**1,506.4**	**883.8**	**2,886**	**2,886**	**44,931**

[a] *Q50c—50-year rainfall intensity clear and burned flow.*

[b] *Q50bb—50-year rainfall intensity burned/bulked flow. However, a bulking factor was not applied for the Project since any debris occurring under post-development conditions would be retained within debris basins on-site. Accordingly, Q50c is equivalent to Q50bb for the Project.*

[c] *Debris Volume—Debris-producing acreage is multiplied by the area's debris-producing rate (range: 30–55 cy/ac). Debris-producing rates were taken from the Public Works Sedimentation Manual (see the Hydrology Study provided in **Appendix 5.9** for reference sheets).*

Source: Alliance Land Planning & Engineering, Inc., 2013.

As also evident in **Table 5.9-3**, Post-Development Drainage Basins and Runoff Discharges, the drainage basins or subareas comprising each primary drainage area would vary from existing conditions. Accordingly, on a drainage basin or subarea scale, drainage patterns would be modified under Project conditions. However, the general drainage patterns of each primary drainage area would remain unchanged, with runoff continuing to flow in a northerly direction to the River. Additionally, the River would not be encroached upon, as the northernmost water quality basin and the associated outlet and energy dissipater would be set back from the River. Thus, these facilities would not have a major effect on the functionality of the River. Please refer to **Section 5.10**, Hydrology and Water Quality—Water Quality, of this Draft EIR for further discussion of hydromodification and the effects of energy dissipaters on the River. Similarly, erosion and sediment control measures are discussed therein, as well as in **Section 5.6**, Geology and Soils, of this Draft EIR.

Finally, with respect to Threshold 5.9-8, Project construction impacts, including those associated with the development of new drainage infrastructure on-site, are evaluated throughout this Draft EIR in each of the Environmental Impact Analysis sections. However, the impacts identified therein are not necessarily due specifically to the construction of new drainage facilities.

In summary, the Project would not substantially alter the existing drainage patterns within and surrounding the Project Site, substantially increase the rate or amount of surface

Table 5.9-4
Comparison of Acreage and Discharge—Existing and Proposed Project

Drainage Basin	Tributary Acreage[a]	Debris-Producing Acreage	Q50c[b] (cfs)	Q50bb[c] (cfs)	Debris Volume[d] (cy)
Existing	1,482.0	1,205.7	2,724	3,586	57,710
Proposed	1,506.4	883.8	2,886	2,886	44,931
Net Effect	+2%	(-27%)	+6%	-20%	(-22%)

[a] *Acreage changes are due to grading.*

[b] *Q50c—50-year rainfall intensity clear and burned flow.*

[c] *Q50bb—50-year rainfall intensity burned/bulked flow. However, a bulking factor was not applied for the Project since any debris occurring under post-development conditions would be retained within debris basins on-site. Accordingly, Q50c is equivalent to Q50bb for the Project.*

[d] *Debris Volume—Debris-producing acreage is multiplied by the area's debris-producing rate (range: 30–55 cy/ac). Debris-producing rates were taken from the Public Works Sedimentation Manual (see the Hydrology Study provided in **Appendix 5.9** for reference sheets).*

Source: Alliance Land Planning & Engineering, Inc., 2013.

runoff in a manner that would result in flooding on- or off-site, create or contribute runoff that exceeds the capacity of existing or planned drainage systems, or create drainage system capacity problems. With compliance with regulatory requirements and implementation of appropriate BMPs, impacts would be less than significant.

(3) County Development Monitoring System

The County DMS flood hazard criteria focus on whether a project is located on land having a major drainage course, a flood prone area, high erosion potential, a high rate of debris production, or high mudflow potential. While the River is considered a major drainage course, the tributary drainages located on-site are not, and the Project Site is not located within FEMA's 100-year floodplain or the County's floodway. As analyzed above, the proposed drainage system would include storm drain, flood control, and water quality improvements that collectively would minimize the potential for flooding, erosion, and mudflows, and would appropriately capture and retain debris. The above analysis is consistent with County DMS criteria as it relates to flood hazards. Specifically, the analysis shows that the Project would not result in a significant environmental impact with respect to flood hazards. Accordingly, the Project is consistent with County General Plan DMS policies as they relate to flood hazards.[29]

[29] *The County has elected to rely on data provided within the Hydrology Study as the equivalent of County DMS buildout data for the reasons specified above in Subsection 2a(3)(c), County Development Monitoring System.*

Threshold 5.9-7: Would the Project place structures in areas subject to inundation by seiche, tsunami, or mudflow?[30]

With regard to the potential for mudflows, the Project vicinity may be subject to inundation by mudflows due to the existing topography. Mudflows, also known as debris flows, are shallow water-saturated landslides that travel rapidly down slopes carrying rocks, brush, and other debris. A mudflow can occur naturally as a result of heavy rainfall on a slope that contains loose soil or debris. Human activity can also induce a slide, such as when soil becomes saturated from a broken water pipe or incorrect diversion of runoff concentrated from developed areas saturates soil. The path of a mudflow is determined by local topography and typically follows existing drainage patterns. As previously mentioned, 12 debris basins are proposed on-site at the downstream ends of natural areas. These basins would intercept flows from undeveloped upland areas prior to discharge into the on-site storm drain system. The proposed debris basins would be designed and sized to capture debris during a capital storm.

As indicated in **Table 5.9-4**, Comparison of Acreage and Discharge—Existing and Proposed Project, the debris volume produced within the tributary watershed would decrease by an estimated 12,779 cy or 22 percent. As also indicated and previously discussed, there would be a 700 cfs or 20 percent reduction in burned/bulked discharge from the tributary watershed, and developed condition clear flows (as well as the equivalent developed condition burned/bulked flows) would be less than the existing condition burned/bulked flows. Additionally, site grading would occur in compliance with Public Works standards, and all slopes would be graded, compacted, and stabilized such that they would not be subject to mudflow hazard (see **Section 5.6**, Geology and Soils, of this Draft EIR for further discussion of the Project Site's pre- and post-development geotechnical characteristics). As such, impacts related to inundation by mudflow would be less than significant.

(1) County Development Monitoring System

The County DMS flood hazard criteria also address high mudflow potential. The analysis above is consistent with County DMS criteria as it relates to flood hazards, as it shows the Project would not result in a significant environmental impact with respect to mudflows. Accordingly, the Project is consistent with County General Plan DMS policies as they relate to high mudflows.

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[30] *Please refer to earlier discussion; no further analysis of Threshold 5.9-7 with respect to seiche and tsunami hazards is provided herein.*

4. CUMULATIVE IMPACTS

The geographic context for the cumulative impact analysis of hydrology is Reach 5 of the Santa Clara River, which extends from roughly I-5 (east of the Project Site) to just west of the Los Angeles/Ventura County line. This area includes the approximately 1,500-acre tributary watershed in which the Project Site is located, the Newhall Ranch Specific Plan area to the west, and southerly draining areas located north of the River. Anticipated growth through 2024 would cumulatively affect hydrological conditions within the Reach 5 drainage area through increased imperviousness and/or changes in drainage patterns and could subject people and property to flood hazards if located within areas subject to flooding or if downstream flooding results. Individual buildings and facilities would be subject to project review, County grading and building permit issuance processes, and FEMA compliance, as appropriate, which would require design features and characteristics to reduce potential flood impacts on an individual, and thus, cumulative basis, to acceptable levels. For those projects located within the County, all future drainage facilities, whether project-specific or serving cumulative development, would be designed for either the 50-year capital storm or the 25-year urban design storm pursuant to Public Works requirements. Public Works also prohibits increases in off-site post-development storm flows and increases in storm flow velocities. Compliance with these requirements would ensure that overall storm runoff discharge quantities from the watershed under post-development conditions would be less than or equal to existing conditions, largely because runoff would include less debris than is typical of undeveloped watersheds and flow rates would not increase. Moreover, because all projects must include on-site drainage facilities built for burned/bulked flows from undeveloped areas, those facilities would have more than adequate capacity to accommodate flows as development occurs. The Project would not contribute to any potentially significant cumulative impacts because it would not result in an increase in burned/bulked runoff flows, and it would neither subject on-site persons and property to inundation from 100-year floodwaters, nor subject downstream uses to floodwaters generated on-site. Therefore, cumulative impacts related to potential drainage and flood hazards would be less than significant.

Please refer to **Section 5.10**, Hydrology and Water Quality—Water Quality, of this Draft EIR for discussion of cumulative impacts related to erosion, sedimentation, and hydromodification. As discussed therein, with compliance with regulatory requirements and implementation of appropriate BMPs, cumulative impacts would be less than significant.

a. County Development Monitoring System

As previously indicated, the DMS flood hazard criteria focus on whether a project is located on land having a major drainage course, a flood prone area, high erosion potential, a high rate of debris production, or high mudflow potential. As the Santa Clara River and some of its tributaries within the surrounding Project area are considered major drainage

courses, some of the related projects may be located within FEMA's 100-year floodplain and/or the County's floodway. Additionally, projects located on land with steep and/or undeveloped terrain may be subject to erosion, debris production, and/or mudflow. Within Santa Clara River Reach 5 (i.e., the geographic context for the cumulative impact analysis of hydrology), a number of projects meet some or all of these criteria, including the proposed and approved villages within the Newhall Ranch Specific Plan area located west of the Project Site.

However, the analysis above is consistent with County DMS criteria as it relates to flood hazards. More specifically, the cumulative analysis shows that cumulative growth is not anticipated to result in a significant environmental impact with respect to flooding, erosion, debris production, or mudflows. As previously indicated, all related development would be subject to project review, County grading and building permit issuance processes, and FEMA compliance, as appropriate, which would require design features and characteristics to reduce potential flood impacts to acceptable levels. All projects also would be required to include appropriate drainage infrastructure, including storm drain, flood control, and water quality improvements that collectively would minimize the potential for flooding, erosion, and mudflows, and would appropriately capture and retain debris, in compliance with County requirements. Accordingly, the Project is consistent with County General Plan DMS as it relates to flood hazards.

5. MITIGATION MEASURES

a. Newhall Ranch RMDP/SCP Mitigation Measures

CDFW previously adopted mitigation measures to minimize impacts related to hydrology in connection with its adoption of the Newhall Ranch RMDP/SCP EIS/EIR. Several of the RMDP/SCP mitigation measures also apply to the Project. If the status of the RMDP/SCP EIS/EIR is unresolved or set aside in the pending litigation at the time the County considers the Project EIR for certification, this EIR recommends that the County adopt the companion Entrada South (ES) mitigation measures set forth below, as applicable, to reduce the Project's less-than-significant hydrology impacts. Those RMDP/SCP mitigation measures that are not applicable to the Project are listed in **Appendix 2B** with an explanation as to why they do not apply. Any italicized text provided in the parentheticals below provides necessary updated information and/or clarifications, as needed.

MM ES 5.9-1/RMDP/SCP HY-1: All on-site and off-site flood control improvements necessary to implement the RMDP must be constructed to the satisfaction of the DPW. (*This measure would be achieved through regulatory compliance with the County Department of Public Works' requirements.*)

MM ES 5.9-2/RMDP/SCP HY-2: The design of flood protection facilities for the Santa Clara River shall be based on the following:

(a) The DPW's capital flood flow rates (50-year rainfall discharge, burned and bulked);

(This measure would be achieved through regulatory compliance with the County Department of Public Works' Hydrology Manual. The additional parts of this measure are not applicable to the Project; see ***Appendix 2B*** *for related explanation.)*

MM ES 5.9-3/RMDP/SCP HY-4: Calculation of bulked flow runoff rates for the capital flood in the Santa Clara River watershed shall utilize the fire factors included in the September 2003 DPW Addendum to the 1991 Hydrology Manual Appendix H: Burn Policy Methodology for the Santa Clara River Watershed. All runoff calculations for watershed subareas with impervious values of 15 percent or less must use the burned soil runoff coefficients developed by the DPW for the Santa Clara River watershed. (*This measure would be achieved through regulatory compliance. Specifically, the Project shall currently meet the requirements of the County Department of Public Works' Hydrology Manual dated January 2006, which has superseded the September 2003 Addendum to the 1991 Hydrology Manual, Appendix H: Burn Policy Methodology for the Santa Clara River Watershed. Should an updated version of these standards be adopted prior to the filing of building permit applications, the standards in effect at that time shall apply.*)

MM ES 5.9-4/RMDP/SCP HY-5: All facilities in developed areas that are not covered under the capital flood protection conditions must be designed for the urban flood. The urban flood is runoff from a 25-year frequency design storm falling on a saturated watershed.

Where street flow reaches the street capacity at the property line, the flow must be split and conveyed both in the street and in a drain below street level. Underground drains must be designed with the capacity to carry at least the flow from the 10-year frequency design storm (DPW Hydrology Manual, 1991). (*This measure would be achieved through regulatory compliance. Specifically, the Project shall currently meet the requirements of the County Department of Public Works' Hydrology Manual dated January 2006, which has superseded the 1991 Hydrology Manual. Should an updated version of these standards be adopted prior to the filing of building permit applications, the standards in effect at that time shall apply.*)

MM ES 5.9-5/RMDP/SCP HY-6: Sumps in urban areas must be designed to carry the runoff resulting from a capital flood, as defined by the DPW. (*This measure would be achieved through regulatory compliance with the County Department of Public Works' Hydrology Manual.*)

MM ES 5.9-6/RMDP/SCP HY-7: Where a drainage system might have to provide more than a single level of flood protection, the drainage system must be designed with the capacity to carry the bulked capital flood flow from the upgradient natural canyon in addition to the capacity to protect the developed area from an urban flood (DPW Hydrology Manual, 1991). (*This measure would be achieved through regulatory compliance. Specifically, the Project shall currently meet the requirements of the County Department of Public Works' Hydrology Manual dated January 2006, which has superseded the 1991 Hydrology Manual. Should an updated version of these standards be adopted prior to the filing of building permit applications, the standards in effect at that time shall apply.*)

MM ES 5.9-7/RMDP/SCP GRR-1: Post-peak stormwater runoff discharges from stormwater drainage systems must be controlled to minimize localized erosion impacts to River geomorphology and riparian habitat. Discharge flows would be regulated using water control features that must capture the runoff from small, frequent flows (i.e., one- and two-year events). Water and hydromodification control features must be designed in accordance with DPW criteria. Where applicable, energy dissipation structures must be incorporated at drainage outlets to the Santa Clara River to minimize discharge velocities and potential localized erosion. (*This measure would be achieved through regulatory compliance with the requirements of the County Department of Public Works' Hydrology Manual.*)

MM ES 5.9-8/RMDP/SCP GRR-3: Structural features such as outlets, bank stabilization, grade stabilization structures, bridge abutments, culverts, and other features that may be subjected to River or tributary flows will be constructed of erosion resistant materials such as concrete, soil cement, or secured riprap to ensure long-term stability and reduce the need for routine maintenance and/or rehabilitation/replacement activities and be subject to approval by DPW. (*This measure would be achieved through regulatory compliance with the requirements of the County Department of Public Works' Hydrology Manual.*)

MM ES 5.9-9/RMDP/SCP GRR-4: Prior to final subdivision map or the issuance of any grading or building permit, instream tributary (open channels, where applicable) channel design features will be incorporated to control potential hydromodification impacts to geomorphology and riparian resources. The design will be based on erosion potential and other hydrologic modeling to determine appropriate equilibrium slope in the post-development condition as described in the Subregional Stormwater Mitigation Plan and be subject to approval by DPW. (*This measure would be achieved through regulatory compliance with the County's MS4 Permit and the requirements of the County Department of Public Works' Hydrology Manual and Low Impact Development Standards Manual*).

MM ES 5.9-10/RMDP/SCP GRR-5: Sediment/debris control structures must be constructed downstream of natural watersheds to protect developed area drainage systems from debris flows. The design capacity for sediment/debris control structures must take into account the classifications stated in the debris production maps provided in Appendix A of the DPW 1991 Hydrology Manual. Sediment/debris control structure capacity and transport rates must be based on the specification stated in the DPW Sedimentation Manual. (*This measure would be achieved through regulatory compliance. Specifically, the Project's design capacity for sediment/debris control structures shall currently be based on the County Department of Public Works' Hydrology Manual dated 2006, which has superseded the debris production maps provided in Appendix A of the 1991 Hydrology Manual. Should an updated version of these standards be adopted prior to the filing of building permit applications, the standards in effect at that time shall apply.*)

MM ES 5.9-11/RMDP/SCP GRR-6: Sediment from upland sources, such as debris basins and other sediment retention activities, will be redistributed in DPW-designated and permitted upland or riparian locations along the Santa Clara River and/or tributaries to reintroduce sediment for beach replenishment purposes. (*This measure would be achieved through regulatory compliance with the requirements of the County Department of Public Works' Hydrology Manual.*)

b. Entrada South Project-Level Mitigation Measures

With implementation of the regulatory compliance measures previously described, the identified mitigation measures, and appropriate BMPs (detailed in **Section 5.10**, Hydrology and Water Quality—Water Quality, of this Draft EIR) incorporated into the Project's design and operations, Project-level hydrology impacts would be less than significant. In addition, cumulative impacts would be less than significant. Therefore, no mitigation measures would be required beyond those identified above.

6. LEVEL OF SIGNIFICANCE AFTER MITIGATION

With compliance with all applicable regulatory requirements and implementation of appropriate BMPs, Project-level and cumulative impacts related to hydrology would be less than significant. Nonetheless, the Project would be required to implement the applicable RMDP/SCP mitigation measures listed above to further reduce impacts related to hydrology.