A BIOLOGICAL CONSTRAINTS ANALYSIS OF THE APPROXIMATELY 4,191.7-acre WILDFLOWER GREEN ENERGY FARM SITE LOCATED IN LOS ANGELES COUNTY, CALIFORNIA

Permit No: RCUPT201000121
Project No: R2010-00256

Prepared For: **Los Angeles County**
Department of Regional Planning
320 West Temple Street
Los Angeles, California 90012

Prepared By: **Natural Resource Consultants**
1590 South Coast Highway, Suite 17
Laguna Beach, CA 92651
Contact: Mr. David Levine

and

Western EcoSystems Technology, Inc.
2003 Central Avenue
Cheyenne, Wyoming 82001
Contact: Ms. Andrea Chatfield

June 14, 2011

TABLE OF CONTENTS

EXECUTIVE SUMMARY **1**
1.0 INTRODUCTION **4**
2.0 SITE LOCATION AND EXISTING CONDITIONS **4**
2.1 CHARACTERISTICS OF THE SITE 4
2.2 GEOLOGY AND TOPOGRAPHY 11
2.3 SOILS 11
2.4 LAND USE 11
2.5 REGIONAL CHARACTERISTICS 15
2.5.1 Land Use *15*
2.5.2 Land Cover Types/Natural Communities *15*
2.5.3 Regional Wetlands and Waters *15*
3.0 FIELD SURVEY METHODS **16**
3.1 GENERAL SURVEY INFORMATION 16
3.2 REVIEW OF OTHER EXISTING INFORMATION 16
3.3 VEGETATION MAPPING 18
3.4 SPECIAL STATUS PLANT SURVEYS 18
3.5 JURISDICTIONAL WETLANDS AND WATERS SURVEYS 19
3.6 WILDLIFE SURVEYS 19
3.6.1 Fixed-Point Bird Use Surveys *19*
3.6.2 Migrating and Breeding bird surveys *21*
3.6.3 Nocturnal Radar Survey *21*
3.6.4 Burrowing Owl and General Wildlife Surveys *21*
3.6.5 Golden Eagle/Raptor Nest Surveys *21*
3.6.6 Bat Surveys *22*
3.6.7 Butterfly Surveys *22*
4.0 VEGETATION COMMUNITIES **23**
4.1 NATIVE ANNUAL GRASSLANDS 24
4.2 NATIVE ANNUAL FORBLANDS 24
4.2.1 California Poppy fields *24*
4.2.2 Fiddleneck Fields *25*
4.2.3 Other Flower Fields *25*
4.3 NON-NATIVE GRASSLAND / SEMI NATURAL STANDS 25
4.3.1 Cheatgrass grasslands *25*
4.3.2 Red brome or Mediterranean grass grasslands *26*
4.3.3 Soft brome grasslands *26*
4.3.4 Wild oats grasslands *26*
4.3.5 Rat-tail fescue grasslands *26*
4.4 NON-NATIVE FORBLANDS / SEMI NATURAL STANDS 27
4.4.1 Prickly Lettuce patches *27*
4.4.2 Hedgemustard and other mustard patches *27*
4.5 NATIVE PERENNIAL GRASSLANDS 27
4.5.1 Purple needlegrass grasslands *27*
4.5.2 Desert Needlegrass grasslands *28*
4.5.3 One-sided blue grass grasslands *28*
4.6 NATIVE PERENNIAL FORBLANDS 29
4.6.1 Rush Marshes *29*
4.6.2 Wild Tarragon Patches *29*
4.7 NATIVE SCRUB AND SHRUBLANDS 29
4.7.1 California Buckwheat Scrub *29*
4.7.2 Rabbitbrush Scrub *29*
4.7.3 Oak Gooseberry thickets *30*
4.7.4 Narrowleaf Goldenbush Scrub *30*
4.7.5 Southern Willow Scrub *30*
4.7.6 Mulefat Scrub *30*
4.7.7 Desert Olive Patches *31*

4.8 VERNAL POOL 31
4.9 OPEN WATER 31
4.10 AGRICULTURE 31
4.11 DISTURBED AND DEVELOPED 32
5.0 SPECIAL STATUS BIOLOGICAL RESOURCES 34
5.1 SPECIAL STATUS VEGETATION COMMUNITIES 34
5.1.1 Native perennial grasslands 34
5.1.2 Oak Gooseberry Thickets (G2 S2?) 34
5.1.3 Narrowleaf Goldenbush Scrub (G3 S3?) 35
5.1.4 Southern Willow Scrub (G3 S2.1) 35
5.1.5 Desert Olive Patches (G3 S2.2) 35
5.1.6 Vernal Pools (GNR SNR) 35
5.2 SPECIAL STATUS PLANT SPECIES 36
5.2.1 Special Status Plants Occurring On Site 36
5.2.1.1 Spreading navarretia 36
5.2.1.2 Short-joint beavertail cactus 36
5.2.2 Special Status Plants Potentially Occurring but Not Detected On Site 36
5.3 SPECIAL STATUS WILDLIFE SPECIES 42
5.3.1 Federal Sensitive Species 42
5.3.2 State Sensitive Wildlife Species 42
5.3.3 Local Sensitive Species 42
5.3.4 Invertebrates 54
5.3.5 Fishes 54
5.3.6 Amphibians and Reptiles 54
5.3.7 Birds 55
5.3.7.1 Swainson's Hawk 56
5.3.7.2 California Condor 56
5.3.7.3 Raptor Nesting 58
5.3.7.4 Potential Areas of Raptor Use 58
5.3.7.5 Important Bird Areas (IBAs) 59
5.3.7.6 Avian Migration 59
5.3.8 Mammals 60
5.3.8.1 Terrestrial Mammals 60
5.3.8.2 Bats 61
5.4 JURISDICTIONAL WETLANDS AND WATERS 62
5.4.1 Wetlands 62
5.4.2 Potential Waters of the United States 65
5.4.3 CDFG/RWQCB Jurisdictional waters 65
5.5 WILDLIFE MOVEMENT CORRIDORS 66
5.5.1 Tehachapi Mountains 66
5.5.2 San Gabriel Mountains and Portal Ridge 66
5.5.3 Local Wildlife Linkages 67
5.6 CRITICAL HABITAT FOR FEDERALLY LISTED SPECIES 67
6.0 CONCLUSIONS 69
6.1 OVERALL BIOLOGICAL VALUE 69
6.2 BIOLOGICAL CONSTRAINTS 69
6.2.1 Special Status Plant Species 70
6.2.2 Special Status Wildlife Species 70
6.2.3 Wetlands, Waters of the U.S., and Streambeds 70
6.2.4 Birds and Bird Nests 72
6.2.5 Bats and Migrating Birds 72
6.2.6 Special Status Vegetation Types 72
6.2.7 Regional Open Space 72
7.0 LITERATURE CITED 73

TABLES

TABLE I: LAND USE 11
TABLE II: BIOLOGICAL SURVEYS AT THE WILDFLOWER GREEN ENERGY FARM 17
TABLE III: VEGETATION TYPES AT THE WILDFLOWER GREEN ENERGY FARM SITE. 23
TABLE IV: SENSITIVE PLANT SPECIES 39
TABLE V: SENSITIVE WILDLIFE SPECIES 46
TABLE VI: BAT FATALITIES FROM U.S. WIND-ENERGY FACILITIES 62
TABLE VII: WETLANDS AND WATERS AT THE WILDFLOWER GREEN ENERGY FARM SITE. 65

EXHIBITS

EXHIBIT 1: SITE MAP 6
EXHIBIT 2: REGIONAL TOPOGRAPHIC MAP 7
EXHIBIT 3: LOCAL TOPOGRAPHY/ USGS QUADRAT 8
EXHIBIT 4A: EXISTING SIGNIFICANT ECOLOGICAL AREAS 9
EXHIBIT 4B: PROPOSED SIGNIFICANT ECOLOGICAL AREAS 10
EXHIBIT 5: SOIL DISTRIBUTION 12
EXHIBIT 6: LAND USE 13
EXHIBIT 7: REGIONAL WETLANDS AND WATERS 14
EXHIBIT 8: FIELD SURVEY LOCATIONS 20
EXHIBIT 9: VEGETATION MAP 33
EXHIBIT 10A: CNDDB SPECIAL STATUS VEGETATION TYPES 37
EXHIBIT 10B: CNDDB SPECIAL STATUS PLANT AREAS 38
EXHIBIT 11A: CNDDB SPECIAL STATUS WILDLIFE AREAS – HERPS AND FISHES 43
EXHIBIT 11B: CNDDB SPECIAL STATUS WILDLIFE AREAS – BIRDS 44
EXHIBIT 11C: CNDDB SPECIAL STATUS WILDLIFE AREAS – MAMMALS 45
EXHIBIT 12: 2010 AND 2011 RAPTOR NEST AND BURROWING OWL SURVEY RESULTS 57
EXHIBIT 13A: JURISDICTIONAL WETLANDS AND WATERS 63
EXHIBIT 13B: VERNAL POOL LOCATIONS 64
EXHIBIT 14: WILDLIFE MOVEMENT ANALYSIS 68
EXHIBIT 15: BIOLOGICAL CONSTRAINTS 71

APPENDICES

APP. A:	SITE PHOTOS
APP. B:	WILDFLOWER GREEN ENERGY FARM FLORAL AND FAUNAL COMPENDIA
APP. C:	KEY NATURAL RESOURCE CONSULTANTS, INC. PERSONNEL
APP. D:	KEY WEST, INC. PERSONNEL
APP. E:	LOS ANGELES COUNTY APNS
APP. F:	VEGETATION ANALYSIS

LIST OF COMMON ACRONYMS

ACOE	UNITED STATES ARMY CORPS OF ENGINEERS
APN	ASSESSOR'S PARCEL NUMBER
BCA	BIOLOGICAL CONSTRAINTS ANALYSIS
BWEC	BATS AND WIND ENERGY COOPERATIVE
CCH	CONSORTIUM OF CALIFORNIA HERBARIA
CDFG	CALIFORNIA DEPARTMENT OF FISH AND GAME
CESA	CALIFORNIA ENDANGERED SPECIES ACT
CEQA	CALIFORNIA ENVIRONMENTAL QUALITY ACT
CNDDB	CALIFORNIA NATURAL DIVERSITY DATABASE
CNPS	CALIFORNIA NATIVE PLANT SOCIETY
FESA	FEDERAL ENDANGERED SPECIES ACT
IBA	IMPORTANT BIRD AREA
NLCD	NATIONAL LAND COVER DATASET
NRC	NATURAL RESOURCE CONSULTANTS
NWCC	NATIONAL WIND COORDINATING COMMITTEE
NWI	NATIONAL WETLANDS INVENTORY
RWQCB	REGIONAL WATER QUALITY CONTROL BOARD
SEA	SIGNIFICANT ECOLOGICAL AREA
SEATAC	SIGNIFICANT ECOLOGICAL AREA TECHNICAL ADVISORY COMMITTEE
USFWS	UNITED STATES FISH AND WILDLIFE SERVICE
USGS	UNITED STATES GEOLOGICAL SURVEY
WEST	WESTERN ECOSYSTEMS TECHNOLOGY, INC.
WS	WATERS OF THE STATE
WGEF	WILDFLOWER GREEN ENERGY FARM
WUS	WATERS OF THE UNITED STATES

EXECUTIVE SUMMARY

This Biological Constraints Analysis (BCA) examines the potential biological constraints and opportunities for development and operation of a wind and solar renewable energy project on the approximately 4,191.7-acre Wildflower Green Energy Farm site (WGEF, the site) located in northern Los Angeles County, California. The project includes an approximately 5-mile long generation tie-line connecting the electricity generated by the project to Southern California Edison's Antelope Substation. This tie-line is proposed to occur either above or below ground along Avenue J and 90th Street West within the 100 foot wide generation tie-line corridor described in this report. A complete list of Los Angeles County Assessor Parcel Numbers within the site is provided as Appendix E. Based on the constraints and opportunities described in this report, Element Power will design a renewable energy project that maximizes the compatibility of site development with biological resource conservation. Project impacts and proposed mitigation measures will be described in a Biota Report following SEATAC's review of this BCA.

The site is located in the central Antelope Valley. Approximately 452 acres of the site (10.7% of the total site) occur within the Fairmont and Antelope Buttes Significant Ecological Area (SEA) No. 57. The Portal Ridge/Liebre Mountain SEA No. 58 lies adjacent to the site's southwestern boundary across the California Aqueduct, and the Joshua Tree Woodland SEA No. 60 is found two miles to the northwest. Other open space areas within the region include: the Antelope Valley California State Poppy Reserve (immediately southwest of the site), Angeles National Forest (approximately one mile southwest), Desert Pines County Wildlife Sanctuary (approximately 2.5 miles west), Arthur B. Ripley Desert State Park (approximately 2.5 miles west), and Ritter Ridge SEA No. 56 (approximately 10 miles southeast). Areas within the WGEF site that overlap with SEA No. 57 as well as Broad Canyon and other areas adjacent to Antelope Valley California State Poppy Reserve have been identified as biological constraints for project development. A full discussion of project design features and mitigation measures designed to avoid and minimize adverse biological effects of the proposed project will be provided in a Biota Report.

Between March 2010 and May 2011, Natural Resource Consultants (NRC) and Western EcoSystems Technology, Inc. (WEST) surveyed all portions of the site. Field surveys include focused studies for vegetation communities, wetlands and waters, sensitive plants and wildlife species. Wildlife studies include focused surveys for burrowing owls, eagles and other raptors, nesting birds, migratory birds, bats, and butterflies. Botanical surveys included detailed vegetation surveys following procedures described by the California Native Plant Society for all observed vegetation types on the site and focused surveys for sensitive plants.

The site is located west of the City of Lancaster at elevations ranging from 2,600 to 3,000 feet. The site is mostly flat in the west and north with the remainder comprised of low rolling hills. Three broad washes traverse the northern and southeastern portions of the site with a number of smaller ephemeral washes and drainage channels traversing the site elsewhere. None of these drainages are hydrologically connected to Waters of the U.S. and are not under the jurisdiction of the U.S. Army Corps of Engineers (ACOE).

Approximately 1,277.5 acres of the site (30.5%) is comprised of non-native annual grasslands and agricultural fields and is actively grazed by cattle and sheep. A horse ranch occupies a small area in the west-central portion. These vegetation types and land uses are regionally abundant and do not generally support habitat for special status plant and wildlife species. Native annual grasslands are the most extensive vegetation type on the site, covering 1,021.1 acres (24.3% of the site). Native scrub and shrublands, mostly dominated by rubber rabbitbrush, comprise another 896.1 acres (21.4%, of site) and non-native grasslands an additional 836.1 acres (20.0% of the site). Native annual forblands comprise 703.9 acres (16.8%) and agriculture comprises 441.4 acres (10.5%). Disturbed, developed, native perennial grasslands, non-native forblands, native perennial forblands, non- native trees, and all waters comprise less than 5% each.

Seven special status plant communities have been identified on the site: purple needlegrass grassland (52.2 acres), desert needlegrass grassland (2.3 acres), one-sided bluegrass grasslands (11.2 acres), oak gooseberry thickets (0.8 acre), narrowleaf goldenbush scrub (2.7 acres), southern willow scrub (3.1 acres), and desert olive patches (0.9 acre). Wildflower fields, a locally important vegetation type covering 703.9 acres, are dominated by California poppy and miniature lupine. In addition, the site includes three vernal pools, totaling 2.38 acres. One vernal pool (2.27 acres) supports a population of spreading navarretia, a federally threatened plant species. Short-joint beavertail cactus, a CNPS 1B.2 plant, is also found on ridgetops in perennial grasslands and California buckwheat scrub.

No special status invertebrate, fish, or amphibian species have been observed on the site. One state-threatened species of bird, Swainson's hawk, has been observed on the site. In 2010 an active Swainson's hawk nest was identified approximately 4 miles northeast of the site along Highway 138. This nest failed in 2010 and was occupied by ravens in 2011. Golden eagles, protected under the federal Bald and Golden Eagle Protection Act and a California fully protected species, have been documented foraging over the site but no suitable nesting habitat is present. Six additional California bird species of special concern were recorded within the site during surveys conducted in 2010 and 2011: American white pelican (migrating high over the site), northern harrier, burrowing owl, loggerhead shrike, tricolored blackbird, and yellow-headed blackbird. Of these, the shrike and burrowing owl are likely to breed on the site and the tricolored blackbird breeds nearby and forages within the site; the others are likely transients or winter visitors only. Furthermore, peregrine falcon, a state fully-protected species, was observed during fall surveys, however no suitable nesting habitat is present on the site. Five bird species on the state watch list were also observed as a winter resident or migrant including: Cooper's hawk, ferruginous hawk, merlin, prairie falcon, and white-faced ibis. No nests or nesting colonies were observed for any of these five species. No federal or state listed mammals have been observed or are likely to occur on the site.

From March 2010 to March 2011, a total of 207 hours of fixed-point bird use surveys were conducted within the site, and 27,675 individual birds comprising 90 distinct species were recorded. Two species, horned lark and tricolored blackbird, comprised 65.3% of all small bird observations. Among large birds, the common raven had the highest use during all four seasons, accounting for 46.5% of all large bird observations. A total of 488 diurnal raptors, comprising 11 distinct species, were observed during surveys. Red-tailed hawk accounted for 35.9% of the raptor sightings, and American kestrel accounted for an additional 34.6%. Raptor use was highest in winter (1.92 raptors/30-minute survey) and fall (1.33 raptors/30-minute survey), compared to spring (0.50 raptors/30-minute survey) and summer (0.82 raptors/30-minute survey). Mean annual diurnal raptor use was moderate relative to raptor use at other wind-energy facilities across North America, ranking 10th out of 39 other facilities that implemented similar data collection protocols. Fixed-point bird use surveys will continue for a second full year, with a scheduled completion date in spring of 2012.

Data collected by the United States Fish and Wildlife Service (USFWS) from telemetered California condors indicate that the site and surrounding portions of the Antelope Valley are not used by the California condor for foraging, nesting, breeding, or any diurnal or nocturnal roosts (USFWS 2009). Furthermore, the site contains no habitats that are known for condor nesting (Snyder and Snyder 2000). There are no historical records of condor use in this area (Willett 1933) and the site is located approximately 15 miles south from the current limits of designated Critical Habitat for this species.

WEST conducted passive surveys for bats using Anabat ultrasonic detectors at three fixed stations from March 23 to April 21, 2011. Anabat studies are ongoing and will continue through the spring of 2012; these data will be updated appropriately. Anabat detectors recorded 1,057 bat passes over the course of 1,553 detector-nights, for an overall mean bat activity of 0.63 bat passes per detector-night. The majority (61.0%) of the recorded calls was between 15 and 30 kilohertz in frequency (i.e., big brown bat, hoary bat, Mexican free-tailed bat), while 38.8% were greater than 30 kilohertz in frequency (i.e.,, most Myotis

species). The remaining calls were by very low-frequency bat species (i.e., spotted bat and western mastiff bat).

To better describe the extent of nocturnal avian migration over the site, surveys using radar equipment designed to detect small objects such as birds (and bats) were conducted at the site in the spring and fall of 2010. The mean hourly passage rate during spring surveys was 157 ± 17 targets/hour, with a mean target flight height of approximately 697 ± 8 meters. During fall, the mean hourly passage rate was 86 ± 8 targets/hour, with a mean target flight height of 777 ± 13 meters. Approximately 11% of targets observed during spring surveys were flying below 150 meter (the zone of risk posed by turbines), while only approximately 2% of targets were below 150 meters during fall. Based on the scarcity of trees and water sources that provide shelter and rehydration, the site is not likely to provide significant stopover points for migrating songbirds.

A total of 3.51 acres of wetlands and 31 waterbodies, comprising 8.26 acres (not including portions of the drainage occupied by wetland areas), were identified within the site and along the proposed generation tie-line corridor as potentially jurisdictional by the ACOE, the California Department of Fish and Game (CDFG), or the Regional Water Quality Control Board (RWQCB). All wetland and waters features were determined to be isolated and, therefore, likely outside of the jurisdiction of the ACOE, however CDFG and RWQCB jurisdiction is anticipated.

The ridges and valleys associated with the Tehachapi Mountains to the west and northwest of the site provide a primary southwest-northeast wildlife movement corridor of regional significance that bridges the Sierra Nevada and San Gabriel Mountain Ranges. In addition, the broad-front linkage between the San Gabriel Mountains (including Portal Ridge) and the Mojave Desert provide a primary northwest-southeast wildlife corridor running south of the site. These two corridors may be used by large mammal species moving to and from wintering grounds in the high desert as well as for summer feeding, denning, and breeding. The site is not an integral part of either of these primary regional corridor or teh secondary linkages associated with these topographic features. There is potential for localized wildlife movement on tertiary corridors between the WGEF site and SEA No. 57, however, movement away from these features is constrained by the California Aqueduct just south of the site, Highway 138 north of the site, and the general absence of tall vegetation throughout the Antelope Valley.

Potential biological constraints to development on this site include: 1) various special status vegetation types, 2) special status plant species, 3) special status wildlife species, 4) avian migration routes and nesting birds, 5) bats foraging over or migrating through the site; 6) Wetlands and Waters regulated by the ACOE, CDFG, and/or RWQCB, and 7) regionally important open space areas. These resources are described in this BCA and will be considered in the design of the wind and solar facilities and generation-tie line. Potential impacts, design features, and mitigation measures to minimize and avoid adverse effects to these resources will be provided in the Biota Report for this project. Opportunities for development including large areas of non-native grasslands, agricultural fields, annual grasslands, shrublands, and disturbed areas are also identified.

1.0 INTRODUCTION

Natural Resource Consultants (NRC) and Western EcoSystems Technology, Inc. (WEST) were retained by Element Power to prepare a Biological Constraints Analysis (BCA) for the approximately 4,191.7-acre Wildflower Green Energy Farm site (WGEF, "the site"), located in Los Angeles County, California approximately 16 miles (26 kilometers [km]) west of the city of Lancaster (Exhibits 1 and 2). Element Power is proposing to develop a wind and solar energy facility on this site. The proposed project includes an approximately 5-mile long generation tie-line (gen-tie) connecting the electricity generated by the project to Southern California Edison's Antelope Substation. This tie-line is proposed to lead 5 miles east from the southeast corner of the site to the Antelope Substation located at the intersection of W Avenue J and 100th Street.

Approximately 452.2 acres of the site (or 10.7% of the total site) lies within part of the Fairmont and Antelope Buttes Significant Ecological Area (SEA) No. 57. The County of Los Angeles Department of Regional Planning requires a BCA as part of the environmental review process for proposed development within a Significant Ecological Area (SEA) or its buffer, as defined in the County Zoning Code Section 22.56.215 (Los Angeles County Department of Regional Planning [Regional Planning] 2010). This document is based on information pertaining to wildlife and jurisdictional surveys conducted by WEST and vegetation, sensitive plant and other regional biological information provided by NRC. Field surveys were conducted between March of 2010 and May 2011 and covered all portions of the site and generation tie-line. The surveys completed described herein are adequate to identify biological constraints and opportunities for development over the entire site. Several wildlife studies (e.g. Anabat surveys, breeding bird surveys, raptor surveys) are ongoing (by design) and final data from these studies will be included in the Biota Report.

2.0 SITE LOCATION AND EXISTING CONDITIONS

2.1 Characteristics of the Site

The site is located on approximately 4,191.7 acres of private land within the rural community of Fairmont in northern Los Angeles County. A complete list of Los Angeles County APN's included within the site is provided as Appendix E. The closest city to the site is Lancaster, approximately 16 miles to the east. Lancaster Avenue runs northwest/southeast through the site, and 170th Street West runs north to south along the west-central portion of the site. The Antelope Valley California State Poppy Reserve is located immediately north and east of the site and the California Aqueduct defines much of the southwestern boundary of the site (Exhibit 2).

The site lies within the Antelope Valley region of Los Angeles County. Elevations within the site boundary and tie-line corridor range from approximately 2,620–3,000 feet (ft) (795 to 914 meters [m]) (Exhibit 3). This gen-tie corridor is defined as the 100ft wide area surrounding the location of the proposed generation tie-line. Much of the site is comprised of previously disturbed agricultural areas and non-native annual grasslands used as pasture for cattle (*Bos taurus*) and sheep (*Ovis aries*) grazing, with some areas of active crop production. Healy Farms, a horse training facility, is located within the site boundary at the intersection of 170th Street West and Lancaster Avenue. Healy Farms consists of a ranch home, horse stables, corrals, pastures, and storage buildings. Fairmont Church is also located within the boundary at 160th Street West and Lancaster Avenue.

The Fairmont and Antelope Buttes SEA No. 57 encompasses approximately 5,567 acres (8.70 mi^2) and 452.2 acres of the WGEF site fall within this SEA boundary (Exhibit 4A). The Fairmont and Antelope Buttes SEA was designated based on the potential for increased biological diversity of the desert butte ecosystem. The Fairmont and Antelope Buttes are the most westerly habitat of this type in the Mojave Desert and a unique feature of the region. Their proximity to the San Gabriel Mountains has allowed for a different

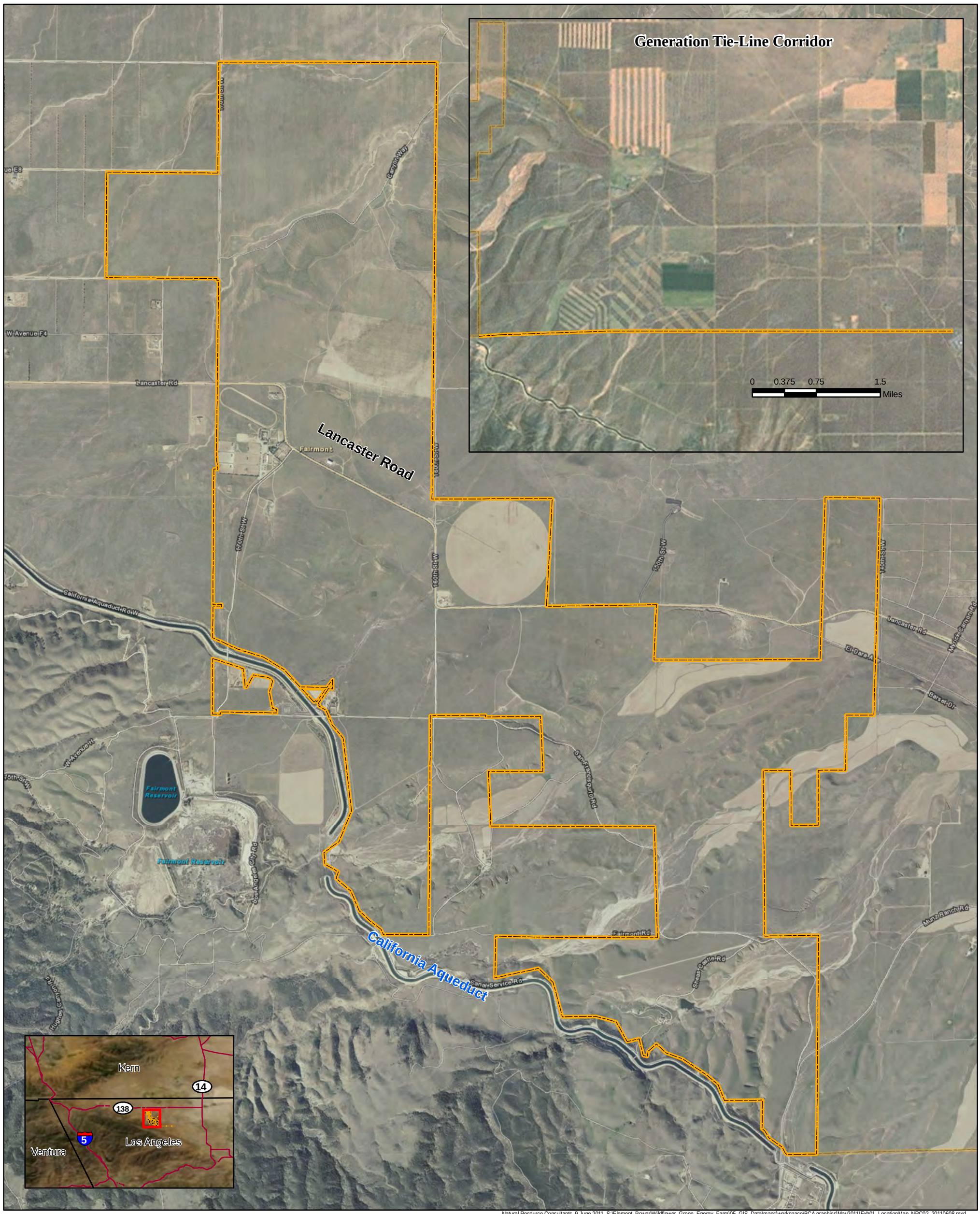
species composition than other butte habitats in the desert. In addition, the buttes serve as a concentrated wintering ground for raptors, providing roosting sites surrounded by cultivated fields and grasslands for foraging opportunities (England and Nelson Environmental Consultants 1976). Native annual forbs (wildflower fields) and native perennial grasslands occur on the slopes of the buttes and are recognized features of the Fairmont and Antelope Buttes SEA.

The Portal Ridge/Liebre Mountain SEA No. 58 is adjacent to the southwest corner of the site, and the Joshua Tree (*Yucca brevifolia*) Woodland SEA No. 60 lays approximately 2 miles northwest of the site (Exhibit 4A). The Portal Ridge/Liebre Mountain SEA bridges three major geographical ranges; the Mojave Desert, the San Gabriel Mountains, and the Tehachapi Foothills. This SEA was designated because of the presence of a diverse and unique flora in the County representing 10 distinct plant communities, including foothill woodland, southern oak (*Quercus* spp.) woodland, valley grassland, riparian woodland, and coastal sage (*Artemisia tridentata*) scrub (England and Nelson Environmental Consultants 1976). The Joshua Tree Woodland SEA represents an excellent example of Joshua tree woodland habitat, which is becoming scarce in the region as a result of accelerated agricultural and urban expansion.

The County of Los Angeles is currently updating its General Plan. As an element of the General Plan, the SEA program is also undergoing revisions. The County Department of Regional Planning has proposed a new SEA plan that would retain a number of existing SEAs and combine several smaller SEAs into larger units (Exhibit 4B). The proposed revisions are based on revised criteria and consideration of land-use changes since the original designation (i.e. increase in developed areas). The revised SEA proposal has not been approved nor has the General Plan update been adopted. This BCA provides a description of proposed SEA boundaries; however, the existing SEA boundaries are used for analysis. It should be noted that the boundaries that are in place at the time a Notice to Prepare an EIR for a particular project is submitted shall be the boundaries which pertain to the processing of that project regardless of future changes (CEQA Guidelines, Section 15126.2[a]).

The County of Los Angles proposed updates to the current SEA boundaries to include the proposed San Andreas Rift Zone SEA. This proposed SEA would encompass the areas of existing SEA Nos. 58 and 59, the Portal Ridge/Liebre Mountain and Tehachapi Foothills SEAs and would overlap approximately 1,856.9 acres (44.3%) of the site (Exhibit 4B). This proposed SEA encompasses a small portion of the western Tehachapi foothills then stretches in a southeasterly direction to include: Quail Lake, the northern foothills of Liebre and Sawmill Mountains, large portions of Portal Ridge, Leona Valley, Ritter Ridge, Fairmont and Antelope buttes, Anaverde Valley, and Lake Palmdale, before terminating at Barrel Springs near the city of Palmdale. The SEA proposal indicates that the primary resource in this area is wildlife movement between the San Gabriel Mountains and the Tehachapi Mountains. The County's report indicates that "this linkage to the Tehachapi Mountains is important because it represents a link to the westernmost extent of the Sierra Nevada Mountains… represent[ing] the only mountain linkage from the Transverse Ranges or the Pacific Coast Range to the Sierra Nevada Range" (PCR 2000). It is assumed that movement would primarily occur along the Portal Ridge system located south of the site. The proposal also mentions that this feature may be a topographic reference and high-elevation foraging grounds for migrating birds.

Other open space areas within the region include the Angeles National Forest (approximately one mile southwest), Desert Pines County Wildlife Sanctuary (approximately 2.5 miles west), Arthur B. Ripley Desert State Park (approximately 2.5 miles west), and Ritter Ridge SEA No. 56 (approximately 10 miles southeast).



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh01_LocationMap_NRC02_20110608.mxd

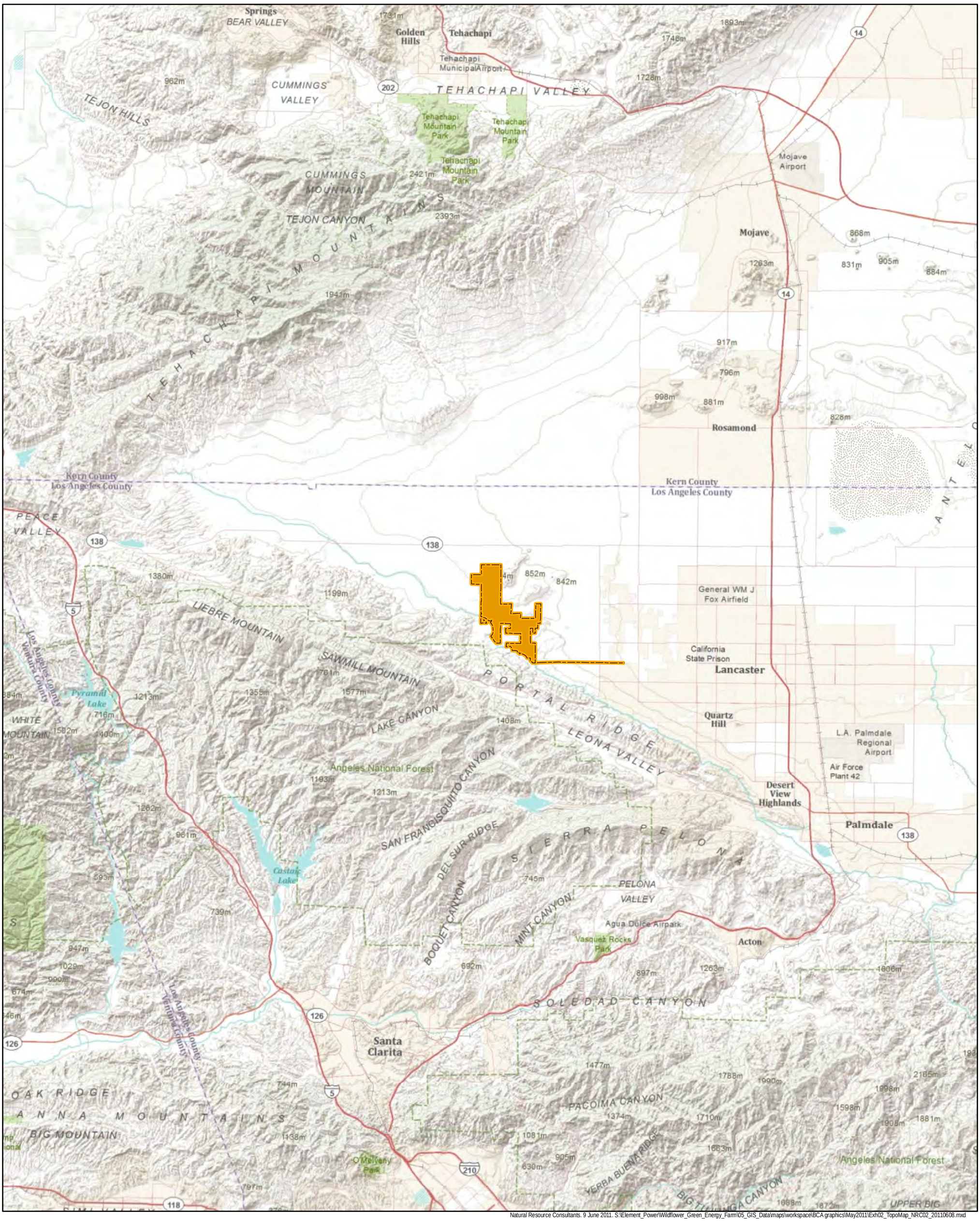
Project Boundary

0 0.2 0.4 0.8
Miles

N
W E
S

Exhibit 1: Site Map

Wildflower Green Energy Farm
Los Angeles County, California



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh02_TopoMap_NRC02_20110608.mxd

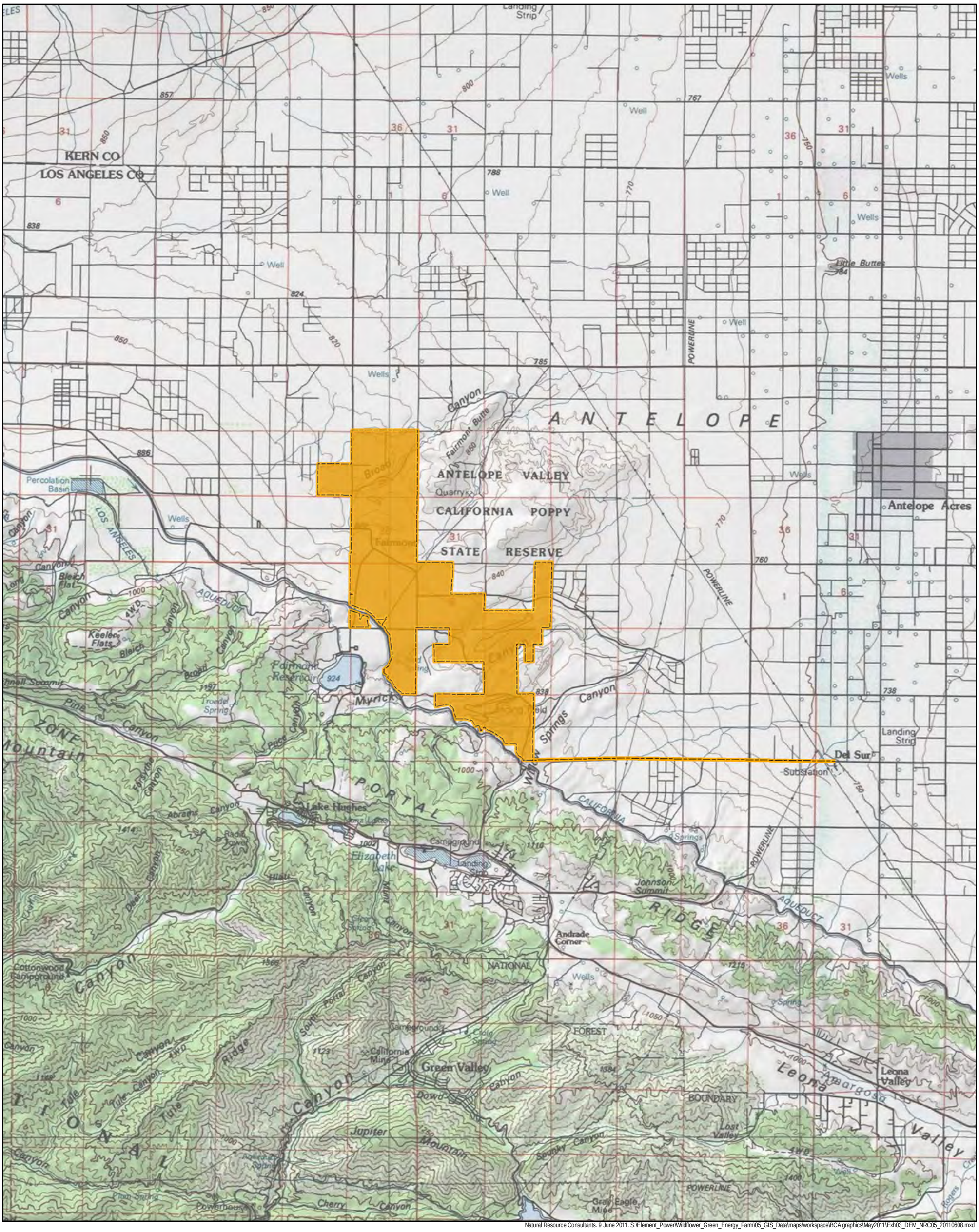
Project Boundary

N
W E
S

0 2 4 8
Miles

Exhibit 2: Regional Topographic Map

Wildflower Green Energy Farm
Los Angeles County, California



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh03_DEM_NRC05_20110608.mxd

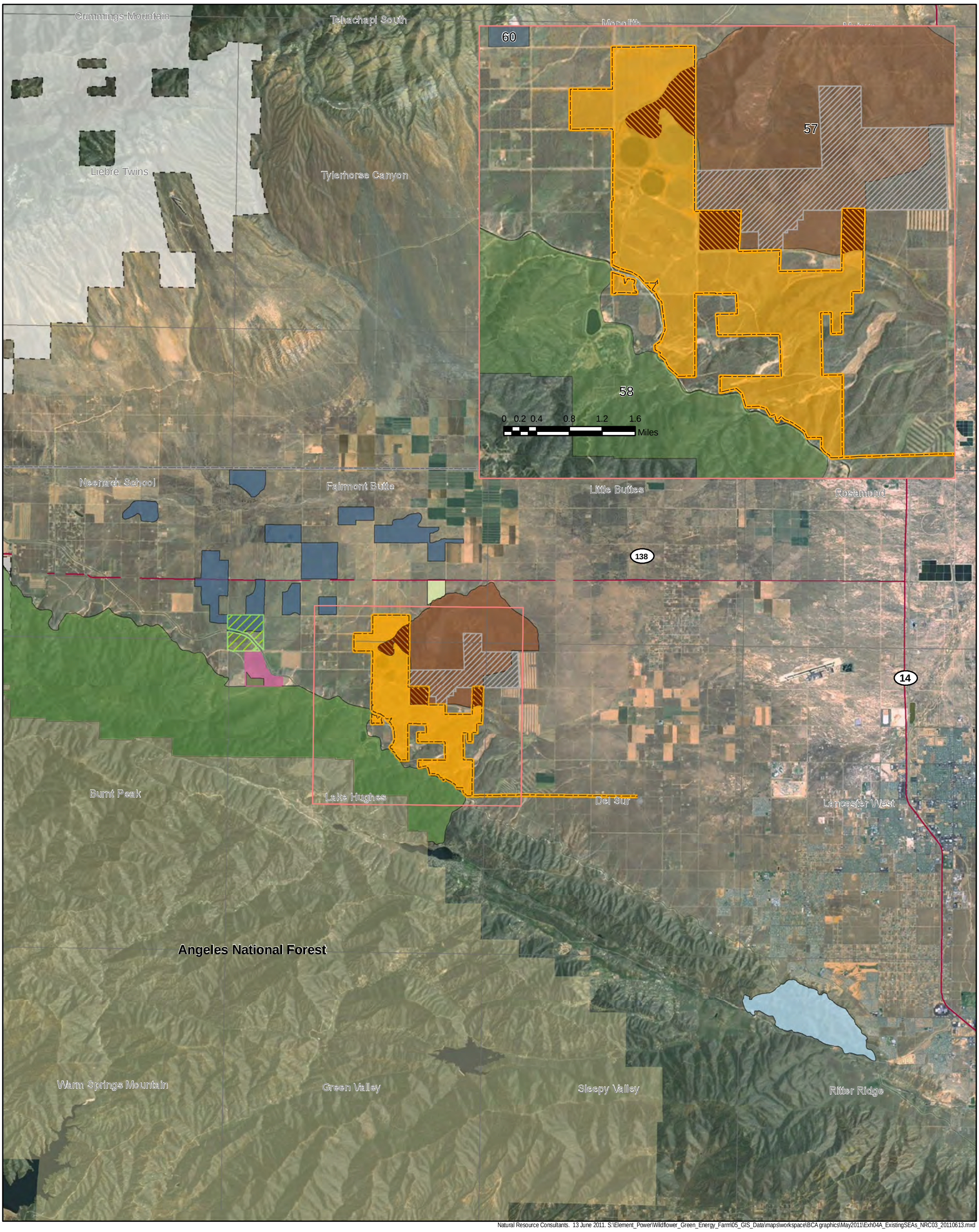
Project Boundary

0 0.4 0.8 1.6 Miles

N W E S

Exhibit 3: Local Topography / USGS Quadrat

Wildflower Green Energy Farm
Los Angeles County, California



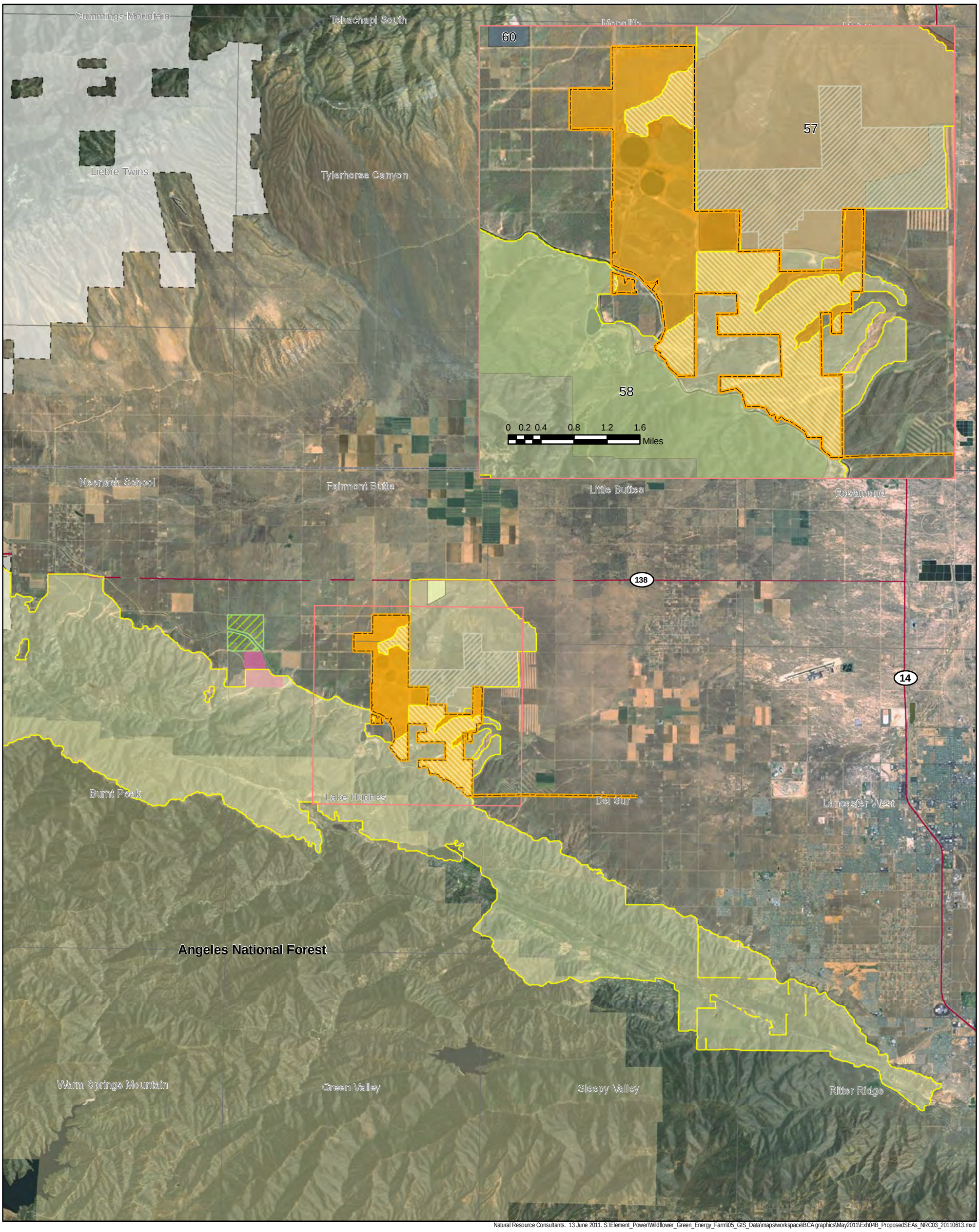
Natural Resource Consultants. 13 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh04A_ExistingSEAs_NRC03_20110613.mxd

- Project Boundary
- County Boundaries
- Angeles National Forest
- Antelope Valley California Poppy Reserve
- Fairmont-Antelope Buttes SEA No. 57
- Joshua Tree Woodland SEA No. 60
- Portal Ridge- Liebre Mountain SEA No. 58
- Ritter Ridge SEA No. 56
- Project Area within existing SEA
- Arthur B. Ripley Desert Woodland SP
- Tejon Ranch
- Fairmont Butte Motorsports Park
- Desert Pines County Wildlife Sanctuary

N W E S

0 1.25 2.5 5 Miles

Exhibit 4A: Existing Significant Ecological Areas
Wildflower Green Energy Farm
Los Angeles County, California



Natural Resource Consultants. 13 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh04B_ProposedSEAs_NRC03_20110613.mxd

- Project Boundary
- County Boundaries
- Angeles National Forest
- Antelope Valley California Poppy Reserve
- San Andreas Rift SEA (proposed)
- Project Area within proposed SEA
- Arthur B. Ripley Desert Woodland SP
- Tejon Ranch
- Fairmont Butte Motorsports Park
- Desert Pines County Wildlife Sanctuary

N W E S

0 1.25 2.5 5 Miles

Exhibit 4B: Proposed Significant Ecological Areas
Wildflower Green Energy Farm
Los Angeles County, California

2.2 Geology and Topography

Topography within the site consists of a mosaic of mostly relatively flat fields and low ridges and hills, with elevations ranging from approximately 2,620 ft (795 m) in the northeast to 3,000 ft (914 m) in the southwest (Exhibits 2 and 3). The western portion of the site has nearly flat topography, while the remainder of the site is characterized by gentle slopes and rolling hills. The southern portion of the site includes three washes and canyons. The largest slopes occur along ridges located in the south of the site. Soil erosion is evident along the washes and drainage channels throughout the site.

2.3 Soils

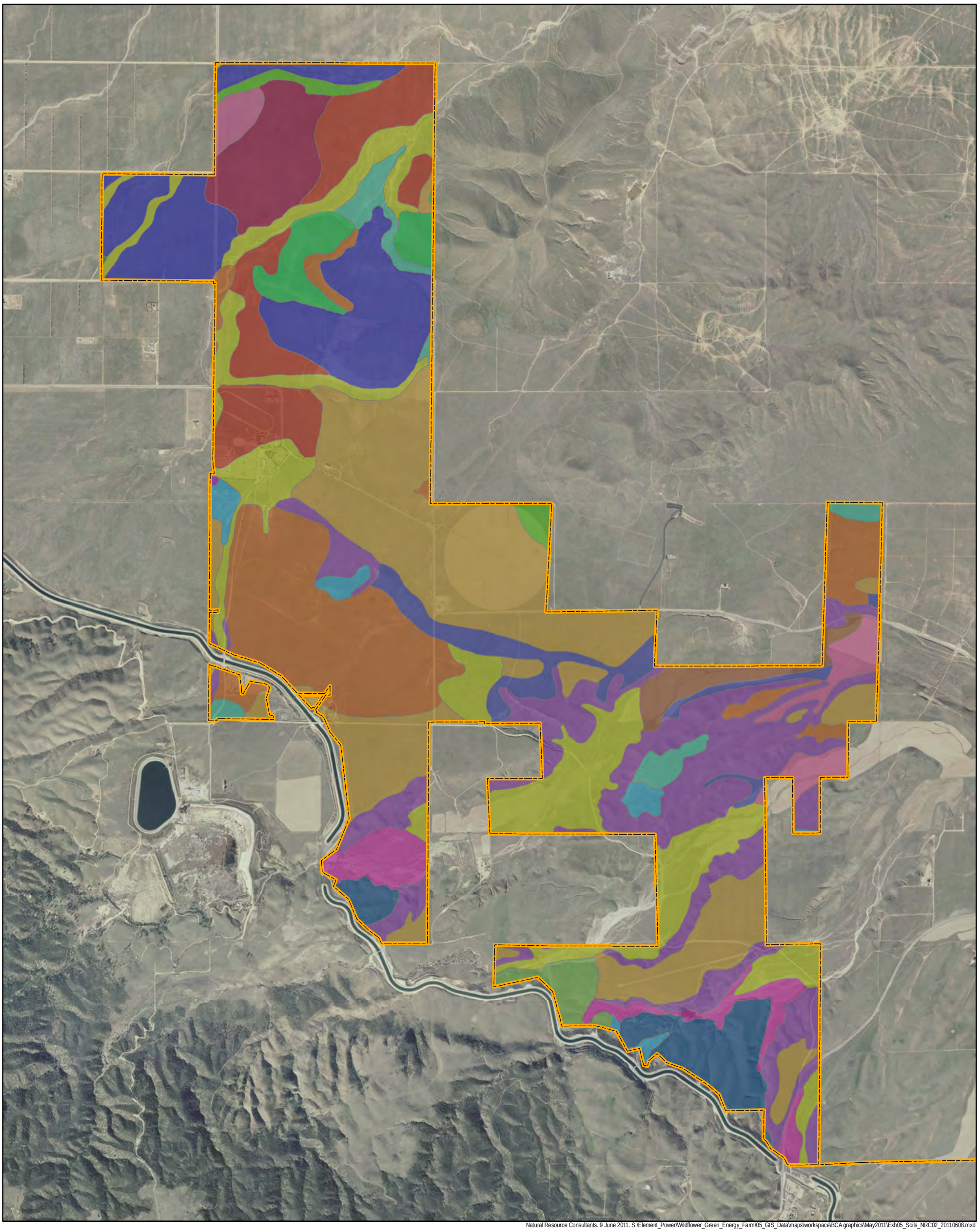
The site is primarily (about 85%) underlain by three soil series comprising seven soil mapping units, which are dependent upon topographic position. The three series include Hanford coarse sandy loam, Greenfield sandy loam, and Terrace escarpments (Exhibit 5). All of these soil series are formed in alluvium derived from granite and are classified in the same ecological range site (NRCS 2010). The three soil series occur on alluvial fans and terraces. None of the other soil series mapped within the site (Auga Dulce stony loam, Hanford sandy loam, Ramona coarse sandy loam, and Vista coarse sandy loam) comprise more than 2% of the total site.

2.4 Land Use

Land cover data from satellite imagery from the 1992 National Land Cover Dataset (NLCD) were reviewed to assess the types of land uses and land cover within and surrounding the site (USGS NLCD 2001; Table I; Exhibit 6). More detailed, site-specific vegetation community mapping was conducted within the site, and that effort is described in Section 4.0. According to the NLCD, the dominant cover type on the site, is herbaceous dominated (or grassland) and comprises 3,210.7 acres (5.0 mi^2) or 76.6% of the site. Cropland is the next most common cover type, comprising 587.8 acres (0.9 mi^2; 14.0%) of the site. Scrub/shrub habitats comprise a further 216.6 acres (0.3 mi^2; 5.2%) of the site, and 169.6 acres (0.3 mi^2; 4.0%) of the site is classified as developed open space. The remaining 0.1% of the site is comprised of small amounts of pasture/hay field (3.8 acres [less than 0.01 mi^2]).

TABLE I: LAND USE
DATA WERE OBTAINED FROM THE 1992, NLCD COMPILED FROM SATELLITE IMAGERY (USGS NLCD 2001).

Cover Type	Acreage	% Composition
Barren Land	4.0	0.1
Cultivated Crops	587.8	14.0
Developed, Open Space	169.6	4.0
Grassland/Herbaceous	3,210.7	76.6
Hay/ Pasture	3.8	0.1
Shrub/Scrub	216.6	5.2
Total	**4191.7**	**100**



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh05_Soils_NRC02_20110608.mxd

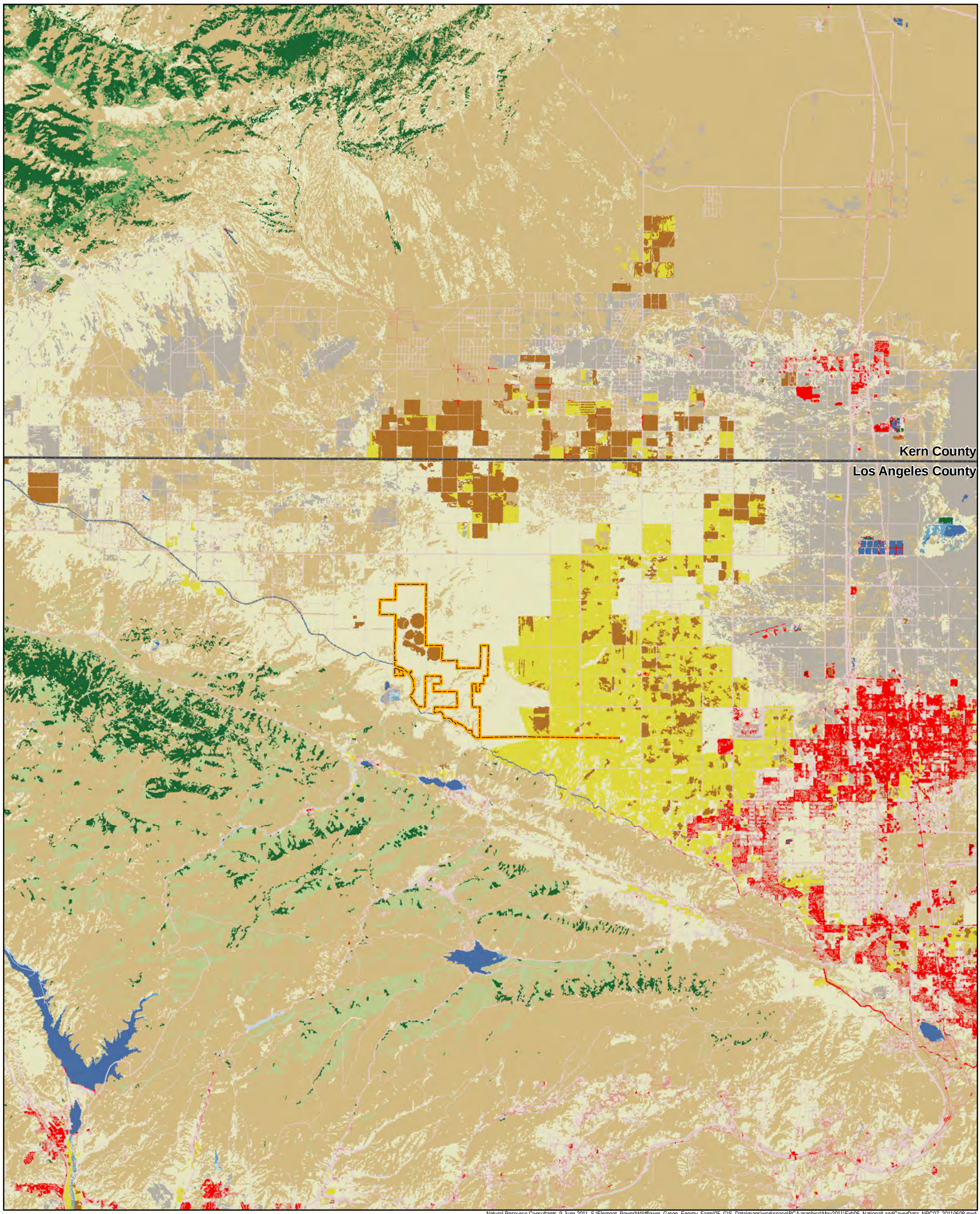
- Project Boundary
- Agua Dulce stony loam, 30 to 50 percent slopes
- Greenfield sandy loam, 0 to 2 percent slopes
- Greenfield sandy loam, 2 to 9 percent slopes
- Greenfield sandy loam, 2 to 9 percent slopes, eroded
- Greenfield sandy loam, 9 to 15 percent slopes, eroded
- Hanford coarse sandy loam, 0 to 2 percent slopes
- Hanford coarse sandy loam, 2 to 9 percent slopes
- Hanford gravelly sandy loam, 2 to 9 percent slopes
- Hanford loam, 0 to 2 percent slopes
- Hanford sandy loam, 0 to 2 percent slopes
- Hanford sandy loam, 2 to 9 percent slopes
- Ramona coarse sandy loam, 0 to 2 percent slopes
- Ramona coarse sandy loam, 2 to 5 percent slopes
- Ramona coarse sandy loam, 5 to 9 percent slopes
- Ramona coarse sandy loam, 9 to 15 percent slopes
- Terrace escarpments
- Vista coarse sandy loam, 15 to 30 percent slopes
- Vista coarse sandy loam, 15 to 30 percent slopes, eroded
- Vista coarse sandy loam, 30 to 50 percent slopes, eroded

0 0.15 0.3 0.6 Miles

N W E S

Exhibit 6: Soil Distribution

Wildflower Green Energy Farm
Los Angeles County, California



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh06_NationalLandCoverData_NRC07_20110608.mxd

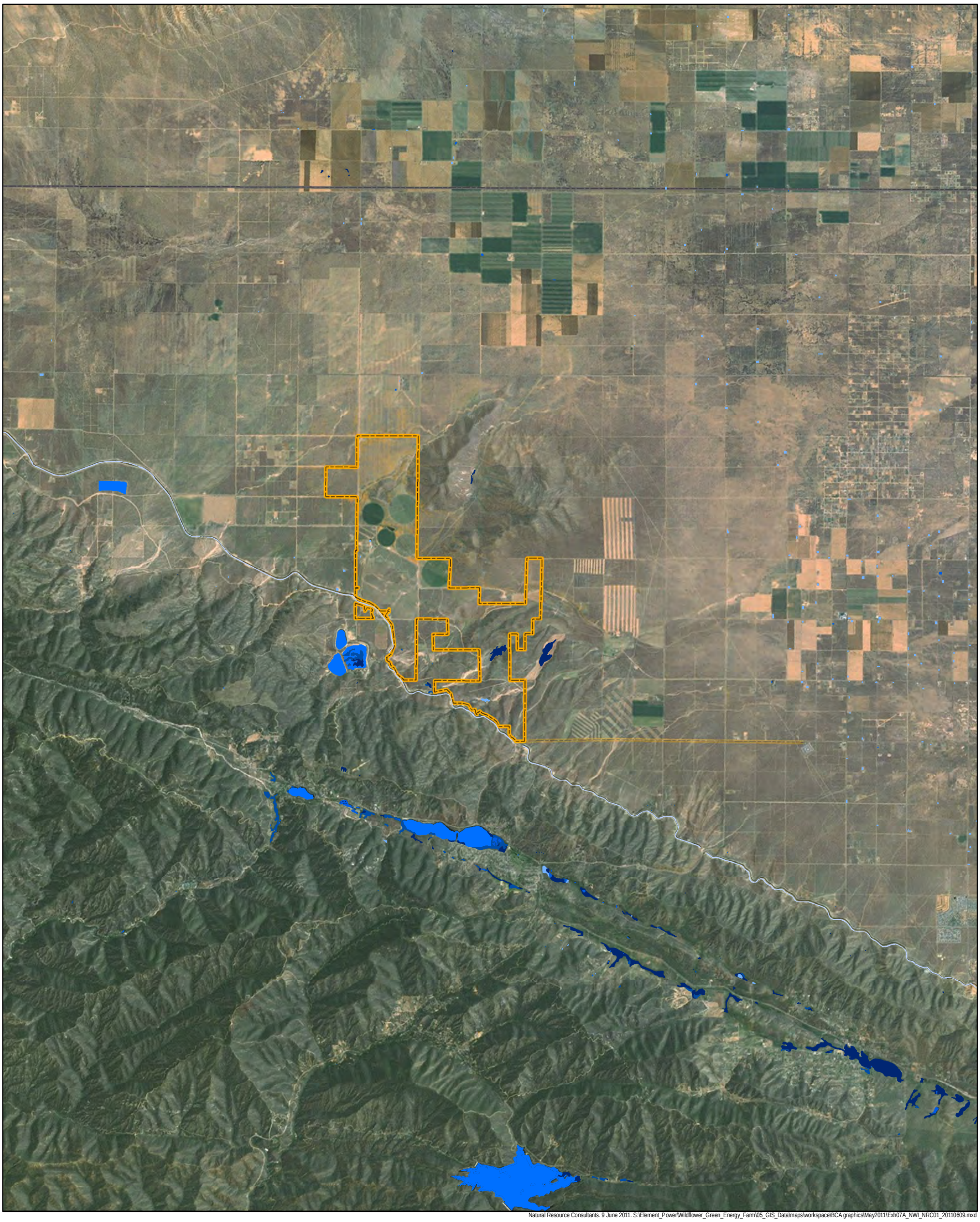
- Project Boundary
- Barren Land
- Cultivated Crops
- Deciduous Forest
- Developed, High Intensity
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, Open Space
- Emergent Herbaceuous Wetlands
- Evergreen Forest
- Hay/Pasture
- Herbaceuous
- Mixed Forest
- Open Water
- Shrub/Scrub
- Woody Wetlands

N W E S

0 1.25 2.5 5 Miles

Exhibit 6: Land Use

Wildflower Green Energy Farm
Los Angeles County, California



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh07A_NWI_NRC01_20110609.mxd

- Project Boundary
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

N
W E
S

0 0.5 1 2 Miles

Exhibit 7: Regional Wetlands and Waters

Wildflower Green Energy Farm
Los Angeles County, California

2.5 Regional Characteristics

The Antelope Valley Region represents a large groundwater basin in the western part of the Mojave Desert. It is characterized by relatively flat land, punctuated by occasional buttes or rock outcroppings, such as the Fairmont and Antelope Buttes immediately northeast of the site. Elevations of the valley floor range from 2,300 to 3,500 ft (700 to 1,070 m) above sea level. The basin is bounded on the northwest by the Garlock Fault zone at the base of the Tehachapi Mountains and on the southwest by the San Andreas Fault zone at the base of the San Gabriel Mountains.

2.5.1 LAND USE

The California Aqueduct runs northwest to southeast along the southwestern boundary of the site. The Fairmont Reservoir (underground) is part of the aqueduct system and located approximately 0.5 miles (0.8 km) south of the southwest corner of the site. Lake Hughes, Lake Elizabeth, and associated residential development, are located approximately 3 mi (4.8 km) south of the site along the San Andreas Fault zone. The Antelope Valley California State Poppy Reserve, administered by the California State Parks Department, is located adjacent to the northeastern boundary of the site, and the Arthur B. Ripley Desert Woodland State Park is located 3 miles west on Lancaster Road at 210th Street West (Exhibit 4A). The Santa Monica Mountains Conservancy manages lands to the north of the site, adjacent to the preserve, and the Angeles National Forest is located approximately 1.5 miles (2.4 km) to the southwest. The Desert Pines County Wildlife Sanctuary is located west of the site, immediately south of the Arthur B. Ripley Desert Woodland State Park, The majority of the remaining land in the surrounding region is comprised of private, unoccupied, grazing and agricultural lands (primarily alfalfa [*Medicago sativa*], onions [*Allium cepa*], and dry wheat [*Triticum aestivum*] farming) with rural residential development and scattered rural homes.

2.5.2 LAND COVER TYPES/NATURAL COMMUNITIES

Based on satellite imagery from the 1992 National Land Cover Dataset (USGS NLCD 2001), the surrounding area within two miles of the site contains greater amounts of scrub/shrub habitats than the site, fewer areas of cropland, and a greater amount of open water (Exhibit 6). The surrounding region also contains very small amounts of evergreen and mixed forest, woody wetlands, emergent wetlands, and low density development that are not present within the site. These wooded areas and wetlands are particularly prevalent along the Portal Ridge and San Gabriel Mountains at higher elevations than those occurring on site. Natural communities found within the site (i.e. native and non-native grasslands and rabbitbrush [*Ericameria* (*Chrysothamnus) nauseosus*] scrub) as well as disturbed and agricultural areas, are also common in the surrounding landscape. Foothills south and west of the site are primarily comprised of mixed chaparral with areas of foothill pine (*Pinus sabiniana*) woodland. Natural communities north and east of the site are primarily composed of more typical Mojave Desert plant communities such as creosote (*Larrea tridentada*) scrub, mixed Mojavean scrub, saltbush scrub, and Joshua tree woodland. Areas of tilled agriculture are present in the vicinity, particularly to the north and east.

2.5.3 REGIONAL WETLANDS AND WATERS

Based on data from the USFWS National Wetland Inventory (NWI; 2010), the region surrounding the site contains a slightly larger proportion of wetland habitat, and the composition is somewhat different, primarily due to the presence of Fairmont Reservoir immediately southwest of the site. Most of the wetland habitat within the surrounding area is classified as lake with lesser amounts of emergent wetland and riverine habitat (Exhibit 7). Jurisdictional determinations for all wetlands and waters occurring on site are discussed in Section 5.4 of this report.

3.0 FIELD SURVEY METHODS

3.1 General Survey Information

Biological studies conducted for this analysis were designed to evaluate constraints related to development of a wind and solar energy project that may affect plant and wildlife resources (Table II). WEST initiated general vegetation mapping, as well as surveys for special status plants, wetlands/waters of the U.S., burrowing owls (*Athene cunicularia*), raptor nests, nocturnal migrants, and butterflies between March and July of 2010. In addition, avian and bat surveys following the California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (Guidelines [CEC and CDFG 2007]) were initiated by WEST in March 2010 and have continued through May 2011. Between November 2010 and May 2011 NRC and WEST have surveyed all portions of the site including surveys for vegetation, wetlands and waters, plants, and wildlife species as described in the following sections. The location of all sampling locations and survey types is shown in Exhibit 8.

Floral and faunal taxonomy used in this report follow the taxonomy used in the most recent authoritative literature. Vegetation types follow Holland (1986) and Sawyer et al. (2009) and are summarized into major guild types (e.g. native annual grasslands, non-native annual forblands, native scrub, etc.) for acreage analysis. For plants, The Jepson Manual (Hickman 1993) is followed. Common plant names, where not available from Hickman, are taken from Abrams (1923 and 1944), Abrams and Ferris (1951 and 1960), Beauchamp (1986), Munz (1974), and CNPS (2010), and Simpson and Hasenstab (2009). Vertebrate taxonomy follows Moriarty (2000) for amphibians and reptiles, American Ornithological Union (1998 and supplements 2000-2010) for birds, and Kays and Wilson (2002) for mammals. Scientific names are mentioned once in the text and common names are used thereafter.

3.2 Review of Other Existing Information

In addition to field surveys several sources of available data were used to identify biological resources within the site and surrounding region, including published literature, field guides, and public data sets. The information presented in this analysis was obtained from the following sources:

Bat Conservation International (BCI) species accounts and range maps (BCI 2010);

CNDDB, maintained by the CDFG, quad-level species occurrence information;

- CNPS' *Online Inventory of Rare and Endangered Plants of California* (CNPS 2010);
- Consortium of California Herbaria (CCH 2011);
- eBird online bird checklist; (eBird 2011)
- List of Important Bird Areas (IBAs) by the National Audubon Society (Audubon 2010);
- Antelope Valley Area Plan Update – Background Report (April 2009; Regional Planning 2009);
- U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) data (Natural Resources Conservation Service [NRCS] 2010);
- USFWS National Wetland Inventory (NWI) data (USFWS NWI 2010);
- USFWS county-level species occurrence information;
- U.S. Geological Survey (USGS) Gap Analysis Program (GAP) land cover data;
- USGS topographic maps and digital elevation data;
- USFWS Critical Habitat designations

TABLE II: BIOLOGICAL SURVEYS AT THE WILDFLOWER GREEN ENERGY FARM

DATE	TIME, BIOLOGIST*	WEATHER	SURVEY INFORMATION
2 Mar. 2010	0900-1100 hours, WE, AC	50's; overcast, windy	Site visit with Element Power, general reconnaissance
12 Mar. 2010	0800-1500 hours, AC	60's; overcast, windy	Habitat and land use evaluation and general site assessment; establishment of avian use surveys stations
18 Mar. 2010 – 3 Mar. 2011	Weekly, WD	Variable	30-minute avian use surveys conducted weekly at 8 points throughout site
23 Mar. 2010 – Present	Nightly, WD	Variable	Passive acoustic bat surveys at three stations throughout site
14 Apr. 2010	0800-1400 hours, AC, TR	70's; sunny, calm	Aerial golden eagle/raptor nest survey
17-30 Apr., 4-7 May, and 6-8 July 2010	0800-1700 hours, KF, JF, EL, SK	Variable	Special-status plant surveys and general vegetation mapping
19 Apr. 2010	0800-1200 hours, AC	70's; sunny	Follow-up visits to nests identified during aerial nest survey; initiation of spring nocturnal migration radar survey
20 Apr. – 19 May 2010	1900-0400 hours, EC	Variable	Nocturnal radar surveys
28-30 Apr. 2010	0800-1700 hours, KF, JF, EL, SK	Variable	Wetland and Waters of the U.S. survey
9 May 2010	0700-1500 hours, AC	60's and 70's; overcast, windy	Assessment of prey base and avian migration pathways, initiation of burrowing owl surveys
9 May – 12 July 2010	0700-1400 hours, DH, MS, TM	Variable	Burrowing owl and general wildlife surveys
10, 16 May 2010	0900-1500 hours, GB	60's and 70's; sunny	Butterfly survey
24-25 May 2010	0800-1400 hours, AC, TR	70's; sunny	Aerial golden eagle/raptor nest survey
26 May 2010	1400-1600 hours, AC	80's; sunny	Follow-up visit to Swainson's hawk nest identified during aerial survey
8 Sept. – 8 Oct. 2010	1900-0400 hours, EC	Variable	Nocturnal radar surveys
17 Nov. 2010	0900-1430 hours, DL	50's; overcast, windy	Vegetation mapping; wildlife surveys; general reconnaissance
19 Nov. 2010	0800-1730 hours, SHR	50's; overcast, windy	Vegetation mapping; general botanical/wetland surveys
25 Nov - 2010	0745-1500 hours, HLJ	40's and 50's; windy	Ornithological evaluation
3 Feb. 2011	0600-1200 hours, SHR	40's, windy	Vegetation mapping; general botanical/wetland surveys
12 – 22 Apr. 2011	0700-1600 hours, SHR, MP	Variable	Vegetation mapping and botanical surveys
13-14, 21 April, 11, 24 May, 2011	0900-1700 hours, AC, WD	Variable	Raptor nest survey
29 April – 30 June, 2011	0600-0900 hours, bi-weekly, WD, DG	Variable	Bi-weekly riparian migrating/breeding bird surveys
2 May 2011 - Present	weekly, WD, DG	Variable	30-minute avian use surveys conducted weekly at 12 points throughout site; 2-hr golden-eagle specific surveys conducted at 2 points within site
12 – 13 May 2011	0600-1700 hours, KF	50's and 60's; overcast, windy	Wetland and Waters of the U.S. survey
18 May 2011 – Present	0700-1400 hours, NV, CK, AP	Variable	Burrowing owl and general wildlife surveys

*WEST Personnel and subcontractors: WE – Wallace Erickson; AC – Andrea Chatfield; WD – William Deppe; TR – Troy Rintz; KF – Kurt Flaig; JF – Jeannette Flaig; EL – Elizabeth Lack; SK – Susan Komarek; EC – Erin Colclazier (Hamer Environmental, L.P.); GB – Guy Bruyea (Bruyea Biological Consulting); DH – Darrell Hutchinson; MS – Melissa Schlothan; TM – Troy Maikis; DG – David Goodward; NV – Nicholas Vitale; CK – Clinton Kveton; AP – Ariel Perriglio
NRC Personnel: DL - David Levine; SHR – Stephen H. Reynolds, HLJ - H. Lee Jones; MP – Mitch Provance

3.3 Vegetation Mapping

Vegetation mapping was done at the alliance level following Sawyer et al. (2009) with a minimum mapping unit of 1,000 sq. ft. (approximately 30m x 30m). This vegetation classification system is the preferred system by the California Native Plant Society and the California Department of Fish and Game (CNPS 2009, CDFG 2009). Woody vegetation types (e.g. shrub or tree dominated vegetation types) were delineated on aerial maps and ground-truthed in the field by NRC for the entire site in April and May 2011. Herb (e.g. grass, graminoid, and forb) dominated vegetation types were mapped using the California Native Plant Society / Department of Fish and Game Protocol for Combined Vegetation Rapid Assessment and Relevé Sampling (CNPS 2009). Under this protocol, homogeneous stands with uniform structure and composition were selected that were most representative of each vegetation type. These stands were then surveyed using plots of equal size. For analysis and graphic presentation this report presents vegetation information at a "community" level for acreage analysis. Information pertaining to vegetation classes (Holland 1986) and alliances (Sawyer et al. 2009) are described as well. A full description of the methods and results of NRC's vegetation analysis is provided in Appendix F.

Prior to field surveys, NRC reviewed aerial photographs and existing documentation pertaining to the distribution of vegetation as mapped by WEST and NRC in March and November 2010. At least three $100m^2$ survey plots (or "relevés") were established for each vegetation type with a greater number of plots in grassland areas to provide details on native components in these areas. For each relevé, specific attributes were quantified including topography (e.g. slope, slope position, microtopography, aspect, etc.), geology (e.g. soil characteristics), and surface cover (e.g. percent water, percent litter). Structural and compositional data were also quantified including heights (e.g. mean tree height, mean forb height), total vegetative cover, and species-specific cover values for all species found within the relevé. Cover values were given using a modified Daubenmire cover class system as follows: 01 = <1%, 02 = 1-5%, 03 = 5-15%, 04 = 15-25%, 05 = 25-50%, 06 = 50-75%, 07 = >75%. Following surveys within the relevé, the boundaries of each herbaceous stand were walked using handheld GPS units. Due to the intergrading and transitional nature of these vegetation types, particularly in annual dominated vegetation types, best estimates of stand boundaries were made in the field. Additionally, all major dominant species within each stand type were recorded. All species were properly vouchered for submittal to the University of California, Riverside Herbarium.

Relevé data were transformed ($x' = x^{0.2}$) and correspondence analysis (COA) was used to determine dominant trends following methods described by Wildi (2010). Cluster analysis using Euclidean distance and Ward's linkage, and later discriminant analysis and multivariate analysis of variance (MANOVA) were used to evaluate field-assessed vegetation alliances names. Stands with relevés showing too little separation following cluster analysis and not previously described by Sawyer and others, were merged and mapped as a single vegetation type. The mapped boundaries of each alliance were then digitized using geographic information system (GIS) software and overlain onto digital ortho-quarter quad (DOQQ) basemaps.

3.4 Special Status Plant Surveys

Pedestrian surveys for special status plant species were conducted throughout the site in April, May and June of 2010 by WEST botanists and March through May of 2011 by NRC botanists. Information regarding the known distribution and habitats of special status plant species was obtained from several sources, including the California Natural Diversity Database (CNDDB) RareFind 3 Application (CNDDB 2010), the California Native Plant Society (CNPS) *Online Inventory of Rare and Endangered Plants of California* (CNPS 2010), *The Jepson Manual* (Hickman 1993), *A California Flora and Supplement* (Munz and Keck 1973), the California Consortium of Herbaria, and agency (e.g. CDFG) information. Surveys were done in areas with suitable or potentially suitable habitat for each species and augmented by walking meandering transects across the site. For meandering surveys, the intensity of the pattern and the

speed at which the surveyor walked was variable and depended upon the structural complexity of the habitat, the visibility of the target species, and the probability of sensitive species occurrence in a given area based on habitat characteristics. Care was taken to thoroughly search all unique features and habitats encountered that could have a high probability for occurrence of sensitive species.

3.5 Jurisdictional Wetlands and Waters Surveys

During the spring of 2010 and 2011, WEST's wetland scientists surveyed the site to determine the extent and location of wetlands, Waters of the United States (WUS), and Waters of the State (WS) and their corresponding streambeds falling under the jurisdiction of the CDFG pursuant to Sections 1600-1616 of the California Fish and Game Code and the Regional Water Quality Control Board (RWQCB). The survey area included the site boundary, comprising approximately 4,192 acres, as well as an approximately 5-mile proposed gen-tie line corridor. Surveys were conducted from April 28-April 30, May 12-May 13, 2010, and May 12-May 13, 2011.

Potential wetlands were examined in accordance with the *1987 Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). The 1987 manual outlines a three parameter approach for an area to be considered a wetland, in which all three parameters must be met. Hydrophytic plants must be the dominant vegetative cover, hydric soils must be present, and wetland hydrology must be present.

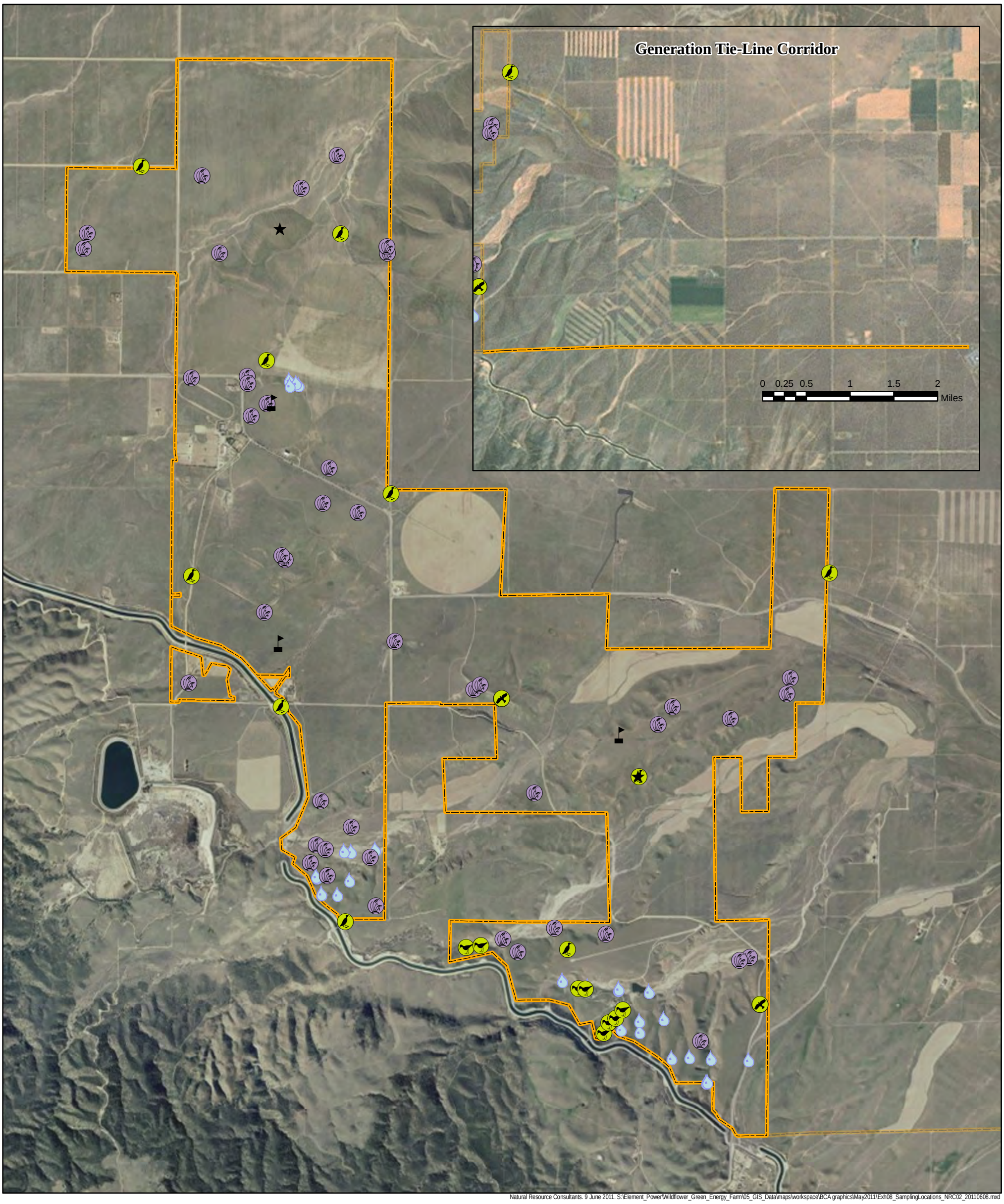
Criteria used to identify potential Army Corps of Engineers (ACOE) WUS's in the field include presence of a defined bed and bank, a surface connection or significant nexus to another WUS, and evidence of periodic flow via an Ordinary High Water Mark (OHWM). Examples of an OHWM include disturbance of litter or debris, natural scour line, shifted gravel/sand, eroded banks, water staining, change in vegetation, and others (Lichvar and McColley 2008). In identifying CDFG streambeds, the term "bank" is interpreted to encompass the physical bank of the stream and all associated riparian vegetation. The lateral extent of the (CDFG) jurisdictional stream is therefore delineated to the top of the physical bank or the upland edge of riparian vegetation, whichever is broader. For dry washes, jurisdiction includes all features within the natural active floodplain.

Wetland boundaries and sample points were recorded in the field with a Trimble GeoXH GPS unit with sub-meter accuracy. Waters of the U.S. and CDFG/RWQCB streambeds were recorded in the field on aerial photographs and later digitized using ArcView.

3.6 Wildlife Surveys

3.6.1 Fixed-Point Bird Use Surveys

Fixed-point bird use surveys, consistent with methods recommended in the Guidelines (CEC and CDFG 2007), were conducted at the site from March 18, 2010 through March 13, 2011 at eight stations established within the site (Exhibit 8). Fixed-point surveys (variable circular plots) were conducted using methods described by Reynolds et al. (1980), with the goal of estimating seasonal, spatial, and temporal use of the site by birds, particularly diurnal raptors. Thirty-minute surveys were conducted weekly at each station. All species of birds observed during the survey were recorded and all large birds observed perched within or flying over the plot were recorded and mapped. In May of 2011, fixed-point bird use surveys were continued at the original eight survey stations and an additional four stations established within the expanded project site. Bird use surveys will continue at all 12 stations through April of 2012. The most current data are presented in this BCA and the final results of the 2-year study will be presented in a final technical report and Biota Report.



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh08_SamplingLocations_NRC02_20110608.mxd

Project Boundary
Releve Locations
Wetlands and Waters Survey Points
Avian Observation Point
Breeding Bird Survey Point
Golden Eagle Observation Point
Nocturnal Migration Point
Anabat Survey Station

N
W E
S

0 0.25 0.5 1
Miles

Exhibit 8: Field Survey Locations
Wildflower Green Energy Farm
Los Angeles County, California

3.6.2 MIGRATING AND BREEDING BIRD SURVEYS

In late April of 2011, bi-weekly point count surveys for migrating and breeding songbirds were initiated at eight survey points established along riparian habitats within the site (Exhibit 8). The focus of the surveys is passerines and other small birds; however, all birds seen or heard during surveys were recorded. Surveys at each point were conducted between dawn and 1000 hours and consisted of 10-min passive listening surveys during which time all species seen or heard were recorded. Migrating and breeding bird surveys will be conducted through June of 2011, and results will be presented in the final Biota Report at the completion of spring survey work.

3.6.3 NOCTURNAL RADAR SURVEY

Nocturnal radar surveys were conducted by Hamer Environmental L.P. in the spring and fall of 2010. Modified marine radar was utilized at two sampling locations within the site on 30 continuous nights in the spring (April 20 to May 19, 2010) and fall (September 8 to October 8, 2010). The objective of the surveys was to characterize avian migration over the site and collect data that can be used to determine the relative magnitude of nocturnal migration over the proposed development area when compared to other sites. Baseline information was collected on flight direction, flight behavior, flight paths, passage rates/density, hourly changes in passage rates and flight altitude of nocturnal migrants at two representative sampling locations within the site.

3.6.4 BURROWING OWL AND GENERAL WILDLIFE SURVEYS

Surveys for burrowing owls, burrows, and owl sign (e.g., whitewash, casts, feathers at burrow entrance) were conducted by walking transects through all suitable burrowing owl habitat within the original 2,400-acre site boundary as well along the gen-tie line corridor between May and July, 2010. In May of 2011, burrowing owl and general wildlife surveys were extended to include all acreages not surveyed in 2010. Survey methods were consistent with the Burrowing Owl Survey Protocol and Mitigation Guidelines (CBOC 1997) recognized by the CDFG. Pedestrian survey transects were spaced no greater than 100 ft (30 m) apart to allow 100% visual coverage of the ground surface. The transect spacing may have been reduced depending on the terrain and/or vegetation density. If owls or burrows with owl sign were recorded within the site, four subsequent visits were then made to these locations to determine occupancy and nesting status. This survey effort is ongoing and expected to continue through July 2011; however, all burrows with evidence of current or past use by burrowing owls will continue to be monitored through the fall and winter of 2011/2012. Current data are presented in this BCA and final results of the surveys will be presented in the Biota Report at the completion of all spring survey work.

3.6.5 GOLDEN EAGLE/RAPTOR NEST SURVEYS

Golden eagles (*Aquila chrysaetos*) are protected by the Bald and Golden Eagle Protection Act (BGEPA 1940) and are also a fully-protected species in California (CDFG, Fish and Game Code, Section 3511). Aerial golden eagle/raptor nest surveys were conducted via helicopter over the site and surrounding region on April 13 and May 24, 2010.

While active and inactive nests of all raptor species (defined here as kites, accipiters, buteos, eagles, harriers, falcons, osprey, and owls) were recorded, the survey specifically targeted golden eagles. Survey methods were consistent with the U.S. Fish and Wildlife Service (USFWS) *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and other Recommendations in Support of Golden Eagle Management and Permit Issuance* (Pagel et al. 2010). Following this protocol, surveys for golden eagles included all suitable eagle nesting habitat within the primary study area and transmission corridor, as well all areas within a 10-mile (16-km) buffer zone around the site. For focused surveys for

all other raptor species, the survey area included all potential nesting habitat within 2 miles (3.2 km) of the primary study area.

In April of 2011, a second year of ground-based raptor nest surveys was initiated within the site. Additionally, this second year of surveys included all areas deemed suitable as Swainson's hawk (*Buteo swainsoni*) nesting habitat within five miles of the site boundary. Survey methods within the 5-mile buffer follows the CDFG's *Swainson's Hawk Survey Protocols, Impact Avoidance, and Minimization Measures for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern Counties, California* (CDFG 2010). The nest survey is conducted by walking or driving throughout the search area looking for raptor nest structures within areas of suitable habitat (e.g., single trees, windrows, woodlots, and other nest platforms such as power poles and transmission towers). Three surveys will be conducted during each of the nesting Periods II (April 1-30), III (May 1-31), and IV (June 1-July 15), as recommended in the CDFG survey protocol. Raptor nest surveys are ongoing and will continue through June of 2011. Current results of this survey effort are presented in this BCA and final information will be presented in the Biota Report at the completion of all spring survey work.

3.6.6 BAT SURVEYS

Acoustic bat surveys, consistent with methods recommended in the Guidelines (CEC and CDFG 2007), were conducted at the site from March 2010 to the present. Surveys were conducted using Anabat™ SD-II (Titley™ Scientific, Australia) acoustic detectors which record bat echolocation calls and other ultrasonic sounds via a broadband, high-frequency microphone. Bat detectors are recommended and widely used to index and compare habitat use by bats (Kunz et al. 2007). Bat activity was surveyed using ground-based detectors at two fixed stations within the site from March 23 to September 6, 2010. On September 7, 2010, three meteorological (met) towers were installed at the site and paired Anabats (ground and raised) were installed at each met tower. Microphones for raised detectors were mounted near the top of each met tower at approximately 20 m (66 ft) above ground level (agl). Upon installation of the 60-m met towers planned for the summer or fall of 2011, a fourth pair of detectors will be added to the site (in an area not previously surveyed) and Anabat microphones will be raised to a height of approximately 50 m (164 ft) agl on the met towers. Acoustic surveys are anticipated to continue through the spring of 2012. Current results of this survey effort are presented in this BCA and final information will be presented in the Biota Report at the completion of all spring survey work.

Because species identification can be difficult based on recordings from ultrasonic detectors, mist netting will also be conducted within the site during the summer and fall of 2011. Mist netting surveys will be conducted at features which have higher potential for bat use (e.g., ponds, riparian habitats, abandoned building or other structures), all of which occur in the southern portions of the site. Netting will occur for three nights during the summer season (June), and three nights during the fall season (August or September). Multiple net sets will be monitored at each location each night, and white-nose syndrome protocols will be followed. All bats captured will be identified, weighed, aged, and sexed. All results available will be included in the Biota Report.

3.6.7 BUTTERFLY SURVEYS

A butterfly survey was conducted within the site in May 2010 by Bruyea Biological Consulting. The primary focus of the butterfly survey was to assess potential suitability of the site as habitat for the San Emigdio blue butterfly (*Plebulina emigdionis*) and the alkali skipper (*Pseudocopaeodes eunus*), both federal species of concern. Prior to field surveys, a search of the California Natural Diversity Database (CNDDB 2010) was conducted to determine the probability that sensitive butterfly species may be present on the site. The survey was conducted by walking meandering transects throughout the site. Special consideration was given to areas supporting native vegetation communities with potential to support host plant habitat requirements. Other habitat requirements such as presence of nectar sources or tree overwintering sites (for monarch [*Danaus plexippus*] butterflies) were assessed. In addition to

surveys for habitat that may support the aforementioned butterfly taxa, a general butterfly inventory was performed during two site visits in May 2010. All butterfly species observed during the surveys were recorded. No special status species were found.

4.0 VEGETATION COMMUNITIES

Following combined CNPS/CDFG protocol rapid assessment and relevé surveys in spring 2011, vegetation data were summarized into a vegetation map showing eleven major vegetation types based on nativeness and growth form and habit of dominant plants (Exhibit 9, Table III). This classification scheme was used as a means to summarize these mostly grassland systems into easily understood classes. The relationship between these classes and other common classification schemes (Holland 1986, Sawyer et al. 2009) is given for each. A more thorough account of vegetation classification can be found in Appendix F.

TABLE III: VEGETATION TYPES AT THE WILDFLOWER GREEN ENERGY FARM SITE.

Vegetation Type	Holland (1986) Code	Area	Percentage of WGEF	Acreage in gen-tie
Native annual grasslands	42000	1,021.1 ac	24.3%	8.7
Native scrub and shrublands	34210, 35400, 37400, 39000, 63220, 63310, 63700	896.1 ac	21.4%	20.6
Non-native grasslands/ semi-natural stands	42200	836.1 ac	20.0%	47.9
Native annual forblands	42300	703.9 ac	16.8%	---
Agriculture	11203, 11204	441.4 ac	10.5%	4.2
Disturbed and developed	11300, 12000	149.1 ac	3.6%	30.5
Native perennial grasslands	42110	65.7 ac	1.6%	---
Non-native forblands / semi-natural stands	42200	62.1 ac	1.5%	---
Native perennial forblands	52410, 63200	6.3 ac	0.2%	---
Non-native trees	12000	5.8 ac	0.1%	---
Vernal pool	44000	2.4 ac	0.1%	---
Open water	13140	1.6 ac	<0.1%	---
	Total	**4,191.7 ac**	**100%**	**111.9**

4.1 Native Annual Grasslands

Holland: Valley and Foothill Grasslands (42000)
Sawyer et al: *Lasthenia californica – Plantago erecta – Vulpia microstachys* Herbaceous Alliance

The most common grasslands observed on the site, covering 1,021.1 acres (24.3%) and 8.7 acres of the gen-tie line corridor, are native annual grassland (Appendix A; Photo W). Alliance membership for this community include areas with at least 30% cover of California goldfields (*Lasthenia californica)*, plantain (*Plantago erecta)*, small fescue (*Vulpia microstachys)*, or any combination of these three species (Sawyer et al. 2009). These areas are co-dominated by California goldfields and small fescue at approximately equal cover values (25-50%). California sandaster (*Corethrogyne filaginifolia)* and common harelead *(Lagophylla ramossissima)* are frequently present. Surface cover is dominated by plant litter (50-75%), however bare ground is characteristically present (25-50%). Native annual forbs (e.g., California poppy (*Eschscholzia californica*), miniature lupine (*Lupinus bicolor)*, Lindley's silverpuffs (*Uropappus lindleyi)*, sleeping combseed (*Pectocarya pennicilata)*, purple owl's clover (*Castilleja exserta),* small wirelettuce *(Stephanomeria exigua*) are found at low cover, typically less than 5%, in these patches of gravel and fine grained soils. Other grasses, including red brome (*Bromus madritensis* ssp. *rubens)*, cheatgrass (*Bromus tectorum)*, and six-weeks fescue (*Vulpia octoflora)* are also present at low cover values. In southern sections of the site, California sandaster and common harelead become less dominant and are seemingly replaced with annual buckwheat species (e.g. *Eriogonum* cf. *angulosum*, *Eriogonum* cf. *davidsonii*) and wirelettuce. Appendix F provides a more detailed description of this vegetation type.

4.2 Native Annual Forblands

Annual forblands are annual herb dominated areas with a seasonal display of blooms (i.e. wildflower fields). The extent and location of flowering fields vary from year to year based on precipitation and other environmental variables. The extent and location of the areas mapped in 2011 and presented in this BCA may change during years with differing environmental conditions. These vegetation types intergrade readily with other annual vegetation types, including native and non-native annual grasslands. Approximately 703.9 acres (16.8%) of the site supported native annual forblands in 2011.

4.2.1 California Poppy fields

Holland: Wildflower Fields (42300)
Sawyer et al: *Eschscholzia (californica)* Herbaceous Alliance

Sawyer et al. (2009) describe California poppy fields as those areas with significant (>50% relative cover) cover and even density of California poppies. At WGEF, poppy fields are found extensively throughout flat bottomlands and mesas. This vegetation type is found overlapping and transitioning with California goldfields-Dwarf plantain-Small fescue flower fields and various non-native annual grass dominated vegetation types (e.g. brome grasslands). In general, California poppy is dominant (cover = 25-50%) in these areas (Appendix A; Photo AG). Miniature lupines, small fescue, or California goldfields often codominate with cover values ranging from 1-5% in pure poppy fields to 25-50% in transitional areas. Other native annuals present, often in dense patches, include Lindley's silverpuffs, Heermann's tarweed (*Holocarphus heermannii*), fiddlenecks (*Amsinckia tessellata*, *A. menziesii*), and common hareleaf (mean cover = 1-5% for all) while purple owl's clover, popcornflowers (*Plagiobothrys arizonicus*, *P. nothofulvus*, *P. cansescens*), annual buckwheats (*Eriogonum spp.*), sleeping combseed, slender combseed, dobiepod (*Tropidocarpum gracile*), and other native annuals are found at low cover (mean = <1% for all). Non-native grasses, including bromes (*Bromus* ssp.), foxtail barley (*Hordeum murinum*) and rattail fescue (*Vulpia myuros*) are common (range = <1 – 15-25%, mean cover = 5-15% for all). Rubber rabbitbrush is intermittent.

4.2.2 FIDDLENECK FIELDS

Holland: Wildflower Fields (42300)
Sawyer et al: *Amsinckia* (*menziesii, tessellata*) Herbaceous Alliance

Fiddleneck fields as those areas with greater than 30% cover of Menzie's fiddleneck (*Amsinckia menziesii)*, bristly fiddleneck (*Amsinckia tessellata)*, or any combination of these two species (Sawyer 2009). These native annual species, while widespread and abundant throughout the site, form dense fields in areas with high levels of disturbance including road margins, fence rows, and other areas where soils have been disturbed and exposed (Appendix A; Photo AK). As such, substrates are typically bare with approximately 75% of the surface cover comprised of sands and finer grain sediments. While *A. menziesii* was commonly observed, fiddleneck fields are dominated by bristly fiddleneck (cover > 50%) at the WGEF site. Red-stemmed filaree (*Erodium cicutarium*) is also abundant (cover > 50%) in these patches. Other species observed at low (< 1%) cover include small fescue, California goldfields, miniature lupine, California poppy, valley popcornflower (*Plagiobothrys canescens)*, and others. Non-native annual grasses, including red brome, cheatgrass, and rattail fescue are also common with a combined cover of approximately 10%. When present, shrubs are sparse and intermittent and include California sandaster and rubber rabbitbrush.

4.2.3 OTHER FLOWER FIELDS

Holland: Wildflower Fields (42300)

Other wildflower fields were recorded on the WGEF site (Appendix A; Photo AH-AJ). These include fields dominated by miniature lupine, as well as floodplains and washes dominated by desert dandelion (*Malacothrix californica*), white layia (*Layia glandulosa*), scalebud (*Anisocoma acaulis*), chia (*Salvia columbariae*), and scarlet lupine (*Lupinus concinnus*). These areas are described in Appendix F.

4.3 Non-native Grassland / Semi Natural Stands

Non-native grasslands / semi natural stands occur on 836.1 acres (20.0%) of WFEG and 47.9 acres of the gen-tie line corridor. These areas and are defined here as annual grasslands dominated by non-native, invasive, annual grasses including various bromes (*Bromus* spp.), wild oats (*Avena* spp.), rattail fescue and others. Native plant cover is typically low (generally, <10%). These stands exists on a variety of habitats, but are most often found in bottomlands, fallow fields, pasture land, and disturbed areas. Five types of non-native grasslands were mapped on the site.

4.3.1 CHEATGRASS GRASSLANDS

Holland: Non-native grassland (42200)
Sawyer et al: *Bromus tectorum* Semi-Natural Stands

Cheatgrass is a non-native annual grass ranked "High" in the California Invasive Plant Council Inventory (CalIPC: High). Sawyer et al. (2009) describe cheatgrass grasslands as herbaceous stands with *B. tectorum* dominant to codominant (>50% relative cover) in the herbaceous layer. At WGEF cheatgrass is abundant; these grasslands are common on lower slopes, flat bottomlands, and abandoned agricultural fields and other disturbed areas (Appendix A; Photo AA). Surface cover is dominated by plant litter (mean cover = 85%) with small patches of exposed soil. Cheatgrass is dominant (cover = >75%) and red-stem filaree is abundant (cover = 25-50%). Native annuals are present at low values (<1%) and include California poppy, California goldfields, miniature lupine, vinegarweed (*Trichostemma lanceolatum)*, bristly fiddleneck, wirelettuce, and combseed. Other non-native species, including various other bromes, Mediterranean grass (*Schismus barbatus*), and mustards are also present at low values.

4.3.2 RED BROME OR MEDITERRANEAN GRASS GRASSLANDS

Holland: Non-native grassland (42200)
Sawyer et al: *Bromus rubens- Schismus* (*arabicus*, *barbatus*) Semi-Natural Stands

Red brome is an invasive (Cal-IPC: High) annual grass native to Europe. This species is found, to varying degrees, naturalized in a variety of habitats and vegetation types. Sawyer et al. (2009) describe red brome grasslands as those vegetation types with >80% relative cover of red brome in the herbaceous layer. At WGEF, although red brome was found in almost every other vegetation type described, grasslands where red brome is the dominant are actually rare (total area = 1.1 acres). Instead, numerous patches, smaller than the project minimum mapping unit, of red bromes exist in a mosaic of other annual grasses. These stands are dominated by low species diversity. Native plants, including California poppy, doveweed (*Eremocarpus setigerus*), California goldfields, silverpuffs, and others, have very low dominance values (mean cover = <%1 for all) when present.

4.3.3 SOFT BROME GRASSLANDS

Holland: Non-native grassland (42200)
Sawyer et al: *Bromus (diandrus, hordeaceus) – Brachypodium distachyon* Semi-Natural Stands

Soft brome (*Bromus hordeaceus*) is an invasive species (CalIPC: Moderate) native to Eurasia. Soft brome grasslands are defines as those areas with >50% relative cover of soft brome in the herbaceous layer (Sawyer et al. 2009). At the WGEF site, 263 acres of soft brome grasslands are found along slopes, particularly west facing slopes in the southern portion of the site intergrading with miniature lupine fields and native annual grasslands (Appendix A; Photo AB). Surface cover is predominantly litter (mean cover = 82%) with little (<5%) bare ground. Overall, diversity is low in these grasslands; soft brome is dominant in the herbaceous layer (mean cover class = 63%), red-stemmed filaree is codominant (mean cover = 50%), and miniature lupine is subdominant (mean cover = 30%) and variable. Emergent shrubs and subshrubs, including rubber rabbitbrush and California sandaster, are found at low cover.

4.3.4 WILD OATS GRASSLANDS

Holland: Non-native grassland (42200)
Sawyer et al: *Avena* (*barbata, fatua*) Semi-Natural Stands

Wild oats grasslands are defined as areas with >50% relative cover of *Avena* spp. and <10% relative cover of native herbs in the herbaceous layer (Sawyer et al. 2009). At the WGEF, these stands are dominated by slender oat (*Avena barbata*) (mean cover = 70%). These stands, totaling 24.4 acres, are found mostly on south facing slopes in the central and south portions of the site on sandy, exposed soils. Native plants are uncommon (mean cover <1% for all) and include combseed, wirelettuce, small fescue, and California goldfields. In two agricultural fields, oats were the dominant cereal crop being grown (Appendix A; Photo AC). These fields were included as agricultural fields (See Section 4.10) and are not included here.

4.3.5 RAT-TAIL FESCUE GRASSLANDS

Holland: Non-native grassland (42200)
Sawyer et al: NA

Rattail fescue is a common non-native, invasive (CalIPC: Moderate) annual grass throughout the WGEF site. Extensive stands of grasslands dominated by this species are found in fallow fields and valleys often intergrading with mustard fields (Appendix A; Photo AD)). This grassland's coverage (161.7 acres) warranted identifying this vegetation type (See Appendix F). These stands are dominated by non-native species including rattail fescue (mean cover = 46%), hedgemustard (*Sisymbrium altissimum*; mean cover = 26%), red-stemmed filaree (mean cover = 17%), Russian thistle (*Salsola tragus*) (mean cover = 3%),

and foxtail barley (mean cover = 3%). Native plant cover is low for most species, including California goldfields, California poppy, miniature lupine, fiddlenecks, and valley popcornflower. Lindley's silverpuffs are found in dense patches throughout these grasslands.

4.4 Non-native Forblands / Semi Natural Stands

Non-native forblands are semi-natural stands dominated by non-native species. Native species are a component, albeit relatively small, in these vegetation types. These forblands occur on 62.1 acres (1.5%) of the site.

4.4.1 PRICKLY LETTUCE PATCHES

Holland: Non-native grassland (42200)
Sawyer et al: NA

Prickly lettuce (*Lactuca serriola*) is found in various non-native dominated vegetation types. This non-native, invasive species also forms near monotypic stands at WGEF on lower slopes, valleys, and agricultural margins (Appendix A; Photo AE). While not described by Sawyer et al. (2009), these stands, as verified by cluster and correspondence analysis (Appendix F), are included here. Prickly lettuce is dominant (cover > 30%) in these patches. Other non-native species, including cereal rye (*Secale cereale*), hedgemustard, short-podded mustard (*Hirshfeldia incana*), and foxtail barley are common to codominant. Native species are uncommon (<10% relative cover).

4.4.2 HEDGEMUSTARD AND OTHER MUSTARD PATCHES

Holland: Non-native grassland (42200)
Sawyer et al: *Brassica* (*nigra*) and other mustards Semi-Natural Stands

Mustard patches are found throughout the WGEF site in fallow fields and disturbed areas (Appendix A; Photo AF). These stands are dominated by non-native, invasive mustards including hedgemustard (CalIPC: unranked), tansy mustard (*Descurainia sophia,* CalIPC: Limited) and/or short-podded mustard (CalIPC: Moderate). These patches often intergrade with rattail fescue grasslands but are distinct in their dominance by various mustards; rattail fescue is present but not dominant in this vegetation type (mean cover = 3%). Other common non-native species include red-stemmed filaree (mean cover = 60%) and foxtail barley (mean cover = 3%). Native plant cover and diversity is low. Encountered native plants include small fescue, California goldfields, common hareleaf, California poppy, and miniature lupine. Isolated patches of fiddlenecks are found on piles of exposed soil.

4.5 Native Perennial Grasslands

The term "native grassland" refers to stands with at least 10 percent absolute cover of native perennial grasses in the herbaceous layer (Stromberg et al. 2007). Native grasslands were mapped along the upper slopes and ridgetops in the northern portion of the site and in several patches located in the central and southwestern portion of the site. This vegetation community covers approximately 65.7 acres (1.6%) of the site (Exhibit 9) and is dominated by purple needlegrass (*Nassella pulchra*), desert needlegrass (*Achnatherum speciosum*), and one-sided blue grass (*Poa secunda* ssp. *secunda*).

4.5.1 PURPLE NEEDLEGRASS GRASSLANDS

Holland: Valley needlegrass grassland (42110)
Sawyer et al: *Nassella pulchra* Herbaceous Alliance

The *Nassella pulchra* Herbaceous Alliance (purple needlegrass grassland) is defined by Sawyer et al. as those vegetation types with >10% relative cover of purple needlegrass in the herbaceous. At WGEF, this vegetation type is found along upper slopes and ridgetops in isolated patches in the northern and central

portions of the site (Appendix A; Photo X). Purple needlegrass is largely dominant with cover values ranging from 10 to over 50% within this alliance (mean cover = 27%). Surface cover, is dominated by fine grained sediments (mean = 60%), however, gravels and cobbles are characteristically present in these rocky substrates. Plant litter is characteristically low. Native diversity can be rather significant; common native species include California poppy, California goldfields, purple owl's clover, rattlesnake weed (*Chamaesaecae albomarginata)*, linanthus (*Linanthus* spp.), gilias (*Gilia* spp.), combseed, miniature lupine, Indian clover (*Trifolium albopurpureum*), pinpoint clover (*Trifolium gracillentum*), vinegarweed, Lindley's silverpuffs, small fescue, and others. These annual herbs occupy open spaces between the bunchgrasses and provide showy blooms of wildflowers in years of adequate rainfall. Cover of non-native grasses and forbs is generally low in these areas.

4.5.2 DESERT NEEDLEGRASS GRASSLANDS

Holland: Valley needlegrass grassland (42110)
Sawyer et al: *Achnatherum speciosum* Herbaceous Alliance

Sawyer et al. (2009) describes the desert needlegrass herbaceous alliance as those areas with >50% relative cover of desert needlegrass. At WGEF, these grasslands are generally small (<1 acre). Several small stands, totaling 2.3 acres, are found in stable sandy washes in the south of the site, however, this vegetation type is also found on dry, north-facing slopes in the central and south (Appendix A; Photo Y). Within washes, these grasslands intergrade with scalebud-chia-scarlet lupine fields, desert dandelion-white layia fields, and central coast riparian scrub. As such, indicator species for all abovementioned alliances are present, although at lower cover values including white layia, desert dandelion, scalebud, chia, scarlet lupine, wild tarragon (*Artemisia dracunculus)*, longstem buckwheat (*Eriogonum elongatum)*, yellow pincushioin (*Chaenactis glabriuscula*), Fremont pincushion (*Chaenactis xantiana*), and California goldfields. Annual grass species are rare to absent. Surface cover is sandy with small gravels and cobbles present at low cover. Shrubs are intermittent and include rubber rabbitbrush and California buckwheat (*Eriogonum fasciculatum*). On dry ridgetops, this vegetation type is similar to purple needlegrass grasslands except desert needlegrass replaces purple needlegrass as the dominant bunchgrass. Big squirreltail (*Elymus multisetus)*, another native perennial bunchgrass, is also common.

4.5.3 ONE-SIDED BLUE GRASS GRASSLANDS

Holland: Valley needlegrass grassland (42110)
Sawyer et al: *Poa secunda* Herbaceous Alliance

One-sided bluegrass is a native perennial bunchgrass species common in a variety of habitats including valley bottoms, slopes, and ridgetops. Sawyer et al. (2009) define one-sided bluegrass grasslands as those areas with >50% relative cover of this species (Hickson et al. 2007). At WGEF, one-sided bluegrass was found infrequently, most often as a component species within purple needlegrass grasslands, rabbitbrush scrub, or buckwheat scrub. When present in these other vegetation types, one-sided bluegrass cover was low (range = 0-5%). One-sided bluegrass grasslands, where one-sided blue grass was the dominant bunchgrass species found and relative cover values were greater than 50 percent, were observed on 11.2 acres at WGEF (Appendix A; Photo Z). These stands were found, typically, on north facing mid to upper slopes. Surface cover was typified by low cover of litter (mean cover = 15%) and, similar to other native perennial grasslands, high cover values of fine grained sediment (mean cover = 50%). Many native herbs were found intermixed in these openings. Common native herbs include California poppy, California goldfields, blue dicks, miniature lupine, shining peppergrass (*Lepidium nitidum*), Indian clover, pinpoint clover, and others. Other native perennial bunchgrass species, including purple needlegrass, and big squirreltail were also observed at low (<1%) cover. In several stands, particularly in the east, leafy fleabane (*Erigeron foliosus*) was codominant. Native subshrubs, particularly California sandaster, were found intermittently. Non-native grasses (e.g. *Bromus* spp.) and red-stem filaree were common at intermediate cover (mean cover of all non-natives = 15%).

4.6 Native Perennial Forblands

4.6.1 RUSH MARSHES

Holland: Coastal and Valley Freshwater Marsh (52410)
Sawyer et al: *Juncus arcticus* (var. *balticus*, *mexicanus*) Herbaceous Alliance

Sawyer et al. (2009) list membership criteria of at least 50% relative cover of *Juncus arcticus* var. *balticus* (aka *J. balticus*), *Juncus arcticus* var. *mexicanus* (aka *J. mexicanus*), or a combination of the two for this alliance. At WGEF, this vegetation type was observed in subtle drainages, wetlands, and low lying flats (Appendix A; Photo AT). Surface cover was typically dominated by plant litter (mean cover = 70%) with patches of fine textured sediments (mean cover = 11%). Baltic rush (*J. balticus*) was dominant with cover at 50-75%. Other native plants were observed at low cover values including wild tarragon, common harelead, Lindley's silverpuffs, and common sandaster were also present at low values and two other species of rushes, toad rush (*J. bufonius*) and irisleaf rush (*J. xiphioides*) were rarely found.

4.6.2 WILD TARRAGON PATCHES

Holland: Central Coast Riparian Scrub (63200)
Sawyer et al: *Artemisia dracunculus* Herbaceous Alliance

Wild tarragon is a perennial herb found in washes, floodplains, and other periodically flooded areas with sandy alluvial soil. Sawyer et al. (2009) describe wild tarragon patches as those areas with >50% relative cover of this species in the herbaceous layer. At WGEF, wild tarragon patches are found over 3.9 acres. (Appendix A; Photo AU) All patches are found on flat, alluvial soil with signs of intermittent flooding. Native shrubs, particularly rubber rabbitbrush, are also found at low (<10%) cover. The surface is lacking in plant litter (mean cover = 3%), yet fine grained sediments are abundant. Native annuals and perennial are also found at low (typically, <1%) cover including cushion cryptantha (*Cryptantha circumcissa*), sharpnut cryptantha (*C. oxygona*), and popcornflowers. Non-native plant cover is also low in these patches.

4.7 Native Scrub and Shrublands

Native scrub and shrublands dominate 896.1 acres (21.4%) of the WGEF site. Most of these shrublands were dominated by rubber rabbitbrush, however other varieties of scrub were found on rocky slopes, washes, and other riparian areas.

4.7.1 CALIFORNIA BUCKWHEAT SCRUB

Holland: Mojave Mixed Woody Scrub (34210)
Sawyer et al: *Eriogonum fasciculatum* Shrubland Alliance

Approximately 31 acres of California buckwheat scrub were observed at WGEF. This scrub, characterized by >5% cover of California buckwheat in the shrub layer, was found mostly on rocky slopes and ridges however several patches were also mapped in dry washes and north facing slopes in the south of the site. The canopy of this scrub is largely open and native annual plants including California goldfields, popcornflower, owl's clover, and others are found in these openings. Native grasses including purple needlegrass are also common. Along the buttes in the north of the WGEF site, short-joint beavertail (*Opuntia basilaris* var. *brachyclada*) is found associated with this scrub type.

4.7.2 RABBITBRUSH SCRUB

Holland: Rabbitbrush Scrub (35400)
Sawyer et al: *Ericameria (Chrysothamnus) nauseosa* Shrubland Alliance

Rabbitbrush scrub covers 856.1 acres of the site and 20.6 acres within the gen-tie corridor. This vegetation community, found in flat bottomlands and ridges as well as dry washes, is typified by 25% or greater relative cover of rabbitbrush in the shrub layer. The herbaceous vegetation observed in rabbitbrush scrub was composed of the same species found in the non-native and native annual grasslands within the site including California goldfields, California poppy, miniature lupine, red brome, cheatgrass, and small fescue.

4.7.3 OAK GOOSEBERRY THICKETS

Holland: Semi-desert Chaparral (37400)
Sawyer et al: *Ribes quercetorum* Provisional Shrubland Alliance

Several oak gooseberry thickets were found in the southern portion of the WGEF site in areas with large exposed boulders and bedrock, particularly on north facing lower slopes. Although relatively small (0.8 acre), these dense thickets provide food and shelter for various birds, small mammals, and reptiles. These thickets are characterized by dominance of oak gooseberry (*Ribes quercetorum*) (cover > 75%), however skunkbush (*Rhus trilobata*) was also found at low (<5% cover) in at least one thicket. Herbaceous plants were uncommon in these thickets.

4.7.4 NARROWLEAF GOLDENBUSH SCRUB

Holland: Upper Sonoran Subshrub Scrub (39000)
Sawyer et al: *Ericameria linearifolia* Provisional Shrubland Alliance

Approximately 2.7 acres of narrowleaf goldenbush scrub was observed on dry upper slopes, ridges, and saddles in the southern portion of WGEF. This scrub was dominated by narrowleaf goldbush (*Ericameria linearifolia*) with cover values greater than 30% for this species. Cooper's goldenbush (*Ericameria cooperi*) was also found in many of these scrublands and individuals intermediate in characteristics (e.g. leaf length, leaf shape) of these two species were observed, suggesting these two species may be hybridizing at the WGEF site. Narrowleaf goldenbush scrub was observed to grade into other shrubland types; both rubber rabbitbrush and California buckwheat were found at low (<10% cover) values. Annuals, particularly miniature lupine and soft brome, were common in openings between shrubs.

4.7.5 SOUTHERN WILLOW SCRUB

Holland: Southern Willow Scrub (63220)
Sawyer et al: *Salix exigua* Shrubland Alliance *et seq*.

Southern willow scrub is composed of dense, broadleafed, winter-deciduous riparian thickets dominated by several *Salix* species, with scattered emergent Fremont's cottonwood (*Populus fremontii*). Most stands are too dense to allow understory development. All willows were mapped as a single unit at the WGEF site to ensure this vegetation type was incorporated. Four species of willow, red willow (*Salix laevigata*), Gooding's willow (*Salix gooddingii*), sandbar willow (*Salix exigua*), and Fremont's cottonwood were observed to grow as co-dominants or alternating dominants along several riparian areas in the south of WGEF. Mulefat (*Baccharis salicifolia*) was also common as were several riparian herbs. A single California buckeye (*Aesculus californica*) was also observed growing in this vegetation type.

4.7.6 MULEFAT SCRUB

Holland: Mulefat Scrub (63310)
Sawyer et al: *Baccharis salicifolia* Shrubland Alliance

Approximately 1.5 acres of mulefat scrub were observed at WGEF. These thickets were characterized by >50% relative cover of mulefat in the shrub layer (Evens and San 2005). Most stands of mulefat scrub were observed in active stream channels and dry washes found in the southern portion of the site,

however at least one other stand was found in upland habitat. In riparian areas, mulefat scrub intergrades with southern willow scrub; a gradient of southern willow scrub to mulefat scrub is apparent moving down stream. Other perennial plants were found scattered in low cover within these stands including wild tarragon, brickelbush (*Brickellia* spp.), and longstem buckwheat. Native annuals including chia, scalebud, and scarlet lupine, were also found at very low (<1%) cover.

4.7.7 DESERT OLIVE PATCHES

Holland: Mojave Desert Wash Scrub (63700)
Sawyer et al: *Forestiera pubescens* Shrubland Alliance

Desert olive (*Forestiera pubescens*) is a tall (3-5m) evergreen shrub found often in monotypic and clonal stands. At WGEF, two patches of desert olive totaling 0.9 acre were found just above active channels in slightly drier conditions in the southern portion of the site. These patches, characterized by >50% relative cover of desert olive, are generally monotypic and were found associated with large boulders and rock outcrops.

4.8 Vernal Pool

Holland: Vernal Pool (44000)
Sawyer et al: NA

Three vernal pools, totaling 2.38 acres, were recorded on the site (Exhibit 9, Exhibit 13B). All three pools were visited when still holding water and several species of birds (e.g., killdeer (*Charadrius vociferous*), spotted sandpiper (*Actitis macularia*), ring-necked duck (*Aythya collaris*), mallard (*Anas platyrhynchos*), and others), amphibians (e.g., Baja California treefrog (*Pseudacris hypochondriaca hypochondriaca*)), and invertebrates (e.g. *Daphnia* spp.) were observed. Spreading navarretia (*Navarettia fossalis*), a federally threatened and CNPS List 1B.1 species, is known to occur in Pool B (Exhibit 9, Exhibit 13B, WEST 2009). Peripheries were walked and species composition was qualitatively surveyed at all locations. All vernal pools were characterized by annual hair grass (*Deschamspia danthonoides*) and finebranched popcornflower (*Plagiobothrys leptocladus*). Pool B, the largest of the three pools (2.27 acres), also contained adobe popcornflower (*Plagiobothrys acanthocarpus*). All three species are vernal pool indicator species in this region (Zedler 1987, Hickman 1993). Additional species found in these pools include speedwell (*Veronica* spp.), spikerush (*Eleocharis* cf. *obtusa*), and California goldfields. Non-native herbs, including red-stemmed filaree and pineapple weed (*Matricaria discoidea* (aka *Chamomilla suaveolens*)), were also observed, particular along disturbed margins.

4.9 Open Water

Holland: Fresh Water (13140)
Sawyer et al: NA

A single retention basin (1.6 acres) is located in Castle Ranch Property in the southern section of the WGEF site. This basin is a jurisdictional feature (See Section 5.4) and is most likely used for flood control and a water source for cattle. No aquatic vegetation was observed within the basin and the banks were predominantly planted with non-native ornamentals.

4.10 Agriculture

Holland: Irrigated/Dryland Grain and Seed Crops (11203/11204)
Sawyer et al: NA

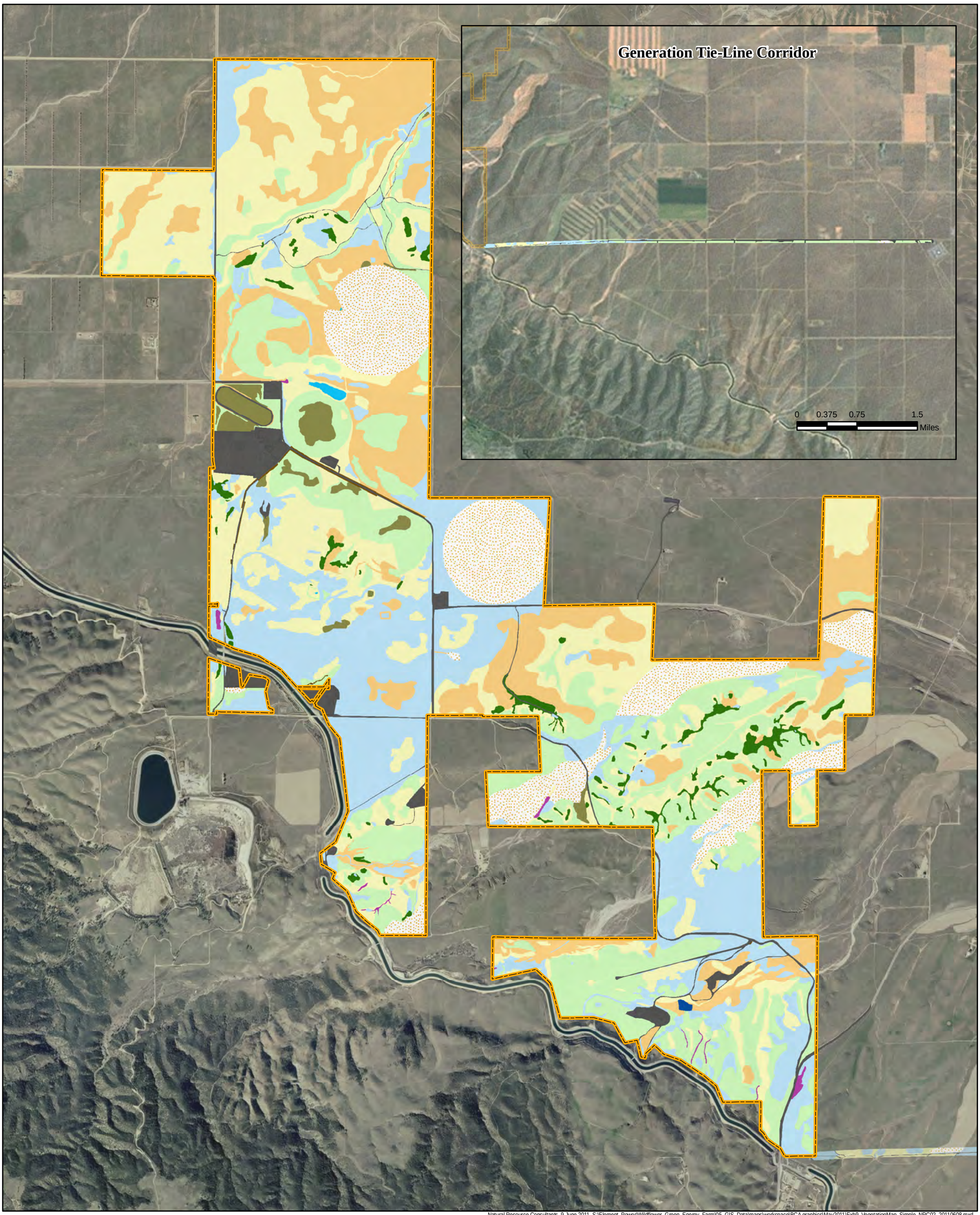
Agricultural fields comprise 441.4 acres (10.5%) of the site and 4.2 acres of the gen-tie corridor (Exhibit 9). Historically, much of the site has been used for agricultural production, but, as of April 2011, there are only five agricultural fields in production. These consisted of two center-pivot irrigated fields, two fields in valley bottoms that appear to be naturally irrigated with channeled runoff water, and one dryland grain

field on a leveled and tilled ridgetops. The predominant crops grown were oats (*Avena* spp.) and cereal rye.

4.11 Disturbed and Developed

Holland: Disturbed and Urban/Developed (11300/12000)
Sawyer et al: NA

Approximately 149.1 acres (3.6%) of the site and 30.5 acres within the gen-tie corridor is composed of Disturbed and Urban/Developed land. These areas include residential houses and yards, ranch houses and associated outbuildings and compounds, and roads (Exhibit 9; Appendix A: Photo H). All of the areas mapped as developed include landscape trees and shrubs, often planted as windbreaks. Commonly planted trees and shrubs observed included almond, Siberian elm (*Ulmus pumila*), black locust (*Robinia pseudoacacia*), gum tree (*Eucalyptus* spp.), and exotic pines (*Pinus* spp.). Rows of non-native junipers (*Juniperus* spp.) and cedars (*Cupressus* spp.) were planted along Lancaster Road near the Healy Farms. Additionally, several Joshua trees are located near the entrance to the Castle property in the south central portion of the site. These trees were planted as ornamentals around the parcel gate (B. Felder, pers. comm.) and are thus included here. No naturally occurring Joshua trees are believed to occur on the site.



Project Boundary
Native Annual Grasslands
Native Scrub and Shrublands
Non-Native Grasslands/Semi-Natural Stands
Native Annual Forblands
Agriculture
Disturbed and Devloped
Native Perennial Grasslands
Non-Native Forblands
Native Perennial Forblands
Non-native Trees
Vernal Pool
Open Water

0 0.25 0.5 1
Miles

N
W E
S

Exhibit 9: Vegetation Map

Wildflower Green Energy Farm
Los Angeles County, California

5.0 SPECIAL STATUS BIOLOGICAL RESOURCES

The following section describes the special status vegetation communities as well as special status plant and wildlife species occurring on site.

5.1 Special Status Vegetation Communities

Special status vegetation communities are those communities that are of limited distribution as listed by the CDFG based on the sensitivity rankings provided in the List of Vegetation Alliances and Associations (CDFG 2011). This list is based on Sawyer and others' A Manual of California Vegetation, Second Edition (2009), however CNDDB data were also used to evaluate the potential for special status vegetation types (Exhibit 10A). Ranking for this list is based on NatureServe's Heritage Methodology where vegetation types are given a global (G) and subnational (S) rank from 1 (critically imperiled) to 5 (secure) (NatureServe 2010). Vegetation alliances with ranks of S1-S3 are considered to be special status under this system. At WGEF, three types of native perennial grassland (purple needlegrass grassland, desert needlegrass grassland, one-sided blue grass grassland) are considered sensitive as are four types of scrub communities (oak gooseberry thickets, narrowleaf goldenbush scrub, southern willow scrub, and desert olive patches). One additional vegetation types not ranked by the CDFG is also considered special status: vernal pool. Using this alliance level system, California poppy fields are not considered special status (G4 S4). However, California poppy fields are a regionally important resource and are discussed in the conclusion section of this BCA.

5.1.1 NATIVE PERENNIAL GRASSLANDS

PURPLE NEEDLEGRASS GRASSLAND (G4 S3?), DESERT NEEDLEGRASS GRASSLAND (G4 S2.2), AND ONE-SIDED BLUE GRASS GRASSLAND (G4 S3?)

The site supports three alliance level types of native perennial grasslands: purple needlegrass grassland (G4 S3?), desert needlegrass grassland (G4 S2.2), and one-sided blue grass grassland (G4 S3?). The extent of these vegetation types is approximately 52.2 acres, 2.3 acres, and 11.2 acres, respectively. Native perennial grasslands are believed to have once covered nearly a fifth of the state and remnants of these native grasslands survive in extreme conditions (e.g. shallow soils on serpentine-based or other anomalous soils, etc.) where native species are not outcompeted by non-native invasive species (e.g. *Bromus* spp., *Lolium* spp., etc.). Additionally, most areas in California that support extensive remnant stands of native grassland plants have been grazed continuously over at least the past century, and evidence indicates that livestock grazing at intermediate stocking levels discourages may slow the invasion of weedy non-native species (Murphy and Ehrlich 1989) into these areas.

Based on a review of aerial photos, review of California Gap Analysis Project (GAP) regional vegetation maps and field observation from a distance, native grasslands surrounding the site occur within the nearby national forests and along the foothills of the Tehachapi and San Gabriel Mountains. Based on preliminary observations, the surrounding grasslands have a comparable species composition to those observed on site.

5.1.2 OAK GOOSEBERRY THICKETS (G2 S2?)

Oak gooseberry thickets (*Ribes quercetorum* Provisional Shrubland Alliance) were mapped in 0.8 acre of the site. These thickets were found along rock outcrops on north facing slopes. Plants begin fruiting after three years and provide habitat and food source for numerous bird and small mammal species.

5.1.3 NARROWLEAF GOLDENBUSH SCRUB (G3 S3?)

Narrowleaf goldenbush scrub (*Ericameria linearifolia* Provisional Shrubland Alliance) was found scattered in isolated patches on dry slopes and ridges in the southern portion of the WGEF site. A total of 2.7 acres was mapped, often in transitional areas with California buckwheat and rabbitbrush scrubs. Plants were also mixed with Cooper's goldenbush and individuals intermediate between the two species were observed.

5.1.4 SOUTHERN WILLOW SCRUB (G3 S2.1)

As discussed above (See Section 4.7.5), all willow dominated alliances were grouped together as "Southern Willow Scrub" following Holland (1986) for the purposes of the WGEF vegetation map. This grouping allowed this vegetation type to meet minimum mapping unit requirements, prevented mapping of individual trees or shrubs, and reduced overall mapping effort while still providing meaningful data. A total of 3.1 acres of southern willow scrub was mapped in riparian areas in the southern portion of the WGEF site. This vegetation type was once extensive along rivers and streams of southern California but has been greatly impacted by channelization of streams and development. These riparian areas provide important food sources, roosting and nesting areas for raptors, access to water, and shelter to a variety of wildlife while providing channel stabilization and flood control.

5.1.5 DESERT OLIVE PATCHES (G3 S2.2)

Desert olive patches (*Forestiera pubescens* Shrubland Alliance) are found on 0.9 acre in the southeast of the WGEF site. This special status (G3 S2) and monotypic vegetation type is found in canyons and along waterways slightly upslope from flowing water. While few other plant species are found in these patches, desert olive provides important foraging and nesting habitat for birds and small mammals.

5.1.6 VERNAL POOLS (GNR SNR)

Three vernal pools, totaling 3.38 acres, are found on the WGEF site (Exhibit 9, Exhibit 13B). These pools are unique wetland features of significance to a variety of birds (e.g., killdeer (*Charadrius vociferous*), spotted sandpiper (*Actitis macularia*), ring-necked duck (*Aythya collaris*), mallard (*Anas platyrhynchos*), and others), amphibians (e.g., Baja California treefrog (*Pseudacris hypochondriaca hypochondriaca*)), and invertebrates (e.g. *Daphnia* spp.) were observed. Spreading navarretia (*Navarettia fossalis*), a federally threatened and CNPS List 1B.1 species, is known to occur in Pool B (Exhibit 9, Exhibit 13B, WEST 2009).

5.2 Special Status Plant Species

A list of state and federal special status plant species with documented occurrence in the Fairmont Butte, Lake Hughs, and/or Del Sur quadrangles and the surrounding thirteen quadrangles was compiled based on data from the CNDDB, CCH, and CNPS (CNDDB 2010b, CCH 2011, CNPS 2011; Exhibit 10B). The results of this compilation are shown in Table IV. Included in this list are state and federal endangered, threatened, and candidate species, state rare species, and species categorized onto one of five lists by the CNPS based on their rarity and endangerment (CNPS 2010).

5.2.1 Special Status Plants Occurring On Site

Two special status plant species have been observed on site: spreading navarretia and shortjoint beavertail cactus

5.2.1.1 Spreading navarretia

One federally threatened plant species, spreading navarretia, has been recorded on the site within a single population of approximately 60,000 individuals. The population recorded at the site occurs in Vernal Pool B located near the center of the site (Exhibit 13B). The pool is approximately 2.3 acres and occurs at 2,700 feet elevation. The pool receives surface runoff from the surrounding grassland and from a shallow "inlet" swale extending east from Lancaster Road. Other plant species recorded within the pool include fine-branched popcorn flower and annual hair-grass, the latter particularly around the margins.

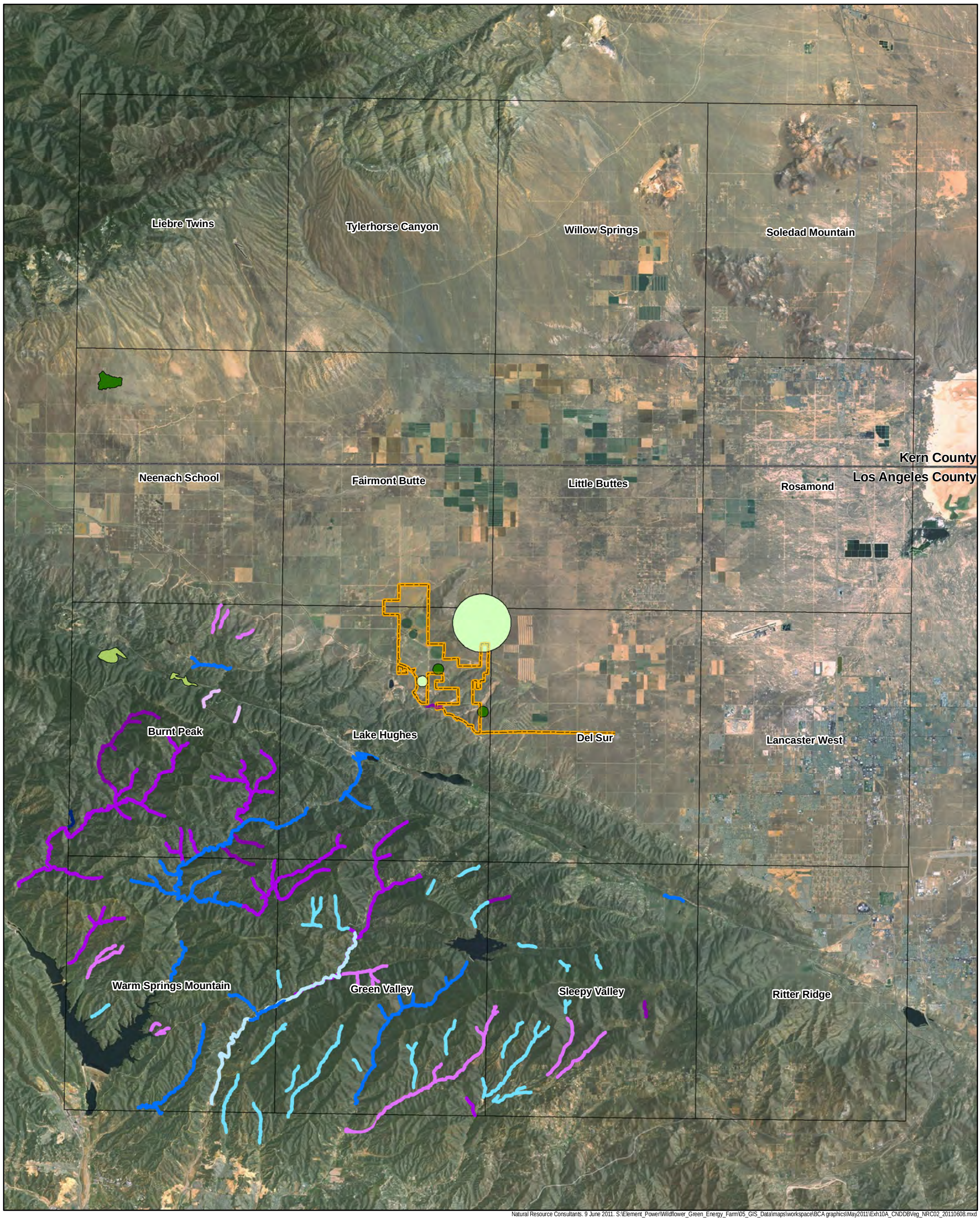
Spreading navarretia is a low (4-6 inches tall), mostly spreading or ascending, annual herb in the phlox family. Its distribution ranges from northwestern Los Angeles County and western Riverside County, south through coastal San Diego County, California to northwestern Baja California (CNPS 2010, USFWS 2005). Fewer than 30 populations exist in the United States, with nearly 60 percent of these populations concentrated in three locations: Otay Mesa in southern San Diego County, along the San Jacinto River in western Riverside County, and near Hemet in Riverside County (USFWS 1998). Spreading navarretia occurs in vernal pools, seasonally flooded alkali vernal plains (including alkali playa, alkali scrub, alkali vernal pool, and alkali annual grassland), and man-made irrigation ditches and detention basins (USFWS 2005). The nearest recorded population is located approximately 15 miles south of the site in the City of Santa Clarita. The site does not occur within the federally designated Critical Habitat for this species.

5.2.1.2 Short-joint beavertail cactus

Short-joint beavertail cactus, a CNPS List 1B.2 species, was also observed on the site. This cactus was found on rocky slopes in purple needlegrass grasslands and Mojave mixed woody scrub. These individuals demonstrate characteristics intermediate between *O.b*. var. *brachyclada* and *O.b. basilaris* (a common species) and are potentially an intermediate or hybrid of the two varieties. Approximately 500 individuals were observed in spring 2011 surveys.

5.2.2 Special Status Plants Potentially Occurring but Not Detected On Site

Surveys for special status plant species were conducted in the spring of 2010, concurrent with a Wetlands and Waters of the U.S. survey and in spring of 2011 concurrent with vegetation mapping and relevé surveys. During these surveys, no additional special status plant species were recorded within the site or along surveyed portions of the proposed transmission line route. Additionally, no oak trees, which are protected by the County of Los Angeles Oak Tree Ordinance (Zoning Code Sections 22.56.2050-22.56.2260; Regional Planning 2010), were found to occur within the site during vegetation mapping surveys. A full list of all potentially occurring special status species is found in Table IV.



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh10A_CNDDBVeg_NRC02_20110608.mxd

Project Boundary

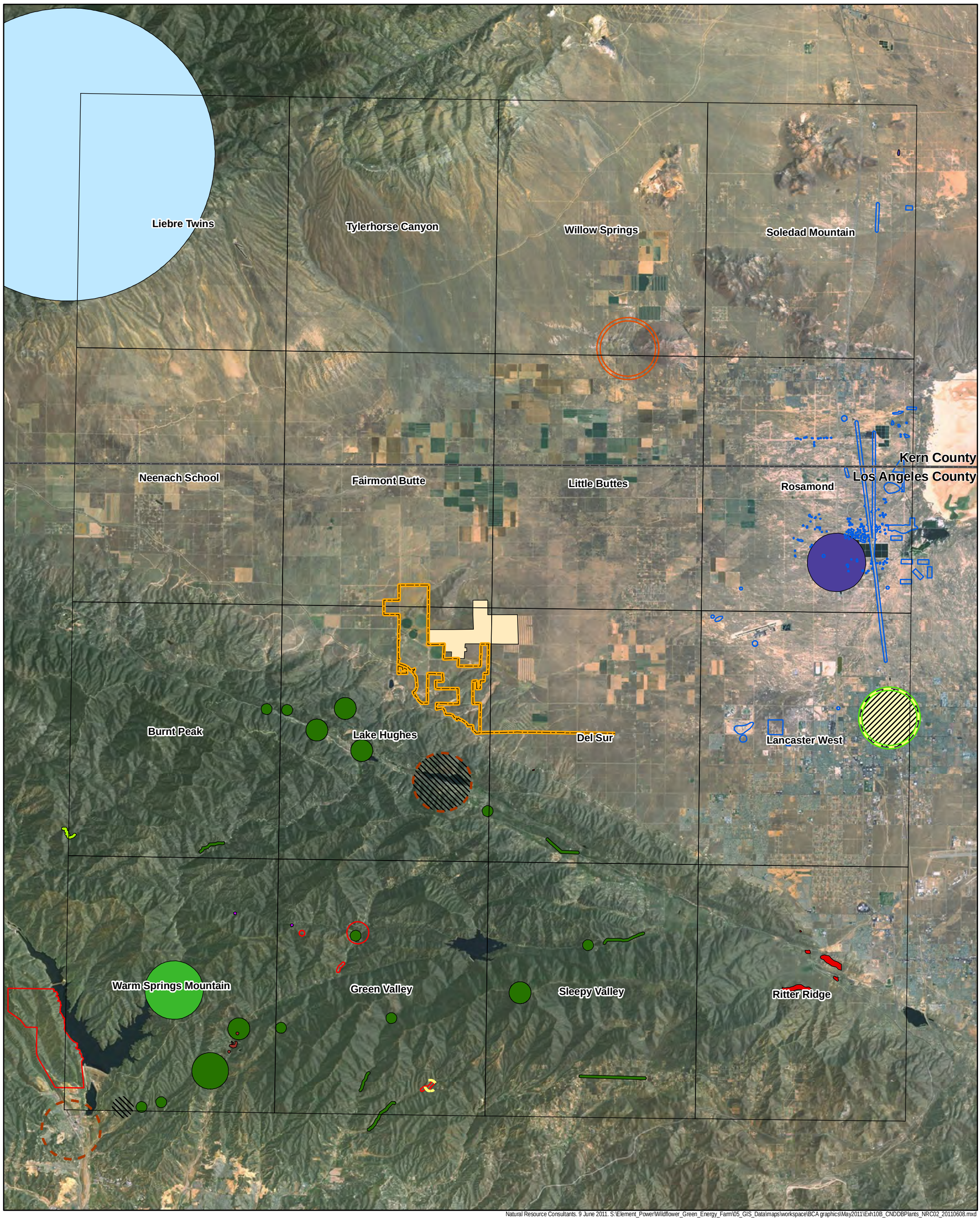
Vegetation Type

- Southern California Threespine Stickleback Stream
- Southern Coast Live Oak Riparian Forest
- Southern Cottonwood Willow Riparian Forest
- Southern Mixed Riparian Forest
- Southern Riparian Forest
- Southern Riparian Scrub
- Southern Sycamore Alder Riparian Woodland
- Southern Willow Scrub
- Valley Needlegrass Grassland
- Valley Oak Woodland
- Wildflower Field

N W E S

0 1 2 4 Miles

Exhibit 10A: CNDDB Special Status Vegetation Types
Wildflower Green Energy Farm
Los Angeles County, California



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh10B_CNDDBPlants_NRC02_20110608.mxd

Project Boundary

Plant Species

- Horn's milk-vetch
- Lancaster milk-vetch
- Parry's spineflower
- San Fernando Valley spineflower
- slender mariposa-lily
- alkali mariposa-lily
- white pygmy-poppy
- round-leaved filaree
- Clokey's cryptantha
- Greata's aster
- Madera leptosiphon
- Nevin's barberry
- Ross' pitcher sage
- San Gabriel bedstraw
- pale-yellow layia
- sagebrush loeflingia
- short-joint beavertail
- Peirson's morning-glory

N W E S

0 1 2 4 Miles

Exhibit 10B: CNDDB Special Status Plant Areas
Wildflower Green Energy Farm
Los Angeles County, California

TABLE V: SENSITIVE PLANT SPECIES WITH KNOWN OR POTENTIAL OCCURRENCE AT THE WILDFLOWER GREEN ENERGY FARM SITE.

Scientific Name	Common Name	USFWS	CDFG	CNPS	Habitat	Flower Period	Likelihood of Occurrence
PLANT SPECIES							
Astragalus hornii var. *hornii*	Horn's milk-vetch	—	—	1B.1	Meadows and seeps, playas (elevations of 160-850 m [525-2,789 ft]). Microhabitat: lake margins and alkaline sites	May-October	**Low.** Habitat generally not suitable; Project site too dry.
Astragalus preussii var. *laxiflorus*	Lancaster milk-vetch	—	—	1B.1	Shadscale (*Atriplex* spp.) scrub (elevations of 700 m [2,297 ft])	March-May	**Low.** Suitable habitat may be present. In California, known only from locations near Lancaster and Edwards AFB
California macrophylla	round-leaved filaree	—	—	1B.1	Cismontane woodland, valley and foothill grasslands (elevations of 15-1,200 m [49-3,937 ft])	March-May (Annual)	**Moderate.** Marginally suitable habitat present in Project; not observed during spring surveys.
Calochortus striatus	alkali mariposa-lily	—	—	1B.2	Chaparral, chenopod scrub, Mojavean Desert scrub, meadows, and seeps (elevations of 90-1,595 m [295-5,233 ft])	April-June	**Moderate.** Marginally suitable habitat is present.
Calystegia peirsonii	Peirson's morning-glory	FOC	—	4.2	Chaparral, chenpod scrub, cismontane woodland, coastal scrub, lower montane coniferous forest, valley and foothill grasslands (elevations of 30-1,500 m [98-4,921 ft])	May-June	**Moderate.** Suitable habitat present in the Project site; not observed during spring 2010 surveys.
Canbya candida	white pygmy-poppy	—	SE	4.2	Joshua tree woodland, Mojavean Desert scrub/sandy habitat (elevations of 725-1,250 m [2,379-4,101 ft])	March-June (Annual)	**Low.** Habitat generally not suitable.
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower	—	—	1B.1	Coastal scrub with sandy substrates, valley and foothill grasslands (elevations of 150-1,220 m [492-4,003 ft])	April-June (Annual)	**Low.** Suitable habitat may present in Project site. Currently known from only three locations. Not observed during spring surveys.
Chorizanthe parryi var. *parryi*	Parry's spineflower	—	—	1B.1	Chaparral, coastal scrub, valley and foothill grasslands/sandy or rocky openings (elevations of 40-1,705 m [131-5,594 ft])	April-June (Annual)	**Moderate.** Suitable habitat present within the Project site. Not observed during spring surveys.

Scientific Name	Common Name	USFWS	CDFG	CNPS	Habitat	Flower Period	Likelihood of Occurrence
Chorizanthe spinosa	Mojave spineflower	—	—	4.2	Chenopod scrub, Joshua tree woodland, Mojavean Desert scrub (elevations of 6.0-1,300 m [20-4,265 ft])	April-July (Annual)	**Low.** Habitat generally not suitable.
Chorizanthe xanti var. *leucotheca*	white-bracted spineflower	—	—	1B.2	Mojavean Desert scrub, pinyon (*Pinus* spp.) and juniper woodland (elevations of 300-1,200 m [984-3,937 ft])	April-June (Annual)	**Low.** Habitat generally not suitable.
Cryptantha clokeyi	Clokey's cryptantha	—	—	1B.1	Mojavean Desert scrub, sandy or gravelly soil (elevations of 800-1,280 m [2,625-4,199 ft])	April	**Moderate.** Suitable habitat present and documented by the CNDDB as occurring in the Antelope Valley California Poppy Preserve immediately to northeast of the Project site.
Cymopterus deserticola	desert cymopterus	—	—	1B.2	Creosote bush scrub, Joshua tree woodland, Mojavean Desert scrub/sandy habitat (elevations of 630-1,500 m)	March-May	**Low.** Habitat generally not suitable.
Goodmania luteola	golden goodmania	—	—	4.2	Mojavean Desert scrub, meadows and seeps, playas, valley and foothill grasslands/alkaline or clay habitats (elevations of 20-2,200 m [66-7,218 ft])	April-August (Annual)	**Moderate.** Suitable habitat present in the Project site; not observed during spring surveys.
Eriophyllum mohavense	Barstow woolly sunflower	—	—	1B.2	Desert chenopod scrub, Mojavean Desert scrub, desert playas (elevations of 500-900 m [1,640-2,953 ft])	April-May (Annual)	**Low.** Habitat generally not suitable.
Eschscholzia minutiflora ssp. *twisselmannii*	red rock poppy	—	—	1B.2	Mojavean Desert scrub (elevations of 680-1,230 m [2,231-4,035 ft])	March-May (Annual)	**Low.** Habitat generally not suitable.
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	—	—	1B.1	Coastal salt marshes, playas, valley and foothill grasslands, vernal pools (elevations of 1.0-1,400 m [3.3-4,593 ft])	February -June (Annual)	**Low.** Habitat generally not suitable. Not observed during spring surveys.
Layia heterotricha	pale-yellow layia	—	—	1B.1	Cismontane woodland, pinyon and juniper woodland, valley and foothill grasslands (elevations of 270-1,365 m [886-4,478 ft])	March-June (Annual)	**Moderate.** Suitable habitat present in the Project site; not observed during spring surveys.

Scientific Name	Common Name	USFWS	CDFG	CNPS	Habitat	Flower Period	Likelihood of Occurrence
Lepechinia rossii	Ross' pitcher sage	—	—	1B.2	Chaparral (elevations of 305-790m)	May-Sept.	**Low.** Habitat generally not suitable.
Leptosiphon serrulatus	madera leptosiphon	FOC	—	1B.2	Cismontane woodland, lower montane coniferous forest (elevations of 300-1,300 m [1,001-4,265 ft])	April-May (Annual)	**Low.** Habitat generally not suitable.
Loeflingia squarrosa var. *artemisiarum*	sagebrush loeflingia	—	—	2.2	Desert dunes, Great Basin scrub, Sonoran Desert scrub / sandy (elevations of 700-1,615 m [2,297-5,299 ft])	April-May (Annual)	**Low.** Habitat generally not suitable.
Navarretia fossalis	spreading navarretia	FT	—	1B.1	Chenopod scrub, assorted shallow freshwater marshes and swamps, playas, vernal pools (elevations of 30-1,300 m [98-4,265 feet])	April-June	**Present.** Identified during field surveys in vernal pool on site.
Opuntia basilaris var. *brachyclada*	short-joint beavertail	—	—	1B.2	Chaparral, Joshua Tree woodland, Mojavean scrub, pinyon and juniper woodland (elevations of 425-1,800 m)	April-June	**Present.** Identified on ridgetops and buttes in the northern portion of the site. Believed to be an intergrade with *O.b.* var. *basilaris*.
Symphyotrichum greatae	Greata's aster	—	—	1B.3	Broadleaved upland forest, chaparral, cismontane woodland, lower montane coniferous forest, riparian woodland / mesic (elevations of 300-2,010 m [984-6,594 ft])	June-October	**Moderate.** Suitable habitat present in southern canyons. .

*FE= Federal Endangered; FT= Federal Threatened; FOC= Federal Species of Concern; SE= State Endangered;
CNPS 1B.1= plants seriously threatened in California and at a minimum rare elsewhere;
CNPS 1B.2= plants fairly threatened in California and at a minimum rare elsewhere;
CNPS 1B.3= plants not very threatened in California and at a minimum rare elsewhere;
CNPS 2.2= plants fairly threatened in California but more common elsewhere;
CNPS 4.2= plants with a limited distribution in California (CNDDB 2010, CDFG 2010, USFWS 2010).

5.3 Special Status Wildlife Species

5.3.1 FEDERAL SENSITIVE SPECIES

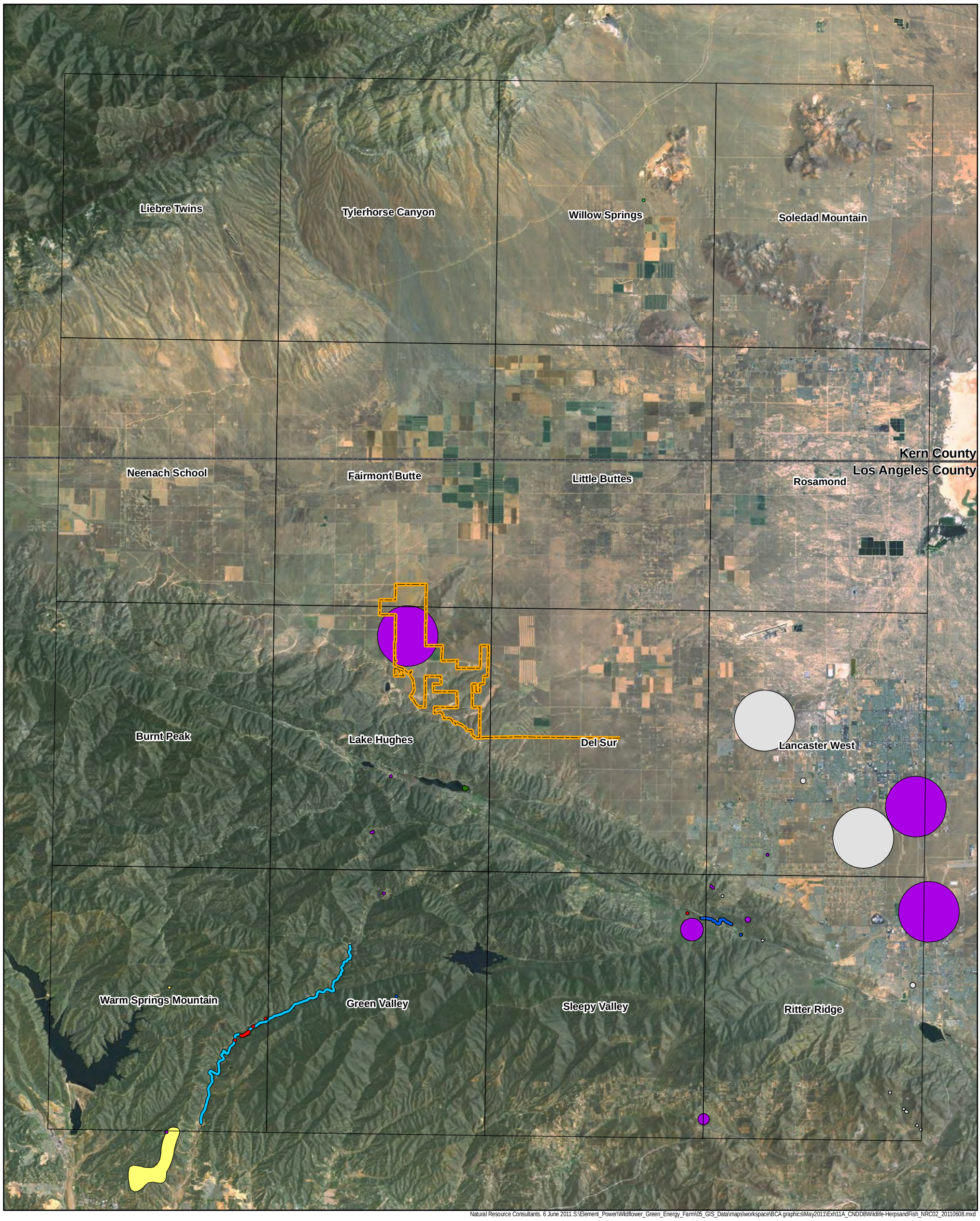
Federal sensitive wildlife species with the potential to occur within the site were identified from a search of the CNDDB (2011a), as well as an online database maintained by the USFWS (2011). The results of this search are presented in Table V and Exhibits 11A-C. Eight species designated as federal threatened, endangered, candidate, or proposed species have been documented in the CNDDB as occurring within the Fairmont Butte, Lake Hughes, or Del Sur quadrangles which comprise the site, and/or within the surrounding 13 quadrangles: Mohave ground squirrel (*Xerospermophilus mohavensis*), California condor (*Gymnogyps californianus*), least Bell's vireo (*Vireo bellii pusillus*), mountain plover (*Charadrius montanus*), desert tortoise (*Gopherus agassizii*), California red-legged frog (*Rana draytonii*), unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), and Riverside fairy shrimp (*Streptocephalus woottoni*) (Table V). Of these, only mountain plover and Riverside fairy shrimp have the potential to occur within the site. An additional 13 species are listed by the USFWS Ventura Office as having the potential for occurrence within this region of Los Angeles and Kern County (USFWS 2011). However, each of these species has a highly restricted range or occupies a specialized habitat that does not occur in the vicinity of the site, and is therefore unlikely to occur. No federally listed threatened, endangered, or candidate species were recorded within the site during field surveys conducted from March 2010 through May 2011.

5.3.2 STATE SENSITIVE WILDLIFE SPECIES

State sensitive wildlife species with potential to occur on the site were identified from a search of the CNDDB (2011a). Twenty-eight species or subspecies designated as state threatened, endangered, or candidate species, state species of special concern, or species maintained on the CDFG's watch list, have been documented within the Fairmont Butte, Lake Hughes, or Del Sur quadrangles and/or the surrounding 13 quadrangles (Table V; Exhibits 11A-C). Based on known species distributions and habitat requirements, an additional 14 species were added to this list. Of the 42 species or subspecies listed in Table V as California special status species, 27 have the potential to occur within the site, including 18 birds, seven mammals, and two reptiles. The remaining species have highly restricted ranges or occupy specialized habitats that do not occur in the vicinity of the site, and therefore have little or no likelihood of occurrence. A total of 15 state sensitive species have been recorded within the site during field surveys conducted from March 2010 through May 2011, including one state-threatened species, two state fully-protected species, six species of special concern, and six watch-list species.

5.3.3 LOCAL SENSITIVE SPECIES

In 2008, a Los Angeles County Sensitive Bird Species Working Group was convened under the aegis of the Los Angeles Audubon Society, with the goal of developing a list of at-risk bird species specific to Los Angeles County (Los Angeles County Sensitive Bird Species Working Group 2009). The list was developed by calculating species rankings where each risk criterion was given a numerical value, with higher values corresponding to greater threat or concern. The risk criteria used were: sensitivity to urbanization, current listing under state or federal law, population trend (if known), the County's importance to the population, distribution within the County, and the scarcity of habitat within the County. A total of 71 species were included on the list of Los Angeles County Sensitive Birds; 32 species not currently receiving conservation attention and 39 species with protection (or at least attention) by either state or federal listing, or by recognition as a California species of special concern. Of these 71 species, 24 were identified as having at least some potential to occur within the site and are listed in Table V. A total of 15 Los Angeles County sensitive bird species were recorded within the site during field surveys conducted from March 2010 through May 2011.



Natural Resource Consultants. 6 June 2011.S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh11A_CNDDBWildlife-HerpsandFish_NRC02_20110608.mxd

Project Boundary

Fishes

unarmored threespine stickleback

Amphibians

California red-legged frog

Reptiles

desert tortoise

western pond turtle

rosy boa

two-striped garter snake

coast horned lizard

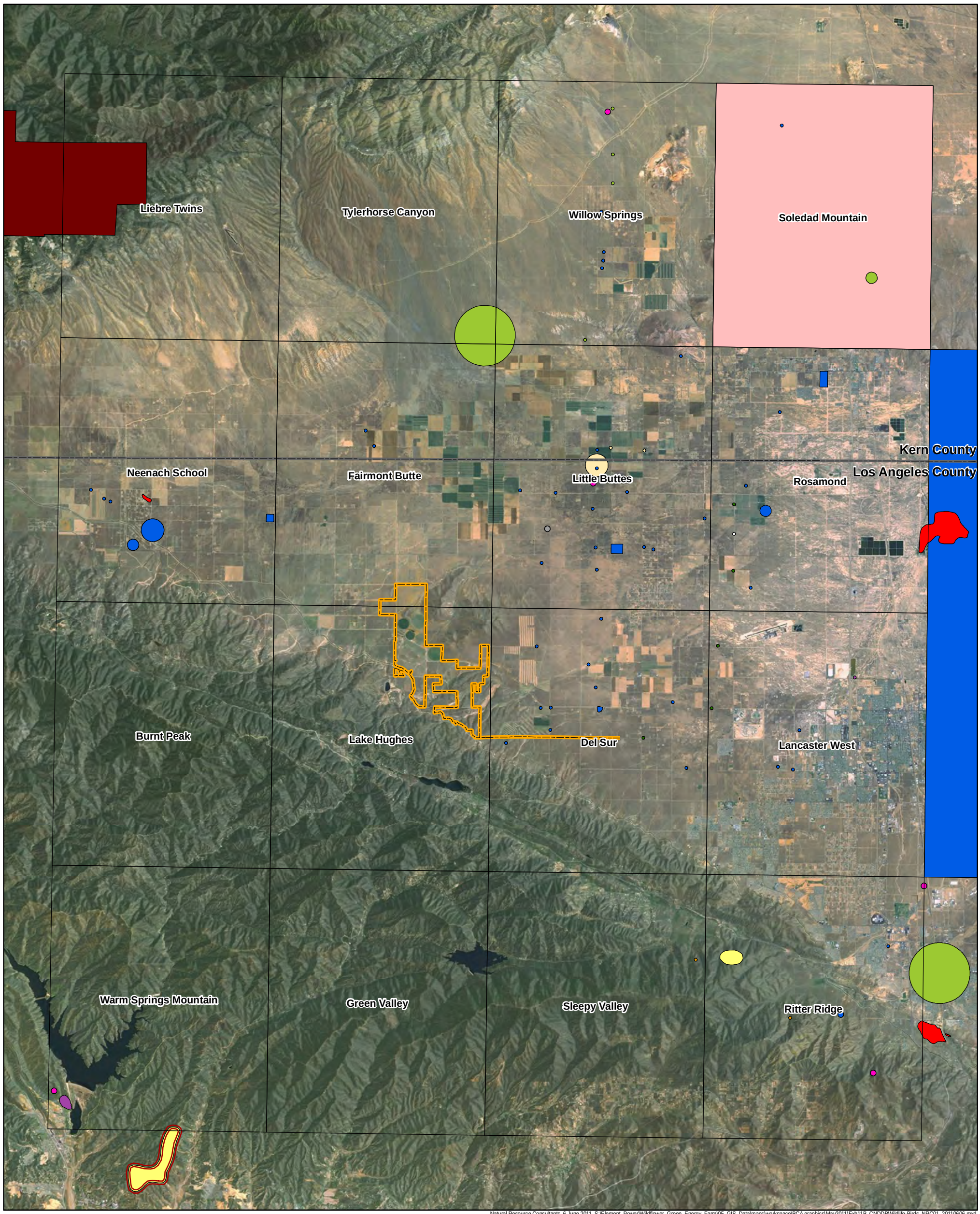
silvery legless lizard

coastal whiptail

N W E S

0 1 2 4 Miles

Exhibit 11A: CNDDB Special Status Wildlife Areas - Herps and Fishes
Wildflower Green Energy Farm
Los Angeles County, California



Natural Resource Consultants. 6 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh11B_CNDDBWildlife-Birds_NRC01_20110606.mxd

Project Boundary

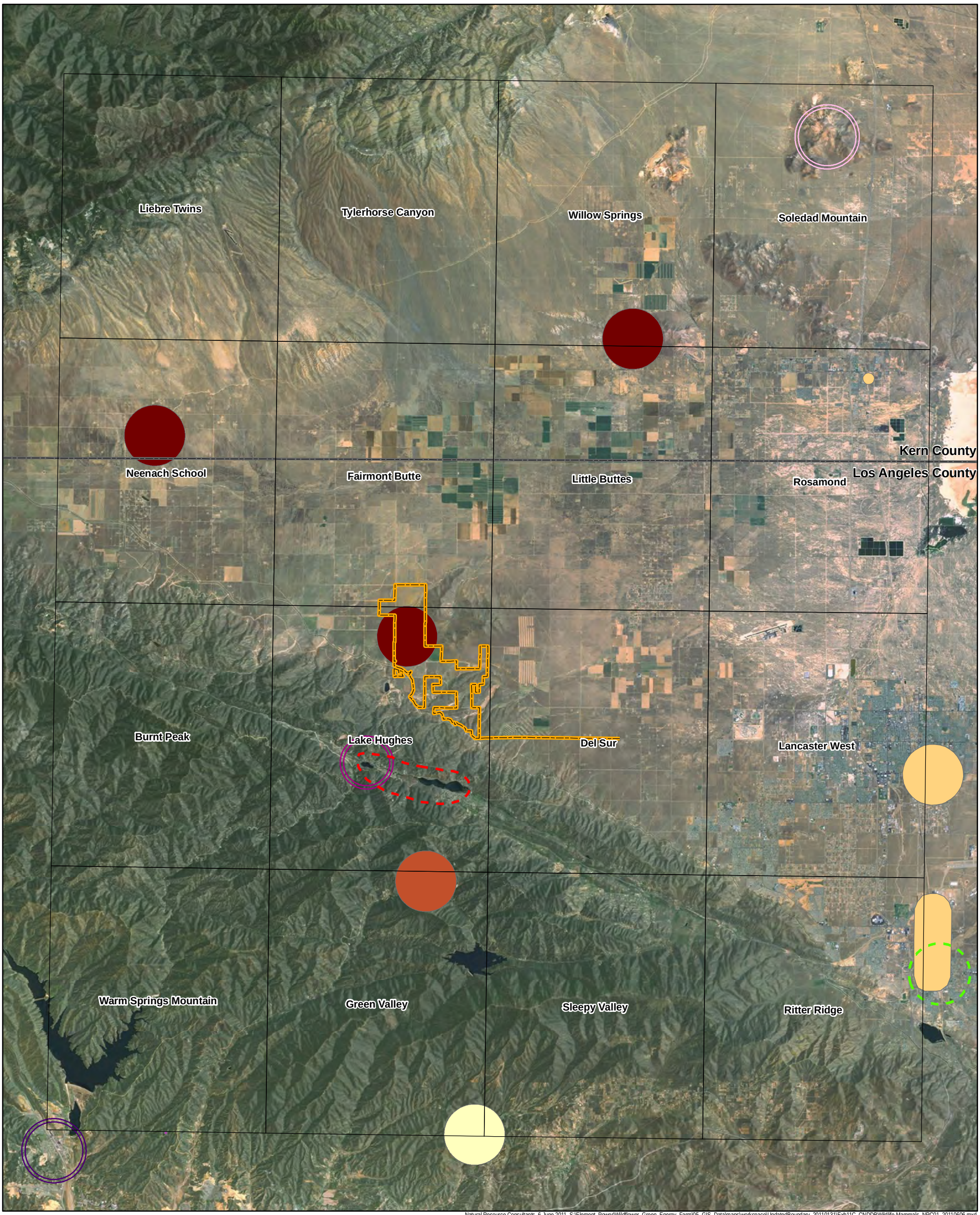
Birds

- California horned lark
- Bell's sage sparrow
- Le Conte's thrasher
- least Bell's vireo
- loggerhead shrike
- mountain plover
- southern California rufous-crowned sparrow
- tricolored blackbird
- white-faced ibis
- burrowing owl
- merlin
- ferruginous hawk
- Swainson's hawk
- prairie falcon
- California condor

N W E S

0 1 2 4 Miles

Exhibit 11B: CNDDB Special Status Wildlife Areas - Birds
Wildflower Green Energy Farm
Los Angeles County, California



Natural Resource Consultants. 6 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\UpdatedBoundary_20110131\Exh11C_CNDDBWildlife-Mammals_NRC01_20110606.mxd

Project Boundary

Mammals

- San Joaquin pocket mouse
- Tehachapi pocket mouse
- southern grasshopper mouse
- lodgepole chipmunk
- Mohave ground squirrel
- San Diego black-tailed jackrabbit
- American badger
- Townsend's big-eared bat
- hoary bat
- pallid bat

N W E S

0 1 2 4 Miles

Exhibit 11C: CNDDB Special Status Wildlife Areas - Mammals
Wildflower Green Energy Farm
Los Angeles County, California

TABLE V: SENSITIVE WILDLIFE SPECIES WITH POTENTIAL TO OCCUR WITHIN THE ANTELOPE VALLEY RENEWABLE ENERGY SITE.

Common Name	Scientific Name	USFWS	CDFG	County	Habitat	Likelihood of Occurrence
MAMMALS						
American badger	*Taxidea taxus*	—	SSC	—	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats with friable soils for digging burrows.	**Possible.** Suitable habitat is present; CNDDB documents occurrence within the boundary of the site.
Mohave ground squirrel	*Xerospermophilus mohavensis*		ST		Occurs in open desert scrub, alkali scrub, and Joshua tree woodland of Mojave desert, preferring sandy to gravelly soil; nests in burrows.	**Unlikely.** Site is outside species known range; suitable desert scrub habitats not present.
pallid bat	*Antrozous pallidus*	—	SSC	—	Inhabits arid grasslands, shrublands, and woodlands from sea level to sub-alpine mixed conifer forest. Roosts in rock crevices, buildings, and bridges.	**Possible.** Limited roosting habitat is present, but species likely forages on the site.
southern grasshopper mouse	*Onychomys torridus Ramona*	—	SSC	—	Common in arid desert habitats of the Mojave Desert and southern Central Valley of California; alkali desert scrub and desert scrub habitats are preferred, but may also occur in succulent scrub, wash, riparian, coastal scrub, mixed chaparral, sagebrush, low sage, and bitterbrush habitats.	**Possible.** Preferred desert scrub habitat not present within site, but other suitable habitats may be present.
spotted bat	*Euderma maculatus*	—	SSC	—	Occupies a wide variety of habitats from deserts and grasslands through mixed conifer forests. Feeds over water and along washes. Requires rock crevices in cliffs or caves for roosting.	**Possible.** No roosting habitat present, but may forage on the site.
Tehachapi pocket mouse	*Perognathus alticola inexpectatus*	—	SSC	—	Occurs in a diversity of habitats including Joshua tree woodland, pinyon-juniper woodland, oak savanna, and non-native grasslands; burrows in friable, sandy soil.	**Unlikely.** Suitable habitat may be present; range is generally to the west and south of the site; CNDDB documents occurrence approximately 3 miles south.
Townsend's big-eared bat	*Corynorhinus townsendii*	—	SSC	—	Typically inhabits arid western desert scrub and pine forest. Forms maternity roosts in caves, mines, or buildings. In winter, hibernates in caves and abandoned mines.	**Possible.** Limited roosting habitat present, but may forage within the site.

Common Name	Scientific Name	USFWS	CDFG	County	Habitat	Likelihood of Occurrence
western mastiff bat	*Eumops perotis*	—	SSC	—	Occurs in many open, semi-arid habitats including conifer and deciduous woodlands, coastal scrub, grassland, etc. Roosts in crevices in cliff faces, high buildings, trees, and tunnels.	**Possible.** No roosting habitat present in the site, but may forage in area.
western red bat	*Lasiurus blossevillii*	—	SSC	—	Roosts primarily in trees 2.0-40 ft (0.6-12 m) above ground; prefers habitat edges and mosaics with trees that are protected from above and open below; uses open areas for foraging.	**Possible.** Limited suitable roosting habitat on the site, but may forage across the site; generally does not occur in desert habitats.
BIRDS						
American white pelican (nesting colony)	*Pelecanus erythrorhynchos*	—	SSC	—	In California, breeds primarily in the Klamath Basin. Forages in shallow inland waters and along lake or river edge. Wintering birds also forage along shallow coastal waters.	**Observed (migration only).** Suitable nesting and foraging habitat is absent, but species could migrate over the site; observed in migration during avian use surveys.
Bell's sage sparrow	*Amphispiza belli belli*		SWL		Resident on the coastal slope of Southern California; nests in chaparral dominated by fairly dense stands of chamise.	**Unlikely.** Site is outside species known ranges; no suitable habitat within site.
burrowing owl	*Athene cunicularia*	BCC	SSC	—	Inhabits open dry grasslands, desert, and scrubland characterized by low-growing vegetation. Utilizes subterranean nests constructed by burrowing mammals.	**Observed.** Suitable habitat present; observed during spring protocol-level burrowing owl surveys.
California condor	*Gymnogyps californianus*	FE	SE	CS	Requires vast expanses of open savannas, grasslands, and foothill chaparral in mountains and foothills; tends to avoid large, open valleys. Nests in clefts of rocky walls of deep canyons. Roosts on cliffs, in large trees, and snags. Can forage up to 180 km from nest/roost.	**Unlikely**. No nesting/roosting habitat present within the site, and the site is generally outside of species' range; may rarely venture over region, especially if condor population continues to expand.
California horned lark	*Eremophila alpestris actia*	—	SWL	—	Found in open habitats, forages in bare dirt in short and/or sparse grassland and areas of scattered shrubs.	**Unlikely.** Suitable habitat is present, but this subspecies generally occurs in more coastal areas.

Common Name	Scientific Name	USFWS	CDFG	County	Habitat	Likelihood of Occurrence
Cooper's hawk	*Eremophila alpestris actia*	—	SWL	—	Nests in woodlands and sometimes suburban settings if mature trees are present. Forages in broken woodlands or near habitat edges with exception of desert occurrences; seldom found in areas without dense or patchy wooded areas.	**Observed.** No suitable nesting habitat present in site, but likely migrant through area; observed traveling through site during site visit.
ferruginous hawk	*Buteo regalis*	BCC	SWL	CS	Winters at lower elevations and open grasslands, agricultural areas in southwestern California, sagebrush flats, desert scrub, low foothills surrounding valleys, and the edges of pinyon-juniper habitats.	**Observed.** Winter resident and/or migrant; observed foraging in site during avian use surveys.
golden eagle	*Aquila chrysaetos*	BCC	SFP, SWL	CS	Inhabits rolling hills, mountains, sage-juniper flats and deserts. Uses secluded cliffs with overhanging ledges and large trees for nesting.	**Observed.** No suitable nesting habitat, but species may forage within the site; observed on the site during avian use surveys.
greater roadrunner	*Geococcyx californianus*	—	—	CS	Year-round resident of steep foothill canyons, desert scrub and woodlands, and coastal sage scrub habitats.	**Observed.** Year-round resident. Observed during spring avian use surveys.
greater white-fronted goose	*Anser albifrons*	—	—	CS	Once common winter resident of Los Angeles County; frequents open water or unvegetated shorelines for roosting and nearby post-harvest grain fields for foraging.	**Unlikely.** No suitable open water habitat within site, but may occur in agricultural fields in area.
Le Conte's thrasher	*Toxostoma lecontei*	BCC	SSC	CS	Occurs in open desert wash, desert scrub, alkali desert scrub, and desert succulent shrub habitats; also Joshua tree habitat with scattered shrubs.	**Unlikely.** Habitat generally not suitable on the site; likely occurs in nearby desert scrub habitats; CNDDB documents nearest occurrence approximately nine miles (14 km) to the north.
least Bell's vireo	*Vireo bellii pusillus*	FE, BCC	SE	—	Occurs in riparian scrub and riparian woodland habitats along river and stream courses. Prefers dense willow thickets for nesting and structurally diverse canopy for foraging.	**Unlikely.** No suitable nesting or foraging habitat within the site; however, may occur within the site's limited riparian habitat during migration.

Common Name	Scientific Name	USFWS	CDFG	County	Habitat	Likelihood of Occurrence
loggerhead shrike (nesting)	*Lanius ludovicianus*	BCC	SSC	CS	Uses open habitats with shrubs, trees, posts, fences, and low utility lines for perching. Forages in edge habitats, preferring shrubs adjacent to grasslands.	**Observed.** Suitable habitat present; observed on the site during avian use surveys.
long-billed curlew (nesting)	*Numenius americanus*	BCC	SWL	CS	Winters in flocks in wetlands and agricultural habitats of the coastal plains of Los Angeles County, and in pastureland and irrigated alfalfa fields in the interior of the County.	**Possible.** Some suitable habitat may be present within pastures and agricultural fields within the site; eBird documents species' occurrence approximately 3 miles to east of site and 3.5 miles to north.
long-eared owl (nesting)	*Asio otus*	—	SSC	CS	For wintering, requires dense stands of vegetation adjacent to large tracts of open habitat for foraging; known to use communal roosts in winter. Within Los Angeles County, suitable wintering habitat largely confined to the Antelope Valley.	**Possible.** May nest or roost in the few wind breaks and riparian corridors present on the site; may forage throughout site; eBird documents species' occurrence in Poppy Preserve just north of site.
Merlin (wintering)	*Falco columbarius*	—	SWL	—	Occurs in open habitats at low elevations. Rare winter migrant in the Mojave Desert. Found in riparian environments, coastlines, open grasslands, savannas, woodlands, lakes, and wetlands.	**Observed.** May occur as winter resident or migrant; observed during fall avian use survey.
mountain bluebird	*Sialia currucoides*	—	—	CS	In winter, occurs in open or sparsely wooded habitat; prefers agricultural fields or pastures often with an occasional tree, rock, post, powerline, or building for perching.	**Observed.** Likely winter resident of site.
mountain plover (wintering)	*Charadrius montanus*	FPT, BCC	SSC	CS	Winter resident in California; inhabits short, open, grasslands, plowed fields, open sagebrush areas, and foothill valleys.	**Possible.** Suitable habitat present; possible winter resident and/or migrant; CNDDB documents species' occurrence approximately four miles (six km) to the northeast; eBird documents species' occurrence in Poppy Preserve just north of site.

Common Name	Scientific Name	USFWS	CDFG	County	Habitat	Likelihood of Occurrence
northern harrier (nesting)	*Circus cyaneus*	—	SSC	CS	Inhabits large open grasslands, fields, prairies, and wetlands/marshes for nesting and hunting; nests on ground in tall wetland or grassland vegetation.	**Observed.** Suitable nesting may be present; likely forages and/or migrates over the site; observed during avian use surveys.
prairie falcon (nesting)	*Falco mexicanus*	BCC	SWL	CS	Inhabits annual grassland to alpine meadows, but is typically found in perennial grasslands, savannahs, rangeland, some agricultural fields and desert scrub areas. Nests on cliff ledges.	**Observed.** No suitable nesting habitat present, but suitable foraging habitat in site; observed during avian use surveys in fall.
American peregrine falcon (nesting)	*Falco peregrinus anatum*	BCC	SFP	CS	Found in open habitats in all seasons, with preference for breeding proximal to water sources. Nesting is favored in coastal cliffs, bluffs, granitic outcrops and on tall bridges and buildings in urban areas.	**Observed (migration only).** Nesting habitat is absent from site, but species may migrate over or forage in area.
Scott's oriole (nesting)	*Icterus parisorum*	—	—	CS	Occurs on arid slopes and highlands supporting larger plants such as Joshua trees, mesquite-acacia associations, pinyon-juniper woodland, and dry oak woodland.	**Unlikely.** Nesting habitat generally absent from site, but species may forage in area.
sharp-shined hawk	*Accipiter striatus*	—	SWL	—	Nests in conifer and riparian forests, preferably on north-facing slopes with dense trees and near water. Forages in many types of habitats in the winter and in migration.	**Observed.** No nesting habitat present, but may forage within the site during winter and/or migrate over the site. Observed during avian use surveys in winter.
short-eared owl (nesting)	*Asio flammeus*	—	SSC	CS	Found in swamp lands, lowland meadows, and irrigated alfalfa fields. Nests on dry ground in depression.	**Possible.** May occur as winter resident and/or migrant; eBird documents species occurrence 3.5 miles north of site.
snow goose	*Chen caerulescens*	—	—	CS	Once common winter resident of Los Angeles County; occurs on marshes or shallow lakes with adjacent agricultural fields.	**Unlikely.** No suitable open water habitat within site, but may occur in agricultural fields in area.
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*		SWL		Inhabits southern California coastal sage scrub and sparse mixed chaparral; frequents relatively steep, often rocky hillsides with grass and forb patches.	**Unlikely.** Suitable sage scrub and chaparral habitat not present in site.

Common Name	Scientific Name	USFWS	CDFG	County	Habitat	Likelihood of Occurrence
southwestern willow flycatcher	*Empidonax traillii extimus*	FE	SE	—	For nesting, requires dense riparian habitats with saturated soils, standing water, or nearby streams, pools, or cienegas. Riparian habitats not suitable for nesting may be used for migration and foraging.	**Unlikely.** No suitable nesting or foraging habitat within the site; however, may occur within the site's limited riparian habitat during migration.
Swainson's hawk (nesting)	*Buteo swainsoni*	BCC	ST	CS	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands; requires adjacent foraging areas supporting rodent populations.	**Observed.** Nest observed approximately four miles to the east of site and is known to nest near alfalfa fields to northeast; observed foraging on site during avian use surveys.
tricolored blackbird	*Agelaius tricolor*	BCC	SSC	CS	Highly colonial species, largely endemic to California, and most numerous in Central Valley. Requires open water, protected nesting substrate, and nearby foraging area with insect prey.	**Observed.** Two breeding colonies located within 100 m of site boundary; observed in large numbers foraging throughout site during spring and summer avian use surveys.
turkey vulture (nesting)	*Cathartes aura*	—	—	CS	For nesting, uses remote, rocky locations with caves, cliff ledges, caviities in trees, snags, and large boulder piles; requires large areas for foraging.	**Observed.** No suitable nesting habitat within site, but frequently forage in area; observed during avian use surveys.
vesper sparrow	*Pooecetes gramineus*	—	—	CS	Winters in open grasslands and sparse shrublands in the valley and desert regions of Los Angeles County.	**Observed.** winter resident of site; observed during fall avian use surveys.
western meadowlark	*Sturnella neglecta*	—	—	CS	Once abundant in Los Angeles County's lowlands, now only commonly found in grasslands, agricultural fields, and other open habitats in the Antelope Valley.	**Observed.** Common year-round resident; observed on site during avian use surveys.
white-faced ibis (nesting colony)	*Plegadis chihi*	—	SWL	CS	Requires fresh or salt-water wetlands with dense emergent vegetation for nesting and nearby fields or pastures for foraging.	**Observed (migration only).** No suitable nesting habitat within site; may forage in area during migration. Observed during spring avian use surveys.
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	—	SSC	CS	Nests colonially in freshwater emergent wetlands with dense vegetation and deep water; often along borders of lakes or ponds.	**Observed.** No suitable nesting or habitat within the site; but may occur as migrant. Observed during spring avian use surveys.

Common Name	Scientific Name	USFWS	CDFG	County	Habitat	Likelihood of Occurrence
REPTILES						
coast horned lizard	*Phrynosoma blainvillii*	—	SSC	—	Occurs in loose sandy soils and alkali flats in a variety of habitats, including chaparral, grassland, saltbrush (*Atriplex* spp.) scrub, coastal sage scrub, coniferous forest, oak woodland, and clearings in riparian woodlands. Abundant prey base of ants and other insects required.	**Possible.** Suitable habitat present; not observed during general wildlife surveys in spring and summer.
desert tortoise	*Gopherus agassizii*	FT	ST	—	Occurs in gravelly desert washes, canyon bottoms, and rocky hillsides in habitats including the creosote, shadscale, and Joshua tree/Mohave yucca series of Mojave Desert scrub, the lower Colorado River valley subdivision of Sonoran Desert scrub, and semi-arid grasslands. Prefers habitats where diversity of perennial species is relatively high and production of ephemerals is relatively high. Requires friable soils for burrow construction.	**Unlikely.** Habitat not suitable; outside of species known range; CNDDB documents species' occurrence approximately 15 miles (24 km) to the northeast of the site.
silvery legless lizard	*Anniella pulchra pulchra*	—	SSC	—	A burrowing species associated with sandy or loose loamy soils with sparse vegetation; uses chaparral, pine-oak woodland, washes, and streamside terraces; requires elevated soil moisture.	**Possible.** Suitable habitat may be present; possibility of occurrence in loose sandy soils along washes.
two-striped garter snake	*Thamnophis hammondii*		SSC		Highly aquatic species found in or near permanent fresh water; often along streams with rocky beds and riparian vegetation.	**Unlikely.** Suitable aquatic habitats not present in site.
western pond turtle	*Emys marmorata*		SSC		Aquatic species which requires permanent ponds, marshes, rivers, or streams, usually with aquatic vegetation; requires suitable basking sites and upland habitat for egg-laying.	**Unlikely.** Suitable aquatic habitat with vegetation not present within site.
AMPHIBIANS						
California red-legged frog	Rana draytonii	FT	SSC		Inhabits lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation; requires 11-12 weeks of permanent water for larval development.	**Unlikely.** Suitable permanent deep water habitat with riparian vegetation not present within site.

Common Name	Scientific Name	USFWS	CDFG	County	Habitat	Likelihood of Occurrence
FISHES						
unarmored threespine stickleback	*Gasterosteus aculeatus williamsoni*	FE	SE	---	Inhabits clear, slow-flowing streams with sand or mud substrate, water temperature less than 24°C (75°F), and abundant aquatic vegetation.	**Unlikely.** No suitable stream habitat present in site.
INVERTEBRATES						
Riverside fairy shrimp	*Streptocephalus woottoni*	FE	—	—	Occurs in vernal pools filled by winter and spring rains within patches of grassland and agriculture interspersed with coastal sage scrub.	**Possible.** Some potential for occurrence in vernal pool habitat on site.

*FE=Federal Endangered; FT=federal threatened; FC=federal candidate for listing; FPT = federal proposed threatened; BCC= USFWS Birds of Conservation Concern; SE=State Endangered; ST=State Threatened; SSC=State Species of Special Concern; SFP=State Fully Protected; SWL=Watch List; CS=Los Angeles County Sensitive (USFWS 2010; CNDDB 2010a; CDFG, Fish and Game Code, Section 3511).

5.3.4 INVERTEBRATES

A butterfly survey was conducted within the site in May 2010 by Bruyea Biological Consulting. A list of 63 butterfly species with potential to occur within the site is included in Appendix B. The specific goal of the butterfly survey was to assess potential suitability of the site as habitat for the San Emigdio blue butterfly and the alkali skipper, both Federal species of concern. The San Emigdio blue butterfly is restricted to southern California in lower Sonoran and riparian habitats and can be locally abundant in association with its primary host plant, four-wing saltbush (*Atriplex canescens*). The species has also been observed in association with quail bush (*A. lentiformis*) at scattered locations. The alkali skipper ranges from southern Nevada to eastern and southern California, where it is strongly associated with its larval host plant, saltgrass (*Distichlis spicata*). Based on the results of the two-day survey effort, the lack of historical occurrence data for the region, and the absence of their respective host plants, it was concluded that the site does not support suitable habitat for either of the target species.

Eight non-sensitive species were encountered during the survey: checkered white (*Pontia protodice*), cabbage white (*Pieris rapae*), alfalfa butterfly (*Colias eurytheme*), painted lady (*Vanessa cardui*), red admiral (*Vanessa atalanta*), West Coast lady (*Vanessa annabella*), funereal duskywing (*Erynnis funeralis*), and lupine blue (*Icaricia lupini*) (Appendix B). Based on seasonal precipitation patterns in the late winter and spring months of 2010, butterfly activity was considered relatively productive for most areas of southern California, including the Antelope Valley and surrounding areas.

There is potentially suitable habitat for the federally endangered Riverside fairy shrimp (*Streptocephalus woottoni)* within Vernal Pool B (Exhibit 13B). The site is outside the currently documented range for this species.

5.3.5 FISHES

Three sensitive fish species are listed by the USFWS (2011) or CNDDB (2010a) as occurring within Los Angeles County. Only one of these, the state and federally endangered unarmored stickleback, is known to occur in the vicinity of the site (Exhibit 11A). However, no suitable aquatic habitat for this species or other sensitive fish species occurs within the site. Fish are present within the California Aqueduct running along the southwest boundary of the site; however these are not likely to be sensitive species and, furthermore, will not be affected by construction and operation of the proposed project.

5.3.6 AMPHIBIANS AND REPTILES

According to the CNDDB, seven special status amphibian species are known to occur in Los Angeles County. Of these, only the California red-legged frog is known to occur within the Fairmont Butte, Lake Hughes, or Del Sur quadrangles and/or the surrounding 13 quadrangles (Table V; Exhibit 11A). This species is unlikely to occur within the site as permanent deep water habitat with riparian vegetation is not present.

Two special status reptile species have some potential to occur within the site: coast horned lizard (*Phrynosoma blainvillii*), and silvery legless lizard (*Anniella pulchra pulchra*; Table V). Desert tortoise and western pond turtle (*Actinemys marmorata*) are also listed as occurring in the site vicinity (Exhibit 11A); however, suitable habitat for these two species is not present within the site, and their occurrence is unlikely.

5.3.7 BIRDS

Thirty-two special status bird species were identified as occurring in the region (Table V, Exhibit 11B). The only state and/or federally listed bird species with potential to occur within the site is the Swainson's hawk (*Buteo swainsoni*) and this species is addressed specifically in Section 5.3.7.1. While the California condor does not currently occur within the site, we have provided a discussion of this species in Section 5.3.7.2 based on the high-profile of this species in the region.

Fixed-point bird use surveys were conducted throughout the site from March 18, 2010 to March 12, 2011. A total of 207 hours of surveys were conducted and 27,675 individual birds comprising 90 distinct species were recorded. Two species, horned lark (*Eremophila alpestris*) and tricolored blackbird (*Agelaius tricolor*), comprised 65.3% of all small bird observations. Among large birds, the common raven (*Corvus corax*) had the highest use during all four seasons, accounting for 46.5% of all large bird observations. A total of 488 diurnal raptors, comprising 11 distinct species, were recorded during surveys. Red-tailed hawk (*Buteo jamaicensis*) accounted for 35.9% of the raptor sightings, and American kestrel (*Falco sparverius*) accounted for an additional 34.6%. Raptor use was highest in winter (1.92 raptors/30-minute survey) and fall (1.33), compared to spring (0.50) and summer (0.82). Mean annual diurnal raptor use was moderate relative to raptor use at other wind-energy facilities across North America, ranking 10th out of 39 other facilities that implemented similar data collection protocols. Fixed-point bird use surveys will continue for a second full year, with a scheduled completion date in spring of 2012.

A total of 14 California state species of special concern, California fully protected species, or watch list species were recorded during avian use surveys, site visits, or other field surveys conducted from March 18, 2010 to May 2011: American white pelican (*Pelecanus erythrorhynchos*), white-faced ibis (*Plegadis chihi*), northern harrier (*Circus cyaneus*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), ferruginous hawk (*Buteo regalis*), golden eagle, merlin (*Falco columbarius*), prairie falcon (*Falco mexicanus*), peregrine falcon (*Falco peregrines*), burrowing owl, loggerhead shrike (*Lanius ludovicianus*), tricolored blackbird (*Agelaius tricolor*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*) (Exhibit 12). Golden eagles are further protected by the federal Bald and Golden Eagle Protection Act (BGEPA 1940). An additional four state species of special concern or state watch list species are document by eBird as occurring within four miles of the site: long-billed curlew (*Numensis americanus*), long-eared owl (*Asio otus*), short-eared owl (*Asio flammeus*), and mountain plover. None of these four species have been observed in 2010 and 2011 surveys.

Of the 14 special status species observed within the site vicinity (Exhibit 11B), American white pelican, white-faced ibis, sharp-shinned hawk, peregrine falcon, merlin, and yellow-headed blackbird are likely migrants passing through the region rather than residents of the site or surrounding area. Northern harrier, Cooper's hawk, and golden eagle reside in the project vicinity and likely forage in the site; however, no suitable nesting habitat is present within the site itself. Loggerhead shrike and burrowing owl are year-round residents and breeders within the site, while ferruginous hawk is a winter resident. Tricolored blackbirds are known to nest in several colonies just outside the site boundary and large flocks of this species forage throughout the site's grasslands in spring and summer.

Of the 71 species designated as Los Angeles County Sensitive Birds, 22 species have at least some potential to occur in the site at some point in the year (Table V). While the majority of these species receive protection, or at least conservation attention, by state and/or federal agencies, 8 species are not included on state or federal lists: greater white-fronted goose (*Anser albifrons*), snow goose (*Chen caerulescens*), turkey vulture (*Cathartes aura*), greater roadrunner (*Geococcyx californianus*), mountain bluebird (*Sialia currucoides*), vesper sparrow (*Pooecetes gramineus*), western meadowlark (*Sturnella neglecta*), and Scott's oriole (*Icterus parisorum*). Of these, turkey vulture, greater roadrunner, mountain bluebird, vesper sparrow, and western meadowlark were observed in the site during avian surveys. A full list of avian species observed within the site, or with potential to occur in the, is included in Appendix B.

However, it should be noted that this list does not include all avian species with potential to migrate over the region.

5.3.7.1 Swainson's Hawk

Swainson's hawk, a state threatened species, was observed foraging in the site on three occasions during avian use surveys in the spring and fall 2010 and, in 2010, was observed nesting approximately 4 mi (6 km) northeast of the site (Exhibit 12). Upon subsequent visits to the nest, it was determined this nest failed in 2010 and was occupied by ravens in 2011. The only potential nesting habitat on the site consists of scattered windrows and isolated trees associated with several residences and abandoned ranch sites. No nests have been documented within the site. Swainson's hawk numbers, both as a breeding species and a migrant, have declined rapidly in California in the past half century (Garrett and Dunn 1981), with declines noted as early as 1933 (Willett 1933).

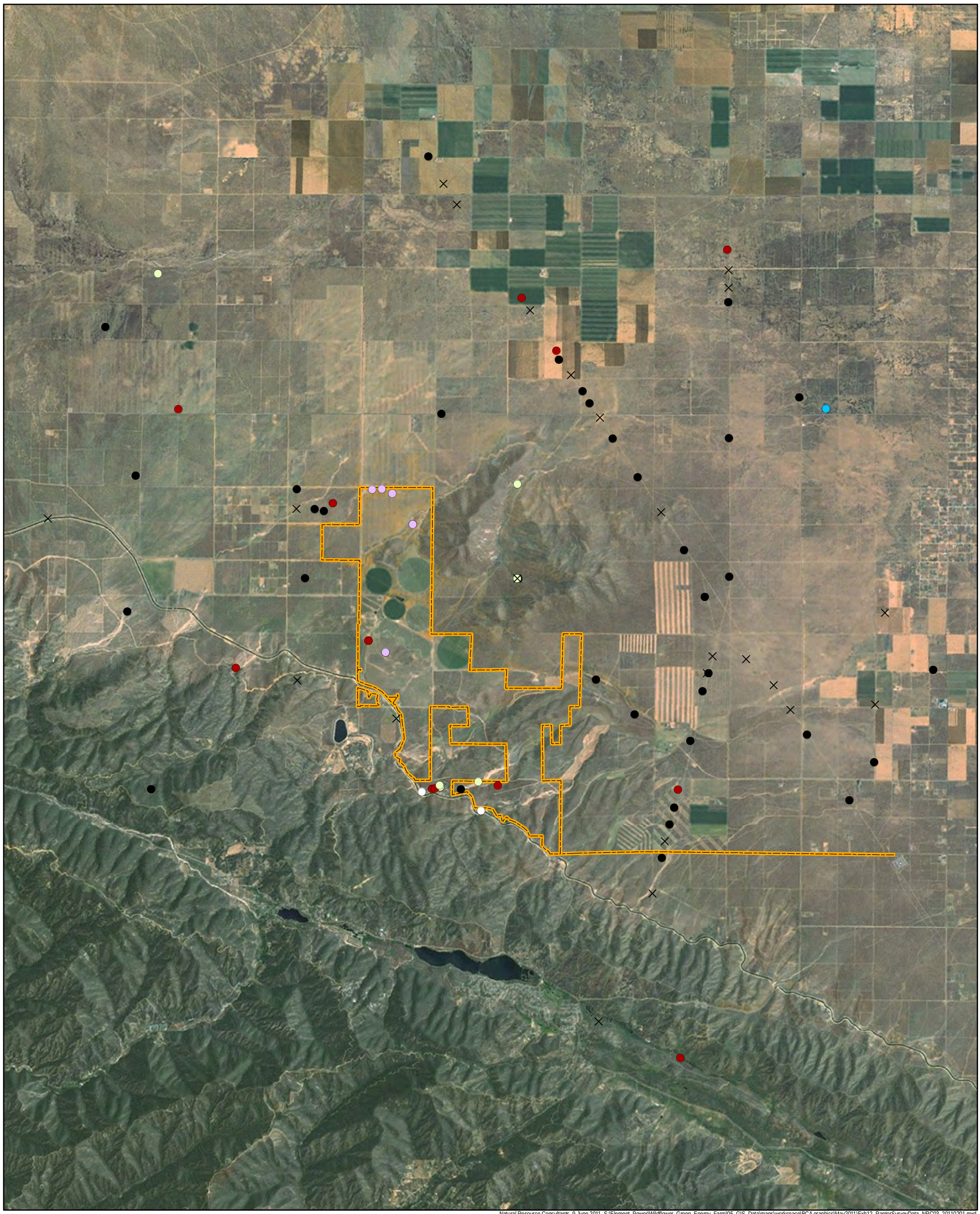
Small numbers of Swainson's hawk congregate in spring migration at staging areas in Anza Borrego State Park and Morongo Valley, from which they move north along the eastern and northern flanks of the coast ranges, across the Tehachapi Mountains and Kern Valley, and into the Central Valley where the largest numbers of Swainson's hawks breed in California. In fall migration, Swainson's hawks are more widely dispersed, with occasional small concentrations observed in the eastern Colorado Desert and Colorado River (Bloom 1980, Bechard et al. 2010, Small 1994). Periods of migration are from early March through mid-May and from early August through October, with peaks of occurrence in the first half of April and from mid-September through mid-October. Other than small, isolated wintering populations in California's Sacramento-San Joaquin River Delta and in southern Florida, the vast majority of birds winter in South America (Bechard et al. 2010).

During both the breeding season and migration, Swainson's hawks feed primarily in grasslands and agricultural fields, among the latter, seemingly preferring alfalfa fields. During the breeding season, primary prey items include ground squirrels, voles, and other small mammals. Following the breeding season, the species' diet shifts from small mammals to insects including grasshoppers, dragonflies, and caterpillars (Bechard et al. 2010).

5.3.7.2 California Condor

The California condor (*Gymnogyps californianus*) is a federal and state listed Endangered Species and a California Fully Protected Species with broad habitat and climatic tolerances. Observations and data from telemetered birds (by radio and satellite) indicate that the site or surrounding portions of the Antelope Valley are not used for foraging, nesting, breeding, or any diurnal or nocturnal roosts (USFWS 2010). Furthermore, the site contains no habitats that are known for nesting and, overall, the site does not contain the essential elements used to define traditional condor habitat (Snyder and Snyder 2000) and there are no historical records of condor use in this area (Willett 1933).

On September 24, 1976, the USFWS designated Critical Habitat for the condor consisting of nine areas encompassing approximately 600,000 acres (USFWS 1976). These areas occur in the following counties: Tulare, San Luis Obispo, Ventura, Kern, Santa Barbara, and Los Angeles. The Sespe-Piru, Matilija, Sisquoc-San Rafael, and Hi Mountain-Beartrap condor areas were considered critical for nesting and related year-long activity, and the Mt. Pinos and Blue Ridge condor areas were considered critical for roosting. The project site is located 11 mi (18 km) from the nearest designated critical habitat for this species.



Project Boundary
Common Raven
Great-horned Owl
Red-tailed Hawk
Swainson's Hawk
Inactive Nest
Tricolored Blackbird
Burrowing Owl

N
W
E
S

0 0.45 0.9 1.8
Miles

Exhibit 12: 2010 and 2011 Raptor Nest and Burrowing Owl Survey Results
Wildflower Green Energy Farm
Los Angeles County, California

5.3.7.3 Raptor Nesting

A small amount of nesting habitat for tree-nesting raptors is present within the site and surrounding area in the form of several small riparian woodlands, windrows and individual large trees or small groups of trees near residential areas. During the aerial golden eagle/raptor nest surveys conducted on April 14 and May 24, 2010, a single red-tailed hawk nest was recorded within the site boundary (Exhibit 12, Appendix A: Photo L). Within approximately 2 miles of the site, and additional two active red-tailed hawk nests, two active great horned owl nests, and over 30 common raven (*Corvus corax*) nests were recorded during the spring 2010 survey (Exhibit 12). A single Swainson's hawk nest was also observed in 2010 approximately 4 miles (6 km) northeast of the site (Exhibit 12, Appendix A: Photo S). This nest failed in 2010 and was occupied by ravens in 2011. Several additional Swainson's hawk nests are known from approximately 6 to 12 miles (9 to 19 km) northeast of the site in association with irrigated alfalfa fields (Erinn Wilson, CDFG, pers. comm.). No golden eagle nests were found within 10-miles (16-km) of the site; however, potential nesting sites exist on the transmission towers east of the site. A second year of raptor nest surveys, focusing on raptor nests located within the site boundary, as well as survey for Swainson's hawk nests within 5 miles of the site, was initiated in the spring of 2011 and is currently ongoing. Thus far, the 2011 nest survey effort has identified five active raptor nests (not including burrowing owls) within or adjacent to the site boundary including three red-tailed hawk nests and two great-horned owl nests (Exhibit 12). To date, no Swainson's hawk nests have been identified within 5 miles of the site during the 2011 nesting season.

During the burrowing owl surveys conducted at the site during May-July 2010, two active territories were identified: an active burrow occupied by a single adult owl in the northwest portion of the site, first observed on May 17, and a pair occupying a burrow in the southwest portion of the site, first observed on May 20 (Exhibit 12, Appendix A: Photos C). Each territory was visited periodically throughout the spring and summer to check for occupancy and nesting status. The single owl in the northwest was last observed near the burrow on June 10, 2010 and not observed on subsequent visits. The pair in the southwest successfully fledged six young and continued to use the burrow throughout the fall and winter. All identified burrows with evidence of past or current of use by burrowing owls continued to be monitoring periodically throughout the fall and winter to identify use by migrant or wintering owls. In May of 2011, additional burrowing owl surveys were initiated within portions of the site not surveyed in 2010. These surveys are currently ongoing and scheduled to continue through June of 2011. To date, three additional active burrowing owl territories have been identified, all in the northern portion of the site (Exhibit 12).

5.3.7.4 Potential Areas of Raptor Use

Studies indicate that raptor mortality at wind-energy facilities may be in part due to behavioral differences between species, increasing the susceptibility of some for collision with turbines. Orloff and Flannery (1992, 1996) suggested that the relatively high golden eagle mortality at the Altamont Pass Wind Resource Area (APWRA) was in part due to the apparently higher densities of California ground squirrels (*Spermophilus beecheyi*) in the area (Thelander and Smallwood 2007). Continued research at the APWRA revealed that the degree of aggregation of pocket gopher (*Thomomys bottae*) burrows around the turbines was positively correlated to red-tailed hawk fatality rates (Smallwood et al. 2001, Thelander et al. 2003, Thelander and Smallwood 2007). In addition, features providing cover for desert cottontails (*Sylvilagus auduboni*) appeared to be associated with areas where golden eagles were killed.

Types of raptor prey species present within the site include rodents associated with arid grasslands and agricultural fields. A number of California ground squirrels were observed during visits to the Wildflower Green Energy Farm site in the spring, and evidence of smaller burrowing rodents, such as pocket mice (*Chaetodipus* spp. and *Perognathus* spp.) and kangaroo rats (*Dipodomys* spp.), was present. Additionally, desert cottontail and black-tailed jackrabbit (*Lepus californicus*) have been observed within the site. The site's grasslands and agricultural field (both active and fallow), with their abundance of prey,

provide valuable foraging habitat for breeding, wintering, and migrating raptors. Additionally, the Fairmont and Antelope Buttes, adjacent to the site, provide both roost and perch site for resident and wintering birds of prey that are otherwise absent from the surrounding landscape.

Several factors influence the migratory pathways of raptors, the most significant being geography. Two geographical features primarily used by raptors during migration are ridgelines and the shorelines of large bodies of water. Updrafts formed as the wind hits the ridges and thermals created over land (and not water) make for energy-efficient travel over long distances (Liguori 2005). For this reason, raptors tend to follow corridors or pathways during migration that include prominent ridges with defined edges and shorelines. While it is certain that raptors migrate through the site, the majority of the site is characterized by rolling hills that would generally not be expected to concentrate or funnel raptors through the area during migration. Regardless, a large number and diversity of raptor species migrate through the site during spring and fall, using the site's productive grasslands as valuable foraging areas. These include Swainson's hawk and other *Buteo* species, golden eagle, several Accipiter and falcon species, as well as large numbers of turkey vultures, particularly during the fall.

5.3.7.5 Important Bird Areas (IBAs)

The National Audubon Society lists IBAs that are sites providing essential habitat for one or more species of bird (Audubon 2010). These include sites for breeding, wintering, and/or migrating birds and can range from a few to thousands of acres in size. The site falls entirely within the Antelope Valley (Lancaster) IBA which encompasses the Antelope Valley of the western Mojave Desert in northern Los Angeles County and southern Kern County. The Antelope Valley IBA is experiencing rapid conversion of the native and agricultural landscape to urban uses. Within the IBA, remnant Joshua tree woodlands north and southeast of the site support one of the westernmost populations of Le Conte's thrasher (*Toxostoma lecontei*) in the state. Grasslands within the IBA, including the site, support wintering bird communities that include raptors and flocks of watch-list species such as vesper sparrow, horned lark (*Eremophila alpestris*), and mountain bluebird, and smaller flocks of mountain plover. Swainson's hawk maintains its southernmost breeding area in the State, mainly in association with alfalfa fields north and east of the site. The IBA falls within the path of a spring migration route for songbirds, and windbreaks throughout the region host hundreds of vireos, thrushes, and warblers in April and May.

5.3.7.6 Avian Migration

Songbirds (order Passeriformes) are by far the most abundant bird group in most terrestrial ecosystems. As a result, they are the most often reported fatalities at wind energy facilities (National Research Council 2007), and the most likely to be displaced by construction of the proposed energy facility. Most species of songbirds migrate at night and may collide with tall man-made structures, although no large mortality events on the same scale as those seen at communication towers have been documented at wind-energy facilities in North America (National Wind Coordinating Collaborative [NWCC] 2004). It is generally assumed that nocturnal migrating passerines move in broad fronts rather than along specific topographical features (Gauthreaux et al. 2003, National Research Council 2007). Large numbers of songbirds have collided with lighted communication towers and buildings when foggy conditions and spring or fall migration coincide. Birds appear to become confused by the lights during foggy or low ceiling conditions, flying circles around the lighted structures until they become exhausted or collide with the structure (Erickson et al. 2001). Most collisions at communication towers are attributed to the guy wires on these structures, which wind turbines do not have. Additionally, the large mortality events observed at communication towers occurred at structures greater than 150 m (492 ft) in height (Erickson et al. 2001), likely because most birds migrate at elevations of 270 m (885 ft) or higher (Young et al. 2004, Young and Erickson 2006). Modern wind turbines are below 270 m in height.

Principal avian migration routes in California are offshore through the Channel Islands, along the coast, through the Sierra Nevada, Transition and Peninsula ranges, and through the Colorado River Basin, which

collectively comprise a major component of the Pacific Flyway. Relatively little is known, however, about the use of deserts within this broad flyway. For many species, deserts are probably avoided because they offer little in the way of food resources and water during stopovers, and because they offer few if any continuous, roughly north-south oriented topographic features to aid in visual navigation.

Although the site, broadly speaking, lies within the Pacific Flyway, it likely does not provide suitable stopover points for birds to rest and refuel between flights. Migrant songbirds, especially in spring, are known to concentrate in the San Gabriel Mountains just south of the site (L. Jones pers. comm.), and there may be a slight "spillover effect" that encompasses the site, but this effect is likely negligible.

Birds that do migrate through the site likely do so in broad fronts moving in a north to south, or south to north direction depending on the season. Grasslands and agricultural areas, as well as a few windbreaks and trees near residences on the site and in the surrounding region, are used as stopover habitat by migrating birds. Significant woodlands, riparian areas, and other wetlands attractive to many migrating songbirds, shorebirds, waterbirds, and waterfowl are limited within the site, which may decrease the threat to these groups of migrants.

To characterize nocturnal avian migration over the site, nocturnal radar surveys were conducted in the spring and fall of 2010 during the peak migration periods, defined as April 1 – May 31 and September 1 – October 31. Surveys were conducted at two sampling locations within the site on 30 continuous nights in the spring and fall. Baseline information was collected on flight direction, passage rates/density, hourly changes in passage rates, and flight altitude of nocturnal migrants at two representative sampling locations within the site. The mean hourly passage rate during spring surveys was 156 ± 17, with a mean target flight height of 697 ± 8 meters. Approximately 11% of targets recorded during spring surveys were flying below 150 m (the zone of risk posed by turbines). During fall surveys, the mean hourly passage rate was 86 ± 17, with a mean flight height of 777 ± 17; only 2.0% of targets were recorded flying below 150 m.

Radar has been used to track large numbers of birds migrating overhead at night (see Berthold 2001, pp. 16-18) and has been successfully employed at a number of sites proposed for wind-energy development to help assess the risk of wind turbines to nocturnal migrants (see Young and Erickson 2006). However, radar studies cannot, by themselves, determine which species are involved, and it has limited utility for detecting birds at low altitudes, and differentiating between birds and bats. Results of the radar surveys will be included in the final Biota Report prepared at the completion of all survey types.

5.3.8 MAMMALS

No sensitive mammal species were recorded during the site visits or fieldwork conducted during the spring of 2010, and no state or federal threatened or endangered mammal species were identified as having the potential to occur within the site.

5.3.8.1 Terrestrial Mammals

Three terrestrial mammal species considered California species of special concern have at least some potential to occur on the site: American badger (*Taxidea taxus*), Tehachapi pocket mouse (*Perognathus alticola inexpectatus*), and the southern grasshopper mouse (*Onychomys torridus ramona*) (Table V). While the Tehachapi pocket mouse is unlikely to occur based on its known distribution, both the American badger and southern grasshopper mouse are possible residents of the site. The CNDDB documents the presence of American badger within the boundary of the site; however, this record is of a specimen collected in 1904 with an approximate location error of 1.0 km (CDFG 2011a; Exhibit 11C). While no active badger dens have been observed during the burrowing owl and general wildlife surveys currently being conducted within the site, open grassland and shrub habitats present over much of the site appear suitable for badgers, and several large, inactive burrows suitable for larger mammal species have

been noted during the surveys. The CNDDB documents the nearest occurrence of the southern grasshopper mouse approximately 12 miles south from the site.

5.3.8.2 Bats

Acoustic bat surveys, using Anabat ultrasonic detectors, were conducted at the site from March 23 to April 21, 2011. A total of six Anabat detectors recorded 1,057 bat passes over the course of 1,553 detector-nights, for an overall mean bat activity rate of 0.63 bat passes per detector-night (WEST 2011). The majority (61.0%) of the recorded calls were between 15 and 30 kilohertz in frequency (indicating species such as big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), and Mexican free-tailed bat (*Tadarida brasiliensis)*), while 38.3% were greater than 30 kilohertz in frequency (indicating several species of *Myotis*). The remaining calls (0.6%) were by very low-frequency bat species (indicating spotted bat (*Euderma maculatum* and western mastiff bat (*Eumops perotis californicus*). Acoustic bat surveys at paired (ground and raised) Anabat detectors is scheduled to continue through spring of 2012. Additionally, mist-netting surveys within areas with greater potential for bat activity (e.g., riparian habitat, ponds) will be conducted during the summer and fall of 2011.

Based on range maps and species accounts from Bat Conservation International (2010), 26 species of bats are known to occur in California. Of those 26 species, 16 have an approximate range that may include the site. While none of these are currently listed as federally or state threatened or endangered species, five species are considered California species of special concern: western red bat (*Lasiurus blossevillii*), pallid bat (*Antrozous pallidus*), spotted bat, Townsend's big-eared bat (*Corynorhinus townsendii*), and western mastiff bat.

Bat fatalities at wind-energy facilities were first noted during avian surveys in the early 1990s (Orloff and Flannery 1992). However it was not until observers estimated relatively high numbers of bat fatalities at facilities in West Virginia (Kerns and Kerlinger 2004) and Tennessee (Fiedler 2004) that concern was elevated. Alliances such as the Bats and Wind Energy Cooperative (BWEC) were established to determine the extent of bat mortality at wind power facilities and to develop solutions to the problem (Arnett 2007). The National Research Council recently published the findings of the Committee on Environmental Impacts of Wind Energy Projects, whose task was to provide a comprehensive review of scientific literature pertaining to the effects of wind-energy facilities on the local environment (National Research Council 2007). Bat casualties have been reported from most facilities where post-construction fatality data are publicly available. Reported estimates of bat mortality at wind-energy facilities have ranged from 0.02 – 53.3 fatalities per megawatt (MW) per year (Arnett et al. 2008). Though some wind-energy facilities have much higher numbers of bat fatalities than others, most data are likely underestimations due to high levels of scavenger removal rate (about 70% of killed bats removed within 24 hours) and low searcher efficiency, especially where vegetation is relatively high (Arnett 2005). The small body size of bats also adds to lower detection ability, compared for example, with detection rates for raptor carcasses.

Most of the bat casualties at wind-energy facilities to date are migratory species which conduct long fall migrations between summer roosts and winter areas (Gruver 2002; Johnson et al. 2003). The reason for disproportionate mortalities during fall is unknown; however, it may be that tree bats fly at lower altitudes during spring migration than during fall migration. For example, hoary bats fly 3 to 16 ft (1 to 5 m) from the ground while migrating through New Mexico in the spring, but apparently not in the fall (Cryan and Veilleux 2007). In contrast, a hoary bat collided with an aircraft above Oklahoma at an altitude of 2,438 m (8,000 ft) in October (Peurach 2003). At least ten bat species have been recovered during carcass searches at wind-energy facilities throughout the U.S. (Johnson 2005, Kunz et al. 2007, NRC 2007, Arnett et al. 2008), and of these, seven species are potential residents and/or migrants at the Wildflower Green Energy Farm site (Table VI).

The highest numbers of bat fatalities found at wind-energy facilities to date have occurred in eastern North America on ridge-tops dominated by deciduous forest (NWCC 2004). This sort of terrain is very different than the low hills and rolling terrain comprising this site; however, Barclay et al. (2007) and Jain (2005) have also reported relatively high fatality rates from facilities in Canada and Iowa, respectively, located in grassland and agricultural habitats. Potential roosting habitat in the site is limited to a few small riparian woodlands, windrows, isolated trees, and buildings. Within the surrounding region, roosting habitat is present in the form of a few rocky outcrops on Fairmont Butte, shelterbelts, small woodlots, and buildings. Bats generally forage over water and open spaces such as agricultural fields, grasslands, streams, and wetlands/ponds. There is potential for bats to forage over the entire site, concentrating seasonally over intermittent streams and irrigated cropland.

TABLE VI: BAT FATALITIES FROM U.S. WIND-ENERGY FACILITIES
(ADAPTED FROM NRC 2007, P. 65).

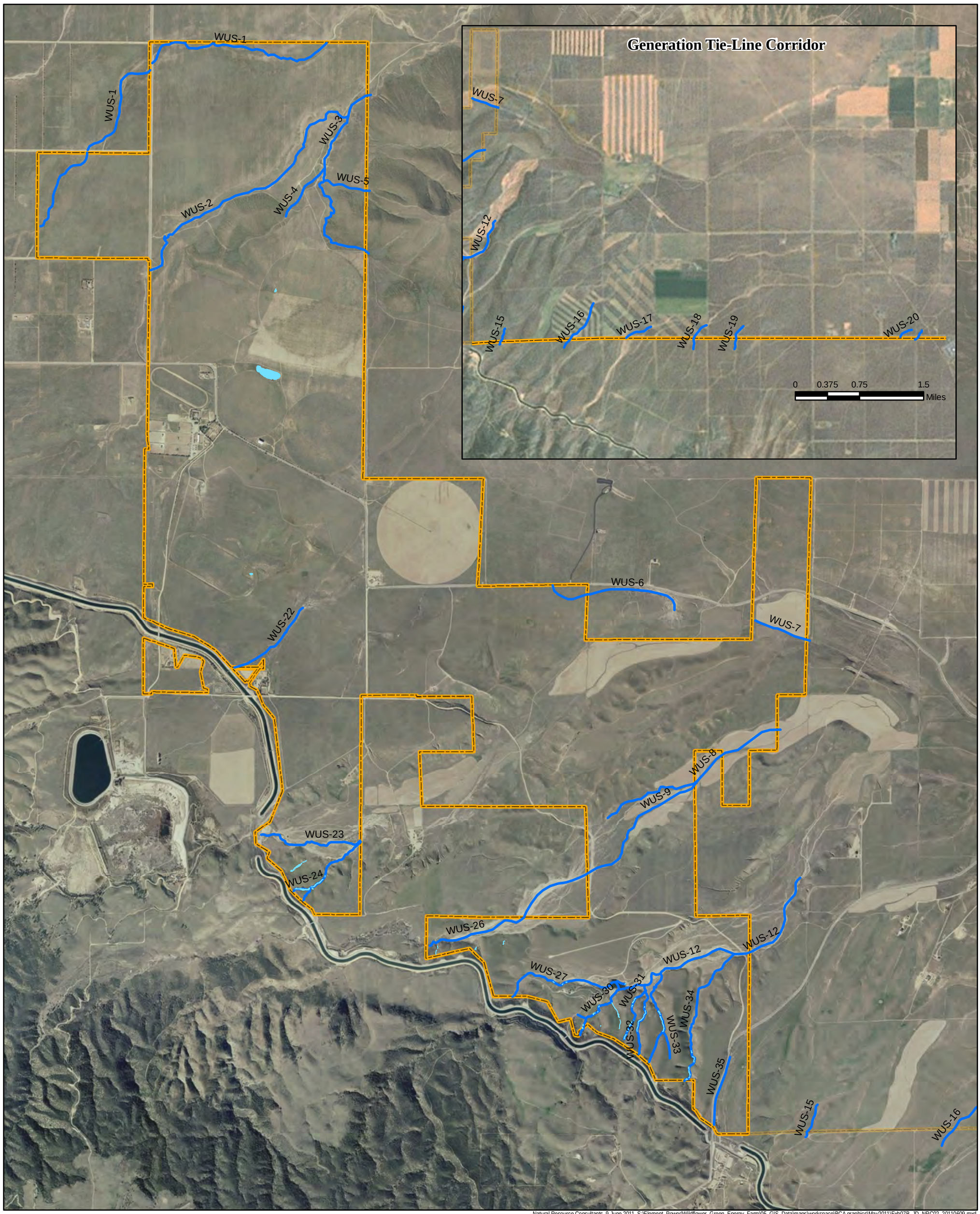
Common name	Scientific name	Total (number and percentage)	
hoary bat*	*Lasiurus cinereus*	1,023	41
eastern red bat	*Lasiurus borealis*	580	23
tri-colored bat (eastern pipistrelle)	*Perimyotis subflavus*	261	11
silver-haired bat*	*Lasionycteris noctivagans*	209	8.4
little brown myotis*	*Myotis lucifugus*	145	5.8
Brazilian (or Mexican) free-tailed bat*	*Tadarida brasiliensis*	143	5.7
big brown bat*	*Eptesicus fuscus*	59	2.4
northern long-eared myotis*	*Myotis septentrionalis*	8	0.4
western red bat*	*Lasiurus blossevillii*	4	0.2
Seminole bat	*Lasiurus seminolus*	1	0.1
unknown	-	53	2.1
Total		**2,486**	**100**

*Potential resident and/or migrant in the Antelope Valley.

5.4 Jurisdictional Wetlands and Waters

5.4.1 WETLANDS

A total of 17 wetlands, comprising 3.51 acres, were delineated within the site boundary (Table VII, Exhibit 13A). All of the 17 wetlands are classified as palustrine emergent wetlands, characterized by the dominance of erect, rooted herbaceous wetland plants. The majority of these wetlands occur either within or along drainage channels or in hillside swales below seeps. The largest of these wetlands (wetland No. 17; Exhibit 13A, Exhibit 13B), located in the northwestern portion of the site, is a vernal pool encompassing 2.27 acres. With the exception of this vernal pool and two other smaller vernal pools, all of the wetlands are located below and in close proximity to the California Aqueduct. The hydrology of these wetlands is either associated with spring- or seep-fed natural drainage channels or with ground water seepage associated with delivery losses from the California Aqueduct (presumably through cracks in the cement-lined aqueduct).



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh07B_JD_NRC02_20110609.mxd

Project Boundary

Isolated Waters (WEST 2010, 2011)

Wetlands (WEST 2010, 2011)

N W E S

Exhibit 13A: Jurisdictional Wetlands and Waters

Wildflower Green Energy Farm
Los Angeles County, California

Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh07C_VernalPools_NRC01_20110606.mxd

Project Boundary Vernal Pool

0 0.05 0.1 0.2 Miles

N W E S

Exhibit 13B: Vernal Pool Locations

Wildflower Green Energy Farm
Los Angeles County, California

5.4.2 POTENTIAL WATERS OF THE UNITED STATES

A total of 31 waterbodies, comprising 8.26 acres (not including portions of the drainage occupied by wetland areas) were identified within the site and along the proposed gen-tie corridor that may qualify as Waters of the United States (WUS; Exhibit 13A). Acreages for WUS identified along the gen-tie line corridor are based on a 100-foot wide survey corridor. Each of the drainage features was examined off site for downstream hydrologic connectivity (i.e., surface connection to other WUS). Several of the waterbodies reached their terminus within the site boundary. The majority of waterbodies extending through the site "fanned out" on the valley floor (i.e., no longer exhibited the presence of a defined bed or bank) within 2-3 miles of downstream examination. As such, it is our recommendation that these are isolated waters and thus not jurisdictional Waters of the U.S. It is understood that this is only a recommendation, and that the final determination on the jurisdiction of any wetland or other WUS is solely the responsibility and duty of the ACOE. Isolated wetlands and other waters that are deemed by the ACOE to be outside of federal jurisdiction are subject to regulation by the State.

5.4.3 CDFG/RWQCB JURISDICTIONAL WATERS

All of the 31 waterbodies encountered within the site are also considered potential CDFG jurisdictional streams (Table VII). A total of 11 of the 31 waterbodies identified within the site featured woody riparian vegetation. The majority of these supported only one or two riparian species. Riparian trees and shrubs observed within the site include Fremont's cottonwood, red willow (*Salix laevigata*, FACW+), mule fat (FACW), blue elderberry (*Sambucus mexicana*, FACU), skunkbush (FACU), and California buckwheat. Potential CDFG jurisdiction along these 11 waterbodies was delineated along the outer limits of the riparian habitat. Potential CDFG jurisdiction along the other 24 waterbodies was extended to the top of bank. A total of 35.14 acres of jurisdictional streambeds were delineated within the site and along the gen-tie corridor. Under the Porter-Cologne Water Quality Control Act, the RWQCB regulates discharges to waters of the state, including isolated waters.

TABLE VII: WETLANDS AND WATERS AT THE WILDFLOWER GREEN ENERGY FARM SITE.

	Acreage	**Linear Feet**
Wetlands		
Vernal Pool A	0.05	–
Vernal Pool B	2.27	–
Vernal Pool C	0.06	–
Other wetlands	1.13	
Waters		
Project Boundary	–	62,903.8
Gen-Tie Corridor	–	666.9
Total	3.51	63,570.7

5.5 Wildlife Movement Corridors

Wildlife movement corridors are topographic features that function to connect at least two significant terrestrial wildlife habitat areas (Beier and Loe 1992). These corridors may help to reduce or moderate the effects of habitat fragmentation by facilitating dispersal of individuals between patches of remaining habitat. Corridors may serve to connect areas of suitable habitat that are otherwise separated by rugged terrain, unsuitable vegetation, or human disturbance. This is important on both a regional and a local scale to allow for the dispersal of young, seasonal movement of species during migration, long-term genetic interchange within and among populations, and the re-colonization of habitat patches from where populations have been locally extirpated. Such connectivity may become even more critical as climate change may affect species, potentially moving them out of established reserves.

An analysis of regional and local wildlife movement corridors was based on a review of USGS topographic maps and aerial maps, site visits and fieldwork conducted at the site, vegetation and habitat maps, wildlife species likely to occur, identification of potential barricades to wildlife movement, and existing land uses within the site and surrounding region. For the purposes of this analysis, only the larger, more mobile terrestrial species were considered, including black bear (*Ursus americanus*), mule deer (*Odocoileus hemionus*), mountain lion (*Puma concolor*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes macrotis*), kit fox (*Vulpes vulpes*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), spotted skunk (*Spilogale gracilis*), and American badger (*Taxidea taxus*).

The site lies near the intersection of three major geographic regions: the Mojave Desert, the Tehachapi foothills and the San Gabriel Mountains. The topographic convergence of two major regional features provides the basis 1) a primary southeast-northwest movement corridor along the south slope of Tehachapi's and 2) a primary northwest-southeast movement along the north slope of the San Gabriel Mountains and Portal Ridge. These primary corridors are directly linked with various canyons and ridges that support secondary wildlife movement.(Exhibit 14). In addition to these movement patterns there are also tertiary corridors (linkages) that support local movement on the site.

5.5.1 TEHACHAPI MOUNTAINS

The south slope of the Tehachapi Mountains is a primary wildlife movement corridor in the region (Exhibit 14). This corridor links the southern Sierra Nevada in the east to the coastal mountains in the west and south. This range provides a link for gene flow in montane and foothill species, connecting the otherwise coastal ranges of central and southern California to the central spine of the Sierra Nevada. In additional to being used as a movement corridor for terrestrial wildlife species, this area may be an important topographic reference for migrating birds and bats. An extension of this movement corridor is the San Andreas Fault zone which provides a connection between the Tehachapi Mountains in the west and the San Gabriel Mountain to the south and east. This corridor is linked with various canyons and ridges that support secondary wildlife movement north into the Tehachapi Mountains. The site occurs approximately 15 miles south of this primary corridor. The site is not directly linked to movement along this primary corridor based on the fact that it is separated from this area by expansive flatlands and is constrained by Highway 138 located approximately 2 miles to the north.

5.5.2 SAN GABRIEL MOUNTAINS AND PORTAL RIDGE

The broad linkage between the San Gabriel Mountains and the Mojave Desert provides a seasonally corridor for wildlife, especially medium-sized and larger mammals moving to and from wintering grounds in the high desert and summer feeding, denning, and breeding areas in the foothills and mountains. The corridor follows the north slope of Liebre Mountain and Portal Ridge This corridor is linked with various canyons and ridges that support secondary wildlife movement into the Angeles

National Forest to the south of the California Aqueduct. The site lies in the proximity of this primary corridor but is separated from the corridor by the California Aqueduct; except at limited "cross-over" points associated roadways.

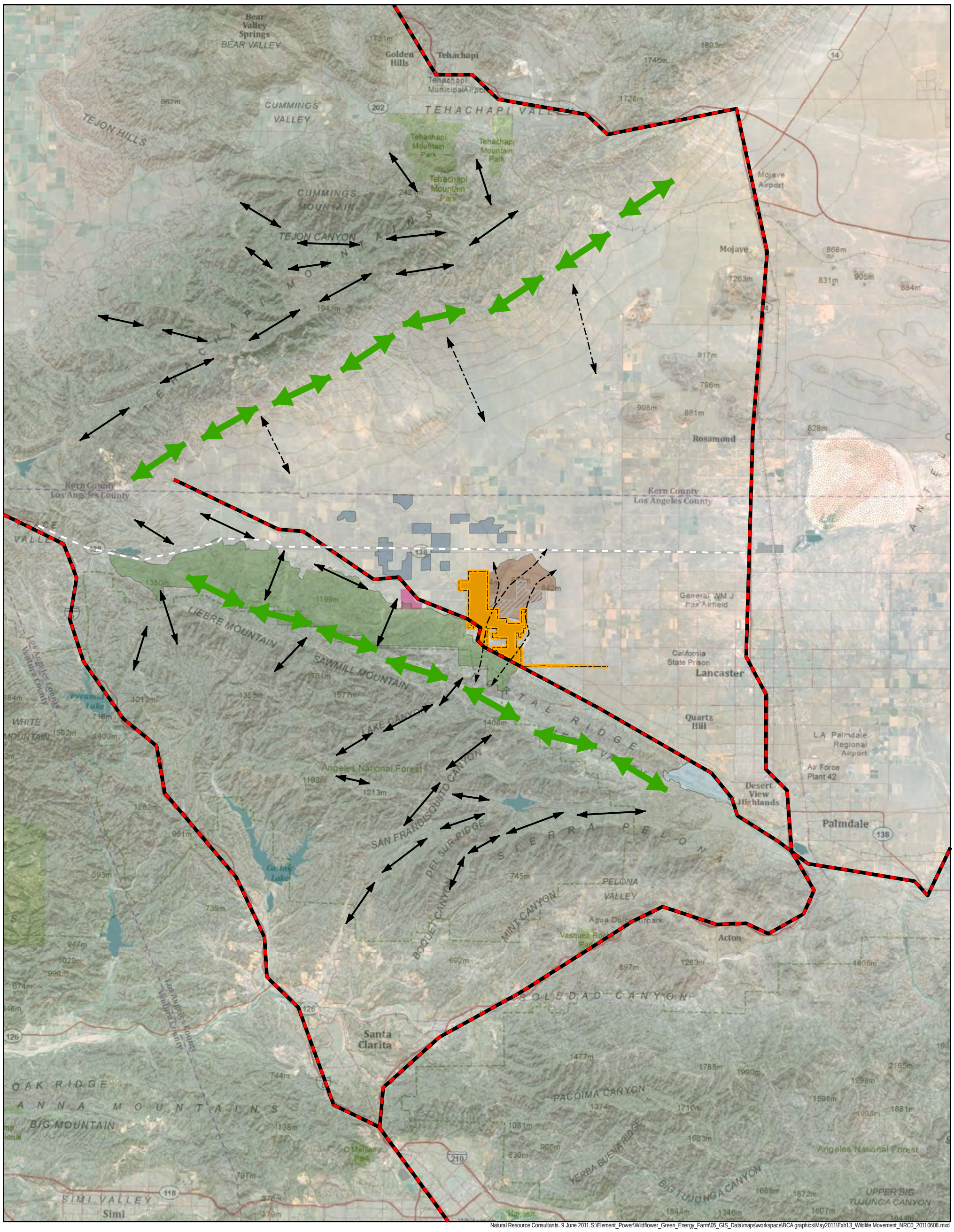
5.5.3 LOCAL WILDLIFE LINKAGES

The site provides little in the way of habitat linkages and is part of the broad expanse between the primary corridors described above. The primary and secondary corridors are topographically distinct and provide vegetation cover, canyon bottoms and riparian corridors. The site provides tertiary linkages including Broad Canyon in the northwest corner of the site, Fairmont Buttes, and Myrick Canyon in the southeast. Myrick Canyon does support areas of willow riparian scrub and riparian woodland in the upper reaches of the canyon. Additionally, several small seeps with associated wetlands and willow riparian scrub habitats are present below the aqueduct along the southern boundary of the site. These areas provide riparian communities within an otherwise arid environment, and serve as year-round water for wildlife species as well as breeding sites for amphibians and nesting and stopover habitat for many species of birds. While there is potential for wildlife movement throughout the site's washes, particularly portions with tree or shrub cover, each are limited to the south by the California Aqueduct. Movement across the aqueduct is limited to several crossings including one at Munz Ranch Road at the extreme southeast corner of the site, and two points along a dirt road near Fairmont Reservoir. These crossings may serve a limited function in funneling animals across the aqueduct. Additionally, Lancaster Avenue running through the center of the site, Rt. 138 to the north of the site, and other secondary roads throughout the area may further limit the movement of animals through the site.

While terrestrial wildlife movement through the site may be constrained by lack of cover and physical impediments, grasslands within site and surrounding region do provide stopover and wintering habitat for raptors and songbirds, and the aqueduct provides habitat for both migrating and wintering waterfowl. The desert butte ecosystem provides important denning, roosting, and refuge sites as well as perch sites for bird of prey that may be absent in the surrounding desert landscape. Tricolored blackbirds traverse the site as they commute between nesting colonies along the aqueduct and within Fairmont Reservoir and their foraging grounds within grasslands in the site and surrounding area.

5.6 Critical Habitat for Federally Listed Species

"Critical Habitat" is a term in the Endangered Species Act defined as "an area occupied by a species listed as threatened or endangered within which are found physical or geographical features essential to the conservation of the species, or an area not currently occupied by the species which is itself essential to the conservation of the species". The site is outside the Critical Habitat boundaries for any federally-listed threatened or endangered species. Designated Critical Habitat for arroyo toad (*Anaxyrus (=Bufo) californicus*) (USFWS 2010a) occurs 13 miles southwest of the site. Designated Critical Habitat for the California condor (*Gymnogyps californianus*) occurs 11 miles northwest of the site (USFWS 1977). Designated Critical Habitat for California red-legged frog (*Rana draytonii*) occurs 10 miles south of the site (USFWS 2010b).



Natural Resource Consultants. 9 June 2011.S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\Exh13_Wildlife Movement_NRC0_20110608.mxd

- Project Boundary
- Antelope Valley California Poppy Reserve
- Fairmont-Antelope Buttes SEA No. 57
- Joshua Tree Woodland SEA No. 60
- Portal Ridge- Liebre Mountain SEA No. 58
- Ritter Ridge SEA No. 56
- Desert Pines County Wildlife Sanctuary
- Primary Dispersal Barrier
- Secondary Dispersal Barrier
- Primary Corridor
- Secondary Corridor
- Tertiary Corridor

N W E S

0 2 4 8 Miles

Exhibit 14A: Wildlife Movement Analysis

Wildflower Green Energy Farm
Los Angeles County, California

6.0 CONCLUSIONS

6.1 Overall Biological Value

Similar to regional land uses, most portions of the site have a long history of crop and orchard production as well as use for rangeland by cattle and sheep. These land uses intermix with several natural communities and habitats, including native and non-native annual grasslands, native perennial grasslands, native and non-native forblands, and various upland and riparian scrub and shrublands.

The most common vegetation types observed, similar to the surrounding region, include native annual grasslands, non-native annual grasslands (dominated by *Bromus* spp., *Avena* spp., and others), and rabbitbrush scrub. These vegetation types, particularly those dominated by annual plants, exist as a shifting and intergrading mosaic of various annual and perennial grass and forb stands that contract and expand in response to numerous factors (e.g., bioturbation, grazing regime, water availability, temperature, fire, etc.) over space and time. The structure, composition, and distribution of these ephemeral vegetation types vary from year to year.

Grasslands, scrub, and washes within the site provide suitable habitat for wildlife. While nesting habitat for most raptors species is limited within the site, the site does provide breeding and/or wintering foraging habitat for special status raptor species including: burrowing owl, short-eared owl, long-eared owl, golden eagle, Swainson's hawk, prairie falcon, northern harrier, and ferruginous hawk.

Broad Canyon, in the northwest corner of the site, and several canyons in the south are the main drainage channels that cross the site. These features are regionally important in that they support several special status vegetation types (e.g., oak gooseberry thickets, desert olive patches, southern willow scrub) while providing habitat and limited wildlife movement opportunities. A number of additional, smaller ephemeral washes occur throughout the site, all of which flow to the north and east. Based on the Wetlands and Waters of the U.S. survey conducted by WEST, none of these channels are hydrologically connected to any waters of the U.S. and are considered isolated waters. Additionally, three vernal pools were mapped in the central portion of the site. Within one pool, a federally threatened wetland plant species, spreading navarretia, was identified during field surveys.

The site and surrounding area do not fall within a primary or secondary wildlife movement corridor. Because most of the larger wildlife species in the region do not typically cross large expanses of open uncovered land, movement by these species is expected to be limited across the site. Wildlife movement through the site is expected to be similar to movement through the surrounding rural areas, as habitats within the site are not unique to the surrounding landscape. South of the site, less disturbed habitats with higher ecological value are present on upland slopes. While these habitats provide connectivity to the Angeles National Forest farther to the south, the California Aqueduct, fencing, and Highway 138 create barriers to many wildlife species, despite the presence of a few intermittent crossings and breaks.

6.2 Biological Constraints

Potential biological constraints that will be considered in the design of a wind and solar energy project are described below. The location of biological constraints are presented in Exhibit 15. Detailed analysis of any potential impacts to these resources as well as project design features and mitigation measures to minimize adverse effects will be provided in the Biota Report.

6.2.1 SPECIAL STATUS PLANT SPECIES

Spreading navarretia, a federally threatened wetland plant species occurs on site. A single, large population was identified in a vernal pool near the center of the site. Actions with the potential to impact the species are regulated by the USFWS under the Federal Endangered Species Act (FESA). Short-joint beavertail cactus, a CNPS List 1B.2 species, was also observed on the site in rocky ridgetops and sandy slopes. Potential impacts to these species as well as project design features and mitigation measures to minimize adverse effects will be provided in the Biota Report.

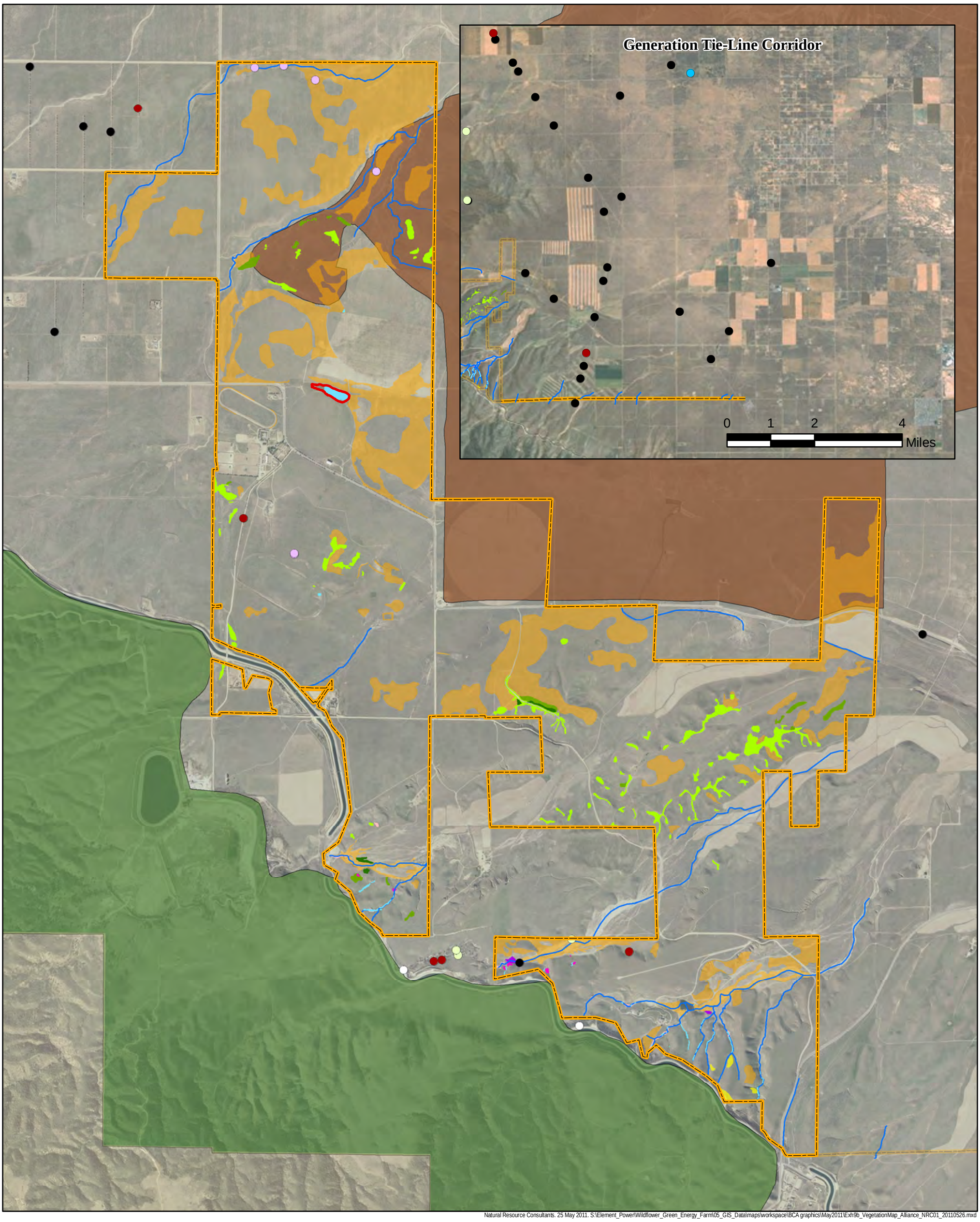
6.2.2 SPECIAL STATUS WILDLIFE SPECIES

The only state-listed species observed during surveys was Swainson's hawk; several individuals were observed during avian use surveys, and an active Swainson's hawk nest was recorded approximately 4 miles outside of the site boundary in 2010. Upon subsequent visits to the nest, it was determined the nest failed in 2010 and was occupied by ravens in 2011. Because Swainson's hawk is a state-threatened species, actions with the potential to impact the species are regulated by the CDFG under the California Endangered Species Act (CESA). Potential impacts to the species will be evaluated in the Biota Report.

An additional six species designated as state species of special concern by the CDFG were observed on the site (American white pelican, northern harrier, burrowing owl, loggerhead shrike, tricolored blackbird, and yellow-headed blackbird). Additionally, six species considered watch-list species by the CDFG were observed (white-faced ibis, golden eagle [also a fully protected species], Cooper's hawk, ferruginous hawk, merlin, and prairie falcon), as well as peregrine falcon, a state fully protected species. Potential impacts to these resources as well as project design features and mitigation measures to minimize adverse effects will be evaluated in the Biota Report.

6.2.3 WETLANDS, WATERS OF THE U.S., AND STREAMBEDS

Based on a Wetlands and Waters of the U.S. survey conducted during the spring of 2010, no wetlands or waterways within the site fall under the jurisdiction of the USACE. While the site contains a number of intermittent washes and drainage channels, none of these are hydrologically connected to any Waters of the U.S. (including navigable waters) and are therefore considered isolated waters outside of the jurisdiction of the ACOE. Impacts to these washes and channels will not require a permit from the ACOE. However, all streambeds, lakebeds, and adjacent riparian vegetation are under the jurisdiction of the CDFG and will require a Streambed Alteration Agreement for any impacts to these areas. Mitigation will be required for CDFG and RWQCB permits. Vegetation types associated with potentially jurisdictional wetlands and waters include: vernal pools (2.38 acres), southern willow scrub (3.1 acres), tarragon patches (3.9 acres), rush marshes (2.4 acres) and herbaceous annuals occurring in floodplains and washes (44.0 acres).



- Project Boundary
- *Navarretia fossalis*
- Purple Needlegrass Grasslands
- Curly Blue Grass Grasslands
- Desert Needlegrass Grasslands
- Oak Gooseberry Thickets
- Narrowleaf Goldenbush Scrub
- Mixed Willow Riparian Scrub
- Desert Olive Patches
- Wildflower Fields
- Wetlands
- Isolated Waters
- Fairmont-Antelope Buttes SEA No. 57
- Joshua Tree Woodland SEA No. 60
- Portal Ridge- Liebre Mountain SEA No. 58
- Ritter Ridge SEA No. 56
- Tricolored Blackbird Colony
- Burrowing Owl Burrow
- Common Raven Nest
- Great-horned Owl Nest
- Red-tailed Hawk Nest
- Swainson's Hawk Nest

Exhibit 15: Biological Constraints

Wildflower Green Energy Farm
Los Angeles County, California

0 0.25 0.5 1 Miles

N W E S

6.2.4 BIRDS AND BIRD NESTS

Most bird species, including their nests and eggs, are protected under the federal MBTA (1918). Further protection to bird nests, eggs, chicks, and birds of prey is provided by the California Fish and Game Code. Construction and/or operation of the proposed solar- and wind-energy facility could result in impacts birds or their nests. Impacts to birds and bird nests will be evaluated under the CEQA and follow Avian and Bat Protection Guidelines as described in the 2011 Land-Based Wind Energy Guidelines by the United States Fish and Wildlife Service (USFWS 2011).

6.2.5 BATS AND MIGRATING BIRDS

Numbers of both bats and nocturnally migrating birds were found to be negligible at a proposed wind energy site near Daggett (Jones and Bloom 2009), located approximately 85 miles foremast of the site. A more detailed assessment of existing conditions and anticipated impacts to bats and nocturnal bird migrants will be provided based on the results of nocturnal migration surveys and acoustic bat monitoring. Potential impacts to bats and migrating birds from the proposed development will be evaluated following Avian and Bat Protection Guidelines as described in the 2011 Land-Based Wind Energy Guidelines by the United States Fish and Wildlife Service (USFWS 2011) and provided in the Biota Report.

6.2.6 SPECIAL STATUS VEGETATION TYPES

Six vegetation types are considered special status at the WGEF site under the newly accepted classification scheme (Sawyer et al. 2009) including: three types of native perennial grassland (purple needlegrass grassland (52.2 acres), desert needlegrass grassland (2.3 acres), one-sided blue grass grassland (11.2 acres)), oak gooseberry thickets (0.8 acre), narrowleaf goldenbush scrub (2.7 acres), southern willow scrub (3.1 acres), and desert olive patches (0.9 acre). 2.38 acres of vernal pool are also found at WGEF.

In addition to the above mentioned vegetation types, the site supported approximately 703.9 acres of wildflower fields in 2011. These areas are not listed as a special status vegetation type; however, they are a regionally important resource. The ecological value of these areas relate to the diverse mix of native and non-native herbaceous and grass species and the yearly expression of flowering annuals. Wildflower blooms vary from year-to-year based on rainfall and other ecological factors. These communities are regionally abundant on the southern Tehachapi Mountain slopes and other lowlands of the Antelope Valley.

6.2.7 REGIONAL OPEN SPACE

The boundaries of SEA No. 57 should be considered a biological constraint where this SEA overlaps the site. Avoiding these areas would maintain continuity with on site resources and Fairmont Buttes. In addition, setting aside lands associated with Broad Canyon in the northern portion of the site as well as the wildflower fields north of Lancaster Road would be regional benefits. These areas adjoin the Antelope Valley California State Poppy Preserve and open spaces associated with Broad Canyon and Fairmont Butte. Finally, the localized linkage between the Fairmont Buttes and Portal Ridge SEA would be enhanced by conservation of the southeastern portion of the site.

7.0 LITERATURE CITED

Abrams, L. 1923. *Illustrated Flora of the Pacific States, Vol. I.* Stanford University Press, Stanford, CA.

Abrams, L. 1944. *Illustrated Flora of the Pacific States, Vol. II*. Stanford University Press, Stanford, CA.

Abrams, L., and Ferris. 1951. *Illustrated Flora of the Pacific States, Vol. III*. Stanford University Press, Stanford, CA.

Abrams, L., and Ferris.1960. *Illustrated Flora of the Pacific States, Vol. IV*. Stanford University Press, Stanford, CA.

American Ornithologists' Union (AOU). 1998 (and annual supplements 2000-2010). *The A.O.U. Check-list of North American Birds, 7th ed*. The Allen Press, Lawrence, KS.

Arnett, E. B., technical editor. 2005. Relationships between Bats and Wind Turbines in Pennsylvania and West Virginia: An Assessment of Bat Fatality Search Protocols, Patterns of Fatality, and Behavioral Interactions with Wind Turbines. A final report submitted to the Bats and Wind Energy Cooperative. Bat Conservation International. Austin, Texas. http://www.batsandwind.org/pdf/ar2004.pdf.

Arnett, E. 2007. Report from the Bats and Wind Energy Cooperative (BWEC) on Collaborative Work and Plans. Presentation at the NWCC Wildlife Workgroup Meeting, Boulder Colorado. Conservation International. November 14th, 2007. Information available at www.nationwind.org

Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, B.L. Hamilton, T.H. Henry, A. Jain, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley, Jr. 2008. Patterns of Bat Fatalities at Wind Energy Facilities in North America. *Journal of Wildlife Management* 72(1): 61-78.

Bald and Golden Eagle Protection Act (BGEPA). 1940. 16 United States Code § 668-668d. June 8, 1940.

Barclay, R.M.R., E.F. Baerwald, and J.C. Gruver. 2007. Variation in Bat and Bird Fatalities at Wind Energy Facilities: Assessing the Effects of Rotor Size and Tower Height. *Canadian Journal of Zoology* 85: 381-387. http://www.bio.ucalgary.ca/contact/faculty/pdf/Barclay07Tur.pdf.

Barry, WJ. 1972. California prairie ecosystems (vol. 1): The Central Valley prairie. California Department of Parks and Recreation. Sacramento, 81 pp.

Bartolome, JK, SE Klukkert, and WJ Barry. 1986. Opal phytoliths as evidence for displacement of native Californian grassland. Madroňo 33: 217-222.

Bat Conservation International (BCI). 2010. Bat Species: U.S. Bats. BCI website. BCI, Inc., Austin, Texas. Accessed May and June, 2010. Homepage: http://www.batcon.org; Species Profiles: http://batcon.org/index.php/education/article-and-information/species-profiles.html.

Beauchamp, R. M. 1986. *A Flora of San Diego County, California*. Sweetwater River Press, National City, CA.

Bechard, Marc J., C. Stuart Houston, Jose H. Sarasola and A. Sidney England. 2010. Swainson's Hawk (*Buteo swainsoni*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Birds of North America Online: http://bna.birds.cornell.edu/bna/species/265

Beier, P. and S. Loe. 1992. A checklist for evaluating impacts to wildlife movement corridors. *Wildlife Society Bulletin* 20: 434-440.

Bloom, P.H. 2008. Tejon Ranch California Condor Conservation and Management Plan. Prepared for Tejon Mountain Village LLC, Tejon Ranch Company.

Bloom, P.H. 1980. The status of the Swainson's hawk in California, 1979. Nongame Wildlife Investigations, Job II-8.0. Wildlife Management Branch, California Department of Fish and Game, Sacramento, CA.

California Burrowing Owl Consortium (CBOC). 1997. Burrowing owl survey protocol and mitigation guidelines. Unpubl. ms.

Consortium of California Herbaria. 2011. Data provided by the participants of the Consortium of California Herbaria (ucjeps.berkeley.edu/consortium/).

California Department of Fish and Game (CDFG). California Fish and Game Code, § 3511. Available online at California Attorney References: http://law.onecle.com/california/fish/3511.html.

California Department of Fish and Game (CDFG). 2003. List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database. CDFG, Biogeographic Data Branch, Vegetation Classification and Mapping Program. September 2003.

California Department of Fish and Game (CDFG). 2010. State and Federally Listed Endangered, Threatened, and Rare Plants of California. State of California Natural Resources Agency, Biogeographic Data Branch, California Natural Diversity Database (CNDD). April 2010. Available online at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEPlants.pdf.

California Energy Commission (CEC) and California Department of Fish and Game (CDFG). 2007. California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development. . Commission Final Report. California Energy Commission, Renewables Committee, and Energy Facilities Siting Division, and California Department of Fish and Game, Resources Management and Policy Division. CEC-700-2007-008-CMF.

California Native Plant Society (CNPS). 2010. Online Inventory of Rare and Endangered Plants in California. Seventh Edition. http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi.

California Native Plant Society (CNPS). 2009. CNPS/CDFG Combined Vegetation Rapid Assessment and Releve Protocol. Available online at: http://www.cnps.org/cnps/vegetation/pdf/protocol-combined.pdf

California Natural Diversity Database (CNDD). 2010. Rare Find 3 Application. California Department of Fish and Game (CDFG). http://www.dfg.ca.gov/biogeodata/cnddb/rarefind.asp.

California Natural Diversity Database (CNDDB). 2010a. State and Federally Listed Endangered and Threatened Animals of California. State of California Natural Resources Agency, Biogeographic Data Branch, California Department of Fish and Game (CDFG). January 2010. Available online at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf.

California Natural Diversity Database (CNDDB). 2010b. State and Federally Listed Endangered, Threatened, and Rare Plants of California. State of California Natural Resources Agency, Biogeographic Data Branch, California Department of Fish and Game (CDFG). April 2010. Threatened and endangered plant species available online at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEPlants.pdf.

Clean Water Act (CWA). 1972. Clean Water Act. October 18, 1972. 33 United States Code § 1251-1387, 1251 et seq., 2000.

Cryan, P.M. and J.P. Veilleux. 2007. Migration and the Use of Autumn, Winter, and Spring Roosts by Tree Bats. In: *Bats and Forests*. Lacki, M.J., J.P. Hayes, and A. Kurta, eds. The Johns Hopkins University Press, Baltimore, Maryland. Pp. 153-175.

eBird. 2011. eBird: An online database of bird distribution and abundance [web application]. Version 2. eBird, Ithaca, New York. Available: http://www.ebird.org. (Accessed: Date [e.g., February 2, 2011]).

England and Nelson Environmental Consultants. 1976.

Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, Jr., K.J. Sernka, and R.E. Good. 2001. Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Bird Collision Mortality in the United States. National Wind Coordinating Collaborative (NWCC) Publication and Resource Document. Prepared for the NWCC by WEST, Inc., Cheyenne, Wyoming. August 2001. http://www.west-inc.com.

Fiedler, J.K. 2004. Assessment of Bat Mortality and Activity at Buffalo Mountain Windfarm, Eastern Tennessee. M.S. Thesis. University of Tennessee, Knoxville, Tennessee. August, 2004. http://www.tva.gov/environment/bmw_report/bat_mortality_bmw.pdf.

Finley, W.L.1906. Life history of the California condor I: Finding a condor's nest. Condor 8:135-142.

Finley, W.L.1908. Life history of the California condor II: Historical data and range of the condor. Condor 10:5-10.

Gauthreaux, S.A. Jr., C.G. Belser, and D. van Blaricom. 2003. Using a Network of WSR 88-D Weather Surveillance Radars to Define Patterns of Bird Migration at Large Spatial Scales. In: *Avian Migration*. Berthold, P., E. Gwinner, and E. Sonnenschein, eds. Berlin: Springer. Pp. 335-346.

Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles Audubon Society, Los Angeles, CA.

Grinnell, J , and A.H. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27. Cooper Ornithological Club, Berkeley, CA.

Gruver, JC. 2002. Assessment of bat community structure and roosting habitat preferences for the hoary bat (*Lasiurus cinereus*) near Foote Creek Rim, Wyoming. Thesis, University of Wyoming.

Hamer Environmental, L.P. 2010. Spring Nocturnal Bird Migration at the Proposed Antelope Valley Renewable Energy Project, Lancaster, California. Prepared for Western EcoSystems Technology, Inc.

Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. University of California Press, Berkeley, California.

Holland, R. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished copies available from Calif. Dept. Fish and Games, Sacramento.

Jain, A. 2005. Bird and Bat Behavior and Mortality at a Northern Iowa Windfarm. M.S. Thesis. Iowa State University, Ames, Iowa. Johnson et al. 2003.

Johnson, G.D. 2005. A Review of Bat Mortality at Wind-Energy Developments in the United States. Bat *Research News* 46(2): 45-49.

Jones, H.L., and P.H. Bloom. 2009. 2008 nocturnal bird surveys for the proposed Daggett Ridge and Sand Ridge Wind Energy Project near Daggett, San Bernardino County, California. Prepared by Bloom Biological, Inc. for AES Wind Generation, Inc.

Kays, R.W., and D.E. Wilson. 2002. *Mammals of North America*. Princeton University Press, Princeton, NJ.

Kerns, J. and P. Kerlinger. 2004. A Study of Bird and Bat Collisions at the Mountaineer Wind Energy Center, Tucker County, West Virginia: Annual Report for 2003. Prepared for FPL Energy and the Mountaineer Wind Energy Center Technical Review Committee. Technical report prepared by Curry and Kerlinger, LLC. February 14, 2004. 39 pp. http://www.wvhighlands.org/Birds/MountaineerFinalAvianRpt-%203-15-04PKJK.pdf.

Kunz, T.H., E.B. Arnett, W.P. Erickson, A.R. Hoar, G.D. Johnson, R.P. Larkin, M.D. Strickland, R.W. Thresher, and M.D. Tuttle. 2007. Ecological Impacts of Wind Energy Development on Bats: Questions, Research Needs, and Hypotheses. *Frontiers in Ecology and the Environment* 5(6): 315-324.

Lichvar, R.W. and S.M. McColley. 2008. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States; A Delineation Manual. Prepared for U.S. Army Corps of Engineers, Wetland Regulatory Assistance Program.

Liguori, J. 2005. *Hawks from Every Angle: How to Identify Raptors in Flight*. Princeton University Press, Princeton, New Jersey.

Los Angeles County Department of Regional Planning (Regional Planning). 2009. Antelope Valley Area Plan Update - Background Report. April 2009. Available online at: http://planning.lacounty.gov/assets/upl/data/tnc_background-report.pdf

Los Angeles County Department of Regional Planning (Regional Planning). 2010. Regional Planning Applications and Forms. Homepage: http://planning.lacounty.gov/apps; Oak Tree Diagram: http://planning.lacounty.gov/assets/upl/apps/oak-tree-diagram_20090529.pdf; Oak Tree Permit Application: http://planning.lacounty.gov/assets/upl/apps/zoning-permit_application_20090324.pdf; Significant Ecological Areas Guidlines: http://planning.lacounty.gov/assets/upl/case/sea_proc-guide.pdf

Los Angeles County Sensitive Bird Species Working Group. 2009. Los Angeles County's Sensitive Bird Species. Western Tanager (A Publication of Los Angeles Audubon). Volume 75, Number 3 January/February 2009.

Meretsky, V.J., and N.F.R. Snyder. 1992. Range use and movements of California condors. *Condor* 94:313-335.

Migratory Bird Treaty Act (MBTA). 1918. 16 United States Code § 703-712. July 13, 1918.

Moriarty, J.J., ed. 2000. Scientific and standard English names of amphibians and reptiles of North America north of Mexico, with comments regarding confidence in our understanding. Society for the Study of Amphibians and Reptiles. Herpetological Circular No. 29, Society for the Study of Amphibians and Reptiles.

Munz, P.A. 1974. *A Flora of Southern California*. University of California Press, Berkeley, CA.

Munz, P.A. and D.D. Keck. 1973. *A California Flora and Supplement*. University of California Press.

Murphy, D.D., and P.R. Ehrlich. 1989. Conservation biology of California's remnant native grasslands. Pages 201-211 in: L.F. Huenneke and H.A. Mooney, eds., *Grassland Structure and Function: California Annual Grassland*. Kluwer Academic Publishers, Dordecht, The Netherlands.

National Audubon Society (National Audubon Society [Audubon]). 2010. The Important Bird Areas. Available online at: http://www.audubon.org/bird/iba.

National Research Council (NRC). 2007. Environmental Impacts of Wind-Energy s. National Academies Press. Washington, D.C. www.nap.edu

National Wind Coordinating Collaborative (NWCC). 2004. Wind Turbine Interactions with Birds and Bats: A Summary of Research Results and Remaining Questions. Fact Sheet. 2nd Edition. November 2004.

Natural Resources Conservation Service (NRCS). 2010. SSURGO Soils Data. U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) Database, USDA Soil Survey Staff, NRCS. SSURGO Database for Los Angeles County, California. Accessed March and June, 2010. Homepage available online at: http://soils.usda.gov/survey/geography/ssurgo/; Los Angeles County, California, soil data available online at: http://soildatamart.nrcs.usda.gov/Report.aspx?Survey=CA675&UseState=CA.

NatureServe. Version 7.1 (2 February 2009), Updated: August 2010. Online database available at: http://www.natureserve.org/explorer/ranking.htm.

Ogden. JC, ed. 1981. Condor field notes. California condor Res. Center, Ventura, CA. 4 pp.

Ogden. JC, ed. 1982. Condor field notes. California condor Res. Center, Ventura, CA. 6 pp.

Orloff, S. and A. Flannery. 1992. Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Solano County Wind Resource Areas, 1989-1991. Final Report P700-92-001 to Alameda, Contra Costa, and Solano Counties, and the California Energy Commission, Sacramento, California, by Biosystems Analysis, Inc., Tiburon, California. March 1992.

Orloff, S. and A. Flannery. 1996. A Continued Examination of Avian Mortality in the Altamont Pass Wind Resource Area. P700-96-004 CN. Report from Ibis Environmental Services, Santa Cruz, California, and BioSystems Analysis, Inc., Tiburon, California, for the California Energy Commission, Sacramento, California. August 1996.

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance. U.S. Fish and Wildlife Service (USFWS). February 2010. Available online at: http://steinadlerschutz.lbv.de/fileadmin/www.steinadlerschutz.de/terimGoldenEagleTechnicalGuidanceProtocols25March2010_1_.pdf.

PCR Services Corporation. 2000. Los Angeles County Significant Ecological Area Update Study 2000. Background Report. Prepared for Los Angeles County Department of Regional Planning. November.

Peurach, S.C. 2003. High-Altitude Collision between an Airplane and a Hoary Bat, *Lasiurus cinereus*. *Bat Research News* 44(1): 2-3.

Reynolds, R.T., J.M. Scott, and R.A. Nussbaum. 1980. A Variable Circular-Plot Method for Estimating Bird Numbers. *Condor* 82(3): 309-313.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. A Manual of California Vegetation; 2nd Edition. Sacramento, CA: California Native Plant Society Press.

Simpson, M.G. and K.E. Hasenstab. 2009. *Cryptantha* of Southern California. *Crossosoma* 35(1): 1-59.

Small, A. 1994. *California Birds: Their Status and Distribution*. Ibis Press, Vista, CA.

Smallwood, K.S., L. Rugge, S. Hoover, M.L. Morrison, and C.G. Thelander. 2001. Intra- and Inter-Turbine String Comparison of Fatalities to Animal Burrow Densities at Altamont Pass. Presented at the the National Avian-Wind Power Planning Meeting IV, Washington D.C. Schwartz, S.S., ed. RESOLVE, Inc. Pp 23-37.

Snyder, Noel F. and N. John Schmitt. 2002. California Condor (*Gymnogyps californianus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.

Snyder, N.F.R., and H. Snyder. 2000. *The California Condor: A Saga of Natural History and Conservation*. Academic Press, London, UK.

Stromberg, MR, JD Corbin, and CM D'Antonio (eds.). 2007. California Grasslands: Ecology and Management. University of California Press: Berkeley, CA.Thelander, C.G. and K.S. Smallwood. 2007. The Altamont Pass Wind Resource Area's Effects on Birds: A Case History. In: *Birds and Windfarms: Risk Assessment and Mitigation*. de Lucas, M.J., G.F.E. Janss, and M. Ferrer, eds. Quercus, Madrid, Spain. Pp. 25-46.

Thelander, C.G., K.S. Smallwood, and L. Rugge. 2003. Bird Risk Behaviors and Fatalities at the Altamont Wind Resource Area: Period of Performance, March 1998-December 2000. Subcontractor Report NREL/SR-500-33829. Report by BioResource Consultants, Ojai, California, for the National Renewable Energy Laboratory, Golden, Colorado. 92 pp. http://www.nrel.gov/wind/pdfs/33829.pdf

U.S. Army Corps of Engineers (USACE). 1987. 1987 Corps of Engineers Wetlands Delineation Manual. Wetlands Research Program Technical Report Y-87-1. Final report prepared by Environmental Laboratory. January 1987. U.S. Army Engineer Waterways Experiment Station. Vicksburg, Mississippi. Available online at: http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf

U.S. Army Corps of Engineers (USACE). 2008. Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region. Wetlands Regulatory Assistance Program Technical Report ERDC/EL TR-08-28. Report prepared by Environmental Laboratory. U.S. Army Engineer Waterways Experiment Station. Vicksburg, Mississippi. September 2008. Available online at: http://www.usace.army.mil/CECW/Documents/cecwo/reg/trel08-28.pdf

U.S. Department of Agriculture (USDA) National Agriculture Imagery Program (NAIP). 2009. NAIP Imagery and Status Maps. Last modified August 31, 2009. http://www.fsa.usda.gov/FSA/apfoapp?area=home&subject=prog&topic=nai

U.S. Fish and Wildlife Service (USFWS). 2011. (Draft) Fisheries and Habitat Conservation and Migratory Birds Program; Draft Land-Based Wind Energy Guidelines. Federal Register 76(34): 9590-9592.

U.S. Fish and Wildlife Service (USFWS). 2010. USFWS website. Last updated June 4, 2010. USFWS Endangered Species Program homepage: http://www.fws.gov/endangered/; Environmental Conservation Online System (ECOS): http://ecos.fws.gov/tess_public; Threatened and Endangered Species System (TESS) listings by state: http://ecos.fws.gov/tess_public/pub/stateListingAndOccurrence.jsp; Candidate species listings by state: http://ecos.fws.gov/tess_public/pub/stateListing.jsp?status=candidate

U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI). 2010. NWI Data Mapper. Updated April 5, 2010. Fort Snelling, Minnesota. USFWS Pacific Southwest Region Homepage: http://www.fws.gov/cno/; Geospatial Wetlands Digital Data: http://www.fws.gov/wetlands/data/index.html; Wetlands Mapper: http://www.fws.gov/wetlands/Data/Mapper.html; Geocortex Internet Mapping Framework: http://wetlandsfws.er.usgs.gov/imf/imf.jsp?site=NWI_CONUS

U.S. Fish and Wildlife Service (USFWS). 2009. [Unpublished USFWS condors location data]

US Fish and Wildlife Service (USFWS). 2005. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Navarretia fossalis* (Spreading Navarretia): Final Rule. USFWS. p. 60657+.

U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI). 2004. National Wetlands Inventory Map. Wetlands Download, USFWS. Aerial Photo Source, Oregon Geospatial Data Clearinghouse.

US Fish and Wildlife Service (USFWS). 1998. Vernal Pools of Southern California Recovery Plan. USFWS, Portland, Oregon. p. 113+.

U.S. Fish and Wildlife Service (USFWS). 1976. [Condor critical habitat]

U.S. Geological Survey (USGS) National Elevation Dataset (NED). 2001. Seamless Data Distribution System (SDDS). USGS Headquarters, USGS National Center. Reston, Viginia. http://seamless.usgs.gov

U.S. Geological Survey (USGS) National Land Cover Database (NLCD). 2001. Land Use/Land Cover NLCD Data. USGS Headquarters, USGS National Center. Reston, Virginia.

Western EcoSystems Technology, Inc. [WEST]. 2011. Baseline Wildlife and Botanical Studies for the Wildflower Renewable Energy Project Los Angeles County, California: Spring/Summer/Fall Interim Report March- November 2010. Prepared for Element Power. February28 2011.

Willett, G. 1933. Birds of the Pacific slope of southern California. Pacific Coast Avifauna No. 7. Cooper Ornithological Club, Hollywod, CA.

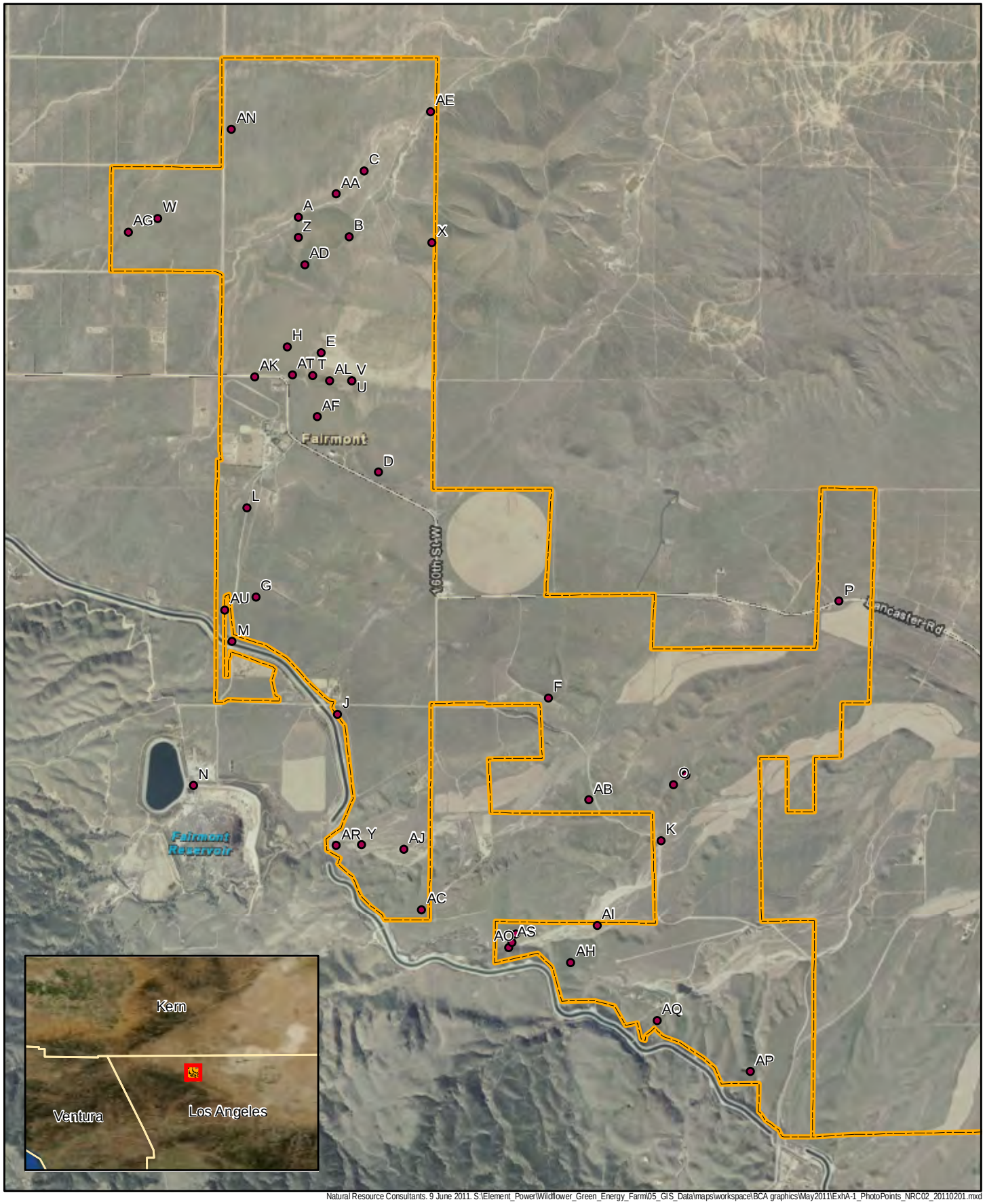
Young, D.P., Jr. and W.P. Erickson. 2006. Wildlife Issue Solutions: What Have Marine Radar Surveys Taught Us About Avian Risk Assessment? Presented at the American Wind Energy Association Windpower 2006 Conference and Exhibition, Pittsburgh, Pennsylvania. June 4-7, 2006.

Young, D.P., Jr., D. Strickland, W.P. Erickson, K.J. Bay, R. Canterbury, T. Mabee, B. Cooper, and J. Plissner. 2004. Baseline Avian Studies, Mount Storm Wind Power , Grant County, West Virginia, May 2003 - March 2004. Final Report. Technical report prepared for NedPower Mount Storm, LLC, Chantilly, Virginia, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, Concord College, Athens, West Virginia, and ABR, Inc., Forest Grove, Oregon. April 23, 2004. 141 pp.

Zedler, P.H. 1987. The Ecology of Southern California Vernal Pools: A Community Profile. U.S. Fish and Wildlife Service. Biological Report 85(7.11).

Appendix A:

Photos taken during site visits and field surveys conducted at the Wildflower Green Energy Farm site in March – July, 2010.



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\ExhA-1_PhotoPoints_NRC02_20110201.mxd

Project Boundary Photo Point

0 0.25 0.5 1 Miles

N W E S

Exhibit A1: Photo Locations

Wildflower Green Energy Farm
Los Angeles County, California

Photo A: Broad Canyon in the northwest of the site, with Fairmont Butte in the distance.

Photo B: Rock outcrop on the northwest face of Fairmont Butte.

Photo C: Active burrowing owl burrow in the northwest of the site.

Photo D: California poppy field at the site, looking north towards Fairmont Butte.

Photo E: California poppy field.

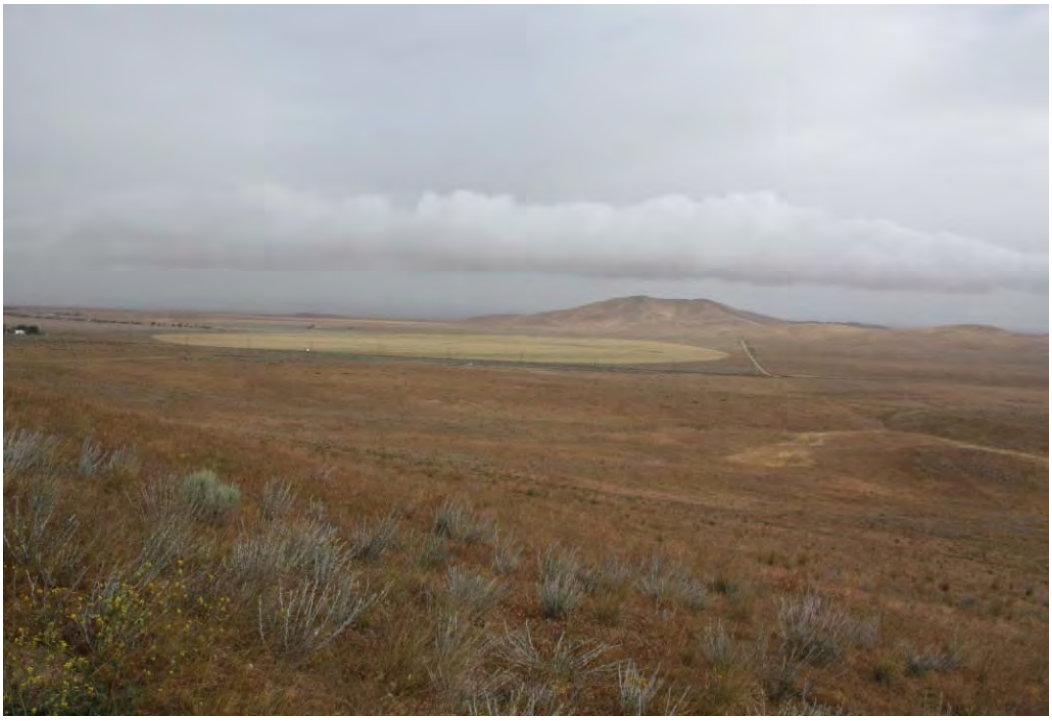


Photo F: Center-pivot crop field near center of the site.

Photo G: Non-native annual grassland in west-central portion of the site.

Photo H: Healy Farms in the west-central portion of the site.

Photo I: Rolling hills and low ridges in southeast of the site (non-native annual grassland).

Photo J: Rabbitbrush scrub in the southwest corner of the site.

Photo K: Myrick Canyon in the southeast corner of the site (rabbitbrush scrub/non-native annual grassland with agricultural field in distance).

Photo L: Red-tailed hawk nest in windbreak along 170th Street in the west-central portion of the site.

Photo M: The California Aqueduct where it crosses the southwestern corner of the site.

Photo N: Fairmont Reservoir, approximately 1.5 miles southwest of the site.

Photo O: Photograph taken from ridge in southeast of the site, looking southwest towards chaparral-covered hills of the Angeles National Forest.

Photo P: California poppy field in the northeast of the site.

Photo Q: Looking east along the proposed transmission line route towards Antelope Substation.

Photo R: Looking west along the proposed transmission line route.

Photo S: Swainson's hawk nest in tree along Highway 138.

Photo T: Vernal pool located in central portion of the site.

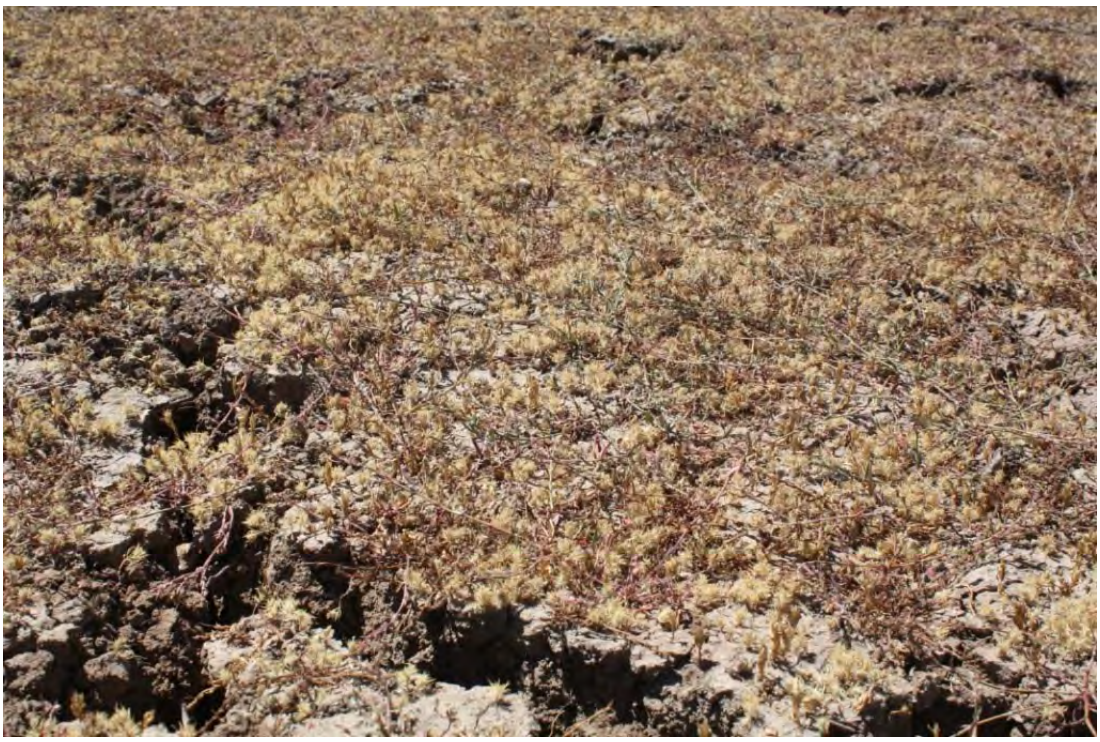


Photo U: *Navarretia fossalis* identified within seasonal depression pictured above.

Photo V: *Navarretia fossalis*

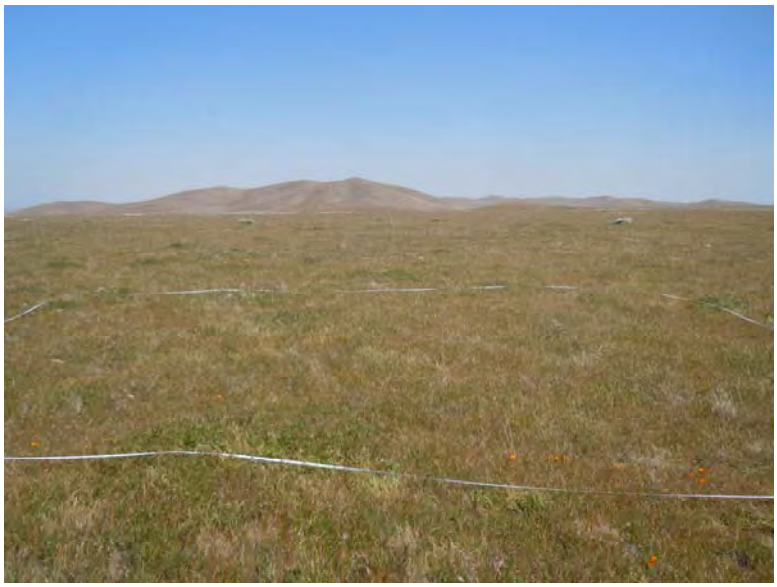


Photo W: California goldfields-Six-weeks fescue flower fields

Photo X: Purple needlegrass grassland.

Photo Y: Desert needlegrass grassland

Photo Z: One-sided blue grass grassland.

Photo AA: Cheatgrass grasslands.

Photo AB: Soft brome grasslands

Photo AC: Wild oats grasslands and agricultural fields

Photo AD: Rat-tail fescue grasslands

Photo AE: Prickly lettuce patches.

Photo AF: Hedgemustard and other mustard patches

Photo AG: California poppy fields

Photo AH: Miniature lupine fields

Photo AI: Desert dandelion- white layia floodplains.

Photo AJ: Scalebud- Chia-Scarlet lupine washes

Photo AK: Fiddleneck fields.

Photo AL: Annual hair grass- Finebranched popcornflower vernal pools

Photo AM: California buckwheat scrub.

Photo AN: Rubber rabbitbrush scrub

Photo AO: Oak gooseberry thickets

Photo AP: Narrowleaf goldenbush scrub

Photo AQ: Mixed willow riparian scrub.

Photo AR: Mulefat thickets

Photo AS: Desert olive patches.

Photo AT: Baltic and Mexican rush marshes

Photo AU: Wild tarragon patches.

Appendix B:

Plant and animal species observed or with the potential to occur within the Wildflower Green Energy Farm site.

Plant species observed within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Estimated Abundance within Project site*	Native/non-native/planted
FERNS AND FERN LIKE PLANTS			
Pteridaceae			
Pellaea mucronata	birdfoot cliffbrake	rare	native
GYMNOSPERMS			
Cupressaceae			
Juniperus californica	California juniper	rare	native
Pinaceae			
Pinus sp.	pine	rare	planted
ANGIOSPERMS - DICOTYLEDONS			
Adoxaceae			
Sambucus mexicana	blue elderberry	uncommon	native
Anacardiaceae			
Rhus trilobata	skunkbush sumac	rare	native
Apiaceae			
Conium maculatum	poison hemlock	rare	non-native
Lomatium nevadense	Nevada biscuitroot	uncommon	native
Lomatium utriculatum	common lomatium	common	native
Asclepiaceae			
Asclepias erosa	desert milkweed	rare	native
Asteraceae			
Agoseris hetrophylla	annual mountain dandelion	uncommon	native
Ambrosia acanthicarpa	annual bursage	uncommon	native
Ancistrocarphus filagineus	wooly fishhooks	uncommon	native
Anisocoma acaulis	scalebud	abundant	native
Artemisia douglasiana	mugwort	rare	native
Artemisia dracunculus	tarragon	uncommon	native
Artemisia tridentata	big sagebrush	rare	native
Baccharis salicifolia	mulefat	uncommon	native
Balsamorhiza deltoidea	deltoid balsamroot	rare	native
Brickellia sp.	brickelbush	rare	native
Chaenactis glabriuscula	yellow pincushion	common	native
Chaenactis xantiana	Fremont pincushion	abundant	native
Chamomilla suaveolens	pineapple weed	abundant	non-native
Cirsium occidentale	western thistle	rare	native
Cnicus benedictus	blessed thistle	uncommon	non-native

Plant species observed within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Estimated Abundance within Project site*	Native/non-native/planted
Conyza canadensis	horseweed	uncommon	native
Coreopsis bigelovii	Bigelow's tickseed	rare	native
Corethrogyne (Lessingia) filaginifolia	common sandaster	abundant	native
Ericameria (Chrysothamnus) nauseosus	rabbitbrush	abundant	native
Ericameria cooperi	Cooper's goldenbush	common	native
Ericameria linearifolia	interior goldenbush	common	native
Erigeron foliosus	leafy fleabane	uncommon	native
Eriophyllum confertiflorum	golden yarrow	rare	native
Filago gallica	narrowleaf cottonrose	abundant	non-native
Gnaphalium californicum	California everlasting	uncommon	native
Gnaphalium palustre	western marsh cudweed	rare	native
Helianthus annuus	annual sunflower	common	native
Heterotheca sessiliflora	false goldenaster	abundant	native
Holocarpha heermannii	Heermann's tarweed	abundant	native
Hypochaeris glabra	smooth catsear	common	non-native
Isocoma acradenia	desert isocoma	uncommon	native
Iva axillaris ssp. robustior	poverty weed	rare	native
Lactuca serriola	prickly lettuce	abundant	non-native
Lagophylla ramosissima	common harelead	abundant	native
Lasthenia californica	California goldfields	abundant	native
Layia glandulosa	white layia	abundant	native
Lepidospartum squamatum	California broomsage	rare	native
Lessingia lemmonii	Lemmon's lessingia	uncommon	native
Malacothrix californica	California dandelion	abundant	native
Malacothrix glabrata	desert dandelion	common	native
Microseris douglassii ssp. douglassii	Douglas' silverpuffs	rare	native
Senecio vulgaris	common groundsel	rare	non-native
Stephanomeria exigua	small wirelettuce	abundant	native
Stephanomeria pauciflora	wire-lettuce	abundant	native
Stephanomeria virgata	virgate wirelettuce	uncommon	native
Uropappus lindleyi	Lindley's silverpuffs	uncommon	native
Boraginaceae			
Amsinckia menziesii	Menzie's fiddleneck	abundant	native
Amsinckia tessellata	bristly fiddleneck	abundant	native
Cryptantha circumscissa	cushion cryptantha	common	native
Cryptantha nevadensis ssp. rigida	Nevada cryptantha	abundant	native

Plant species observed within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Estimated Abundance within Project site*	Native/non-native/planted
Cryptantha oxygona	sharpnut cryptantha	abundant	native
Pectocarya linearis ssp. ferocula	slender combseed	abundant	native
Pectocarya penicillata	sleeping combseed	abundant	native
Plagiobothrys acanthocarpus	adobe popcornflower	rare	native
Plagiobothrys arizonicus	Arizona popcornflower	abundant	native
Plagiobothrys canascens	valley popcornflower	abundant	native
Plagiobothrys leptocladus	finebranched popcornflower	uncommon	native
Plagiobothrys nothofulvus	rusty popcornflower	uncommon	native
Brassicaceae			
Capsella bursa-pastoris	shepherd's purse	uncommon	non-native
Descurainia pinnata	western tansy mustard	uncommon	native
Descurainia sophia	Tansy mustard	common	non-native
Hirschfeldia incana	short-podded mustard	common	non-native
Lepidium nitidum	shining peppergrass	common	native
Sisymbrium altissimum	skyrocket	abundant	non-native
Sisymbrium orientale	Oriental mustard	uncommon	non-native
Thysanocarpus cuvipes	fringe pod	uncommon	native
Tropidocarpum gracile	dobie pod	common	native
Cactaceae			
Opuntia basilaris var. *basilaris* x. *O.b.* var. *brachyclada*	beavertail	uncommon	native
Chenopodiaceae			
Atriplex polycarpa	cattle spinach	common	native
Chenopodium californicum	California goosefoot	uncommon	native
Chenopodium sp. (C. strictum or *C. berlandieri)*	goosefoot	rare	unknown
Salsola tragus	Russian thistle	uncommon	non-native
Convolvulaceae			
Calystegia occidentalis	western morning glory	common	native
Convolvulus arvensis	field bindweed	uncommon	non-native
Crassulaceae			
Crassula connata	sand pygmyweed	rare	native
Caryophyllaceae			
Cerastium glomeratum	mouseear chickweed	uncommon	non-native
Cucurbitaceae			
Marah fabaceus	California manroot	uncommon	native

Plant species observed within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Estimated Abundance within Project site*	Native/non-native/planted
Ericaceae			
Arctostaphylos glauca	bigberry manzanita	rare	native
Euphorbiaaceae			
Chamaesyce albomarginata	rattlesnake weed	abundant	native
Eremocarpus setigerus	turkey mullein	abundant	native
Fabaceae			
Astragalus didymocarpus var. *didymocarpus*	dwarf milkvetch	common	native
Astragalus douglasii	Jacumba milkvetch	abundant	native
Astragalus lentiginosus var. *variabilis*	freckled milkvetch	uncommon	native
Lathyrus vestitus var. *vestitus*	Pacific pea	rare	native
Lotus humistratus	foothill deervetch	uncommon	native
Lotus scoparius	deerweed	common	native
Lotus strigosus	hairy lotus	abundant	native
Lupinus bicolor	miniature lupine	abundant	native
Lupinus concinnus	scarlet lupine	common	native
Lupinus excubitus	grape soda lupine	rare	native
Lupinus excubitus ssp. austromontanus	grape soda lupine	rare	native
Lupinus formosus var. *robustus*	summer lupine	abundant	native
Lupinus microcarpus	chick lupine	uncommon	native
Lupinus sparsiflorus	Mojave lupine	uncommon	native
Medicago polymorpha	California burclover	uncommon	non-native
Trifolium albopurpureum	Indian clover	abundant	native
Trifolium gracillentum	pinpoint clover	abundant	native
Trifolium willdenovii	tomcat clover	common	native
Geraniaceae			
Erodium botrys	filaree	common	non-native
Erodium cicutarium	red-stem filaree	abundant	non-native
Saxifragaceae			
Ribes cf. quercetorum	oak gooseberry	uncommon	native
Hippocastaneaceae			
Aesculus californica	California buckeye	rare	native
Hydrophyllaceae			
Heliotropium curassavicum var. *oculatum*	salt heliotrope	rare	native
Nemophila pedunculata	littlefoot nemophila	rare	native
Phacelia cicutaria	caterpiller phacelia	common	native
Phacelia distans	distant phacelia	rare	native

Plant species observed within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Estimated Abundance within Project site*	Native/non-native/planted
Phacelia imbricata	imbricate phacelia	common	native
Phacelia ramossisima	branching phacelia	uncommon	native
Phacelia tanacetifolia	tansy leafed phacelia	uncommon	native
Turricula parryi	poodle dog bush	rare	native
Lamiaceae			
Marrubium vulgare	horehound	abundant	non-native
Salvia columbariae	chia	abundant	native
Stachys albens	whitestem hedgenettle	rare	native
Trichostema lanceolatum	vinegarweed	abundant	native
Loasaceae			
Mentzelia veatchiana	Veatch's blazingstar	uncommon	native
Myrtaceae			
Eucalyptus sp.	gum tree	rare	planted
Nyctaginaaceae			
Mirabilis laevis	California four-o' clock	uncommon	native
Oleaceae			
Forestiera pubescens	desert olive	uncommon	native
Onagraceae			
Camissonia campestris	Mojave sun cup	common	native
Camissonia graciliflora	hill suncup	common	native
Camissonia claviformis	browneyes	uncommon	native
Camissonia pusilla	little wiry suncup	uncommon	native
Camissonia strigulosa	strigose suncup	uncommon	native
Clarkia purpurea	purple clarkia	uncommon	native
Epilobium canum	California fuchsia	uncommon	native
Oenothera californica ssp. californica	California evening primrose	common	native
Papaveraceae			
Argemone sp.			
Eschscholzia californica	California poppy	abundant	native
Platystemon californicus	cream cups	common	native
Polygonaceae			
Eriogonum cf. baileyi	Bailey's buckwheat	abundant	native
Eriogonum davidsonii	Davidson's buckwheat	abundant	native
Eriogonum elongatum	longstem buckwheat	common	native
Eriogonum fasciculatum ssp. foliolosum	California buckwheat	common	native
Eriogonum fasciculatum ssp. polifolium	California buckwheat	common	native

Plant species observed within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Estimated Abundance within Project site*	Native/non-native/planted
Eriogonum roseum	wand buckwheat	common	native
Rumex salicifolia	willow dock	rare	non-native
Rumex crispus	curly dock	rare	non-native
Rumex hymenosepalus	wild-rhubarb	uncommon	native
Plantaginaeaea			
Plantago erecta	dotseed plantain	uncommon	native
Polemoniaceae			
Gilia capitata	bluehead gilia	uncommon	native
Gilia latiflora ssp. davyi	broad-flowered gilia	uncommon	native
Gilia minor	little gilia	uncommon	native
Gilia ochroleuca	volcanic gilia	uncommon	native
Linanthus liniflorus	narrowleaf flaxflower	common	native
Linanthus parviflorus	common linanthus	uncommon	native
Linanthus parryae	Parry's linanthus	uncommon	native
Navarretia fossalis	spreading navarretia	uncommon	native
Phlox gracilis	slender phlox	rare	native
Portulacaceae			
Calandrinia ciliata	red maids	uncommon	native
Claytonia parviflora ssp. parviflora	miner's lettuce	uncommon	native
Rhamnaceae			
Ceanothus cuneatus	wedgeleaf ceanothus	rare	native
Rhamnus ilicifolia	hollyleaf buckthorn	rare	native
Rosaceae			
Adenostoma fasciculatum	chamise	rare	native
Prunus dulcis	almond	uncommon	planted
Rubiaceae			
Galium aparine	common bedstraw	rare	native
Galium parisiense	wall bedstraw	rare	non-native
Salicaceae			
Populus fremontii	Fremont cottonwood	rare	native
Salix laevigata	red willow	rare	native
Salix gooddingii	Goodding's willow	rare	native
Salix exigua	sandbar willow	rare	native
Scrophulariaceae			
Castilleja subinclusa	longleaf indian paintbrush	rare	native
Castilleja exserta	purple owl’s clover	abundant	native

Plant species observed within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Estimated Abundance within Project site*	Native/non-native/planted
Castilleja tenuis	hairy owl's clover	rare	native
Mimulus guttatus	yellow monkeyflower	uncommon	native
Penstemon centranthifolius	scarlet begler	rare	native
Veronica peregrina ssp. xalapensis	speedwell	rare	native
Veronica sp.	neckweed	uncommon	unknown
Solanaceae			
Datura wrightii	Jimson weed	common	native
Nicotiana sp.	tobacco	rare	native
Solanum xantii	purple nightshade	uncommon	native
Tamaricaceae			
Tamarix sp.	tamarisk	rare	non-native
Ulmaceae			
Ulmus sp.	elm	rare	planted
ANGIOSPERMS - MONOCOTYLEDONS			
Cyperaceae			
Eleocharis cf. obtusa	spikerush	rare	native
Juncaceae			
Juncus balticus	baltic rush	common	native
Juncus bufonius	toad rush	rare	native
Juncus xiphioides	irisleaf rush	rare	native
Liliaceae			
Allium lacunosum var. *davisiae*	Davis' pitted onion	uncommon	native
Bloomeria crocea	common goldenstar	common	native
Chlorogalum spp.	soapplant	rare	native
Dichelostemma capitatum	blue dicks	common	native
Muilla maritima	common muilla	common	native
Yucca brevifolia	Joshua tree	rare	planted
Yucca whipplei	chaparral yucca	rare	native
Poaceae			
Achnatherum speciosum	desert needlegrass	common	native
Avena barbata	wild oat	abundant	cultivated, non-native
Avena fatua	wild oat	abundant	cultivated, non-native
Bromus diandrus	ripgut	common	non-native
Bromus hordeaceus	soft brome	abundant	non-native

Plant species observed within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Estimated Abundance within Project site*	Native/non-native/planted
Bromus madritensis ssp. rubens	foxtail chess	abundant	non-native
Bromus tectorum	cheat grass	abundant	non-native
Cynodon dactylon	Bermuda grass	uncommon	non-native
Deschampsia danthonioides	annual hairgrass	common	native
Elymus cf. glaucus	wildrye	common	native
Elymus elymoides	bottlebrush	common	native
Elymus multisetus	big squirreltail	common	native
Hordeum murinum	foxtail barley	abundant	non-native
Nassella pulchra	purple needlegrass	abundant	native
Piptatheum miliaceum	smilo grass	uncommon	non-native
Poa secunda	one-sided bluegrass	abundant	native
Polypogon monspeliensis	rabbitsfoot grass	uncommon	non-native
Schismus barbatus	Mediterranean grass	common	non-native
Secale cereale	rye	abundant	cultivated, non-native
Triticum aestivum	wheat	uncommon	cultivated, non-native
Unknown grass in vernal pool	unknown grass	rare	unknown
Vulpia microstachys var. *ciliata*	small fescue	abundant	native
Vulpia myuros	rattail fescue	abundant	non-native
Vulpia octoflora	sixweeks fescue	common	native

* *Abundant*: observed or expected to occur in substantial numbers (>500 observations) in suitable habitat and in the appropriate season; *Common*: observed or expected to occur in high numbers (100-500 observations) in suitable habitat and in the appropriate season; *Uncommon*: observed or expected to occur in low numbers (10-100 observations) in suitable habitat and in the appropriate season; may be restricted to few habitat types; *Rare*: observed or expected to occur in very low numbers (<10 observations) in suitable habitat and in the appropriate season; restricted to specific habitat types

Animal species observed or with the potential to occur within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Occurrence	Estimated Abundance within Project site	Status
INSECTA	**INSECTS**			
Papilionidae				
Papilio rutulus	western tiger swallowtail	Potential	Uncommon	
Papilio eurymedon	pale swallowtail	Potential	Uncommon	
Papilio zelicaon	anise swallowtail	Potential	Uncommon	
Papilio cresphontes	giant swallowtail	Potential	Rare	
Nymphalidae				
Danaus gilippus	striated queen	Potential	Uncommon	
Danaus plexippus	monarch	Potential	Common	
Ceononympha tullia californica	California ringlet	Potential	Rare	
Agraulis vanillae incarnata	Gulf fritillary	Potential	Rare	
Basilarchia lorquini	Lorquin's admiral	Potential	Rare	
Adelpha bredowii californica	California sister	Potential	Rare	
Euphydryas chalcedona	chalcedon checkerspot	Potential	Uncommon	
Junonia coenia	buckeye	Potential	Common	
Charidryas gabbii	Gabb's checkerspot	Potential	Uncommon	
Phyciodes mylitta	Mylitta crescent	Potential	Uncommon	
Polygonia satyrus	satyr anglewing	Potential	Rare	
Nymphalis californica	California tortoise-shell	Potential	Rare	
Nymphalis milberti	Milbert's tortoise-shell	Potential	Rare	
Nymphalis antiopa	mourning cloak	Potential	Rare	
Vanessa virginiensis	Virginia lady	Potential	Uncommon	
Vanessa atalanta	red admiral	Observed	Uncommon	
Vanessa cardui	painted lady	Observed	Abundant	
Vanessa annabella	West Coast lady	Observed	Common	
Riodinidae				
Apodemia mormo	Mormon metalmark	Potential	Common	
Lycaenidae				
Atlides halesus	great purple hairstreak	Potential	Uncommon	
Callophrys perplexa	bramble hairstreak	Potential	Common	
Euphilotes bernardino	Bernardino blue	Potential	Common	
Incisalia augustinus iroides	western elfin	Potential	Common	
Icaricia acmon	acmon blue	Potential	Common	
Icaricia lupini	lupine blue	Observed	Common	
Everes amyntula	western tailed-blue	Potential	Uncommon	

Animal species observed or with the potential to occur within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Occurrence	Estimated Abundance within Project site	Status
Glaucopsyche lygdamus australis	southern blue	Potential	Common	
Hemiargus ceraunus gyas	Edward's blue	Potential	Uncommon	
Hemiargus isola alce	Reakirt's blue	Potential	Rare	
Leptotes marina	marine blue	Potential	Common	
Brephidium exilis	pygmy blue	Potential	Common	
Lycaena xanthoides	great copper	Potential	Rare	
Satyrium californica	California hairstreak	Potential	Rare	
Strymon melinus	common hairstreak	Potential	Common	
Pieridae				
Colias (Zerene) eurydice	California dogface	Potential	Rare	
Colias (Zerene) cesonia	southern dogface	Potential	Rare	
Colias alexandra harfordii	Harford's sulfur	Potential	Rare	
Colias eurytheme	alfalfa sulfur	Observed	Common	
Nathalis iole	dwarf yellow	Potential	Common	
Anthocharis cethura	Felder's orange-tip	Potential	Uncommon	
Anthocharis sara sara	sara orange-tip	Potential	Common	
Anthocharis lanceolata	gray marble	Potential	Rare	
Euchloe lotta	desert marble	Potential	Uncommon	
Eurema nicippe	nicippe yellow	Potential	Uncommon	
Phoebis sennae	cloudless sulfur	Potential	Rare	
Pieris rapae	cabbage white	Potential	Uncommon	
Pontia protodice	checkered white	Observed	Common	
Pontia beckeri	Becker's white	Potential	Uncommon	
Pontia sisymbrii	spring white	Potential	Uncommon	
Hesperiidae				
Lerodea eufala	eufala skipper	Potential	Common	
Paratrytone melane	umber skipper	Potential	Rare	
Hylephila phyleus	fiery skipper	Potential	Common	
Atalopedes campestris	field skipper	Potential	Uncommon	
Ochlodes agricola	rural skipper	Potential	Uncommon	
Polites sabuleti	sandhill skipper	Potential	Uncommon	
Erynnis funeralis	funereal duskywing	Observed	Common	
Erynnis tristes	mournful duskywing	Potential	Rare	
Heliopetes ericetorum	large white skipper	Potential	Uncommon	
Pyrgus albescens	white checkered-skipper	Potential	Common	

Animal species observed or with the potential to occur within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Occurrence	Estimated Abundance within Project site	Status
AMPHIBIA	**AMPHIBIANS**			
Bufonidae				
Bufo punctatus	red spotted toad	Potential	Uncommon	
Ranidae				
Lithobates catesbeianus	bullfrog	Potential	Uncommon	
Hylidae				
Pseudacris hypochondriaca hypochondriaca	Baja California treefrog	Observed	Uncommon	
REPTILIA	**REPTILES**			
Anguidae				
Elgaria multicarinata webbii	San Diego alligator lizard	Potential	Common	
Phrynosomatidae				
Sceloporus occidentalis	western fence lizard	Observed	Abundant	
Uta stansburiana	side-blotched lizard	Observed	Abundant	
Phrynosoma blainvillii	coast horned lizard	Potential	Rare	SSC
Phrynosoma platyrhinos	desert horned lizard	Potential	Uncommon	
Crotaphytidae				
Gambelia wislizenii	Long-nosed leopard lizard	Observed	Rare	
Xantusiidae				
Xantusia vigilis	desert night lizard	Potential	Common	
Scincidae				
Plestiodon skiltonianus	western skink	Potential	Rare	
Plestiodon gilberti	Gilbert's skink	Potential	Rare	
Teliidae				
Aspidoscelis tigris	western whiptail	Observed	Uncommon	
Angidae				
Elgaria multicarinata	southern alligator lizard	Potential	Common	
Anniellidae				
Anniella pulchra pulchra	silvery legless lizard	Potential	Rare	SSC
Leptotyphlopidae				
Leptotyphlops humilis	western blind snake	Potential	Rare	
Botidae				
Lichanura trivirgata	rosy boa	Potential	Rare	
Colubridae				
Coluber constrictor mormon	western yellow-bellied racer	Potential	Uncommon	
Coluber flagellum piceus	red coachwhip	Observed	Common	

Animal species observed or with the potential to occur within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Occurrence	Estimated Abundance within Project site	Status
Masticophis lateralis	California whipsnake	Potential	Uncommon	
Salvadora hexalepis	western patch-nosed snake	Potential	Uncommon	
Pituophis catenifer	gopher snake	Observed	Abundant	
Arizona elegans	glossy snake	Potential	Uncommon	
Lampropeltis getula californiae	California kingsnake	Observed	Common	
Lampropeltis zonata	California mountain kingsnake	Potential	Rare	
Rhinocheilus lecontei	long-nosed snake	Observed	Common	
Tantilla planiceps	western black-headed snake	Potential	Rare	
Trimorphodon biscutatus	western lyre snake	Potential	Uncommon	
Hypsiglena ochrorhyncha	California night snake	Potential	Common	
Viperidae				
Crotalus oreganus	northern Pacific rattlesnake	Observed	Common	
Crotalus scutulatus	Mojave rattlesnake	Observed	Common	
AVES	**BIRDS**			
Podicipedidae				
Podilymbus podiceps	pied-billed grebe	Observed	Uncommon on Aqueduct	
Pelecanidae				
Pelecanus erythrorhynchos	American white pelican	Observed	Common during migration	SSC
Ardeidae				
Ardea herodias	great blue heron	Potential	Uncommon	
Ardea alba	great egret	Observed	Common	
Threskiornithidae				
Plegadis chihi	white-faced ibis	Observed	Uncommon	SWL, CS
Anatidae				
Anser albifrons	greater white-fronted goose	Potential	Uncommon	CS
Chen caerulescens	snow goose	Potential	Uncommon	CS
Branta canadensis	Canada goose	Potential	Common during migration	
Anas platyrhynchos	mallard	Observed	Abundant on Aqueduct	
Anas strepera	gadwall	Observed	Common on Aqueduct	
Aythya collaris	ring-necked duck	Observed	Abundant on Aqueduct	
Aythya affinis	lesser scaup	Observed	Common on Aqueduct	
Bucephala albeola	bufflehead	Observed	Common on Aqueduct	
Cathartidae				
Cathartes aura	turkey vulture	Observed	Common	CS
Accipitridae				
Circus cyaneus	northern harrier	Observed	Common	CS, SSC

Animal species observed or with the potential to occur within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Occurrence	Estimated Abundance within Project site	Status
Accipiter striatus	sharp-shinned hawk	Observed	Uncommon	SWL
Accipiter cooperii	Cooper's hawk	Observed	Uncommon	SWL
Buteo lineatus	red-shouldered hawk	Potential	Uncommon	
Buteo swainsoni	Swainson's hawk	Observed	Uncommon	BCC, CS, ST
Buteo jamaicensis	red-tailed hawk	Observed	Abundant	
Buteo regalis	ferruginous hawk	Observed	Uncommon (winter only)	BCC, CS, SWL
Buteo lagopus	rough-legged hawk	Potential	Uncommon (winter only)	
Aquila chrysaetos	golden eagle	Observed	Uncommon	BCC, CS, SFP, SWL
Falconidae				
Falco columbarius	merlin	Observed	Uncommon	SWL
Falco sparverius	American kestrel	Observed	Common	
Falco mexicanus	prairie falcon	Observed	Uncommon	BCC, CS, SWL
Falco peregrinus anatum	peregrine falcon	Observed	Rare	BCC, CS, SFP
Odontophoridae				
Callipepla californica	California quail	Observed	Abundant	
Oreortyx pictus	mountain quail	Potential	Uncommon	
Phasianidae				
Alectoris chukar	chukar	Potential	Rare	
Phasianus colchicus	ring-necked pheasant	Observed	Uncommon	
Gruiformes				
Fulica americana	American coot	Observed	Uncommon on Aqueduct	
Charadriidae				
Charadrius montanus	mountain plover	Potential	Rare	FPT, BCC, CS, SSC
Charadrius vociferus	killdeer	Observed	Abundant	
Scolopacidae				
Tringa melanoleuca	greater yellowlegs	Observed	Uncommon	
Actitis macularia	spotted sandpiper	Observed	Uncommon	
Numenius americanus	long-billed curlew	Potential	Rare	BCC, SWL, CS
Laridae				
Larus delawarensis	ring-billed gull	Potential	Uncommon	
Larus californicus	California gull	Potential	Uncommon	
Columbidae				
Zenaida macroura	mourning dove	Observed	Common	
Columba livia	rock pigeon	Potential	Common	

Animal species observed or with the potential to occur within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Occurrence	Estimated Abundance within Project site	Status
Cuculidae				
Geococcyx californicus	greater roadrunner	Observed	Uncommon	CS
Tytonidae				
Tyto alba	barn owl	Potential	Common	
Strigidae				
Asio otus	long-eared owl	Potential	Uncommon	SSC, CS
Asio flammeus	short-eared owl	Potential	Uncommon (winter)	CS, SSC
Bubo virginianus	great horned owl	Observed	Common	
Athene cunicularia	burrowing owl	Observed	Uncommon	BCC, CS, SSC
Megascops kennicottii	western screech-owl	Potential	Uncommon	
Caprimulgidae				
Phalaenoptilus nuttallii	common poorwill	Potential	Common	
Chordeiles acutipennis	lesser nighthawk	Potential	Uncommon	
Apodidae				
Chaetura vauxi	Vaux's swift	Observed	Uncommon (migration only)	SSC
Aeronautes saxatalis	white-throated swift	Potential	Common	
Trochilidae				
Calypte anna	Anna's hummingbird	Observed	Uncommon	
Selasphorus rufus	rufous hummingbird	Observed	Rare	
Picidae				
Melanerpes formicivorus	acorn woodpecker	Potential	Uncommon	
Sphyrapicus ruber	red-breasted sapsucker	Potential	Rare	
Picoides nuttallii	Nuttall's woodpecker	Observed	Rare	
Picoides scalaris	ladder-backed woodpecker	Observed	Uncommon	
Colaptes auratus	northern flicker	Observed	Common	
Tyrannidae				
Contopus sordidulus	western wood-pewee	Potential	Rare	
Sayornis nigricans	black phoebe	Observed	Rare	
Sayornis saya	Say's pheobe	Observed	Uncommon	
Myiarchus cinerascens	ash-throated flycatcher	Potential	Uncommon	
Tyrannus verticalis	western kingbird	Observed	Common	
Laniidae				
Lanius ludovicianus	loggerhead shrike	Observed	Common	BCC, CS, SSC
Corvidae				
Cyanocitta stelleri	Steller's jay	Potential	Rare	
Aphelocoma californica	western scrub-jay	Potential	Uncommon	

Animal species observed or with the potential to occur within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Occurrence	Estimated Abundance within Project site	Status
Corvus corax	common raven	Observed	Abundant	
Alaudidae				
Eremophila alpestris	horned lark	Observed	Abundant	
Hirundinidae				
Stelgidopteryx serripennis	northern rough-winged swallow	Observed	Uncommon	
Tachycineta thalassina	violet-green swallow	Observed	Uncommon	
Tachycineta bicolor	tree swallow	Observed	Common	
Petrochelidon pyrrhonota	cliff swallow	Observed	Abundant	
Hirundo rustica	barn swallow	Observed	Common	
Paridae				
Baeolophus inornatus	oak titmouse	Potential	Rare	
Aegithalidae				
Psaltriparus minimus	bushtit	Potential	Rare	
Troglodytidae				
Thryomanes bewickii	Bewick's wren	Observed	Uncommon	
Troglodytes aedon	house wren	Observed	Uncommon	
Campylorhynchus brunneicapillus	cactus wren	Potential	Uncommon	
Salpinctes obsoletus	rock wren	Observed	Common	
Sylviidae				
Chamaea fasciata	wrentit	Potential	Rare	
Regulidae				
Regulus calendula	ruby-crowned kinglet	Observed	Rare	
Turdidae				
Sialia currucoides	mountain bluebird	Observed	Common	CS
Sialia mexicana	western bluebird	Observed	Common	
Turdus migratorius	American robin	Potential	Common	
Polioptilidae				
Polioptila caerulea	blue-gray gnatcatcher	Potential	Uncommon	
Mimidae				
Mimus polyglottos	northern mockingbird	Observed	Common	
Toxostoma redivivum	California thrasher	Potential	Uncommon	
Sturnidae				
Sturnus vulgaris	European starling	Observed	Common	
Motacillidae				
Anthus rubescens	American pipit	Observed	Common	

Animal species observed or with the potential to occur within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Occurrence	Estimated Abundance within Project site	Status
Ptilogonatidae				
Phainopepla nitens	phainopepla	Potential	Rare	
Bombycillidae				
Bombycilla cedrorum	cedar waxwing	Potential	Rare	
Parulidae				
Oreothlypis celata	orange-crowned warbler	Observed	Uncommon	
Dendroica coronata	yellow-rumped warbler	Observed	Common	
Geothlyps trichas	common yellowthroat	Potential	Rare	
Emberizidae				
Melozone crissalis	California towhee	Observed	Common	
Amphispiza belli	sage sparrow	Observed	Uncommon	
Spizella breweri	Brewer's sparrow	Potential	Uncommon	
Passerculus sandwichensis	savannah sparrow	Observed	Common	
Pooecetes gramineus	vesper sparrow	Observed	Uncommon	CS
Chondestes grammacus	lark sparrow	Observed	Common	
Zonotrichia leucophrys	white-crowned sparrow	Observed	Common	
Melospiza melodia	song sparrow	Potential	Uncommon	
Junco hyemalis	dark-eyed junco	Potential	Uncommon	
Icteridae				
Sturnella neglecta	western meadowlark	Observed	Abundant	CS
Molothrus ater	brown-headed cowbird	Observed	Common	
Xanthocephalus xanthocephalus	yellow-headed blackbird	Observed	Rare	CS, SSC
Agelaius tricolor	tricolored blackbird	Observed	Abundant	BCC, CS, SSC
Agelaius phoeniceus	red-winged blackbird	Observed	Common	
Euphagus cyanocephalus	Brewer's blackbird	Observed	Common	
Icterus bullockii	Bullock's oriole	Observed	Uncommon	
Icterus cucullatus	hooded oriole	Observed	Uncommon	
Icterus parisorum	Scott's oriole	Potential	Rare	CS
Fringillidae				
Carpodacus purpureus	purple finch	Potential	Rare	
Carpodacus mexicanus	house finch	Observed	Common	
Spinus lawrencei	Lawrence's goldfinch	Observed	Uncommon	
Spinus psaltria	lesser goldfinch	Observed	Uncommon	
Spinus tristis	American goldfinch	Observed	Uncommon	
Passeridae				
Passer domesticus	house sparrow	Observed	Common	

Animal species observed or with the potential to occur within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Occurrence	Estimated Abundance within Project site	Status
MAMMALIA	**MAMMALS**			
Sciuridae				
Spermophilus beecheyi	California ground squirrel	Observed	Common	
Ammospermophilus leucurus	white-tailed antelope squirrel	Potential	Rare	
Geomyidae				
Thomomys bottae	Botta's pocket gopher	Potential	Common	
Heteromyidae				
Chaetodipus californicus	California pocket mouse	Potential	Uncommon	
Perognathus alticolus inexpectatus	Tehachapi pocket mouse	Potential	Rare	SSC
Perognathus longimembris	little pocket mouse	Potential	Rare	
Perognathus inornatus	San Joaquin pocket mouse	Potential	Rare	
Dipodomys merriami	Merriam's kangaroo rat	Potential	Uncommon	
Muridae				
Peromyscus maniculatus	American deer mouse	Potential	Common	
Onychomys torridus	southern grasshopper mouse	Potential	Common	
Reithrodontomys megalotis	western harvest mouse	Potential	Common	
Neotoma lepida	desert woodrat	Potential	Rare	
Microtus californicus	California vole	Potential	Rare	
Leporidae				
Sylvilagus audubonii	desert cottontail	Observed	Common	
Lepus californicus	black-tailed jackrabbit	Observed	Common	
Vespertilionidae				
Myotis californicus	California bat	Potential	Common	
Myotis ciliolabrum	western small-footed bat	Potential	Rare	
Lasionycteris noctivagans	silver-haired bat	Potential	Common during migration	
Parastrellus herperus	canyon bat	Potential	Common	
Eptesicus fuscus	big brown bat	Potential	Common	
Lasiurus blossevillii	western red bat	Potential	Uncommon during migration	SSC
Lasiurus cinereus	hoary bat	Potential	Common during migration	
Euderma maculatus	spotted bat	Potential	Uncommon	SSC
Corynorhinus townsendii	Townsend's big-eared bat	Potential	Uncommon	SSC
Antrozous pallidus	pallid bat	Potential	Common	SSC
Molossidae				
Tadarida brasiliensis	Brazilian free-tailed bat	Potential	Common	
Eumops perotis	western mastiff bat	Potential	Uncommon	SSC

Animal species observed or with the potential to occur within the Antelope Valley Renewable Energy Project.

Scientific Name	Common Name	Occurrence	Estimated Abundance within Project site	Status
Felidae				
Lynx rufus	bobcat	Potential	Rare	
Canidae				
Canis latrans	coyote	Observed	Common	
Vulpes macrotis	kit fox	Potential	Uncommon	
Urocyon cinereoargenteus	gray fox	Observed	Common	
Ursidae				
Ursus americanus	black bear	Potential	Rare	
Procyonidae				
Procyon lotor	northern raccoon	Potential	Common	
Mephitidae				
Spilogale gracilils	western spotted skunk	Potential	Rare	
Mephitis mephitis	striped skunk	Potential	Common	
Mustelidae				
Taxidea taxus	American badger	Potential	Uncommon	SSC

*FE=Federal Endangered; FT=federal threatened; FC=federal candidate for listing; FPT = federal proposed threatened; BCC= USFWS Birds of Conservation Concern; SE=State Endangered; ST=State Threatened; SSC=State Species of Special Concern; SFP=State Fully Protected; SWL=Watch List; CS=Los Angeles County Sensitive (USFWS 2010; CNDDB 2010a; CDFG, Fish and Game Code, Section 3511).

Appendix C:

Resumes of key Natural Resource Consultants, Inc. personnel

DAVID A. LEVINE | PRINCIPAL

Education

Master of Science (Biology) 1985, University of California, Irvine
Program in Marine Ecology 1982, Stanford University, Pacific Grove, California
Bachelor of Science (Biology) 1982, Lewis and Clark College, Portland, Oregon

Permits and Certification

California Department of Fish and Game Scientific Collector Permit
Riverside County - List of Qualified Biological Consultants
San Diego County - CEQA Consultant List; Biological Resources
Los Angeles County - Approved Consultant for Significant Ecological Area
San Bernardino County - Authorized Biological Consultant

Other Training

Quino Checkerspot Butterfly Identification Seminar, 1997
Natural Communities Conservation Planning, 1993

Countries of Work Experience

USA (California and Hawaii)
Jakarta, Indonesia
China (Yunnan and Taiwan)
Bangkok, Thailand
Hong Kong
Koror, Republic of Palau

Professional Experience

Principal/Ecologist | Natural Resource Consultants 1993 - Present

Mr. Levine is the principal in charge of NRC's biological consulting services. He brings over 20 years of project experience to NRC's efforts and provides team leadership for complex environmental permitting projects, large-scale biological studies, and multi-agency conservation planning efforts. Mr. Levine has conducted hundreds of biological resource evaluations for public and private sector projects throughout California. As NRC's principal, Mr. Levine ensures that NRC's studies and documentation emphasize compliance with local, state, and federal environmental regulations and balancing development with conservation of regionally significant biological resources.

Environmental Planner/Biologist | MBA International 1988 - 1993

Between 1991 and 1993 and prior to founding NRC, Mr. Levine participated as a consultant to the World Bank and Asian Development Bank for environmental review of project loans in southeast Asia and the South Pacific islands. Prior to 1990, he prepared and implemented habitat management plans for federally endangered species in locations throughout southern California. Mr. Levine also has designed and instructed seminars on environmental regulations for land use planners with training focused on regional and federal environmental laws effecting resource development.

Environmental Analyst | The Planning Center 1987 - 1988

At The Planning Center Mr. Levine conducted site surveys to determine land uses and demographic profiles of study areas including the review of literature and historical records for potential hazardous materials within study areas. Mr. Levine coordinated input of air pollution, water pollution, traffic, and cultural experts and prepared environmental impact reports in compliance with California Environmental Quality Act.

Instructor | Orange County Marine Institute 1986 - 1987

As ecology instructor of students in marine and terrestrial ecology Mr. Levine prepared demonstrations of biological principles, conducted classes on use of scientific equipment, identification of marine invertebrates, and measurement of marine water temperature, pH, and turbidity

Lecturer | Yunnan University 1985 - 1986

Prepared daily lectures and writing assignments for Chinese graduate students in the Foreign Language Department of Yunnan University. All students were graduates of the English-language department with opportunities for further study in the United States and Europe. Lecture topics related directly to current world events, cultural change in the U.S. and Europe, and technical and creative writing.

Publications

Results of a Five-Year Monitoring Study for a Habitat Conservation Plan (HCP) Designed to Protect an Isolated Coastal California Gnatcatcher Population: Successful Management of a Small Populations and Breeding Success in Revegetated Habitats; Proceedings of CALGNAT 95.

H. LEE JONES, PH.D. | ORNITHOLOGIST

Education

Post-doctoral fellowships, University of California, Los Angeles and Irvine campuses 1974-1978
Ph.D., Biology, emphasis on biogeography and avian ecology, University of California, Los Angeles 1974
Bachelor of Science, Zoology, North Carolina State University 1968

Permits and Certification

U.S. Fish and Wildlife Service Section 10(a) permit for California Gnatcatcher
U.S. Fish and Wildlife Service Section 10(a) permit for Least Bell's Vireo
U.S. Fish and Wildlife Service Section 10(a) permit for Southwestern Willow Flycatcher (Permit No. TE829204-4).

Professional Experience

Consulting biologist	1993-present
Member, Board of Directors, Michael Brandman Associates	1991-1993
Director of Resources Management, Michael Brandman Associates	1984-1993
Consulting biologist	1978-1984

Dr. Jones is a biologist specializing in the environmental sciences. He is an Internationally recognized ornithologist but also has a solid working knowledge of the other terrestrial vertebrate groups (amphibians, reptiles, and mammals), butterflies, and vascular plants. He has been a professional environmental consultant for 30 years, principally in California, but also in Nevada, Arizona, and several other countries, including Belize, Mongolia, Cambodia, and the island Republics of Palau and Kiribati. Dr. Jones has been responsible for a wide variety of biological, ecological, and conservation studies ranging from local biological assessments to regional conservation planning. He has directly participated in or supervised the production of numerous environmental compliance documents including: environmental impact reports (California), environmental impact statements (federal), and environmental impact assessments (countries outside the US); resource management and habitat restoration plans; habitat conservation plans for Endangered Species Act Section 7 consultations and Section 10(a) permits; Clean Water Act Section 404 permits; and State of California Section 1600 streambed alteration agreements. For the past 18 years Dr. Jones has specialized in conflict resolution between project proponents and the resource agencies on endangered species and resource management issues. He also specializes in conducting and supervising U.S. Fish and Wildlife Service protocol-level surveys for the federally threatened California Gnatcatcher, and the federal and state endangered Least Bell's Vireo and Southwestern Willow Flycatcher (Permit No. TE829204-4). Dr. Jones was a member of the California Bird Records Committee from 1978 to 1983.

Representative Projects

Presence-absence surveys, population studies, and conservation plans for California gnatcatcher 1991-2008

Environmental compliance documents for wind and solar energy projects in southern California 1978-2009

Chief consulting biologist for Protected Areas Management Program, Government of Belize 2000-2006

Assisted the governments of Mongolia, Cambodia, and Kiribati in establishing environmental review processes, as well as the underlying environmental regulations, standards, and policies that serve as the foundation for environmental review 1992-1997

Selected Publications

(with Oliver Komar). Central America. [Quarterly column on seasonal bird distribution in Central America]. *North American Birds*, vols. 55-63: 2000-2009
Birds of Belize. Univ. of Texas Press, Austin. 317 pp.

(with A. C. Vallely). 2001. *Annotated checklist of the Birds of Belize*. Lynx Edicions, Barcelona, Spain.

2000. *Maiuia Mannikibani Kiritimati (The Birdlife of Christmas Island)*. Dames & Moore, Honolulu.

(with Stuart Pimm and Jared Diamond). 1988. On the risk of extinction. *American Naturalist* 132(6): 757–785

(with Kimball Garrett and Arnold Small). 1981. Checklist of the birds of California. *Western Birds* 12:57-73

(with Jared Diamond). 1980. Species turnover in island bird communities. In: *Proceedings of the 17th International Ornithological Congress* 2: 777-782. Berlin, June 5-11, 1978. (R. Nohring, ed.).

STEPHEN H. REYNOLDS | SENIOR PLANT ECOLOGIST

Education

Masters of Science (Conservation Biology). In progress. State University of New York, College of Environmental Science and Forestry. Syracuse, NY.
Bachelor of Science (Geology: Concentration in Environmental and Engineering Geology) 2001, James Madison University, Harrisonburg, VA.
Bachelor of Science (Biology: Concentration in Plant Biology) 2001, James Madison University, Harrisonburg, VA.

Other Training

USACE Federal and Arid West Region Wetland Delineation. 2007. WTI.
Rare Plants of San Diego County. 2008. CNPS.

Professional Experience

2007 - Present — Sr. Plant Ecologist/ GIS Specialist | Natural Resource Consultants

Mr. Reynolds has served as project manager for numerous projects throughout southern California, including the development, implementation, and supervision of a large scale, multiyear grassland monitoring program at Tejon Ranch. Principle management duties include hiring and supervision of field crews, coordinating and prioritizing daily field and office logistics for several sites, establishing and maintaining effective communication among clients, coworkers, review boards and regulatory agencies, data management and statistical analyses, GIS analyses and graphics, and preparation of formal reports. Mr. Reynolds has also served as senior botanist for all company projects and duties include identification of unknown plant specimens from various vegetation types, surveys for special status plant species, and development or review of all vegetation restoration programs. He has performed or assisted in protocol presence/absence and potential habitat surveys for numerous special status species including burrowing owl, Quino checkerspot butterfly, Western willow flycatcher, California gnatcatcher, and numerous plant taxa and is experienced in vegetation mapping, jurisdictional wetlands delineations, and suitable habitat evaluations, often across a large extent, for numerous taxa and within several vegetation types.

2003 – 2007 — Instructor | SUNY-CESF

Mr. Reynolds taught several laboratory and lecture sections in general ecology, zoology and ecosystem science. He served as head laboratory instructor for nine sections of general ecology in 2005 and 2006. Mr. Reynolds also served as a guest instructor and co-designed and taught all aspects of two graduate-level lecture and laboratory sections of plant ecology in 2006.

2004 – 2006 — Research Ecologist | The Research Foundation at SUNY-CESF

Mr. Reynolds contributed to several major research projects including paleoecological work with the Lake Ontario Biocomplexity Project, focused surveys and population demography of eight protected orchid species throughout NY and PA, elemental analyses in plant tissues in northern NY wetlands, and examinations of effects of nitrogen-fixing plants on community composition and diversity in Lake Ontario coastal peatlands.

Competencies

Computer Software: SAS, PC-ORD, IDRISI, ArcGIS, MODFLOW, GSLIB, RAMAS GIS

Field techniques: Study design, sampling techniques, wetland delineation, hydrologic modeling,vascular/nonvascular plant ID, GPS, sediment coring, community/geologic mapping.

Laboratory techniques: Inductively Coupled Plasma-Optical Emission spectroscopy, NMR, elemental C:N, and various other geochemical techniques.

Memberships

Ecological Society of America
Society of Wetland Scientists
Society for Conservation Biology
California Native Plant Society

Select Publications, Presentations and Guest Lectures

Hajek, KL, DJ Leopold, and SH Reynolds. (in review) A multiscale analysis of environmental influences on rich fen plant communities in central New York. Wetlands.

Reynolds, SH, MT Distler, and KL Hajek. June 27-29, 2006. Native Wetland Species Workshop and Field Trip. The Northeast Symposium on Native Plant Education, Conservation and Gardening. Mexico, NY.

Reynolds, SH and JJ Gillrich, RW Kimmerer, and DJ Leopold. April 19, 2006. Diversity and distribution pattern of bryophytes and vascular plants in two rich fens of the Fall Creek Watershed, NY. Spotlight on Student Research and Outreach Symposium. SUNY-CESF, Syracuse, NY.

Reynolds, SH, MT Distler, JJ Gillrich, KL Hajek and DJ Leopold. Oct. 7-10, 2005. Controlling Factorsof Plant Diversity Across Multiple Spatial Scales in Fens of New York State. Binghamton Geomorphology Symposium. University at Buffalo, Buffalo, NY.

Reynolds, SH. 2005. An Introduction to Field Identification of Graminoids. Wetland Ecology (SUNY-CESF). Cranberry Lake Biological Station. Cranberry Lake, NY.

Cloyd, ET, MS Lucash, NE Muir-Hotaling, JH Hornbeck, HJ Jensen, BJ Norelius, SH Reynolds and JD Wickham. 2004. Diversity and Productivity in Grassland Ecosystems. Conservation Biology: 18(4):1171-1173.

Grants Received

Environmental influences on plant diversity in rich fens of Central New York; A multiscale analysis. The New York Biodiversity Research Institute. May- December, 2006. SH Reynolds and DL Leopold.

Preliminary exploration of plant diversity patterns in fens of the Fall Creek Watershed, NY. The Edna Bailey Sussman Foundation; Internship with The Nature Conservancy (Central and Western NY Chapter). May-Aug., 2003. SH Reynolds.

Honors and Distinctions

Botanical Society of America's Young Botanist of the Year: 2002
JMU Geology Dept. Award for graduating senior with highest GPA: 2001
JMU Male Scholar-Athlete of the Year: 2001 finalist
Varsity Letter in NCAA Div. I Men's Gymnastics: 1997-2001
Verizon Academic Athlete Award: 1999-2001

MITCHELL C. PROVANCE, PH.D. | LEAD BOTANIST

Qualification

Dr. Provance is an expert botanist with project experience throughout southern California. Dr. Provance completed his doctorate work at U.C. Riverside and provides strong academic and professional biological support to our botanical team. Dr. Provance's expertise is taxonomy of vascular plants, floristics, and composition of vegetation communities, especially of southern California and Mexico and the taxonomy, biogeography and ethnobotany of *Diospyros* (Ebenaceae). Dr. Provance has performed numerous surveys for common and rare plant species within Riverside County and has acquired an intimate knowledge of the various vegetation communities found throughout the county. He has experience conducting surveys and construction monitoring for large development and utility infrastructure projects since 1998.

Related Experience

Museum Scientist	U.C. Riverside Herbarium, CA	2007-present
Consulting Botanist	Various	2004-present
Herbarium Assistant	U.C. Riverside	1997-2001
Graduate Researcher	U.C. Riverside	2002-2006

Representative Projects

Construction Monitoring and Surveys	San Bern. and Riverside Counties, CA	2009
Botanical Survey; Mormon Mesa	San Bernardino County, CA	2008
Botanical Survey; BrightSource Energy	San Bernardino County, CA	2008
Botanical Surveys; Tejon Ranch	Los Angeles, County, CA	2008
Rare Plant Survey; Lake Elsinore	Riverside County, CA	2007
Botanical Survey; Kern River	Kern County, CA	2003

Education

Ph.D., Plant Biology, emphases in plant taxonomy, biogeography, and ethnobotany, University of California, Riverside	2006
Bachelor of Science, Botany, University of California, Riverside	2000

Publications

Sanders, A.C. and M.C. Provance. (Book chapter in review). A Botanical Survey of Rancho El Jabalí, Colima/Jalisco, Mexico. Biodiversity of Colima (Biodiversidad de Colima).

Provance, M.C., Ignacio Garcia-Ruiz, A.C. Sanders. 2008. The *Diospyros salicifolia* complex (Ebenaceae) in Mesoamerica. Journal of the Botanical Research Institute of Texas. 2(2): (pagination pending).

Provance, M.C., A.C. Sanders. 2005. More American black sapotes: new *Diospyros* Ebenaceae) for Mexico and Central America. Sida 22(1): 277–304. http://www.brit.org/sida/PDF/PDF22(1)/15_Provance-Sanders _Diospyros_277-304.pdf

Provance, M.C., A.C. Sanders. 2005. *Diospyros torresii* (Ebenaceae): a new black zapote from tropical Mexico. Sida 21(4): 2045–2050. http://www.brit.org/sida/PDF/PDF21(4)/08_Provance-Sanders_Diospyros_2045-2050.pdf

Cahill, J. P. and M.C. Provance. 2002. Genetics of qualitative traits in domesticated chia (*Salvia hispanica* L.). The Journal of Heredity 93(1): 52–55. http://jhered.oxfordjournals.org/cgi/reprint/93/1/52

Appendix D:

Resumes of key WEST, Inc. personnel

WALLACE P. ERICKSON, *Consulting Biometrician / Senior Manager*

EDUCATION

M.S.	University of Wyoming, Laramie, Wyoming	1992	*Statistics*
B.S.	Winona State University, Winona , Minnesota	1989	*Statistics and Mathematics*

PROFESSIONAL EXPERIENCE

1991-Present *Consulting Biometrician/Senior Manager*, Western EcoSystems Technology, Inc., Cheyenne, Wyoming
1990-1991 *Research Assistant*, University of Wyoming, Laramie, Wyoming
1990-1991 *Field Scientist*, University of Alaska, Fairbanks, Alaska
1989 *Research Assistant*, Alumni Office, Winona State University, Winona, Minnesota

SPECIALTY AREAS

Professional Summary: Statistician with over 18 years of experience in applying statistical solutions to a wide variety of natural resource problems. Has worked for state and federal wildlife agencies and industry throughout the U.S. Authored/co-authored over 40 professional publications on statistical applications in wildlife and other related fields.

Statistical Design and Analysis of Monitoring and Risk/Impact Assessment Studies: Numerous projects in designing and analyzing data collected to estimate or monitor the impacts of potential environmental perturbations or general monitoring programs. Was a principal Biometrician responsible for design and analysis of studies of impacts of the *Exxon Valdez* oil spill on marine organisms for the state of Alaska. Has had similar responsibility working for the States in several other NRDA studies, mainly involving mining impacts. Has participated in studies designed to assess impacts of windpower development on birds, bats and other wildlife in over 25 states. Has worked with numerous National Wildlife Refuges in Alaska and other states designing monitoring programs. Currently working with the Charles M. Russell NWR on innovative studies of plant, ungulate grazing interactions and development of new models for rangeland health.

Resource/Habitat Selection: Numerous projects in the study of resource selection by animals. Has participated in teaching workshops on resource selection. Experience includes the study of resource selection by moose in Alaska, study the effect of salvage logging on passerines in Oregon, study of brown bear habitat selection on the Kenai Peninsula in relation to development, study of brand habitat selection in wintering areas in Mexico, and the study of habitat selection by bighorn sheep in Idaho. Organized First International Conference on Resource Selection held in Laramie, Wyoming, January 2003. Co-author of book entitled "Resource Selection by Animals."

Wildlife Population Estimation: Knowledgeable in many techniques for estimation of abundance of wildlife. Participated in studies using mark/recapture techniques, line transect techniques, quadrat/plot methods, point counts surveys, etc. Designed studies to estimate moose populations in Alaska using line transect sampling. Participated in studies to estimate polar bear numbers, spotted owls and brant populations using capture/recapture techniques; neotropical migrants using point count/variable circular plot methods; walrus using adaptive sampling techniques.

Conducting Statistical Workshops for Biologists: Has developed material for, and conducted statistical workshops for biologists on the topics of general statistical methods, biological sampling and animal abundance estimation, resource selection, computer intensive statistics and spatial statistics.

SELECTED PUBLICATIONS

Arnett, E.B., W.K. Brown, W.P. Erickson, J.K. Fiedler, B.L. Hamilton, T.H.Henry, A. Jain, G.D. Johnson, J. Kerns, R.R. Koford, C.P. Nicholson, T.J. O'Connell, M.D. Piorkowski, and R.D. Tankersley. 2008. Patterns of Bat Fatalities at Wind Energy Facilities in North America. J. Wild. Man. 72(1).

Johnson, G. D., M. D. Strickland, W. P. Erickson, and D. P. Young, Jr. 2006. Use of data to develop mitigation measures for wind power development impacts to birds. In M. Ferrer, G. Janss and M. de Lucas, editors. Birds and windpower. Quercus Press, Spain. In Press.

Johnson, G.D., M.K. Perlik, W.P. Erickson, and M.D. Strickland. 2004. Bat activity, composition and collision mortality at a large wind plant in Minnesota. Wildlife Society Bulletin 32: in Press.

Erickson, W.P., R. Nielson, R. Skinner, B. Skinner and J. Johnson. 2004. Applications of resource selection modeling using unclassified Landsat Thematic Mapper imagery In Resource Selection Technique and Applications. Huzurbazar, editor. Omnipress, Madison Wisconsin.

Howlin, S., W.P. Erickson, and R. Nielson. 2004. Techniques for assessing predictive ability of resource selection functions. In Resource Selection Technique and Applications. Huzurbazar, editor. Omnipress, Madison, WI.

Erickson, W.P., G.D. Johnson, and D.P. Young. 2004. Summary of anthropogenic causes of bird mortality. Proceedings of the 2002 International Partner's in Flight Conference, Monterrey, California.

SCIENTIFIC ORGANIZATION MEMBERSHIPS

American Statistical Association *Biometrics Society*
The Wildlife Society *The National Audubon Society*

ANDREA H. CHATFIELD, *Wildlife Biologist / Project Manager*

EDUCATION

M.S.	University of Minnesota, St. Paul, Minnesota	2005	*Wildlife Conservation*
B.S.	University of Michigan, Ann Arbor, Michigan	1996	*Natural Resources & Environment*

PROFESSIONAL EXPERIENCE

2006-Present	*Wildlife Biologist/Project Manager*, Western EcoSystems, Inc., Arcata, California
2005-2006	*Wildlife Ecologist*, Williams Wildland Consulting, Inc., Marysville, California
1999-2005	*Research Assistant/Crew Leader*, Spotted Owl Demography Study, University of Minnesota, St. Paul, Minnesota
2001-2002	*Research Volunteer*, Wildlife Conservation Society, Wara Sara, Papua New Guinea
1999-2001	*Restoration Technician*, Circuit Rider Productions, Inc., Windsor, California
1999	*Biological Science Technician*, USFS, Lake Tahoe Basin and Sierra National Forest, California
1997-1998	*Task Force Coordinator and Research Assistant*, University of Michigan, Flint, Michigan
1997	*Field Research Assistant*, Sacramento State University, Sacramento, California
1997	*Field Research Intern*, USGS, Hakalau Forest NWR, Hawaii
1996, 1998	*Field Research Assistant*, University of Vermont, Hopland, California
1995	*Botany/Forestry Assistant*, USFS, San Juan National Forest, Colorado

TRAINING/CERTIFICATION

2010	Noninvasive Acoustic Monitoring of Bats, Field Techniques Workshop, Wind Wolves Preserve, California
2009	Anabat Techniques Training Course, Titley Scientific, Orange County, California
2007	Desert Tortoise Survey Techniques Workshop, Desert Tortoise Council, Ridgecrest, California

PROFESSIONAL SUMMARY

Andrea Chatfield has over fifteen years of experience working in the field of wildlife biology. Andrea has been involved in a variety of natural resource studies throughout the U.S., both in academia and in the private sector. Andrea joined WEST in 2006 as a field biologist and has since worked primarily on wildlife and environmental studies related to utility-scale wind-energy development throughout the U.S.

Project Management: Andrea is the Project Manager for a number of pre- and post-construction wildlife monitoring projects at wind-energy facilities primarily throughout California and other western states. As a project manager, Andrea has supervised wildlife and natural resource studies throughout all phases of wind project development from early site assessment to post-construction monitoring and mitigation. Andrea has experience with all aspects of project management including budget preparation, hiring and training field survey crews, coordinating with clients, designing wildlife studies to meet the needs of clients and resource agencies, study implementation, and report preparation. Studies have included initial site evaluation, pre-construction avian use surveys, threatened, endangered, and sensitive species surveys, ground and aerial raptor nest surveys, breeding bird surveys, acoustic bat surveys, land cover/habitat mapping, and post-construction avian and bat fatality monitoring.

Wildlife Studies: Andrea has extensive field experience conducting research and monitoring for a variety of wildlife species in a variety of habitats throughout the U.S. and overseas. She spent seven years as crew leader on a University of Minnesota long-term spotted owl demography study in the central Sierra Nevada of California. Andrea's graduate research involved creating a landscape-scale cover-class map and testing predictive models of spotted owl habitat use at multiple spatial scales using a GIS interface. Additional field experience includes the design and/or implementation of surveys for northern goshawk, great gray owl, burrowing owl, willow flycatcher, Hawaiian honeycreepers and other passerines, pine marten, pacific fisher, western fence lizard, and Cassowary. She has experience with a variety of wildlife survey techniques including mist-netting, banding of raptors and passerines, avian broadcast surveys, line transect and fixed-point avian surveys, nest searching, track plate surveys, camera trapping, radio telemetry, bat monitoring using Anabat acoustic detectors, and vegetation sampling. She is experienced with Garmin and Trimble GPS units and is proficient in ArcGIS 9.2. Andrea is currently managing pre- and post-construction environmental monitoring at wind-energy facilities primarily throughout California.

SCIENTIFIC ORGANIZATION MEMBERSHIPS

The Wildlife Society
Western Section of The Wildlife Society

KURT FLAIG, *Botanist / Wetland Ecologist*

EDUCATION

M.S.	Colorado State University, Fort Collins, Colorado	1999	*Range Ecology*
B.S.	Colorado State University, Fort Collins, Colorado	1995	*Natural Resource Management*
B.A.	Florida Atlantic University, Boca Raton, Florida	1989	*Political Science*

PROFESSIONAL EXPERIENCE

2003-Present *Botanist/Wetland Ecologist*, Western EcoSystems Technology, Inc., Cheyenne, Wyoming
2001-2003 *Plant Ecologist*, H.T. Harvey & Associates, San Jose, California
2000-2001 *Range Technician*, Colorado State Cooperative Extension Program and Division of Wildlife, Weston, Colorado
2000-2001 *Natural Resource Technician*, Center for Ecological Management of Military Lands, Fort Collins Colorado
1999-2000 *Biological Science Technician*, U.S. Forest Service, Canyon Lakes District, Fort Collins, Colorado
1998-1999 *Range Technician*, Colorado State Cooperative Extension Program, Fort Collins, Colorado and Y-Cross Ranch, Horse Creek, Wyoming
1996-1999 *Graduate Research Assistant*, Department of Rangeland Ecosystem Science, Fort Collins, Colorado and Fort Richardson, Alaska
1995-1996 *Research Assistant*, Department of Rangeland Ecosystem Science, Colorado State University, Fort Collins, Colorado
1994-1995 *Range Technician*, Colorado State Cooperative Extension Program, Fort Collins, Colorado

SPECIAL TRAINING AND COURSES

Functional Assessment of Colorado Wetlands (FACWet) Methodology Training, 2009
Biological Assessment/Biological Evaluation Preparation Training, USFS, 2008
Advanced Hydric Soils Course, Wetland Training Institute, 2005
Wetland Delineation Course, Wetland Training Institute, 2003
California Native Plant Society Rapid Assessment Course for Vegetation Mapping, 2001
EIR/EIS Preparation and Review, UC Davis Extension, 2001
Wetland Regulations, UC Davis Extension, 2001

SPECIALTY AREAS

Wetland delineation, mitigation and monitoring, functional assessment, permitting/regulations
Special-status plant survey and site/project evaluation
Special-status plant and habitat impact and mitigation assessment
Floristic inventory (including noxious weed)
Vegetation monitoring (short- and long-term) using a variety of sampling techniques
Vegetation community/association description and mapping
Preparation of technical reports

PROFESSIONAL SOCIETY MEMBERSHIPS

Society of Wetland Scientists
Wyoming Native Plant Society
Colorado Native Plant Society
California Native Plant Society

BOTANICAL EXPERIENCE – MOJAVE DESERT

Sidewinder Wind Project Special-status Plant Survey, Barstow, CA, 2008
White Hills Wind Project Special-status Plant Survey, White Hills, AZ, 2008
Eiastrum hooveri (Hoover's woolly-star) Inventory (in preparation for BA), Rosamond/Lancaster, CA, 2003

BILL DEPPE, *Field Technician/Avian Crew Leader*

EDUCATION

B.S.	University of Redlands 1968-1972
Teaching Credential	Cal. State University at Los Angeles 1973
Admin. Credential	Cal. State University at San Bernardino 1988
Various natural science/ornithology classes to present	

PROFESSIONAL EXPERIENCE

- Retired Teacher of 34 years. Last assignment was teaching Life Science at the secondary level.
- Worked on several projects for WEST, Inc. over past five years conducting following surveys:
  - Fixed-point avian use surveys
  - Raptor migration surveys
  - Breeding bird surveys
  - Raptor nest surveys
  - Acoustic bat surveys using AnaBat detectors
- Worked for Tierra Madre (Riverside office) in the following areas:
  - Least Bell's Vireo surveys along the Santa Ana River
  - Conducted a bio-survey for a wind generation facility in Palm Springs
  - Rodent trapping/surveys
- Licensed bird bander—I have banded for approximately 20 years. I operated a MAPS Banding station at the Lewis Center in Apple Valley, CA during the summers of 2003-4.
- Conducted raptor surveys in the Barstow/Newberry area since 2000.
- Volunteer participant in numerous bird surveys, including:
  - Mountain Plover and Tricolored Blackbird Surveys in Newberry Springs
  - San Bernardino County Breeding Bird Atlas
  - Numerous Christmas Bird Counts in San Bernardino and Riverside Counties
  - Rapid Bird Assessments along the Mojave River—2001 and 2002
  - Turkey Vulture/raptor migration monitoring in Victorville, CA for several years
  - Bird Breeding Survey route in Victorville, CA—1997 to 2001
- Active San Bernardino County birder. I know the desert areas very well and recently set the Big Year record for San Bernardino County.

PROFESSIONAL MEMBERSHIPS

- American Birding Association
- Western Field Ornithologists
- Founding member and current president of the Mojave Desert Bird Club, Victorville, CA

Appendix E:

Los Angeles County Assessor Parcel Numbers found within the Wildflower Green Energy Farm Site

Assessor Parcel Numbers					
3203034022	3236015021	3236020016	3236027007	3267006009	3267017014
3203034027	3236015030	3236020017	3236027008	3267006018	3267017015
3203034804	3236015032	3236020018	3238009006	3267006025	3267023014
3203034805	3236015043	3236020900	3238009007	3267006026	3267023015
3203034806	3236015044	3236020901	3238009015	3267006037	3267023016
3235001023	3236015051	3236020903	3238009021	3267006038	3267023017
3235001024	3236015052	3236020906	3238009022	3267007012	3267023018
3235001904	3236015054	3236020907	3240009009	3267007023	3267030001
3235002022	3236016001	3236020908	3240010006	3267007024	3267030002
3235002023	3236016002	3236020909	3240010007	3267007025	3267030003
3235002900	3236017003	3236021004	3240010009	3267007030	3267030004
3236008001	3236017005	3236021006	3240010901	3267007038	3267030006
3236008002	3236017006	3236021007	3267001001	3267007039	3267030007
3236009001	3236017007	3236021900	3267001002	3267011001	3267030032
3236009002	3236018020	3236021902	3267001003	3267011003	3267030033
3236009003	3236018021	3236022012	3267001004	3267014009	3267030034
3236010001	3236018024	3236022013	3267001005	3267014010	3267030036
3236010002	3236018025	3236022022	3267001007	3267014012	3267030037
3236010003	3236018900	3236022023	3267001008	3267014013	3267030038
3236010004	3236018901	3236022024	3267001009	3267014014	3267030039
3236010005	3236019002	3236022026	3267001019	3267014015	3267030040
3236010006	3236019003	3236022027	3267001903	3267014016	3267030043
3236010007	3236019007	3236022028	3267002001	3267014017	3267030901
3236010009	3236019008	3236022029	3267002004	3267014021	3267032013
3236010010	3236019010	3236023001	3267002005	3267016001	3267032014
3236010011	3236019013	3236023007	3267002011	3267016009	3267032015
3236011001	3236019014	3236023012	3267002013	3267016014	3267032016
3236011002	3236019015	3236023013	3267002270	3267016015	
3236011003	3236019900	3236023018	3267004004	3267016016	
3236011004	3236019901	3236023022	3267004005	3267016023	
3236012002	3236020001	3236024001	3267004009	3267016024	
3236012003	3236020002	3236024002	3267004011	3267016040	
3236012006	3236020003	3236024003	3267004036	3267016050	
3236012007	3236020004	3236024005	3267004037	3267016275	
3236012008	3236020006	3236024007	3267004041	3267017001	
3236012009	3236020007	3236027001	3267004042	3267017009	
3236012010	3236020008	3236027002	3267004043	3267017010	
3236012011	3236020013	3236027003	3267004044	3267017011	
3236015012	3236020014	3236027004	3267004045	3267017012	
3236015017	3236020015	3236027006	3267004046	3267017013	

Appendix F:
2011 Vegetation Analysis

TABLE OF CONTENTS

1.0 INTRODUCTION ..... - 4 -

1.1 GRASSLAND ECOLOGY ..... - 4 -
1.1 VEGETATION CLASSIFICATION ..... - 4 -

2.0 METHODS ..... - 4 -

2.1 PRE-SURVEY ANALYSES ..... - 4 -
2.2 DATA ACQUISITION ..... - 4 -
2.3 DATA ANALYSIS ..... - 5 -

3.0 RESULTS ..... - 7 -

3.1 NATIVE SCRUB AND SHRUBLANDS ..... - 7 -
3.1.1 California Buckwheat Scrub ..... - 7 -
3.1.2 Rubber Rabbitbrush Scrub ..... - 7 -
3.1.3 Oak Gooseberry thickets ..... - 7 -
3.1.4 Narrowleaf Goldenbush Scrub ..... - 9 -
3.1.5 Southern Willow Scrub ..... - 9 -
3.1.6 Mulefat Scrub ..... - 9 -
3.1.7 Desert Olive Patches ..... - 9 -
3.2 OTHER ALLIANCES ..... - 10 -
3.2.1 Agriculture ..... - 10 -
3.2.2 Disturbed and Developed ..... - 10 -
3.2.3 Water ..... - 10 -
3.3 HERB DOMINATED ALLIANCES ..... - 10 -
3.3.1 Site-Wide Results ..... - 10 -
3.3.2 Herbaceous Community Analysis ..... - 14 -
3.3.2.1 Native Annual Grasslands ..... - 14 -
3.3.2.2 Purple needlegrass grasslands ..... - 15 -
3.3.2.3 Desert Needlegrass grasslands ..... - 15 -
3.3.2.4 One-sided blue grass grasslands ..... - 16 -
3.3.2.5 Red brome or Mediterranean grass grasslands ..... - 16 -
3.3.2.6 Cheatgrass grasslands ..... - 16 -
3.3.2.7 Soft brome grasslands ..... - 17 -
3.3.2.8 Wild oats grasslands ..... - 17 -
3.3.2.9 Rat-tail fescue grasslands ..... - 17 -
3.3.2.10 Prickly Lettuce patches ..... - 21 -
3.3.2.11 Hedgemustard and other mustard patches ..... - 21 -
3.3.2.12 California poppy fields ..... - 21 -
3.3.2.13 Miniature lupine fields ..... - 22 -
3.3.2.14 Desert dandelion- white layia washes ..... - 22 -
3.3.2.15 Scalebud- Chia-Scarlet lupine washes ..... - 22 -
3.3.2.16 Fiddleneck Fields ..... - 23 -
3.3.2.17 Annual hair grass- Finebranched popcornflower vernal pools ..... - 23 -
3.3.2.18 Rush Marshes ..... - 24 -
3.3.2.19 Wild Tarragon Patches ..... - 24 -

4.0 CONCLUSIONS ..... - 25 -

5.0 WORKS CITED ..... - 26 -

TABLES

TABLE F-I: VEGETATION TYPES AT WGEF ..... - 11 -
TABLE F-II: SPECIES IMPORTANCE VALUES BY HERBACEOUS ALLIANCE ..... - 18 -
TABLE F- III: SUMMARY DATA FOR SIXTEEN HERBACEOUS ALLIANCES AT WGEF ..... - 20 -

EXHIBITS

EXHIBIT F - 1: RELEVÉ SAMPLING LOCATIONS ..... - 6 -
EXHIBIT F - 2: VEGETATION MAP BY ALLIANCE ..... - 8 -

1.0 INTRODUCTION

Natural Resource Consultants (NRC) was retained by Element Power to prepare a vegetation map of the approximately 4,192-acre Wildflower Green Energy Farm site (WGEF, "the site"), located in north-central Los Angeles County, California. The site is located approximately 16 miles (26 kilometers [km]) west of the city of Lancaster. NRC studies were conducted in April 2011 for the entire site. All woody and herbaceous vegetation types were mapped with a focus on herb (e.g. grasses, graminoids, forbs) dominated vegetation using the California Native Plant Society / Department of Fish and Game Protocol for Combined Vegetation Rapid Assessment and Relevé Sampling (CNPS 2009). This study used to create a detailed vegetation map and, in part, inform a biological constraints analysis for the WGEF site. Data collected in 2011 were used to map vegetation alliances from which a summarized community map was used to assess vegetation impacts on the WGEF site.

1.1 Grassland Ecology

Prior to European settlement, California's Mediterranean type grasslands were dominated by caespitose grasses, particularly *Nassella pulchra* and *N. cernua* (Bartolome et al. 1986). These grasslands, however, have undergone a vast and permanent change since pre-settlement conditions (Bartolome et al. 1986, Baker 1989, Heady et al. 1991). Currently, California grasslands are often a mosaic of various annual and perennial grass and forb stands that vary in distributions and composition based on yearly precipitation (Hobbs and Mooney 1995, Holmes and Rice 1996, Hamilton et al. 1999) as well as other ecological factors such as competition from other plants (Dyer et al. 1996, Seabloom et al. 2003*a*, Corbin and D'Antonio 2004), grazing (Mackey and Currie 2000, Hayes and Holl 2003, Bartolome et al. 2004), fire (Hervey 1949, Glenn-Lewin et al. 1990), soils (Stromberg and Griffin 1996, Seabloom et al. 2003*b*), and land use changes (Stromberg and Griffin 1996, Stylinski and Allen 1999). These factors can result in substantial yearly changes in the distribution, structure, and composition of grassland communities. While the botanical details (diversity, native cover, etc) vary from year to year, it is possible to classify these areas into useful vegetation classes for evaluation of potential impacts to these areas.

1.1 Vegetation Classification

The California Department of Fish and Game has recently adapted the system described in a Manual of California Vegetation, 2nd Edition (Sawyer et al. 2009) as a standard for the state. The following report describes the methods and results used to generate a vegetation map using this alliance-level system. The alliance data was summarized into community level classification system presented in the BCA

2.0 METHODS

2.1 Pre-Survey Analyses

Prior to the start of the field season, an exploratory GIS analysis was conducted to identify all areas of the study area dominated by woody plant dominated vegetation. The extent of this sampling area was delineated using recent aerial photographs of the region and field-checked in November 2010 and April 2011. From this analysis, approximately one third of the site was mapped as scrub or shrubland, or "other" (e.g. agriculture, disturbed, etc.).

2.2 Data Acquisition

Data were collected from April 6 to April 21, 2011. This time period coincides with the 2011 peak flowering period in the Antelope Valley for the majority of on-site native annual forbs. Vegetation mapping was done at the alliance level following Sawyer et al. (2009) with a minimum mapping unit of 1,000sq.ft (approximately 30m x 30m). This vegetation classification system is the preferred system by the California Native Plant Society and the California Department of Fish and Game and is the newly adapted system for ranking California vegetation type rarity (CDFG 2009). Woody vegetation types (e.g. shrub or tree dominated vegetation types) were delineated on aerial maps and ground-truthed in the field by NRC for the entire site in April 2011. Herb (e.g. grasses, graminoids, and forbs) dominated vegetation

types were mapped using the California Native Plant Society / Department of Fish and Game Protocol for Combined Vegetation Rapid Assessment and Relevé Sampling (CNPS 2009).

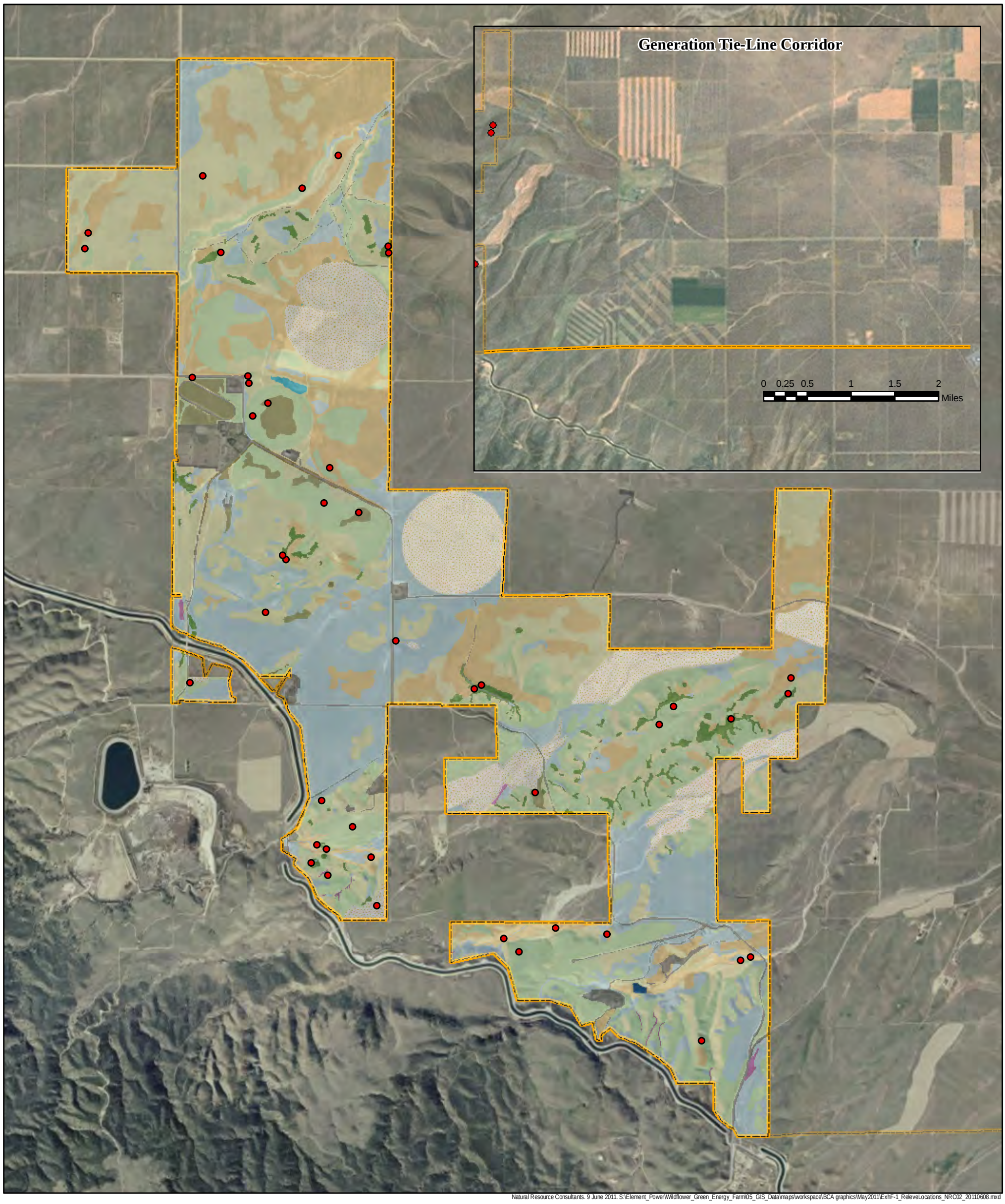
Based on previous mapping efforts by NRC in 2010 homogeneous stands with uniform structure and composition for each vegetation type were selected. Several 100m^2 survey plots (or "relevés") were established for each herbaceous stand type (N=44; Exhibit F-1), each within separate representative stands. At least three relevés were established for most presumed vegetation types. Within each relevé, various attributes were quantified including geographic and environmental data such as topography (e.g. slope, slope position, microtopography, aspect, etc.), geology (e.g. soil characteristics), and surface cover (e.g. percent water, percent litter). Structural and compositional data were also quantified including heights (e.g. mean tree height, mean forb height), total vegetative cover, and species-specific cover values for all species found within the relevé. Cover values were given using a modified Daubenmire cover class system as follows: 01 = <1%, 02 = 1-5%, 03 = 5-15%, 04 = 15-25%, 05 = 25-50%, 06 = 50-75%, 07 = >75%. Following surveys within the relevé, the boundaries of each herbaceous stand were walked using handheld GPS units or, where appropriate, drawn on small-scale detailed field maps. Based on the intergrading and transitional nature of these vegetation types, particularly in annual dominated vegetation types, best estimates of stand boundaries were made in the field but assumed to be an approximation. Additionally, all major dominant species within each stand type were recorded. All species were properly vouchered for submittal to the University of California, Riverside Herbarium.

2.3 Data Analysis

Relevé data from herb-dominated stands were transformed ($x' = x^{0.2}$) and correspondence analysis (COA) was used to determine dominant trends following methods described by Wildi (2010).

Cluster analysis, using Euclidean linkage, and subsequent oblique principle component analysis, was used to cluster and compare all plots based on similarities in cover of all observed species. All cluster and discriminant analyses were done using PC-ORD (McCune and Mefford 1999) and SAS/STAT® software.

The mapped boundaries of each vegetation type were digitized using geographic information system (GIS) software, ArcGIS, and overlain onto digital ortho-quarter quad (DOQQ) basemaps. Importance Values (IV) were calculated for each species within an alliance as the sum of the relative dominance and relative frequency. Species with a larger IV are, therefore, those showing greater cover and greater frequency within plots.



Project Boundary

Releve Locations

N
W E
S

0 0.25 0.5 1
Miles

Exhibit F - 1: Releve Sampling Locations
Wildflower Green Energy Farm
Los Angeles County, California

3.0 RESULTS

3.1 Native Scrub and Shrublands

Seven woody dominated scrub and shrubland vegetation alliances were identified at the WGEF site from aerial photo interpretation and field analyses (Table I; Exhibit F - 2)

3.1.1 CALIFORNIA BUCKWHEAT SCRUB

Holland: Mojave Mixed Woody Scrub (34210)
Sawyer et al.: *Eriogonum fasciculatum* Shrubland Alliance

Approximately 31 acres of California buckwheat (*Eriogonum fasciculatum*) scrub were observed at WGEF (Appendix A; Photo AM). This scrub, characterized by >5% cover of California buckwheat in the shrub layer, was found mostly on rocky slopes and ridges however several patches were also mapped in dry washes and north facing slopes in the south of the site. The canopy of this scrub is largely open and native annual plants including California goldfields, popcornflower, owl's clover, and others are found in these openings. Native grasses including purple needlegrass are also common. Along the buttes in the north of the WGEF site, short-joint beavertail (*Opuntia basilaris* var. *brachyclada*) is found associated with this scrub type.

3.1.2 RUBBER RABBITBRUSH SCRUB

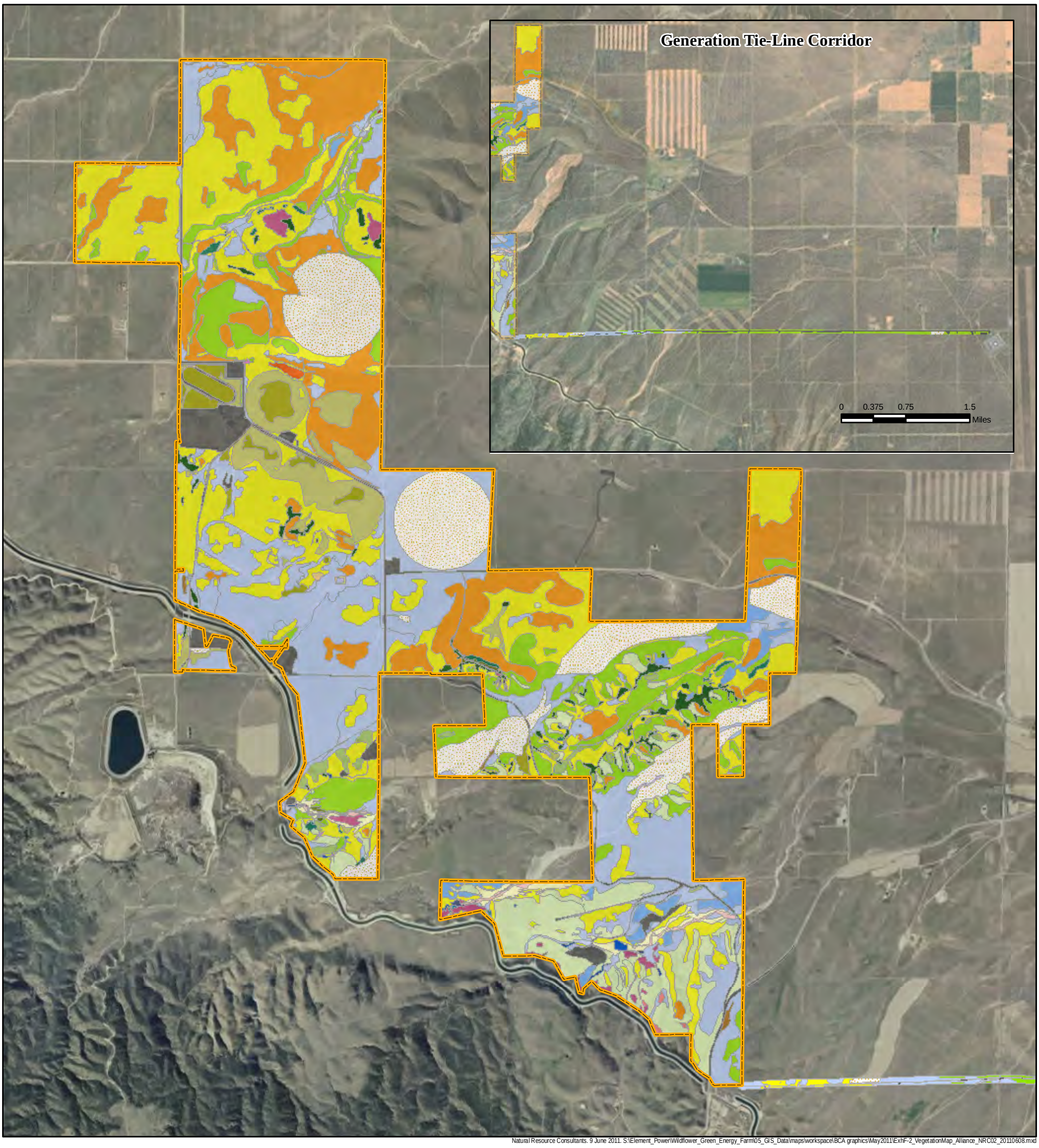
Holland: Rabbitbrush Scrub (35400)
Sawyer et al.: *Ericameria (Chrysothamnus) nauseosa* Shrubland Alliance

Rabbitbrush scrub covers 856.1 acres of the site (Appendix A; Photo AN). This vegetation community, found in flat bottomlands and ridges as well as dry washes, is typified by 25% or greater relative cover of rabbitbrush (*Chrysothamnus nauseosus*) in the shrub layer. The herbaceous vegetation observed in rabbitbrush scrub was composed of the same species found in the non-native and native annual grasslands within the site including California goldfields, California poppy, miniature lupine, red brome, cheatgrass, and small fescue.

3.1.3 OAK GOOSEBERRY THICKETS

Holland: Semi-desert Chaparral (37400)
Sawyer et al.: *Ribes quercetorum* Provisional Shrubland Alliance

Several oak gooseberry thickets were found in the southern portion of the WGEF site in areas with large exposed boulders and bedrock, particularly on north facing lower slopes (Appendix A; Photo AO). Although relatively small (0.8 acres), these dense thickets provide food and shelter for various birds, small mammals, and reptiles. These thickets are characterized by dominance of oak gooseberry (*Ribes quercetorum*) (cover > 75%). Skunkbush (*Rhus trilobata*) was also found at low (<5% cover) in at least one thicket. Herbaceous plants were uncommon in these thickets.



Natural Resource Consultants. 9 June 2011. S:\Element_Power\Wildflower_Green_Energy_Farm\05_GIS_Data\maps\workspace\BCA graphics\May2011\ExhF-2_VegetationMap_Alliance_NRC02_20110608.mxd

Project Boundary

Valley Needlegrass Grasslands
- Purple Needlegrass Grasslands
- Curly Blue Grass Grasslands
- Desert Needlegrass Grasslands

Non-native Grasslands
- Soft Brome Grasslands
- Red Brome or Mediterranean Grass Grasslands
- Cheatgrass Grasslands
- Wild Oats Grasslands and Agricultural Fields
- Rat-Tail Fescue Grasslands
- Prickly Lettuce Patches
- Hedgemustard Semi0Natural Herbaceous Stands

Wildflower Fields
- California Poppy Fields
- Miniature Lupine Fields
- Desert Dandelion- White Layia Floodplains
- Scalebud- Chia-Scarlet Lupine Washes
- Fiddleneck Fields

Valley and Foothill Grasslands
- California Goldfields-Six Weeks Fescue Fields

Vernal Pools
- Annual Hair Grass- Finebranched Popcornflower Vernal Pools

Mojave Mixed Woody Scrub
- California Buckwheat Scrub

Rabbitbrush Scrub
- Rubber Rabbitbrush Scrub

Semi-Desert Chaparral
- Oak Gooseberry Thickets

Upper Sonoran Subshrub Scrub
- Narrowleaf Goldenbush- Cooper's Goldenbush Scrub

Coastal and Valley Freshwater Marsh
- Baltic and Mexican Rush Marshes

Central Coast Riparian Scrub
- Wild Tarragon Patches

Southern Willow Scrub
- Mixed Willow Riparian Scrub

Mulefat Scrub
- Mulefat Thickets

Mojave Desert Wash Scrub
- Desert Olive Patches

Irrigated/Dryland Grain and Seed Crops
- Agriculture

Disturbed and Urban/Developed
- Planted Joshua Trees
- Disturbed and Devloped
- Non-native trees

Fresh Water
- Open Water

Exhibit F - 2: Vegetation Community Map (sensu Sawyer et al. 2009)

Wildflower Green Energy Farm
Los Angeles County, California

3.1.4 NARROWLEAF GOLDENBUSH SCRUB

Holland: Upper Sonoran Subshrub Scrub (39000)
Sawyer et al.: *Ericameria linearifolia* Provisional Shrubland Alliance

Approximately 2.7 acres of narrowleaf goldenbush scrub was observed on dry upper slopes, ridges, and saddles in the southern portion of WGEF (Appendix A; Photo AP). This scrub was dominated by narrowleaf goldbush (*Ericameria linearifolia*) with cover values greater than 30% for this species. Cooper's goldenbush (*Ericameria cooperi*) was also found in many of these scrublands and individuals intermediate in characteristics (e.g. leaf length, leaf shape) of these two species were observed, suggesting these two species may be hybridizing at the WGEF site. Narrowleaf goldenbush scrub was observed to grade into other shrubland types; both rubber rabbitbrush and California buckwheat were found at low (<10% cover) values. Annuals, particularly miniature lupine and *Bromus hordeaceus* (mean cover class= 25-50% for both), were common in openings between shrubs.

3.1.5 SOUTHERN WILLOW SCRUB

Holland: Southern Willow Scrub (63220)
Sawyer et al.: *Salix exigua* Shrubland Alliance *et seq*.

Southern willow scrub is composed of dense, broadleafed, winter-deciduous riparian thickets dominated by several *Salix* species, with scattered emergent *Populus fremontii* and/or *Platanus racemosa*. Most stands are too dense to allow much understory development. Sawyer et al. (2009) describe several woodland and shrubland riparian willow alliances. However, because of the 1,000 sq.ft. minimum mapping unit used in vegetation surveys at WGEF all willows were mapped as a single unit at the WGEF site. Four species of willow, red willow (*Salix laevigata*), Gooding's willow (*Salix gooddingii*), sandbar willow (*Salix exigua*), and Fremont's cottonwood (*Populus fremontii*) were observed to grow as co-dominants or alternating dominants along several riparian areas in the south of WGEF (Appendix A; Photo AQ). Mulefat (*Baccharis salicifolia*) and several riparian herbs were present. A single California buckeye (*Aesculus californica*) was also observed growing in this vegetation type.

3.1.6 MULEFAT SCRUB

Holland: Mulefat Scrub (63310)
Sawyer et al.: *Baccharis salicifolia* Shrubland Alliance

Approximately 1.5 acres of mulefat thickets were observed at WGEF (Appendix A; Photo AR). These thickets were characterized by >50% relative cover of mulefat (*Baccharis salicifolia*) in the shrub layer. Most stands of mulefat scrub were observed in active stream channels and dry washes found in the southern portion of the site, however at least one other stand was found in upland habitat. In riparian areas, mulefat scrub intergrades with southern willow scrub; a gradient of southern willow scrub to mulefat scrub is apparent moving down stream. Other perennial plants were found scattered in low cover within these stands including wild tarragon, brickelbush, and longstem buckwheat. Native annuals including chia, scalebud, and scarlet lupine, were also found at very low (<1%) cover.

3.1.7 DESERT OLIVE PATCHES

Holland: Mojave Desert Wash Scrub (63700)
Sawyer et al.: *Forestiera pubescens* Shrubland Alliance

Desert olive (*Forestiera pubescens*) is a tall (3-5m) evergreen shrub found often in monotypic and clonal stands. At WGEF, two patches of desert olive totaling 0.9 acres were found just above active channels in slightly drier conditions in the southern portion of the site (Appendix A; Photo AS). These patches, characterized by >50% relative cover of desert olive, were both presumed to be clonal as no evidence of sexual reproduction (e.g. flowers, fruits) were observed. Stands were generally monotypic with other plant species generally lacking and were found associated with large boulders and rock outcrops.

3.2 Other Alliances

3.2.1 AGRICULTURE

Holland: Irrigated/Dryland Grain and Seed Crops (11203/11204)
Sawyer et al.: NA

Agricultural fields comprise 441.4 acres (10.5%) of the site and 4.2 acres of the transmission line corridor. Historically, much of the site has been used for agricultural production, but, as of April 2011, there are only five agricultural fields in production. These consisted of two center-pivot irrigated fields, two fields in valley bottoms that appear to be naturally irrigated with channeled runoff water, and one dryland grain field on a leveled and tilled ridgetop. The predominant crops grown were oats (*Avena* spp.) and cereal rye (*Secale cereale*).

3.2.2 DISTURBED AND DEVELOPED

Holland: Disturbed and Urban/Developed (11300/12000)
Sawyer et al.: NA

Approximately 155 acres (3.7%) of the site and 30.5 acres within the transmission line corridor is composed of Disturbed and Urban/Developed land. These areas include residential houses and yards, ranch houses and associated outbuildings and compounds, and roads. All of the areas mapped as developed include landscape trees and shrubs, often planted as windbreaks. Commonly planted trees and shrubs observed included Siberian elm (*Ulmus pumila*), black locust (*Robinia pseudoacacia*), Fremont cottonwood (*Populus fremontii*), gum tree (*Eucalyptus* spp.), apple (*Malus sylvestris*), exotic pines (*Pinus* spp.), and sumac (*Rhus* spp.). Rows of junipers (*Juniperus* spp.) and cedars (*Cupressus* spp.) were planted along Lancaster Road near the Healy Farms. Additionally, several Joshua trees are (*Yucca brevifolia*) located near the entrance to the Castle property in the south central portion of the site. These trees were planted as ornamentals around the parcel gate when the area was first used as an almond orchard and are thus included here. No naturally occurring Joshua trees are found on the site.

3.2.3 WATER

Holland: Fresh Water (13140)
Sawyer et al.: NA

A single retention basin (1.6 acres) is located in Castle Ranch Property in the southern section of the WGEF site. This basin is a jurisdictional feature (See Section 5.1.3) and is most likely used for flood control and a water source for cattle. No aquatic vegetation was observed within the basin and the banks were predominantly planted with non-native ornamentals.

3.3 Herb dominated Alliances

3.3.1 SITE-WIDE RESULTS

A total of 215 plant species were observed within relevés or during the mapping effort (Appendix B). Relevés contained an average of 17 different species (mean cover= 81.9%) and were dominated by litter (mean cover= 47.25%) and fine grained sediments (mean cover=29.0%). Of the top twenty most important species (IV > 2.0 for all) encountered, eight were non-native herbs and grasses (Table F-II). Four non-native species, *Erodium cicutarium*, *Bromus tectorum*, *Bromus madritensis*, and *Vulpia myuros*, clearly dominated the sampling area with a cumulative relative importance value of 60.5%. The four most important native species, *Lupinus bicolor*, *Vulpia microstachys*, *Lasthenia californica*, and *Amsinckia tessellata* had a cumulative relative importance value of 39.5%.

TABLE F-I: VEGETATION TYPES AND ACREAGES AT THE WILDFLOWER GREEN ENERGY FARM SITE.

	Vegetation Type (Holland 1986)	Vegetation Alliance (Sawyer et al. 2009)	Rarity Ranking	Acreage	Percent of Site
Native annual grassland	Valley and Foothill Grasslands – 42000	California goldfields-Dwarf plantain-Six-weeks fescue flower fields (*Lasthenia californica- Plantago erecta- Vulpia microstachys* Herbaceous Alliance)	G4 S4	**1021.1**	**24.4**
Native perennial grassland	Valley Needlegrass Grassland – 42110	Purple needlegrass grassland (*Nassella pulchra* Herbaceous Alliance)	G4 S3?	52.2	1.2
		Desert needlegrass grassland (*Achnatherum speciosum* Herbaceous Alliance)	G4 S2.2	2.3	0.1
		One-sided blue grass grassland (*Poa secunda* Herbaceous Alliance)	G4 S3?	11.2	0.3
			Subtotal	**65.7**	**1.6**
Non-Native annual grassland/ Semi-natural stands	Non-native Grassland – 42200	Red brome or Mediterranean grass grasslands (*Bromus rubens- Schismus* (*arabicus, barbatus*) Semi-Natural Herbaceous Stands)	-----	1.1	0.0
		Cheatgrass grasslands (*Bromus tectorum* Semi-Natural Herbaceous Stands)	-----	385.9	9.2
		Soft brome grasslands (*Bromus* (*diandrus, hordeaceus*)-*Brachypodium distachyon* Semi-Natural Herbaceous Stands)	-----	263	6.3
		Wild oats grasslands and agricultural fields (*Avena* (*barbata, fatua*) Semi-Natural Herbaceous Stands)	-----	24.4	0.6
		Rat-tail fescue grasslands (*Vulpia myuros* Semi-Natural Stands)	-----	161.7	3.9
			Subtotal	**836.1**	**19.9**
Non-native pereenial forblands	Non-native Grassland – 42200	Prickly lettuce patches (*Lactuca serriola* Semi-Natural Stands)	-----	0.2	0.0
		Hedgemustard and other mustard patches (*Sisymbrium* (*altissimum*)- *Hirshfeldia incana* Provisional Semi-Natural Stands)	-----	61.9	1.5
			Subtotal	**62.1**	**1.5**

Native annual forblands	Wildflower Field - 42300	California poppy fields (*Eschscholzia* (*californica*) Herbaceous Alliance)	G4 S4	595.4	14.2
		Miniature lupine fields (*Lupinus bicolor* Provisional Herbaceous Alliance)	GNR SNR	60.1	1.4
		Desert dandelion- white layia floodplains (*Malacothrix californica-Layia glandulosa* Provisional Herbaceous Alliance)	GNR SNR	33.9	0.8
		Scalebud- Chia-Scarlet lupine washes (*Anisocoma acaulis- Salvia columbariae- Lupinus concinnus* Provisional Herbaceous Alliance)	GNR SNR	10.1	0.2
		Fiddleneck fields (*Amsinckia* (*menziesii*, *tessellata*) Herbaceous Alliance)	G4 S4	4.4	0.1
			Subtotal	**703.9**	**16.8**
Vernal pool	Vernal Pool – 44000	Annual hair grass- Finebranched popcornflower vernal pools (*Deschampsia danthonoides- Plagiobothrys leptocladus* Provisional Herbaceous Alliance)	GNR SNR	**2.4**	**0.1**
Native scrub and shrublands	Mojave Mixed Woody Scrub - 34210	California buckwheat scrub (*Eriogonum fasciculatum* Shrubland Alliance)	G5 S5	31	0.7
	Rabbitbrush scrub - 35400	Rubber rabbitbrush scrub (*Ericameria* (*Chrysothamnus*) *nauseosa* Shrubland Alliance)	G5 S5	856.1	20.4
	Semi-desert Chaparral – 37400	Oak gooseberry thickets (*Ribes quercetorum* Provisional Shrubland Alliance)	G2 S2?	0.8	<0.1
	Upper Sonoran Subshrub Scrub - 39000	Narrowleaf goldenbush scrub (*Ericameria linearifolia* Provisional Shrubland Alliance)	G4 S3.2	2.7	0.1
	Southern Willow Scrub – 63220	Mixed willow riparian scrub (Mixed *Salix* spp. riparian scrub)	G3 S 2.1	3.1	0.1
	Mulefat Scrub - 63310	Mulefat thickets (*Baccharis salicifolia* Shrubland Alliance)	G5 S4	1.5	<0.1
	Mojave Desert Wash Scrub – 63700	Desert olive patches (*Forestiera pubescens* Shrubland Alliance)	G3 S2	0.9	<0.1
			Subtotal	**896.1**	**21.4**

Native perennial forblands	Coastal and Valley Freshwater Marsh - 52410	Baltic and Mexican rush marshes (*Juncus arcticus* (var. *balticus*, *mexicanus*) Herbaceous Alliance)	G5 S4	2.4	0.1
	Central Coast Riparian Scrub - 63200	Wild tarragon patches (*Artemisia dracunculus* Herbaceous Alliance)	G4 S4	3.9	0.1
			Subtotal	**6.3**	**0.2**
Agriculture	Irrigated/Dryland Grain and Seed Crops – 11203/11204	Agriculture	-----	**441.4**	**10.5**
Disturbed and Developed	Disturbed and Urban/Developed - 11300/12000	Disturbed and Developed	-----	149.1	3.6
		Non-Native Trees	-----	5.8	0.1
			Subtotal	**155**	**3.7**
Water	Fresh Water – 13140	Open Water	-----	**1.6**	**0.0**
			Total	**4191.7**	

3.3.2 HERBACEOUS COMMUNITY ANALYSIS

Forty four relevé plots were established throughout the WGEF site in April 2011 (Exhibit F-1). Based on alliances defined by Sawyer and others and results from cluster and subsequent discriminant analysis, sixteen different alliance-level vegetation types were differentiated including ten herbaceous alliances and six semi-natural stands (Fig. F-1). Of these sixteen vegetation types, three herbaceous alliances and one semi natural stand were not described by Sawyer et al (2009). None of these additional alliances are considered sensitive by any local, regional, or State resource protection agency or conservation organization. Two vegetation types (desert dandelion floodplains and scalebud washes) fall within features areas considered "Waters of the State" and are therefore under the jurisdiction of the CDFG. .

The most important species in each alliance (i.e. that with the greatest IV) differed, however, several species, including *Erodium cicutarium* and *Bromus tectorum*, were important within all alliances (Table F-II). Vegetative cover was greatest in red brome grasslands (mean cover = 98.0%) and lowest in scalebud-chia-scarlet lupine washes (mean cover = 48.3%) (Table F-III). Species richness was greatest in desert dandelion-white layia floodplains (mean = 23) and lowest in soft brome grasslands (mean = 10.7) (Table F-III).

Three alliances were not sampled in the field and were added to the list of observed alliances *post facto*. These include prickly lettuce patches (*Lactuca serriola* Provisional Semi-Natural Stands), wild tarragon patches (*Artemisia dracunculus* Herbaceous Alliance), and annual hairgrass-finebranched popcornflower vernal pools (*Deschampsia danthonoides – Plagiobothrys leptocladus* Provisional Herbaceous Alliance). The former two alliance types were not sampled due to the fact that their apparent distinguishing composition, environmental setting, and small distribution (less than 5 acres combined) were distinct enough where survey effort was deemed better utilized on other herbaceous alliances. Relevés were not used in the latter alliance due to the sensitivity of this vegetation type and presence of standing water during observed during the survey period. These provisional alliances are similar to other mapped alliances. Besides the vernal pool, these areas do not support any sensitive plant species, and none are considered sensitive by any local regional or State agency. A brief description of each alliance is given below.

3.3.2.1 Native Annual Grasslands

Holland: Valley and Foothill Grasslands (42000)
Sawyer et al.: *Lasthenia californica – Plantago erecta – Vulpia microstachys* Herbaceous Alliance

The most common type of grassland observed throughout the site is best described as *Lasthenia californica – Plantago erecta – Vulpia microstachys* Herbaceous Alliance (California goldfields-Dwarf plantain-Six-weeks fescue fields), covering 1,021.9 acres (24.4%) (Appendix A; Photo W). Sawyer et al. (2009) list membership criteria for this alliance of at least 30% cover of *Lasthenia californica*, *Plantago erecta*, *Vulpia microstachys*, or any combination of these three species. *P. erecta* is uncommon on site; both *V. microstachys* and *L. californica*, however, are abundant throughout. Two associations were mapped within the same alliance: however, it is possible that other associations occur on the site. While they are included together under the above association in the final vegetation map, they are discussed here merely as a means to express the relative diversity observed within this large alliance.

L. californica- V. microstachys - Corethrogyne filaginifolia Association
California goldfields-six-weeks fescue- California sandaster fields

This association, found mostly in flat bottomlands and west facing slopes, is co-dominated by California goldfields and small fescue at approximately equal cover values (25-50%). *Corethrogyne filaginifolia* and *Lagophylla ramossissima* are also characteristically present to codominant. Surface cover is dominated by plant litter (50-75%), however bare ground is characteristically present (25-50%). Native annual forbs (e.g., *Eschscholzia californica*, *Lupinus bicolor*, *Uropappus lindleyi*, *Pectocarya*

pennicilata, *Castilleja exserta*, *Stephanomeria exigua*) are found at low cover, typically less than 5%, in these patches of gravel and fine grained soils. Other grasses, including *Bromus madritensis* ssp. *rubens*, *Bromus tectorum*, and *Vulpia octoflora* are also present at low cover values. In southern sections of the site, *Corethrogyne filaginifolia* and *Lagophylla ramossissima* become less dominant and are seemingly replaced with annual buckwheat species (e.g. *Eriogonum* cf. *angulosum*, *Eriogonum* cf. *davidsonii*) and *Stephanomeria* spp.

Vulpia microstachys Association
Small fescue grasslands

This association occurs largely on flat plains and bottomlands. Total vegetative cover is greater than 90% with plant litter dominating the surface cover (>75%). Bare ground is mostly lacking (< 5%). Small fescue is characteristically dominant with cover values greater than 50%. Compared to the *L. californica- V. microstachys* Association, *L. californica* is significantly less abundant in this association with a mean cover values less than 5%. *Erodium cicutarium* is also abundant with cover values greater than 50%. Other native plant species are present at low (i.e. < 5%) cover including *Uropappus lindleyi*, *Lupinus bicolor*, *Corethrogyne filaginifolia*, *Eschscholzia californica*, and *Trichostemma lanceolata*. Other non-native species, typically occurring with < 5% cover, include *Bromus madritensis* ssp. *rubens*, *Bromus tectorum*, and *Lactuca serriola*.

3.3.2.2 Purple needlegrass grasslands

Holland: Valley needlegrass grassland (42110)
Sawyer et al.: *Nassella pulchra* Herbaceous Alliance

The *Nassella pulchra* Herbaceous Alliance (purple needlegrass grassland) is defined by Sawyer et al. as those vegetation types with >10% absolute cover of *Nassella pulchra*. At WGEF, this vegetation type is found along upper slopes and ridgetops in isolated patches in the northern and central portions of the site (Appendix A; Photo X). Purple needlegrass is largely dominant with mean cover values averaging 27 percent cover in all areas mapped. Surface cover, is dominated by fine grained sediments (mean = 60%), however, gravels and cobbles are characteristically present in these rocky substrates. Plant litter is characteristically low. Native diversity is high relative to other areas of the site. Common native species include *Eschscholzia californica*, *Lasthenia californica*, *Castilleja exserta*, *Chamaesaecae albomarginata*, *Linanthus* spp., *Gilia* spp., *Pectocarya* spp., *Lupinus bicolor*, *Poa secunda*, *Trifolium albomarginata*, *T. gracilente*, *Trichostemma lanceolata*, *Uropappus lindleyi*, *Vulpia microstachys*, and others. These mostly annual herbs occupy open spaces between the bunchgrasses. Non-native grasses and forbs are generally low.

3.3.2.3 Desert Needlegrass grasslands

Holland: Valley needlegrass grassland (42110)
Sawyer et al.: *Achnatherum speciosum* Herbaceous Alliance

Sawyer et al. (2009) describes the desert needlegrass herbaceous alliance as those areas with >50% relative cover of *Achnatherum speciosum*. At WGEF, these grasslands are generally small (<1 acre). Several small stands are found in stable sandy washes in the south of the site, however, this vegetation type is also found on dry north-facing slopes in the central and south (Appendix A; Photo Y). Within washes, these grasslands intergrade with scalebud-chia-scarlet lupine fields, desert dandelion- white layia fields, and central coast riparian scrub. As such, indicator species for all abovementioned alliances are present, although at lower cover values including *Layia glandulosa*, *Malacothrix californica*, *Anisocoma acaulis*, *Salvia columbariae*, *Lupinus concinnus*, *Artemisia dracunculus*, *Eriogonum elongatum*, *Chaenactis glabriuscula*, *C. xantiana*, and *Lasthenia californica*. Annual grass species are rare to absent. Surface cover is very sandy with small gravels and cobbles present at low cover. Shrubs are intermittent and include *Ericameria nauseosa* and *Eriogonum fasciculatum*. On dry ridgetops, this vegetation type is

similar to purple needlegrass grasslands except *Achnatherum speciosum* replaces *Nassella pulchra* as the dominant bunchgrass. *Elymus multisetus*, another native perennial bunchgrass, species is also common. These ridgetop patches are generally very small; many patches were observed but not mapped because they did not meet the minimum mapping unit of 1,000 sq.ft.

3.3.2.4 One-sided blue grass grasslands

Holland: Valley needlegrass grassland (42110)
Sawyer et al.: *Poa secunda* Herbaceous Alliance

One-sided bluegrass (*Poa secunda* ssp. *secunda*) is a native perennial bunchgrass species common in a variety of habitats including valley bottoms, slopes, and ridgetops. Sawyer et al. (2009) define one-sided bluegrass grasslands as those areas with >50% relative cover of this species (Hickson et al. 2007). At WGEF, one-sided bluegrass was found most often as a component species within purple needlegrass grasslands, rabbitbrush scrub, or buckwheat scrub. When present in these other vegetation types, one-sided bluegrass cover was low (range = 0-5%). One-sided bluegrass grasslands, where *Poa secunda* was the dominant bunchgrass species found and relative cover values were greater than 50 percent, were observed on 11.2 acres at WGEF (Appendix A; Photo Z). These stands were found, typically, on north facing mid to upper slopes. Surface cover was typified by low cover of litter (mean cover = 15%) and, similar to other native perennial grasslands, high cover values of fine grained sediment (mean cover = 50%). Many native herbs were found intermixed in these openings. Common native herbs include California poppy, California goldfields, blue dicks, miniature lupine, shining peppergrass (*Lepidium nitidum*), Indian clover (*Trifolium albopurpureum*), pinpoint clover (*Trifolium gracilentum*), and others. Other native perennial bunchgrass species, including purple needlegrass, and bottlebrush (*Elymus multisetus*) were also observed at low (<1%) cover. In several stands, particularly in the east, leafy fleabane (*Erigeron foliosus*) was codominant. Native subshrubs, particularly California sandaster, were found intermittently. Non-native grasses (e.g. *Bromus* spp.) and red-stem filaree were common at intermediate cover (mean cover of all non-natives = 15%).

3.3.2.5 Red brome or Mediterranean grass grasslands

Holland: Non-native grassland (42200)
Sawyer et al.: *Bromus rubens- Schismus* (*arabicus*, *barbatus*) Semi-Natural Stands

Red brome (*Bromus madritensis* ssp. *rubens* (*Bromus rubens* syn.)) is an invasive (Cal-IPC: High) annual grass native to Europe. This species is found, to varying degrees, naturalized in a variety of habitats and vegetation types. Sawyer et al. (2009) describe red brome grasslands as those vegetation types with >80% relative cover of *Bromus madritensis* ssp. *rubens* in the herbaceous layer. At WGEF, although red brome was found in almost every other vegetation type described, grasslands where red brome is the dominant are actually rare (total area = 1.1 acres). Instead, numerous patches, smaller than the project minimum mapping unit, of red bromes exist in a mosaic of other annual grasses. These stands are dominated by low species diversity. Native plants, including California poppy, doveweed, California goldfields, silverpuffs, and others, have low dominance values (mean cover = <%1 for all) when present.

3.3.2.6 Cheatgrass grasslands

Holland: Non-native grassland (42200)
Sawyer et al.: *Bromus tectorum* Semi-Natural Stands

Cheatgrass (*Bromus tectorum*) is a non-native annual grass ranked “High” in the California Invasive Plant Council Inventory. Cheatgrass greatly alters the extent, frequency, and timing of wildfires, thereby often reducing the viability of perennial plants (Young 2000). Sawyer et al. (2009) describe cheatgrass grasslands as herbaceous stands with *B. tectorum* dominant to codominant (>50% relative cover) in the herbaceous layer. At WGEF cheatgrass is abundant; these grasslands are common on lower slopes, flat bottomlands, and abandoned agricultural fields and other disturbed areas (Appendix A; Photo AA). Surface cover is dominated by plant litter (mean cover = 85%) with small patches of exposed soil.

Cheatgrass (cover = >75%) and red-stem filaree are abundant (cover = 25-50%). Native annuals are present at low values (<1%) and include California poppy, California goldfields, miniature lupine, vinegarweed, fiddleneck, wirelettuce (*Stephanomeria* spp.) and combseed. Other non-native species, including various other bromes, Mediterranean grass (*Schismus barbatus*), and mustards are also present at low values.

3.3.2.7 Soft brome grasslands

Holland: Non-native grassland (42200)
Sawyer et al.: *Bromus (diandrus, hordeaceus) – Brachypodium distachyon* Semi-Natural Stands

Soft brome (*Bromus hordeaceus*) is an invasive species (CalIPC: Moderate) native to Eurasia. Soft brome grasslands are defines as those areas with >50% relative cover of *Bromus hordeaceus* in the herbaceous layer (Sawyer et al. 2009). At the WGEF site, 263 acres of soft brome grasslands are found along slopes, particularly west facing slopes in the southern portion of the site intergrading with miniature lupine fields and native annual grasslands (Appendix A; Photo AB). Surface cover is predominantly litter (mean cover = 82%) with little (<5%) bare ground. Overall, diversity is low in these grasslands; soft brome is dominant in the herbaceous layer (mean cover class = 63%), red-stemmed filaree is codominant (mean cover = 50%), and miniature lupine is subdominant (mean cover = 30%) and variable. Emergent shrubs and subshrubs, including rubber rabbitbrush and California sandaster, are found at low cover.

3.3.2.8 Wild oats grasslands

Holland: Non-native grassland (42200)
Sawyer et al.: *Avena* (*barbata, fatua*) Semi-Natural Stands

Wild oats grasslands are defined as areas with >50% relative cover of Avena spp. and <10% relative cover of native herbs in the herbaceous layer (Sawyer et al. 2009). At the WGEF, these stands are dominated by slender oat (*Avena barbata*) (mean cover = 70%). These stands, totaling 24.4 acres, are found mostly on south facing slopes in the central and south portions of the site on sandy, exposed soils. Native plants are uncommon (mean cover <1% for all) and include combseed, wirelettuce (*Stephanomeria* spp.), small fescue and California goldfields. In two agricultural fields, *Avena* spp. was the dominant cereal crop being grown (Appendix A; Photo AC). These fields were included as agricultural fields and are not included here.

3.3.2.9 Rat-tail fescue grasslands

Holland: Non-native grassland (42200)
Sawyer et al.: NA

Rattail fescue (*Vulpia myuros*) is a common non-native, invasive (CalIPC: Moderate) annual grass throughout the WGEF site. Extensive stands of grasslands dominated by this species are found in fallow fields and valleys often intergrading with mustard fields (Appendix A; Photo AD). This grassland's coverage (161.7 acres) warranted identifying this vegetation type as verified by cluster and discriminant analysis results. These stands are dominated by non-native species including rattail fescue (mean cover = 46%), hedgemustard (mean cover = 26%), red-stemmed filaree (mean cover = 17%), Russian thistle (*Salsola tragus*) (mean cover = 3%), and foxtail barley (*Hordeum murinum*) (mean cover = 3%). Native plant cover is low for most species, including California goldfields, California poppy, miniature lupine, fiddlenecks, and valley popcornflower (*Plagiobothrys canescens*). Lindley's silverpuffs (*Uropappus lindleyi*) are found in dense patches throughout these grasslands.

TABLE F- II: SPECIES IMPORTANCE VALUES BY HERBACEOUS ALLIANCE
VERY IMPORTANT SPECIES (IV > 10) ARE SHOWN IN BOLD FOR EACH ALLIANCE; NON-NATIVE SPECIES ARE SHOWN IN ITALICS

Species	Desert needlegrass grassland	Fiddleneck fields	Scalebud- Chia-Scarlet lupine washes	Wild oats grasslands	Hedgemustard and other mustard patches	Soft brome grasslands	Red brome or Mediterranean grass grasslands	Cheatgrass grasslands	California poppy fields	Baltic and Mexican rush marshes	California goldfields-Six-weeks fescue flower fields	Miniature lupine fields	Desert dandelion-white layia floodplains	Purple needlegrass grassland	Curly blue grass grassland	Rat-tail fescue grasslands
Achnatherum speciosum	**57.6**															
Amsinckia tessellata		**53.1**						8.5	5.1	6.6		6.0				7.5
Anisocoma acaulis			**32.9**													
Avena barbata				***82.2***												
Bromus hordeaceus				*5.1*		***57.3***						*9.8*				
Bromus madritensis	*7.2*	*5.7*	*9.1*	*8.6*	*6.1*		***86.0***	*7.2*	***16.2***		*7.6*	*7.0*		***20.0***	*7.0*	*8.4*
Bromus tectorum	*7.2*	***12.0***	*6.8*	*9.4*	*5.2*	*9.8*	***10.4***	***74.3***	***10.5***	*6.6*	*8.5*	*6.0*		*8.5*	***10.5***	***10.8***
Castilleja exserta												6.0			7.0	
Chamaesyce albomarginata				5.1			8.1									
Chaenactis glabriuscula	5.5		6.8													
Chaenactis xantiana			9.1													
Dichelostemma capitatum															5.2	
Eremocarpus setigerus		5.7		7.7				4.8								
Eriogonum cf. *baileyi*					6.5											6.5
Eriogonum fasciculatum							5.2									
Erigeron foliosus															6.1	
Ericameria nauseosus	5.5		9.1	6.0		3.9							5.6			
Erodium cicutarium	*9.0*	***37.7***	***11.4***	***17.9***	***54.6***	***33.6***	***21.1***	***31.2***	***26.2***	***28.0***	***45.8***	*9.0*	***11.1***	*8.5*	***15.6***	***22.7***
Eschscholzia californica		7.2						7.8	**23.4**		6.6	8.0				
Heterotheca sessiliflora												6.0				
Holocarpha heermannii									11.7							
Hordeum murinum					*6.7*			*4.8*		*6.6*						*7.5*
Juncus balticus										**43.5**						
Lactuca serriola					*4.7*						*3.8*					*6.7*

Species	Desert needlegrass grassland	Fiddleneck fields	Scalebud- Chia-Scarlet lupine washes	Wild oats grasslands	Hedgemustard and other mustard patches	Soft brome grasslands	Red brome or Mediterranean grass grasslands	Cheatgrass grasslands	California poppy fields	Baltic and Mexican rush marshes	California goldfields-Six-weeks fescue flower fields	Miniature lupine fields	Desert dandelion-white layia floodplains	Purple needlegrass grassland	Curly blue grass grassland	Rat-tail fescue grasslands
Lagophylla ramosissima							8.1			**28.0**						
Lasthenia californica		5.7	6.8	5.1		9.8	8.1	7.2	**10.1**		**14.6**	6.0	**11.1**	8.5	7.9	
Layia glandulosa			6.8										**38.2**			
Lessingia filaginifolia	5.5									6.6	**10.4**			8.5		
Lupinus bicolor		6.4		6.0		**33.0**	8.1	7.8	**16.9**		8.1	**80.8**		**10.0**	7.9	6.7
Lupinus concinnus			**13.7**													
Malacothrix californica													**26.9**			
Nassella pulchra														**50.3**		
Pectocarya penicillata											3.8					
Plagiobothrys arizonicus	5.5															
Plagiobothrys canascens					6.7											
Poa secunda						6.5									**63.9**	
Salvia columbariae	**16.5**		**32.9**													
Salsola tragus					*4.7*											
Sisymbrium altissimum					***43.1***											***14.3***
Stephanomeria exigua	5.5	5.7						4.8				6.0				
Trifolium albopurpureum														7.0		
Trifolium gracillentum	5.5															
Uropappus lindleyi	5.5	5.7							**16.2**		7.6	6.0				
Vulpia microstachys		7.2	6.8	5.1	8.3		8.1	7.2	**11.6**	6.6	**44.4**	9.0	**11.1**	7.0	5.2	
Vulpia myuros		*5.7*			*7.8*	*7.1*				*6.6*						***53.2***

TABLE F- III: SUMMARY DATA FOR SIXTEEN HERBACEOUS ALLIANCES AT WGEF

		Desert needlegrass grassland	Fiddleneck fields	Scalebud- Chia-Scarlet lupine washes	Wild oats grasslands	Hedgemustard and other mustard patches	Soft brome grasslands	Red brome or Mediterranean grass grasslands	Cheatgrass grasslands	California poppy fields	Baltic and Mexican rush marshes	California goldfields- Six-weeks fescue flower fields	Miniature lupine fields	Desert dandelion- white layia floodplains	Purple needlegrass grassland	Curly blue grass grassland	Rat-tail fescue grasslands
Surface Cover	Water	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Stem Basal Area	5.0	3.3	3.0	5.0	13.3	14.0	16.5	10.7	11.0	10.0	14.3	16.0	2.0	15.0	18.3	10.0
	Litter	1.5	30.3	5.0	15.0	78.3	81.7	81.0	87.3	61.7	85.0	55.5	60.0	4.5	18.3	18.3	76.7
	Bedrock	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Boulder (>60cm diameter)	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	Stone (25-60cm diameter)	0.3	0.3	1.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.7	0.0
	Cobble (7-25cm diameter)	1.0	0.5	4.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	1.5	1.2	0.3	0.3
	Gravel (2mm-7.5cm diameter)	4.0	0.7	76.7	0.0	0.0	0.5	0.0	0.2	0.2	1.0	21.4	1.3	74.0	2.8	4.7	0.3
	Fines (<2mm diameter)	88.5	64.7	9.3	80.0	8.3	3.7	2.5	2.0	27.3	4.0	9.0	19.0	7.5	62.0	57.7	12.7
Absolute Cover	Total Vascular Cover	62.5	66.7	48.3	75.0	97.0	97.7	98.0	93.7	94.3	95.0	89.3	88.3	65.0	81.7	70.0	88.3
	Percent Cover (trees)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Percent Cover (saplings)	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Percent Cover (shrubs)	0.5	0.8	1.3	0.7	0.0	0.5	0.5	0.3	0.3	0.5	10.1	0.3	1.0	2.0	0.7	0.7
	Percent Cover (herbs)	62.5	66.7	48.3	75.0	97.0	97.3	98.0	93.7	93.3	95.0	85.5	88.3	65.0	81.0	70.0	95.0
Height (m)	Mean height (trees)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean height (saplings)	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean height (shrubs)	0.3	0.3	0.8	0.6	0.0	0.2	0.1	0.3	0.2	0.3	0.3	0.3	0.8	0.3	0.2	0.1
	Mean height (herbs)	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.8	0.3	0.3	0.3	0.3	0.3	0.3
Diversity	Relative Cover (Natives)	88.6	59.6	88.6	6.0	5.3	24.4	4.8	6.9	63.8	69.3	64.2	89.2	89.5	78.0	79.5	10.5
	Relative Cover (Non-natives)	11.4	40.4	11.4	94.0	94.7	75.6	95.2	93.1	36.2	30.7	35.8	10.8	10.5	22.0	20.5	89.5
	Species Richness	21.0	19.0	18.3	14.0	17.3	10.7	13.0	14.7	15.7	21.0	13.8	18.7	23.0	21.3	21.7	19.0
	Native Species Richness	17.5	12.7	15.0	8.0	8.7	6.7	8.5	9.7	11.0	11.0	10.3	13.7	19.0	17.3	17.7	9.3
	Non-Native Species richness	3.5	6.3	3.3	6.0	8.7	4.0	4.5	5.0	4.7	10.0	3.5	5.0	4.0	4.0	4.0	9.7

3.3.2.10 Prickly Lettuce patches

Holland: Non-native grassland (42200)
Sawyer et al.: NA

Prickly lettuce (*Lactuca serriola*) is found in various non-native dominated vegetation types. This non-native, invasive species also forms near monotypic stands at WGEF on lower slopes, valleys, and agricultural margins (Appendix A; Photo AE). While not described by Sawyer et al. (2009), these stands, as verified by cluster and correspondence analysis are included here. Prickly lettuce is dominant (cover > 30%) in these patches. Other non-native species, including rye (*Secale cereale*), mustards (*Sisymbrium altissimum*, *Hirshfeldia incana*), and foxtail barley are common to codominant. Native species are uncommon (<10% relative cover).

3.3.2.11 Hedgemustard and other mustard patches

Holland: Non-native grassland (42200)
Sawyer et al.: *Brassica* (*nigra*) and other mustards Semi-Natural Stands

Mustard patches are found throughout the WGEF site (61.9 acres) in fallow fields and disturbed areas (Appendix A; Photo AF). These stands are dominated by non-native, invasive mustards including hedgemustard (Sisymbrium altissimum; CalIPC: unranked), tansy mustard (*Descurainia sophia*, CalIPC: Limited) and/or shortpod mustard (*Hirschfeldia incana;* CalIPC: Moderate). These patches often intergrade with rattail fescue grasslands but are distinct in their dominance by various mustards; rattail fescue is present but not dominant in this vegetation type (mean cover = 3%). Other common non-native species include red-stemmed filaree (mean cover = 60%) and foxtail barley (mean cover = 3%). Native plant cover and diversity is low. Encountered native plants include small fescue, California goldfields, common hareleaf, California poppy, and miniature lupine. Isolated patches of fiddlenecks are found on piles of exposed soil.

3.3.2.12 California poppy fields

Holland: Wildflower Fields (42300)
Sawyer et al.: *Eschscholzia (californica)* Herbaceous Alliance

Sawyer et al. (2009) describes California poppy fields as those areas with significant (>30% relative cover) cover and even density of California poppies (*Eschscholzia californica*). The authors note, however, that little is understood regarding the relationships between this vegetation type and other herbaceous alliances. The authors continue to caution that other alliances with native annuals as dominants will likely be described (See "*Lupinus bicolor* Provisional Herbaceous Alliance") in future editions of the manual. At WGEF, poppy fields are found extensively throughout flat bottomlands and mesas. This vegetation type is found overlapping and transitioning with California goldfields-Dwarf plantain-Six-weeks fescue flower fields and various non-native annual grass dominated vegetation types (e.g. brome grasslands). As such, distinctions between these vegetation types can be difficult to discern in the field and, like other annual plants, germination and robustness of *Eschscholzia* varies between years with differing precipitation, temperature, and other factors. For these reasons, these delineations should be considered approximations based off of conditions observed in and leading up to April 2011 (Appendix A; Photo AG); actual acreages for these annual dominated vegetation types are expected to vary from year to year. Surface cover is approximately equal amounts of plant litter and fine grained sediments with occasional gravels or cobbles. In general, California poppy is dominant (cover = 25-50%) in these areas. Miniature lupines, small fescue, or California goldfields often codominate with cover values ranging from 1-5% in pure poppy fields to 25-50% in transitional areas. Other native annuals present, often in dense patches, include Lindley's silverpuffs (*Uropappus lindleyi*), Heermann's tarweed (*Holocarphus heermannii*), fiddlenecks (*Amsinckia tessellata*, *A. menziesii*), and branched lagophylla (*Lagophylla ramossissima*) (mean cover = 1-5% for all) while Douglas's milkvetch (*Astragalus douglasii*), purple owl's clover (*Castilleja exserta*), popcornflowers (*Plagiobothrys arizonicus*, *P.*

nothofulvus, *P. cansescens*), annual buckwheats (*Eriogonum spp.*), combseed (*Pectocarya penniclata*, *P. linearis*), dobiepod (*Tropidocarpum gracile*), and other native annuals are found at very low cover (mean = <1% for all). Non-native grasses, including bromes (*Bromus madritensis* ssp. *rubens*, *B. tectorum*, *B. hordeaceus*), wild rye (*Hordeum murinum*) and rattail fescue (*Vulpia myuros*) are common (range = <1 – 15-25%, mean cover = 5-15% for all). Rubber rabbitbrush (*Chrysothamnus nauseosus*) is intermittent.

3.3.2.13 Miniature lupine fields

Holland: Wildflower Field (42300)
Sawyer et al.: NA

While not described by Sawyer et al. (2009), expansive fields of miniature lupine (*Lupinus bicolor*) occur throughout the WGEF site (Appendix A; Photo AH). This provisional alliance was included due to its apparent distinction from other vegetation types and consistent occurrence on sloping hills and bottomlands as observed in the field and verified by cluster analysis results, This vegetation type is found often intergrading with California poppy fields and *Bromus hordeaceus* grasslands and is largely dominated (mean = 50-75%) by miniature lupine. Surface cover is predominantly litter (mean = 60%) with fine grained sediments averaging approximately 19% cover. Shrubs are lacking or, when present, very sparse and diminutive. While total vegetative cover is high (mean = 87%), species diversity is relatively low when compared to other vegetation types. Other native forbs are found at very low (typically, <1%) cover and include *Amsinckia tessellata*, *Castilleja exserta*, *Eschscholzia californica*, *Lasthenia californica*, *Stephanomeria exigua*, *Platystemon californicum*, and *Heterotheca sessiliflora*. *Bromus hordeaceus* and *Vulpia microstachys* are the only grass species with substantive cover averaging approximately 8% each while Erodium cicutarium is a common and abundant non-native forb.

3.3.2.14 Desert dandelion- white layia washes

Holland: Wildflower Field (42300)
Sawyer et al.: NA

This provisional alliance, not described by Sawyer et al. (2009), was surveyed independently due to its consistent occurrence on floodplains and terraces throughout the site and observable distinction from other vegetation types (Appendix A; Photo AI). Cluster and discriminant analyses verified this class independent from other vegetation types. The substrate is characteristically bare with greater than 75% of the surface covered by gravels (sediment size = 2mm-7.5cm). Both *Malacothrix californica* and *Layia glandulosa* are dominant or characteristically present (average cover = 5-15% for both) in the herbaceous layer. Perennial herbs (e.g. *Artemisia dracunculus*, *Heterotheca grandiflora*) and shrubs (e.g. *Eriogonum fasciculatum*, *Ericameria nauseosa*) are intermittent at low frequencies. A diverse number of native species are found within this alliance at cover values less than 5%, including *Stephanomeria exigua*, *Chaenactis xantiana*, *Chaenactis glabriuscula*, *Lotus strigosus*, *Castilleja exserta*, *Eriogonum* cf. *roseum*, *Trifolium gracilentum*, *Plagiobothrys arizonicus*, *Oenothera californica*, *Pectocarya pennicilata*, *Pectocarya linearis*, *Uropappus lindleyi*, and others. Non-native species, including *Erodium cicutarium*, *Bromus tectorum*, and *Bromus madritensis* ssp. *rubens* also occur at low cover.

3.3.2.15 Scalebud- Chia-Scarlet lupine washes

Holland: Wildflower Field (42300)
Sawyer et al.: NA

This provisional alliance, not described by Sawyer et al. (2009), was included due to its apparent uniqueness and consistent occurrence in washes throughout the site, particularly in the south and supported by cluster and discriminant analysis results (Appendix A; Photo AJ). The substrate is characteristically bare with almost 100% of the surface covered by gravels (sediment size = 2mm-7.5cm) or finer sediments. While similar to the *Malacothrix californica-Layia glandulosa* Provisional Herbaceous Alliance at first glance, scalebud (*Anisocoma acaulis*) replaces *M. californica*, a similar appearing pale yellow chicory-type of annual composite, in these washes. Additionally, while *Layia glandulosa* still occurs in isolated patches, the codominant and characteristic annuals within these washes

are chia (*Salvia columbariae*) and scarlet lupine (*Lupinus concinnus*) (mean cover = 1-5 % for each). Perennial herbs (e.g. *Artemisia dracunculus, Heterotheca grandiflora*) and shrubs (e.g. *Brickellia* spp., *Baccharis salicifolia, Eriogonum fasciculatum, and Ericameria nauseosa*) are intermittent at low frequencies and this alliance tends to grade into both the *Artemisia dracunculus* Herbaceous Alliance and the *Baccharis salicifolia* Shrubland Alliance. A diverse number of other native species are found within this alliance at cover values typically less than 1%, including *Stephanomeria exigua*, *Chaenactis xantiana*, *Chaenactis glabriuscula*, *Lotus strigosus*, *Eriogonum* cf. *roseum*, *Trifolium gracilentum*, *Plagiobothrys arizonicus*, *Oenothera californica*, *Pectocarya pennicilata*, *Pectocarya linearis*, *Uropappus lindleyi*, and others. Non-native species, including *Erodium cicutarium*, *Bromus tectorum*, and *Bromus madritensis* ssp. *rubens* also occur at very low cover.

3.3.2.16 Fiddleneck Fields

Holland: Wildflower Fields (42300)
Sawyer et al.: *Amsinckia* (*menziesii, tessellata*) Herbaceous Alliance

Sawyer et al. (2009) describe fiddleneck fields as those areas with greater than 30% cover of *Amsinckia menziesii*, *Amsinckia tessellata*, or any combination of these two species. These native annual species, while widespread and abundant throughout the site, form dense fields in areas with high levels of disturbance including road margins, fence rows, and other areas where soils have been disturbed and exposed (Appendix A; Photo AK). As such, substrates are typically bare with approximately 75% of the surface cover comprised of sands and finer grain sediments. While *A. menziesii* was commonly observed, fiddleneck fields are dominated by *A. tessellata* (cover > 50%) at the WGEF site. Red-stemmed filaree (*Erodium cicutarium*) is also abundant (cover > 50%) in these patches. Other species observed at low (< 1%) cover include *Vulpia microstachys*, *Lasthenia californica*, *Lupinus bicolor*, *Eschscholzia californica*, *Plagiobothrys canescens*, and others. Non-native annual grasses, including *Bromus madritensis* ssp. *rubens*, *B. tectorum*, and *V. myuros* are also common with a combined cover of approximately 10%. When present, shrubs are sparse and intermittent and include *Corethrogyne filaginifolia* and *Ericameria nauseosa*.

3.3.2.17 Annual hair grass- Finebranched popcornflower vernal pools

Holland: Vernal Pool (44000)
Sawyer et al.: NA

Three vernal pools were visited in April 2011. All three pools were visited when still holding water and several species of birds (e.g., killdeer (*Charadrius vociferous*), spotted sandpiper (*Actitis macularia*), ring-necked duck (*Aythya collaris*), mallard (*Anas platyrhynchos*), and others), amphibians (e.g., Baja California treefrog (*Pseudacris hypochondriaca hypochondriaca*)), and invertebrates (e.g. *Daphnia* spp.) were observed. Spreading navarretia (*Navarettia fossalis*), a federally threatened and CNPS List 1B.1 species, is known to occur in at least one pool. Due to the sensitivity of these areas and the fact that many plants were submerged or, due to their phenology, otherwise unidentifiable, protocol surveys were not conducted in these vernal pools. Instead, peripheries were walked and species composition was qualitatively surveyed. All three vernal pools were characterized by annual hair grass (*Deschamspia danthonoides*) and finebranched popcornflower (*Plagiobothrys leptocladus*; Appendix A; Photo AL). Pool A, the largest of the three pools, also contained adobe popcornflower (*Plagiobothrys acanthocarpus*). All three species are considered vernal pool indicator species in this region. Additional species found in these pools include speedwell (*Veronica* spp.), spikerush (*Eleocharis* cf. *obtusa*), and California goldfields. Non-native herbs, including red-stemmed filaree and pineapple weed (*Matricaria discoidea* (*Chamomilla suaveolens*, syn.)), were also observed, particular along disturbed margins.

3.3.2.18 Rush Marshes

Holland: Coastal and Valley Freshwater Marsh (52410)
Sawyer et al: *Juncus arcticus* (var. *balticus*, *mexicanus*) Herbaceous Alliance

Sawyer et al. (2009) list membership criteria of at least 50% relative cover of *Juncus arcticus* var. *balticus* (aka *J. balticus*), *Juncus arcticus* var. *mexicanus* (aka *J. mexicanus*), or a combination of the two for this alliance. At WGEF, this vegetation type was observed in subtle drainages and low lying flats (Appendix A; Photo AT). Surface cover was typically dominated by plant litter (mean cover = 70%) with patches of fine textured sediments (mean cover = 11%). Baltic rush (*J. balticus*) was dominant with cover at 50-75%. Other native plants were observed at low cover values including wild tarragon (*Artemisia dracunculus*), branched lagophylla (*Lagophylla ramossissima*), Lindley's silverpuffs (*Uropappus lindleyi*), and common sandaster were also present at low values and two other species of rushes, toad rush (*J. bufonius*) and irisleaf rush (*J. xiphioides*) were rarely found. While recognized as the *Juncus* (*oxymeris*, *xiphioides*) Provisional Herbaceous Alliance by Sawyer et al. 2009, only a few irisleaf rushes were found and the area was well below the minimum mapping unit determined for the project. For this reason, this area is included with other Baltic rush marshes here. Red-stemmed filaree and non-native grasses, particularly *Hordeum murinum*, *Vulpia myuros*, *Bromus tectorum*, *B. diandrus*, and *Piptatherum milliaceum*, were common at low (typically, 1-5%) cover.

3.3.2.19 Wild Tarragon Patches

Holland: Central Coast Riparian Scrub (63200)
Sawyer et al.: *Artemisia dracunculus* Herbaceous Alliance

Wild tarragon (*Artemisia dracunculus*) is a perennial herb found in washes, floodplains, and other periodically flooded areas with sandy alluvial soil (Appendix A; Photo AU). Sawyer et al. (2009) describe wild tarragon patches as those areas with >50% relative cover of this species in the herbaceous layer. At WGEF, wild tarragon patches are found over 3.9 acres. All patches are found on flat, alluvial soil with signs of intermittent flooding. Native shrubs, particularly rubber rabbitbrush, are also found at low (<10%) cover. The surface is lacking in plant litter (mean cover = 3%), yet fine grained sediments are abundant. Native annuals and perennial are also found at low (typically, <1%) cover including cushion cryptantha (*Cryptantha circumcissa*), sharpnut cryptantha (*C. oxygona*), and popcornflowers. Non-native plant cover is also low in these patches.

4.0 CONCLUSIONS

These results illuminate much regarding the overall plant community composition and distribution within the Wildflower Green Energy Farm site. All cover values and results are based solely on data gathered in 2011, an unusual climatic year and, while these results are accurate for this water-year, they must be used with caution and understanding that these communities will change between years and with differing climatic conditions. It is understood that the structure, composition, and distribution of vegetation types, particularly those dominated by annual species, will differ among years with differing temperature and water availability. However, these findings provide a general framework and provide several important conclusions:

- Evidence of historical and current use for orchard land, rangeland, agriculture, and recreational use is apparent. These land uses can greatly affect the composition, structure, and distribution of vegetation types via: altered fire regimes, introduction of viruses and other plant pathogens, soil depletion, seedbank manipulation, selective herbivory, trampling, nutrient deposition, propagule dispersal, and other factors.
- One third of the entire sampling area is dominated by native scrub and shrublands. While the majority of these areas consist of rubber rabbitbrush scrub, several other shrub dominated areas, although relatively small, are found. This includes four special status vegetation types: oak gooseberry thickets, desert olive patches, and southern willow scrub are found in washes and canyons while narrowleaf goldenbush scrub is found along ridges and saddles to the south.
- Four non-native species (*Erodium cicutarium*, *Bromus madritensis*, *B. tectorum*, and *Vulpia myuros*) are particularly widespread and prevalent. These species can be dominant in most areas they occur.
- Nineteen vegetation alliances were identified on the WGEF. These alliances were summarized into nine vegetation communities presented in the BCA. This community level analysis is sufficient for determination of impacts to vegetation resources for the BCA and subsequent CEQA analysis.
- Agricultural areas and non-native grasslands, including grasslands dominated by *Bromus madritensis*, *B. hordeaceus*, *B. tectorum*, *Avena barbata*, and *Vulpia* myuros cover 1,277.5 acres and 30.5 percent of the site and show the lowest species diversity. Native perennial grasslands (e.g. *Nassella pulchra*, *Poa secunda*, and *Achnatherum speciosum* Herbaceous Alliances) cover 65.7 acres of the site.
- Wildflower fields covering approximately 703.9 acres at WGEF are a regionally important resource. The ecological value of these areas relate to the diverse mix of native and non-native herbaceous and grass species and the yearly expression of flowering annuals. Wildflower blooms vary from year-to-year based on rainfall and other ecological factors. These communities are regionally abundant on the southern Tehachapi Mountain slopes and other lowlands of the Antelope Valley.

5.0 WORKS CITED

Baker, H.G. 1989. Sources of naturalized grasses and herbs in California. In LF Huenneke and HA Mooney, eds. Grassland structure and function: California annual grassland. Tasks for vegetation science. Vol. 20. Kluwer Academic Publishers: Dordrecht, The Netherlands.

Bartolome, J.W., S.E. Klukkert, and W.J. Barry. 1986. Opal phytoliths as evidence for displacement of native California grassland. Madroño. **33**: 217-222.

Bartolome, J.W., J.S. Fehmi, R.D. Jackson, and B. Allen-Diaz. 2004. Response of a native perennial grass stand to disturbance in California's Coast Range Grassland. Rest. Ecol. **12**: 279-289.

California Department of fish and game (CDFG). 2009. Vegetation Publications and Protocols. Available online at: http://www.dfg.ca.gov/biogeodata/vegcamp/veg_publications_protocols.asp

California Native Plant Society (CNPS). 2009. CNPS/CDFG Combined Vegetation Rapid Assessment and Releve Protocol. Available online at: http://www.cnps.org/cnps/vegetation/pdf/protocol-combined.pdf

Corbin, J.D., and C.M. D'Antonio. 2004. Competition between native perennial and exotic annual grasses: implications for an historical invasion. Ecology **85**: 1273-1283.

Dyer, A.R., H.C. Fossum, and J.W. Menke. 1996. Emergence and survival of *Nassella pulchra* in a California grassland. Madroño. **43**: 316-333.

Glenn-Lewin, D.C., L.A. Johnson, T.W. Jurik, A. Akey, M. Loeschke, and T. Rosburg. 1990. Fire in central North American grasslands; vegetative reproduction, seed germination, and seedling establishment. In SL Collins and LL Wallace, eds. Fire in North American tallgrass prairies. University of Oklahoma Press: Norman, OK.

Heady, H.F., J.W. Bartolome, M.D. Pitt, M.G. Stroud, and G.D. Savelle. 1991. California prairie. In RT Coupland, ed. Natural grasslands. Ecosystems of the World, Vol. 8A. Elsevier: Amsterdam, The Netherlands.

Hervey, D.F. 1949. Reaction of a California annual-plant community to fire. J. Range Mgmt. **2**: 116-121.

Hobbs, R., and H.A. Mooney. 1995. Spatial and temporal variability in California annual grassland: results from a long-term study. Journal of Vegetation Science **6**: 43-56.

Holland, R. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished copies available from Calif. Dept. Fish and Games, Sacramento.

Holmes, T.H. and K.J. Rice. 1996. Patterns of growth and soil-water utilization in some exotic annuals and native perennial bunchgrasses of California. Annals of Botany **78**: 233-243.

Hamilton, J.G., C. Holzapfel, and B.E. Mahall. 1999. Coexistence and interference between a native perennial grass and non-native annual grasses in California. Oecologia **121**:518-526.

Hayes, G.F., and K.D. Holl. 2003. Cattle grazing impacts on annual forbs and vegetation composition of mesic grasslands in California. Con. Bio. **17**: 1694-1702.

Mackey, R.L., and D.J. Currie. 2000. A re-examination of the expected effects of disturbance on diversity. Oikos **88**: 483-493.

McCune, B. and M. J. Mefford. 2011. PC-ORD. Multivariate Analysis of Ecological Data. Version 6. MjM Software, Gleneden Beach, Oregon, U.S.A.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. A Manual of California Vegetation; 2nd Edition. Sacramento, CA: California Native Plant Society Press.

Seabloom, E.W., W.S. Harpole, O.J. Reichman, and D. Tilman. 2003*a*. Invasion, competitive dominance, and resource use by exotic and native California grassland species. PNAS **100**: 13384-13389.

Seabloom, E.W., E.T. Borer, V.L. Boucher, R.S. Burton, K.L. Cottingham, L. Goldwasser, W.K. Gram, B.E. Kendall, and F. Micheli. 2003*b*. Competition, seed limitation, disturbance, and reestablishment of California native forbs. Ecol. App. **13**: 575-592.

Seabloom, E.W., O.N. Bjørnstad, B.M. Bolker, and O.J. Reichman. 2005. Spatial structure of environmental heterogeneity, dispersal, and competition in successional grasslands. Ecol. Mono. **75**: 199-214.

Stromberg, M.R. and J.R. Griffin. 1996. Long-term patterns in coastal California grasslands in relation to cultivation, gophers, and grazing. Ecological Applications **6** 1189-1211.

Stylinski, C.D. and E.B. Allen. 1999. Lack of native species recovery following severe exotic disturbance in southern California shrublands. J. App. Ecol. **36**: 544-554.

Wildi, O. 2010. Data Analysis in Vegetation EcologyWest Sussex, United Kingdom: . John Wiley and Sons.

Young, J. 2000. *Bromus tectorum* L. pages 76-80 in CC Bossard, JM Randall, and MC Hoshovsky (eds.) *Invasive Plants of California's Wildlands*. Berkeley, CA: University of California Press.