HELIX Environmental Planning

Sycamore Canyon/Goodan Ranch County Preserve

Vegetation Management Plan

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TABLE OF CONTENTS

Section **Page**

1.0 INTRODUCTION 1

1.1 Purpose and Need 2
1.2 Site Location and Description 3
1.3 Vegetation Management Goals and Objectives 4

2.0 ENVIRONMENTAL RESOURCES 6

2.1 Soils 6
2.1.1 Arlington Series 7
2.1.2 Escondido Series 7
2.1.3 Friant Series 7
2.1.4 Huerhuero Series 7
2.1.5 Metamorphic Rock Land Series 8
2.1.6 Olivenhain Series 8
2.1.7 Redding Series 8
2.1.8 Stony Land Series 9
2.1.9 Visalia Series 9
2.2 Biological Resources 9
2.2.1 Vegetation Communities 9
2.2.2 Sensitive Plant Species 12
2.2.3 Sensitive Animal Species 13
2.3 Cultural Resources 15

3.0 INVASIVE NON-NATIVE PLANT SPECIES MANAGEMENT 21

3.1 Target Invasive Non-native Plant Species for Removal 25
3.1.1 High-Priority Species for Removal 26
3.2 Removal Methods 31
3.2.1 Manual Removal 32
3.2.2 Mechanical Removal 32
3.2.3 Herbicides 32
3.2.4 Cut and Daub 33

4.0 HABITAT RESTORATION 34

4.1 Proposed Habitat Restoration Areas 34
4.1.1 Trails 35
4.2 Habitat Restoration Methods 35
4.2.1 Passive Habitat Restoration 35
4.2.2 Active Habitat Restoration 35
4.2.3 Restoration Areas Descriptions and Recommendations. 36

5.0 FIRE MANAGEMENT 42

5.1 Current Fire Management Practices 42

TABLE OF CONTENTS (cont.)

Section **Page**

5.2 Fire Environment 43
5.2.1 Climate 44
5.2.2 Topography 46
5.2.3 Watershed Description 46
5.2.4 Fire History 47
5.2.5 Vegetation Dynamics and Fuel Loads 48
5.3 Fuel Management Methods 54
5.3.1 Grazing 55
5.3.2 Mowing 55
5.3.3 Herbicides 55
5.3.4 Prescribed Fire 55
5.3.5 Hand Tool or Mechanical Equipment Thinning 56
5.3.6 Fuel Breaks 56
5.4 Fire Response Plan 56
5.4.1 Fire Hazard and Current Fire Management Practices Evaluation 58
5.4.2 Primary Actions and Contacts for Wildfire Emergency 59
5.4.3 Roads/Access 60
5.4.4 Fuel Breaks 63
5.4.5 Emergency Staging Areas 63
5.4.6 Fire Hydrants 63
5.4.7 Other Water Sources 64

6.0 MANAGEMENT DIRECTIVES 64

6.1 Invasive Non-native Plant Species Removal 64
6.2 Restoration 65
6.3 Fire Management 67

7.0 REFERENCES 71

TABLE OF CONTENTS (cont.)

LIST OF APPENDICES

A Special-status Plant Species Detected or with Potential to Occur
B Special-status Animal Species Detected or with Potential to Occur
C Invasive Non-native Plant Species with Moderate or Low Priority for Removal
D Fire Behavior Modeling

LIST OF FIGURES

No.	Title	Follows Page
1	Regional Location	2
2	USGS Topography	2
3a	Vegetation Communities and Land Cover Types – San Diego Vegetation Classification Manual Index	12
3b-e	Vegetation Communities and Land Cover Types – San Diego Vegetation Classification Manual	12
4a	Vegetation Communities and Land Cover Types – Holland Oberbauer Index	12
4b-e	Vegetation Communities and Land Cover Types – Holland Oberbauer	12
5	Special-status Plant Locations	12
6a	Special-status Wildlife Locations Index	26
6b-e	Special-status Wildlife Locations	26
7	Cultural Resources	(Confidential, bound separately)
8a	Target Invasive Non-native Plant Species Locations and Potential Habitat Restoration Sites Index	26
8b-e	Target Invasive Non-native Plant Species Locations and Potential Habitat Restoration Sites	26
9a-b	Revegetation Areas	34
10	Fire History	48
11	Vegetation Management Units	48
12	Gates, Access Roads, and Easements	60

TABLE OF CONTENTS (cont.)

LIST OF TABLES

No.	Title	Page
1	Vegetation Communities/Land Cover Types	10
2	Special-Status Plant Species	13
3	Special-Status Animal Species	14
4	Eligibility Status of Resources within the Preserve	16
5	Invasive Non-Native Plant Species	22
6	Target Invasive Non-Native Plant Species for Removal and Management	25
7	Black Sage - Laurel Sumac Plant Palette	37
8	Chamise Chaparral - Woolly-Leaved Ceanothus Plant Palette	38
9	Scrub Oak - Mountain-Mahogany/Riparian Plant Palette	39
10	Scrub Oak - Mountain-Mahogany Plant Palette	40
11	Temperature and Precipitation Data for Poway Valley Weather Station	45
12	Worst Case Weather and Burning Conditions, Interior Zone	46
13	Preserve Fire Interval Data	47
14	Vegetation Communities and Associated Fuel Model Assignments	49
15	Fuel Model Assignments	69

ACRONYMS AND ABBREVIATIONS

AMSL	above mean sea level
APN	Assessor's Parcel Number
BMPs	Best Management Practices
BRCA	Biological Resource Core Area
CAL FIRE	California Department of Forestry and Fire Protection
Cal-IPC	California Invasive Plant Council
County	County of San Diego
CEQA	California Environmental Quality Act
DPR	Department of Parks and Recreations
F	Fahrenheit
FRAP	Fire and Range Assessment Program
ft	foot/feet
HELIX	HELIX Environmental Planning, Inc.
Lakeside FPD	Lakeside Fire Protection District
m	meter(s)
MCAS	Marine Corps Air Station
MD	Management Directive
MPH	Miles Per Hour
MSCP	Multiple Species Conservation Program
NRCS	Natural Resource Conservation Service
Preserve	Sycamore Canyon/Goodan Ranch County Preserve
RA	Restoration Area
RMP	Resources Management Plan
SanGIS	San Diego Geographic Information Source
SDG&E	San Diego Gas & Electric
SRA	State Responsibility Area
SR	State Route
Subarea Plan	MSCP Subarea Plan
USGS	U.S. Geological Survey

ACRONYMS AND ABBREVIATIONS (cont.)

VCM	Vegetation Classification Manual
VMP	Vegetation Management Plan
VMU	Vegetation Management Unit
WRCC	Western Regional Climate Center
WUI	Wildland Urban Interface

1.0 INTRODUCTION

The Sycamore Canyon/Goodan Ranch County Preserve (Preserve) is an approximately 2,847-acre[1] open space preserve located in the unincorporated community of Lakeside in San Diego County, to the northeast of the Marine Corps Air Station (MCAS) Miramar, southeast of the City of Poway, east and west of State Route (SR-) 67, and approximately two miles north of the City of Santee. The Preserve is owned by the County of San Diego's (County) Department of Parks and Recreation (DPR) and is the result of a series of acquisitions. Several additions to the Preserve have been acquired by DPR over the last 20 years. These include the acquisition of the Sycamore South and Sycamore North (formerly known as Hagey) properties in 2010-2011; acquisition of the Southern Parcel in 2013; acquisition of the 2015 Northern and Southern Additions (formerly known as the 2015 Northern Addition and 2015 Southern Addition, respectively) in 2015; acquisition of the San Vicente Connector parcels, which are east of SR-67, between 2003 and 2018; and acquisition of the Southern Gap parcels in 2019 and 2020. The Preserve is managed in accordance with the Resource Management Plan (RMP) for Sycamore Canyon/ Goodan Ranch County Preserve, which includes Management Directives (MDs), pursuant to the requirements of the South County Multiple Species Conservation Program (MSCP) Subarea Plan.

This Vegetation Management Plan (VMP) will address the entirety of the Preserve, which includes the Sycamore North Addition, Sycamore South Addition, 2015 Northern Addition, 2015 Southern Addition, Southern Parcel Addition, San Vicente Connector parcels, and Southern Gap parcels, referenced herein as "the Preserve". This document updates the following VMPs to incorporate all additions that are currently part of the Preserve: Sycamore Canyon and Goodan Ranch Preserves (Dudek 2013), 2015 Northern Addition and 2015 Southern Addition (AECOM 2017, as updated by HELIX Environmental Planning, Inc. [HELIX] 2019), and Sycamore Canyon/Goodan Ranch Preserve Additional Properties (ICF 2023).

The Preserve primarily supports high-quality native vegetation communities as invasive non-native plant species are generally found at low frequencies. Human activities have marginally impacted the Preserve, including two staging areas, the Sycamore/Goodan Ranch Visitors Center (Visitors Center), and a trail system. However, several areas of invasive non-native plant species are found within Sycamore Canyon Creek and in the lower valley near the Visitors Center within Sycamore Canyon; pockets of invasive non-native plant species occur mainly along roads, trails, and grassy areas within the 2015 Northern Addition and 2015 Southern Addition; as a component of the non-native grassland in the Southern Parcel Addition; and as isolated individuals or small patches of individuals, particularly along roads and trails in the San Vicente Connector parcels. As such, management for invasive non-native plant species should focus on control of existing populations of invasive non-native plant species in Sycamore Canyon Creek and surrounding habitats to minimize the potential for further invasion. The entirety of the Preserve burned in the 2003 Cedar Fire, and the majority of the Preserve has recovered.

[1] The County reports both Assessor's and GIS (Geographic Information System) acreages for conserved lands. Assessor's acreage is the formal unit of measurement the County utilizes internally for real estate acquisitions, accounting, and reporting. However, GIS acreage is calculated using data provided by the San Diego Geographic Information Source (SanGIS). Assessor's and GIS acreage totals can differ as records of the legal acreage of parcels are plotted on paper and then converted into GIS. For consistency, SanGIS data is used in this document when calculating acreage for the Preserve, such as land use, habitat, or vegetation areas, within the Preserve. Based on SanGIS parcel data, the total Preserve acreage is 2,994. However, the official Preserve acreage is 2,847.

1.1 PURPOSE AND NEED

The purpose of this VMP is to describe current conditions within the Preserve and provide recommendations for vegetation management, including (1) invasive non-native plant species management, (2) habitat restoration, and (3) fire management. This VMP is not intended to be a stand-alone document, as the information and recommendations presented will be used to augment the existing RMP. This information is needed to ensure the Preserve's vegetation is managed to provide habitat for wildlife shelter and breeding, foraging opportunities, and movement corridors. In addition, the VMP provides fire response personnel with critical site information for emergency fire response within and immediately adjacent to the Preserve boundaries and identifies targeted fuel management actions that can be implemented as preventative measures.

The information and recommendations presented in this VMP will be used by the County of San Diego DPR to develop Management Directives as part of the RMP being developed for the Properties. The VMP includes the following components:

- Section 1*, Introduction*, describes the VMP's purpose and organization, site location, and vegetation management goals and objectives.

- Section 2, *Environmental Resources*, discusses both biological and cultural resources.

    - Section 2.1, *Soils*, presents the soil types found on the Preserve.

    - Section 2.2, *Biological Resources*, presents the vegetation communities found at the Preserve, while listing the most prominent plant species and the plant species with special status in California. Observed special-status animal species are presented along with designated U.S. Fish and Wildlife Service (USFWS) Critical Habitat and the proposed habitat categories for the MSCP Subarea Plan (Subarea Plan).

    - Section 2.3, *Cultural Resources*, presents the results of a Phase I cultural resources survey.

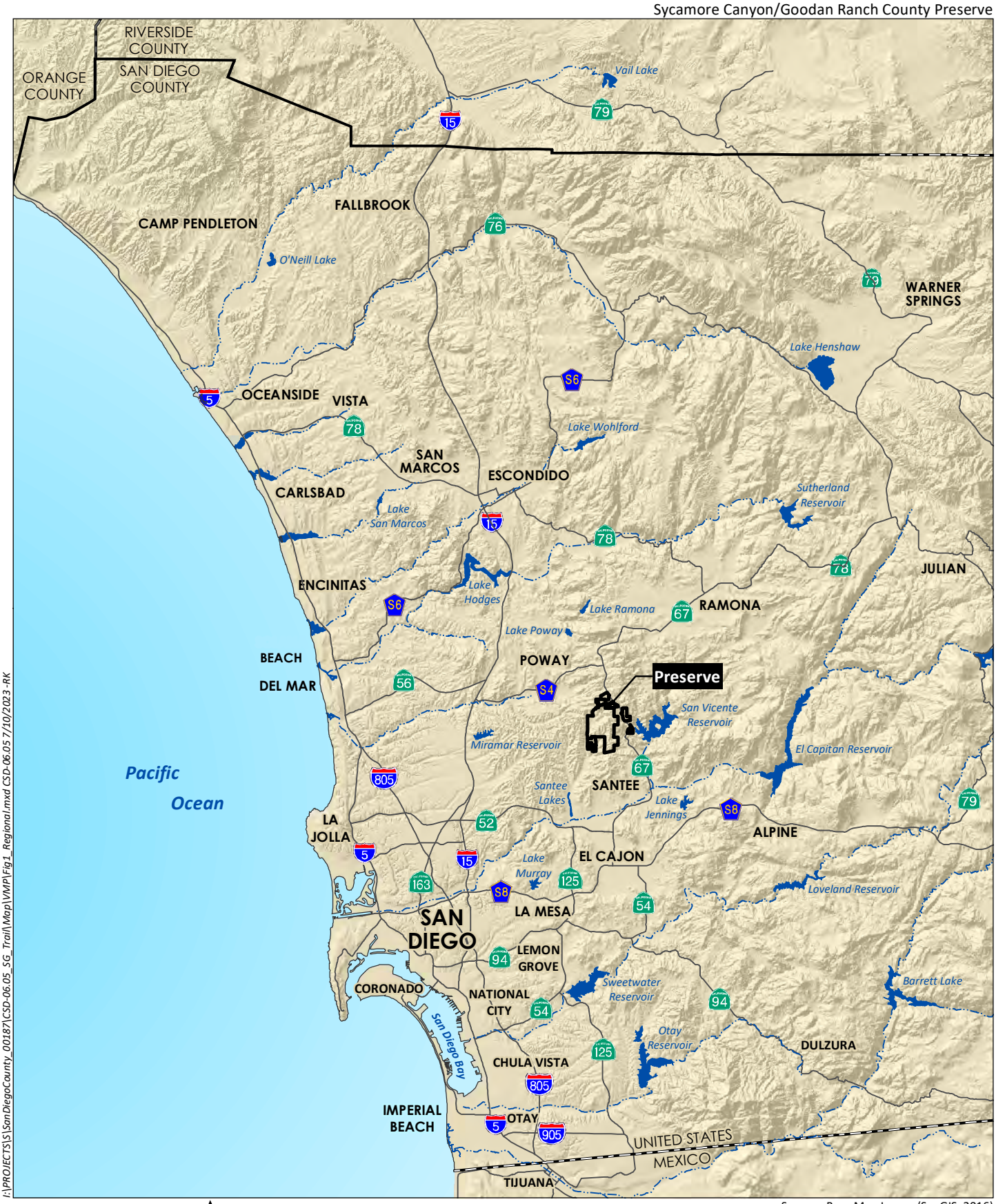
- Section 3, *Invasive Non-Native Plant Species Management*, lists the target invasive non-native plant species observed at the Preserve, identifies and prioritizes target species for removal, and outlines standard removal methods.

- Section 4, *Habitat Restoration*, identifies potential restoration opportunities within the Preserve and outlines standard restoration methods.

- Section 5, *Fire Management*, outlines a framework to address wildfire risk and discusses strategic fuels management that may be needed at the Preserve. The framework includes a discussion of fire prevention, suppression, and post-suppression fire control activities within the Properties.

- Section 6, *Management Directive*s, identifies directives for managing invasive non-native plant species removal, habitat restoration, and fire management.

- Section 7, *References*, includes source documents used throughout the report.



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Source: Base Map Layers (SanGIS, 2016)

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Regional Location

Figure 1

Preserve Boundaries

- Original Sycamore Canyon and Goodan Ranch Preserves
- Sycamore North Addition
- Sycamore South Addition
- 2015 Northern Addition
- 2015 Southern Addition
- Southern Parcel Addition
- San Vicente Connector Parcels
- Southern Gap Parcels

The existing reach of road between the two parcels comprising the 2015 Southern Addition (32404007 and 32404008) is not part of the Preserve.

Source: San Vicente Reservoir 7.5' Quad (USGS)

0 2,000 Feet

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USGS Topography

Figure 2

The goals and objectives, as well as the recommendations in this VMP, are consistent with the MSCP Subarea Plan (County 1997) and the County Vegetation Management Report (County 2009), which addresses vegetation management criteria for wildland and urban areas of unincorporated San Diego County. It is anticipated that this VMP will be revised once every ten years, as needed, in conjunction with anticipated Preserve RMP updates. The VMP may be revised on a shorter timescale if there is a change in circumstance, for example, the acquisition of additional Preserve land or a wildfire event on-site.

1.2 SITE LOCATION AND DESCRIPTION

The Preserve is located in the unincorporated community of Lakeside in San Diego County, to the northeast of the MCAS Miramar, southeast of the City of Poway, east and west of SR-67, and approximately two miles north of the City of Santee (Figure 1, *Regional Location*). It is located in the U.S. Geological Survey (USGS) 7.5-minute San Vicente Reservoir quadrangle within Township 14 South, Range 1 West, Sections 14, 15, 16, 21, 22, 23, 25, 26, 27, 28, 33, 34, and 35 and Township 15 South, Range 1 West, Sections 2, 3 and 4 (Figure 2, *USGS Topography*).

The Assessor's Parcel Numbers (APNs) for the Preserve are: 323-111-04; 324-040-41; 324-040-42; 324-040-46; 324-040-50; 324-041-01; 324-041-02; 324-050-28; 325-020-01; 325-020-03; 325-060-01; 325-060-02; 325-060-03; 325-060-08; 325-060-09; 325-060-14; 325-060-15; 325-060-16; 325-060-25; 326-021-02; 326-050-18; 326- 070-01; 325-060-04; 325-060-05; 325-060-06; 325-060-07; 325-060-10; 325-060-11; 325-060-12; 325-060-17; 325-060-18; 325-060-19; 325-060-20; 325-060-21; 325- 060-22, 325-060-23; 325-060-24; 324-040-25; 324-040-26; 32424-040-27; 324-040-28; 324-040-31; 324-040-32, 324-011-15, 324-070-29, 324-040-07, 324-040-08; 374-030-01, 324-050-05, 324-051-04 324-051-05, 326-020-23, 326-030-06, and 326-020-07.

The Preserve is in the coastal foothills of the Peninsular Ranges of Southern California. The Preserve is located approximately 16 miles inland from the Pacific coast and is not located in the Coastal Zone. The Preserve is dominated by Sycamore Canyon, which runs north-south and is surrounded by steep slopes, ridges, drainages, and generally hilly terrain. Elevations range between approximately 190 to 512 meters (m) /640-1,680 feet (ft) above mean sea level (AMSL). Sycamore North Addition, located at the northern reach of the Preserve, is separated from the rest of the Preserve by Calle de Rob. The Sycamore South Addition is composed of three non-contiguous areas in the southern region of the Preserve. The 2015 Northern Addition is located in the northern portion of the Preserve west of SR-67, and the 2015 Southern Addition is located in the northern-central portion of the Preserve. The Southern Parcel Addition is located southeast of the southernmost Sycamore South Addition. The San Vicente Connector parcels are located east of SR-67 north of the San Vicente Reservoir. The Southern Gap parcels are located in the southwestern portion of the Preserve, filling in the gaps between the Sycamore South Addition.

The Preserve is currently located in the management district of one full-time supervising park ranger, two full-time park rangers, two full-time park maintenance workers, and two part-time seasonal park attendants. Live-on volunteer Park Hosts assist staff with operations and maintenance in the Preserve. Staffing can change over time, but the Preserve will consistently have one full-time supervising park ranger, park ranger, and park maintenance worker (County 2009). The Preserve consists primarily of chamise chaparral, southern mixed chaparral, Diegan coastal sage scrub, and non-native grassland habitats. It is classified as a Very High Fire Hazard Severity Zone by the California Department of Forestry

and Fire Protection ([CAL FIRE] 2009). The entirety of the Preserve is designated a state responsibility area (SRA) and lies within the service area of CAL FIRE.

The Preserve is located within the Central Poway/San Vicente Reservoir/North Poway designated MSCP Biological Resource Core Area (BRCA). The Central Poway/San Vicente Reservoir/North Poway BRCA is connected to two BRCAs to the south: Mission Trails/Kearny Mesa/East Elliot/Santee BRCA and Lake Jennings/Wildcat Canyon-El Cajon Mountain BRCA; and one BRCA to the north: Hodges Reservoir/San Pasqual Valley BRCA. Biological linkages are also found along SR-67 to the north and south and Poway Road to the west. In addition, the Preserve is an important connection to other large open space preserves, including MCAS Miramar, Mission Trails Regional Park, and Iron Mountain.

The Preserve is located on unincorporated lands within the Metro-Lakeside-Jamul segment of the South County MSCP Subarea Plan (County 1997). Within the Subarea Plan, the Preserve occurs within areas identified as a Pre-Approved Mitigation Area. The Sycamore Canyon Preserve, Sycamore South Addition, Sycamore North Addition, 2015 Northern Addition, 2015 Southern Addition, Southern Parcel Addition, San Vicente Connector parcels, and Southern Gap parcels are fully owned and operated by DPR, while the Goodan Ranch property is owned jointly by DPR, California Department of Fish and Wildlife, City of Poway, and City of Santee. Through a Joint Exercise of Powers Agreement executed in 1995 (County 1995) and updated in November 2020, DPR is identified as responsible for the management of the property in cooperation with all parties).

1.3 VEGETATION MANAGEMENT GOALS AND OBJECTIVES

This VMP aims to develop management strategies consistent with the County of San Diego Vegetation Management Report (County 2009), which addresses vegetation management criteria for wildland and urban areas of unincorporated San Diego County. To that end, the vegetation management goals for the Preserve are focused on environmental resource preservation and enhancement of existing native habitat. Specifically, the goals of this VMP are as follows:

- Goal 1: Ensure the long-term viability and sustainability of natural ecosystem function and processes.

- Goal 2: Manage invasive non-native plant species to ensure the preservation of native vegetation communities and resources.

- Goal 3: Restore and/or enhance the quality of degraded vegetation communities in a manner consistent with overall species and habitat preservation goals.

- Goal 4: Develop fuel-load management methods consistent with overall management goals for the Preserve.

The following objectives have been formulated to provide management guidelines :

1. Maximize quality of native vegetation communities and habitat for target species through management of invasive non-native plant species:

    - Identify invasive non-native plant species and their locations.

- Investigate and report on control techniques.
- Develop management objectives and priorities.
- Remove or control invasive non-native plant species to the maximum extent feasible.

2. Provide a framework for the restoration of disturbed areas within the Preserve:
    - Identify current and long-term restoration needs for specific vegetation and target species on the Preserve.
    - Identify closed trails, roads, and other areas of potential restoration.
    - Avoid or minimize adverse impacts from restoration activities to sensitive and high-value habitats.
    - Develop management objectives for the restoration areas.
    - Create a process to monitor restoration success and follow up to ensure target restoration goals are achieved.
3. Provide a fire management strategy for the Preserve that will include planning for wildland fires:
    - Provide a description of the fire environment relating to vegetation and land use on the Preserve and in the surrounding areas.
    - Investigate and report on current fire management practices.
    - Prepare maps depicting relevant fire management data, including boundaries of the Preserve, topography, vegetation, fuel types, and access.
    - Establish mapped vegetation management units (VMUs) for the Preserve to facilitate fire management utilizing vegetation, topography, or other clearly discernible landscape features to delineate the unit boundaries.
    - Identify wildland urban interface (WUI) areas and associated fuel management goals, with a dual role of preventing wildfire from impacting urban areas, as well as protecting the Preserve from fire originating in urban areas.
    - Develop management objectives through a fire response plan.
    - Provide a discussion of fire management methods such as mowing, herbicide application, and prescribed fire to reduce available fuel and invasive non-native plants in a manner consistent with the goals for habitat preservation, enhancement and restoration, and cultural resource protection.
    - Prepare fire restoration management guidelines for each VMU, including a discussion of prevention, suppression, and post-suppression activities.

- Provide maps of sensitive biological and cultural resources on the Preserve to be avoided to the maximum extent possible, to local fire agencies, including the CAL FIRE San Diego Unit, Lakeside Fire Protection District, and Poway Fire Station 1.

- Provide information about fire behavior on the Preserve to local fire agencies, for inclusion in local fire agency wildland pre-response plans.

- Provide appropriate contact information to responding fire personnel in the event fire management activities may affect priority resources.

- Minimize the likelihood of catastrophic wildfires through the Preserve by limiting ignition potential, reducing fuel loads in key areas, limiting illegal access, and increasing public awareness.

2.0 ENVIRONMENTAL RESOURCES

Baseline biological surveys of the original Preserve were first conducted in 2008 (ICF Jones and Stokes 2008a). Baseline biological surveys of Sycamore North and Sycamore South parcels were conducted in 2012 (Dudek 2013). Baseline surveys of the 2015 Northern and Southern Additions (formerly called the Wu and Cielo properties, respectively) were completed in 2016 (AECOM 2018). Baseline surveys of the Southern Parcel were completed in 2019 (HELIX 2020), as were baseline surveys of the San Vicente Connector parcels (ICF 2021). No baseline surveys have been completed for the Southern Gap parcels but will occur at a future date. Baseline surveys included vegetation communities mapping, rare plant surveys, invasive non-native plant species mapping, butterfly surveys and habitat assessment for Quino checkerspot (*Euphydryas editha quino*) and Hermes Copper (*Lycaena hermes*) butterflies, herpetological pitfall trap surveys, diurnal and nocturnal avian point count surveys, passive bat surveys, small mammal trapping, and large and medium mammal surveys using remote camera stations. Brief descriptions of the existing vegetation communities, sensitive plant and wildlife species, and cultural resources documented in the Preserve during the baseline surveys are provided below.

2.1 SOILS

The Preserve contains 14 soil types belonging to nine soil series. These include Arlington coarse sandy loam (2 to 9 percent slopes); Escondido very fine sandy loam (5 to 9 percent slopes, 9 to 15 percent slopes, eroded; and 15 to 30 percent slopes, eroded); Friant rocky fine sandy loam (9 to 30 percent slopes; and 30 to 70 percent slopes); Huerhuero loam (2 to 9 percent slopes; and 9 to 15 percent slopes, eroded); Metamorphic rock land, Olivenhain cobbly loam (9 to 30 percent slopes; and 30 to 50 percent slopes), Redding cobbly loam, dissected (15 to 50 percent slopes); Stony land; and Visalia gravelly sandy loam (2 to 5 percent slopes; Natural Resource Conservation Service [NRCS] 2023). A brief description of each soil series is provided below. These 14 soils mapped for the Preserve are all derived from metamorphosed sedimentary rock, which is known to support sensitive species of plants, including several that might be expected on the Preserve. A brief description of each soil series and associated soil types are provided below.

2.1.1 Arlington Series

Arlington coarse sandy loam is the representative Arlington series mapped within a small portion of the northwestern corner of the Preserve and supports southern mixed chaparral. Arlington soils are characterized as moderately well-drained moderately deep coarse sandy loams and are usually found on alluvial fans with slopes ranging from two percent to nine percent. It is found at elevations ranging from 122 to 335 meters (400 to 1,100 feet). The surface layer is brown in color and coarse sandy loam in texture. The subsoil is yellowish-brown, brown, and light yellowish-brown in color and slightly acidic. The substratum extends to a depth of 122 centimeters [48 inches] and is weakly cemented, slightly acidic coarse sandy loam. The Arlington series occurs from the coastal and intermediate valleys of Southern California (NRCS 2012).

2.1.2 Escondido Series

Escondido very fine sandy loams are representative of the Escondido series found in uplands at elevations ranging from 122 to 853 meters (400 to 2,800 feet) on five percent to nine percent slopes, nine percent to 15 percent slopes, and 15 percent to 30 percent slopes. This soil series is characterized by moderately deep to deep, well-drained fine sandy loams. The surface layer is dark brown, very fine sandy loam that is usually 15 centimeters (six inches) thick and slightly acidic. The subsoil is brown, very fine sandy loam that is usually 58 centimeters (23 inches) thick and neutral. The layer below this consists of metasedimentary rock. These soils are found in the northern and northwestern portions of the Preserve and support southern mixed chaparral and non-native grassland and sensitive plant species San Diego thorn-mint (*Acanthomintha ilicifolia*), Palmer's grappling hook (*Harpagonella palmeri*), California adder's tongue (*Ophioglossum californicum*), and small-flowered morning glory (*Convolvulus simulans*). The Escondido series occur mainly in San Diego and Western Riverside counties (NRCS 2012).

2.1.3 Friant Series

Friant rocky fine sandy loam is the representative of the Friant series mapped within the entirety of the Sycamore North Addition and 2015 Southern Addition, portions of the 2015 Northern Addition, portions of the San Vicente Connector parcels, and in the northwestern portion of the Preserve. Friant soils are shallow and well-drained; they are characterized by medium to very rapid runoff and moderately rapid permeability. Friant soils are found in mountainous uplands with slopes varying from seven percent to 90 percent. Typical vegetation found on this soil series is buckwheat, chaparral, and naturalized grasses and forbs. The layer below this consists of metasedimentary rock. Boulders and rock outcrops are present. The Friant series occurs from the foothills of the east side of the San Joaquin Valley and the southwestern area of Southern California (NRCS 2012).

2.1.4 Huerhuero Series

Huerhuero loam is the representative Huerhuero series located in the western portions of the Preserve. This soil series consists of moderately well-drained loams that have a clay subsoil. These soils developed in sandy marine sediment and are typically found on slopes ranging from two percent to 30 percent with elevations ranging from three to 122 meters (10 to 400 feet). In a representative profile, the surface layer is brown and pale-brown, strongly acidic, and medium acid loam about 30.48 centimeters (12 inches) thick. The upper part of the subsoil is brown, moderately alkaline clay, and extends to a depth of about 104.14 centimeters (41 inches). Below this, and extending to a depth of more than 152.4 centimeters (60 inches), is a brown, mildly alkaline clay loam and sandy loam. The specific soil type

found in the Preserve is Huerhuero loam (two percent to nine percent slopes and nine percent to 15 percent slopes). Within the Preserve, this soil type supports southern mixed chaparral, non-native grasslands, and southern coast live oak riparian woodland. Sensitive plant species found on this soil type include graceful tarplant. The Huerhuero series occurs in San Diego County, Ventura, and Los Padres National Forest Area (NRCS 2012).

2.1.5 Metamorphic Rock Land Series

This soil type occurs in excessively drained hilly to mountainous areas within the northeastern portion of the Preserve. Fifty percent to 90 percent is exposed rock outcrops, angular stones, and cobblestones. There are 25 centimeters (10 inches) or less of soil material that consists of very fine sandy loam to silt loam (NRCS 2012). It occupies the eastern-central portion of the Preserve, and supports southern mixed chaparral and the sensitive plant species Palmer's sagebrush (*Artemisia palmeri*).

2.1.6 Olivenhain Series

Olivenhain cobbly loam is the representative of the Olivenhain series, found in two small areas in the northwestern portions of the Preserve, as well as the southern San Vicente Connector parcels. This soil series is characterized by well-drained, moderately deep to deep cobbly loams and is usually found on slopes ranging from two percent to 50 percent. It is found on dissected marine terraces at elevations ranging from 30 to 183 meters (100 to 600 feet). The surface layer is usually 25 centimeters (10 inches) thick and moderately acidic. The topsoil is brown and reddish-brown and cobbly loam in texture. The subsoil is reddish-brown, red, and pink in color, strongly acidic, very cobbly clay and clay loam, and is about 81 centimeters (32 inches) thick. The substratum is pinkish-white in color and strongly acidic. Runoff is medium to rapid, and the erosion hazard is moderate to high. The soil type supports southern mixed chaparral and sensitive plant species San Diego thorn-mint. The Olivenhain series are found in the coastal plains of Southern California (NRCS 2012).

2.1.7 Redding Series

Redding cobbly loam, dissected, is the representative in the Redding series, which is found entirely within the Sycamore South Addition, Southern Parcel Addition, and also occupies the majority of the southern and central portions of the Preserve. This series is composed of moderately deep to duripan, well or moderately well-drained soils formed in alluvium. This series is found on dissected or level and undulating hilly high terraces at elevations ranging from 61 to 152 meters (200 to 500 feet), which characterize the Sycamore South Addition. These soils are well or moderately well-drained, have slow permeability, and runoff varies from low to high, although there is typically ponding in intermound areas. This soil series is characterized by well-drained, undulating to steep gravelly loams, and is usually found on slopes ranging from two percent to 20 percent. The surface layer is usually 38 centimeters (15 inches) thick and medium to strongly acidic gravelly loam. The subsoil is yellowish-red and red in color, very strongly acidic, gravelly heavy clay loam and gravelly clay, and is about 76 centimeters (30 inches) thick. Below this is an iron-silica cemented hardpan. Annual grasses and forbs are typical native vegetation found on soils in the Redding series (NRCS 2012). Within the Preserve, this soil type primarily supports southern mixed chaparral. Sensitive plants found on this soil type include willowy monardella (*Monardella viminea*), San Diego thorn-mint, small-flowered morning glory, Palmer's grappling hook, California adder's tongue, and variegated dudleya (*Dudleya variegata*). Redding series soils are found on high terraces along the northern and eastern edge of the Central Valley in California (NRCS 2012).

2.1.8 Stony Land Series

Stony land series soils occur at the base of cliffs or below steep rocky slopes. The material consists of many stones, and in many places, there are large boulders 0.9 to 1.8 meters (three to six feet) in diameter on the surface. This soil type is found within two areas within the southwestern portion of the Preserve, as well as in the Southern Parcel Addition, and is associated with openings in southern mixed chaparral and southern coast live oak riparian woodland.

2.1.9 Visalia Series

Visalia gravelly sandy loam, in the Visalia series, is found near the Visitors Center within the developed lands and within the southern coast live oak riparian woodland vegetation located in the southwestern portion of the Preserve. This soil series is characterized by moderately well-drained, very deep sandy loams and is usually found on slopes ranging from zero to 15 percent. It is found on alluvial fans and floodplains at elevations ranging from 122 to 610 meters (400 to 2,000 feet). The surface layer is usually 30.5 centimeters (12 inches) thick and slightly acidic. The topsoil is dark grayish-brown in color and sandy loam in texture. The subsoil is dark grayish-brown, slightly acidic, sandy loam, and loam, and is more than 152.4 centimeters (60 inches) thick. Runoff is very slow to medium, and the erosion hazard is slight to moderate. The gravelly sandy loam consists of approximately 15 percent gravel. Visalia series soils occur in San Diego County, western Riverside County, eastern Fresno, Sierra National Forest, and Madera (NRCS 2012).

2.2 BIOLOGICAL RESOURCES

2.2.1 Vegetation Communities

Vegetation community classification was based on two separate systems: the Vegetation Classification Manual (VCM) for Western San Diego County (SANDAG 2011) and the Holland classification system (Holland 1986; as modified by Oberbauer et al. 2008). The predominant vegetation community within the Preserve is chamise chaparral–woolly leaved ceanothus association. A total of 34 plant alliances or associations and an additional four unvegetated or disturbed/developed land cover types have been mapped within the Preserve. These vegetation community types are described below and organized as they are in the classification key by functional group (e.g., riparian forests and woodlands, upland forests and woodlands, evergreen shrublands, drought-deciduous shrublands, and upland herbaceous vegetation). The VCM for Western San Diego County does not include unvegetated habitat (e.g., disturbed land and urban/developed); therefore, these land cover types are described using the Oberbauer-modified Holland classification system (Oberbauer et al. 2008, Holland 1986).

Until the VCM was finalized in 2011, Subarea Plan preserve lands were generally mapped using the Holland classification system. To ensure consistency with previous mapping efforts, the Preserve map data layer was cross-walked to the Holland/Oberbauer system pursuant to the VCM (AECOM et al. 2011).

Acreages of the vegetation communities on the Preserve are listed in Table 1, *Vegetation Communities/Land Cover Types*. While botanists conducted vegetation mapping for a 100-foot buffer around the Preserve, that acreage is not included in Table 1. Vegetation communities according to the VCM and the Holland/Oberbauer classification system are included in Figures 3a-e, *Vegetation*

Communities and Land Cover Types- San Diego Vegetation Classification Manual and Figures 4a-e, *Vegetation Communities and Land Cover Types-Holland/Oberbauer Classification*.

Table 1
VEGETATION COMMUNITIES/LAND COVER TYPES

VCM CODE[1]	VCM Alliance/Association	VCM Common Name	Holland Code	Holland Classification	Acres On-Site
Evergreen Shrublands					
4.1	*Adenostoma fasciculatum* Alliance	Chamise Chaparral Alliance	37200	Chamise Chaparral	528.14
4.1.2	*Adenostoma fasciculatum-(Eriogonum fasciculatum, Artemisia californica, Salvia mellifera)* Association	Chamise-California Buckwheat-California Sagebrush-Black Sage Association	37200	Chamise Chaparral	27.81
4.1.4	*Adenostoma fasciculatum – Ceanothus tomentosus* Association	Chamise Chaparral-Woolly-leaved Ceanothus Association	37200	Chamise Chaparral	696.12
4.1.5	*Adenostoma fasciculatum – Acmispon glaber* Association	Chamise Chaparral-Deerweed Association	37200	Chamise Chaparral	21.83
4.18.1	*Ceanothus tomentosus* Association	Woolly-leaved Ceanothus Association	37120	Southern Mixed Chaparral	147.75
4.2	*Adenostoma fasciculatum –Cercocarpus betuloides Alliance*	Chamise Chaparral-Mission Manzanita Alliance	37120	Southern Mixed Chaparral	8.95
4.2.3	*Adenostoma fasciculatum – Cercocarpus betuloides – Ceanothus tomentosus* Association	Chamise Chaparral-Mission Manzanita-Woolly-leaved Ceanothus Association	37120	Southern Mixed Chaparral	74.97
4.2.6	*Adenostoma fasciculatum – Xylococcus bicolor – Quercus (berberidifolia,* x*acutidens*) Association	Chamise Chaparral-Mission Manzanita-Scrub Oak Association	37120	Southern Maritime Chaparral	3.50
4.20.1	*Cercocarpus minutiflorus* Provisional Association	Mountain-Mahogany Provisional Association	37120	Southern Mixed Chaparral	0.34
4.37	*Quercus (berberidifolia,* x*acutidens)* Alliance	Scrub Oak Chaparral Alliance	37900	Scrub Oak Chaparral	93.01
4.37.2	*Quercus* (*berberidifolia, xacutidens*) *–Cercocarpus minutiflorus* Association	Scrub Oak -Mountain-Mahogany Association	37900	Scrub Oak Chaparral	22.49
4.38.1	*Quercus (berberidifolia,* x*acutidens) – Adenostoma fasciculatum* Association	Scrub Oak - Chamise Chaparral Association	37900	Scrub Oak Chaparral	1.07
				Evergreen Shrublands Total	*1,625.98*

Table 1 (cont.)
VEGETATION COMMUNITIES/LAND COVER TYPES

VCM CODE[1]	VCM Alliance/Association	VCM Common Name	Holland Code	Holland Classification	Acres On-Site
		Drought Deciduous Shrublands			
4.7.1	*Artemisia californica – Eriogonum fasciculatum – Malosma laurina* Association	California Sagebrush - California Buckwheat - Laurel Sumac Association	32500	Diegan Coastal Sage Scrub	319.61[2]
4.8	*Artemisia californica – Salvia mellifera* Alliance	California Sagebrush - Black Sage Scrub Alliance	32500	Diegan Coastal Sage Scrub	14.30
4.23.1	*Eriogonum fasciculatum* Association	California Buckwheat Scrub Association	32500	Diegan Coastal Sage Scrub	12.10
4.29.1	*Isocoma menziesii* Provisional Association	Menzies' Goldenbush Scrub Provisional Association	32000	Coastal Scrub	8.52
4.32.1	*Acmispon glaber* Association	Deerweed Association	42200	Non-Native Grassland	1.13
4.35	*Malosma laurina* Alliance	Laurel Sumac Alliance	32000	Coastal Scrub	0.78
4.35.1	*Malosma laurina – Acmispon glaber* Association	Laurel Sumac – Deerweed Association	32000	Coastal Scrub	320.76
4.43.1	*Salvia apiana* Provisional Association	White Sage Provisional Association	32500	Diegan Coastal Sage Scrub	4.28
4.44	*Salvia mellifera* Alliance	Black Sage Scrub Alliance	32500	Diegan Coastal Sage Scrub	155.72
4.44.1	*Salvia mellifera – Eriogonum fasciculatum* Association	Black Sage - California Buckwheat Scrub Association	32500	Diegan Coastal Sage Scrub	37.73
4.44.2	*Salvia mellifera – Malosma laurina* Association	Black Sage - Laurel Sumac Association	32500	Diegan Coastal Sage Scrub	160.20
				Drought Deciduous Shrublands Total	*1,035.13*
		Herbaceous Vegetation			
5.13.1	*Deinandra fasciculata* Association	Tarweed Association	42300	Wildflower Fields	0.36
5.21	Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands	Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands	42200	Non-Native Grassland	19.44
5.5	*Avena (barbata, fatua)* Semi-Natural Stands	Wild Oats Grasslands Semi-Natural Stands	42200	Non-Native Grassland	4.44
5.8	*Bromus* (*diandrus, hordeaceus*)-*Brachypodium distachyon* Semi-Natural Stands	Annual Brome Grasslands Semi-Natural Stands	42200	Non-Native Grassland	163.93
				Herbaceous Total	*189.53*

Table 1 (cont.)
VEGETATION COMMUNITIES/LAND COVER TYPES

VCM CODE[1]	VCM Alliance/Association	VCM Common Name	Holland Code	Holland Classification	Acres On-Site
Forests and Woodlands					
3.2	*Eucalyptus (globulus, camaldulensis)* Semi-Natural Stands	Eucalyptus Woodland Semi-Natural Stands	79100	Eucalyptus Woodland	0.05
3.4.1	*Platanus racemosa – Baccharis salicifolia* Association	California Sycamore – Mule Fat Association	62500	Southern Riparian Woodland	2.66
3.4.3	*Platanus racemosa-Quercus agrifolia* Association	California Sycamore-Coast Live Oak Association	61300	Southern Riparian Forest	3.02
3.6	*Quercus agrifolia* Alliance	Coast Live Oak Woodland Alliance	71160	Coast Live Oak Woodland	25.05
3.6.4	*Quercus agrifolia/Toxicodendron diversilobum/*Grass Association	Coast Live Oak/Poison Oak/Grass Association	71161	Open Coast Live Oak Woodland	8.11
3.10.1	*Salix lasiolepis* Association	Arroyo Willow Thickets Association	63320	Southern Willow Scrub	0.86
				Forests and Woodlands Total	*39.75*
Unvegetated, Disturbed, or Developed					
N/A	N/A	N/A	64200	Non-vegetated Channel	0.71
N/A	N/A	N/A	11300	Disturbed Habitat	40.13
N/A	N/A	N/A	12000	Urban/Developed	1.46
				Unvegetated, Disturbed, and Developed Total	*42.30*
General Agriculture					
N/A	N/A	N/A	18100	Orchards and Vineyards	1.20
				General Agriculture Total	*1.20*
				Total	**2,934.04[3]**

[1] Vegetation Community descriptions based on the VCM (SANDAG 2011).
[2] Includes 2.47 acres of restoration in the 2015 Northern Addition associated with road cuts for Scripps Poway Parkway.
[3] Numbers may not sum due to rounding. Acreages presented herein are based on San Diego Geographic Information Source (SanGIS) parcel data for the Preserve boundaries minus the Southern Gap parcels acreage. No data is included for the Southern Gap parcels, as baseline surveys have not been conducted.

2.2.2 Sensitive Plant Species

The Preserve was surveyed extensively for special-status plant species that may be expected, particularly considering that the soil is derived from metasedimentary rock, a substrate that has been shown to support multiple special-status plant species. Sixteen special-status plant species have been documented within the Preserve. Table 2, *Special-status Plant Species*, presents the sensitive plant species identified in the Preserve. A table of the special-status plant species with the potential to occur on the Preserve, with the exception of Sycamore Canyon, is included in Appendix A, *Special-status Plant Species Observed or with Potential to Occur*. Special-status plant species locations are presented in Figure 5, *Special-status Plant Locations*.

b Map Series Index

Preserve Boundaries

- Original Sycamore Canyon and Goodan Ranch Preserves
- Sycamore North Addition
- Sycamore South Addition
- 2015 Northern Addition
- 2015 Southern Addition
- Southern Parcel Addition
- San Vicente Connector Parcels
- Southern Gap Parcels

Note: Habitat mapping is typically completed within a 100-foot buffer extending outward from the Preserve boundary; however, this mapping has not been completed for some of the Preserve parcels. SanGIS parcel boundary data not aligning with mapping boundaries also resulted in variations in width of buffers around some parcels (e.g., Figure 3e).

b

c

d

e

Scripps Poway Parkway

Sycamore Canyon Rd

67

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Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013, AECOM 2018, HELIX 2019)

HELIX Environmental Planning

Vegetation Communities and Landcover Types – San Diego Vegetation Classification Manual Map Index

Figure 3a

Map Series Boundary

Preserve Boundaries

- Original Sycamore Canyon and Goodan Ranch Preserves
- Sycamore North Addition
- 2015 Northern Addition
- 2015 Southern Addition

Vegetation (VCM)

Drought-Deciduous Shrublands

- (4.44) BSS - Black Sage Scrub Alliance
- (4.44.2) BS-LS - Black Sage - Laurel Sumac Association
- (4.7.1) CSB-CBW-LS - California Sagebrush - California Buckwheat - Laurel Sumac Association
- (4.7.1) CSB-CBW-LS-R - California Sagebrush - California Buckwheat - Laurel Sumac Association Restoration
- (4.32.1) DW - Deerweed Association
- (4.35.1) LS-DW - Laurel Sumac - Deerweed Association

Evergreen Shrublands

- (4.18.1) WLC - Woolly-leaved Ceanothus Association
- (4.1) CC - Chamise Chaparral Alliance
- (4.1.2) C-CB-CSB - Chamise – California Buckwheat – California Sagebrush – Black Sage Association
- (4.1.4) CC-WLC - Chamise Chaparral - Woolly-leaved Ceanothus Association
- (4.1.5) CC-DW - Chamise Chaparral - Deerweed Association
- (4.2) CC-MM - Chamise Chaparral - Mission Manzanita Alliance
- (4.2.3) CC-MM-WLC - Chamise Chaparral - Mission Manzanita - Woolly-leaved Ceanothus Association
- (4.37) SOC - Scrub Oak Chaparral Alliance
- (4.37.2) SO-MTNM - Scrub Oak - Mountain-mahogany Association

Herbaceous Vegetation

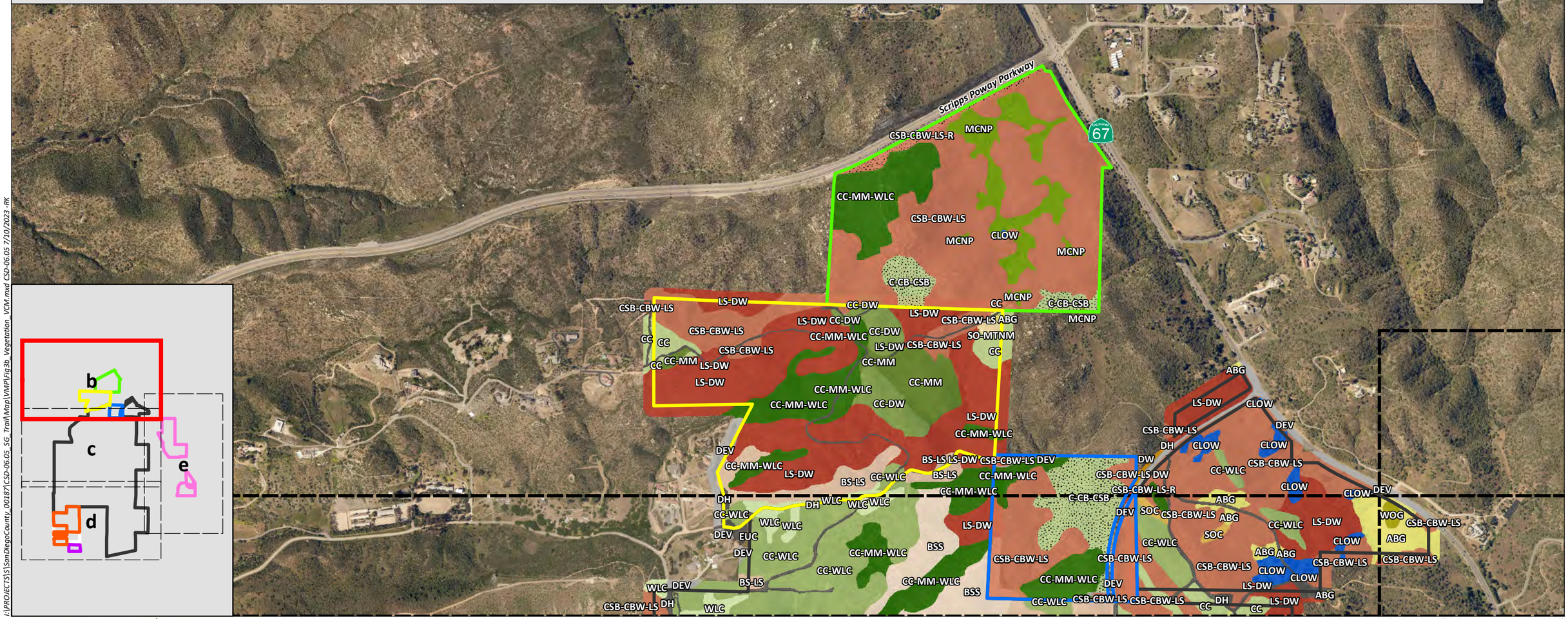
- (5.8) ABG - Annual Brome Grasslands Semi-Natural Stands
- (5.2.1) MCNP - Mediterranean California Naturalized Annual and Perennial Grassland Semi-natural Stands
- (5.5) WOG - Wild Oats Grasslands Semi-Natural Stands

Forests and Woodlands

- (3.6) CLOW - Coast Live Oak Woodland Alliance
- (3.2) EUC - Eucalyptus Woodland Semi-Natural Stands

Unvegetated, Disturbed, or Developed Areas (Holland/Oberbauer Classification)

- DH - Disturbed Habitat
- DEV - Urban/Developed



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Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013 and AECOM 2018)

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HELIX Environmental Planning

Vegetation Communities and Land Cover Types – San Diego Vegetation Classification Manual

Figure 3b

Map Series Boundary

Preserve Boundaries

- Original Sycamore Canyon and Goodan Ranch Preserves
- Sycamore North Addition
- 2015 Southern Addition
- San Vicente Connector Parcels

Vegetation (VCM)

Drought-Deciduous Shrublands

- (4.44) BSS - Black Sage Scrub Alliance
- (4.44.2) BS-LS - Black Sage - Laurel Sumac Association
- (4.44.1) BS-CBW - Black Sage - California Buckwheat Scrub Association
- (4.8) CSB-BSS - California Sagebrush - Black Sage Scrub Alliance
- (4.7.1) CSB-CBW-LS - California Sagebrush - California Buckwheat - Laurel Sumac Association
- (4.32.1) DW - Deerweed Association
- (4.35.1) LS-DW - Laurel Sumac - Deerweed Association
- (4.29.1) MGB - Menzies' Goldenbush Scrub Provisional Association
- (4.43.1) WS - White Sage Provisional Association

Evergreen Shrublands

- (4.18.1) WLC - Woolly-leaved Ceanothus Association
- (4.1) CC - Chamise Chaparral Alliance
- (4.1.4) CC-WLC - Chamise Chaparral - Woolly-leaved Ceanothus Association
- (4.2.6) CC-MM-Oak - Chamise Chaparral - Mission Manzanita - Oak Association
- (4.2.3) CC-MM-WLC - Chamise Chaparral - Mission Manzanita - Woolly-leaved Ceanothus Association
- (4.20.1) MTNM - Mountain-mahogany Provisional Association
- (4.37) SOC - Scrub Oak Chaparral Alliance
- (4.38.1) SO-CC - Scrub Oak - Chamise Chaparral Association
- (4.37.2) SO-MTNM - Scrub Oak - Mountain-mahogany Association

Herbaceous Vegetation

- (5.8) ABG - Annual Brome Grasslands Semi-Natural Stands
- (5.2.1) MCNP - Mediterranean California Naturalized Annual and Perennial Grassland Semi-natural Stands
- (5.5) WOG - Wild Oats Grasslands Semi-Natural Stands

Forests and Woodlands

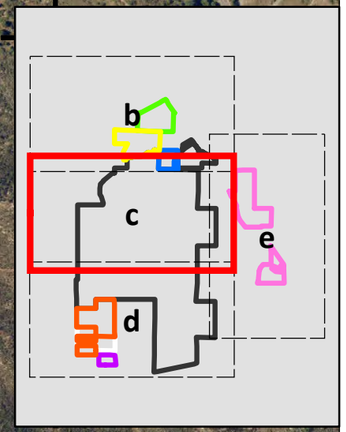
- (3.10.1) ARW - Arroyo Willow Thickets Association
- (3.4.1) CAS-MF - California Sycamore - Mule Fat Association
- (3.6) CLOW - Coast Live Oak Woodland Alliance
- (3.2) EUC - Eucalyptus Woodland Semi-Natural Stands

Unvegetated, Disturbed, or Developed Areas (Holland/Oberbauer Classification)

- ORC - Orchards and Vineyards
- DH - Disturbed Habitat
- DEV - Urban/Developed

Sycamore Park Drive

Sycamore Canyon Rd



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Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013 and AECOM 2018)

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HELIX Environmental Planning

Vegetation Communities and Land Cover Types – San Diego Vegetation Classification Manual

Figure 3c

Map Series Boundary

Preserve

- Original Sycamore Canyon and Goodan Ranch
- Sycamore South
- Southern Parcel
- Southern Gap

Vegetation (VCM)

Drought-Deciduous Shrublands

- (4.44) BSS - Black Sage Scrub Alliance
- (4.44.2) BS-LS - Black Sage - Laurel Sumac Association
- (4.44.1) BS-CBW - Black Sage - California Buckwheat Scrub Association
- (4.8) CSB-BSS - California Sagebrush - Black Sage Scrub Alliance
- (4.7.1) CSB-CBW-LS - California Sagebrush - California Buckwheat - Laurel Sumac Association
- (4.23.1) CBW - California Buckwheat Scrub Association
- (4.32.1) DW - Deerweed Association
- (4.35.1) LS-DW - Laurel Sumac - Deerweed Association

Evergreen Shrublands

- (4.18.1) WLC - Woolly-leaved Ceanothus Association
- (4.1) CC - Chamise Chaparral Alliance
- (4.1.4) CC-WLC - Chamise Chaparral - Woolly-leaved Ceanothus Association
- (4.2.3) CC-MM-WLC - Chamise Chaparral - Mission Manzanita - Woolly-leaved Ceanothus Association
- (4.37) SOC - Scrub Oak Chaparral Alliance
- (4.37.2) SO-MTNM - Scrub Oak - Mountain-mahogany Association

Herbaceous Vegetation

- (5.8) ABG - Annual Brome Grasslands Semi-Natural Stands
- (5.2.1) MCNP - Mediterranean California Naturalized Annual and Perennial Grassland Semi-natural Stands

Forests and Woodlands

- (3.10.1) ARW - Arroyo Willow Thickets Association
- (3.4.1) California Sycamore - Mulefat
- (3.6) CLOW - Coast Live Oak Woodland

Unvegetated, Disturbed, or Developed Areas (Holland/Oberbauer Classification)

- DH - Disturbed Habitat
- NVC - Non-vegetated Channel



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Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013 and HELIX 2019)

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Map Series Boundary

Preserve Boundaries

San Vicente Connector Parcels

Vegetation (VCM)

Drought-Deciduous Shrublands

(4.44) BSS - Black Sage Scrub Alliance

(4.7.1) CSB-CBW-LS - California Sagebrush - California Buckwheat - Laurel Sumac Association

(4.35) LSA - Laurel Sumac Alliance

(4.35.1) LS-DW - Laurel Sumac - Deerweed Association

Evergreen Shrublands

(4.18.1) WLC - Woolly-leaved Ceanothus Association

(4.1) CC - Chamise Chaparral Alliance

(4.1.2) Chamise – California Buckwheat – California Sage Brush – Black Sage Association

(4.1.4) CC-WLC - Chamise Chaparral - Woolly-leaved Ceanothus Association

(4.1.5) CC-DW - Chamise Chaparral - Deerweed Association

Herbaceous Vegetation

(5.8) ABG - Annual Brome Grasslands Semi-Natural Stands

(5.2.1) NNG - Non-Native Grassland Semi-Natural Stands

(5.5) WOG - Wild Oats Grasslands Semi-Natural Stands

(5.8.2) BD - Bromus Diandrus Semi-Natural Stand Type

(5.13.1) TWA - Tarweed Association

Forests and Woodlands

(3.4.3) CS-CLOA - California Sycamore – Coast Live Oak Association

(3.6) CLOW - Coast Live Oak Woodland Alliance

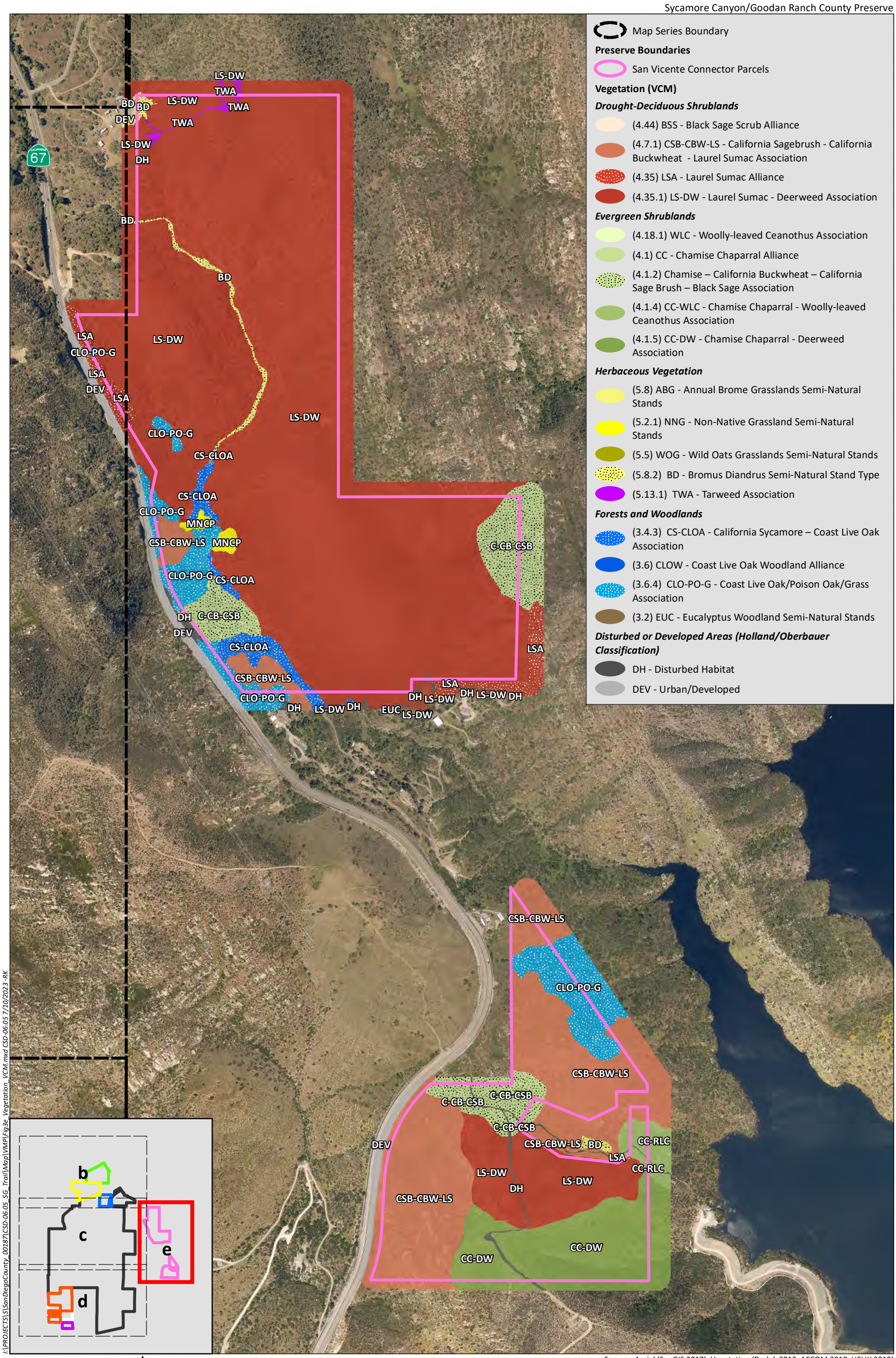
(3.6.4) CLO-PO-G - Coast Live Oak/Poison Oak/Grass Association

(3.2) EUC - Eucalyptus Woodland Semi-Natural Stands

Disturbed or Developed Areas (Holland/Oberbauer Classification)

DH - Disturbed Habitat

DEV - Urban/Developed



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Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013, AECOM 2018, HELIX 2019)

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HELIX Environmental Planning

Vegetation Communities and Land Cover Types – San Diego Vegetation Classification Manual

Figure 3e

b Map Series Index

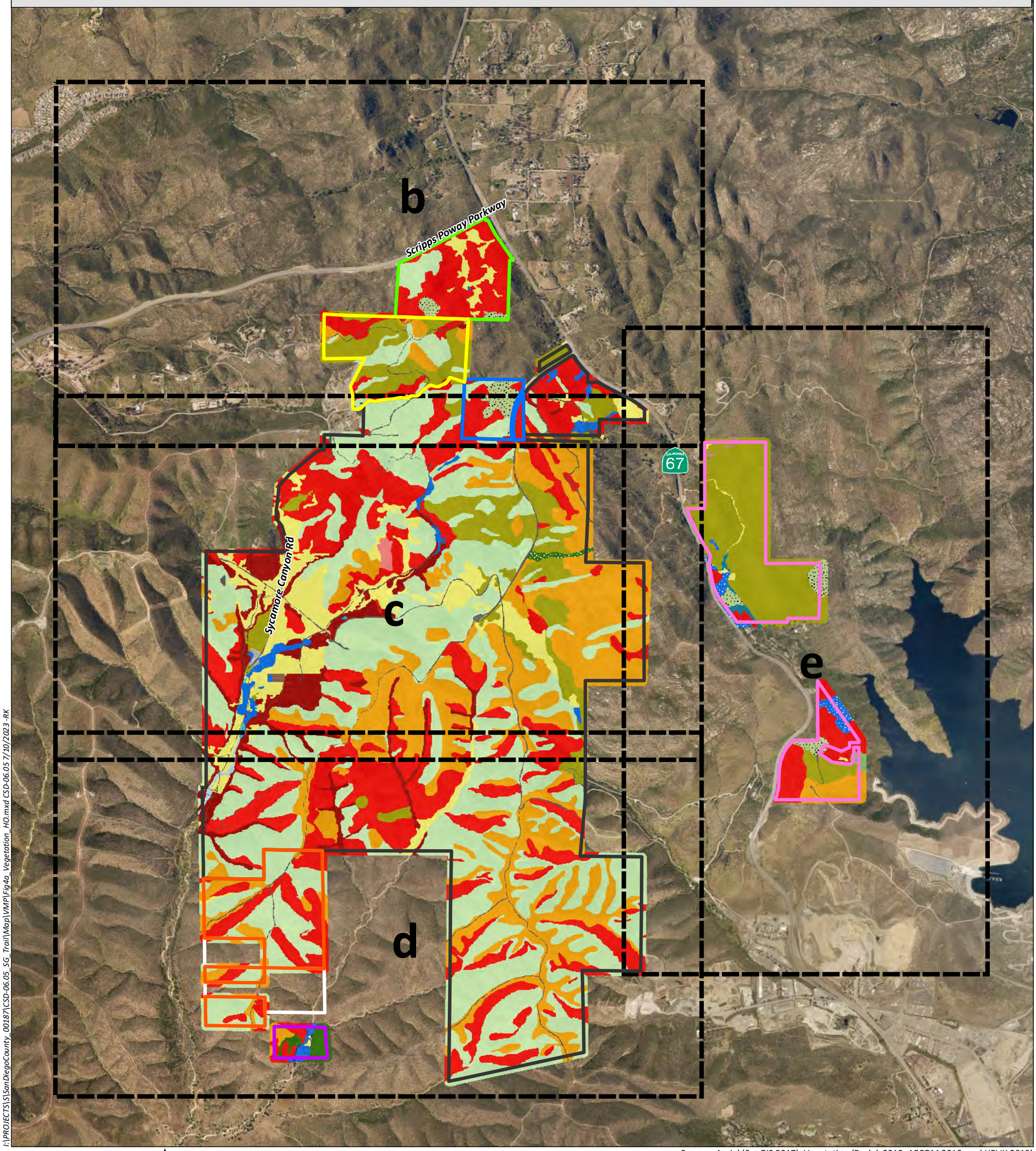
Preserve Boundaries

- Original Sycamore Canyon and Goodan Ranch Preserves
- Sycamore North Addition
- Sycamore South Addition
- 2015 Northern Addition
- 2015 Southern Addition
- Southern Parcel Addition
- San Vicente Connector Parcels
- Southern Gap Parcels

Vegetation Communities

- (32000) CS - Coastal Scrub
- (32500) CSS - Diegan Coastal Sage Scrub
- (32520) CSSI - Diegan Coastal Sage Scrub: Inland Form
- (37000) CHP - Chaparral
- (37120) SMX - Southern Mixed Chaparral
- (37121) GSMX - Granitic Southern Mixed Chaparral
- (37122) SMC - Southern Mixed Chaparral
- (37C30) SMCM - Southern Maritime Chaparral
- (37200) CC - Chamise Chaparral
- (37900) SOC - Scrub Oak Chaparral
- (37G00) CS-CT - Coastal Sage - Chaparral Transition
- (42200) NNG - Non-native Grassland
- (42300) WF - Wildflower Field
- (61300) SRF - Southern Riparian Forest
- (62500) SRW - Southern Riparian Woodland
- (63320) SWS - Southern Willow Scrub
- (71160) CLOW - Coast Live Oak Woodland
- (71161) OCLO - Open Coast Live Oak Woodland
- (79100) EUC - Eucalyptus Woodland
- (18100) ORC - Orchards and Vineyards
- (11300) DH - Disturbed Habitat
- (12000) DEV - Urban/Developed
- (64000) NVC - Non-vegetated Channel

Note: Habitat mapping is typically completed within a 100-foot buffer extending outward from the Preserve boundary; however, this mapping has not been completed for some of the Preserve parcels. SanGIS parcel boundary data not aligning with mapping boundaries also resulted in variations in width of buffers around some parcels (e.g., Figure 4e).



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0 2,300 Feet

Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013, AECOM 2018, and HELIX 2019)

HELIX Environmental Planning

Vegetation Communities and Land Cover Types – Holland/Oberbauer Map Index

Figure 4a

Map Series Boundary

Preserve Boundaries

Original Sycamore Canyon and Goodan Ranch Preserves

Sycamore North Addition

2015 Northern Addition

2015 Southern Addition

Vegetation Communities

(32000) CS - Coastal Scrub

(32500) CSS - Diegan Coastal Sage Scrub

(37000) CHP - Chaparral

(37120) SMX - Southern Mixed Chaparral

(37200) CC - Chamise Chaparral

(37900) SOC - Scrub Oak Chaparral

(37G00) CS-CT - Coastal Sage - Chaparral Transition

(42200) NNG - Non-native Grassland

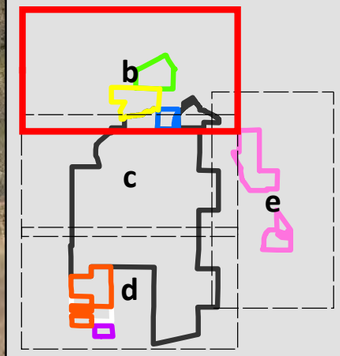
(71160) CLOW - Coast Live Oak Woodland

(79100) EUC - Eucalyptus Woodland

(11300) DH - Disturbed Habitat

(12000) DEV - Urban/Developed

Sycamore Canyon & Goodan Ranch Preserve



0 900 Feet

N

Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013 and AECOM 2018)

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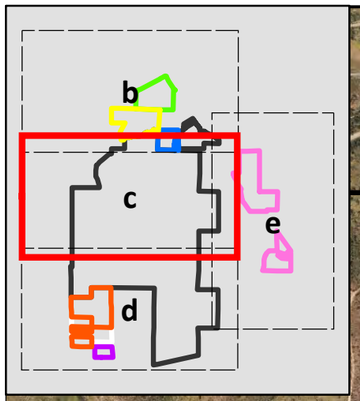
HELIX Environmental Planning

Vegetation Communities and Land Cover Types – Holland/Oberbauer Classification

Figure 4b



Map Series Boundary

Preserve Boundaries

- Original Sycamore Canyon and Goodan Ranch Preserves
- Sycamore North Addition
- 2015 Southern Addition
- San Vicente Connector Parcels

Vegetation Communities

- (32000) CS - Coastal Scrub
- (32500) CSS - Diegan Coastal Sage Scrub
- (32520) CSSI - Diegan Coastal Sage Scrub: Inland Form
- (37000) CHP - Chaparral
- (37120) SMX - Southern Mixed Chaparral
- (37C30) SMCM - Southern Maritime Chaparral
- (37200) CC - Chamise Chaparral
- (37900) SOC - Scrub Oak Chaparral
- (37G00) CS-CT - Coastal Sage - Chaparral Transition
- (42200) NNG - Non-native Grassland
- (62500) SRW - Southern Riparian Woodland
- (63320) SWS - Southern Willow Scrub
- (71160) CLOW - Coast Live Oak Woodland
- (71161) OCLO - Open Coast Live Oak Woodland
- (79100) EUC - Eucalyptus Woodland
- (18100) ORC - Orchards and Vineyards
- (11300) DH - Disturbed Habitat
- (12000) DEV - Urban/Developed

0 900 Feet

N

Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013 and AECOM 2018)

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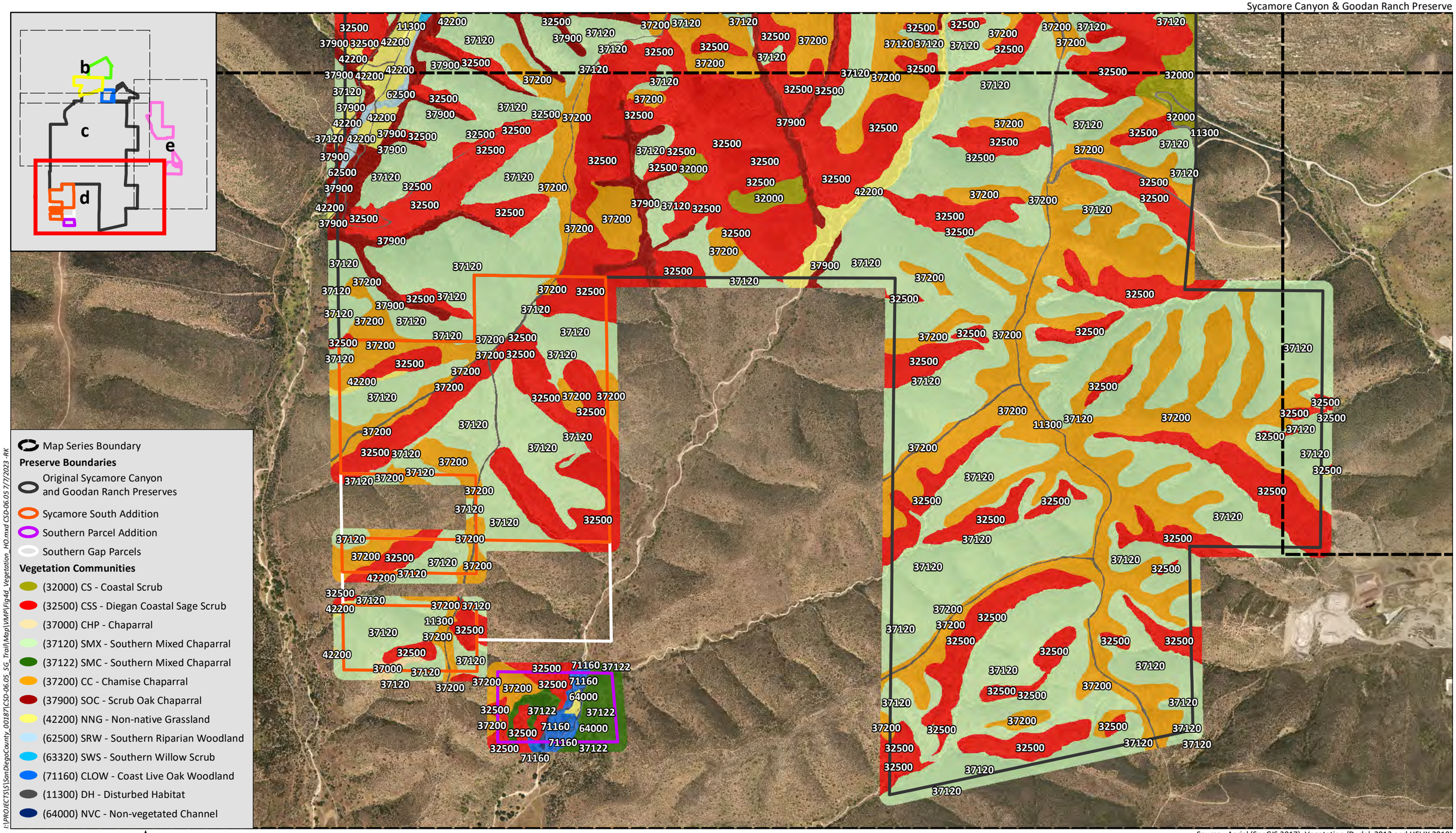
HELIX Environmental Planning

Vegetation Communities and Land Cover Types – Holland/Oberbauer Classification

Figure 4c



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Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013 and HELIX 2019)

HELIX Environmental Planning

Vegetation Communities and Land Cover Types – Holland/Oberbauer Map Index

Figure 4d

Sycamore Canyon/Goodan Ranch County Preserve

Map Series Boundary

Preserve Boundaries

San Vicente Connector Parcels

Vegetation Communities

(32000) CS - Coastal Scrub

(32500) CSS - Diegan Coastal Sage Scrub

(37121) GSMX - Granitic Southern Mixed Chaparral

(37200) CC - Chamise Chaparral

(37G00) CS-CT - Coastal Sage - Chaparral Transition

(42200) NNG - Non-native Grassland

(42300) WF - Wildflower Field

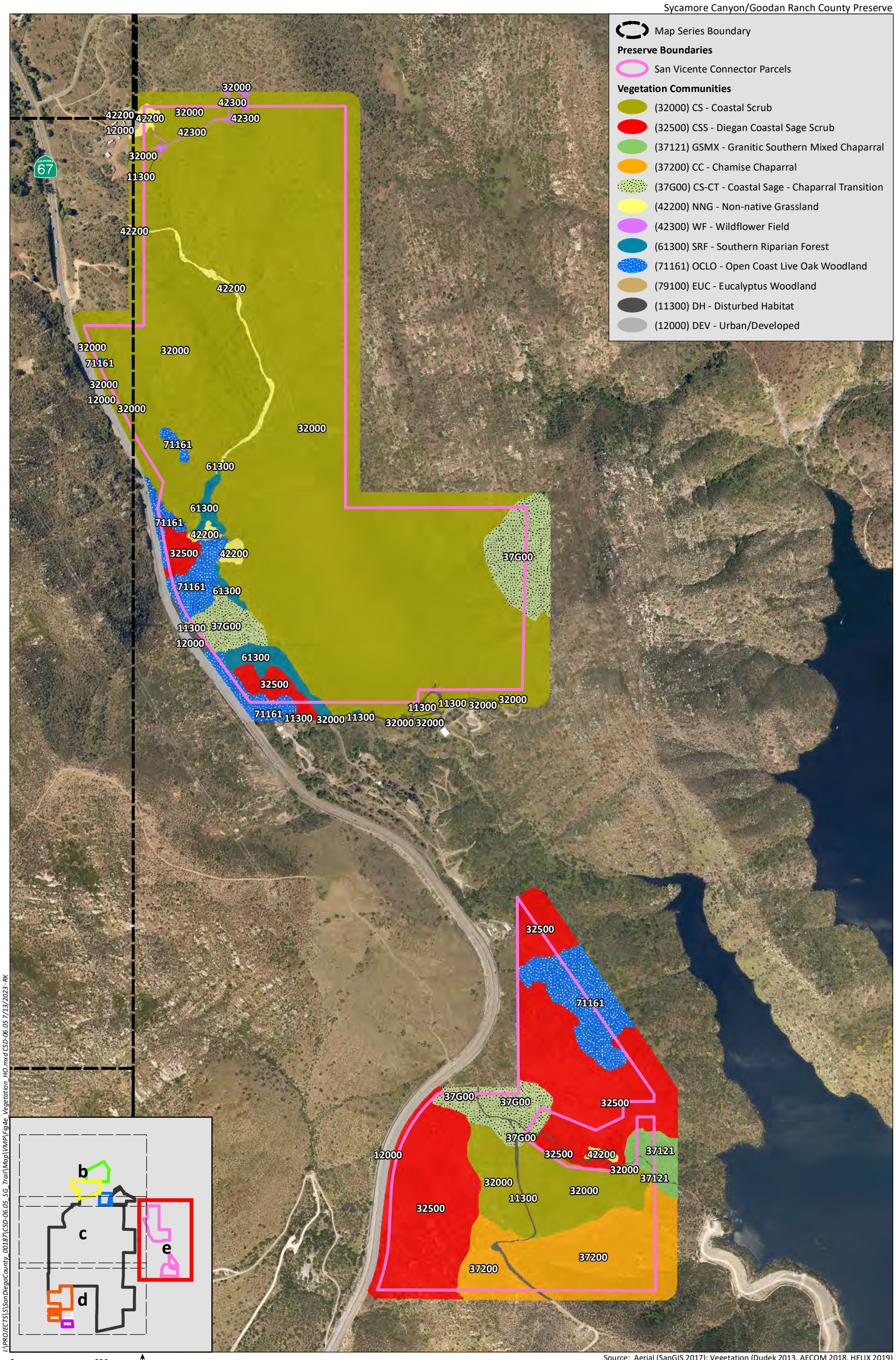
(61300) SRF - Southern Riparian Forest

(71161) OCLO - Open Coast Live Oak Woodland

(79100) EUC - Eucalyptus Woodland

(11300) DH - Disturbed Habitat

(12000) DEV - Urban/Developed



Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013, AECOM 2018, HELIX 2019)

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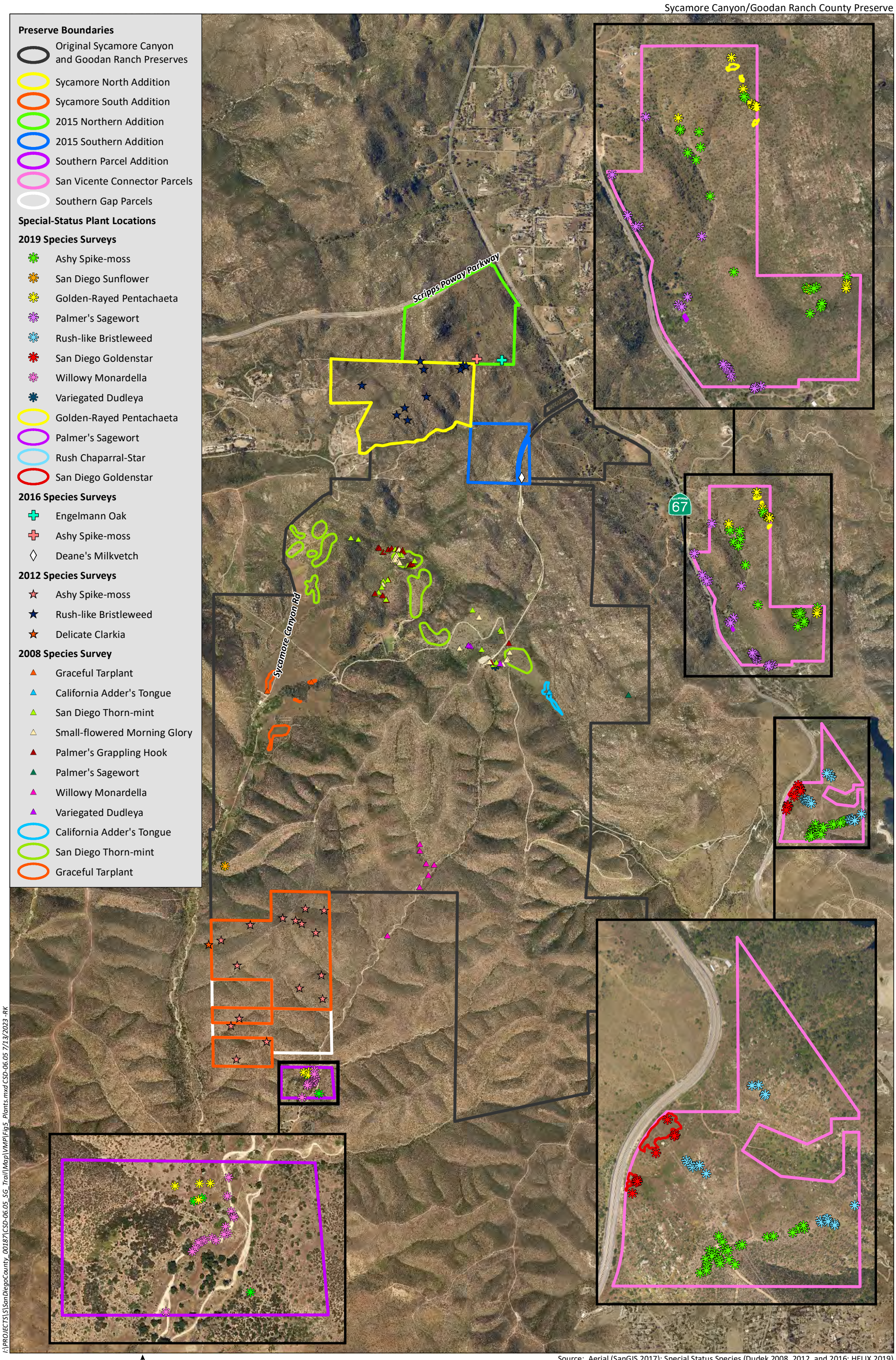
HELIX Environmental Planning

Vegetation Communities and Land Cover Types – Holland/Oberbauer Map

Figure 4e



Source: Aerial (SanGIS 2017); Special Status Species (Dudek 2008, 2012, and 2016; HELIX 2019)

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HELIX Environmental Planning

Special-Status Plant Locations

Figure 5

Table 2
SPECIAL-STATUS PLANT SPECIES

Common Name	Scientific Name	Status (Federal/State/CNPS/County, MSCP)[1]
Ashy-spike moss	*Selaginella cinerascens*	None/None/CRPR 4.1/County List D
California adder's tongue	*Ophioglossum californicum*	None/None/CRPR 4.2/County List D
Deane's milkvetch	*Astragalus deanei*	None/None/CRPR 1B.1/County List A
Delicate clarkia	*Clarkia delicata*	None/None/CRPR 1B.2/County List A
Engelmann oak	*Quercus engelmannii*	None/None/CRPR 4.2/County List D
Golden-rayed Pentachaeta	*Pentachaeta aurea* ssp. *aurea*	None/None/CRPR 4.2/County List D
Graceful tarplant	*Holocarpha virgata* ssp. *elongata*	None/None/CRPR 4.2/County List D
Palmer's grappling hook	*Harpagonella palmeri*	None/None/CRPR 4.2/County List D
Palmer's sagebrush	*Artemisia palmeri*	None/None/CRPR 4.2/County List D
Rush-like bristleweed	*Xanthium junceum*	None/None/CRPR 4.3/County List D
San Diego goldenstar	*Bloomeria clevelandii*	None/None/CRPR 1B.1/County List A, MSCP
San Diego sunflower	*Bahiopsis laciniata*	None/None/CRPR 4.3/County List D
San Diego thorn-mint	*Acanthomintha ilicifolia*	FT/SE/CRPR 1B.1/County List A, MSCP
Small-flowered morning glory	*Convolvulus simulans*	None/None/CRPR 4.2/County List D
Variegated dudleya	*Dudleya variegata*	None/None/CRPR 1B.2/County List A, MSCP
Willowy monardella	*Monardella viminea*	FE/SE/CRPR 1B.1/County List A, MSCP

[1] Listing codes as follows: F = Federal; S = State of California; E = Endangered; T = Threatened

CRPR = California Rare Plant Rank: 1A – presumed extirpated in California and either rare or extinct elsewhere; 1B – rare, threatened, or endangered in California and elsewhere; 2A – presumed extirpated in California, but more common elsewhere; 2B – rare, threatened, or endangered in California, but more common elsewhere; 3 – more information needed; 4 – watch list for species of limited distribution. Extension codes: .1 – seriously endangered; .2 – moderately endangered; .3 – not very endangered.

County of San Diego Sensitivity Status: Plant species are divided into Groups A through D on the County Rare Plant List. **Groups A and B** Plants include those that have a very high level of sensitivity, either because they are listed as threatened or endangered or because they have very specific natural history requirements that must be met. **Groups C and D** Plants include those species that are becoming less common but are not yet so rare that extirpation or extinction is imminent without immediate action. These species tend to be prolific within their suitable habitat types.

MSCP Covered Species: Covered Species under County's MSCP Subarea Plan

2.2.3 Sensitive Animal Species

Overall, 44 special-status animal species were observed or detected within the Preserve during surveys (Figures 6a-e, *Special-status Wildlife Locations*). Twelve of the detected species are also covered under the MSCP. Special-status wildlife species included one invertebrate, one amphibian, eight reptile, 19 bird, and 15 mammal species. A summary of the special-status wildlife species observed is provided in Table 3, *Special-status Animal Species*. A table of the special-status wildlife species with potential to occur on the Preserve, with the exception of Sycamore Canyon, is included in Appendix B, *Special-status Wildlife Species Observed or with Potential to Occur*.

Table 3
SPECIAL-STATUS ANIMAL SPECIES

Common Name	Scientific Name	Status (Federal/State/County, MSCP)[1]
Invertebrates		
Quino checkerspot butterfly	*Euphydryas editha quino*	FE/None/Group 1, MSCP NE
Amphibians		
Western spadefoot toad	*Spea hammondii*	None/SSC/Group 2
Reptiles		
Orange-throated whiptail	*Aspidoscelis hyperythra beldingi*	None/WL/Group 2, MSCP
Blainville's horned lizard	*Phrynosoma blainvillii*	None/SSC/Group 2, MSCP
Coast patch-nosed snake	*Salvadora hexalepis virgultea*	None/SSC/Group 2
Coronado skink	*Plestiodon skiltonianus interparietalis*	None/WL/Group 2
Rosy boa	*Lichanura orcuttii*	None/None/Group 2
Northern red diamond rattlesnake	*Crotalus ruber*	None/SSC/Group 2
Coastal whiptail	*Aspidoscelis tigris stejnegeri*	None/SSC/Group 2
Two-striped garter snake	*Thamnophis hammondii*	None/SSC/Group 1
Birds		
Bald eagle	*Haliaeetus leucocephalus*	None/SSC/Group 1
Barn owl	*Tyto alba*	None/None/Group 2
Bell's sage sparrow	*Amphispiza belli belli*	None/WL/Group 1
Burrowing owl	*Athene cunicularia*	None/SSC/Group 1, MSCP
California horned lark	*Eremophila alpestris actia*	None/WL/Group 2
Coastal California gnatcatcher	*Polioptila californica californica*	FT/SSC/Group 1, MSCP
Cooper's hawk	*Accipiter cooperii*	None/WL/Group 1, MSCP
Golden eagle	*Aquila chrysaetos*	BCC/WL, FP/Group 1, MSCP
Northern harrier	*Circus cyaneus*	None/SSC/Group 1, MSCP
Osprey	*Pandion haliaetus*	None/WL/Group 1
Red-shouldered hawk	*Buteo lineatus*	None/None/Group 1
Sharp-shinned hawk	*Accipiter striatus*	None/WL/Group 1
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	None/WL/Group 1, MSCP
Turkey vulture	*Cathartes aura*	None/None/Group 1
Vaux's swift	*Chaetura vauxi*	None/SSC/None
Western bluebird	*Sialia mexicana*	None/None/Group 2, MSCP
White-tailed kite	*Elanus leucurus*	None/FP/Group 1
Yellow-breasted chat	*Icteria virens*	None/SSC/Group 1
Yellow warbler	*Setophaga petechia*	BCC/SSC/Group 2
Mammals		
Big free-tailed bat	*Nyctinomops macrotis*	None/SSC/Group2
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	None/SSC/Group 2
Mountain lion	*Puma concolor*	None/SSC/Group 2, MSCP
Northwestern San Diego pocket mouse	*Chaetodipus fallax fallax*	None/SSC/Group 2
Pallid bat	*Antrozous pallidus*	None/SSC/Group 2
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	None/SSC/Group 2
San Diego black-tailed jackrabbit	*Lepus californicus bennettii*	None/SSC/Group 2
San Diego desert woodrat	*Neotoma bryanti (formerly lepida) intermedia*	None/SSC/Group 2

Table 3 (cont.)
SPECIAL-STATUS ANIMAL SPECIES

Common Name	Scientific Name	Status (Federal/State/County, MSCP)[1]
Southern mule deer	*Odocoileus hemionus*	None/None/Group 1, MSCP
Townsend's bat	*Corynorhinus townsendii*	None/SSC/Group 2
Western mastiff bat	*Eumops perotis californicus*	None/SSC/Group 2
Western red bat	*Lasiurus blossevillii*	None/SSC/Group 2
Western small-footed myotis	*Myotis ciliolabrum*	None/None/Group 2
Western yellow bat	*Lasiurus xanthinus*	None/SSC/None
Yuma myotis	*Myotis yumanensis*	None/None/Group 2

[1] Listing codes are as follows: FE = Federally Endangered; FT = Federally Threatened; FC= Federal Candidate species; BCC = Birds of Conservation Concern; SE = State of California Endangered; FP = State of California Fully Protected; WL = State of California Wait-Listed; SSC = State of California Species of Special Concern. County of San Diego Sensitive Animal List: Group 1 = Animals that have a very high level of sensitivity, either because they are listed as threatened or endangered or because they have very specific natural history requirements that must be met; Group 2 = Animals that are becoming less common, but are not yet so rare that extirpation or extinction is imminent without immediate action; these species tend to be prolific within their suitable habitat types.

2.3 CULTURAL RESOURCES

The information provided in Section 2.3 includes excerpts from the County of San Diego Guidelines for Determining Significance, the Cultural Resources Phase I Survey and Inventory, Sycamore Canyon and Goodan Ranch Preserves (ICF Jones and Stokes 2008), Archaeological Survey Report for the Hagey and Sycamore South Properties, Additions to the Sycamore Canyon and Goodan Ranch Preserves (ASM 2012), Cultural Resources Phase 1 Survey and Inventory, Sycamore Canyon/Goodan Ranch Preserve, 2015 Southern Addition and2015 Northern Addition(AECOM 2016), Cultural Resources Phase 1 Survey and Inventory, Sycamore Canyon/Goodan Ranch Preserve, Southern Parcel Addition (HELIX 2019), Cultural Resources Inventory and Assessment, Sycamore Canyon/Goodan Ranch Preserve Public Access Plan (HELIX 2023), and Phase 1 Cultural Resources Survey and Inventory of Six Parcels for Addition to the Sycamore-Goodan Ranch Preserve (ICF 2019). Surveys were completed in compliance with the County of San Diego Guidelines for Determining Significance: Cultural Resources: Archaeological and Historic Resources (County 2007) to assist in land use and resource protection planning.

A total of 116 cultural resources are currently documented within the Preserve, comprised of 16 historic-period buildings, structures, objects, or archaeological sites; four multicomponent archaeological sites; 61 prehistoric archaeological sites; 33 prehistoric isolates; and two historic isolates), as detailed in Table 4, *Eligibility Status of Cultural Resources Within the Preserve* and their locations shown in Figure 7, *Cultural Resources*, which is confidential and bound separately. These resources are discussed further in the RMP (County 2023). Of the 116 cultural resources documented within the Preserve, 79 archaeological sites and 33 isolates identified within the Preserve have not been evaluated for eligibility under the California Environmental Quality Act (CEQA). The 33 isolates are not considered CEQA significant, and thus, no further analysis is required. The unevaluated sites are treated as significant resources under County guidelines (County of San Diego 2007). The significance of four of the cultural resources has been determined through evaluation: P-37-030107 has been evaluated as significant; CA-SDI-12,852, P-37-035993, and P-37-035983 have been evaluated as not significant.

Table 4
ELIGIBILITY STATUS OF RESOURCES WITHIN THE PRESERVE

Site Numbers	Era	Site Contents	Eligibility Status
Sites			
CA-SDI-119	Prehistoric	Lithic scatter and ground stone	Not evaluated - must be treated as significant
CA-SDI-6859	Prehistoric	Boulder slicks, two metates	Not evaluated - must be treated as significant
CA-SDI-8340	Prehistoric	Nine bedrock milling features with a total of 12 slicks and one basin; one associated mano fragment and one quartzite flake	Not evaluated - must be treated as significant
CA-SDI-9704	Prehistoric	Lithic scatter	Not evaluated - must be treated as significant
CA-SDI-9705	Prehistoric	Ten milling features, lithic scatter	Not evaluated - must be treated as significant
CA-SDI-9706	Prehistoric	Milling site – two features	Treat as significant
CA-SDI-9707H	Historic	Joseph Fischer homestead and Stowe post office	Not evaluated - must be treated as significant
CA-SDI-9708	Prehistoric	Sixteen milling features, lithic scatter	Not evaluated -must be treated as significant
CA-SDI-9712H	Multi-component site	Goodan Ranch structural ruins and other features; prehistoric artifact scatter	Not evaluated - must be treated as significant
CA-SDI-12,821H	Historic	Boulder Oaks Spur of the historic Foster Truck Trail	Not evaluated - must be treated as significant
CA-SDI-12,838	Prehistoric	Milling feature and artifact scatter	Not evaluated - must be treated as significant
CA-SDI-12839	Prehistoric	Rock feature	Not evaluated - must be treated as significant
CA-SDI-12,842	Prehistoric	Two milling features, granary basin	Not evaluated - must be treated as significant
CA-SDI-12,843	Prehistoric	Two milling features, lithic scatter	Not evaluated - must be treated as significant
CA-SDI-12,850	Prehistoric	Bedrock milling feature	Not evaluated - must be treated as significant
CA-SDI-12,852	Prehistoric	Lithic scatter and flakes	Tested; not significant
CA-SDI-12,861H	Historic	Trash scatter and stacked rock wall	Not evaluated - must be treated as significant
CA-SDI-13,221	Prehistoric	Lithic scatter	Not evaluated - must be treated as significant
CA-SDI-13,223	Prehistoric	Lithic scatter	Not evaluated - must be treated as significant
CA-SDI-13,636	Prehistoric	Milling site – one feature with one slick and thumb scraper	Not evaluated - must be treated as significant

Table 4 (cont.)
ELIGIBILITY STATUS OF RESOURCES WITHIN THE PRESERVE

Site Numbers	Era	Site Contents	Eligibility Status
CA-SDI-16,515	Prehistoric	Lithic scatter	Not evaluated - must be treated as significant
CA-SDI-16,516	Prehistoric	Lithic scatter	Not evaluated - must be treated as significant
CA-SDI-16,517	Multi-component	Lithic scatter and historic concrete dam	Not evaluated - must be treated as significant
CA-SDI-16,518	Prehistoric	Lithic scatter	Not evaluated - must be treated as significant
CA-SDI-17,151	Prehistoric	Six milling features, lithic scatter	Not evaluated - must be treated as significant
CA-SDI-17,152	Prehistoric	Eight milling feature, lithic and ceramic scatter	Not evaluated - must be treated as significant
CA-SDI-17,153	Historic	Dam constructed of stacked rock	Not evaluated - must be treated as significant
CA-SDI-17,154	Multi-component	Stone foundation and prehistoric mano and hammerstone	Not evaluated - must be treated as significant
CA-SDI-17,155	Prehistoric	Milling site – one milling feature includes a basin	Not evaluated - must be treated as significant
CA-SDI-17,156	Historic	Farm site consisting of three eucalyptus trees in a cultivated field	Not evaluated - must be treated as significant
CA-SDI-17,157	Historic	Trash scatter	Not evaluated - must be treated as significant
CA-SDI-17,158	Historic	Target shooting range	Not evaluated - must be treated as significant
CA-SDI-19,170	Prehistoric	Milling site – one feature with one slick	Treat as significant
CA-SDI-19,171	Prehistoric	Milling site – one feature with two slicks	Treat as significant
CA-SDI-19,172	Prehistoric	Milling site – one feature with three slicks	Not evaluated - must be treated as significant
CA-SDI-19,173	Prehistoric	Milling site – two features with four slicks and possible mano	Not evaluated - must be treated as significant
CA-SDI-19,174	Prehistoric	Milling site – one feature with two slicks	Not evaluated - must be treated as significant
CA-SDI-19,175	Prehistoric	Milling site – one feature with one mortar	Not evaluated - must be treated as significant
CA-SDI-19,176	Prehistoric	Lithic scatter with two metavolcanic flakes and one jasper flake	Not evaluated - must be treated as significant
CA-SDI-19,177	Prehistoric	Milling site – one feature with one slick	Not evaluated - must be treated as significant
CA-SDI-19,178	Prehistoric	Milling site – two features with three slicks	Not evaluated - must be treated as significant

Table 4 (cont.)
ELIGIBILITY STATUS OF RESOURCES WITHIN THE PRESERVE

Site Numbers	Era	Site Contents	Eligibility Status
CA-SDI-19,179	Prehistoric	Milling site – one feature with one slick	Not evaluated - must be treated as significant
CA-SDI-19,180	Prehistoric	Milling site– one feature with four slicks, one flake	Not evaluated - must be treated as significant
CA-SDI-19,181	Prehistoric	Lithic scatter - three quartz flakes, one jasper flake, & one jasper chunk	Treat as significant
CA-SDI-19,182	Prehistoric	Lithic site - five volcanic flakes and five quartzite flakes	Not evaluated - must be treated as significant
CA-SDI-19,183	Prehistoric	Lithic scatter consisting of over twenty flakes	Not evaluated - must be treated as significant
CA-SDI-19,184	Prehistoric	Milling site – one feature including a basin	Not evaluated - must be treated as significant
CA-SDI-19,185	Prehistoric	Milling site – one feature with one slick, one associated mano	Not evaluated - must be treated as significant
CA-SDI-19,186	Prehistoric	Lithic scatter – over twenty flakes and three mano fragments (possibly CA-SDI-119)	Not evaluated - must be treated as significant
CA-SDI-19,187	Prehistoric	Milling site – one feature with one slick	Not evaluated - must be treated as significant
CA-SDI-20,691	Historic	Brick, refuse, and can scatter	Not evaluated - must be treated as significant
CA-SDI-20944	Prehistoric	Bedrock milling features and lithic scatter	Not evaluated - must be treated as significant
CA-SDI-21,918	Prehistoric	Lithic scatter	Not evaluated - must be treated as significant
CA-SDI-21,919	Prehistoric	Bedrock milling feature	Not evaluated - must be treated as significant
CA-SDI-21,920	Prehistoric	Bedrock milling feature and lithic scatter	Not evaluated - must be treated as significant
CA-SDI-21,921	Prehistoric	Bedrock milling feature with three slicks	Treat as significant
CA-SDI-21,922	Prehistoric	Bedrock milling feature, one bifacial mano, two bifacial mano fragments, and two debitage flakes	Treat as significant
CA-SDI-21,923	Historic	Remnants of old homestead	Treat as significant
P-37-024271	Prehistoric	Two volcanic flakes; updated metavolcanic flake and core	Treat as significant
CA-SDI-23439	Prehistoric	Lithic scatter	Not evaluated - must be treated as significant
P-37-024967	Prehistoric	Lithic scatter including one hammerstone- originally recorded as an isolate	Not evaluated - must be treated as significant
P-37-028924	Historic	Four cement cistern/guzzlers	Treat as significant

Table 4 (cont.)
ELIGIBILITY STATUS OF RESOURCES WITHIN THE PRESERVE

Site Numbers	Era	Site Contents	Eligibility Status
P-37-030084	Prehistoric	Lithic scatter (two flaking stations)	Treat as significant
P-37-030106	Historic	Earthen dam or levee (	Not evaluated - must be treated as significant
P-37-030107	Historic	San Diego Aqueduct; previously evaluated as significant	NRHP/CRHR eligible
P-37-030197	Historic	Stowe Road, a wagon trail of at least 110 years of age incorporated in the Stowe Trail	Not evaluated - must be treated as significant
P-37-030226	Prehistoric	Milling feature, volcanic flake	Not evaluated - must be treated as significant
P-37-035980	Prehistoric	One bedrock milling feature and associated lithic scatter	Treat as significant
P-37-035983	Prehistoric	Lithic scatter and one core tool	Tested; not significant
P-37-035987	Prehistoric	Light lithic scatter	Not evaluated - must be treated as significant
P-37-035988	Prehistoric	Light lithic scatter	Not evaluated - must be treated as significant
P-37-035992	Historic	Possible historic outer building	Treat as significant
P-37-035993	Historic	Historic road segment	Not significant
P-37-038409	Prehistoric	Two bedrock milling features with one slick each	Not evaluated - must be treated as significant
P-37-038410	Prehistoric	One bedrock milling feature with one slick and two basins	Not evaluated - must be treated as significant
P-37-038957	Prehistoric	One bedrock milling feature and associated ground stone and ceramic scatter	Not evaluated - must be treated as significant
P-37-038958	Historic	Rock alignment or foundation	Treat as significant
P-37-038959	Prehistoric	Lithic scatter	Treat as significant
P-37-038960	Prehistoric	Lithic scatter	Treat as significant
P-37-038961	Prehistoric	Lithic scatter with three granitic manos, one utilized flake tool, and one flake	Not evaluated - must be treated as significant
P-37-040514	Historic	Survey monument	Not evaluated - must be treated as significant
P-37-040516	Prehistoric	Bedrock milling feature/grinding slick	Not evaluated - must be treated as significant
Isolates			
P-37-015294	Prehistoric	Flake	Isolate - not considered significant
P-37-024963	Prehistoric	Cobble smoothing/burnishing tool	Isolate - not considered significant
P-37-024964	Prehistoric	Quartzite flake	Isolate - not considered significant

Table 4 (cont.)
ELIGIBILITY STATUS OF RESOURCES WITHIN THE PRESERVE

Site Numbers	Era	Site Contents	Eligibility Status
P-37-024965	Prehistoric	One core/spokeshave and one quartzite core	Isolate – not considered significant
P-37-024966	Prehistoric	Isolate quartzite flake	Isolate – not considered significant
P-37-024968	Prehistoric	Isolate quartzite domed scraper	Isolate - not considered significant
P-37-024969	Prehistoric	Mano fragment	Isolate - not considered significant
P-37-030091	Prehistoric	Jasper flake	Isolate - not considered significant
P-37-030094	Prehistoric	One Lusardi (LSV) chopper and one metavolcanic flake	Isolate - not considered significant
P-37-030096	Prehistoric	Green metavolcanic flake	Isolate – not considered significant
P-37-030098	Prehistoric	Quartzite core	Isolate – not considered significant
P-37-030102	Prehistoric	Mano	Isolate - not considered significant
P-37-030104	Prehistoric	Lusardi (LSV) flake	Isolate - not considered significant
P-37-030078	Prehistoric	One broken pottery sherd	Isolate – not considered significant
P-37-030083	Prehistoric	Quartz flake	Isolate - not considered significant
P-37-030079	Prehistoric	Unifacial volcanic tool	Isolate - not considered significant
P-37-032647	Prehistoric	Metate fragment	Isolate – not considered significant
P-37-035977	Prehistoric	Two quartzite flakes	Isolate – not considered significant
P-37-035978	Prehistoric	One volcanic flake	Isolate – not considered significant
P-37-035979	Prehistoric	One volcanic flake	Isolate – not considered significant
P-37-035981	Prehistoric	One volcanic flake	Isolate – not considered significant
P-37-035982	Historic	Metal lamp	Isolate – not considered significant
P-37-038946	Prehistoric	One mano	Isolate – not considered significant
P-37-038947	Prehistoric	One mano	Isolate – not considered significant
P-37-038948	Prehistoric	One mano fragment	Isolate – not considered significant
P-37-038949	Prehistoric	One mano	Isolate – not considered significant

Table 4 (cont.)
ELIGIBILITY STATUS OF RESOURCES WITHIN THE PRESERVE

Site Numbers	Era	Site Contents	Eligibility Status
P-37-038950	Prehistoric	One core/scraper and one core	Isolate – not considered significant
P-37-038951	Prehistoric	One flake tool	Isolate – not considered significant
P-37-038952	Prehistoric	One flake	Isolate – not considered significant
P-37-038953	Prehistoric	One flake and one hammerstone fragment	Isolate – not considered significant
P-37-038954	Prehistoric	One flake	Isolate – not considered significant
P-37-038955	Prehistoric	One flake and one core/hammerstone	Isolate – not considered significant
P-37-038956	Prehistoric	One core/scraper and one hammerstone	Isolate – not considered significant

3.0 INVASIVE NON-NATIVE PLANT SPECIES MANAGEMENT

The introduction of invasive species into native habitats is becoming more common, and further expansion of human activities into areas away from urban and suburban centers will amplify this effect. Today, it is almost impossible to find any lowland areas in California that do not support a collection of plant species brought from elsewhere. Because invasive non-native plant species can have significant impacts on native plant associations, ecosystem processes, and biodiversity, special management measures are needed for their removal and control. Non-native plants have few ecological controls on their population sizes, and they tend to thrive under conditions created by humans. They often exhibit aggressive growth, out-compete or otherwise harm sensitive species, and can alter natural fire regimes by increasing the frequency and intensity of wildfire (Bell 2009). The removal of invasive non-native plant species is a management action that facilitates the recovery of native habitats. If invasive non-native plant species are removed using mechanical methods such as mowing, cutting, or disking; cultural methods such as grazing or burning; or chemical control through the application of herbicide, desirable native plant species can increase their densities and their distribution to natural levels pre-invasion. Reestablished native plant communities can support systems for native fauna, thereby maintaining biodiversity richness and abundance within the Preserve.

Target non-native invasive species were selected based on their invasive potential, prevalence throughout the Preserve, discussions with DPR rangers and staff, and the ability for management. Invasive non-native plant species were surveyed and mapped within the Preserve in 2008, in 2012 for the Sycamore North Addition and Sycamore South Addition, in 2016 for the 2015 Northern Addition and 2015 Southern Addition, and in 2019 for the Southern Parcel Addition and the San Vicente Connector parcels. Some invasive non-native species were found as isolated individuals or as small patches of individuals, while other species were found throughout the Preserve.

The focus was on mapping species with the greatest potential to invade native habitats, such as those listed on the California Invasive Plant Council's (Cal-IPC) California Invasive Plant Inventory (Cal-IPC 2023)

with a rating of moderate or high (e.g., Crimson fountaingrass [*Pennisetum setaceum*]), or species that may not be rated as moderate or high, but considered to have a localized potential for habitat invasion (e.g., olive tree [*Olea europea*]). Ubiquitous species scattered across the Preserve that pose limited potential for invasion into established habitats and that would be impractical to control on an individual basis (e.g., brome grasses [*Bromus* spp.], wild oat [*Avena* spp.], filaree [*Erodium* spp.], etc.) were not mapped as individual occurrences; however, their presence was noted as components of non-native grasslands mapped on-site. Some of the species often associated with the non-native grasslands on-site (e.g., Maltese star thistle [*Centaurea melitensis*]) were noted for control in areas where they are invading into native coastal scrub and chaparral communities and are not directly associated with non-native grasslands. Table 5, *Invasive Non-native Plant Species*, lists the invasive non-native plant species observed on the Preserve. An attempt was made to count or estimate the quantity of individuals at each location where invasive non-native species were mapped to facilitate land management efforts for invasive species control. However, populations of many of the mapped invasive species, particularly annual species, can fluctuate dramatically from season to season, depending on rainfall. Therefore, the mapped quantities of invasive plants should only be considered an indication of the presence and abundance of the species. The larger, woody invasive non-native plant species, such as Chinaberry tree (*Melia azedarach*), and other invasive non-native plant species or less well-established plants, such as African fountain grass (*Cenchrus setaceus*) and blue-eye cape-marigold (*Dimorphotheca sinuata*) are examples of species for which general mapping took place.

Invasive non-native plants are present throughout the Preserve, but the greatest amounts are found along the roads and trails, and around grassy areas. Many of the invasive non-native annual plant species found on the Preserve have been established in this region for many years. Table 5 lists the 99 invasive non-native plant species observed, their location observed in the Preserve, and their associated Cal-IPC Inventory rating.

Table 5
INVASIVE NON-NATIVE PLANT SPECIES

Scientific Name	Common Name	Observed[1]	Cal-IPC Rating[2]
Arundo donax	giant reed	SV	High
Brassica tournefortii	Sahara mustard	SG, SV	High
Bromus madritensis ssp. *rubens*[3]	foxtail brome	NA, SA, SP, SV	High
Cortaderia selloana	pampas grass	SG	High
Ehrharta calycina[3]	perennial veldt grass	SV	High
Tamarix ramosissima	saltcedar	SG, SV	High
Atriplex semibaccata	Australian saltbush	SG	Moderate
Avena barbata[3]	slender oat	NA, SA, SP, SV	Moderate
Avena fatua[3]	wild oat	NA, SA, SV	Moderate
Brachypodium distachyon[3]	purple false-brome	SP, SV	Moderate
Brassica nigra	black mustard	SG, SA, SP, SV	Moderate
Cardaria draba	hoary cress	SG	Moderate
Bromus diandrus[3]	ripgut brome	NA, SA, SP, SV	Moderate
Carduus pycnocephalus	Italian thistle	SG, SP, SV	Moderate
Centaurea melitensis	Maltese star-thistle	SG, NA, SA, SP, SV	Moderate
Cirsium vulgare	bull thistle	SG	Moderate

Table 5 (cont.)
INVASIVE NON-NATIVE PLANT SPECIES

Scientific Name	Common Name	Observed[1]	Cal-IPC Rating[2]
Cynara cardunculus	artichoke thistle	SG	Moderate
Cynodon dactylon[3]	Bermuda grass	SG, SV	Moderate
Festuca myuros[3]	rattail sixweeks grass	NA, SA, SP, SV	Moderate
Festuca perennis[3]	Italian rye grass	NA, SV	Moderate
Foeniculum vulgare	fennel	SV	Moderate
Dittrichia graveolens	stinkwort	SG, SV	Moderate
Gazania linearis	treasure flower	NA, SP	Moderate
Hirschfeldia incana	shortpod mustard	SG, NA, SA, SV	Moderate
Lepidium draba	whitetop (hoary cress)	SG	Moderate
Lythrum hyssopifolia	hyssop loosestrife	SV	Moderate
Mesembryanthemum crystallinum	crystalline iceplant	SG	Moderate
Oxalis pes-caprae	Bermuda buttercup	SP	Moderate
Pennisetum setaceum[3]	crimson fountain grass	SG, NA, SV	Moderate
Schinus terebinthifolius	Brazilian pepper tree	SG	Moderate
Vinca major	greater periwinkle	SG	
Washingtonia robusta	Mexican fan palm	SG	Moderate
Bromus hordeaceus[3]	soft brome	NA, SP, SV	Limited
Cotula coronopifolia	brass buttons	SP	Limited
Eucalyptus camaldulensis	river red gum	SG, SV	Limited
Glebionis coronaria	crown daisy	SV	Limited
Helminthotheca echioides	bristly ox-tongue	SG	Limited
Hypochaeris glabra	smooth cats ear	NA, SA, SP, SV	Limited
Marrubium vulgare	horehound	SG	Limited
Medicago polymorpha	California burclover	SV	Limited
Mesembryanthemum nodiflorum	slender-leaf iceplant	SG	Limited
Olea europaea	olive tree	SG	Limited
Plantago lanceolata	English plantain	SG	Limited
Polypogon monspeliensis[3]	annual beard grass	SA, SV	Limited
Raphanus sativus	wild radish	SP	Limited
Ricinus communis	castor bean	SV	Limited
Rumex crispus	curly dock	SG, SP, SV	Limited
Salsola tragus	Russian thistle	NA	Limited
Schinus molle	Peruvian pepper tree	SG	Limited
Schismus barbatus[3]	common Mediterranean grass	NA	Limited
Silybum marianum	milk thistle	SG, SV	Limited
Sisymbrium irio	London rocket	NA	Limited
Trifolium hirtum	rose clover	SV	Limited
Amaranthus albus	white tumbleweed	SG	None
Anthemis cotula	mayweed	SP	None

Table 5 (cont.)
INVASIVE NON-NATIVE PLANT SPECIES

Scientific Name	Common Name	Observed[1]	Cal-IPC Rating[2]
Apium graveolens	common celery	SG	None
Briza minor[3]	little rattlesnake grass	SV	None
Cerastium glomeratum	large mouse ears	SV	None
Chenopodium murale	nettle leaf goosefoot	NA	None
Dimorphotheca sinuata	blue-eyed cape marigold	NA	None
Encelia californica	California encelia	NA	None
Erigeron bonariensis	flax-leaved horseweed	NA	None
Erodium botrys	big heron bill	NA, SA, SP, SV	None
Erodium cicutarium	red stemmed filaree	NA, SA, SP, SV	None
Erodium moschatum	whitestem filaree	SP	None
Euphorbia maculata	spotted spurge	SV	None
Euphorbia peplus	petty spurge	SP	None
Galium parisiense	wall bedstraw	SV	None
Gamochaeta pensylvanica	Pennsylvania everlasting	SV	None
Gastridium phleoides[3]	nit grass	SV	None
Hedypnois cretica	crete weed	NA, SA, SP, SV	None
Lamarckia aurea[3]	goldentop	NA, SA, SP, SV	None
Logfia gallica	narrowleaf cottonrose	NA, SA, SV	None
Lysimachia arvensis	scarlet pimpernel	NA, SP, SV	None
Malva parviflora	cheeseweed	SG	None
Melia azedarach	Chinaberry tree	NA	None
Melilotus alba	white sweet clover	SG	None
Melilotus indicus	annual yellow sweet clover	SV	None
Melinus repens	rose natal grass	SG, NA, SA, SV	None
Petrorhagia dubia	hairy pink	SG	None
Plantago major	common plantain	SG	None
Plumbago auriculata	cape leadwort	SG	None
Poa annua[3]	annual bluegrass	SG	None
Poterium sanguisorba	garden burnett	SG	None
Pseudognaphalium leucocephalum	white rabbit-tobacco	SG	None
Reseda luteola	Dyer's rocket	NA, SA, SV	None
Senecio vulgaris	common groundsel	SV	None
Senna didymobotrya	African wild cassia	SV	None
Silene gallica	common catchfly	NA, SA, SP, SV	None
Sisymbrium orientale	Indian hedge mustard	SV	None
Solanum nigrum	black nightshade	SG	None
Sonchus asper ssp. *asper*	sow thistle	NA, SA, SV	None
Sonchus oleraceus	sow thistle	SV	None
Spergularia arvensis	stickwort	SG	None
Spergularia bocconi	sand-spurrey	SV	None

Table 5 (cont.)
INVASIVE NON-NATIVE PLANT SPECIES

Scientific Name	Common Name	Observed[1]	Cal-IPC Rating[2]
Stellaria media	chickweed	SG	None
Taraxacum officinale	common dandelion	SG	None
Urtica urens	annual stinging nettle	SV	None
Veronica anagallis-aquatica	water speedwell	SG	None
Vicia villosa	hairy vetch	SG	None

1 SG= Sycamore Canyon and Goodan Ranch Preserves; NA=2015 Northern Addition; SA=2015 Southern Addition; SP= Southern Parcel; SV= San Vicente Connector parcels.

2 Source: Cal-IPC 2023. Overall rating listed for southwest region, factoring impact, invasiveness, distribution, and documentation level.

3 Non-native grass species.

3.1 TARGET INVASIVE NON-NATIVE PLANT SPECIES FOR REMOVAL

Twenty-one invasive non-native plant species observed within the Preserve have been identified as target species requiring removal and control. A removal priority ranking system was established for these target species to assist management efforts. The criteria used for assigning removal priority rankings for the invasive non-native plant species included an evaluation of the Cal-IPC rating, the current cover and distribution in the Preserve, the potential for invading sensitive habitat, and the potential for increasing fire intensity. These species and associated management/control recommendations are presented below, along with a removal priority ranking. Table 6, *Target Invasive Non-native Plant Species for Removal and Management*, summarizes this information. Invasive plant species locations are shown on Figures 8a–e, *Target Invasive Non-native Plant Species Locations*.

Species ranked as high-priority are recommended for control as soon as possible; species ranked as moderate-priority are recommended for control as soon as high-priority species are under control; and species ranked as low-priority are recommended for control after high- and moderate-priority species are under control. Species ranked as moderate- and low-priority for removal are discussed in Appendix C, *Moderate and Low-Priority Invasive Non-native Species for Removal.* General recommendations for control include manual and mechanical removal, application of herbicides, and cut and daub. The appropriate removal methodology should ultimately be determined with the consideration of many variables, including time of year, severity of infestation, presence of special-status species, the degree of intermixing of invasive non-native plant species with sensitive native habitats, access, and proximity to surface water. Specific invasive non-native plant control recommendations for high-priority species are included below.

Table 6
TARGET INVASIVE NON-NATIVE PLANT SPECIES FOR REMOVAL AND MANAGEMENT

Scientific Name	Common Name	Cal-IPC Rating[1]	Removal Priority
Arundo donax	giant reed	High	High
Cortaderia selloana	pampas grass	High	High
Ehrharta calycina[2]	perennial veldt grass	High	High
Tamarix ramosissima	saltcedar	High	High
Brachypodium distachyon[2]	purple false-brome	Moderate	High

Table 6 (cont.)
TARGET INVASIVE NON-NATIVE PLANT SPECIES FOR REMOVAL AND MANAGEMENT

Scientific Name	Common Name	Cal-IPC Rating[1]	Removal Priority
Dittrichia graveolens	stinkwort	Moderate	High
Gazania linearis	treasure flower	Moderate	High
Eucalyptus camaldulensis	river red gum	Limited	High
Glebionis coronaria	crown daisy	Limited	High
Silybum marianum	milk thistle	Limited	High
Dimorphotheca sinuata	blue-eyed cape marigold	None	High
Melia azedarach	Chinaberry tree	None	High
Brassica nigra	black mustard	Moderate	Moderate
Centaurea melitensis	Maltese star-thistle	Moderate	Moderate
Hirschfeldia incana	shortpod mustard	Moderate	Moderate
Pennisetum setaceum	crimson fountain grass	Moderate	Moderate
Melinus repens	rose natal grass	None	Moderate
Carduus pycnocephalus	Italian thistle	Moderate	Low
Cynodon dactylon[2]	Bermuda grass	Moderate	Low
Rumex crispus	curly dock	Limited	Low
Reseda luteola	Dyer's rocket	None	Low

[1] Source: Cal-IPC 2023. Overall rating listed for southwest region, factoring impact, invasiveness, distribution, and documentation level.

[2] Non-native grass species.

3.1.1 High-Priority Species for Removal

Giant Reed

Giant reed (*Arundo donax*) is a tall perennial grass (family Poaceae) that typically forms dense stands on disturbed sites, sand dunes, riparian areas, and wetlands. It has invaded central California river valleys in San Luis Obispo and Monterey Counties, the San Francisco Bay Area, and the Sacramento and San Joaquin River Valleys; it is also increasing in the North Coast region. Giant reed is threatening California's riparian ecosystems by outcompeting native species, such as willows, for water. Several clumps of giant reed occur within the San Vicente Connector parcels, specifically along SR-67, within the California Department of Transportation right-of-way and the northern parcel. An estimated 20 stems (less than 0.1 acre) from two clumps occur at the San Vicente Connector parcels location.

The recommended approach to manage giant reed is to cut and remove the current biomass, wait three to six months for the species to resprout, and then apply herbicide, preferably glyphosate, to the emerging stems and leaves. Care must be taken when using glyphosate because it is a non-selective treatment and could affect native species as well. Other herbicides, such as imazapyr, are also effective. These applications can be done year-round, if the foliage is green, but are best done in the winter and spring months following rainfall and recent growth. Follow-up foliar application is recommended to ensure the species is eradicated.

Pampas Grass

Pampas grass (*Cortaderia selloana*) is a large, clumping grass, about six to eight feet tall. It is an aggressively spreading, ornamental species that produces significant amounts of biomass, which is

Map Series Index

Preserve Boundaries

- Original Sycamore Canyon and Goodan Ranch Preserves
- Sycamore North Addition
- Sycamore South Addition
- 2015 Northern Addition
- 2015 Southern Addition
- Southern Parcel Addition
- San Vicente Connector Parcels
- Southern Gap Parcels

b

c

d

e

Scripps Poway Parkway

67

Sycamore Canyon Rd

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0 2,300 Feet

Source: Aerial (SanGIS 2017); Special Status Species (Dudek 2008 and 2012; HELIX 2019 and 2022)

HELIX Environmental Planning

Special-Status Wildlife Locations Map Index

Figure 6a

Sycamore Canyon/Goodan Ranch County Preserve

Map Series Boundary

Preserve Boundaries

Original Sycamore Canyon and Goodan Ranch Preserves

Sycamore North Addition

2015 Northern Addition

2015 Southern Addition

Special-Status Wildlife Locations

2022 Species Surveys

Coastal California Gnatcatcher

Coastal Whiptail

2016 Species Surveys

Belding's Orange-throated Whiptail

Rosy Boa

Red Diamond Rattlesnake

Coastal Whiptail

Coast Patch-nosed Snake

San Diego Desert Woodrat

Pocketed Free-tailed Bat

Townsend's Big-eared bat

Western Small-footed Myotis

Western Red bat

Western Yellow Bat

Yuma Myotis

Bald Eagle

Coastal California Gnatcatcher

Sharp-shinned Hawk

Southern California Rufous-crowned Sparrow

Turkey Vulture

Mule Deer

Dulzura Pocket Mouse

Northwestern San Diego Pocket Mouse

2012 Species Surveys

Rosy Boa

Red Diamond Rattlesnake

Blainville's Horned Lizard

Belding's Orange-throated Whiptail

Southern California Rufous-crowned Sparrow

Coastal California Gnatcatcher

Barn Owl

San Diego Desert Woodrat

Dulzura Pocket Mouse

Northwestern San Diego Pocket Mouse

San Diego Black-tailed Jackrabbit

Mule Deer

Pallid Bat

Pocketed Free-tailed Bat

Western Red Bat

Western Small-footed Myotis

Western Yellow Bat

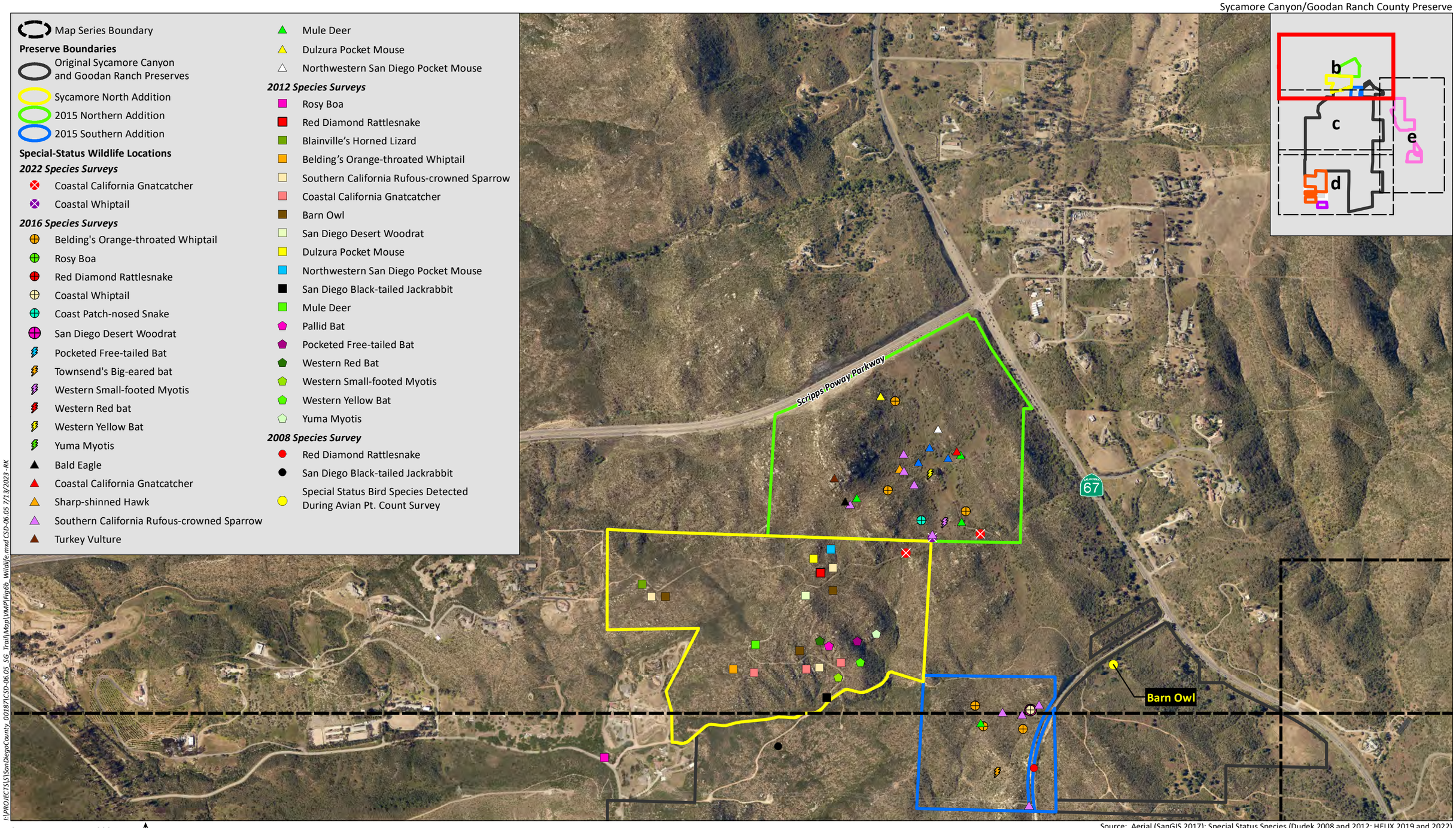
Yuma Myotis

2008 Species Survey

Red Diamond Rattlesnake

San Diego Black-tailed Jackrabbit

Special Status Bird Species Detected During Avian Pt. Count Survey



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Source: Aerial (SanGIS 2017); Special Status Species (Dudek 2008 and 2012; HELIX 2019 and 2022)

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HELIX Environmental Planning

Special-Status Wildlife Locations

Figure 6b

Map Series Boundary

Preserve Boundaries

Original Sycamore Canyon and Goodan Ranch Preserves

Sycamore North Addition

2015 Southern Addition

San Vicente Connector Parcels

Special-Status Animals

2019 Species Surveys

Coastal California Gnatcatcher

2016 Species Surveys

Belding's Orange-throated Whiptail

Coastal Whiptail

Pocketed Free-tailed Bat

Townsend's Big-eared bat

Western Small-footed Myotis

Western Yellow Bat

Yuma Myotis

Southern California Rufous-crowned Sparrow

Mule Deer

2012 Species Surveys

White-tailed Kite

Rosy Boa

San Diego Black-tailed Jackrabbit

2008 Species Survey

Red Diamond Rattlesnake

San Diego Black-tailed Jackrabbit

Coast Patch-nosed Snake

Blainville's Horned Lizard

Western Bluebird

Western Spadefoot

Belding's Orange-throated Whiptail

Horned Lark

Special Status Bird Species Detected During Avian Pt. Count Survey

Special Status Herptiles Detected During Hepetological Array Trapping

Orange-throated Whiptail, Coronado Skink, Western Spadefoot Toad

Western Spadefoot Toad, California Western Whiptail, Orange-throated Whiptail

California Western Whiptail, Orange-throated Whiptail

Western Spadefoot Toad, California Western Whiptail, Orange-throated Whiptail, Blainville's Horned Lizard

Rufous-crowned Sparrow, Bell's Sage Sparrow

Rufous-crowned Sparrow, Western Bluebird

Cooper's Hawk, Western Bluebird

Rufous-crowned Sparrow, Bell's Sage Sparrow, Osprey

Barn Owl, Rufous-crowned Sparrow, Red-shouldered Hawk, Western Bluebird, White-tailed Kite, Yellow-breasted Chat

Sycamore Canyon Rd

California Western Whiptail, Orange-throated Whiptail, Coronado Skink

Rufous-crowned Sparrow, Yellow-breasted Chat

Rufous-crowned Sparrow, Bell's Sage Sparrow

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e

0 900 Feet

N

Source: Aerial (SanGIS 2017); Special Status Species (Dudek 2008 and 2012; HELIX 2019 and 2022)

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HELIX Environmental Planning

Special-Status Wildlife Locations

Figure 6c

Map Series Boundary

Preserve Boundaries

Original Sycamore Canyon and Goodan Ranch Preserves

Sycamore South Addition

Southern Parcel Addition

Southern Gap Parcels

Special-Status Animals

2019 Species Surveys

- Quino Checkerspot Butterfly
- Mule Deer
- San Diego Black-tailed Jackrabbit
- Yuma Myotis
- Western Mastiff Bat
- San Diego Desert Woodrat
- Pocketed Free-tailed Bat
- Turkey Vulture
- Yellow Warbler
- Southern California Rufous-crowned Sparrow
- Belding's Orange-throated Whiptail
- Western Spadefoot

2012 Species Surveys

- Turkey Vulture
- Blainville's Horned Lizard
- Belding's Orange-throated Whiptail
- Southern California Rufous-crowned Sparrow
- Coastal California Gnatcatcher
- Barn Owl
- San Diego Desert Woodrat
- Northwestern San Diego Pocket Mouse
- Mule Deer
- Pocketed Free-tailed Bat
- Western Red Bat
- Western Small-footed Myotis
- Yuma Myotis

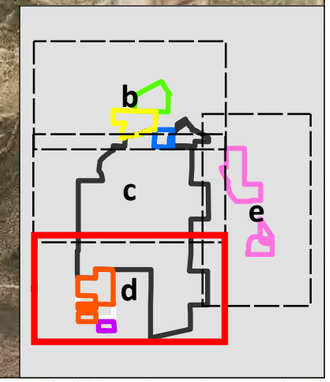
2008 Species Survey

- Southern California Rufous-crowned Sparrow
- Red Diamond Rattlesnake
- San Diego Black-tailed Jackrabbit
- Blainville's Horned Lizard
- Burrowing Owl
- Horned Lark
- Special Status Bird Species Detected During Avian Pt. Count Survey

Rufous-crowned Sparrow, Yellow-breasted Chat

Rufous-crowned Sparrow, Bell's Sage Sparrow, Western Bluebird

Horned Lark, Rufous-crowned Sparrow, Bell's Sage Sparrow, Vaux's Swift



0 900 Feet

Source: Aerial (SanGIS 2017); Special Status Species (Dudek 2008 and 2012; HELIX 2019 and 2022)

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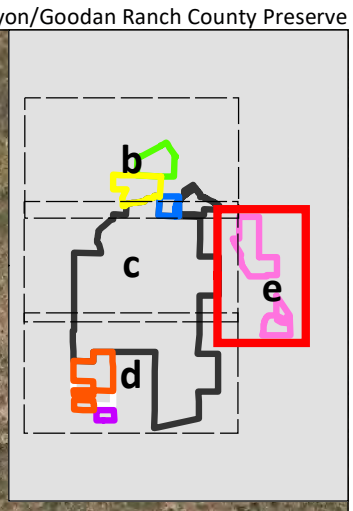
HELIX Environmental Planning

Special-Status Wildlife Locations

Figure 6d

Sycamore Canyon/Goodan Ranch County Preserve



b

c

e

67

Map Series Boundary

Preserve Boundaries

Original Sycamore Canyon and Goodan Ranch Preserves

San Vicente Connector Parcels

Special-Status Animal Species

2019 Species Surveys

- Barn Owl
- Cooper's Hawk
- California Gnatcatcher
- Southern California Rufous-crowned Sparrow
- Turkey Vulture
- Yellow Warbler
- Dulzura Pocket Mouse
- Dulzura Pocket Mouse and San Diego Desert Woodrat
- San Diego Desert Woodrat
- San Diego Pocket Mouse
- Blainville's Horned Lizard
- Coastal Whiptail
- Two-striped Gartersnake
- San Diego Black-tailed Jackrabbit
- Southern Mule Deer
- Big Brown Bat
- Canyon Bat
- Hoary Bat
- Mexican Free-tailed Bat
- Pocketed Free-tailed Bat
- Townsend's Big-eared Bat
- Western Small-footed Myotis
- Western Yellow Bat
- Yuma Myotis

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0 600 Feet

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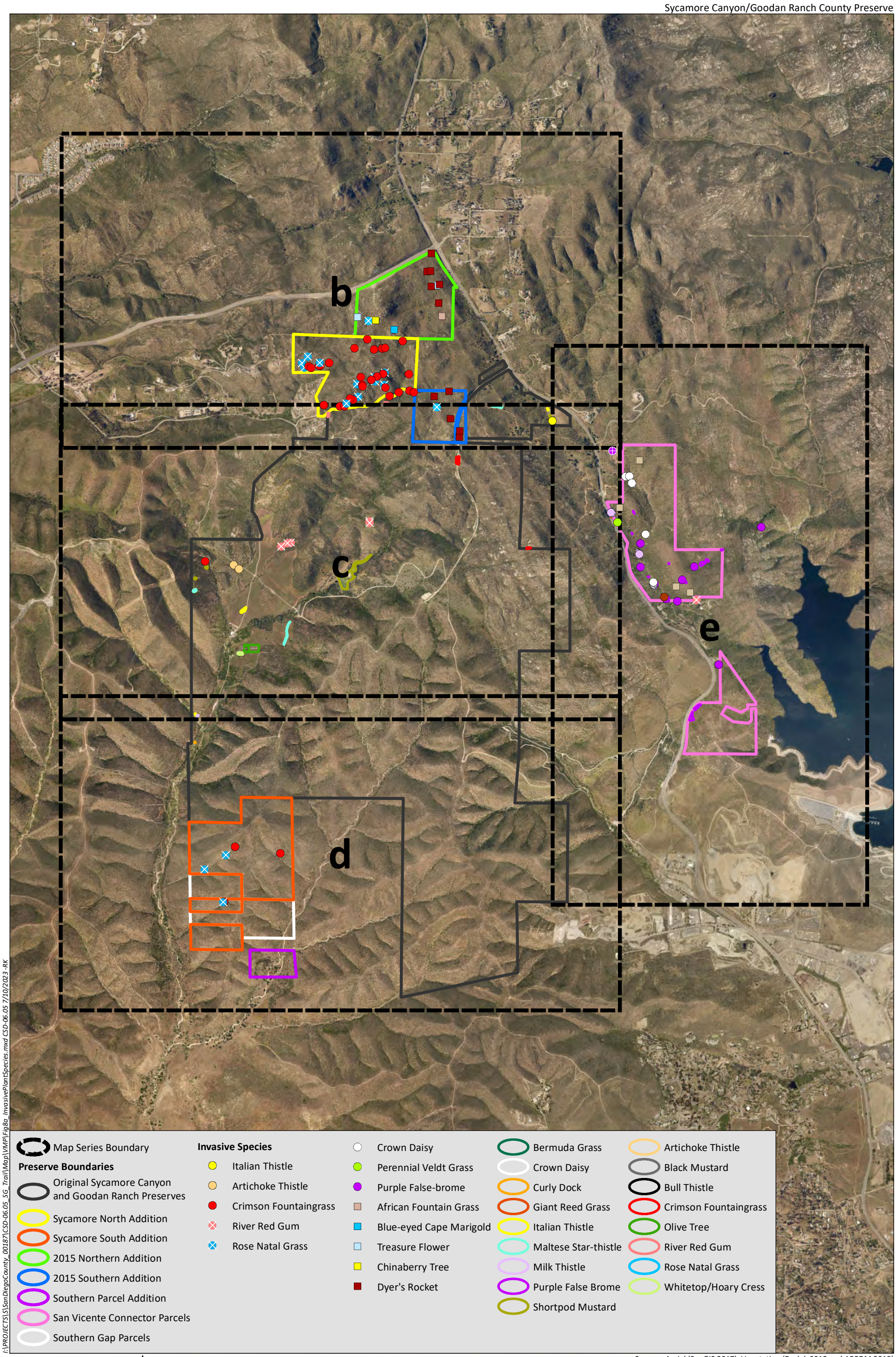
Source: Aerial (SanGIS 2017); Special Status Species (Dudek 2008 and 2012; HELIX 2019 and 2022)

HELIX Environmental Planning

Special-Status Wildlife Locations

Figure 6e



Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013 and AECOM 2018)

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HELIX Environmental Planning

Target Invasive Non-native Plant Species Locations Map Index

Figure 8a

Sycamore Canyon/Goodan Ranch County Preserve

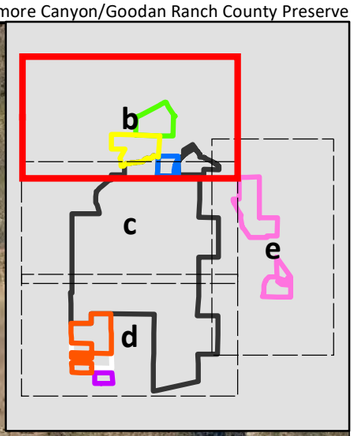
Map Series Boundary

Preserve Boundaries

- Original Sycamore Canyon and Goodan Ranch Preserves
- Sycamore North Addition
- 2015 Northern Addition
- 2015 Southern Addition

Invasive Species

- Italian Thistle
- Crimson Fountaingrass
- Rose Natal Grass
- African Fountain Grass
- Blue-eyed Cape Marigold
- Treasure Flower
- Chinaberry Tree
- Dyer's Rocket
- Italian Thistle
- Maltese Star-thistle
- Shortpod Mustard
- Crimson Fountaingrass
- River Red Gum
- Rose Natal Grass



0 900 Feet

N

Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013 and AECOM 2018)

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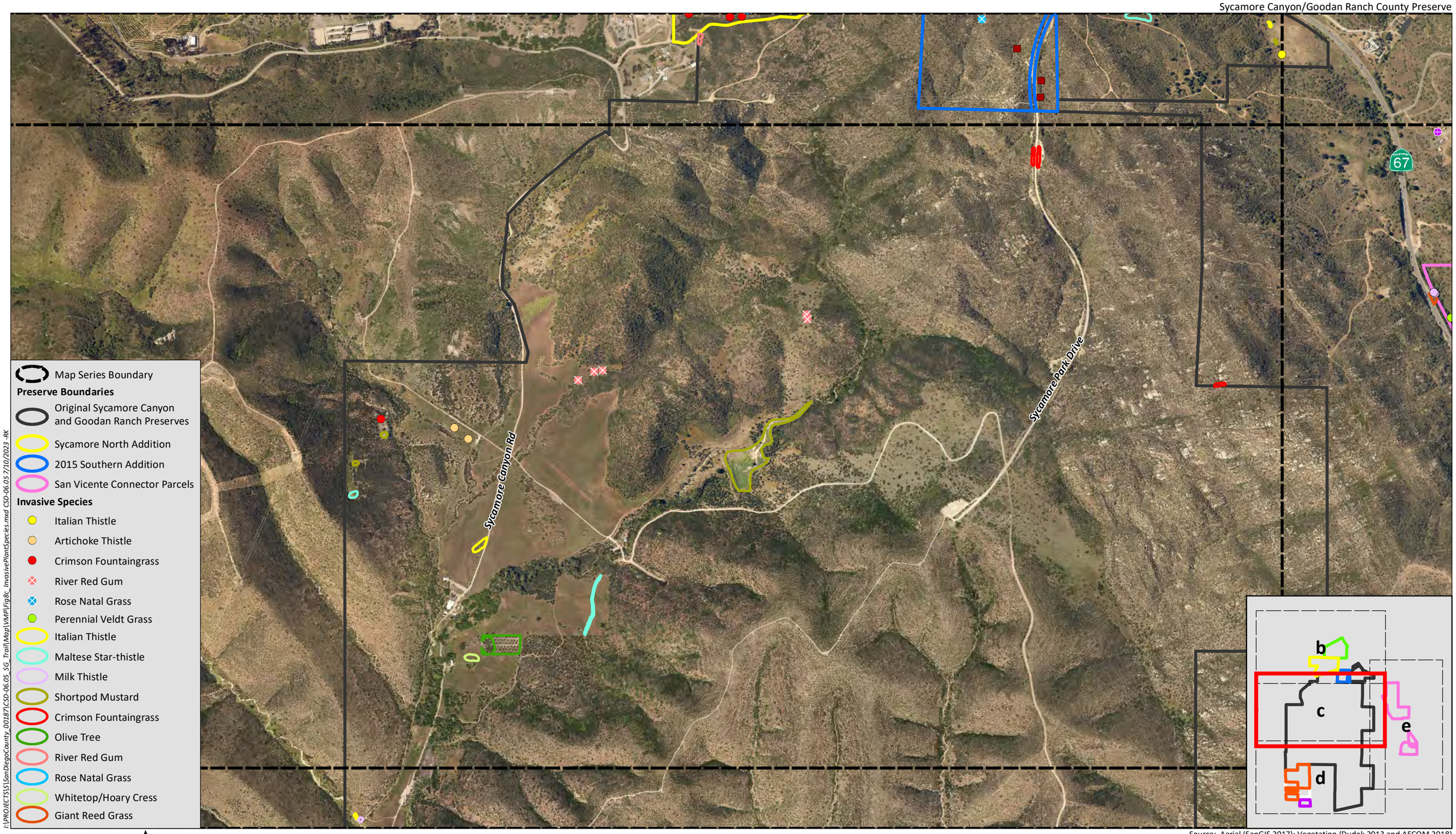
HELIX Environmental Planning

Target Invasive Non-native Plant Species Locations

Figure 8b



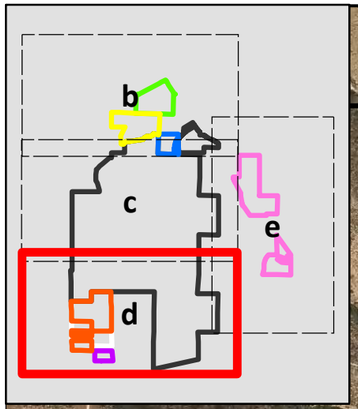
Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013 and AECOM 2018)

HELIX Environmental Planning

Target Invasive Non-native Plant Species Locations

Figure 8c

Sycamore Canyon/Goodan Ranch County Preserve



Map Series Boundary

Preserve Boundaries

Original Sycamore Canyon and Goodan Ranch Preserves

Sycamore South Addition

Southern Parcel Addition

Southern Gap Parcels

Invasive Species

Crimson Fountaingrass

Rose Natal Grass

Curly Dock

Italian Thistle

Milk Thistle

0 900 Feet

N

Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013 and HELIX 2019)

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HELIX Environmental Planning

Target Invasive Non-native Plant Species Locations

Figure 8d

Sycamore Canyon/Goodan Ranch County Preserve

Map Series Boundary

Preserve Boundaries

San Vicente Connector Parcels

Crown Daisy

Milk Thistle

Perennial Veldt Grass

Purple False Brome

Saltcedar

African Fountain Grass

River Red Gum

Stinkwort

Crown Daisy

Giant Reed Grass

Milk Thistle

Purple False Brome

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b

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d

e

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0 600 Feet

Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013, AECOM 2018, HELIX 2019)

HELIX Environmental Planning

Target Invasive Non-native Plant Species Locations

Figure 8e

extremely flammable, thus increasing the potential for fire ignition and/or spread. This species produces an abundance of seeds, which are light and can be windblown into the surrounding areas (Cal-IPC 2023).

The Cal-IPC inventory categorizes pampas grass as having an overall rating of "high", and it is ranked as a high priority for removal/control within the Preserve because of its ability to spread rapidly and contribute to the spread of wildfire (Cal-IPC 2023). This species was observed scattered in the creeks north and south of the Visitors Center in the western portion of the Preserve. Only five individual plants (covering approximately 500 square feet) were observed and mapped within the Preserve during the 2012 survey, but it is likely that there are more individuals along the riparian corridor of Sycamore Creek.

Removal of pampas grass involves either hand digging or pulling/winching plants out of the ground. If complete removal of the plant is not feasible, it may be treated with an herbicide to control. Herbicide application can occur as a foliar application, or the plants can be cut to near the ground surface and treated with an appropriate systemic herbicide (e.g., glyphosate). Treatment is recommended to occur prior to setting seed (blooms September to March), and if viable seed is present at the time of treatment, plumes should be carefully cut and bagged to prevent seed spread. Fall applications of herbicide for treatment result in better control compared to summer applications (Bossard 2000).

Perennial Veldt Grass

Perennial veldt grass (*Ehrharta calycina*) is a perennial grass (family Poaceae) found in disturbed grasslands, roadsides, and coastal habitats in California's south and central-west regions. Perennial veldt grass is spreading very rapidly in the central coast region, where it invades dunes and shrublands. It was originally imported to California for use as a pasture grass and for erosion control. Perennial veldt grass displaces native vegetation and converts coastal scrub and chaparral communities to grasslands. It resprouts after fires and may increase fire frequency. Five individual perennial veldt grass were mapped at one location within the San Vicente Connector parcels.

Perennial veldt grass can be mechanically removed by hand-pulling or by shoveling. Glyphosate is the preferred herbicide and should be applied as a foliar spray to young rapidly growing plants. Application should occur in the growing season.

Saltcedar

Saltcedar (*Tamarix ramosissima*) is a shrub or tree typically found along waterways, drainages, and riparian areas. It is associated with dramatic changes in geomorphology, groundwater availability, soil chemistry, fire frequency, plant community composition, and native wildlife diversity. Saltcedar presents the greatest risk of reducing habitat quality within riparian areas and vegetated ephemeral drainages, which are limited in presence within the Preserve (Cal-IPC 2023). Five individuals of saltcedar were observed within drainages in the northwestern portion of the Preserve, just north of the ranch house, in addition to one saltcedar mapped within the northern portion of the San Vicente Connector parcels, but it is likely that there are more individuals along the riparian corridors.

The Cal-IPC inventory categorizes saltcedar as having an overall rating of "high" (Cal-IPC 2023). Removal of pampas grass involves either hand digging or pulling/winching plants out of the ground. If complete removal of the plant is not feasible, it may be treated with an herbicide to control. Herbicide application can occur as a foliar application, or the plants can be cut to near the ground surface and treated with an appropriate systemic herbicide (e.g., glyphosate). Treatment is recommended to occur prior to setting

seed (blooms September to March), and if viable seed is present at the time of treatment, plumes should be carefully cut and bagged to prevent seed spread. Fall applications of herbicide for treatment result in better control compared to summer applications (Bossard 2000).

Purple False-Brome

Purple false-brome (*Brachypodium distachyon*) is a winter annual grass that is locally abundant in drier regions of California (Cal-IPC 2023). This species occurs primarily in dry, open, or disturbed sites that flower later than most other annual grasses. This species has a "moderate" Cal-IPC Inventory Ranking (Cal-IPC 2023). This species was observed at two locations in the north-central portion of the Southern Parcel adjacent to the unvegetated channels in areas dominated by other annual non-native grasses. Less than 10 individuals were observed at each observation location. Over 1,700 individual purple false-brome were estimated and mapped at several locations on the San Vicente Connector parcels.

Small areas of infestation can be controlled with hand pulling, mowing, or tillage. The species can also be treated with an appropriate herbicide (e.g., fusillade) early in the postemergence stage before the boot stage (the time when the seedhead is enclosed within the sheath of the flag leaf).

Artichoke Thistle

Artichoke thistle (*Cynara cardunculus*) is a large perennial thistle found at lower elevations throughout multiple regions of California. It prefers areas of disturbance, in vegetation communities lacking a dense canopy, such as non-native grasslands, chaparral, sage scrub, and more open canopy riparian areas. Artichoke thistle is an ornamental plant and is available commercially. It reproduces by seed and sometimes by re-sprouting from root fragments.

The Cal-IPC inventory categorizes artichoke thistle as having an overall rating of "moderate" (Cal-IPC 2023). This species is ranked as a high priority for removal/control in the Preserve because of its tendency to spread and establish rapidly, and for the difficulty in complete control. Within the Preserve, artichoke thistle has been targeted and removed from areas where it was previously mapped. The Preserve is actively monitored for this species, and individuals encountered are hand-pulled or treated with herbicide.

Control of this species could include manual removal, mechanical control, or herbicide treatment. The species produces abundant, wind-blown seed, and therefore, control should be focused during the winter and early spring months before the species develops seed. Young plants can be pulled, cut, or treated with an appropriate herbicide (e.g., glyphosate) to control.

Control of the species is most effective when mature plants are bolting, generally in early to mid-April in Southern California and late April or May farther north. Artichoke thistle can be controlled by physical control, such as grubbing or prescribed burning, or by chemical control.

Stinkwort

Stinkwort (*Dittrichia graveolens*) is a fall-flowering, sticky, aromatic non-native annual dicot that appears to be rapidly expanding its range in California. It colonizes disturbance areas through seed dispersal (Cal-IPC 2023). The Cal-IPC inventory categorizes this species as having an overall rating of "moderate" (Cal-IPC 2023). Additionally, Cal-IPC categorizes this species as an "alert" species, which indicates that it has significant potential for invading new ecosystems (Cal-IPC 2023). This species is ranked as a high priority

for removal/control in the Preserve because of its tendency to spread rapidly and displace native vegetation communities. Within the Preserve, stinkwort is located northwest and east along roads and creeks extending to the Visitors Center in the western portion of the Preserve. Approximately 15 individual plants (approximately 50 square feet) were documented in the western portion. Additionally, one population was mapped in the access road outside the San Vicente Connector parcels boundary, totaling approximately 1,000 individuals (Figures 8a-e).

Stinkwort has a relatively shallow root system, so control by hoeing or pulling is an option. The species can also be controlled by chemical means.

Treasure Flower

Treasure flower (*Gazania linearis*) is a perennial herb introduced as an ornamental plant (Cal-IPC 2023). This species has a "moderate" Cal-IPC Inventory Ranking (Cal-IPC 2023). This species was observed growing on the western edge of the 2015 Northern Addition (Figures 8a-e). A relatively low number of plants were growing in two locations; they were observed in the northeastern portion of the Preserve, as well as sporadically throughout the Preserve.

This species should be removed to reduce the spreading potential. Due to the small number, this can occur at any time using mechanical removal techniques. It is recommended to manually remove this plant while the inflorescences are still intact. This plant is known to flower year-round. Chemical treatment is recommended before the plant produces inflorescences unless the plant will also be removed after it senesces.

Maltese Star-thistle

Maltese star thistle (*Centaurea melitensis*) is widespread in open or disturbed areas in the western United States. This species occupies grasslands, open woodlands, roadsides, and agricultural fields (Cal-IPC 2023). This species has more invasive potential in Southern California and has been designated with a "moderate" Cal-IPC Inventory Ranking. The species is rated as a moderate priority for control within the Preserve due to its difficulty in effective control. Maltese star-thistle is a common component of non-native annual grasslands but was occasionally mapped herein for control where its presence was particularly abundant. As shown in Figures 8a-e, areas for control are located in the northeastern corner, central and western portions of the site. A total of 2,900 plants (approximately 1,500 square feet) were mapped within the Preserve.

As a competitor species with a number of native annual species, it would be difficult to remove. Control of this species could include manual removal, mechanical control, or herbicide treatment. Control should be focused during the winter and early spring months before the species develops seed. Young plants can be pulled, cut, or treated with an appropriate herbicide (e.g., glyphosate) to control. Additionally, mowing and burning at the appropriate time before the seeds set may assist in reducing its cover, and biocontrol insects have also been used. It can be treated in early spring during its growing period.

Whitetop (Hoary Cress)

Whitetop (*Lepidium [Cardaria] draba*) is a perennial herb found most commonly in riparian areas and areas of disturbance. It is found in multiple regions in California and, in some areas, can be very invasive. This plant quickly colonizes areas of soil disturbance. It reproduces by seed and rhizomatous growth

from its root system. It is possible for new individuals to sprout from root fragments, making manual removal difficult. It produces a large number of viable seeds, which can be dispersed rapidly (Cal-IPC 2023).

The Cal-IPC inventory categorizes whitetop as having an overall rating of "moderate"; however, it is ranked as a high priority for removal/control within the Preserve due to its potential to rapidly spread within the Preserve (Cal-IPC 2023). Within the Preserve, artichoke thistle has been targeted and removed from areas where it was previously mapped. The Preserve is actively monitored for this species, and individuals encountered are treated with herbicide.

Hand removal of whitetop is impractical due to the extensive root and rhizome system. Treatment is recommended to occur prior to setting seed, and if viable seed is present at the time of treatment, seed heads should be carefully cut and bagged to prevent seed spread. Herbicide control is recommended as manual removal of plants creates the potential for fragmentation of roots left within the soil which can regenerate into new individuals. Herbicide application is most effective during the bolting and flowering stage (generally March to June; Bossard 2000).

River Red Gum

River red gum (*Eucalyptus camaldulensis*) is a eucalyptus species that occurs in Southern California, both in upland and riparian habitats. It can spread rapidly, outcompete native species, and increase fuel levels for fires as it tends to overcrowd native plants and trees by growing in dense stands. Approximately 16 individuals (approximately 0.3 acre) were observed on the Sycamore Canyon Preserve. One individual river red gum was observed on the San Vicente Connector parcels.

River red gum within the Preserve is best managed by cutting down each tree and stump, and treating them with full concentrate glyphosate. The biomass should be removed from the site. Follow-up treatments with foliar spray are recommended to control resprouts.

Crown Daisy

Crown daisy (*Glebionis coronaria*) is a flowering annual (family Asteraceae) found along the central and south coast of California. Crown daisy commonly invades riparian areas, coastal dunes, prairies, and scrub. It is a common ornamental plant that escapes garden settings and easily invades disturbed areas. The seeds of crown daisies sprout very quickly after rain, even in relatively dry areas. Seedlings may grow up to five feet tall and may form dense stands that crowd out native vegetation. Dead plant mass can remain in place for many years, preventing native plants from re-colonizing. A total of 42 crown daisy were mapped at 11 locations within the northern portion of the San Vicente Connector parcels, totaling approximately 0.004 acre. In some cases, there is only one individual, and in other cases, groups of individuals.

Control of the species can be done through non-chemical or chemical means. Non-chemical control includes mechanical methods such as pulling and cutting, which should occur during the growing period (early winter and spring) and before the seeds set (April through May). Plants should be removed yearly before seeding so the seedbank will eventually become depleted. Chemical treatments using glyphosate are effective in controlling crown daisy. These treatments should occur from January to April, before the seeds set. Care must be taken when using glyphosate because it is a non-selective treatment and could affect native species as well. Treatment areas should be monitored each year until the species is eradicated.

Milk Thistle

Milk thistle (*Silybum marianum*) is a winter annual or biennial with prickly leaves (family Asteraceae). It is widely spread throughout California in overgrazed pastures and along fence lines and other disturbed areas. Milk thistle produces tall, dense stands that outcompete native species. A few isolated patches were observed in the central and southern portions of the Preserve in addition to approximately 111 individuals mapped at four locations within the northern portion of the San Vicente Connector parcels, totaling approximately 0.044 acre (Figures 8a-e).

Control of the species can be done through non-chemical or chemical means. Non-chemical control includes mechanical methods, such as pulling and cutting, and should occur before the seeds set. Glyphosate is the recommended herbicide, and treatments should occur between January and March, preferably before flowering and seed set.

Blue-Eye Cape-Marigold

Blue-eye cape-marigold (*Dimorphotheca sinuata*) occurs on the south slope of the southern hills in the northwestern portion of the Preserve, south of Scripps Poway Parkway (Figures 8a-e). Only a few individual plants were found at that location. Blue-eye cape-marigold has been commonly planted to provide cover to road cuts and freeway edges. It occasionally escapes into the natural environment. The fruits do not have a pappus, so wind dispersal is not a major means for it to spread.

The population that occurs on the Preserve is currently quite small, which would facilitate its removal using mechanical hand tools. If the population becomes too large to be manageable by hand, it may be necessary to use chemical treatment. Because it has not yet become a serious pest, there is not much information on treatment for its removal. However, comparable species have been treated with a three percent solution of glyphosate (Plant Health & Pest Prevention Services 2017). Because it is an annual, it must be treated before the plants set seed and disperse them. It is recommended to manually remove this plant prior to flowering (February to June) or while inflorescences are still intact, such that they may be removed from the Preserve. Chemical treatment is recommended before the plant produces inflorescences unless the plant will also be removed after it senesces.

Chinaberry Tree

Chinaberry tree (*Melia azedarach*) grows in a small location in the northwestern portion of the Preserve, south of Scripps Poway Parkway, consisting of one individual on an upper slope area (Figures 8a-e). It is in a non-natural location.

Removal of this species would be fairly simple by hand at any time of the year. It is not known how it might have been dispersed into that location unless a seed or fruit was carried by a California scrub jay (*Aphelocoma californica*) or common raven (*Corvus corax*). It is not likely that it will grow to a significant size since it is entirely dependent on local rainfall for watering.

3.2 REMOVAL METHODS

The selection of the appropriate removal methodology should be determined with consideration of many variables, including the time of year, severity of infestation, presence of sensitive plants and wildlife, degree of intermixing of invasive non-native plant species with sensitive native habitats, access, and proximity to surface water. General recommendations for the Preserve are provided below.

3.2.1 Manual Removal

Manual vegetation removal (e.g., hand pulling, grubbing, and hoeing) is a low-impact but labor-intensive method of controlling invasive non-native plant species within a focused area. Due to the perennial nature of many of the target invasive plant species, their large size, and/or difficulty of control, manual vegetation control is primarily applicable to the smaller, annual species within the Preserve. Appropriate applications for manual removal are for small occurrences of annual invasive non-native plant species and seedlings of perennial species when complete removal of the root system is possible. More mature perennial plants will limit the ability for manual removal based on their size and root mass. Manual removal should be incorporated where herbicide application alone is inadequate, or where the proximity of sensitive plant species prevents safe application (e.g., risk of overspray or drifting of herbicides). It is anticipated that DPR rangers and staff will routinely remove invasive non-native plant species in the early stages of growth when found along trails and at locations identified during invasive plant surveys and monitoring. With minimal training, and using shovels, hoes, loppers, or by hand, newly spotted seedlings could be removed before they have the chance to establish themselves and/or set seed. A volunteer program, with trained community volunteers, would help enfranchise the general public with a vested interest in the Preserve and its protection, as well as serve as an educational experience whose effects could extend beyond the boundaries of the Preserve. Unless it is infeasible (portions of trees may be too large to remove without significant effort or impact), all removed invasive non-native plant material should be disposed of in a manner that does not promote the spread or infestation of the species into new areas of the Preserve. If the plant material cannot be contained on-site to decompose without regenerating, it should be disposed of outside of the Preserve at a green waste facility or landfill.

Targeted species as part of this Vegetation Management Plan that can be manually removed include perennial veldt grass, purple false-brome, stinkwort, maltese star-thistle, crown daisy, artichoke thistle, milk thistle, and blue-eye cape-marigold.

3.2.2 Mechanical Removal

Mechanical removal may be necessary for the control of some larger target invasive species, such as Chinaberry tree, eucalyptus, pampas grass, and saltcedar, and is recommended to be combined with herbicide application. The advantage of using mechanized equipment is that it can cover large areas relatively quickly. The disadvantages include the costs of operator training, initial equipment purchase, and equipment maintenance and transportation. Cutting and removal of the aboveground plant material can be conducted with chainsaws and/or hand saws. The resulting material should be chipped and hauled off-site. Subsequent application of herbicides should follow product guidelines for safe transport, storage, and application. Stumps remaining on-site after cutting and herbicide application are not recommended for removal or grinding but should be left to decompose in place.

3.2.3 Herbicides

Herbicide application may be used on its own or as a secondary treatment following manual or mechanical removal for controlling sprout growth and regeneration. The advantage of using chemical treatments is that they typically result in high kill rates and can prevent the invasives from setting seed. Thus, over time, the invasives are eliminated as their “seed bank” in the soil is eventually eliminated. The application of herbicide can be costly and require safety equipment and training to minimize the impact on non-target species. The applicators must be trained and then licensed by the State of

California. The use of herbicides in conjunction with hand/mechanical removal is the most widely used and effective technique for controlling invasive plants.

Herbicides are broadly classified into two basic types: pre-emergent and post-emergent. Pre-emergent herbicides are sprayed directly onto the ground and prevent plants from germinating and/or growing. As such, they have a larger potential to impact any native seeds remaining in the soil, and often have longer persistence times in the environment. Post-emergent herbicides are applied directly onto the plants, often during the early phases of their growth, killing them before they have the chance to mature and set seed. With proper equipment and training, they can be applied relatively selectively and will have no impact on native seeds residing in the soil. However, should the target species be intermixed with growing native species, the chance of affecting these natives would be greatly increased.

Different plants vary in their response to any particular herbicide and can also vary in their response depending upon which stage in their life cycle the herbicide is applied. Herbicides applied during the "bolting" phase (when flowering stalks are being produced) may have greater kill rates than the same chemical applied during the rosette stage or the flowering stage. Some herbicides target specific groups of plants (e.g., fusillade affects only grasses), while others can kill virtually all kinds of plants. Only those herbicides permitted for use in California should be used. Systemic herbicides (as opposed to contact herbicides) are likely the most effective for the control of invasive non-native plant species due to their ability to spread via translocation into root tissue.

Herbicide application is recommended following the removal of all target invasive tree species and other perennial species with the ability to regenerate from root fragments when the removal of all plant material is not feasible. Herbicide use should be limited to localized applications rather than foliar applications to eliminate the possibility of drift and impacts to neighboring desirable species. A wide range of herbicides is available for such types of treatment.

Herbicide labels and material safety data sheets list susceptible target plant species and provide proper direction in the use and handling of the products. Herbicides should be applied in accordance with state and federal law.

3.2.4 Cut and Daub

Cut and daub treatment is recommended for larger invasive plants, such as large trees and shrubs, to control regrowth and kill the portion of the plant remaining below ground. Cut and daub involves the cutting of invasive plant stalks or trunks and then the direct application of an appropriate systemic herbicide directly to the cambium layer of the freshly cut stump or stem. Other related methods include drill and fill where holes are drilled into the trunk of a tree and herbicide is injected; or the glove method, where an herbicide-soaked glove is used to apply directly to plant foliage or freshly cut stumps. As with general herbicide use, the applicator must be correctly trained, and licensed by the State of California as an Applicator.

It is critical that the herbicide treatment occurs immediately after the plants are severed so that the herbicide is carried into the plant tissue. If enough time elapses to allow the cut surface of the severed plant to dry out, a fresh cut should be made prior to herbicide application.

Targeted species as part of this Vegetation Management Plan that are best treated with the cut and daub method include giant reed, salt cedar, and river red gum.

4.0 HABITAT RESTORATION

The goal of habitat restoration on County-managed lands is to reestablish or enhance the biological functions and values of habitat that has been degraded from either human or natural causes. Restoration methods range from active revegetation, which recreates habitat, to passive management. For Preserve lands, habitat restoration is typically not required per the Subarea Plan; however, in some cases, if resources are available, active habitat restoration may assist the recovery of an area that has been disturbed and is showing difficulty in recovering.

4.1 PROPOSED HABITAT RESTORATION AREAS

The Preserve is generally composed of high-quality native vegetation communities, and habitat restoration opportunities are limited within the Preserve. There are a few areas in the Preserve that would benefit from habitat restoration activities, as shown in Figures 9a-b, *Revegetation Areas*. Approximately 9.36 acres of disturbed habitats are proposed for habitat restoration, which primarily include previously cleared and/or disturbed areas. These are located throughout the site, among sagebrush, chaparral, and oak communities, and identified as Restoration Areas (RA)- 1 through RA-8. Within the northeastern portion of the Preserve are several graded areas of disturbance which are associated with the Sunrise Powerlink Project. These are assumed proposed for revegetation by the project and are therefore not included in this VMP.

The role of habitat restoration on a natural preserve such as the Preserve is to reestablish the natural functions of areas that have been affected by human causes. Habitat restoration methods include active revegetation (including planting of native species) and passive management, which may involve invasive non-native plant control or simply monitoring the natural recruitment of native shrubs in the area. Habitat restoration activities should use only local native species from the general area and should follow accepted techniques to avoid impacts to native vegetation that already exists on the Preserve. There are several areas in the Preserve that would benefit from revegetation, as described in further detail below.

The Southern Parcel Addition consists of high-quality native habitat, primarily coastal sage scrub and chaparral communities (Figures 3d and 4d), and there are limited habitat restoration opportunities. The central portion of the site contains non-native grassland dominated by abundant annual non-native plant species. Habitat restoration opportunities within the Southern Parcel should focus on the control of invasive and non-native plant species, particularly within the coastal sage scrub and chaparral portions of the site. Host plants for Quino checkerspot butterfly were observed in these areas, and the species has a high potential to occur within the Southern Parcel. Control of annual non-native plant species within these native habitat areas would preserve the integrity of native habitat in the Southern Parcel, and prevent degradation of habitat that has the potential to support Quino checkerspot butterfly and other special-status animal and plant species.

There are no areas proposed for active habitat restoration within the San Vicente Connector parcels or Southern Gap parcels. Removal of target invasive species followed by passive habitat restoration is recommended because the parcels are mostly composed of high-quality native habitat.

Restoration Areas

Preserve Boundaries

- Original Sycamore Canyon and Goodan Ranch Preserves
- Sycamore North Addition
- Sycamore South Addition
- Wu Addition
- Cielo Addition
- Southern Parcel Addition
- San Vicente Connector Parcels
- Southern Gap Parcels

RA-6 Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands Active/Passive Restoration (1.62 acres)

Scripps Poway Parkway

RA-1 Black Sage-Laurel Sumac Association Active Restoration (0.18 acre)

RA-3 Chamise Chaparral-Woolly-leaved Ceanothus Active Restoration (0.46 acre)

Sycamore Canyon Rd

RA-4 Scrub Oak-Mountain-Mahogany/Riparian Active Restoration (3.27 acres)

RA-2 Black Sage Active Restoration (0.91 acre)

RA-5 Scrub Oak-Mountain-Mahogany Active Restoration (1.20 acres)

67

RA-7 Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands Passive Restoration (0.43 acres)

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0 1,600 Feet

Source: Aerial (SanGIS 2017); Vegetation (Dudek 2013, AECOM 2018, and HELIX 2019)

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Revegetation Areas

Figure 9a

Sycamore Canyon/Goodan Ranch County Preserve

RA-8a Passive Restoration (0.41 acre)

RA-8b Passive Restoration (0.39 acres)

Passive Restoration Locations

Preserve Boundaries

Original Sycamore Canyon and Goodan Ranch Preserves

San Vicente Connector Parcels

0 600 Feet

Source: Aerial (SanGIS 2017); Special Status Species (Dudek 2008 and 2012; HELIX 2019 and 2022)

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Revegetation Areas

Figure 9b

4.1.1 Trails

Public access is addressed in the draft Public Access Plan prepared for the entire Preserve (RICK Engineering Company 2023). The Preserve currently includes approximately 13 miles of formal designated trails and access roads, as well as a network of informal trails. The 2015 Northern and Southern Additions are currently not open to the public and, at this time, no authorized access is permitted. DPR-approved trails have been identified with trail markers, although the access roads have not.

Restoring disturbed areas will provide an overall increase in acreage of native vegetation, connectivity of existing native vegetation, and erosion control in areas of disturbance. Restoration of these areas, will improve the integrity of the surrounding vegetation communities by reducing erosion, limiting flashy fuels, and enhancing the adjacent habitat.

4.2 HABITAT RESTORATION METHODS

Two methods of habitat restoration are proposed for the disturbed areas within the Preserve: (1) passive habitat restoration, and (2) active habitat restoration, described in further detail below. The habitat restoration areas are identified on Figures 9a-b.

4.2.1 Passive Habitat Restoration

Passive habitat restoration involves performing invasive, non-native plant species and erosion control, as needed, in disturbed areas where the natural recruitment of native plant species is actively occurring. Additionally, mapped areas within the Preserve with purple false brome could be manually managed (with line trimmers) or chemically treated with herbicide and then allowed to recover through passive habitat restoration and natural recruitment. Since the process of recruitment and establishment of native plant species has already begun, no soil disturbance (e.g., ripping, tilling, grading) or other soil preparation is recommended. Based on site conditions, erosion control measures, and invasive non-native plant species control should be conducted where necessary. Erosion control features will help to limit further erosion and soil loss and, if installed correctly, will capture sediments that can create areas for native plants to establish. Passive habitat restoration should be maintained so that invasive non-native plant species cover is less than 10 percent to allow native recruitment to continue until the area is reincorporated into surrounding native vegetation communities. Should natural recruitment slow or stop over time, seed application and/or container plants could be incorporated. Passive Restoration is proposed for RA-10a-b.

4.2.2 Active Habitat Restoration

Active habitat restoration involves preparing the soil and planting or seeding disturbed areas where native vegetation is not re-growing. On the Preserve, the areas appropriate for active restoration have been previously used as trails. Where the trails cross steep slopes, some soil contouring may be necessary to reduce erosion and provide a stable slope. In some cases, the act of creating a more stable slope will provide a surface that will be more readily vegetated by seeds dispersing onto the Preserve naturally. Otherwise, native plants and seed can be installed utilizing plant sources nearby. This may involve the propagation of native stock collected from the area and then planting. The composition of the specific sites to be revegetated, as well as plant quantities and rates, should be determined on a case-by-case basis. Appropriate erosion control measures, such as straw wattles, soil stabilizing mesh,

and burlap materials, should be installed to prevent or reduce erosion during the initial revegetation periods.

Improvement of the grassland areas could be attained by selectively applying herbicides to the filaree and brome grasses to prevent the seed set of the non-natives and create conditions that favor native grasses and forbs in those areas. That would involve specific determination for the goals of those areas and probably some experimental treatments to determine the best procedure based on the soils and species present.

Breaking up the compacted soils may cause weeds to flourish and require removal. Treatment of invasive non-native plant species could be mechanical, by hand, or with herbicide. Invasive non-native plant species removal in restored locations can utilize a glyphosate herbicide like Roundup and mechanical line trimmers. If container plants are utilized, it is best to remove weeds by hand to avoid damaging the plants with herbicides. Establishment takes two to three years before the plants may be left to survive on their own without hand treatment and augmented watering. Herbicides also work well for eliminating thistles while they are still small rosettes, but become less effective after the thistles reach a large size.

4.2.3 Restoration Areas Descriptions and Recommendations.

The following descriptions and recommendations correspond to the restoration polygons RA-1 through RA-8 on Figures 9a-b.

RA-1 Black Sage - Laurel Sumac Association Active Habitat Restoration

RA-1 is located along the western edge of the northern end of the Preserve. It is a 0.18-acre area, which was mapped as disturbed habitat due to previous vegetation clearing likely associated with brush management activities. This area was still bare at the time of evaluation, showing no signs of significant natural native plant recruitment or recovery. Based on the adjacent native vegetation community context, RA-1 is proposed to be revegetated with a Black Sage - Laurel Sumac plant palette (Table 7, *Black Sage - Laurel Sumac Plant Palette*).

Black sage and laurel sumac are codominants in the black sage – laurel sumac association, which is found throughout the central and southern coasts of California, including the Transverse and Peninsular ranges, and into Baja California. Other shrubs found in this association, at lower percent cover, include California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), orange bush monkeyflower (*Diplacus aurantiacus*), and ceanothus (*Ceanothus* sp.), among others (SANDAG 2011). The tree canopy, if present, is sparse, and herbaceous cover is high in openings (SANDAG 2011). Final plant quantities, percent composition, and application methods shall be determined by field conditions and context at the time of implementation.

Table 7
BLACK SAGE - LAUREL SUMAC PLANT PALETTE

Container Plants			
Scientific Name	**Common Name**	**Suggested Size**	**Average Spacing (feet on center)**
Artemisia californica	California sagebrush	1 gallon	3
Eriogonum fasciculatum	California buckwheat	1 gallon	3
Acmispon scoparius	deerweed	1 gallon	3
Isocoma menziesii	Menzies' goldenbush	1 gallon	3
Mimulus aurantiacus	monkeyflower	1 gallon	4
Salvia apiana	white sage	1 gallon	4
Salvia mellifera	black sage	1 gallon	4
Seed Mix			
Scientific Name	**Common Name**	**Minimum Pure Live Seed (PLS)**	**Pounds Per Acre**
Artemisia californica	California sagebrush	10	3
Eriogonum fasciculatum	California buckwheat	10	4
Eriophyllum confertiflorum	golden yarrow	25	0.5
Eschscholzia californica	California poppy	85	0.5
Hazardia squarrosa	sawtooth goldenbush	3	2
Isocoma menziesii	Menzies' goldenbush	15	0.5
Lasthenia californica	California goldfields	50	0.5
Lessingia filaginifolia	sand aster	3	2
Acmispon scoparius	deerweed	85	0.5
Lupinus bicolor	pygmy lupine	90	2
Malosma laurina	laurel sumac	70	3
Mimulus aurantiacus	monkeyflower	2	1
Stipa lepida	foothill needlegrass	65	2
Plantago erecta	dot seed plantain	85	1
Salvia mellifera	black sage	40	3
		Total	**25.5**

RA-2 Black Sage Active Habitat Restoration

RA-2 is located along the western edge of the Preserve, north of the ranch house (Figure 9a). It is a 0.91-acre area, which was mapped as Annual Brome Grasslands because non-native grasslands are the predominant vegetative component. However, the location of the site on a hillside surrounded by coastal scrub and chaparral makes this site an ideal candidate for habitat restoration. Based on the adjacent native vegetation community context, RA-2 is proposed to be revegetated with a Black Sage plant palette (Table 7).

Annual brome grasslands are characterized by a dense to sparse cover of annual grasses, particularly bromes (*Bromus diandrus*, *B. hordeaceus*, *B. madritensis*), which are dominant or codominant in the herbaceous layer. There may be trees or shrubs present, although at very low densities (SANDAG 2011). This vegetation community frequently results from changes in natural ecosystem processes, which can be caused by maintenance (e.g., mowing, scraping, discing, spraying), grazing, repetitive fire, agriculture, or other mechanical disruption that has altered soils and removed native seed sources from areas formerly supporting native vegetation (SANDAG 2011). Annual brome grasslands typically occur

adjacent to roads or other developed areas where there has been some historic disturbance (SANDAG 2011). RA-2 occurs on an east-facing hillside.

RA-2 is proposed for revegetation with black sage vegetation community components (Table 7). In the black sage scrub alliance, black sage can be codominant with other shrubs such as chamise, California sagebrush, California encelia (*Encelia californica*), or white sage (*Salvia apiana*; SANDAG 2011). Final plant quantities, percent composition, and application methods shall be determined by field conditions and context at the time of implementation.

RA-3 Chamise Chaparral - Woolly-leaved Ceanothus Active Habitat Restoration

RA-3 is located northeast of RA-2, in the western portion of the Preserve (Figure 9a). It is a 0.46-acre area, which was mapped as Disturbed Habitat. Based on the adjacent native vegetation community context, RA-3 is proposed to be revegetated with a Chamise Chaparral - Woolly-leaved Ceanothus Association plant palette (Table 8, *Chamise Chaparral – Woolly-leaved Ceanothus Plant Palette*). This area was mapped as disturbed due to a previous soil disturbance. This area was still mostly unvegetated at the time of evaluation, showing little signs of natural native plant recruitment or recovery. Chamise and woolly-leaved ceanothus (*Ceanothus tomentosus*) are codominants in this association, and form a mostly continuous shrub layer (SANDAG 2011). Other species commonly found in this association include oaks, manzanita, sages, and other species of ceanothus (e.g., *C. leucodermis*, *C. oliganthus*). This association is commonly found on slopes of cismontane foothills (SANDAG 2011).

Table 8
CHAMISE CHAPARRAL - WOOLLY-LEAVED CEANOTHUS PLANT PALETTE

Container Plants			
Scientific Name	**Common Name**	**Suggested Size**	**Average Spacing (feet on center)**
Adenostoma fasciculatum	chamise	1 gallon	6
Artemisia californica	California sagebrush	1 gallon	3
Ceanothus tomentosus	woolly-leaved ceanothus	1 gallon	5
Eriogonum fasciculatum	California buckwheat	1 gallon	3
Malosma laurina	laurel sumac	1 gallon	8
Mimulus aurantiacus	monkeyflower	1 gallon	4
Salvia mellifera	black sage	1 gallon	4
Seed Mix			
Scientific Name	**Common Name**	**Minimum PLS**	**Pounds Per Acre**
Adenostoma fasciculatum	chamise	20	4
Artemisia californica	California sagebrush	10	3
Ceanothus tomentosus	woolly-leaved ceanothus	75	4
Eriogonum fasciculatum	California buckwheat	10	2
Eriophyllum confertiflorum	golden yarrow	25	0.5
Eschscholzia californica	California poppy	85	0.5
Hazardia squarrosa	sawtooth goldenbush	3	2
Lasthenia californica	California goldfields	50	0.5
Lessingia filaginifolia	sand aster	3	2
Acmispon scoparius	deerweed	85	0.5
Lupinus bicolor	pygmy lupine	90	2
Malacothamnus fasciculata	chaparral mallow	10	2

Table 8 (cont.)
CHAMISE CHAPARRAL - WOOLLY-LEAVED CEANOTHUS PLANT PALETTE

Seed Mix			
Scientific Name	**Common Name**	**Minimum PLS**	**Pounds Per Acre**
Malosma laurina	laurel sumac	70	3
Mimulus aurantiacus	monkeyflower	2	1
Stipa lepida	foothill needlegrass	65	2
Plantago erecta	dot seed plantain	85	1
Salvia mellifera	black sage	40	3
		Total	**33**

RA-4 Scrub Oak - Mountain-Mahogany/Riparian Active Habitat Restoration

RA-4 is located in the central portion of the Preserve (Figure 9a). It is a 3.27-acre area, which was mapped as Annual Brome Grasslands. This area is located along an existing riparian corridor and was previously disturbed to construct a seasonal detention pond for ranching purposes. The detention pond is no longer functioning, and the outlet is highly eroded. In addition to the annual brome grassland vegetation characteristics described for RA-2, RA-4 also has significant cover by shortpod mustard (*Hirschfeldia incana*) and maltese star thistle. Based on the adjacent native vegetation community context, RA-4 is proposed to be revegetated with a Scrub Oak - Mountain-Mahogany plant palette (Table 9, *Scrub Oak – Mountain Mahogany/Riparian Plant Palette*). Given that the linear context of RA-4 is that of a riparian corridor, coast live oak has been added to this palette.

Scrub oak (*Quercus berberidifolia*/*Q. xacutidens*) and mountain-mahogany (*Cercocarpus minutiflorus*) are codominant in the shrub canopy of the scrub oak – mountain-mahogany association (SANDAG 2011). Scrub oak is typically at least 50 percent of the relative cover in the shrub canopy. Subdominant species include poison oak (*Toxicodendron diversilobum*), chamise, manzanita, ceanothus, and monkeyflower. Herbaceous diversity and cover are low and are present primarily in habitat openings. Species diversity increases after fires (SANDAG 2011).

Table 9
SCRUB OAK - MOUNTAIN-MAHOGANY/RIPARIAN PLANT PALETTE

Container Plants			
Scientific Name	**Common Name**	**Suggested Size**	**Average Spacing (feet on center)**
Artemisia californica	California sagebrush	1 gallon	3
Cercocarpus minutiflorus	mountain-mahogany	1 gallon	6
Eriogonum fasciculatum	California buckwheat	1 gallon	3
Mimulus aurantiacus	monkeyflower	1 gallon	4
Quercus agrifolia	coast live oak	1 gallon	15
Quercus berberidifolia	scrub oak	1 gallon	6
Salvia mellifera	black sage	1 gallon	4

Table 9 (cont.)
SCRUB OAK - MOUNTAIN-MAHOGANY/RIPARIAN PLANT PALETTE

Seed Mix			
Scientific Name	**Common Name**	**Minimum PLS**	**Pounds Per Acre**
Artemisia californica	California sagebrush	10	3
Cercocarpus minutiflorus	mountain-mahogany	40	4
Eriogonum fasciculatum	California buckwheat	10	2
Eriophyllum confertiflorum	golden yarrow	25	0.5
Eschscholzia californica	California poppy	85	0.5
Hazardia squarrosa	sawtooth goldenbush	3	2
Lasthenia californica	California goldfields	50	0.5
Lessingia filaginifolia	sand aster	3	2
Acmispon scoparius	deerweed	85	0.5
Lupinus bicolor	pygmy lupine	90	2
Mimulus aurantiacus	monkeyflower	2	1
Stipa lepida	foothill needlegrass	65	2
Plantago erecta	dot seed plantain	85	1
Quercus agrifolia	coast live oak	N/A	(acorn to be placed)
Quercus berberidifolia	scrub oak	N/A	(acorn to be placed)
Salvia mellifera	black sage	40	3
		Total	**24**

RA-5 Scrub Oak - Mountain-Mahogany Active Habitat Restoration

RA-5 is located along the western edge of the Preserve, southeast of the ranch house (Figure 9a). This 1.20-acre area consists of an olive orchard. While olive trees are not highly aggressive invaders, this orchard represents an opportunity to provide additional native vegetation cover. Based on the adjacent native vegetation community context and existing conditions, RA-5 is proposed to be revegetated with a Scrub Oak - Mountain-Mahogany plant palette (Table 10, *Scrub Oak – Mountain-Mahogany Plant Palette*). This community is described above for RA-4.

Table 10
SCRUB OAK - MOUNTAIN-MAHOGANY PLANT PALETTE

Container Plants			
Scientific Name	**Common Name**	**Suggested Size**	**Average Spacing (feet on center)**
Artemisia californica	California sagebrush	1 gallon	*3*
Cercocarpus minutiflorus	mountain-mahogany	1 gallon	6
Eriogonum fasciculatum	California buckwheat	1 gallon	3
Mimulus aurantiacus	monkeyflower	1 gallon	4
Quercus berberidifolia	scrub oak	1 gallon	6
Salvia mellifera	black sage	1 gallon	4

Table 10 (cont.)
SCRUB OAK - MOUNTAIN-MAHOGANY PLANT PALETTE

Seed Mix			
Scientific Name	**Common Name**	**Minimum PLS**	**Pounds Per Acre**
Acmispon scoparius	deerweed	85	0.5
Artemisia californica	California sagebrush	10	3
Cercocarpus minutiflorus	mountain-mahogany	40	4
Eriogonum fasciculatum	California buckwheat	10	2
Eriophyllum confertiflorum	golden yarrow	25	0.5
Eschscholzia californica	California poppy	85	0.5
Hazardia squarrosa	sawtooth goldenbush	3	2
Lasthenia californica	California goldfields	50	0.5
Lessingia filaginifolia	sand aster	3	2
Lupinus bicolor	pygmy lupine	90	2
Mimulus aurantiacus	monkeyflower	2	1
Stipa lepida	foothill needlegrass	65	2
Plantago erecta	dot seed plantain	85	1
Quercus berberidifolia	scrub oak	N/A	(acorn to be placed)
Salvia mellifera	black sage	40	3
		Total	**24**

RA-6 Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands Active/Passive Habitat Restoration

RA-6 is located along the northern edge of the Preserve, south of Scripps Ranch Parkway (Figure 9a). This 1.62-acre area was mapped as Mediterranean California naturalized annual and perennial grassland semi-natural stands due to previous trails, past grazing, and possibly cultivation activities in the area. This area showed signs of natural native vegetation recruitment and recovery at the time of evaluation; therefore, passive habitat restoration methods may be appropriate. For passive habitat restoration of this area, non-native plant species should be regularly controlled, to promote the spread and establishment of native species. Erosion potential should be evaluated and monitored, and erosion control Best Management Practices (BMPs) implemented as needed. Should the active habitat restoration be determined appropriate, based on the adjacent native vegetation community context and existing conditions, RA-6 is proposed to be revegetated with a Black Sage – Laurel Sumac plant palette (Table 7). This community is described above for RA-1.

RA-7 Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands Passive Habitat Restoration

RA-7 is located in the center of the Southern Parcel Addition (Figure 9a). This 0.43-acre area was mapped as Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands due to previous trails, past grazing, and possibly cultivation activities in the area. This area showed signs of natural native vegetation recruitment and recovery at the time of evaluation; therefore, passive restoration methods are recommended. For passive habitat restoration of this area, non-native plant species should be regularly controlled to promote the spread and establishment of native species. Erosion potential should be evaluated and monitored, and erosion control BMPs implemented as needed.

RA-8a and 8b Passive Habitat Restoration

RA-8a and 8b are located in the northern and southern San Vicente Connector Parcels (Figure 9b). RA-8a comprises 0.41 acre, occurring in California sagebrush-deerweed association and California sycamore-coast live oak association habitats. RA-8b comprises 0.39 acre, occurring in California sagebrush-California buckwheat-laurel sumac association habitat. These areas showed signs of natural native vegetation recruitment and recovery at the time of evaluation; therefore, passive restoration methods are recommended. Mapped areas with purple false brome could be manually managed (with line trimmers) or chemically treated with herbicide and then allowed to recover through passive habitat restoration and natural recruitment. Grass-specific (e.g., fusillade) or general herbicides (e.g., glyphosate) can be used. However, as discussed in Section 3.0, these activities should be closely monitored to ensure that the management actions are effective and not leading to an increase in cover and composition of other non-native plant species.

5.0 FIRE MANAGEMENT

5.1 CURRENT FIRE MANAGEMENT PRACTICES

Fire management consists of fire prevention, fire suppression, and the use of fuel management techniques to achieve vegetation management goals. The two major goals of all vegetation management activities are public and firefighter safety and the achievement of biological objectives such as invasive species management or habitat enhancement. Fire that occurs too frequently can alter vegetation community composition and structure and can promote the recruitment and establishment of invasive non-native plant species. Fuel management activities can be used to reduce fuel loads and fuel continuity in proximity to residential communities to improve public safety should a wildfire occur.

DPR will comply with applicable County ordinances and state laws regarding fire protection. The Poway Fire Department and CAL FIRE are the primary responders to the Preserve since the Preserve is in an SRA, with the Lakeside Fire Department as the primary responder for the San Vicente Connector parcels. The Preserve is within designated SRAs where CAL FIRE is the agency with primary responsibility for suppressing and controlling wildfires. The local Poway Fire District and Lakeside Fire Protection District (Lakeside FPD) resources have primary responsibility for structural fire protection on SRA lands. However, all districts respond to all Initial Attack fires on SRA lands, often arriving and beginning fire attack operations before CAL FIRE resources reach the scene.

Currently, fire management practices in the Preserve include maintenance of fuel modification zones and defensible space surrounding the Visitors Center. The existing access road and trail network through the Preserve, the adjacent SR-67 and Scripps Poway Parkway, and existing fuel modification zones outside the boundary of the Preserve on the west adjacent to residential structures generally meet the anticipated fuel break requirements for the Preserve. Additionally, there are other activities associated with fire management implemented on the Preserve. These activities are related to emergency response and access. Among them are:

- In the event of a fire, the main entrance road that extends from the northern Goodan Staging Area off Sycamore Canyon Road through the northwestern portion of the Preserve serves as an access road for Poway Fire Department. Roads and trails have been successfully used for fire

containment during small fires, and trails within the Preserve provide the opportunity for access and fire operations.

- The existing trail and access road system is maintained, as needed, and provides a means for fire control. Existing perimeter gates have County padlocks. The Sycamore Ranch Road access gate has a Poway Fire Department Knox key switch. No other fire agencies have the means to unlock any other gates.

The Lakeside FPD currently does not have an established formal fire response or fuels management plan or policies for the 2015 Northern Addition, 2015 Southern Addition, Southern Parcel, San Vicente Connector parcels, or Southern Gap parcels. DPR will provide a liaison contact with the Lakeside FPD to coordinate fire response guidelines and policies, and the implementation measures outlined in this VMP. This will ensure that activities and programs are up-to-date and adequate for effective fire response within the Preserve. As part of DPR's communication with Lakeside FPD, DPR will provide maps and Geographic Information System files of the location of special-status species to minimize impacts on these species from fire control activities.

San Diego Gas & Electric (SDG&E) intermittently conducts vegetation clearance around electrical transmission poles, in accordance with the operational protocols in the SDG&E *Subregional Natural Community Conservation Plan* (SDG&E 1995). SDG&E may conduct fuels management along the Sunrise Powerlink right-of-way in the southern portion of the San Vicente Connector parcels Addition but does not conduct fuels modification along SR-67 or access roads.

Existing dirt roads through the 2015 Northern and Southern Additions provide access that can be traversed in emergency situations to attack fire, set fire lines, or utilize backfires. These roads may have been used in the past during the fire events of the last two decades.

An analysis of the fire environment has been conducted as part of this VMP, specifically for the Sycamore Canyon Preserve, 2015 Northern and Southern Additions, and San Vicente Connector parcels (Appendix D, *Fire Behavior Modeling*). This analysis, presented in the following sections, provides the basis for the evaluation of existing fire management practices and their adequacy for meeting Preserve goals and providing for public safety.

5.2 FIRE ENVIRONMENT

The fire environment comprises several factors. Fires can occur in any environment where conditions are conducive to ignition and fire movement. The three major components of fire environment are climate, topography, and vegetation/fuels. The state of each of these components and their interaction with each other determine the potential characteristics and behavior of a fire at any given moment. Understanding these existing conditions is necessary to understand the potential for fire within and around the Preserve.

Wildfires are a regular and natural occurrence in most of Southern California. However, increasing numbers of fires and acres burned annually have been experienced over the last several decades. These wildfires are mostly human-caused, suggesting that the historic fire interval has been artificially affected across large areas. In addition, wildfire suppression efforts over the last several decades may have aided in the accumulation of fuels in some natural communities (Minnich 1983; Minnich and Chou 1997), resulting in larger and more intense wildfires. Large wildfires have had, and will continue to have, a

substantial and recurring role in native California landscapes (Keeley and Fotheringham 2003), in part because (1) native landscapes become highly flammable each fall, (2) the climate in the region has been characterized by fire climatologists as the worst fire climate in the United States (Keeley 2004) with Santa Ana winds occurring during autumn after a six-month drought period each year, and (3) ignitions via anthropogenic sources have increased or are increasing in many wildland or Wildland Urban Interface areas. The Fire Hazard Severity Zones were created by the Fire and Range Assessment Program (FRAP) of CAL FIRE (CAL FIRE 2009) per the State of California Public Resources Code, Sections 4201-4204. The Preserve is located within a Very High Fire Hazard Severity Zone. This is the most dangerous rating. The Very High Fire Hazard Rating is based on a combination of relevant factors of fuel/vegetation, terrain, and climate/weather. Based on available information and an understanding of the fire environment of the region, it is expected that large wildfires will occur again and burn within the Preserve.

Most wildfires are of human-caused origins, especially as building development and construction continue to invade historic natural vegetative habitats, creating the WUI. The WUI are those areas on the landscape where buildings are threatened and can be destroyed by wildfires. Buildings in WUI zones have a geographical relationship on three levels:

- Interface Zone – buildings immediately adjacent to unmanaged wildlands
- Intermix Zone – buildings erected inside wildland areas
- Open Space – buildings surrounding the perimeters of wildland areas

There are two residences located adjacent to the Preserve. One residence is near the northwest corner of the Northern San Vicente Connector parcels. The residential building is not within 100 feet of the Preserve, so the County does not have any responsibility of maintaining defensible space around this structure. The other residence is located near the northwestern corner of the Preserve.

5.2.1 Climate

As with most of Southern California, the regional climate in the vicinity of the Preserve is influenced by the Pacific Ocean and is frequently under the influence of a seasonal, migratory, subtropical high-pressure cell known as the Pacific High (WRCC 2023a). Wet winters and dry summers with mild seasonal changes generally characterize the Southern California climate. This climate pattern is occasionally interrupted by extreme periods of hot weather, winter storms, or dry, easterly Santa Ana winds (WRCC 2023a).

Additionally, the local vegetation and the seasonal drying produce climatic conditions that result in fuel-driven wildfires and fire-associated climatic changes. This type of condition is referred to as a plume-dominated wildfire. Plume-dominated wildfires are fires where the energy produced by the fire in conjunction with atmospheric instability creates significant convective forces and increased winds. Such fires are extremely unpredictable, spread in various directions simultaneously, and exhibit extreme fire behavior. These fires are extremely dangerous and are often large.

However, there is some local variation in the typical Southern California climate. The inland location of the Preserve affects the degree of influence of the Pacific Ocean, resulting in less-regulated temperatures. The average high temperature calculated from August 1957 to May 2016 for the

surrounding Poway Valley area is approximately 75.1˚ Fahrenheit (˚F), with higher temperatures in summer and early fall (June through September) reaching up to an average of 84.3°F (WRCC 2023b). The mean annual precipitation for the area is 13.24 inches, with the most rainfall concentrated in the months of January (2.80 inches), February (2.70 inches), and March (2.30 inches) (WRCC 2023b).

The prevailing wind pattern is from the west, but the presence of the Pacific Ocean causes a diurnal wind pattern known as the land/sea breeze system. During the day, winds are typically from the west–southwest (sea), and at night, winds are from the northeast (land). During the summer season, the diurnal winds can be slightly stronger than the winds during the winter season due to greater pressure gradient forces. Surface winds can also be influenced locally by topography and slope variations. On the Preserve, the varied topography may affect wind velocity and patterns. The highest wind velocities are typically associated with downslope, canyon, and Santa Ana winds.

The fire season in Southern California typically starts in June, as vegetation begins to dry out after winter and spring rains, and typically ends in October, although fire weather may be present year-round (Schroeder and Buck 1970). The highest fire danger for this area coincides with the Santa Ana winds. Santa Ana wind conditions are a reversal of the prevailing southwesterly winds that usually occur on a region-wide basis during late summer and early fall. They are dry, warm winds that flow from the higher desert elevations in the north through the mountain passes and canyons. As they converge through the canyons, their velocities increase. Consequently, peak velocities are highest at the mouths of canyons and dissipate as they spread across valley floors.

General weather conditions for the region were derived from the Poway Valley Weather Station 1, as presented in Table 11, *Temperature and Precipitation Data for Poway Valley Weather Station (047111)*. Additional weather variables were analyzed to determine extreme fire weather conditions, as outlined in the guidelines and standards presented by the County of San Diego, Planning and Development Services. Specifically, Peak and Summer wind and fuel moisture conditions were evaluated and used in the fire behavior modeling efforts conducted for the Preserve. The fire weather variables and an analysis of fire behavior for the Preserve are presented in Appendix D.

Table 11
TEMPERATURE AND PRECIPITATION DATA FOR POWAY VALLEY WEATHER STATION (047111)

Period of Record: May 1, 1893 through May 21, 2016													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Average Maximum Temperature (F)	66.6	66.0	67.4	72.1	74.2	80.9	85.6	86.4	84.4	79.2	71.7	67.3	**75.1**
Average Minimum Temperature (F)	40.6	42.9	43.7	48.3	54.4	56.2	60.1	62.2	58.1	50.2	43.2	38.6	**49.9**
Average Total Precipitation (inches)	2.80	2.70	2.30	0.95	0.37	0.08	0.04	0.07	0.19	0.52	1.36	1.87	**13.24**

Fire season in this area is June through October, and significant fires have occurred in February and May, including May of 2014, under conditions of mid-90 to 103 ˚F temperatures and gusty northeasterly winds (Office of Emergency Services 2014). Generally, greater fire threat begins following the drying of the vegetation after spring. In fall, fire season extends until the first significant rains, usually at the end of October or November, but even later if rainfall is not significant.

The U.S. Forest Service Weather Information Management System provides information about weather patterns in the County. Daily afternoon weather observations in the County were analyzed for 44 years (1961–2005) at selected fire stations. San Diego County has five climate zones between the coast and the desert. Weather data between April and December are used to represent the annual fire season in San Diego County, with the most severe fire weather conditions in September and October. Table 12, *Worst Case Weather and Burning Conditions, Interior Zone*, was derived from the analysis of San Diego County's Interior Climate Zone where the Preserve is located.

Table 12
WORST CASE WEATHER AND BURNING CONDITIONS, INTERIOR ZONE

Period	Temperature[1]	Humidity	Wind speed[2]	Burning Index[3]
Summer	90-109	5-9%	18	72.1
Santa Ana	90-109	5-9%	24	48.3
Peak	90-109	5-9%	56	0.95

[1] Degrees Fahrenheit
[2] Miles per hour
[3] Burning Index is an estimate of the potential difficulty of fire containment as it relates to the flame length at the head of the fire. Burn index over 110 indicates crowning, spotting and major fire runs are probable.

5.2.2 Topography

The topography of the Preserve includes moderate and steep slopes with elevation ranges from approximately 190 to 512 m /640 to 1,680 ft AMSL. Two primary ridgelines characterize the southern portion of the Preserve and extend roughly north-south until they join in the central portion of the Preserve where they form one primary ridge extending northward. The upper reaches of Sycamore Canyon, Clark Canyon, Slaughterhouse Canyon, and Beeler Canyon extend into the southern and central portions of the Preserve. Elevations rise upward from these canyon bottoms to the peaks of their associated ridgelines. The western portion presents the flattest area of the Preserve, within Sycamore Canyon at the Goodan Ranch site. The canyons and drainages on the Preserve contain slopes with gradients reaching up to 70 percent (approximately 35 degrees) in some areas. The 2015 Northern and Southern Additions consist of small shallow valleys and rocky hills in the form of a wide shelf on the broad west-facing slope of the foothills of the Peninsular Range Mountains. The western portion of the 2015 Northern Addition includes two steep rocky hills with a narrow gap between them. The Southern Parcel is located within Clark Canyon, which contains a relatively narrow north-south valley bordered by east- and west-facing slopes. The northern San Vicente Connector parcel has a distinct drainage running roughly through the middle of the parcel exiting at the southern end. The southern San Vicente Connector parcel has several hilltops and is separated by a saddle at lower elevations.

Topographic features that may present a fire spread facilitator are the narrow canyons and sub-drainages, which may serve to funnel winds, thus increasing their velocity and potential for influencing extreme fire behavior. Additionally, a "saddle" located at the upper reach of Slaughterhouse Canyon is potentially wind-aligned, and wind funneling may occur due to local terrain.

5.2.3 Watershed Description

The extreme northern portion of the Preserve is located within the Peñasquitos Watershed, while the remaining Preserve area is within the San Diego River Watershed. The upper reaches of Sycamore Canyon and Clark Canyon drain southwesterly into Sycamore Creek, and ultimately into the San Diego

River. The upper reach of Slaughterhouse Canyon drains southeasterly from the Preserve into San Vicente Creek, which then flows southward into the San Diego River. The San Diego River then flows southwest, ultimately draining into the Pacific Ocean. The upper reach of Beeler Canyon drains northward, into Beeler Creek and ultimately into Peñasquitos Creek. Peñasquitos Creek then flows west, also draining into the Pacific Ocean.

Floods occur occasionally in this region; however, the location of the Preserve at the upper boundaries of the watersheds limits the effects of floods on the Preserve. The greatest flood on record for San Diego County occurred in January 1916, when many stations received more than their normal seasonal precipitation during a two-week period (McGlashan 1918). Floods also occurred in 1927 and more recently, in 1980. In January 1916, Poway received half of its normal seasonal rainfall in a period of less than three days.

5.2.4 Fire History

Based on historical fire perimeter data (FRAP 2023), all of the Preserve has burned at least once during the recorded data period, with fires occurring in 1913, 1938, 1950, 1955, 1971, 1981, 1984, 1985, 1986, 1994, 1997, 2003, 2006, 2010, and 2016 (Figure 10, *Fire History*). One area of the Preserve (within the 2015 Northern Addition) has burned five times over the course of the recorded fire history, and other areas have burned as many as four times. Table 13, *Preserve Fire Interval Data*, presents the number of times the Preserve has burned by land area (acreage).

Table 13
PRESERVE FIRE INTERVAL DATA

Fire Year[1]	Fire Name	Interval (years)	Acreage Bound	Percent of Preserve Burned[2]
1913	Unnamed	N/A	106.67	3.6
1938	Unnamed	6	549.03	18.3
1955	Goat Mtn.	8	506.43	16.9
1971	Rabbit	12	137.01	4.6
1981	Slaughter	11	58.12	1.9
1984	Bowles	18	19.50	0.7
1985	Sycamore	18	524.94	17.5
1985	Sycamore	12	220.89	7.4
1986	Sycamore #2	31	32.14	1.1
1994	Rocoso	41	86.77	2.9
1997	Slaughterhouse	14	57.77	1.9
2003	Sycamore	30	245.93	8.2
2003	Cedar	15	2718.16	90.8
2006	67	23	30.16	1.0
2010	Slaughterhouse	16	44.41	1.5
2016	Lakeside	17	16.89	0.6
	Average	**17**	**316.18**	**10.6**

[1] FRAP 2023

[2] Numbers may not sum due to rounding. Acreages presented herein are based on SanGIS parcel data for the Preserve boundaries totaling 2,993.77 acres.

Based on an analysis of this fire history data set, specifically the years in which the fires burned, the average interval between wildfires on the Preserve was calculated at 17 years with intervals ranging

between zero (multiple fires occurring in the same year) and 41 years. Based on this analysis, it is expected that the Preserve would be subject to wildfire occurrence every 17 years, with the realistic possibility of shorter interval occurrences. Fire history is an important component in understanding fire frequency, fire type, significant ignition sources, and vulnerable areas. The topography, vegetation, and climatic conditions associated with the Preserve combine to create a unique situation capable of supporting large-scale, high-intensity wildfires, such as the Cedar Fire in 2003. Younger-age vegetation is generally less flammable than old vegetation, particularly when the old vegetation contains large amounts of standing dead material. As the vegetation continues to recover, even with drought conditions with few seasons above normal rainfall, the aging process will cause the vegetation to become more susceptible to new fires, especially during extreme weather conditions of heat, wind, and low humidity.

Based on an analysis of the fire history, vegetation age classes on the Preserve are fairly consistent across the site due to the extent of burning in 2003. Specifically, over 90 percent of the vegetation on the Preserve is 20 years old, burning during either the Sycamore or Cedar Fires in 2003. The remaining vegetation (approximately 216 acres), located in the southernmost portion of the Preserve, last burned in the 1994 Rocoso Fire, resulting in 29-year-old vegetation. While younger vegetation is generally considered less susceptible to fire than older vegetation, all vegetation is capable of igniting and carrying fire, especially during extreme weather (Red Flag Warning Conditions), and over time, the younger age vegetation will become more susceptible to fire ignition and spread due to accumulation and retention of dead plant material.

5.2.5 Vegetation Dynamics and Fuel Loads

Utilizing site vegetation maps, field evaluations were conducted to evaluate fuel loading and classify vegetation types into fuel models (Anderson 1982; Scott and Burgan 2005; Weise and Regelbrugge 1997). Fuel model assignments are presented in Table 14, *Fuel Model Assignments*, by vegetation type and are graphically presented in Figure 11, *Vegetation Management Units*. Chaparral and sage scrub contain high levels of stem and leaf resin, and they often retain dead plant material in addition to supporting a growth form that carries fire with high intensity. During extreme severe weather conditions of low humidity, high heat, and wind, the National Weather Service declares a Red Flag Warning, indicating a severe weather hazard for fires. During those conditions, fires may occur in most vegetation and will even burn younger-age vegetation, particularly if it has a high level of annual weed growth, though it might burn with lower intensity than if it was older. If invasive non-native plant species become established, the frequency of fires in the overall area can be affected because high levels of dried annual fuels can become easily ignited (Brooks 2004). These vegetation classifications follow the Holland/Oberbauer categories from Figures 4a-e. The model categories are included here for information purposes since the County standard model was used for the analysis in this plan, as described in Appendix D.

In addition, invasive non-native plants can increase the frequency of fires by providing more continuous fuels that are more easily ignited (Brooks et al. 2004). The vegetation characteristics, combined with topography, climate, and relatively common weather events (i.e., Santa Ana winds), combine to create a fire environment in which prevention and control are extremely difficult. Invasive plants also present hazards when located adjacent to neighboring structures or within fuel modification zones that are meant to provide defensible space. Invasive non-native species of the greatest concern within the Preserve include giant reed, pampas grass, perennial veldt grass, saltcedar, purple false-brome,

Preserve Boundaries

- Original Sycamore Canyon and Goodan Ranch Preserves
- Sycamore North Addition
- Sycamore South Addition
- 2015 Northern Addition
- 2015 Southern Addition
- Southern Parcel Addition
- San Vicente Connector Parcels
- Southern Gap Parcels

Most Recent Fire Boundaries

- Cedar - October 2003
- Sycamore - June 2003
- 67 -August 2006
- Slaughterhouse - May 2010
- Lakeside - July 2016
- Fires that Occured between 1910 and 2003

Burn Frequency Post 1913*

- 1
- 2
- 3
- 4
- 5
- 6

**Number of times an area has burned since 1913.*

IRON MOUNTAIN 1953
POWAY 1995
UNNAMED 1913
UNNAMED 1973
BOWLES 1984
GOAT MTN. 1955
UNNAMED 1938
FOSTER 1983
SYCAMORE 1985
SYCAMORE 1985
ELLIOTT RESERVATION 1950
SYCAMORE #2 1986
SLAUGHTER 1981
SLAUGHTERHOUSE 1997
SYCAMORE 1995
UNNAMED 1910
ASSIST #69 1980
ROCOSO 1994
QUARRY 1950
ASSIST #38 1987
UNNAMED 1974
UNNAMED 1974

UNNAMED 1938
SYCAMORE 1985
SLAUGHTERHOUSE 1997
SLAUGHTER 1981

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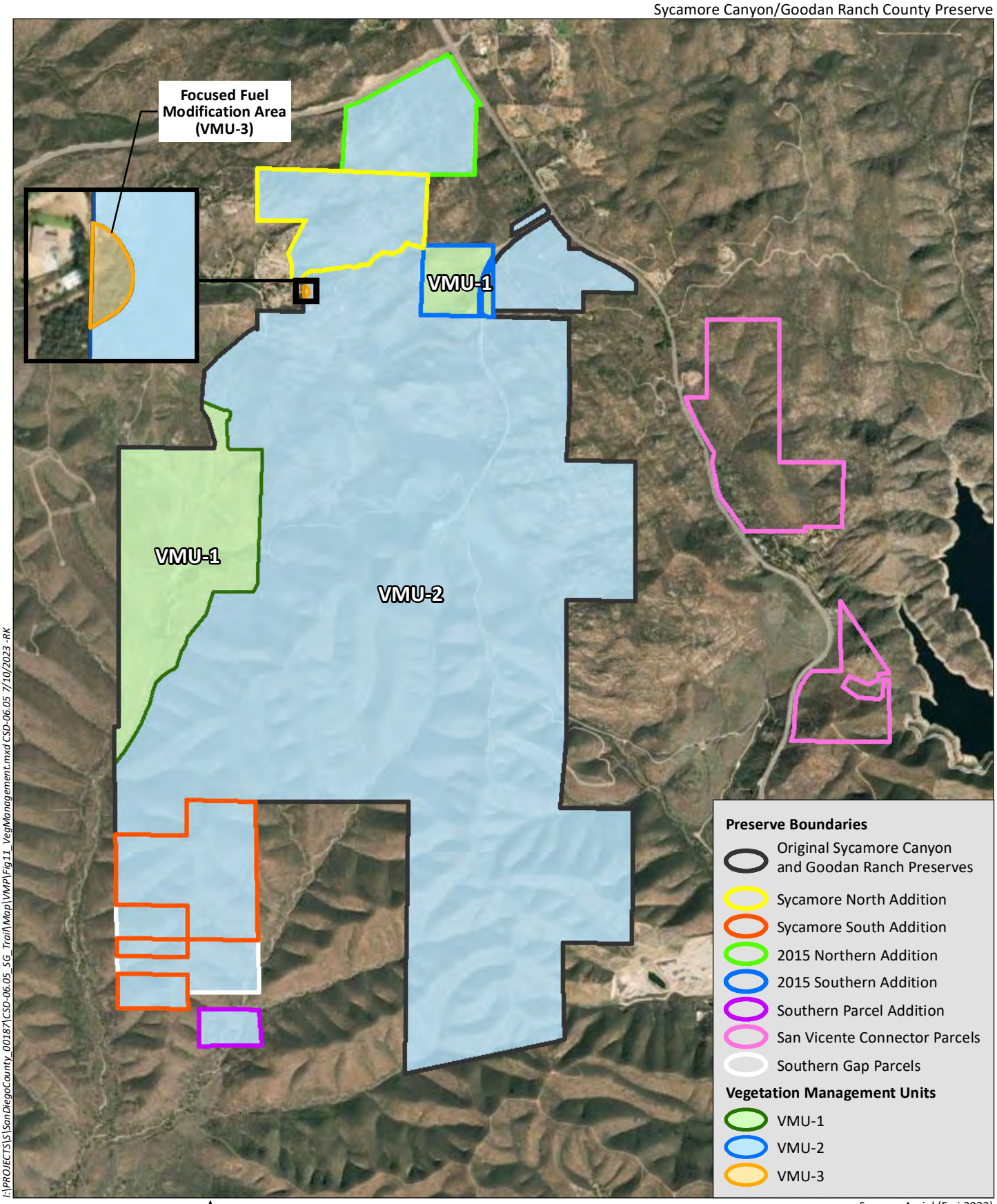
0 2,000 Feet

Source: Aerial (SanGIS 2017); Fire History (CalFire 2022)

HELIX Environmental Planning

Fire History

Figure 10



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Source: Aerial (Esri 2022)

HELIX Environmental Planning

Vegetation Management Units

Figure 11

stinkwort, treasure flower, river red gum, crown daisy, milk thistle, blue-eyed cape marigold, and Chinaberry tree (Figures 8a-e).

The vegetative fuels in the Preserve can be classified as one or more of the following Fuel Types:

- Fuel Model-4 (FM-4): chaparral
- Grass-2 (GR-2): continues grass one foot tall
- Grass-2 (GS-2): shrubs are one to three feet high, moderate grass load; spread rate high; flame length moderate
- Nonburnable-1 (NB-1): urban or suburban development; insufficient wildland fuel to carry wildland fire
- Southern California-18 (SCAL-18): Southern California coastal sage
- Shrub-2 (SH-2): moderate fuel load (higher than SH-1), depth about one foot, no grass fuel present; spread rate low; flame length low
- Shrub-5 (SH-5): heavy shrub load, depth four to six feet; spread rate very high; flame length very high
- Timber Understory-1 (TU-1): fuel bed is a low load of grass and/or shrub with litter; spread rate low; flame length low
- Timber Understory-5 (TU-5): fuel bed is a high load of conifer litter with shrub understory; spread rate moderate; flame length moderate

Table 14
VEGETATION COMMUNITIES AND ASSOCIATED FUEL MODEL ASSIGNMENTS

Vegetation Community/Land Cover[1]	Fuel Model[2]	Acres[3]	Percentage
Chamise Chaparral	FM-4	549.97	18.7%
Chaparral	FM-4	1.13	0.04%
Coast Live Oak Woodland	TU-1	25.05	0.9%
Open Coast Live Oak Woodland	TU-1	8.11	0.3%
Coastal Sage-Chaparral Transition	SH-5/SCAL 18	27.81	0.9%
Coastal Scrub	SH-5/SCAL 18	330.06	11.2%
Diegan Coastal Sage Scrub	SH-5/SCAL 18	699.66	23.8%
Diegan Coastal Sage Scrub: Inland Form	SH-5/SCAL 18	4.28	0.1%
Disturbed Habitat	1	40.13	1.4%
Eucalyptus Woodland	TU-5	0.05	0.001%
Non-Native Grassland	GR-2	189.17	6.4%
Non-Vegetated Channel	NB-1	0.71	0.02%
Orchards and Vineyards	9	1.20	0.04%
Scrub Oak Chaparral	SH-5	116.73	4.0%
Southern Willow Scrub	8	0.86	0.03%
Southern Maritime Chaparral	SH-5	3.50	0.1%

Table 14 (cont.)
VEGETATION COMMUNITIES AND ASSOCIATED FUEL MODEL ASSIGNMENTS

Vegetation Community/Land Cover[1]	Fuel Model[2]	Acres[3]	Percentage
Southern Mixed Chaparral	SH-5	928.14	31.6%
Southern Riparian Forest	TU-1	3.02	0.1%
Southern Riparian Woodland	TU1	2.66	0.09%
Urban/Developed	0	1.46	0.05%
Wildflower Field	GS-2	0.36	0.01%
	TOTAL	**2,934.04**	**100%**

[1] Holland Code is basis for models.

[2] Fuel Models are classified according to USDA terminology that is based on the volume of biomass in the vegetation. O is urban/developed. 1 is grassland/disturbed habitats. 8 is oak woodland, riparian woodland, riparian scrub. 9 is orchards and vineyards. TU-5 is a model based on Timber Understory classification with a high level of understory. SH-4 and SH-5 are shrub habitat models referencing fuel load. SH-5 is heavy load and SH-4 is low to moderate load. GR-1 is model for short grass, GR-2 is model for continuous grass 1 foot tall (Scott and Burgan 2005), andGS-2 is a model for shrubs one to three high, moderate grass load (Scott and Burgan 2005). SCAL-18 is a custom fuel model for coastal sage scrub habitats for the Behave Fuel Model (Dicus and Zimmerman 2007).

[3] Numbers may not sum due to rounding. Acreages presented herein are based on SanGIS parcel data for the Preserve boundaries. No data is included for the Southern Gap parcels, as baseline surveys have not been conducted.

5.2.5.1 Vegetation Dynamics

Vegetation plays a significant role in fire behavior and is an important component of the fire behavior models discussed in this report. A critical factor to consider is the dynamic nature of vegetation communities. Fire presence and absence at varying cycles or regimes affect plant community succession, or the natural sequential replacement of vegetation types over time. The succession of plant communities, most notably the gradual conversion of shrublands to grasslands in areas with high fire frequencies and short intervals between fires, and grasslands to shrublands in areas with fire exclusion or long fire-free periods, are highly dependent on fire characteristics, including intensity, duration, and return interval.

Additionally, encroachment of invasive non-native plant species from residential landscaping into wildland areas is already occurring and is expected to continue based on the proximity of ornamental landscaping to open space. Consequently, routine maintenance of the fuel reduction areas/defensible space zones, and the establishment of defensible space zones in some areas are needed to maintain reduced hazard conditions.

Biomass and associated fuel loading will increase over time, assuming that disturbance or fuel reduction efforts are not realized. Depending on factors such as fire exclusion activities, mechanical treatments, and prescribed burning, among others, the current vegetation composition and density will continue to change, either through increased volume and the establishment of invasive non-native plant species or the continued degradation of scrublands and persistence of annual grasses.

The Preserve is dominated by chaparral vegetation communities (approximately 55 percent) and sage scrub vegetation communities (approximately 36 percent), with grassland and woodland types present at lower elevations and concentrated primarily within Sycamore, Clark, and Slaughterhouse Canyons, along with scattered patches in the northeast corner of the Preserve. It should be noted that chaparral and sage are not susceptible to annual burning, but grass cover can burn yearly (Minnich and Scott 2005). Lack of disturbance, such as fire and grazing will, over time, allow shrub cover to establish in areas currently dominated by grass cover. Shrub cover, although less likely to burn in the first 20 years

during typical weather conditions, will burn under extreme fire events (Moritz 2003). Once established, the shrub cover will increase in volume, and following approximately 20 years, the hazard will increase corresponding with fuel age (Keeley 2005; Moritz et al. 2004). Additionally, as previously mentioned, encroachment of non-native plants into open space areas is likely based on the proximity of ornamental landscaping to undeveloped open space land, in many cases increasing the fuel load and likelihood for higher intensity fire.

As with the changes in vegetative cover in grassland habitats over time, changes in the chaparral, scrub, and woodland types will also occur with the lack of disturbance. Chaparral and sage scrub stands will continue to accumulate biomass and volume, often retaining dead plant material within individual component shrubs. Oak woodland cover types tend to limit ground fuel accumulation with age. Canopy closure serves to "shade-out" understory plants, resulting in mature oak woodland characterized by a dense canopy layer and an understory consisting primarily of leaf and twig litter. Hardwood stands vary in species composition with disturbance, but maintain typically consistent shrub and tree cover with associated ladder fuels allowing the potential for canopy fire spread.

5.2.5.2 Sage Scrub Fire Effects

Sage scrub occupies approximately 1,035 acres within the Preserve. Following fire, typical sage scrub succession includes a predominance of annual herbs during the first year. Non-native plant species may dominate a landscape after wildfire due to their success in establishing quickly and outcompeting many native species. Non-native plant species tend to decline in subsequent years without fire or other disturbances as shrubs establish and attain greater cover. Perennial herb understory species, which may grow from resprouts, show low recruitment from the soil seed bank. Unlike herbaceous annuals, the overall diversity of perennial understory herbs remains constant for the first few years following fire. New species continue to become established in recovering sage scrub, reaching a peak at five to 10 years after a fire. After the peak in species diversity, there is a general decline in perennial understory herb species, possibly attributable to shading effects from dominant shrubs (Wills 2000; Keeley and Keeley 1984).

Lack of fire will allow shrub cover to return to burned areas over time. Recovering shrub cover is less likely to burn in the first 20 years during typical weather conditions, but it will burn under extreme fire events (Moritz 2003). The Preserve's vegetation age is almost entirely consistent, with over 90 percent of vegetation being 20 years old at the time of this report. The scrub cover will continue to increase in volume, and within approximately 10 years, the fire hazard will increase, corresponding with fuel age (Keeley 2005). Changes in land use will also affect the vegetation distribution pattern. For example, the encroachment of non-native plants is likely based on the proximity of residential development and site disturbance during the 2003 Cedar Fire.

In sage scrub habitat immediately following a fire, the first indication of recovery is the resprouting of laurel sumac. After the winter rains, large levels of germination of plants from seeds occur, including the shrubs that make up the habitat, such as California sagebrush and California buckwheat, and plants, such as sawtooth goldenbush (*Hazardia squarrosa*); at the same time, an explosion of annual herbs occurs, including varieties that do not appear as adult plants for many years between fires. Annual weeds may also spread during this period. Under some conditions, they may spread extensively. Some of the herbaceous species that become apparent following fires are perennial geophytes, plants with bulbs and rhizomes, which exist in the soil but send up leaves and flowers during the first few springs following a fire. The native annual species decline as the shrubs grow larger and overshadow them.

Within 10 years, it may be difficult to tell that a fire had burned through the area except for a few skeletons of the larger woody shrubs that occur on the edges of this community.

5.2.5.3 Chaparral Fire Effects

Chaparral communities cover approximately 1,630 acres of the Preserve. This vegetation type typically ranges from one to three meters (three to 10 feet) in height, with little herbaceous understory in mature stands. Chaparral vegetation communities have developed post-fire reproductive strategies intended to survive stand-replacing wildfires. Specifically, component plant species can be classified as obligate sprouters, obligate seeders, or facultative seeders. Obligate sprouters reproduce via root systems that survive after a fire (e.g., toyon), while obligate seeders rely solely on seedling establishment for survival (e.g., ceanothus, Manzanita; Conrad 1987). Facultative seeders are those chaparral species that stump sprout and regenerate via seed following fire (e.g., chamise; Conrad 1987). Current fire frequency in chaparral communities averages between 20 and 30 years (Keeley and Keeley 1988), although historic fire frequency is likely in the range of 50 to 100+ years (Conard and Weise 1998). The shortening of fire-free periods in chaparral has been affected by increases in ignition sources due to the proximity of chaparral communities to developed/urban areas. Fires in chaparral typically consume all aboveground vegetation. In the first year following fire, there is typically abundant herbaceous vegetative growth, although, by the fifth post-fire year, shrub cover dominates the site (Keeley and Keeley 1988). In general, vegetation/fuel volume in chaparral will increase in the years following fire, with the rate of biomass increase leveling out between 20 and 40 years, depending on numerous site-specific variables (Conard and Weise 1998).

The average fire interval on the Preserve is roughly 17 years, as indicated by the fires that have occurred over the past 100 years. Historic fire frequency is more likely to have been longer, possibly in the range of 50 to 100+ years (Conard and Weise 1998; Zedler 1995). The number of ignitions in modern times is the result of the greater population in the region and higher probabilities for ignitions to occur.

Fire burn patterns for chaparral are similar to those described above for the sage scrub habitats. Fires usually consume the above-ground portion of the plants except for stems from hard, woody chaparral shrubs, which may be burned but leave charred skeletons. Charred skeletons of the hard woody plants may stand for many years after the fire. The resprouting shrubs begin new growth relatively quickly following a fire. Following the winter rains, germination of the seed-reproducing species such as wild lilac takes place. Large numbers of annual wildflowers such as Parry's phacelia (*Phacelia parryi*), California poppy (*Eschscholzia californica*), and ground pinks (*Linanthus dianthiflorus*) grow. Geophytic plants such as blue dicks (*Dichelostemma capitatum*) and Mariposa lilies (*Calochortus splendens*, *Calochortus weedii*) send up flowering stalks for the first few springs following a fire. Annual weeds may also spread into chaparral habitats during these periods; however, on the Preserve, the chaparral shrubs appear stable even with the effects of fire.

Following a fire, the chaparral vegetative biomass will continue to increase for many decades unless a fire consumes the vegetation during this time. Some chaparral species live longer than others. Some of the obligatory seeding wild lilac and other *Ceanothus* are thought to decline after long periods of time without fire though they are still represented in a seed bank that persists for very long times (League 2005). Other chaparral species may continue to grow unabated for additional decades to old age. Periods of drought or stress may cause temporary die-back on some of the chaparral shrubs, and, in an area where wood decay is slow, the dead material accumulates until another fire occurs. Little seed reproduction of any kind occurs in chaparral between fire intervals (Zedler 1995).

5.2.5.4 Live Oak Woodland and Engelmann Oak Woodland Effects

Coast live oak woodland and open coast live oak woodland cover approximately 30 acres of the Preserve. Coast live oak trees are very fire resistant, with fire adaptations including evergreen leaves, thick bark, and post-fire sprouting from surviving tissue. Fire intensity affects individual tree survival, with the amount and extent of trunk char and canopy consumption playing a critical role in survival and response (Plumb and Gomez 1983). Following burning, coast live oaks sprout from the main trunk and upper crown even after severe burning (Plumb and McDonald 1981). Post-fire recovery of coast live oak woodlands is dependent on fire intensity, and fall fire damage is typically more severe than that occurring earlier in the year (Plumb and Gomez 1983). While the thick bark of mature coast live oak trees minimizes the effects of heat exposure from wildfire, seedlings and acorns are much more susceptible to mortality, even following low-intensity fires. Recovery of coast live oaks may take up to three years, so post-fire cutting of affected trees should be postponed verifying whether re-sprouting will occur (Plumb and Gomez 1983). As with coastal sage and chaparral, decreases in fire frequency in coast live oak woodlands and forests favor woodland/forest expansion into neighboring grassland (Callaway and Davis 1993). Fire behavior in oak woodlands and forests is typically much less intense than wildfires burning in chaparral and sage scrub communities. Low, compacted leaf litter understory, canopy shading of ground fuels, and wind velocity reduction resulting from tree canopies significantly reduce the intensity and spread rates of surface fires in oak woodland and forest vegetation types. Transition from ground to canopy fire increases fire intensity, spotting, and tree mortality potential.

The level of flammable understory growth also plays a role in determining how much mortality trees undergo during fires. Following a fire, upper branches typically resprout, producing new growth. If the main trunk is damaged, the trees may also resprout from the base. The level of mortality and affected ability to resprout depends on multiple factors, including the severity of the weather conditions, such as heat and humidity, and the intensity of the fire resulting from the understory, adjacent vegetation, and level of standing dead material in the area. While large oak trees are resistant to damage from fire, younger trees are much more susceptible to damage from fires (Plumb 1980). Recovery of trees from fires may take several years.

For the coast live oak trees on the Preserve, low growing vegetation around the tree on three sides and shielding of the south side from the adjacent larger shrubs are beneficial for the oak tree. These factors help to reduce the intensity of heat that would be generated by a fire. In fact, upon reviewing the Google Earth images for mid-2004, the first spring following the Cedar Fire, it appears that the foliage of the oak tree in the northern portion of the Preserve retained its rounded form after the fire. This is unlike the other trees in the area, indicating that the coast live oak tree was apparently not affected by the fire as severely as other oak trees.

When they are older, Engelmann oak trees are resistant to mortality from fires due to their thick bark. They may be affected by the intensity of fire associated with the surrounding shrubs; however, they are more typically associated with the lower sage scrub vegetation than heavy, woody chaparral.

5.2.5.5 Grassland Fire Effects

Annual grassland covers approximately 190 acres of the Preserve. Annual grassland responses to fire are varied. A review and analysis of the response to burning and grazing of California grasslands indicates that prescribed burning temporarily reduces non-native annual grasses, but also results in increased non-native and native forbs (Rice 2005; Bainbridge and D'Antonio 2003; D'Antonio et al. 2003). These

studies indicate that single-prescribed burns often decrease non-native annual grasses, but they recover by the third year in the absence of additional disturbance. Grazing or follow-up burns hinder the recovery of non-native annual grasses and maintain forb cover. One effect that appears to be fairly common among non-native grasses is that lower-intensity grassland fires rarely damage seeds on or near the soil surface (Daubenmire 1968). Since seeds on the soil surface are not generally exposed to high enough temperatures to cause mortality in a grassland environment, burn timing is most effective after desirable species have dispersed their seeds, but when target invasive species have their seed heads directly exposed to flames (DiTomaso and Johnson 2006). For management purposes, non-native grassland burning must be timed appropriately so that the target seeds are consumed, resulting in the decreased reestablishment of non-natives and reduced competition for annual forbs. While in some cases, burning annual grassland may enhance the reproduction of native annuals, DPR does not burn annual grasslands in County Preserves.

5.2.5.6 Fire Behavior

The County of San Diego Report Format and Content Requirements (County 2010) regarding Wildland Fire and Fire Protection provides information regarding fire behavior modeling, which provides reasonably accurate representations of how wildfire would move through available fuels in high-fire hazard areas. The Fire Behavior Model is a tool for fire authorities to estimate the behavior of fire moving across the vegetated landscape, given certain assumptions. The Behavior Models are only an estimate and are not designed to replace eyewitness accounts or the experience of the local fire authority that has jurisdiction and is familiar with wildland fire behavior. Fire behavior calculations are based on site-specific fuel characteristics supported by fire science research that analyzes heat transfer related to specific fire behavior. Current and accepted fire research data from several programs that specialize in the study of wildland fire were utilized for the completion of this analysis for the Preserve. To objectively predict flame lengths and intensities, the FlamMap fire behavior fuel modeling system was applied using predominant fuel characteristics from representative fuel models observed on the Preserve (Finney et al. 2012). In addition to fuels data, topographic and weather data were utilized in developing fire behavior models for two separate weather conditions: Summer (onshore flow) and Peak (offshore flow with Santa Ana condition). Results of fire behavior modeling efforts for the Preserve are presented in Appendix D.

5.3 FUEL MANAGEMENT METHODS

Successful fire management requires preplanning and utilization of fire prevention techniques and strategies. The majority of the Preserve has been fire-free for approximately 20 years. Two fires have burned the southern portion of the San Vicente Connector parcels: the 2010 Slaughterhouse Fire, which burned approximately 41 acres, and the 2016 Lakeside Fire, which burned approximately 17 acres. Since the majority of the Preserve has been fire-free for many years, management of fuels is an important component of overall Preserve management. To that end, vegetation management units (VMUs), based on topography or other clearly discernible landscape boundaries, have been delineated on the Preserve to assist with fuel management planning. Figure 11, *Vegetation Management Units*, illustrates the VMU boundaries. Vegetation management units were not delineated in the San Vicente Connector parcels because there are no fuel management requirements or needs for these parcels (ICF 2023). VMU-specific fuel management recommendations are provided in Section 6.3. General fuel management methods and their suitability for use in the Preserve are discussed as follows.

5.3.1 Grazing

Animal grazing is an effective fuel reduction method and can be compatible with Preserve management goals. Focused grazing is a feasible alternative on this Preserve, but it would need to be highly managed to avoid introducing and spreading non-native plant species, overgrazing, or escape grazing. Grazing by cattle would generally be most effective in portions of the Preserve where slopes are not as steep, and goat grazing could be directed to areas where slopes are greater. Currently, there is no pressing need to introduce grazing. However, the method should remain in the management toolbox for specific applications adjacent to highly sensitive habitats, adjacent roadways, and potentially in areas that require fuel modification.

5.3.2 Mowing

Mowing is one of the most common and successful methods for reducing fuel loads, and it is compatible with Preserve management goals, but is of limited use in rocky and rugged terrain. Mowing is a feasible option for the Preserve to conduct fuel modification efforts, and is limited to areas adjacent to roads and trails. However, annual mowing may convert shrub-dominated areas to grasslands over time. Therefore, mowing should be conducted in late spring after weedy annuals have stopped growing but have not yet produced viable seed (Bell 2009).

5.3.3 Herbicides

Chemical means to control fuels/non-native plants are an effective method. Focused chemical selection and application minimize the detrimental effects and make the use of chemicals, such as glyphosate and selective chemicals, a feasible alternative. Herbicides could be used in specific treatments for difficult issue areas.

5.3.4 Prescribed Fire

Prescribed fire occurs in two forms: (1) natural fire, occurring primarily through lightning strikes that are then allowed to burn, and (2) intentional, managed fires. Natural fires are rare in San Diego County due to a general lack of lightning. However, natural fires may occur, and if allowed to burn as part of a fire plan, would then be considered a prescribed fire. Although considered unlikely, if a natural fire occurs on the Preserve and the fire is determined to pose no threat to life or high-value resources, the fire may be allowed to burn if it meets DPR objectives. If unsafe conditions exist (e.g., high winds, low humidity, high temperature) and, without suppression, it has a high likelihood of burning into areas of fire exclusion or is threatening valuable resources on- or off-site, then assertive suppression would be pursued. Intentionally managed fires are planned ignitions for purposes of reducing fuels primarily for public safety or habitat improvement, are regulated by all applicable laws, and are managed by CAL FIRE's Vegetation Management Program. Where prescribed burning is feasible, it shall be conducted under a permit from CAL FIRE or under contract with CAL FIRE under the statewide Vegetation Management Program.

Prescribed fire on the Preserve is not considered a high priority for fuel management with respect to the other treatment options included in this VMP. However, future conditions may warrant the use of prescribed fire as a fire hazard reduction or habitat modification technique. For instance, conducting prescribed burns in the non-native grasslands will aid in the reestablishment of perennial grasses and provide a natural fuel break, bisecting the northern and southern portions of the Preserve. Prescribed

fire can only be implemented by CAL FIRE, or a similar fire authority with experience and certifications to conduct burns, and requires the preparation and approval of a prescribed burn plan prior to implementation. Burning objectives shall adhere to those included in the County Vegetation Management Report (County 2009), specifically: prescribed burns will generally be utilized in strategic locations when the surrounding land has few residences, or a fire can be easily controlled because of topographic or other features. Again, the use of fire as a management tool will be considered specific to ecosystem management objectives. Strategic fuels treatments would be located to provide the most effective potential for reducing catastrophic fires. The potential for promoting vegetation health could be factored into decisions on locating strategic fuel treatments.

5.3.5 Hand Tool or Mechanical Equipment Thinning

Thinning can reduce fuel continuity and loading by selective removal of dead and dying, overly dense, horizontal and vertical bunches, and non-natives. This type of fuel reduction is most useful in urban interface and intermix areas and/or around high-value resources, such as cultural sites. Adjacent semi-rural residential lots along the northern preserve boundary have 100 feet of defensible space around the combustible structures. Thinning is recommended to occur on an annual basis prior to June for fuel modification areas associated with off-site residences or other habitable structures. Thinning is appropriate anywhere in the Preserve where insect or disease outbreaks and frost or drought kill occur, resulting in dense, dead vegetation.

5.3.6 Fuel Breaks

Fuel breaks provide areas of removed fuels that play an important role in helping contain wildfires. The local fire departments and CAL FIRE attempt to minimize impacts to sensitive resources when fighting fires in wildlands, when possible; and where feasible, fires are allowed to run to natural breaks, including trails, roads, the adjacent SR-67, and Scripps Poway Parkway. These locations then serve as a defensive position for fighting the fire.

5.4 FIRE RESPONSE PLAN

The Poway Fire Department and CAL FIRE are the primary responders to the Preserve since the Preserve is in an SRA, with the Lakeside Fire Department as the primary responder for the San Vicente Connector parcels. It is expected that CAL FIRE and Poway Fire would be the primary agencies involved in wildland fire suppression on the Preserve, with assistance from the other close by agencies, such as Santee Fire and Lakeside FPD. Given the location of the primary access to the Preserve on Sycamore Canyon Road, the initial response to wildland fires will likely be by Poway Fire Department Station #1 since they are capable of reaching the Preserve more quickly. These fire agencies, as well as the other agencies that would respond via automatic or mutual aid, are extremely qualified and experienced in responding to wildfires in this area.

CAL FIRE responds to wildfires in the SRA, including the Preserve, and Poway and Lakeside Fire Departments respond to structure fires, wildfires, and medical and associated emergencies. CAL FIRE has a vast arsenal of firefighting personnel and apparatus throughout the County that can be called upon for responding to wildfires within or in the vicinity of the Preserve, including:

- Air tankers
- Helicopters
- Air-tactical aircraft (AA)
- Various engine types
- Crew transports
- Bulldozers
- Communications centers

Once the initial attack force has responded, CAL FIRE can augment resources from within CAL FIRE, San Diego County, and other regions of California using the San Diego County Master Mutual Aid Plan and the California Fire and Rescue Mutual Aid System. Poway Fire Department and Lakeside FPD, as a CAL FIRE contract cooperative agreement agency, will be included in any initial dispatch of fire resources to the Preserve and will be part of the incident's unified Incident Command System.

The Lakeside FPD has Automatic Aid Agreements with the Heartland/Central Mutual Aid Zone of San Diego County. The Heartland/Central Mutual Aid Zone has an additional 20 fire stations (excluding Lakeside FPD facilities) located within a reasonable response time of Preserve lands. The Lakeside FPD is a signatory to the California and San Diego County Mutual Aid Agreement.

CAL FIRE utilizes three levels of dispatch and response based on weather conditions and time of year. The three levels are:

- Low – includes two engines with three personnel each
- Medium – includes three engines (Type III) with three personnel each, one Battalion Chief, one mid-sized bulldozer, one Type III helicopter, and one 16-person hand crew
- High – includes five engines with three personnel each, one Battalion Chief, two medium-sized bulldozers, one AA, two air tankers, and one Type III helicopter

Dispatch levels are based on weather conditions. Low dispatch occurs during the winter months from November through May. Medium and high dispatches occur during the normally declared fire season, which is June through October. There is some variation in the timing of the dispatch levels, based entirely on the weather.

Poway Fire currently employs the following firefighting apparatus with associated firefighting personnel:

- Structure protection type I pumpers
- Type III brush engines
- One water tender
- Command vehicles

Fire Suppression Air Support with fire retardant drops may be a component of responses to the entire area of the Preserve, especially under conditions that would accelerate wildfire spread. Under extreme conditions, or at night, air support may not be available; in these situations, response categories may become secondary to public safety.

In some cases, a fire passing through preserved lands such as the Preserve may move into nearby urban areas. Response to a fire within the Preserve will likely include the use of existing access roads for firefighting personnel, Type I engines (limited to off-site paved roadways), Type III engines, fire crews, air attacks and fire retardants, helicopters, and air tankers. On-site existing dirt roadways are less than 20 feet in width. Fire suppression actions may include direct attacks with engines, fire crews, helicopters, and firing operations. Line construction activities within the Preserve would be best carried out by hand crews. Dozers/road graders may be activated but should not be put into operation on the Preserve unless necessary for improving existing roads for engine access or constructing a line or secondary line for the preservation of high-value resources, including plant and animal species, habitats, people, or property. Following fires, vegetation rehabilitation should take place to remediate any physical disturbance that occurs due to fire suppression activities.

5.4.1 Fire Hazard and Current Fire Management Practices Evaluation

Based on specific data analysis, the Preserve is subject to an ongoing fire hazard that can result in significant fire intensity and spread during extreme weather events. This section presents a discussion of fire hazard situations for the Preserve. This information was collected during the initial analysis of the Preserve and reviews of project data, fire behavior modeling information, and high-resolution aerial imagery, and it was integrated into the preparation of this VMP and associated recommendations.

1. Based on the topography, vegetation, and fire history of the region, a large conflagration during Santa Ana wind conditions will likely enter the Preserve from the east, traveling across the Cleveland National Forest and the Barona Reservation or from southern Ramona, as seen with the Cedar Fire in 2003. Fires during typical on-shore wind patterns are likely to enter the Preserve from the adjacent urban lands in the City of Poway in the vicinity of the large industrial park or the area of Sycamore Estates off of Stonebridge Parkway in the City of San Diego. It could also come from the southwest across MCAS Miramar, although that is not the prevailing wind direction.

2. The Preserve can be primarily classified as WUI, representing the wildland part of the spectrum with undeveloped and often inaccessible lands to the east. A few roads can serve as access and areas from which treatment may occur, including Sycamore Park Drive on the south with access to the southeastern branch of Calle de Rob and Sycamore Canyon Road with access to the western terminus of Calle de Rob. Scripps Poway Parkway and State Route 67 form boundaries from which firefighting activities may proceed. However, the access from Scripps Poway Parkway is up a steep road cut.

3. Potential ignitions include a variety of residential-related sources including structure fire and yard machines to the west, but there are maintained open areas surrounding many of the houses in that location that would limit those types of fires. During Santa Ana east wind events, the Iron Mountain Drive and Rio Maria Road/Foster Truck Trail area housing could be a source of fire. Accidental fire from residents living in the area and accessing the Preserve would be a potential source for ignition as well. Ignition sources not associated with residential development include vehicular-associated ignitions (e.g., car fire, catalytic converter, tossed

cigarette, etc.) along Scripps Poway Parkway and State Route 67. Additional nonresidential ignition sources include electrical transmission lines near the Preserve, accidental fires from individuals experiencing homelessness in the area (though there was no evidence of that on the Preserve), and arson.

4. Wildfires fueled by Santa Ana winds may move rapidly across the Preserve. Coastal sage scrub and chaparral fuels will be the predominant carriers of fire across the Preserve. Rocky hilltops west of an elevated shallow valley surrounded by rolling hills west of SR-67 typify the topography of the Preserve. Fires in the smaller grassland areas move very quickly when carried by the wind. Fires in chaparral or sage scrub fuels will move more slowly but will produce greater flame lengths (greater than 20 feet) and associated heat output (in excess of 5,000 British thermal units).
5. A fire originating in a structure within an approximately one-mile radius of the Preserve could result in burning embers landing within the Preserve, potentially resulting in vegetation ignition if there is a receptive fuel bed.
6. In general, fires that burn through the Preserve are more likely to be the result of ignition sources that occur outside of the Preserve, either far to the east, west, or potentially the north.

Based on current roadways, firefighting access is adequate for the western and southern sides of the Preserve and is also good for the northern and eastern boundaries due to the presence of the major roads and highways, such as SR-67. For the San Vicente Connector parcels, SR-67, a publicly owned and maintained highway, borders the western boundary, and provides access to the southern and northern portions. The existing road through the Preserve could be used as a base from which to fight fires, including the use of back fires and other techniques. Air attack will be an important component for firefighting but may not be available or usable, depending on the extent of the fire event and/or the time of day and weather conditions. Firefighting to the west and east of the Preserve is expected to be driven primarily by structure protection efforts.

The catastrophic wildfire threat for the Preserve is extreme when severe fire weather occurs, which will coincide with Red Flag Warning periods. Red Flag Warnings are declared by the National Weather Service and are issued when sustained winds are greater than 25 miles per hour (mph) (with gusts greater than or equal to 35 mph) and relative humidity is 15 percent or lower (for at least six hours), or dry lightning occurs with more than isolated coverage (National Weather Service, San Diego Office 2012).

Beyond these provisions, fire management practices are restricted to response and tactical suppression efforts associated with wildfires originating on or burning onto the Preserve. No active fire or fuels management plans are currently employed on the Preserve.

5.4.2 Primary Actions and Contacts for Wildfire Emergency

Public and firefighter safety should be the primary consideration before and during a wildfire. The following measures shall be implemented at the Preserve:

- Evacuate any DPR staff, contractors, or trail users from the Preserve;
- Close trails and staging areas;

- Post fire danger signs at staging areas and trailheads;
- Post signs with phone numbers for Preserve visitors to call and report suspicious activity or fires;
- Post signage at staging areas instructing trail users to report suspicious activity to the 911 dispatch center;
- Post signage at staging areas instructing trail users to immediately report fire activity to the 911 dispatch center or fire agency; and
- In the event of a fire on the Preserve or a fire approaching the Preserve, designate a DPR staff member to liaison with CAL FIRE/Lakeside or Poway FPD.

The following persons/agencies should be contacted in the event of a wildfire on the Preserve or for information regarding fire management activities.

CAL FIRE
San Diego Unit
Emergency: 911
Non-Emergency – Unit Chief, El Cajon: 619.590.3100
Website: http://www.fire.ca.gov/.

City of Poway Fire Department (PFD)
13050 Community Road
Poway, CA 92064
Emergency: 911
Non-Emergency – Fire Marshal: 858.668.4470
Website: http://www.poway.org/fire department.

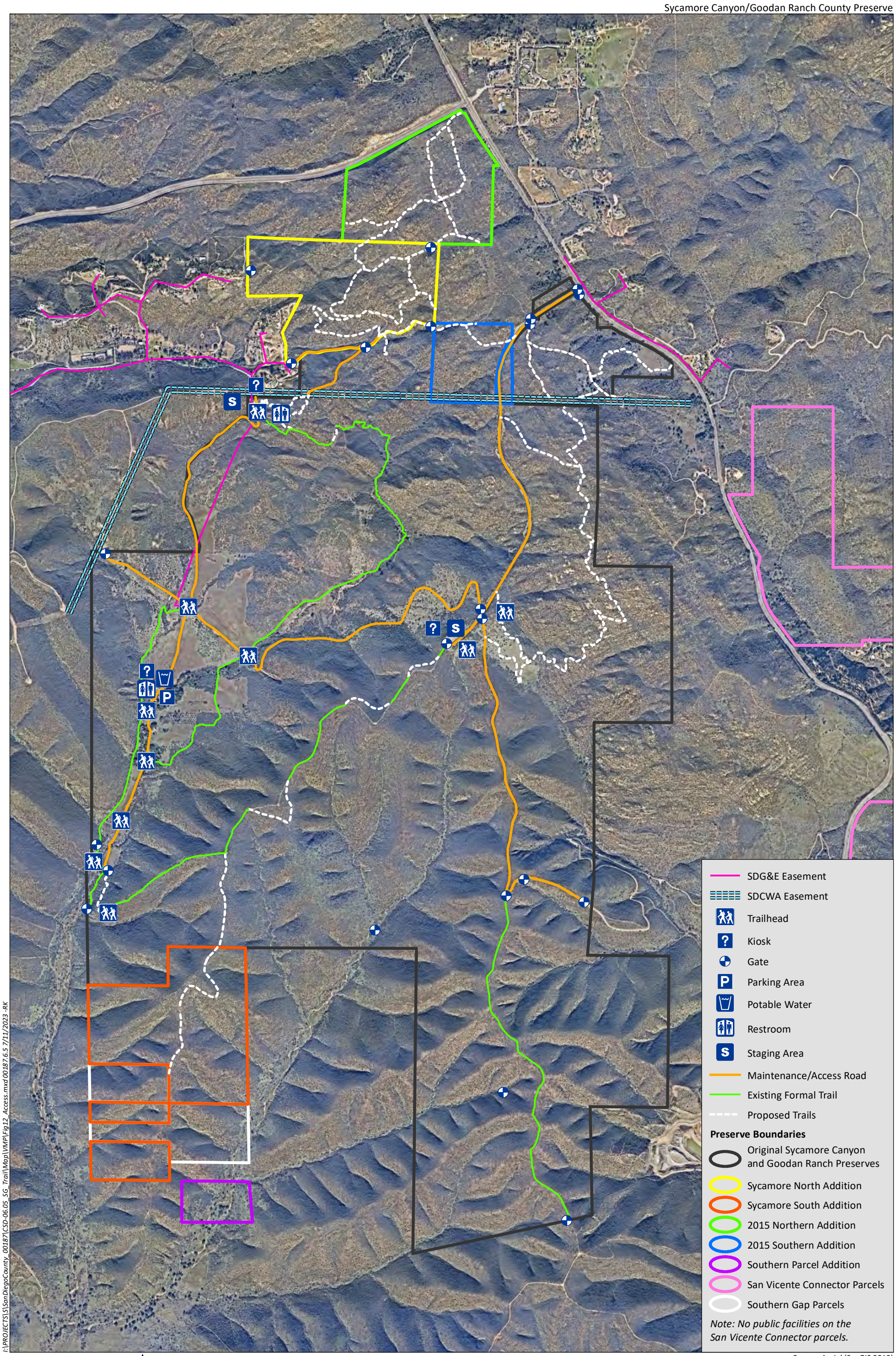
Lakeside Fire Protection District (Lakeside FPD)
12216 Lakeside Avenue
Lakeside, CA 92040
Emergency: 911
Non-Emergency – Fire Marshal: 619.390.2350
Website: https://lakesidefire.org/.

5.4.3 Roads/Access

Access to the Preserve consists of vehicular entrances and non-vehicular entrances. Access via roads, trails, and access gates is presented in Figure 12, *Access Roads, Trails, and Access Gates*, and discussed in detail below.

5.4.3.1 Existing Vehicular Entrances

Vehicle access to the Preserve is currently provided by two primary entrances. One entrance (Goodan Staging Area) is in the northwest corner of the Preserve at the end of Sycamore Canyon Road. It generally facilitates access to the northern and western portions of the Preserve. The entrance includes



Source: Aerial (SanGIS 2019)

HELIX Environmental Planning

Gates, Access Roads, and Easements

Figure 12

parking for 10 to 12 vehicles within a fenced decomposed granite surface staging area. Additional features at this entrance point include:

- A large entry sign,
- Trail kiosk,
- Regulatory and informational signage,
- A vault toilet,
- Trash and recycling bins, and
- A gate at the entrance and a second automated gate separating the staging area from the road continuing into the Preserve.

A second entrance is on the eastern edge of the Preserve via Sycamore Park Drive from SR-67. Sycamore Park Drive is a 24-foot-wide road, paved (for the first 1,800 feet) and continuing approximately 1 mile as a maintained gravel road to a staging area (67 Staging Area) located roughly in the middle of the Preserve. The 67 Staging Area provides a reasonable access point to the entire Preserve, though trail travel distances to the northern and southern edges are substantial. The staging area provides unmarked parking for approximately 90 vehicles, including horse trailers, within a fenced decomposed granite surface. Additional features at this entrance/staging area include:

- A large entry sign at SR-67,
- Trail kiosk,
- Regulatory and informational signage at the staging area,
- A seating area with shade structure,
- Portable restroom,
- Trash bins, and
- Gates at the SR-67 entrance (open during normal park hours), and gates where the road and staging area bisect other roads and trails (normally locked but allowing non-vehicular passage).

Emergency and operational access into the interior of the Preserve is provided by the aforementioned vehicular entries, which are connected through the middle of the Preserve by Cardiac Hill Road, an unpaved service drive and popular hiking route. Other emergency and operational vehicular access routes are also possible along the Fanita Fire Road; the Ridge Trail; and a portion of Slaughterhouse Canyon Trail.

From a fire suppression perspective, access to the Preserve is the main entrance at Sycamore Canyon Road, where the main gate and Goodan staging area are located. This road is the primary access for Poway Fire to enter the Preserve. An automatic gate with a Knox switch has been installed. The Knox switch can only be operated with a key from Poway Fire. Additionally, fire suppression personnel can enter the Preserve through a locked gate off SR-67. The SR-67 gate is kept open during business hours

and locked afterward. Several interior gates have County padlocks and are kept open during business hours only. No fire agencies have keys to these locks after business hours.

5.4.3.2 Existing Non-Vehicular Entrances

Non-vehicular access to the Preserve is located in four general areas along the edge of the Preserve, including:

- Northern Edge: Access to the Preserve from the north is currently possible via an informal single-track trail on the City of Poway property that crosses Scripps Poway Parkway through a large wildlife tunnel. This route provides the only safe crossing of Scripps Poway Parkway, a 4-lane arterial road, from open space areas to the north. This route is not currently authorized by the County as an access point to the Preserve.

- Northeast Corner: An unauthorized single-track trail currently connects the northeast corner of the Preserve to the intersection of Scripps Poway Parkway and SR-67. This entrance could provide a valuable connection to the Iron Mountain Trail and other open spaces, but would require some improvements to ensure safe use. The first short segment is relatively steep and crosses a concrete brow ditch.

- Southern Edge: There are currently no authorized entrances at the southern edge of the Preserve. However, there are numerous routes on private property and MCAS Miramar property that are used by hikers and mountain bikers to access the southeast corner of the Preserve and the Stowe Trail alignment through Sycamore Canyon. Mountain bikers often park along Mast Boulevard to access the Stowe Trail. The Stowe Trail follows a logical route through Sycamore Canyon until it enters the western edge of the Preserve south of the Visitors Center. The Stowe Trail is approximately four miles long and parallels the eastern border of MCAS Miramar and is marked with appropriate signs to facilitate access to the trail by members of the San Diego community who have obtained a valid permit. Applications for permits must be submitted through the MCAS Miramar Provost Marshal's Office. The official MCAS Miramar website contains pertinent information regarding the process to obtain a permit and appropriate use of the trail. Persons who access Stowe Trail without a permit may be subject to citations, fines, and any other punitive measure as determined by the U.S. District Court. The Fanita Ranch development project has proposed to create new trail connections to the Preserve at the Fanita Fire Road and possibly at the Stowe Trail.

- Western Edge: The western edge of the Preserve has several entry points:

    - A maintenance access road for the SDCWA pipeline connects to the Preserve, just north of the Visitors Center, and is gated at the Preserve boundary.

    - A trail currently connects from open space to the west to the Goodan Staging area. This trail ultimately connects West Sycamore, City of San Diego Mission Trails Regional Park to the Stonebridge community to the west.

    - An important additional entrance point exists at Calle de Rob, but due to private property easements, this entrance is usable only for park operations; it is not open to the public.

Dirt roads within the Preserve are, on average, about 10 feet wide. All roads have been recently graded and are in good condition. Most of the interior roads and trails are named and marked on a Preserve map. The trails have been identified with trail signs; however, signage has not been erected for the dirt roads. Calle de Rob connects Sycamore Park Drive and Sycamore Canyon Road through the northern end of the Preserve, and Paragon Mesa Road bisects the northernmost portion of the Preserve. Roads located along the easternmost portion of the Preserve are maintained and used by the San Diego County Water Authority and SDG&E.

5.4.4 Fuel Breaks

Fuel breaks are a fire defense improvement that reduces the volume of flammable vegetation prior to fire season. The existing multi-use trail/access roads through the Preserve currently serve as fuel breaks. Based on the topography of the Preserve and the potential for related impacts, it is not recommended that additional breaks be created at this time. However, the need for fuel breaks is dependent on the specific conditions of a fire. If new fire breaks are required, the location should be coordinated with the Incident Command team where possible. The Incident Command team includes the District Park Manager and fire agency staff with access to location information on sensitive biological and cultural resources that should be avoided, if possible.

5.4.5 Emergency Staging Areas

Emergency staging areas are temporary locations where resources await assignment. The Preserve has three potential staging areas depending on the location of a fire. These areas are marked on the Preserve map as the SR-67 staging area, the Goodan staging area, and the Goodan Ranch Visitors Center parking area. Additional pre-designated staging areas, although important for incident command to organize, plan, and implement firefighting strategies, are not necessary.

5.4.6 Fire Hydrants

The Preserve has a 10,000-gallon water tank adjacent to the Visitors Center and is primarily for the fire protection system for the Visitors Center. However, the water tank is equipped with a fire department connection at the base. Additionally, fire hydrants are located within residential development areas off-site approximately three miles west of the Preserve within the jurisdiction of the City of Poway. Fire hydrants may be utilized during a fire event to refill engines, as necessary, provided agreements are in place for their use.

The nearest public fire hydrant to the San Vicente Connector parcels is on the east side of SR-67, between Slaughterhouse Canyon Road and Vigilante Road. This hydrant is approximately 1.0 mile south of the southern boundary of the San Vicente Connector parcels.

Several additional fire hydrants are at the following locations (distance from Southern San Vicente Connector parcels):

- Vigilante Road and SR-67 (approximately 1.5 miles);
- Slaughterhouse Canyon Road at the San Diego Asphalt Recycling Center (approximately 1.5 miles);

- Slaughterhouse Canyon Road at the West Coast Sand and Gravel Facility (approximately 1.5 miles);

- Slaughterhouse Canyon Road at the Brewer Crane and Rigging Facility (approximately 2.0 miles); and

- Slaughterhouse Canyon Road at SR-67/TTT Concrete Facility (private hydrant inside of facility compound; approximately 2.0 miles)

5.4.7 Other Water Sources

Private water tanks with a minimum 10,000-gallon capacity have been placed on the residential properties in the drainage between the southern and northern San Vicente Connector parcels. There are at least six private firefighting reservoir tanks located in this area, for a minimum water supply of approximately 60,000 gallons.

Other water sources which may be available during a wildfire event within the Preserve include the following:

- San Vicente Reservoir, approximately 3.5 miles southeast from the furthest reaches of the Preserve, provides helicopter dipping access.

- Lake Jennings, approximately seven miles southeast from the furthest reaches of the Preserve, provides helicopter dipping access.

- Lake Miramar, approximately seven miles west of the boundary of the Preserve, may also be available for helicopter dipping access.

6.0 MANAGEMENT DIRECTIVES

This section provides recommendations for vegetation management within the Preserve, including management directives that are specifically related to invasive non-native plant species management, habitat restoration, and fire management.

6.1 INVASIVE NON-NATIVE PLANT SPECIES REMOVAL

The short-term management directives below address high-priority invasive non-native plant species removal, while longer-term management directives consider invasive non-native plant species for their risk of reducing vegetation community quality over time.

Management Directive Invasive 1 – Reduce, control, or, where feasible, eradicate invasive, non-native flora known to be detrimental to native species and/or the local ecosystem. Remove aggressive, invasive non-native plant species and those with a high fire hazard within the Preserve, including giant reed, pampas grass, perennial veldt grass, saltcedar, purple false-brome, artichoke thistle, stinkwort, treasure flower, river red gum, crown daisy, milk thistle, blue-eyed cape marigold, and Chinaberry tree, as soon as possible. The Chinaberry tree is limited and not likely to spread. However, its removal is still recommended.

Management Directive Invasive 2 – Identify and pursue funding for long-term invasive non-native plant species control. Coordinate with other agencies, nonprofit organizations, and/or volunteer groups to seek funding and implement invasive non-native plant species removal projects for moderate and low-priority invasive non-native plant species within the Preserve.

Management Directive Invasive 3 – Conduct invasive non-native plant species monitoring. Continue to monitor other identified invasive non-native plant species within the Preserve to determine if removal efforts are warranted in order to maintain and/or improve the quality of the existing native vegetation communities. Monitor for any new invasive non-native plant species that may inhabit the Preserve during regular patrols at 10-year internals.

Guidance for Invasive Non-native Plant Species Management:

- Train DPR staff in the identification of invasive non-native plant species to allow them to quickly determine the extent of any infestations.

- Immediately begin the eradication of the target species discussed in this VMP.

- During routine patrols and inspections, when small patches or isolated individuals of invasive non-native species are found (at any time of year), record the locations and remove invasive non-native plants immediately using hand tools or spot spraying. Remove plant material and dispose of it in such a manner as to prevent contamination (reproduction or seeding) elsewhere.

- Use the least invasive approach to eradication. Generally, this will be hand removal, or cut and daub method for larger individuals. Take care to limit ground disturbance as much as possible, as several of the invasive species require disturbed earth to grow.

- If larger infestations are found, carefully plan and perform an eradication program, which will be carried out at the most appropriate time of year for the species in question (treatment methods listed in Section 3.0). Most often, this will involve the use of selective herbicide treatment(s) by a licensed pest control applicator (e.g., County of San Diego Department of Agriculture, Weights and Measures).

Management Directive Invasive 4 – Conduct educational outreach on invasive landscaping plants. Prepare and implement an invasive non-native plant species educational outreach program and/or materials to reduce the use of these plants by nearby property owners and potential land managers.

Management Directive Invasive 5 – Prepare an equestrian use education program. Prepare and implement an equestrian use education program that discusses the potential negative impacts to native ecosystems from the spread of non-native seeds along trails from feed sources containing weed seed. The program could include signage and brochures promoting weed-free feed for at least 72 hours prior to entry into the Preserve to help preserve the natural environment.

6.2 RESTORATION

This VMP provides potential habitat restoration opportunities. The primary management directives for native vegetation community restoration include the following:

Management Directive Restoration 1 – Restore degraded habitats to protect and enhance populations of rare and sensitive species through the stabilization of eroded lands and strategic revegetation. Restore degraded areas to reestablish and/or enhance the biological functions and values of native vegetation communities in these areas.

> **1A – Passive Restoration**. Perform invasive non-native plant and erosion control as needed in disturbed areas where the natural recruitment of native plant species is actively occurring.
>
> **1B – Active Restoration**. Conduct soil preparation and native planting of disturbed or degraded areas where native vegetation recruitment is not actively occurring. Consider management of the grassland areas to reduce the dominance of those areas by red stemmed filaree (*Erodium cicutarium*).

Management Directive Restoration 2 – Address long-term restoration needs. Restoration activities should occur following landscape-changing disturbances that remove, damage, degrade, or alter the existing native vegetation communities. Restoration methods will be customized to the Preserve, based on the type of disturbance, and will require preparation and implementation of a restoration plan. Restoration will incorporate active revegetation, including:

- Native vegetation community establishment/creation through planting and/or seeding
- Native vegetation community enhancement, including the grassland areas
- Removal of invasive non-native plants when they are young
- Application of herbicides, pesticides, and fertilizers if needed
- Application of supplemental irrigation if needed

Management Directive Restoration 3 – Monitor invasive non-native plant removal sites. While the invasive non-native plant species burden on the Preserve is not high, continue to monitor invasive non-native plant species removal sites to ensure that passive natural recruitment is successfully occurring in these areas.

Management Directive Restoration 4 – Monitor native vegetation community quality. Continue to monitor the quality of native vegetation communities throughout the Preserve using comparative vegetation mapping over time and evaluation of potential type conversions.

Management Directive Restoration 5 – Monitor pests and diseases. Monitor the disease presence and pest levels to determine outbreaks and prescribe an active treatment, as appropriate.

Management Directive Restoration 6 – DPR will ensure that only native, site-appropriate trees are planted within the Preserve. Prior to planting native trees, DPR staff will identify potential locations for tree planting and then determine suitable species based on the presence of the same species in/near the target area or in similar habitats and slope aspects in other parts of the Preserve. Irrigation options will be evaluated, including potential access constraints, availability for hand or truck watering, or temporary above-ground irrigation. DPR may also coordinate with the County's arborist or an outside

consultant arborist or restoration specialist to assist in the selection of appropriate tree species and planting locations.

6.3 FIRE MANAGEMENT

The long-term strategic fire management plan considers strategic fire prevention activities, fire suppression with regard to fire effects on habitat, and post-fire monitoring and rehabilitation. The long-term strategic fire plan for the Preserve must prioritize public safety while meeting habitat management goals. This planning process also needs to be coordinated with the existing Preserve management planning process. Management directives are as follows.

Management Directive Fire 1 –Maintain fuel modification zones. Annually maintain fuel modification zones to 100 feet around on-site buildings and facilities (Figure 11; VMU 3). Additionally, annually maintain fuel modification zones along the property boundaries that function as extensions of off-site residential structure fuel modification zones (Figure 11; VMU 3). Figure 11 provides a focused view of proposed fuel modification areas, consistent with the boundary of VMU 3. Fuel modification zones are measured at 100 horizontal feet from the edge of structures.

Management Directive Fire 2 – Delineate fuel modification areas. Install and maintain inconspicuous fuel modification extent markers for all fuel modification zones (Figure 11; VMU 3) within the Preserve to minimize additional thinning outside the intended area.

Management Directive Fire 3 – Maintain fire suppression. Fire suppression, in combination with other management methods in targeted Preserve habitat management areas, is the priority for the Preserve composed of coastal sage scrub and southern mixed chaparral (20-year-old vegetation). Lengthening the fire return cycle to an optimal frequency will require fuel reduction experiments, research, monitoring, and analysis as part of the overall management approach. The optimal fire frequency in southern mixed chaparral may be from 50 to 100 years or more (Conard and Weise 1998) but shorter in coastal sage scrub. It may be difficult to achieve longer fire return intervals given the current and projected ignition sources that may affect the Preserve. However, the results of site-specific data analysis will more firmly establish the optimal return intervals to meet habitat goals, or if additional steps need to be implemented, to lengthen the return of fire.

Management Directive Fire 4 – Share access data. Maintain local fire agency gate locks and report any notice of removed or missing locks to the appropriate fire agency. Signs should be installed indicating access limitations and extents (map form) and provide road quality to local fire responders. This information will be included in their wildland pre-response plans, resulting in more efficient responses. Information readily accessible by responders not familiar with the area, such as out-of-County or out-of-state responders, will improve firefighter safety.

Management Directive Fire 5 – Control illegal access. Continue to restrict off-highway vehicles and shooting access. These are potential ignition sources that must be managed by restricting access (e.g., continued use of fences, gates, and signage) and by establishing a high-profile presence of DPR staff. The legality of the presence of existing inhabitants within and adjacent to the area needs to be evaluated. While there is no evidence of this, at present, if trespassers appear on the Preserve, they should be removed.

Management Directive Fire 6 – Conduct educational outreach on fire management. Private property owners in the wildland urban interface (WUI) should be encouraged to play an active role in reducing the potential fire hazard. It will also be beneficial if the public understands the management actions occurring on the Preserve, such as mowing, and herbicides, as applicable. As such, this VMP recommends a concerted effort to reach property owners situated in locations that may be affected by wildfire on the Preserve or whose properties and actions may serve as Preserve ignition sources. Educational material can be customized for these homeowners to include a discussion of the importance of the Preserve. Standard measures for implementing a 100-foot fuel modification/defensible space zone can be provided from materials available from CAL FIRE and from the County Department of Planning & Development Services. As part of the public education program, private property owners should be encouraged to participate to help curb illegal access and report potential problems.

Management Directive Fire 7 – Reduce ignition sources. Ignition sources are present on and adjacent to the Preserve. The high-voltage electrical transmission lines that cross the Preserve present potential ignition sources. Adjacent sources include roadways with vehicular travel, especially SR-67, adjacent residences, recreational users, and MCAS Miramar training activities, among others. As such, it is not possible to remove all sources of ignition. Rather, reducing the potential spread of wildfire onto or throughout the Preserve is recommended.

Management Directive Fire 8 – Conduct recommended fuels management. Conduct fuels management using the identified VMUs, as feasible, and as presented in Table 15, *Fuel Model Assignments*. Table 15 provides a summary of the high-value resource areas acknowledged for the Preserve and the associated fire prevention strategy recommended for achieving long-term management goals.

Management Directive Fire 9 – Conduct post-fire management and erosion control. Provide controls following fire events to stabilize the soils in the burn area and minimize the potential for erosion. Erosion control BMPs, such as mechanical rehabilitation treatments, including straw mulch, hay bales, and jute rolls, should be in place as soon as possible after a fire and prior to the onset of the winter rainy season. Care should be taken to select and inspect these materials, so they are not a source of invasive non-native plant species. The use of certified weed-free hay is a good policy (Bell 2009).

Management Directive Fire 10 – Coordinate with the local fire departments. DPR will coordinate with the local Fire Departments, as well as CAL FIRE, to discuss the VMP, specifically in relation to the preservation of sensitive natural resources, sensitive cultural resources, and avoidance measures for these resources during wildfire events. DPR will discuss additional components of the VMP with the local Fire Departments, as necessary.

Table 15
FUEL MODEL ASSIGNMENTS

VMU	Sensitive Resources[1]	Fuel Reduction Practice
1 Area: 239.40 acres	Sensitive Plant Species: 22 Sensitive Animal Species: 2 Cultural Resources: 30	VMU 1 is characterized by non-native grassland, Diegan coastal sage scrub, coastal sage scrub-chaparral transition, a southern mixed chaparral, and coast live oak and riparian woodland along the bottom of Sycamore Canyon. Vegetation age in this VMU is 20 years. Access to the VMU is via Sycamore Canyon Road. Fuel treatment in VMU 1 should also focus on invasive species removal. Strategic understory shrub thinning/crown raising may be implemented along the oak woodland interface to minimize the potential for crown fire occurrence in the oak woodland/riparian zone. Reduction of fires through strategic mowing is recommended along the edge of Sycamore Canyon Road. This road should be maintained free of vegetation to effectively maintain a north-south fire break. Thinning/vegetation reduction may be necessary to reduce potential for catastrophic fire near sensitive species locations. Vegetation should be removed via manual methods in these areas, with biological oversight to help ensure that sensitive species are not impacted. There is a total of 30 total known significant cultural resources within VMU 1
2 Area: 2321.50 acres	Sensitive Plant Species: 139 Sensitive Animal Species: 105 Cultural Resource Sites: 60	VMU 2 consists primarily of chaparral and sage scrub fuels which are predominantly 20 years old. Access to VMU 2 is relatively limited, with access via the northwest corner of the Preserve at the end of Sycamore Canyon Road. It generally facilitates access to the northern and western portions of the Preserve or from the eastern edge of the Preserve via Sycamore Park Drive from SR-67 which provides access to the central or southeastern portion of the Preserve. Steep terrain in this VMU also limits access and the amount of thinning that would be possible. Consequently, fuel treatment in VMU 2 should be limited to invasive non-native plant species treatment and removal. Dead fuel removal and invasive non-native plant species removal should be conducted along publicly-accessed roadways within and adjacent to the VMU to minimize the likelihood of ignitions. Reduction of fires through strategic mowing/fuel reduction is recommended along Sycamore Park Drive and Calle de Rob. These roads should be maintained free of vegetation to effectively maintain north-south and east-west fire breaks. Thinning/vegetation reduction may be necessary to reduce potential for catastrophic fire near sensitive species locations. Vegetation should be removed via manual methods in these areas, with biological oversight to help ensure that sensitive species are not impacted. There is a total of 60 known significant cultural resources within VMU 2.

Table 15 (cont.)
FUEL MODEL ASSIGNMENTS

VMU	Sensitive Resources[1]	Fuel Reduction Practice
3 (WUI Fuel Modification Zones) Area: 0.37 acres	Residences	This zone is characterized by the adjacent residential development in the northwest corner of the Preserve. Fuel reduction by manual thinning, mowing, and non-native removal should be conducted routinely to minimize fire spread and ignition potential from residential development. Inconspicuous fuel modification extent markers are recommended to minimize additional thinning outside the intended area. There are no known significant cultural resources sites or sensitive species within VMU 3.

[1] Totals account for every species or resource observed within the VMU.

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Appendix A

Special-status Plant Species Detected or with Potential to Occur

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
San Diego thorn-mint (*Acanthomintha ilicifolia*)	FT/SE CRPR 1B.1 County List A MSCP Covered MSCP NE	Annual herb. Typically found on clay soils within chaparral, coastal scrub, valley and foothill grassland, and vernal pools. Flowering period: April to June. Elevation: below 3,150 feet (960 meters).	**SP, SV**	**Low (SP).** Though the species has been documented within the Preserve (County 2009), suitable clay soils are not mapped within the Southern Parcel. This species was not observed during the 2019 HELIX rare plant surveys. **Moderate (SV).** Suitable soils observed on the southern portion. Properties and nearest recent record are less than one mile away.
California adolphia (*Adolphia californica*)	--/-- CRPR 2B.1 County List B	Perennial shrub. Most often found in sage scrub but occasionally occurs in peripheral chaparral habitats, particularly hillsides near creeks on clay soils. Flowering period: December to April. Elevation: below 1,312 feet (400 meters).	**SP, SV**	**Low (SP).** Suitable clay soils are not mapped within the Southern Parcel. however, no recent or historical records for this conspicuous shrub within the Preserve. **Not Expected (SV).** No suitable soils observed on the Properties. Additionally, Properties are located outside of species' known geographical range.
Singlewhorl burrobush (*Ambrosia monogyra*)	--/-- CRPR 2B.2	Perennial shrub. Sandy soils in chaparral and Sonoran Desert scrub. Elevation range: 33-1640 ft. Blooming period: August – November.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.
San Diego ambrosia (*Ambrosia pumila*)	FE/-- CRPR 1B.1 County List A MCSP NE	Perennial rhizomatous herb. Sandy loam or clay soils that are sometimes alkaline and often in disturbed areas of chaparral, coastal scrub, valley and foothill grassland and vernal pool habitats. Elevation range: 65-1360 ft. Blooming period: April – October.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.
Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*)	FE/-- CRPR 1B.1 County List A MSCP Covered	Perennial shrub. Found within relatively open, coastal chaparral. At occasional inland sites it occurs in denser mixed chaparral. Flowering period: December to June. Elevation: below 1,200 feet (365 meters).	**SP, SV**	**Low (SP).** Suitable chaparral habitat occurs within the Southern Parcel; however, no recent or historical records for this conspicuous shrub within the Preserve. The species has been documented over 2.5 miles southwest of the Southern Parcel within Marine Corps Air Station (MCAS) Miramar and at Mission Trails Regional Park. **Not Expected (SV).** Properties are outside of species' known geographical range.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
San Diego sagewort (*Artemisia palmeri*)	--/-- CRPR 4.2 County List D	Perennial herb. Typically found along stream courses, often beneath riparian woodland, on sandy and mesic soils. May occur in coast live oak woodland, coastal sage scrub, and southern mixed chaparral. Flowering period: June to October. Elevation: below 1,969 feet (600 meters).	**NA, SA, SP, SV**	**Moderate (NA, SA).** Properties may be too high in elevation. **Moderate (SP).** Suitable stream habitat occurs within the Southern Parcel but is dominated by rocky and cobbly soils. However, the species has been previously documented in the northern portion of the Preserve during surveys conducted in 2008 (County 2013). This species was not observed during the 2019 HELIX rare plant surveys. **Present (SV).** Suitable habitat occurs on the Properties. Species was observed within the Properties during 2019 surveys.
Western spleenwort (*Asplenium vespertinum*)	--/-- CRPR 4.2 County List D	Perennial rhizomatous herb. Occurs in chaparral, cismontane woodland, and coastal scrub along rocky bluffs. Flowering period: February to June. Elevation: 590 to 3,280 feet (180 to 1,000 meters).	**SP, SV**	**Low (SP).** Suitable habitat rocky bluffs do not occur within the Southern Parcel and there are no recent or historical records within the Preserve. A historical record from 1935 was recorded to the east of the Preserve at San Vicente Reservoir. **Low (SV).** Suitable soils exist within the Properties and the nearest recent record is located approximately 3 miles away. Species was not observed on the Properties 2019 surveys.
Deane's milkvetch (*Astragalus deanei*)	--/-- CRPR 1B.1 County List A	Perennial herb. Found on open, shrubby slopes in chaparral. Also occurs within coastal scrub, cismontane woodland, and riparian forest. Flowering period: February to May. Elevation: 246 to 2,280 feet (75 to 695 meters).	**NA, SA, SP, SV**	**Present (NA, SA).** Found on southeast portion of Cielo property. **High (SP).** Suitable habitat occurs within the Southern Parcel and the species was previous detected in the northern portion of the Preserve during surveys conducted in 2016 (AECOM 2017). **Not Expected (SV).** Properties are outside of species' known geographical range.
San Diego milkvetch (*Astragalus oocarpus*)	--/-- CRPR 1B.2 County List A	Perennial herb. Openings in chaparral and cismontane woodland habitats. Elevation range: 1000-5000 ft. Blooming period: May – August.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Coulter's saltbush (*Atriplex coulteri*)	--/-- CRPR 1B.2 County List A	Perennial herb. Alkaline or clay soils in coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland habitats. Elevation range: 5-1510 ft. Blooming period: March – October.	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.
South Coast saltscale (*Atriplex pacifica*)	--/-- CRPR 1B.2 County List A	Annual herb. Coastal bluff scrub, coastal dunes, coastal scrub, and playa habitats. Elevation range: 0-460 ft. Blooming period: March – October.	**SV**	**Not Expected (SV).** Properties are outside of species' known elevation range.
Parish's brittlescale (*Atriplex parishii*)	--/-- CRPR 1B.1 County List A	Annual herb. Alkaline soils in chenopod scrub, playa and vernal pool habitats. Elevation range: 80-6235 ft. Blooming period: June –October.	**SV**	**Not Expected (SV).** No suitable soils or habitat observed on the Properties.
Encinitas baccharis (*Baccharis vanessae*)	FT/SE CRPR 1B.1 County List A MSCP Covered MSCP NE	Perennial shrub. Relatively low-growing mature chaparral is the primary habitat. Also found in southern maritime and southern mixed chaparrals, and understory of Torrey-pine forest. Flowering period: August to December. Elevation: 197 to 984 feet (60 to 300 meters).	**NA, SA, SP, SV**	**High potential to occur (NA, SA)**. It has been found on rocky peak areas in central San Diego County four miles away (Calflora 2016). **Low (SP).** Suitable chaparral habitat is present within the Southern Parcel; however, no recent or historical records for this conspicuous shrub within the Preserve. The nearest observation occurs over 4 miles north of the Preserve at Mount Woodson. **Not Expected (SV).** No suitable soils or habitat observed on the Properties.
San Diego sunflower (*Bahiopsis laciniata*)	--/-- CRPR 4.3 County List D	Perennial shrub. Occurs on a variety of soil types within coastal sage scrub. Generally, shrub cover is more open than at mesic, coastal locales supporting sage scrub. Flowering period: February to August. Elevation: 295 to 2,461 feet (90 to 750 meters).	**SP**	**High (SP).** Suitable habitat occurs within the Southern Parcel and the species was detected in the southwestern portion of the Preserve during the 2019 biological surveys conducted by HELIX for the Sycamore Canyon and Goodan Ranch Preserve Public Access Plan Project.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
San Diego goldenstar (*Bloomeria clevelandii*)	--/-- CRPR 1B.1 County List A MSCP Covered	Perennial bulbiferous herb. Occurs in valley grasslands and coastal scrub, particularly near mima mound topography or in the vicinity of vernal pools, on clay soils. Flowering period: April to May. Elevation: 164 to 1,526 feet (50 to 465 meters).	**SP, SV**	**Low (SP).** Suitable clay soils are not mapped within the Southern Parcel though the species has been previously documented just south of the Preserve in the Fanita Ranch area. **Present (SV).** Suitable habitat occurs on the Properties. Species was observed within the Properties during 2019 surveys.
Thread-leaved brodiaea (*Brodiaea filifolia*)	FE/SE CRPR 1B.1 County List A MSCP	Perennial bulbiferous herb. Often clay soils in openings of chaparral, cismontane woodland, coastal scrub, playa, valley and foothill grassland, and vernal pool habitats. Elevation range: 80-3675ft. Blooming period: March – June.	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.
Orcutt's brodiaea (*Brodiaea orcuttii*)	--/-- CRPR 1B.1 County List A MSCP Covered	Perennial bulbiferous herb. Grows on mesic or clay soils within grasslands and vernal pools. Additional habitat associations include closed-cone coniferous forest, chaparral, woodlands, and meadows and seeps. Flowering period: May to July. Elevation: 98 to 5,550 feet (30 to 1,692 meters).	**SP, SV**	**Low (SP).** Clay soils are not mapped within the study area, though grassland habitat along the Clark Canyon Creek is potentially suitable for the species. However, there are no recent or historical records within the Preserve. This species was observed south of the Preserve at Marine Corps Air Station Miramar as recently as 2012. **Not Expected (SV).** No suitable soils observed on the Properties.
Brewer's calandrinia *(Calandrinia breweri*)	--/-- CRPR 4.2 County List D	Annual herb. Sandy or loamy soils, disturbed and/or burned sites in chaparral and coastal scrub. Elevation range: 32-4001 ft. Blooming period: March - June	**SV**	**Low (SV).** Suitable soils exist within the Properties and the nearest recent record is located approximately 3 miles away. Species was not observed on the Properties 2019 surveys.
Dunn's mariposa lily *(Calochortus dunnii*)	CR/-- CRPR 1B.2 County List A MSCP Covered	Perennial bulbiferous herb. Gabbroic or metavolcanic and rocky soils in closed-cone coniferous forest, chaparral, valley and foothill grassland habitats. Elevation range: 605-6005 ft. Blooming period: sometimes February, April – June.	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Lewis' evening-primrose (*Camissoniopsis lewisii*)	--/-- CRPR 3 County List C	Annual herb. Occurs on sandy or clay soils within grasslands, coastal scrub, cismontane woodland, and coastal bluffs and dunes. Flowering period: March to June. Elevation: below 2,600 feet (800 meters).	**SP, SV**	**Low (SP).** Suitable grassland habitat is present within the Southern Parcel; however, there are no recent or historical records within the Preserve. The species has been historically observed east of the Preserve near San Vicente Reservoir and south within Mission Trails Regional Park. **Not Expected (SV).** No suitable soils observed on the Properties.
San Luis Obispo sedge (*Carex obispoensis*)	--/-- CRPR 1B.2	Perennial rhizomatous herb. Often found on serpentine or gabbro seeps, or on clay soils in closed coned coniferous forest, chaparral, coastal prairie, coastal scrub, and valley and foothill grassland. Elevation range: 32-2689 ft. Blooming period: April - June	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.
Payson's jewelflower (*Caulanthus simulans*)	--/-- CRPR 4.2 County List D	Annual herb. Sandy and granitic soils in chaparral and coastal scrub habitats. Elevation range: 295-7220 ft. Blooming period: sometimes February, March – May, sometimes June.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.
Lakeside ceanothus (*Ceanothus cyaneus*)	--/-- CRPR 1B.2 County List A MSCP Covered MSCP NE	Perennial shrub. Occurs on slopes and ridgelines in closed cone coniferous forest and chaparral. Flowering period: April to June. Elevation: 770 to 2,540 feet (235 to 755 meters).	**SP, SV**	**Low (SP).** Suitable chaparral habitat is present within the Southern Parcel; however, there are no recent or historical records of this conspicuous shrub within the Preserve. A historical record from 1940 was recorded to the east within San Vicente Reservoir. **Low (SV).** Suitable soils exist within the Properties and the nearest recent record is located approximately 3 miles away. Surveys were conducted during this species' blooming period. Species was not observed on the Properties 2019 surveys.
Otay Mountain ceanothus (*Ceanothus otayensis*)	--/-- CRPR 1B.2	Evergreen shrub. Closed-cone coniferous forest, and dense chaparral. Elevation range: 771-2543 ft. Blooming period: April – June.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Wart-stemmed ceanothus (*Ceanothus verrucosus*)	--/-- CRPR 2B.2 County List B MSCP Covered	Perennial evergreen shrub. Chaparral habitats. Elevation range: 0-1245 ft. Blooming period: December – May.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.
Southern tarplant (*Centromadia parryi* ssp. *australis*)	--/-- CRPR 1B.1 County List A	Annual herb. Margins of marshes and swamps, vernally mesic valley and foothill grassland and vernal pool habitats. Elevation range: 0-1575 ft. Blooming period: May – November.	**SV**	**Not Expected (SV).** No suitable microhabitats exist within the Properties. Additionally, Properties is outside of species' known geographical range.
Smooth tarplant (*Centromadia pungens* ssp. *laevis*)	--/-- CRPR 1B.1 County List A	Annual herb. Alkaline soils in chenopod scrub, meadow and seep, playa, riparian woodland, and valley and foothill grassland habitats. Elevation range: 0-2100 ft. Blooming period: April – September.	**SV**	**Not Expected (SV).** No suitable soils or habitat observed on the Properties.
Southern mountain misery (*Chamaebatia australis)*	--/-- CRPR 4.2 County List D	Chaparral hillsides on unusual soil types. The species occurs on soils derived from gabbro, metasedimentary, and metavolcanic rock.	**NA, SA, SV**	**Moderate (NA, SA)**. It has been found on similar habitat to the east. However, north slopes with enough moisture may be too small on the Properties for it. **Not Expected (SV).** No suitable soils observed on the Properties.
Long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*)	--/-- CRPR 1B.2 County List A	Annual herb. Clay lenses, largely devoid of shrubs in chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, and vernal pools. Elevation range: 98-5018 ft. Blooming period: April – July.	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.
Peninsular spineflower (*Chorizanthe leptotheca*)	--/-- CRPR 4.2 County List D	Annual herb. Alluvial fan and granitic soils in chaparral, coastal scrub, and lower montane coniferous forest habitats. Elevation range: 980-6235 ft. Blooming period: May – August.	**SV**	**Low (SV).** Suitable soils exist within the Properties and the nearest recent record is located approximately 2 miles away. Surveys were conducted during this species' blooming period. Species was not observed on the Properties 2019 surveys.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Delicate clarkia (*Clarkia delicata*)	--/-- CRPR 1B.2 County List A	Annual herb. Occurs in chaparral and oak woodlands, often on gabbroic soils. Flowering period: April to May. Elevation: 770 to 3,280 feet (235 to 1,000 meters).	**NA, SA, SP, SV**	**Moderate (NA, SA).** Suitable habitat exists within the Properties. **High (SP).** Suitable habitat chaparral habitat occurs within the Southern Parcel, though gabbroic soils are not mapped. This species was observed just outside of the western boundary of the Preserve during surveys conducted in 2012 (Dudek 2013; County 2013). **Not Expected (SV).** No suitable soils observed on the Properties.
San Miguel savory (*Clinopodium chandleri*)	--/-- CRPR 1B.2 County List A MSCP Covered	Perennial shrub. Occurs within coastal scrub, chaparral, cismontane woodland, riparian woodland, and grasslands on rocky, gabbroic, or metavolcanic soils. Flowering period: March to July. Elevation: 390 to 3,530 feet (120 to 1,075 meters).	**NA, SA, SP, SV**	**Moderate (NA, SA).** Suitable habitat is present, and species occurs less than 2 miles to the east (Calflora 2016). **Moderate (SP).** Suitable chaparral and rocky soils occur within the Southern Parcel; however, there are no recent or historical records within the Preserve. The nearest observation occurs 4 miles to the northeast north of San Vicente Reservoir. **Not Expected (SV).** No suitable soils observed on the Properties.
Summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*)	--/-- CRPR 1B.2 County List A	Perennial shrub. Occurs in chaparral and cismontane woodland. Flowering period: May to June. Elevation: 328 to 1,804 feet (100 to 550 meters).	**NA, SA, SP, SV**	**Moderate (NA, SA)** Suitable habitat occurs on the Properties and the species occurs in other locations that are similar to the Properties. **Low (SP).** Suitable chaparral habitat occurs within the Southern Parcel; however, there are no recent or historical records of this conspicuous shrub within the Preserve. Recent documented occurrences of the species are located over 8 miles south within Mission Trails Regional Park. **Not Expected (SV).** Properties are outside of species' known geographical range.
Small-flowered morning-glory (*Convolvulus simulans*)	--/-- CRPR 4.2 County List D	Annual herb. Occurs on clay soils and serpentine seeps in openings within chaparral, coastal scrub, and native grassland. Flowering period: April to June. Elevation: 98 to 2,871 feet (30 to 875 meters).	**SP, SV**	**Low (SP).** Suitable clay soils or serpentine seeps are absent from the Southern Parcel. However, the species was observed at several locations within the Preserve in 2008 (County 2009). **Not Expected (SV).** No suitable soils observed on the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Short-bracted bird's-beak (*Cordylanthus rigidus* ssp. *brevibracteatus*)	--/-- CRPR 4.3	Annual hemiparasitic herb. Openings on granitic soil in chaparral, lower montane coniferous forest, pinyon and juniper woodland, and upper montane coniferous forest habitats. Elevation range: 2000-8497 ft. Blooming period: July - August, sometimes October.	**SV**	**Not Expected (SV).** Properties are outside of species' known elevation range.
San Diego sand aster (*Corethrogyne filaginifolia* var. *incana*)	--/-- CRPR 1B.1 County List A MSCP Covered	Perennial herb. Occurs within grasslands, coastal bluff scrub, coastal scrub, and chaparral. Flowering period: June to September. Elevation: 15 to 2,362 feet (5 to 720 meters).	**SP, SV**	**Moderate (SP).** Suitable habitat is present within the Southern parcel; however, there are no recent or historical records within the Preserve. Documented occurrences occur to the east at the west end of San Vicente Reservoir and south within Mission Trails Regional Park. **Not Expected (SV).** Properties are outside of species' known elevation range.
Western dichondra (*Dichondra occidentalis*)	--/-- CRPR 4.2 County List D	Perennial herb. Found among rocks and shrubs within grasslands, coastal sage scrub, chaparral, and oak woodlands. Often proliferates on recently burned slopes. Flowering period: March to June. Elevation: below 1,706 feet (520 meters).	**SP, SV**	**Moderate (SP).** Suitable habitat is present within the Southern Parcel; however, there are no recent or historical records within the Preserve. The species was detected east of the Preserve just west of SR 67 along Sunrise Powerline and over 4 miles southwest within MCAS Miramar. **Not Expected (SV).** Properties are outside of species' known geographical range.
Cleveland's bush monkeyflower (*Diplacus clevelandii*)	--/-- CRPR 4.2 County List D	Perennial rhizomatous herb. Gabbroic or rocky soils, often in disturbed areas and openings of chaparral, and cismontane woodland habitats. Elevation range: 1475-6560 ft. Blooming period: April – July.	**SV**	**Not Expected (SV).** Properties are outside of species' known elevation range.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Variegated dudleya (*Dudleya variegata*)	--/-- CRPR 1B.2 County List A MSCP Covered MSCP NE	Perennial herb succulent. Occurs on clay soils of dry hillsides and mesas within chaparral, valley grassland, foothill woodland and coastal sage scrub communities. Flowering period: April to June. Elevation: below 984 feet (300 meters).	**SP, SV**	**Low (SP).** Suitable clay soils are not mapped within the Southern Parcel. However, the species has been previously documented within the Preserve in 2008 (County 2009). **Low (SV).** Suitable soils exist within the Properties and the nearest recent record is located approximately 2 miles away. Surveys were conducted during this species' blooming period. Species was not observed on the Properties 2019 surveys.
Palmer's goldenbush (*Ericameria palmeri* var. *palmeri*)	--/-- CRPR 1B.1 County List B MSCP Covered MSCP NE	Perennial Shrub. Found in mesic areas within coastal sage scrub and chaparral. Flowering period: September to November. Elevation: below 1,968 feet (600 meters).	**SP, SV**	**Low (SP).** Suitable habitat occurs within the Southern Parcel; however, there are no recent or historical records of this conspicuous shrub within the Preserve. The nearest observation occurs 5 miles east along Wildcat Canyon Road. **Low (SV).** No suitable soils observed on the Properties.
Sessile-leaved yerba santa (*Eriodictyon sessilifolium*)	--/-- CRPR 2B.1	Perennial shrub. Volcanic soils in coastal scrub habitats. Blooming period: July.	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.
Vanishing wild buckwheat (*Eriogonum evanidum*)	--/-- CRPR 1B.1	Annual herb. Sandy or gravelly soils in chaparral, cismontane woodland, lower montane coniferous forest, and pinyon and juniper woodland habitats. Elevation range: 3608-7300 ft. Blooming period: July – October.	**SV**	**Not Expected (SV).** Properties are outside of species' known elevation range.
San Diego button-celery (*Eryngium aristulatum* var. *parishii*)	FE/SE CRPR 1B.1 County List A MSCP Covered	Annual/perennial herb. Mesic soils in coastal scrub, valley and foothill grassland, and vernal pool habitats. Elevation range: 65-2035 ft. Blooming period: April – June.	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.
Palomar monkeyflower (*Erythranthe diffusa*)	--/-- CRPR 4.3	Annual herb. Sandy or gravelly soils in chaparral and lower montane coniferous forest habitats. Elevation range: 4000-6005 ft. Blooming period: April – June.	**SV**	**Not Expected (SV).** Properties are outside of species' known elevation range.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Abrams' spurge (*Euphorbia abramsiana*)	--/-- CRPR 2.2	Annual herb. Sandy soils in Mojavean desert scrub and Sonoran Desert scrub. Elevation range: -16 – 3002 ft. Blooming period: August – November.	**SV**	**Not Expected (SV).** No suitable habitat observed on the Properties.
San Diego barrel cactus (*Ferocactus viridescens*)	--/-- CRPR 2B.1 County List B MSCP Covered	Perennial (stem succulent) shrub. Grows in sandy to rocky areas within coastal scrub, chaparral, grasslands, and vernal pools. Flowering period: May to June. Elevation: below 1,480 feet (450 meters).	**NA, SA, SP, SV**	**Not expected (NA, SA).** The Properties are possibly too high in elevation, even though species occurs to the south and west of the Properties. **High (SP).** Suitable habitat and rocky soils occur within the Southern Parcel and there are numerous occurrences of the species within the surrounding area including to the west within Beeler Canyon and south within the Fanita Ranch area. **Not Expected (SV).** Properties are outside of species' known geographical range.
Campbell's liverwort (*Geothallus tuberosus*)	--/-- CRPR 1B.1	Ephemeral liverwort. Mesic soils in coastal scrub and vernal pool habitats. Elevation range: 33-1969 ft.	**SV**	**Not Expected (SV).** No suitable habitat observed on the Properties.
Mission Canyon bluecup (*Githopsis diffusa* ssp. *filicaulis*)	--/-- CRPR 3.1	Annual herb. Occurs in mesic and disturbed areas within chaparral. Flowers April to June. Flowering period: April to June. Elevation: 1,475 and 2,300 feet (450 to 700 meters).	**SP, SV**	**Low (SP).** Suitable habitat is present within the Southern Parcel, but the site lies outside of the known elevation range for this species. There are no recent or historical records for within the Preserve. The nearest observation occurs over 6 miles east within the Silverwood Wildlife Sanctuary. **Not Expected (SV).** Properties are outside of species' known elevation range.
San Diego gumplant (*Grindelia hallii*)	--/-- CRPR 1B.2 County List A	Perennial herb. Grows on dry slopes and meadows within open pine and oak woodlands. Also found within chaparral and grasslands. Flowering period: July to October. Elevation: 600 to 5,725 feet (185 to 1,745 meters).	**SP, SV**	**Low (SP).** Suitable dry slopes and chaparral habitat occur within the Southern Parcel; however, there are no recent records within the Preserve and the site is located at the lower elevation limit of the species. Documented occurrences of the species are generally located further east near Descanso and Cuyamaca Mountains. **Not Expected (SV).** Properties are outside of species' known geographical range.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Palmer's grapplinghook (*Harpagonella palmeri*)	--/-- CRPR 4.2 County List D	Annual herb. Found in clay soils in annual grasslands and coastal sage scrub. Flowering period: March to May. Elevation: 65 to 3,100 feet (20 to 955 meters).	**NA, SA, SP, SV**	**Not expected (NA, SA).** The Properties lack suitable habitat. **Low (SP).** Suitable clay soils are not mapped within the Southern Parcel, though the species was documented in the northwest portion of the Preserve during surveys conducted in 2008 (County 2009). **Not Expected (SV).** No suitable soils observed on the Properties.
Tecate cypress (*Hesperocyparis forbesii*)	--/-- CRPR 1B.1 County List A MSCP Covered	Perennial evergreen tree. Clay, gabbroic, or metavolcanic soils within closed-cone coniferous forest and chaparral. Elevation range: 262-4921 ft.	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.
Graceful tarplant (*Holocarpha virgata* ssp. *elongata*)	--/-- CRPR 4.2 County List D	Annual herb. Occurs in grasslands, coastal scrub, chaparral, and cismontane woodland. Flowering period: May to November. Elevation: 195 to 3,600 feet (60 to 1,100 meters).	**SP, SV**	**High (SP).** Suitable habitat occurs within the Southern Parcel and the species was observed within grassland habitat located in the central portion of the Preserve, adjacent to the southern coast live oak riparian forest, during surveys conducted in 2008 (County 2009) and within southwestern area of the Preserve in 2015 (ICF 2015). **Not Expected (SV).** Properties are outside of known species geographical range.
Vernal barley (*Hordeum intercedens*)	--/-- CRPR 3.2 County List C	Annual herb. Coastal dunes, coastal scrub, saline flats and depressions in valley and foothill grassland, and vernal pool habitats. Elevation range: 15-3280 ft. Blooming period: March – June.	**SV**	**Not Expected (SV).** No suitable habitat observed on the Properties.
Ramona horkelia (*Horkelia truncata*)	--/-- CRPR 1B.3 County List A	Perennial herb. Occurs on clay and gabbroic soils within chaparral and woodlands. Flowering period: May to June. Elevation: 1,310 to 4,265 feet (400 to 1,300 meters).	**NA, SA, SP, SV**	**Low (NA, SA).** The Properties lack gabbro soils. **None (SP).** Suitable clay or gabbroic soils are not mapped within the Southern Parcel and there are no recent or historical records within the Preserve. The nearest observation is approximately 6 miles northeast of the Preserve, north of San Vicente Reservoir. **Not Expected (SV).** Properties are outside of species' known elevation range.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Decumbent goldenbush (*Isocoma menziesii* var. *decumbens*)	--/-- CRPR 1B.2 County List A	Perennial shrub. Occurs in sandy soil and disturbed areas on the inland side of dunes, hillsides, and arroyos within coastal sage scrub and chaparral communities. Flowering period: July to November. Elevation: below 450 feet (135 meters).	**SP, SV**	**Low (SP).** Suitable habitat occurs within the Southern Parcel, but the site is located at the upper elevation limit of the species and there are no recent or historical records for this perennial shrub within the Preserve. The closest reported occurrences is located over 1.5 miles southeast near Eucalyptus Hills Elementary School in Santee. **Not Expected (SV).** Properties are outside of species' known elevation range.
San Diego marsh-elder (*Iva hayesiana*)	--/-- CRPR 2B.2 County List B	Perennial herb. Found in alkaline flats, depressions, and streambanks within wetland communities. Flowering period: April to October. Elevation: 32 to 1,640 feet (10 to 500 meters).	**NA, SA, SP, SV**	**Low (NA, SA).** The Properties have little suitable habitat. **Low (SP).** Potentially suitable habitat occurs within the Southern Parcel along Clark Canyon Creek; however, there are no recent or historical records for this conspicuous perennial herb within the Preserve. The nearest observation occurs over 5 miles south within Mission Trails Regional Park. **Not Expected (SV).** No suitable habitat observed on the Properties.
Southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*)	--/-- CRPR 4.2 County List D	Perennial rhizomatous herb. Mesic coastal dunes, meadows and alkaline seeps, and coastal salt marshes and swamps. Elevation range: 5-2955 ft. Blooming period: sometimes March, May – June.	**SV**	**Not Expected (SV).** No suitable soils or habitat observed on the Properties.
Pride-of-California (*Lathyrus splendens*)	--/-- CRPR 4.3 County List D	Perennial herb. Chaparral. Elevation range: 656-5002 ft. Blooming period: March – June.	**SV**	**Not Expected (SV).** Properties are outside of known species geographical range.
Heart-leaved pitcher sage (*Lepechinia cardiophylla)*	--/-- CRPR 1B.2 MSCP NE County List A	Chaparral elevation 300 to 700 meters. Perennial shrub. Blooms April through July. The species occurs in chaparral habitat.	**NA, SA, SV**	**Moderate (NA, SA).** May be too isolated from other locations. Occurs 2 miles away on similar soils (Calflora 2016). **Not Expected (SV).** Properties are outside of species' known elevation range.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Gander's pitcher sage (*Lepechinia ganderi*)	--/-- CRPR 1B.3 County List A MSCP Covered MSCP NE	Perennial shrub. Occurs on gabbroic and metavolcanic soils within coastal sage scrub, chaparral, coniferous forests, and grasslands. Flowering time: June to July. Elevation: 980 to 3,600 feet (300 to 1,100 meters).	**SP, SV**	**None (SP).** Suitable gabbroic and metavolcanic soils are not mapped within the Southern Parcel and the site lies outside of the species known elevation range. There are no recent of historical records for this perennial shrub within the Preserve. **Not Expected (SV).** No suitable soils observed on the Properties.
Robinson's pepper-grass (*Lepidium virginicum* var. *robinsonii*)	--/-- CRPR 4.3 County List A	Annual herb. Grows in openings in sage scrub and chaparral at the coastal and foothill grasslands. Typically observed in relatively dry, exposed locales rather than beneath a shrub canopy. Also, found in disturbed areas Flowering period: March to June. Elevation: below 9,186 feet (2,800 meters).	**NA, SA, SP, SV**	**Moderate (NA, SA).** Suitable habitat occurs on the Properties and the species occurs in other locations that are similar to the Properties. **Moderate (SP).** Suitable habitat occurs within the Southern Parcel; however, there are no recent or historical records within the Preserve. The closest occurrence is located over 3 miles northeast near Boulder Oaks County Park. **Moderate (SV).** Suitable soils exist within the Properties and the nearest recent record is located approximately 2 miles away. Surveys were conducted during this species' blooming period. Species was not observed on the Properties 2019 surveys.
Felt-leaved monardella (*Monardella hypoleuca* ssp. *lanata*)	--/-- CRPR 1B.2 County List A MSCP Covered MSCP NE	Perennial (rhizomatous) herb. Found within chaparral understory, typically beneath mature stands of chamise in xeric, rocky, granitic slopes. Flowering period: May to October. Elevation: 985 and 5,000 feet (300 to 1500 meters).	**NA, SA, SP, SV**	**Moderate (W, SA).** The Properties contain ridge tops and suitable understory habitat. **Low (SP).** Suitable habitat chaparral habitat occurs within the Southern Parcel; however, the site lies outside of the species known elevation range. There are no recent or historical records within the Preserve. The closest occurrence is located over 4 miles northeast near Iron Mountain. **Moderate (SV).** Suitable soils exist within the Properties and the nearest recent record is located approximately 2 miles away. Surveys were conducted during this species' blooming period. Species was not observed on the Properties 2019 surveys.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Willowy monardella (*Monardella viminea*)	FE/SE CRPR 1B.1 County List A MSCP Covered MSCP NE	Perennial herb. Associated with riparian scrub, usually at sandy locales in seasonally dry washes is habitat of this small subshrub. Generally, there is no canopy cover, and river cobbles may lie in close proximity. Flowering period: June to August. Elevation: below 1,300 feet (400 meters).	**NA, SA, SP, SV**	**Not expected (NA, SA).** The Properties lack suitable habitat even though there is USFWS designated critical habitat for the species several miles south (USFWS 2012). **Present (SP).** Twenty-two (22) individuals were observed within the Southern Parcel along Clark Canyon Creek during the 2019 biological surveys (Figure 12). This species has also been observed within the southern portion of the Preserve, upstream of the Southern Parcel, during biological surveys conducted in 2008 (County 2009) and 2015 (ICF 2015). Designated Critical Habitat occurs just south of the Southern Parcel. **Not Expected (SV).** Properties are outside of species' known elevation range.
Little mousetail (*Myosurus minimus* ssp. *apus*)	--/-- CRPR 3.1 CSD List C	Annual herb. Valley and foothill grassland, and alkaline vernal pool habitats. Elevation range: 65-2100 ft. Blooming period: March – June.	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.
Spreading navarretia (*Navarretia fossalis*)	FT/-- CRPR 1B.1 County List A MSCP NE	Annual herb. Chenopod scrub, assorted shallow freshwater marshes and swamps, playa and vernal pool habitats. Elevation range: 95-2150 ft. Blooming period: April – June.	**SV**	**Not Expected (SV).** No suitable habitat observed on the Properties.
Prostrate vernal pool navarretia (*Navarretia prostrata*)	--/-- CRPR 1B.1	Annual herb. Mesic soils in coastal scrub, meadow and seep, alkaline valley and foothill grassland, and vernal pool habitats. Elevation range: 10-3970 ft. Blooming period: April – July.	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.
Dehesa nolina (*Nolina interrata*)	CE/-- CRPR 1B.1 County List A MSCP Covered	Perennial herb. Gabbroic, metavolcanic or serpentinite soils in chaparral. Elevation range: 606- 2805 ft Blooming period: June – July.	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
California adder's-tongue (*Ophioglossum californicum*)	--/-- CRPR 4.2 County List D	Perennial rhizomatous herb. Occurs within mesic areas of chaparral and grassland habitats, and along the margins of vernal pools. Flowering period: January to June. Elevation: 196 to 1,722 feet (60 to 525 meters).	**SP, SV**	**High (SP).** Potentially suitable habitat occurs within the Southern Parcel along Clark Canyon Creek. The species previously observed in one area within the Preserve during surveys conducted in 2008 (County 2009). **Not Expected (SV).** Suitable soils exist within the Properties and the nearest recent record is located approximately 2.5 miles away. Surveys were conducted during this species' blooming period. Species was not observed on the Properties 2019 surveys.
Gander's ragwort (*Packera ganderi*)	--/SR CRPR 1B.2 County List A	Perennial herb. Occurs on gabbroic soils within the understory of chaparral and recently burned chaparral slopes. Flowering period: April to June. Elevation: 1,310 to 3,940 feet (400 to 1,200 meters).	**SP, SV**	**None (SP).** Suitable gabbroic soils are not mapped within the Southern Parcel and there are no recent or historical records of this perennial herb within the Preserve. The closest reported observation occurs over 4 miles northeast just east of Iron Mountain. **Not Expected (SV).** No suitable soils or habitat observed on the Properties.
Golden-rayed pentachaeta (*Pentachaeta aurea* ssp. *aurea*)	--/-- CRPR 4.2 County List D	Annual herb. Occurs in grassy areas within coastal scrub, chaparral, cismontane woodland, lower montane coniferous forest, riparian woodland. Flowering period: March to July. Elevation: 260 to 6,100 feet (80 and 1,850 meters).	**SP, SV**	**Present (SP).** Approximately 50 individuals were mapped in four different locations within the northwestern portion of the Southern Parcel (Figure 12). **Present (SV).** Suitable habitat occurs on the Properties. Species was observed within the Properties during 2019 surveys.
Woolly chaparral pea (*Pickeringia montana* var. *tomentosa*)	--/-- CRPR 4.3	Evergreen shrub. Gabbroic, granitic, or clay soils in chaparral. Elevation range: 0-5577 ft. Blooming period: May – August.	**SV**	**Not Expected (SV).** Properties are outside of known species geographical range.
San Diego mesa mint (*Pogogyne abramsii*)	FE/SE CRPR 1B.1 County List A MSCP NE	Annual herb. Vernal pool habitats. Elevation range: 295-655 ft. Blooming period: March – July.	**SV**	**Not Expected (SV).** No suitable habitat observed on the Properties.
Otay mesa mint (*Pogogyne nudiuscula*)	FE/SE CRPR 1B.1 County List A	Annual herb. Vernal pool habitats. Elevation range: 295-849 ft. Blooming period: May – July.	**SV**	**Not Expected (SV).** Properties are outside of species' known elevation range.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Fish's milkwort (*Polygala cornuta* var. *fishiae*)	--/-- CRPR 4.3 County List D	Perennial deciduous shrub. Chaparral, cismontane woodland, and riparian woodland habitats. Elevation range: 325-3280 ft. Blooming period: May – August.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.
Chaparral rein orchid (*Piperia cooperi*)	--/-- CRPR 4.2 County List D	Perennial herb. Generally found on dry sites within grasslands, chaparral, and cismontane woodland. Flowering period: March to June. Elevation: 50 to 5,200 feet (15 to 1,585 meters).	**SP**	**Moderate (SP).** Suitable chaparral and grassland habitat occur within the Southern Parcel; however, there are no recent or historical records of this perennial herb within the Preserve. The species was observed in 1991 over 4.5 miles northeast of the Preserve south of Dos Picos Park.
white rabbit-tobacco (*Pseudognaphalium leucocephalum*)	--/-- CRPR 2B.2	Perennial herb. Sandy or gravelly soils in chaparral, cismontane woodland, coastal scrub, and riparian woodland. Elevation range: 0-6888 ft. Blooming period: July – December.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.
Cedros Island oak (*Quercus cedrosensis*)	--/-- CRPR 2B.2 County List B	Perennial tree. Closed-cone coniferous forest with chaparral and coastal scrub. Flowering period: April to May. Elevation: 328 to 5,900 feet (100 to 1,800 meters).	**SP, SV**	**Presumed Absent (SP).** This species was recorded within the Preserve in 2004, 0.5 mile south of the staging area on Beeler Canyon Road but was not observed during biological surveys conducted in 2008 or 2012. This conspicuous perennial tree would most likely have been observed if present. **Not Expected (SV).** Properties are outside of species' known geographical range.
Nuttall's scrub oak (*Quercus dumosa*)	--/-- CRPR 1B.1 County List A	Perennial shrub. Occurs on sandy or clay loam soils near the coast within coastal scrub, chaparral, cismontane woodland, and riparian woodland. Flowering period: March to May. Elevation: below 656 feet (200 meters).	**SP, SV**	**Moderate (SP).** Suitable habitat occurs within the Southern Parcel; however, there are no recent or historical records within the Preserve. The species was observed to the southwest within MCAS Miramar in 2000. **Not Expected (SV).** Properties are outside of species' known geographical range.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Engelmann oak (*Quercus engelmannii*)	--/-- CRPR 4.2 County List D	Perennial tree. Occurs on slopes and foothills within grasslands, chaparral, oak woodland, and riparian woodlands. Flowering period: March to June. Elevation: 160 to 4,300 feet (50 to 1,300 meters).	**NA, SA, SP, SV**	**Present (NA, SA).** Individual Engelmann oaks were found near the center of the Cielo parcel and the southeast corner of the Wu parcels. **Presumed Absent (SP).** Suitable habitat occurs within the Southern Parcel and the species occurs within the northern portion of the Preserve (AECOM 2017). However, this conspicuous perennial tree would most likely have been observed if present. **Not Expected (SV).** Species would have been evident during surveys.
Moreno currant (*Ribes canthariforme*)	--/-- CRPR 1B.3 County List A	Deciduous shrub. Chaparral and riparian scrub. Elevation range: 1115-3937 ft. Blooming period: February – April.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.
Munz' sage (*Salvia munzii*)	--/-- CRPR 2B.2 County List B	Perennial evergreen shrub. Chaparral and coastal scrub habitats. Elevation range: 375-3495 ft. Blooming period: February – April.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.
Ashy spike-moss (*Selaginella cinerascens*)	--/-- CRPR 4.1 County List D	Rhizomatous fern. Occurs in chaparral and coastal sage scrub. Elevation: below 1,804 feet (550 meters).	**NA, SA, SP, SV**	**Present (NA, SA).** Mesa spike-moss was found on the southeastern portion of the Wu parcels. **Present (SP).** Observed in three different locations in the northwestern and southeastern portions of the Southern Parcel (Figure 12). Each location consisted of a patch about 2 to 5 meters in size. This species was also previously detected within the southwestern portion of the Preserve during biological surveys conducted in 2012 (Dudek 2013; County 2013) and in northern portion of the Preserve in 2016 (AECOM 2017). **Present (SV).** Suitable habitat occurs on the Properties. Species was observed within the Properties during 2019 surveys.
Chaparral ragwort (*Senecio aphanactis*)	--/-- CRPR 2B.2 County List B	Annual herb. Chaparral, cismontane woodland, coastal scrub, and alkaline flats. Elevation range: 49-2624 ft. Blooming period: January – April.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Purple stemodia (*Stemodia durantifolia*)	--/-- CRPR 2B.1 County List B	Perennial herb. Grows on wet sand or rocks within riparian habitats or drying streambeds. Flowering period: year-round. Elevation: below 1,312 feet (400 meters).	**NA, SA SP, SV**	**Not expected (NA, SA).** The Properties lack suitable habitat. **Moderate (SP).** Suitable habitat occurs within the Southern Parcel along Clark Canyon Creek; however, there are no recent or historical records of this perennial herb within the Preserve. The species has been observed over 6 miles southwest of the site within Mission Trails Regional Park as recently as 2018. **Not Expected (SV).** No suitable habitat observed on the Properties.
San Diego County needle grass (*Stipa diegoensis*)	--/-- CRPR 4.2 County List D	Perennial herb. Found in rocky, mesic soils near streams or along the coast within coastal scrub and chaparral. Flowering period: February to June. Elevation: 30 to 2,600 feet (10 and 800 meters).	**SP, SV**	**Low (SP).** Suitable habitat occurs within the Southern Parcel along Clark Canyon Creek; however, there are no recent or historical records of this perennial herb within the Preserve. The species has been observed over 6 miles southwest of the site within Mission Trails Regional Park as recently as 2012. **Not Expected (SV).** Properties are outside of species' known geographical range.
Oil neststraw (*Stylocline citroleum*)	--/-- CRPR 1B.1	Annual herb. Clay soils in chenopod scrub, coastal scrub, and valley and foothill grassland habitats. Elevation range: 164-1312 ft. Blooming period: March – April.	**SV**	**Not Expected (SV).** No suitable soils observed on the Properties.
Parry's tetracoccus (*Tetracoccus dioicus*)	--/-- CRPR 1B.2 County List A MSCP Covered	Perennial deciduous shrub. Chaparral and coastal scrub habitats. Elevation range: 540-3280 ft. Blooming period: April – May.	**SV**	**Not Expected (SV).** Properties are outside of species' known geographical range.
Woven-spored lichen (*Texosporium sancti-jacobi*)	--/-- CRPR 3	Crustose, terricolous lichen. On soil, small mammal pellets, dead twigs and on *Selaginella* spp. within openings of chaparral. Elevation range: 197-2165 ft.	**SV**	**Not Expected (SV).** This species has only been recorded in databases.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Rush-like bristleweed (*Xanthisma junceum*)	--/-- CRPR 4.3 County List D	Perennial herb. Found in xeric, low-growing chamise chaparral or Diegan coastal sage scrub. Usually grows on exposed locations with rocky substrate that do not foster much annual understory. An inconspicuous species that flowers late and is probably under reported. Flowering period: May to October. Elevation: below 3,300 feet (1,000 meters).	**NA, SA, SP, SV**	**Present (NA, SA).** Rush chaparral-star was found on the southeastern portion of the 2015 Northern Addition. **High (SP).** Suitable habitat occurs within the Southern Parcel and the species was observed during surveys conducted in 2012 in the northern portion of the Preserve adjacent to Paragon Mesa Road (County 2013) and in the northeastern portion of the Preserve in 2016 (AECOM 2017). **Present (SV).** Suitable habitat occurs on the Properties. Species was observed within the Properties during 2019 surveys.

[1] Listing codes as follows: F = Federal; S = State of California; E = Endangered; T = Threatened; CE = Candidate Endangered; R = Rare

CRPR = California Native Plant Society Rare Plant Rank: 1A – presumed extirpated in California and either rare or extinct elsewhere; 1B – rare, threatened, or endangered in California and elsewhere; 2A – presumed extirpated in California, but more common elsewhere; 2B – rare, threatened, or endangered in California, but more common elsewhere; 3 – more information needed; 4 – watch list for species of limited distribution. Extension codes: .1 – seriously endangered; .2 – moderately endangered; .3 – not very endangered.

County of San Diego Sensitivity Status: Plant species are divided into Groups A through D on the County Rare Plant List. **Groups A and B** Plants include those that have a very high level of sensitivity, either because they are listed as threatened or endangered or because they have very specific natural history requirements that must be met. **Groups C and D** Plants include those species that are becoming less common but are not yet so rare that extirpation or extinction is imminent without immediate action. These species tend to be prolific within their suitable habitat types.

MSCP Covered Species: Covered Species under County's MSCP Subarea Plan; NE = Narrow Endemic Species under the South County's MSCP Subarea Plan.

[2] SA= 2015 Southern Addition, NA=2015 Northern Addition, SP= Southern Parcel Addition, SV= San Vicente Connector Parcels.

[3] Potential to Occur is assessed as follows: **None**: There are no present or historical records of the species occurring on or in the immediate vicinity of the study area and the diagnostic habitats and soils associated with the species do not occur on or in the immediate vicinity of the project; **Low**: Suitable habitat is present in the study area and a historical record of the species occurs in the immediate vicinity but existing conditions such as elevation, soils, density of cover, prevalence of non-native species, evidence of disturbance, limited habitat area, and/or isolation substantially reduce the possibility that the species may occur; **Moderate**: The diagnostic habitats associated with the species occur on or in the immediate vicinity of the study area, but there is not a recorded occurrence of the species within the immediate vicinity. Some species that contain extremely limited distributions may be considered moderate, even if there is a recorded occurrence in the immediate vicinity; **High**: Suitable habitat occurs in the study area and the species has been recorded recently on or in the immediate vicinity but the species was not observed during project surveys; **Present**: The species was observed during biological surveys for the project and is assumed to occupy the study area; **Presumed Absent**: Species would be visible all year and would have been observed if present.

Appendix B

Special-status Animal Species Detected or with Potential to Occur

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
INVERTEBRATES				
San Diego fairy shrimp (*Branchinecta sandiegonensis)*	FE/-- County Group 1 MSCP Covered	Vernal pools and seasonal depressions, restricted to mesas and other areas with suitable soils.	**NA, SA, SP, SV**	**Not Expected (NA, SA):** The Properties contain no suitable habitat (vernal pools) for this species. **Low (SP).** Vernal pools were not documented within the Southern Parcel during biological surveys and the species has not been documented within the Sycamore Canyon/Goodan Ranch Preserve. However, the species was documented immediately south of the site within the Fanita Ranch area. **Not Expected (SV).** No suitable habitat observed on the Properties.
Quino checkerspot butterfly (*Euphydryas editha quino*)	FE/-- County Group 1	Larvae feed on several host plants including dot-seed plantain (*Plantago erecta*), woolly plantain (*Plantago patagonica*), southern Chinese houses (*Collinsia concolor*), purple owl's clover (*Castilleja exserta*), and others. Adults nectar on a variety of flowering annuals including cryptantha species (*Cryptantha* sp.), linanthus (*Linanthus* sp.). Populations occur in semi-open Diegan coastal sage scrub, various chaparral types, and open ridgelines and hilltops.	**NA, SA, SP, SV**	**High (NA, SA).** Suitable habitat occurs within the Properties with multiple patches of host plants and nectar sources. This species was recorded in 2005 within the Sycamore Canyon/Goodan Ranch Preserve (County of San Diego 2013). **High (SP).** Suitable habitat occurs within the Southern Parcel and several of the species host plants were documented during the 2019 biological surveys. There are numerous reported occurrences of the species within the surrounding area, including previous sightings within the Preserve. Furthermore, one quino checkerspot butterfly was documented within the Preserve along Slaughterhouse Canyon Trail by HELIX biologists in 2019. The individual was observed approximately 1,500 feet from the southern boundary of the Preserve. **Moderate (SV).** Outside of the USFWS recommended survey area. Its primary ovipositional larval host plant dot-seed plantain (*Plantago erecta*) was abundant throughout most of the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Harbison's dun skipper (Euphyes vestris harbisoni)	--/-- County Group 1 MSCP NE	Occurs in the foothills of northern and southern San Diego County, extreme western Riverside County, and southern Orange County. Prefers oak woodlands but is also found within chaparral or riparian areas that have narrow canyons or drainages where the species host plant, San Diego sedge (Carex spissa) is found. Generalist feeder with a preference for milkweeds and thistle. Nectaring resources include morning glory (Calystegia macrostegia tenuifolia), red thistle (Cirsium occidentale), loosestrife (Lythrum californicum), and less frequently golden yarrow (Eriophyllum confertiflorum) and black mustard (Brassica nigra).	**SP**	**Moderate (SP).** Suitable habitat occurs within the Southern Parcel, but the species host plant was not observed. The species has been previously documented within Preserve north and east of the Ranger Station along Sycamore Canyon Creek in 2001.
Hermes copper butterfly (*Lycaena Hermes*)	CE/-- County Group 1	Hermes copper butterfly larvae utilize redberry (*Rhamnus crocea*) as a foodplant and the distribution of the Hermes copper is closely tied to the distribution of redberry, typically occurring in chaparral or coastal sage scrub. Adults visit flowers, especially those of flat-top buckwheat (*Eriogonum fasciculatum*).	**NA, SA, SP**	**High (NA, SA).** There are historical records of this species from the Sycamore Canyon/Goodan Ranch Preserve before the 2003 Cedar Fire (County of San Diego 2013). The Properties contain suitable chaparral habitat with abundant nectar sources. Larval host plants are present within the Properties. **Low (SP).** Suitable habitat is present within the Southern Parcel and the species host plant was documented in the southern portion of the site during biological surveys. The species was previously observed within the Preserve and surrounding area prior to the 2003 Cedar Fire; however, the fire burned suitable habitat within the Southern Parcel and surrounding area which severely impacted the species through habitat loss and extirpation of several known populations, including within the Preserve (Marschalek and Klein 2010). Furthermore, recent drought conditions and below average rainfall from 2014 through 2018 has restricted the distribution of the species and resulted in regional population declines (Marschalek 2019).

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Laguna Mountains skipper (*Pyrgus ruralis lagunae*)	FE/-- County Group 1	Inhabits wet montane meadows, reaching altitudes of approximately 4,000 to 6,000 feet (1,800 meters) in yellow pine forests of the Laguna and Palomar Mountains. The larval host plant is Cleveland's horkelia (*Horkelia clevelandii*).	**NA, SA**	**Not Expected (NA, SA).** Properties are located outside of the known range of this species.
VERTEBRATES				
Riverside fairy shrimp (*Streptocephalus woottoni*)	FE/-- County Group 1 MSCP NE	Vernal pools. Species occurs from Los Angeles County to Baja California. In San Diego County, all populations are within 15 kilometers of the coast.	**SV**	**Not Expected (SV).** No suitable habitat observed on the Properties.
Arroyo toad (*Anaxyrus californicus*)	FE/SSC County Group 1 MSCP Covered	Gravelly or sandy washes, stream and river banks, and arroyos. Also, upland habitat near washes and streams such as sage scrub, mixed chaparral, Joshua tree woodland, and sagebrush habitats.	**NA, SA, SP, SV**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species and the species does not occur nearby. **None (SP).** Suitable breeding habitat is absent from the Southern Parcel and there are no occurrences of the species within the vicinity. The nearest reported location is over 5 miles northeast of the Southern Parcel along San Vicente Creek. Clark Canyon Creek consists of a rocky, ephemeral to intermittent drainage that lacks suitable sandy soils and riparian habitat to support the species. **Not Expected (SV).** Suitable breeding habitat not present within the Properties.
Sierra Madre yellow-legged frog (*Rana muscosa*)	FE/-- County Group 1	Inhabits rocky streams in narrow canyons and in the chaparral belt.	**NA, SA**	**Not Expected (NA, SA).** This species is extirpated from San Diego County.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Western spadefoot (*Spea hammondii*)	--/SSC County Group 2	Sandy or gravelly soil in grasslands, open chaparral and pine-oak woodlands, coastal sage scrub; vernal pools or freshwater marshes are essential for breeding.	**NA, SA, SP, SV**	**High (NA, SA).** There is suitable aestivation habitat for this species within the Properties, but no suitable breeding habitat or potentially ponded areas are present. The species is known to occur south in the Sycamore Canyon/Goodan Ranch Preserve. **Present (SP).** Two individuals were captured during the herpetofauna surveys within the drift fence-funnel traps. The species has also been previously documented within eastern and northern portions of the Preserve in 2008 (County 2009). **Moderate (SV).** Suitable habitat occurs within the drainage located on the Properties. Species was not observed on the Properties during 2019 surveys.
Southern California legless lizard (formerly silvery legless lizard) (*Anniella stebbinsi*)	--/SSC County Group 2	Occurs in moist warm loose soil with plant cover. Moisture is essential. Found in beach dunes, pine-oak woodlands, chaparral, desert scrub, washes, and stream terraces.	**NA, SA SV**	**Moderate (NA, SA).** The Properties contain marginally suitable habitat patches for this species. **Moderate (SV).** Suitable habitat in riparian woodland in drainage. Species was not observed on the Properties during 2019 surveys.
California glossy snake (*Arizona elegans occidentalis*)	--/SSC	Prefers open areas in a variety of habitats, including light shrubby to barren desert scrub, grassland, chaparral, cismontane, and coastal sage scrub. The species is active mostly at night and remains underground during the day.	**SP, SV**	**Low (SP).** Suitable habitat occurs within the Southern Parcel; however, the only reported occurrences of the species within the area are from the 1940s and are located over 5 miles from the site. **Moderate (SV).** Suitable habitat occurs throughout Properties, though most areas may be too thickly vegetated. Species was not observed on the Properties during 2019 surveys.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Belding's orange-throated whiptail *(Aspidoscelis hyperythra beldingi*)	/-- County Group 2 MSCP Covered	Low-elevation coastal scrub, chaparral, and valley-foothill hardwood habitats. Prefers washes and other sandy areas with patches of brush and rocks. Perennial plants necessary for its major food-termites.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected throughout the Properties during drift fence surveys in 2016. **Present (SP).** A single individual was incidentally observed within the southern portion of the Southern Parcel during the herpetofauna surveys. The species has also been documented in the northern and central portions of the Preserve in 2008 (County 2009), northern and southwestern portions in 2012 (Dudek 2013; County 2013), and northern portion in 2016 (AECOM 2017). **High (SV).** Suitable habitat observed throughout the Properties and this species is relatively common in suitable habitat. Species was not observed on the Properties during 2019 surveys.
San Diegan tiger whiptail (*Aspidoscelis tigris stejnegeri*)	--/SSC County Group 2	Open areas in grasslands, scrublands, and woodlands.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected throughout the Properties during drift fence surveys in 2016. **High (SP).** Suitable habitat occurs within the Southern Parcel and the species was captured during reptile trapping surveys conducted within the Preserve in 2008 (County 2009) and 2016 (AECOM 2017). **Present (SV).** Suitable habitat observed throughout the Properties and this species is relatively common in suitable habitat. Species was captured on the Properties during 2019 surveys.
Southwestern pond turtle (*Clemmys marmorata pallida*)	--/SSC County Group 1 MSHCP Covered	Ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches, with abundant vegetation, and either rocky or muddy bottoms, in woodland, forest, and grassland. In streams, prefers pools to shallower areas. Logs, rocks, cattail mats, and exposed banks are required for basking. May enter brackish water and even seawater.	**NA, SA, SV**	**Not Expected (NA, SA).** The Properties lack suitable wetland habitat for this species. **Not Expected (SV).** No suitable aquatic present within the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
San Diego banded gecko (*Coleonyx variegatus abbotti*)	--/-- County Group 2	Occurs in arid areas, including creosote flats, sagebrush desert, pinion-juniper woods, and chaparral. Prefers rocky areas but may occur in rock-free areas such as sand dunes.	**NA, SA, SP, SV**	**High (NA, SA).** The Properties contain suitable habitat for this species, and it is known to occur around San Vicente Reservoir. **Low (SP).** Suitable habitat is present within the Southern Parcel but there are no recent occurrences of the species within the surrounding area. The most recent reported observation of the species consists of a voucher specimen from the 1920s located over 3 miles east of the site. **Moderate (SV).** Potentially suitable habitat occurs within the Properties. Species was not observed on the Properties during 2019 surveys.
Red diamond rattlesnake (*Crotalus ruber*)	--/SSC County Group 2	Coastal sage scrub and grasslands. Occurs in rocky areas and dense vegetation with rodent burrows, cracks in rocks, or surface cover objects.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Wu parcel during drift fence surveys in 2016. **High (SP).** Suitable habitat is present within the Southern Parcel and was observed within Preserve during biological conducted in 2008 and 2012 (County 2009; Dudek 2009; County 2013), and was captured in the northern portion of the Preserve in 2016 (AECOM 2017). **High (SV).** Suitable habitat observed throughout the Properties and this species is relatively common in suitable habitat. Species was not observed on the Properties during 2019 surveys.
San Diego ringed-neck snake (*Diadophis punctatus similis*)	--/-- County Group 2	Prefers moist habitats, including wet meadows, rocky hillsides, gardens, grassland, chaparral, mixed coniferous woods, and woodlands.	**NA, SA, SP, SV**	**High (NA, SA).** The Properties contain suitable habitat for this species. **Moderate (SP).** Suitable habitat is present within the Southern Parcel; however, the majority of reported occurrences of the species within the vicinity are prior to 1950. The most recent report is located over 4 miles east of the site from 2008. **High (SV).** Suitable habitat in riparian woodland in drainage. Species was not observed on the Properties during 2019 surveys.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Large-blotched salamander (*Ensatina klauberi*)	--/SSC County Group 1	Inhabits moist shaded evergreen and deciduous forests and oak woodlands on Palomar Mountain and in the Peninsular Ranges.	**NA, SA**	**Not Expected (NA, SA).** The Properties lie outside the known range of this species.
Coronado Island skink (*Eumeces skiltonianus interparietalis*)	--/-- County Group 2	Scrub habitats with leaf litter and sandy substrates.	**NA, SA, SP, SV**	**Moderate (NA, SA).** The Properties contain marginally suitable habitat for the species, and it has been detected in the adjacent Sycamore Canyon/Goodan Ranch Preserve. **High (SP).** Suitable habitat is present within the Southern Parcel and the species was previously captured within the Preserve near Sycamore Canyon Creek during reptile trapping surveys conducted in 2008 (County 2009). **High (SV).** Suitable habitat in riparian woodland in drainage. Species was not observed on the Properties during 2019 surveys.
Northern three-lined boa (former subspecies of coastal rosy boa) (*Lichanura orcutti*)	--/-- County Group 2	Scrub habitats with rock outcrops. Once common on the coast, now typically found in inland locations.	**NA, SA, SP**	**Present (NA, SA).** Detected in the 2015 Northern Addition parcel during drift fence surveys in 2016. **High (SP).** Suitable habitat is present within the Southern Parcel and the species was previously observed within the Preserve by County Park Rangers in 2008 (County 2009) and was captured in the northern portion of the Preserve in 2016 (AECOM 2017).
Coastal rosy boa (*Lichanura trivirgata*)	--/-- County Group 2	Inhabits rocky areas in coastal sage scrub, chaparral, and desert environments.	**SV**	**High (SV).** Suitable habitat occurs throughout the Properties. Species was not observed on the Properties 2019 surveys.
Blainville's horned lizard (*Phrynosoma blainvillei)*	--/SSC County Group 2 MSHCP Covered	Coastal sage scrub and chaparral in arid and semi-arid climate conditions. Prefers friable, rocky, or shallow sandy soils.	**NA, SA, SP, SV**	**Present (WNASA)**. Detected within the 2015 Northern Addition during surveys in 2016. **High (SP).** Suitable habitat is present within the Southern Parcel and the species was observed within the Preserve in 2008 (County 2009) and captured during reptile trapping events conducted in 2012 (Dudek 2013; County 2013) and 2016 (AECOM 2017). **High (SV).** Suitable habitat observed throughout the Properties. Species was not observed on the Properties during 2019 surveys.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Coast patch-nosed snake (*Salvadora hexalepis virgultea*)	--/SSC County Group 2	Grasslands, scrublands, and woodlands with sandy soils and leaf litter.	**NA, SA, SP, SV**	**Present (V, SA).** Detected within the 2015 Northern Addition during the drift fence surveys on 2016. **High (SP).** Suitable habitat is present within the Southern Parcel and the species was captured in the northeastern portion of the Preserve during reptile trapping surveys conducted in 2008 (County 2009) and 2016 (AECOM 2017). **High (SV).** Suitable habitat observed throughout the Properties and this species is relatively common in suitable habitat. Species was not observed on the Properties during 2019 surveys.
Two-striped garter snake (*Thamnophis hammondii*)	--/SSC County Group 2	Aquatic habitats, preferably rocky streams with protected pools, cattle ponds, marshes, vernal pools, and other shallow bodies of water lacking large aquatic predators.	**NA, SA, SP, SV**	**Low (NA, SA).** The Properties are primarily upland chaparral and do not contain riparian habitat. However, the species has been detected in the adjacent Sycamore Canyon/Goodan Ranch Preserve. **High (SP).** Suitable habitat is present within the Southern Parcel and the species was observed by Park Rangers during 2008 (County 2013). **Present (SV).** An individual was observed in the creek on northern portion of the Properties
Cooper's hawk (*Accipiter cooperii*)	--/-- County Group 1 MSHCP Covered	Usually found nesting in oak woodlands, but occasionally in willow or eucalyptus woodlands.	**NA, SA, SP, SV**	**High (NA, SA).** There is suitable adjacent habitat for breeding and the Properties contain suitable foraging habitat for the species. The species is known to occur in the adjacent Sycamore Canyon/Goodan Ranch Preserve. **High (SP).** Suitable habitat is present within the Southern Parcel and the species was observed within the Preserve during wildlife surveys conducted in 2008 (County 2009). **Present (SV).** Suitable foraging and nesting habitat present in the study area. Widespread and common within suitable habitat. Species was observed on the Properties during 2019 surveys.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Sharp-shinned hawk (*Accipiter striatus*)	--/-- County Group 1	A winter visitor, distributed over the coastal slope of San Diego County. The habitat of this species encompasses a variety of vegetation communities and land covers. It requires a certain amount of dense cover, but this can be localized and scattered through relatively open country.	**NA, SA, SP**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **Moderate (SP).** Suitable wintering habitat is present within the Southern Parcel and there are numerous eBird sightings of the species south of the site near Santee Lakes. The species was observed in the northern portion of the Preserve in 2016 (AECOM 2017). The species would be expected to only occur as a wintering visitor as the site is located outside the species' known breeding range.
Tricolored blackbird (*Agelaius tricolor*)	--/SSC County Group 1 MSHCP Covered	Freshwater marshes with cattails and other emergent vegetation.	**NA, SA, SV**	**Low (NA, SA).** There is no suitable breeding habitat within the Properties or nearby. **Not Expected (SV).** Suitable marsh habitat is lacking within the Properties.
Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)	--/-- County Group 1 MSHCP Covered	Coastal sage scrub and sparse mixed chaparral, often in steep or rocky terrain.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected throughout the Properties during surveys in 2016. **Present (SP).** The species was detected within coastal sage scrub and chaparral habitat located in the western and eastern portion of the Southern Parcel during the avian point counts. Furthermore, the species was previously documented within Preserve during wildlife surveys conducted in 2008, 2012, and 2016 (County 2009; Dudek 2013; County 2013; AECOM 2017). **Present (SV).** Suitable foraging and nesting habitat present on the Properties. Common within suitable habitat. Was observed on the Properties during 2019 surveys.
Grasshopper sparrow (*Ammodramus savannarum*)	--/SSC County Group 1	This species prefers open, low-growing grassland habitat interspersed with small shrubs. Open, low-growing Diegan coastal sage scrub with mixed grasses is also suitable.	**NA, SA, SP, SV**	**Low (NA, SA).** No suitable nesting habitat occurs within the Properties; however, the species may occasionally forage or fly over the Properties. **Moderate (SP).** Limited suitable habitat is present within the Southern Parcel. The species was previously documented within the Preserve prior to the 2003 Cedar Fire but there are no recent reported observations of the species within the area. **Low (SV).** Grasslands on the Properties are very small and not expected to support this species.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Golden eagle (*Aquila chrysaetos*)	FP/-- County Group 1 MSCP Covered	Nests on cliff ledges and trees on steep slopes. Hunts for prey in nearby grasslands, sage scrub, or broken chaparral. Requires very large territories.	**NA, SA, SP, SV**	**High (NA, SA).** The Properties contain suitable foraging habitat for this species and there are known nearby nesting locations (San Vicente Reservoir is the closest known nesting location). The species has been detected within the adjacent Sycamore Canyon/Goodan Ranch Preserve. **Moderate (SP).** Suitable foraging habitat is present within the Southern Parcel; however, suitable nesting habitat is absent. The species was observed within the Preserve flying overhead during wildlife surveys conducted in 2008 (County 2009). The site is generally situated adjacent to heavily urbanized areas and lacks suitable remote habitat and cliffs suitable for nesting. This species likely only occurs as a migrant or foraging visitor. **Moderate (SV).** No suitable nesting habitat occurs within the Properties. Suitable foraging habitat occurs within the Properties.
Great blue heron (*Ardea herodias*)	--/-- County Group 2	Forages in wetlands and occasionally grasslands. Communal nester on trees near water.	**SV**	**Not Expected (SV**). Low potential to nest in eucalyptus trees on the Properties. No nests observed. May forage in the artificial pond when water is present.
Bell's sparrow (*Artemisiospiza belli*)	--/-- County Group 1	Coastal sage scrub and sparse chaparral, typically in large unfragmented blocks in inland locales.	**NA, SA, SP, SV**	**High (NA, SA).** The Properties contain suitable breeding habitat for this species, and it is known to occur in the nearby Sycamore Canyon/Goodan Ranch Preserve. **High (SP).** Suitable habitat is present within the Southern Parcel and the species was detected throughout the Preserve during wildlife surveys conducted in 2008, including successful breeding observations (County 2009). **High (SV).** Suitable foraging and nesting habitat present on the Properties. Common within suitable habitat. Was not observed on the Properties during 2019 surveys.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Long-eared owl (*Asio otus*)	--/SSC County Group 1	Sporadic nester within San Diego County in the nests of other raptor species in dense woodland habitats.	**NA, SA, SP, SV**	**Low (NA, SA).** No suitable nesting habitat occurs within the Properties; however, the species may occasionally forage or fly over the Properties. **Low (SP).** Limited suitable habitat is present within the Southern Parcel. The species was historically documented within the Preserve (Unitt 2004) but has not been observed since the 2003 Cedar Fire (County 2013). There are no recent occurrences or eBird sightings of the species within the surrounding area. **Not Expected (SV).** Suitable foraging and nesting habitat is limited on the Properties.
Western burrowing owl (*Athene cunicularia hypugaea*)	--/SSC County Group 1 MSCP Covered	Grasslands, open scrublands, and margins of agriculture fields with burrows. Subterranean nester, dependent upon burrowing mammals, especially California ground squirrel.	**NA, SA, SP, SV**	**Low (NA, SA).** The Properties lack the characteristic open, grassland habitat for this species. However, the species has been detected in the adjacent Sycamore Canyon/Goodan Ranch Preserve. **Not Expected (SP).** Suitable habitat is present within the Southern Parcel and a presumed migrant individual was observed within the Preserve during wildlife surveys conducted in 2008 (County 2009). However, there are no wintering and breeding observations of the species within the surrounding area. Though migrating individuals may temporarily utilize the site, the species is not anticipated to winter or breed within the Southern Parcel based on the lack of observations within the Preserve and surrounding area. **Not Expected (SV).** The small grasslands on the Properties do not support vegetation structure or ground squirrel colonies necessary for this species.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Red-shouldered hawk (*Buteo lineatus*)	--/-- County Group 1	Occurs mainly in swamp, riverine, riparian, and forest habitats. They use the same nesting site from year to year, often placed in a large sycamore or oak tree.	**NA, SA, SP, SV**	**High (NA, SA).** There is suitable breeding habitat adjacent to the Properties, and suitable foraging habitat within the Properties. The species is known to occur within the adjacent Sycamore Canyon/Goodan Ranch Preserve. **Moderate (SP).** Limited suitable habitat is present within the Southern Parcel; however, a pair was documented building a nest near the Ranger Station in 2008 (County 2009). **High (SV).** Suitable foraging and nesting habitat present in the study area. Widespread and common within suitable habitat. Species was observed on the Properties during 2019 surveys.
Green heron (*Butorides virescens*)	--/-- County Group 2	Common in wetland thickets throughout much of North America. Generally, a solitarily nester but are known to sometimes nest socially in loose colonies. Usually forages for fish by wading at water's edge or in very shallow water.	**SV**	**Not Expected (SV).** No suitable aquatic present within the Properties.
Coastal (San Diego) cactus wren (*Campylorhynchus brunneicapillus sandiegensis*)	--/SSC County Group 1 MSCP Covered	Coastal sage scrub with abundant mature cactus patches that provide vertical structure for their nests.	**NA, SA, SP, SV**	**Not Expected (NA, SA).** The Properties lack large patches of cactus that this species requires for nesting. **None (SP).** Patches of mature cacti required by the species for nesting do not occur within the Southern Parcel. Closest documented location is over 2 miles east of the Preserve boundary. **Not Expected (SV).** No suitable breeding habitat (cactus thickets) occur on the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Turkey vulture (*Cathartes aura*)	--/-- County Group 1	Forages aerially above virtually any vegetation type or terrain, except dense human development. Secluded cliff ledge or rock fissure in remote, rugged terrain required for nesting. Native or non-native tree groves in lowlands often used as winter roosts.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016 including an active nest with two eggs in the Wu parcel. **Present (SP).** Two individuals were documented by the wildlife camera within the northwestern portion of the Southern Parcel. The species was also observed within the Preserve during wildlife surveys conducted in 2008, 2012, and 2016 (County 2009; Dudek 2009; County 2013; AECOM 2017). **Not Expected (SV).** No suitable nesting habitat is present, but suitable foraging habitat is present in the study area. A group was observed flying over the Properties during 2019 surveys.
Vaux's swift (*Chaetura vauxi*)	--/SSC	Occurs as a migrant and summer resident in California. Breeds within the northern and central portions of the State from Del Norte County south to Santa Cruz County, and within the Cascade-Sierra Nevada range from Siskiyou County south to Fresno County. Only occurs as a migrant in southern California. Nests in tree cavities and less frequently in artificial structures such as chimneys. Suitable habitat includes coniferous and mixed forests, particularly coast redwood habitats and Douglas-fir forests in California.	**SP**	**Moderate (SP).** One individual was detected flying overhead during wildlife surveys conducted in 2008 (County 2009). The species would be expected to only occur within the Southern Parcel as a migrant as the site is located outside of the species' known breeding range.
Western snowy plover (*Charadrius alexandrinus nivosus*)	FT/SSC MSCP Covered	Coastal sandy beaches, dunes, and estuary habitats.	**NA, SA**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Northern harrier (*Circus cyaneus*)	--/SSC County Group 1 MSCP Covered	A resident breeder within San Diego County in grassland, marsh, and scrubby habitats. It tends to prefer flat areas with dense low-growing vegetation for nesting and foraging. Tends to prefer nesting and foraging along the coastal slope and inland valleys.	**NA, SA, SP, SV**	**Moderate (NA, SA).** The species is known to occur in the adjacent Sycamore Canyon/Goodan Ranch Preserve, but there is only limited foraging habitat within the Properties. **Moderate (SP).** Suitable foraging habitat is present within the Southern Parcel and the species was detected foraging over the Preserve during wildlife surveys conducted in 2008 (County 2009). Limited suitable nesting habitat (i.e., grasslands) occurs within the Southern Parcel. **Not Expected (SV).** Suitable nesting habitat is very limited within the Properties. Suitable foraging habitat is present.
Olive-sided flycatcher (*Contopus cooperi)*	--/SSC Group 2	Inhabits openings in and edges to dense coniferous forests.	**NA, SA**	**Low (NA, SA).** The Properties do not contain suitable breeding habitat for this species, as it is out of its known breeding range. However, the species may migrate though the Properties.
Yellow warbler (*Dendroica petechia brewsteri*)	--/SSC County Group 2	Mature riparian woodlands consisting of cottonwood, willow, alder, and ash trees. Restricted to this increasingly patchy habitat.	**NA, SA, SV**	**Low (NA, SA).** No suitable riparian habitat exists on the Properties; however, the species may occur as a migrant. **Present (SV).** Suitable nesting habitat present within riparian woodland on the Properties. Detected within coastal scrub on the Properties.
White-tailed kite (*Elanus leucurus*)	--/SSC County Group 1	Widespread over the coastal slope of San Diego County preferring riparian woodlands, oak groves, or sycamore groves adjacent to grasslands.	**NA, SA, SP, SV**	**Moderate (NA, SA).** The Properties contain limited patches of suitable foraging and nesting habitat for this species, and the species is known to occur at the adjacent Sycamore Canyon/Goodan Ranch Preserve. **Moderate (SP).** Limited breeding habitat occurs within the Southern Parcel, but the species was observed perched and foraging within the Preserve near Sycamore Canyon Creek during wildlife surveys conducted in 2008 (County 2009). Not Expected (SV). Low potential to nest riparian trees on the Properties. No nests observed. Suitable foraging habitat within the Properties is limited.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Southwestern willow flycatcher (*Empidonax traillii extimus*)	FE/SE County Group 1 MSCP Covered	Restricted to a few colonies in riparian woodlands scattered throughout southern California. Riparian forests are integral to this species' persistence.	**NA, SA, SV**	**Low (NA, SA).** No suitable riparian habitat exists on the Properties; however, the species may occur as a migrant. **Low (SV).** Riparian habitat occurs in drainage, but area is likely too small to support this species.
California horned lark (*Eremophila alpestris actia*)	--/-- County Group 2	The species breeds in open grassy and semi-open habitats where it forages on the ground. This species breeds in areas with low to no vegetative growth.	**NA, SA, SP, SV**	**Moderate (NA, SA).** Limited suitable habitat within the 2015 Northern Addition. The species is known to occur in the adjacent Sycamore Canyon/ Goodan Ranch Preserve. **Moderate (SP).** Suitable habitat is present within the Southern Parcel and the species was detected within the Preserve during wildlife surveys conducted in 2008 (County 2009). Limited suitable breeding habitat (i.e., grasslands) occur within the Southern Parcel. **High (SV).** Suitable nesting habitat present on the Properties in cleared areas. Was not observed on the Properties during 2019 surveys.
Merlin (*Falco columbarius*)	--/-- County Group 2	This species only winters in San Diego County and forages for birds in a variety of habitats from open grassy areas, to wooded areas, agricultural areas, and other locations where prey species congregate.	**NA, SA, SP**	**Moderate (NA, SA).** No suitable nesting habitat occurs within the Properties; however, the species may occasionally forage or fly over the Properties. **Moderate (SP).** Suitable wintering habitat is present within the Southern Parcel and the species was detected within the Preserve in 2007 but was not documented during wildlife surveys conducted in 2008 and 2012 (County 2009; County 2013).
Prairie falcon (*Falco mexicanus*)	--/-- County Group 1	A resident breeder within San Diego County in cliff and rocky habitat. Forages widely, but prefers	**NA, SA, SP, SV**	**Low (NA, SA).** No suitable nesting habitat occurs within the Properties; however, the species may occasionally forage or fly over the Properties. **Low (SP).** Suitable foraging habitat occurs within the Southern Parcel, but suitable nesting habitat is absent. If present, this species likely only occurs as a migrant or foraging visitor. There are no reported occurrences of the species within the Preserve or surrounding area. **Moderate (SV).** No suitable nesting habitat occurs within the Properties. Suitable foraging habitat occurs within the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Peregrine Falcon (*Falco peregrinus*)	--/SE County Group 1 MSCP (S)	Will forage over a variety of habitats however only breed near water, typically with the nest placed on a cliff ledge.	**SV**	**Moderate (SV).** No suitable nesting habitat occurs within the Properties. Suitable foraging habitat occurs within the Properties.
Bald eagle (*Haliaeetus leucocephalus*)	--/SE County Group 1 MSCP Covered	Bald eagles breed across the United States and from Alaska to south Florida. They breed primarily in tall, mature trees in proximity to bodies of water. They consume a wide variety of prey items from fish, waterbirds, carrion, to ground squirrels. The species is now a regular visitor to wetland areas within Southern California and multiple pairs breed within San Diego County. During the winter months there is an additional influx of bald eagles into the County.	**NA, SA, SP**	**Present (NA, SA).** Detected flying over the Properties during surveys in 2016 and is known to occur in the nearby San Vicente Reservoir. However, no suitable nesting or foraging habitat is present within the Properties. **Not Expected (SP).** Suitable foraging, wintering, and nesting habitat is absent from the Southern Parcel, though the species was observed flying over the northern portion of the Preserve in 2016 (AECOM 2017). The species likely only disperses over the Southern Parcel as the site, and larger Preserve, lack large bodies of water and other suitable foraging habitat for the species.
Yellow-breasted chat (*Icteria virens*)	--/SSC County Group 1	Riparian woodland, with dense undergrowth.	**NA, SA, SP, SV**	**Low (NA, SA).** No suitable riparian habitat exists on the Properties; however, the species may occur as a migrant. The species is known to occur in the adjacent Sycamore Canyon/Goodan Ranch Preserve. **None (SP).** Suitable riparian habitat for the species is absent from the Southern Parcel, though the species was detected within the Preserve in riparian habitat adjacent to Clark Canyon during wildlife surveys conducted in 2008 (County 2009). **Low (SV).** Riparian habitat occurs in drainage, but area is relatively small in size.
Least bittern (*Ixobrychus exilis*)	--/SSC County Group 2	Marsh habitats or large emergent wetlands with cattails (*Typha* sp.) and tules.	**NA, SA, SV**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species. **Not Expected (SV).** No suitable aquatic present within the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Loggerhead shrike (*Lanius ludovicianus*)	--/SSC County Group 1	This species is both a resident breeder, and there is an increase in their numbers during winter. The species prefers open habitats, with scattered shrubs for perching and nesting.	**NA, SA, SP, SV**	**Moderate (NA, SA).** Limited suitable nesting habitat occurs within the 2015 Northern Addition, and the species may occasionally forage or fly over the Properties. **High (SP).** Suitable habitat is present within the Southern Parcel and there are multiple eBird sightings of the species within the northern portion of the Preserve. **Moderate (SV).** Suitable foraging and nesting habitat present is present on the Properties. Was not observed on the Properties during 2019 surveys.
California black rail (*Laterallus jamaicensis coturniculus*)	--/SSC County Group 2	Freshwater and saltwater marshes with bulrush or pickleweed.	**NA, SA**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species.
Osprey (*Pandion haliaetus*)	--/-- County Group 1	Primarily a winter visitor, and occasional resident breeder to lakes, rivers, estuaries, and other bodies of water containing fish within San Diego County. Known to occur around San Vicente Reservoir.	**NA, SA, SP**	**Low (NA, SA).** There is no suitable habitat for this species within the Properties; however, it may fly over during migration. The species is known to occur in the adjacent Sycamore Canyon/Goodan Ranch Preserve. **None (SP).** Suitable habitat is absent from the Southern Parcel, though the species was observed soaring over the Preserve during wildlife surveys conducted in 2008 (County 2009). The species would likely only disperse through the Southern Parcel as the site lacks suitable aquatic habitat required by the species for foraging and nesting. The species has been documented east of the Southern Parcel at San Vicente Reservoir.
Belding's savannah sparrow (*Passerculus sandwichensis beldingi*)	--/SE County Group 1 MSCP Covered	Salt marsh and mudflats with pickleweed.	**NA, SA**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species.
Double-crested cormorant (*Phalacrocorax auritus)*	--/-- County Group 2	Marine, freshwater and estuary environments. Needs water for foraging and perching areas to dry out.	**NA, SA**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
White-faced ibis (*Plegadis chihi*)	--/-- County Group 1 MSCP Covered	Freshwater marsh, shallow lacustrine waters, muddy ground of wet meadows, and irrigated or flooded pastures and croplands. Nests in dense freshwater marsh.	**NA, SA, SV**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species. **Not Expected (SV).** Suitable nesting and foraging habitat is lacking within the Properties.
Coastal California gnatcatcher (*Polioptila californica californica*)	FT/SSC County Group 1 MSCP Covered	Coastal sage scrub below 2,500 feet in elevation. Low, coastal sage scrub, in arid washes, on mesas and slopes.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **High (SP).** Suitable coastal sage scrub habitat is present within the Southern Parcel and the species was detected within the Preserve during wildlife surveys conducted in 2012 and 2016 (Dudek 2013; County 2013; AECOM 2017). USFWS-designated critical habitat for this species occurs immediately south of the Southern Parcel. **Present (SV).** Suitable foraging and nesting habitat present in on the Properties.
Light-footed Ridgway's rail (*Rallus obsoletus levipes*)	FE/SE County Group 1 MSCP Covered	Coastal salt marshes and freshwater marshes with connection to estuarine habitats.	**NA, SA**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species.
Yellow warbler (*Setophaga petechia*)	BCC/SSC County Group 2	Common to locally abundant species breeding throughout California at elevations below 8,500 feet, excluding most of the Mojave Desert, and all of the Colorado Desert. Breeds in riparian areas dominated by willows (Salix spp.) and cottonwoods (Populus spp.) near rivers, streams, lakes, and wet meadows. Also breeds in montane shrub and conifer forests in higher elevation areas.	**SP**	**Present (SP).** The species was detected within the central portion of the Southern Parcel during the avian point count surveys. However, the site lacks suitable riparian habitat required by the species for breeding. Observations were presumably migrating individuals.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Western bluebird (*Sialia mexicana*)	--/-- County Group 2 MSCP Covered	Frequents open woodlands for foraging, but requires suitable roosting and nesting cavities usually in snags. Availability of suitable nesting cavities in large trees may limit population density.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **High (SP).** Limited suitable breeding habitat occurs in the Southern Parcel, though the species was observed within the central and northern portions of the Preserve during wildlife surveys conducted in 2008 and 2016, including a nesting pair near Sycamore Canyon Creek in 2008 (County 2009; AECOM 2017). **High (SV).** Suitable nesting habitat present within riparian woodland on the Properties.
California least tern (*Sterna antillarum browni*)	FE/SE County Group 1 MSCP Covered	Coastal beaches and salt flats.	**NA, SA**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species.
Barn owl (*Tyto alba*)	--/-- County Group 2	Inhabit grasslands, deserts, marshes, agricultural fields, narrow forest strips, brushy fields, and suburbs and cities. They nest in tree cavities, caves, and in buildings.	**NA, SA, SP, SV**	**High (NA, SA).** Suitable foraging habitat exists on the Properties and the species is known to occur within the adjacent Sycamore Canyon/Goodan Ranch Preserve. **High (SP).** Suitable habitat occurs within the Southern Parcel and the species was detected within the Preserve during avian point count surveys conducted in 2008 and 2012 (County 2009; Dudek 2013; County 2013). **Present (SV).** Suitable foraging and nesting habitat present in the Properties. Widespread and common within suitable habitat. Species was observed on the Properties during 2019 surveys.
Least Bell's vireo (*Vireo bellii pusillus*)	FE/SE County Group 1 MSCP Covered	Willow and mulefat-dominated riparian forests and woodlands.	**NA, SA, SP, SV**	**Low (NA, SA).** No suitable riparian habitat exists on the Properties; however, the species may occur as a migrant. **None (SP).** Suitable riparian habitat required by the species is absent from the Southern Parcel. **Moderate (SV).** Riparian habitat occurs in drainage, but area is relatively small in size.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Pallid bat (*Antrozous pallidus*)	--/SSC County: Group 2	Deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect species from high temperatures.	**NA, SA, SP, SV**	**Not Expected (NA, SA).** The Properties contain suitable habitat for this species and the species was detected in the adjacent Sycamore Canyon/Goodan Ranch Preserve. **High (SP).** Suitable habitat is present within the Southern Parcel and the species was documented within the Preserve during surveys conducted in 2012 (County 2013; Dudek 2013). **High (SV).** Suitable roosting habitat is present within the riparian habitat located on the Properties. Was not detected during 2019 passive or active bat surveys Properties.
Ringtail (*Bassariscus astutus*)	--/-- County Group 2	Usually not found more than 1 km (0.6 mi) from permanent water. Suitable habitat consists of a mixture of forest and shrubland in close association with rocky areas or riparian habitats. Forages on ground, among rocks, in trees; usually near water.	**SV**	**Moderate (SV).** Riparian and rocky habitats occurs in drainage, but area is relatively small in size.
Dulzura pocket mouse (*Chaetodipus californicus femoralis*)	--/SSC County Group 2	Slopes covered with chaparral and live oaks.	**NA, SA SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **High (SP).** Suitable habitat is present within the Southern Parcel and the species was captured within the Preserve during the small mammal trapping surveys conducted in 2008 and 2016 (County 2009; AECOM 2017). Additionally, two individuals were caught in 1992 in upper Sycamore Canyon about 0.5 mile north of Goodan Ranch. **Present (SV).** Species was captured within the Properties during 2019 surveys. Suitable habitat occurs throughout the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*)	--/SSC County Group 2	Sagebrush scrub, annual grassland, chaparral, and desert scrubs. Sandy, herbaceous areas, usually in association with rocks or coarse gravel.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **High (SP).** Suitable habitat is present within the Southern Parcel and the species was captured within the Preserve during the small mammal trapping surveys conducted in 2012 and 2016 (County 2013; Dudek 2013; AECOM 2017). Additionally, two individuals were caught in 1992 in upper Sycamore Canyon about 0.5 mile north of Goodan Ranch. **Present (SV).** Species was captured within the Properties during 2019 surveys. Suitable habitat occurs throughout the Properties.
Mexican long-tongued Bat (*Choeronycteris mexicana*)	--/SSC County Group 2	Likes desert canyons and arid mountain ranges. Roosts by day in caves, mines or buildings. Records indicate only a summer resident in San Diego County. Feeds on nectar and pollen from agaves and cactus blossoms.	**SP, SV**	**Low (SP).** Potentially suitable habitat is present within the study area; however, the species is primarily known to occur in development areas within southern California. There are no recent occurrences of the species within the surrounding area, the closest reported location is from 1981 in Poway. **Not Expected (SV).** Appropriate vegetation is not present on the Properties.
Townsend's big-eared bat (*Corynorhinus townsendii*)	--/SSC County Group 2	Coniferous forests, deserts, prairies, riparian communities, active agricultural areas, and coastal habitats with caves and cave-like roosting habitat, mines, and abandoned buildings.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **Low (SP).** Potential roosting habitat within the Southern Parcel is limited to hollows within oak trees. However, the species was detected in the northern portion of the Preserve in 2016 (AECOM 2017). One adult male was collected in 2012 approximately 2 miles northwest of the Preserve at Sycamore Canyon Road, 1.5 miles west of Goat Peak. **Present (SV).** Roosting habitat is limited on the Properties. Detected during 2019 passive bat surveys on the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Stephens' kangaroo rat (*Dipodomys stephensi*)	FE/ST County Group 1	Inhabits annual and perennial grassland habitats, but may occur in coastal scrub or sagebrush with sparse canopy cover, or in disturbed areas.	**NA, SA, SV**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species and there are no known adjacent populations. **Not Expected (SV).** Species not known to occur in vicinity of Properties. Habitat within the Properties is not suitable for this species. Not observed during 2019 trapping surveys.
Western mastiff bat (*Eumops perotis californicus*)	--/SSE County Group 2	Chaparral; live oaks; and arid, rocky regions. Requires downward-opening crevices.	**NA, SA, SP, SV**	**High (NA, SA).** The Properties contain suitable habitat for this species and the species was detected in the adjacent Sycamore Canyon/Goodan Ranch Preserve. **Present (SP).** The species was recorded by the bat detectors within the western portion of the Southern Parcel. Additionally, the species was documented in the Preserve during wildlife surveys conducted in 2008 (County 2009). Individuals have also been documented approximately 4 miles north in Dos Picos County Park. **High (SV).** Roosting habitat is present on the Properties. Species was not detected during 2019 passive and active bat surveys on the Properties.
Western red bat (*Lasiurus blossevillii*)	--/SSE County Group 2	Feeds over grasslands, shrublands, open woodlands, forests, and croplands. Roosts primarily in trees and at times, shrubs, often in edge habitats along streams, fields, or urban areas.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **Moderate (SP).** Suitable riparian habitat is absent from the Southern Parcel, though the species may utilize the oak woodland habitat on site. The species was documented in the Preserve during wildlife surveys conducted in 2008, 2012, and 2016 (County 2009; Dudek 2013; County 2013; AECOM 2017). **High (SV).** Suitable roosting habitat is present on the Properties. Was not detected during 2019 passive or active bat surveys Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Western yellow bat (*Lasiurus xanthinus*)	--/SSC	Associated with thorny vegetation on the Mexican Plateau and found in desert regions of the southwestern United States, particularly in association with palms.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **Low (SP).** Suitable riparian habitat and fan palms are absent from the Southern Parcel, though the species was documented within the Preserve during wildlife surveys conducted in 2008, 2012, and 2016 (County 2009; Dudek 2013; County 2013; AECOM 2017). **Present (SV).** Species was detected during 2019 active bat surveys on the Properties.
San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)	--/SSC County: Group 2	Grasslands, open scrub habitats, disturbed areas, and agricultural fields.	**NA, SA, SP, SV**	**High (NA, SA**). The Properties contain suitable habitat for this species and the species was detected in the adjacent Sycamore Canyon/Goodan Ranch Preserve. **Present (SP).** The species was documented by the wildlife camera in the northwestern portion of the Southern Parcel. Additionally, the species was documented within the Preserve during wildlife surveys conducted in 2008 and 2012 (County 2009; Dudek 2013; County 2013). **Present (SV).** One individual's image was captured on remote camera. Suitable habitat occurs throughout the Properties.
California leaf-nosed bat (*Macrotus californicus*)	--/SSC County Group 2	Preferred habitats are caves, mines, and rock shelters, mostly in Sonoran desert scrub.	**NA, SA**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Western small-footed myotis (*Myotis ciliolabrum*)	--/-- County Group 2	Inhabits deserts, semideserts, and desert mountains, and roosts in crevices and cracks in canyon walls, caves, mine tunnels, behind loose tree bark, or in abandoned houses.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **Present (SP).** The species was recorded by the bat detectors within the western portion of the Southern Parcel. Additionally, the species was documented within the Preserve during wildlife surveys conducted in 2008, 2012, and 2016 (County 2009; Dudek 2013; County 2013; AECOM 2017). **Present (SV).** Suitable roosting habitat is present on the Properties. Detected during 2019 passive bat surveys on the Properties.
Long-eared myotis (*Myotis evotis*)	--/-- County Group 2	Uses mostly forested areas, especially with broken rock outcrops, also shrubland, meadows near tall timber, wooded streams, and reservoirs. Often roosts in buildings, hollow trees, mines, caves, fissures, etc.	**NA, SA, SV**	**Low (NA, SA).** The Properties contain limited suitable habitat for this species. **High (SV).** Suitable roosting habitat is present on the Properties. Was not detected during 2019 passive or active bat surveys Properties.
Fringed myotis (*Myotis thysanodes*)	--/SSC County Group 2	Occurs in a variety of habitats from desert scrub to fir-pine associations. Oak and pinyon woodlands are most commonly used. Roosts within caves, mines, and buildings.	**NA, SA**	**Low (NA, SA).** The Properties contain limited suitable habitat for this species.
Yuma myotis (*Myotis yumanensis*)	--/-- County Group 2	Primarily an inhabitant of desert regions where it is most commonly encountered in lowland habitats near open water, where it prefers to forage.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **Present (SP).** The species was recorded by the bat detectors within the western portion of the Southern Parcel. Additionally, the species was documented within the Preserve during wildlife surveys conducted in 2008, 2012, and 2016 (County 2009; Dudek 2013; County 2013; AECOM 2017). **Present (SV**). Detected during 2019 passive and active bat surveys on the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
San Diego desert woodrat (*Neotoma lepida intermedia*)	--/--	Sagebrush scrub, annual grassland, chaparral, and desert scrubs, often with cactus patches, rock outcrops, or rock piles.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **Present (SP).** A single individual was captured within the Southern Parcel during the small mammal trapping survey. Additionally, the species was captured within the Preserve during the small mammal trapping surveys conducted in 2008, 2009, and 2016 (County 2009; Dudek 2013; County 2013; AECOM 2017). **Present (SV).** Species was captured within the Properties during 2019 surveys. Suitable habitat occurs throughout the Properties.
Pocketed free-tailed bat (*Nyctinomops femorosaccus*)	--/SSC County: Group 2	Rugged cliffs, rocky outcrops, and slopes in desert shrub and pine oak forests.	**NA, SA, SP, SV**	**Present (NA, SA).** Detected within the Properties during surveys in 2016. **Present (SP).** The species was recorded by the bat detectors within the western portion of the Southern Parcel. Additionally, the species was documented within the Preserve during wildlife surveys conducted in 2008, 2012, and 2016 (County 2009; Dudek 2013; County 2013; AECOM 2017). **Present (SV).** Species was detected during 2019 passive bat surveys on the Properties.
Big free-tailed bat (*Nyctinomops macrotis*)	--/SSC County Group 2	Low-lying arid areas in Southern California.	**NA, SA, SP, SV**	**High (NA, SA).** The Properties contain suitable habitat for this species, and it has been detected in the adjacent Sycamore Canyon/Goodan Ranch Preserve. **Low (SP).** Potentially suitable roosting habitat within the Southern Parcel is limited to hollows within oak trees. There are no reported occurrences located in the Preserve. Individuals have been documented approximately over 4 miles south of the site in Lakeside. **Low (SV).** No roosting colonies are known to occur in San Diego County. Species was not detected during 2019 passive or active bat surveys Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
Southern mule deer (*Odocoileus hemionus fuliginata*)	--/-- County Group 2 MSCP Covered	Oak woodlands, open scrub and young chaparral, low-elevation pine forests, riparian areas, and along the margins of meadows and grasslands.	**SP, SV, SA, NA**	**Present (SP).** Multiple individuals were documented within the western portion of the Southern Parcel by the wildlife cameras. Mule deer were documented within the Preserve during biological surveys conducted in 2008, 2012, and 2016 (County 2009; Dudek 2013; County 2013; AECOM 2017). **Present (SV).** Images were captured on remote cameras 1, 2, and 3. **Present (NA, SA).** Detected within the Properties during surveys in 2016.
Ramona grasshopper mouse (*Onychomys torridus ramona*)	--/SSC County Group 2	Grasslands and sparse coastal sage scrub habitats.	**SV**	**Not Expected (SV).** Species not known to occur in vicinity of Properties. Habitat within the Properties is not suitable for this species. Not observed during 2019 trapping surveys.
Pacific pocket mouse (*Perognathus longimembris pacificus*)	FE/SSC County Group 1	Coastal areas with sandy substrates and sparse vegetation. Known populations are restricted to Dana Point, and three populations on Marine Corps Base Camp Pendleton. Only occurs along the coast and up to 3 miles inland.	**NA, SA**	**Not Expected (NA, SA).** The Properties contain no suitable habitat for this species and are outside the range for the species.
Mountain lion (*Puma concolor*)	--/-- County Group 2 MSCP Covered	Rugged mountains, forests, deserts, and swamps with abundant prey (particularly mule deer).	**NA, SA, SP, SV**	**High (NA, SA).** The Properties contain suitable habitat and abundant prey (mule deer) for this species and the species has been documented within the Sycamore Canyon and Goodan Ranch Preserve. **High (SP).** Suitable habitat and prey species are present within the Southern Parcel and Park Rangers have previously reported observations of this species within the Preserve in 2008 (County 2009). **High (SV).** No images observed on trail cameras. Suitable habitat present in the Properties.

Species Name	Status[1]	Habit, Ecology and Life History	Preserve Boundary[2]	Potential to Occur[3]
American badger (*Taxidea taxus*)	--/SSC County Group 2 MSCP Covered	Shrub, forest, and herbaceous habitats, with friable soils, often associated with vast tracts of grassland areas but species also occurs in grassy canyons. Needs sufficient food and friable soils. Preys on burrowing rodents, especially California ground squirrels.	**NA, SA, SP, SV**	**Moderate (NA, SA).** The Properties contain suitable habitat for this wide-ranging species, but it has not been detected nearby. **Low (SP).** Though suitable habitat is present within the Southern Parcel, there are no reported occurrences of the species with the surrounding area. The species was reportedly detected over 5 miles east of the site at tracking stations along Wildcat Canyon in 2003 and 2004. **Low (SV).** Properties. Isolated from other grasslands. No tracks or burrows were observed during the surveys.

[1] Listing codes as follows: F = Federal; S = State of California; E = Endangered; T = Threatened; CE = Candidate Endangered; R = Rare

CRPR = California Native Plant Society Rare Plant Rank: 1A – presumed extirpated in California and either rare or extinct elsewhere; 1B – rare, threatened, or endangered in California and elsewhere; 2A – presumed extirpated in California, but more common elsewhere; 2B – rare, threatened, or endangered in California, but more common elsewhere; 3 – more information needed; 4 – watch list for species of limited distribution. Extension codes: .1 – seriously endangered; .2 – moderately endangered; .3 – not very endangered.

County of San Diego Sensitivity Status: Plant species are divided into Groups A through D on the County Rare Plant List. **Groups A and B** Plants include those that have a very high level of sensitivity, either because they are listed as threatened or endangered or because they have very specific natural history requirements that must be met. **Groups C and D** Plants include those species that are becoming less common but are not yet so rare that extirpation or extinction is imminent without immediate action. These species tend to be prolific within their suitable habitat types.

MSCP Covered Species: Covered Species under County's MSCP Subarea Plan; NE = Narrow Endemic Species under the County's MSCP Subarea Plan.

[2] SA=2015 Southern Addition, NA=2015 Northern Addition, SP= Southern Parcel Additions, SV= San Vicente Connector Parcels.

[3] Potential to Occur is assessed as follows: **None**: There are no present or historical records of the species occurring on or in the immediate vicinity of the study area and the diagnostic habitats and soils associated with the species do not occur on or in the immediate vicinity of the project; **Low**: Suitable habitat is present in the study area and a historical record of the species occurs in the immediate vicinity but existing conditions such as elevation, soils, density of cover, prevalence of non-native species, evidence of disturbance, limited habitat area, and/or isolation substantially reduce the possibility that the species may occur; **Moderate**: The diagnostic habitats associated with the species occur on or in the immediate vicinity of the study area, but there is not a recorded occurrence of the species within the immediate vicinity. Some species that contain extremely limited distributions may be considered moderate, even if there is a recorded occurrence in the immediate vicinity; **High**: Suitable habitat occurs in the study area and the species has been recorded recently on or in the immediate vicinity but the species was not observed during project surveys; **Present**: The species was observed during biological surveys for the project and is assumed to occupy the study area; **Presumed Absent**: Species would be visible all year and would have been observed if present.

Appendix C

Invasive Non-native Plant Species with Moderate or Low Priority for Removal

MODERATE-PRIORITY SPECIES FOR REMOVAL

Dyer's Rocket (*Reseda luteola*)

Dyer's rocket (*Reseda luteola*) is a biennial or perennial herb. It grows in scattered clusters on the Wu and Cielo Properties. Dyer's rocket is also found on the San Vincente Connector Parcels. This species is considered a moderate priority for removal because it should be removed whenever there is an opportunity; however, it may be difficult to completely eliminate it from the Wu Addition and Cielo Addition. This species is not rated on the Cal-IPC Ranking.

It might be possible to hand-remove them with some effort without the need for the use of pesticides. However, if the plants begin to spread more significantly or if they grow in higher numbers during rainfall seasons that have precipitation levels that are closer to normal, various herbicides are thought to be successful against it. Glyphosate is one herbicide that could be used in spot spray (NRM Biosecurity 2016). It is recommended to manually remove this plant prior to flowering (bloom period March through October) or while inflorescences are still intact, such that they may be removed from the properties. Chemical treatment is recommended before the plant produces inflorescences unless the plant will also be removed after it senesces.

Rose Natal Grass (*Melinis repens*)

Rose natal grass (*Melinis repens* ssp. *repens*) is a pink-colored grass that apparently spreads by the wind. It is considered a moderate priority for removal because it should be removed whenever there is an opportunity; however, it may be difficult to completely eliminate it from the Wu Addition and Cielo Addition. Rose natal grass is also found in the Sycamore-Goodan Ranch and San Vincente Connector Parcels. This species possesses a low ability to displace well-established native upland vegetation communities and will primarily colonize disturbed areas along roads or trails, or areas of naturally occurring sparse vegetation, such as sandy/rocky outcroppings on south-facing slopes. It was found growing in a few locations on the Properties, especially in cracks in rocky areas. Rose Natal grass is not rated by the Cal-IPC (Cal-IPC 2023). However, in the Preserve, this species is equally or more abundant than fountain grass and colonizes the same types of environments. Therefore, it is ranked as a moderate priority for removal/control within the Preserve due to its high abundance within portions of the Preserve, but limited ability to displace established habitats. The number of individuals mapped within the Preserve during the 2012 survey was 718 (approximately 700 square ft) (Figures 7a-e).

It is a relatively recent invader. However, due to its ease at dispersing to the isolated portions of the Preserve, even if it was removed, it would reinvade. It is stimulated to spread by fire and mowing. It currently does not form dense stands in potential habitat areas. Efforts should be carried out to ensure it remains only in low numbers. It can be controlled through physical removal and chemical control (Sylvan Kaufman 2014) during the spring active growing season, particularly prior to seed set. Spot treatment of glyphosate at one to two percent solution with a surfactant is described as providing good control. It is recommended to manually remove this plant prior to flowering or while inflorescences are still intact, such that they may be removed from the properties. This plant is known to flower year-round. Chemical treatment is recommended before the plant produces inflorescences unless the plant will also be removed after it senesces.

LOW-PRIORITY SPECIES FOR REMOVAL

Bermuda grass (*Cynodon dactylon*)

Bermuda grass (*Cynodon dactylon*)is a low-statured, creeping, warm-season perennial grass (family Poaceae) commonly planted in garden lawns and as turf. It is native to East Africa but has become a cosmopolitan weed in warmer regions around the world, where it tolerates a broad range of soil types and moister levels. Bermuda grass is distinguished by having slightly flattened stems, hairs that jut out at the leaf blade and sheath junctures, grey-green foliage, and an inflorescence comprised of a cluster of two to six spikes arranged radially from a single point. Plants reproduce both via rhizomes and seeds. Bermuda grass is fast-growing and can out-compete native species, particularly in riparian areas. However, it can escape cultivation and out-compete native species, particularly in riparian areas (Cal-IPC 2023). This species has a "moderate" Cal-IPC Inventory Ranking. It is rated as a low priority for control within the Preserve due to its limited distribution.

Bermuda grass is located south of the ranch house in the western portion of the Sycamore Canyon Preserve. It is also located in the San Vincente Connector Parcel. The number of individuals mapped is approximately 1,000 (approximately 1,000 square feet), although the spreading growth habitat of this species makes it difficult to quantify. Recommended control of this species is repeated systemic herbicide treatments, as it will quickly regenerate from stem and root fragments left in the soil. The species goes dormant in the winter. Therefore, control measures should occur from spring through fall.

Curly dock (*Rumex crispus*)

Curly dock (*Rumex crispus*) is a perennial forb that grows in grassy areas, roadsides, flood plains, and agricultural areas (Cal-IPC 2023). This species has a "limited" Cal-IPC Ranking and is rated as a low priority for removal within the Preserve. Curly dock is located north and south of the ranch house in the western portion of the site. It is also found in the San Vicente Connector Parcels and Southern Parcel Addition. A total of 20 individuals (approximately 20 square feet) were mapped within the Preserve.

It is possible to manually remove this species by hand-pulling, although due to its deep taproot, it is very difficult to remove entirely. Recommended control for this species includes treatment with an appropriate herbicide (e.g., glyphosate) prior to the development of mature seed heads in the summer. Should control not occur prior to the maturation of seed, it is recommended that the seed heads be removed, bagged, and disposed of off-site, with the remaining plant receiving an herbicide treatment.

Russian thistle (*Salsola tragus*)

Prickly Russian-thistle (*Salsola tragus*), also known as tumbleweed, occurs in a variety of locations on the Wu Addition. This species has a "limited" Cal-IPC Ranking (Cal-IPC 2023). Russian thistle occurs in lowlands and flats on the Wu Addition. It is mostly found in disturbed and grassy areas; however, it is another species that would be impossible to remove. Its population size is somewhat dependent upon the rainfall of that particular season. It is a widespread plant that has periodic population expansions depending on the period of rainfall. This species is a low priority for removal, but would be useful to control by removing those present in the Preserve in times that they have high populations due to rainfall periods, particularly during late summer.

Russian thistle can be pulled or hoed just below ground level before seed set. Hand-pulling or hoeing is effective in small infestations. This species of plant is difficult to control with postemergence herbicides late in the season. Perspective, Milestone, Clarity, Tordon 22k, Garlon 4 Ultra, and Roundup are postemergence herbicides used to suppress Russian-thistle populations (DiTomaso, J.M., G.B. Kyser et al. 2013).

REFERENCES

DiTomaso, J.M., and D.W. Johnson (eds.). 2006. "The Use of Fire as a Tool for Controlling Invasive Plants." Cal-IPC Publication 2006-01. Berkley, CA: California Invasive Plant Council.

Appendix D

Fire Behavior Modeling

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SYCAMORE CANYON-GOODAN PRESERVE VEGETATION MANAGEMENT AND FIRE RESPONSE PLAN

LOCATION/ADDRESS :
STATE ROUTE HIGHWAY 67, LAKESIDE, CALIF.
APNS: 326-050-04; 324-051-04,05; 326-020-23; 326-030-06; 326-020-07

JANUARY 2020

Prepared for the County of San Diego Department of Parks & Recreation

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Contact: Jennifer Price

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by

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J. Charles Weber, Fire & Life Safety Consultant

TABLE OF CONTENTS

Section	Topic	Page
1	**Introduction & Environmental Setting**	**4**
1.1	**Preserve Location & Environmental Setting**	**4**
1.1.1	Preserve Location	**4**
1.1.2	Preserve Description	**5**
1.1.3	Multiple Species Conservation Plan Lands	**7**
1.1.4	Open Space & Riparian Areas	**8**
1.1.5	Off Site Improvements	**9**
1.1.6	Environmental Setting	**12**
1.1.7	Fire History	**21**
1.1.8	Climate	**22**
2	**Determinations of Significance**	**23**
2.1	**Emergency Services**	**23**
2.1.1	Emergency Services Availability	**23**
2.1.2	Fire Response Dispatch Patterns	**27**
2.1.3	Response Times & Nearest Fire Station	**28**
2.2	**Emergency Access**	**29**
2.2.1	Evacuation Routes	**29**
2.3	Firefighting Water Supply	**33**
2.3.1	Existing Water Distribution System	**33**
2.4	Defensible Space and Vegetation Management	**36**
2.4.1	Preserve Lands Defensible Space Responsibilities	**36**
2.4.2	Off-Site Defensible Space Responsibilities	**37**
2.4.3	General Defensible Space & Vegetation Management Responsibilities	**37**
3	**Anticipated Fire Behavior**	**38**
3.1	**Fire Behavior Model**	**38**
3.2	**Vegetative Fuel Fire Assessment**	**39**
3.2.1	General Assessment, Current Vegetative Fuels	**39**
3.2.2	General Assessment, Future Vegetative Fuels	**42**
3,3	**Fire Behavior of Vegetative Fuels**	**45**
3.3.1	Fire Behavior Modeling	**45**
3.3.2	Modeling Summary	**45**
3.3.3	Fire Behavior Threat Analysis	**46**
3.3.4	Preserve Fire Behavior Analysis	**58**
4	**Environmental Impacts & Constraints**	**63**
4.1	**Multiple Species Conservation Plan**	**63**
4.2	**Metro-Lakeside-Jamul Link Segment – Sub-Area Plan**	**67**
4.3	**San Diego County Resource Protection Order and Steep Slopes**	**70**
4.4	**Limitations of Vegetation Management for Fire Protection Purposes**	**74**

Section	Topic	Page
5	**Defensible Space & Fuel Management Practices**	77
5.1	**Existing Preserve Conditions**	77
5.2	**Existing Off-Site Defensible Space Conditions**	**78**
5.3	**Defensible Space Prescriptive Code Requirements**	**78**
5.4	**Defensible Space & Vegetation Management Practices**	**79**
5.4.1	Preserve Defensible Space & Vegetation Management Practices	**79**
5.4.2	Preserve Defensible Space Practices for Off-Site Exposed Properties	**84**
5.4.3	On-Site Preserve Fuel Modifications & Management Practices	**89**
6	**Fire Mitigations for Future Development**	**101**
6.1	**Fire Apparatus Access Roads**	**101**
6.2	**Water Supply Mitigations**	**103**
6.3	**Ignition Resistant Construction & Automatic Fire Sprinklers**	**106**
6.4	**Defensible Space & Fuel Modification Mitigations**	**107**
7	**Conclusions**	**111**
7.1	**Significant Impacts Mitigated by Fire Protection Plan**	**111**
7.2	**Concluding Statements**	**115**
8	**List of Preparers, Persons & Organizations Contacted**	**115**
9	**Attachments and References**	**116**
A	**Fire Behavior Modeling Data**	**116**
B	**Access Road Requirements**	**126**
C	**Ignition Resistant Construction & Fire Protection Systems**	**128**
D	**Fire Water Storage Tank Requirements**	**130**
E	**San Diego County Approved Plant Lists**	**132**
	References	**138**

SECTION 1
INTRODUCTION AND ENVIRONMENTAL SETTING

This Vegetation Management Plan-Fire Response Section (VMP-FRS) has been prepared for the eastern Sycamore Canyon-Goodan Preserve, located adjacent to State Route (SR)Highway 67 right-of-way corridor in unincorporated Lakeside, San Diego County, California.

The purpose of the VMP-FRS is to:

- Identify invasive non-native plant species control
- Identify habitat restoration opportunities
- Provide a fire response plan based on fuel modeling
- Outline fire response management activities
- Ensure that vegetation management activities do not conflict with the goals and objectives of the South County Multi-Species Conservation Plan

The Fire Management Section of the VMP will:

- Assess the potential impacts resulting from wildland fire hazards
- Identify the measures necessary to adequately mitigate those impacts.

As part of the assessment, the VMP-FRS will consider the property location, topography, geology, combustible vegetation (fuel types), climatic conditions, and fire protection systems and equipment, impacts to existing emergency services, defensible space and vegetation management.

The VMP-FRS identifies and prioritizes areas for hazardous fuel reduction treatments and recommends methods of treatments that will protect one or more at-risk communities and essential infrastructures.

The VMP-FRS will recommend measures that the San Diego County Department of Parks and Recreation (DPR) and other Preserve management entities may take to:

- Reduce the probability of ignition of future Preserve and neighboring buildings and structures
- Mitigate for fire behavior generated by natural and non-native vegetative fuel in the Preserve lands addressed by the Plan.

1.1 Preserve Location, Description and Environmental Setting

1.1.1 Preserve Location

The southern boundary of the eastern Sycamore Canyon-Goodan Preserve is approximately 4.2 miles north of the central business district of the unincorporated community of Lakeside, located in San Diego County. California.

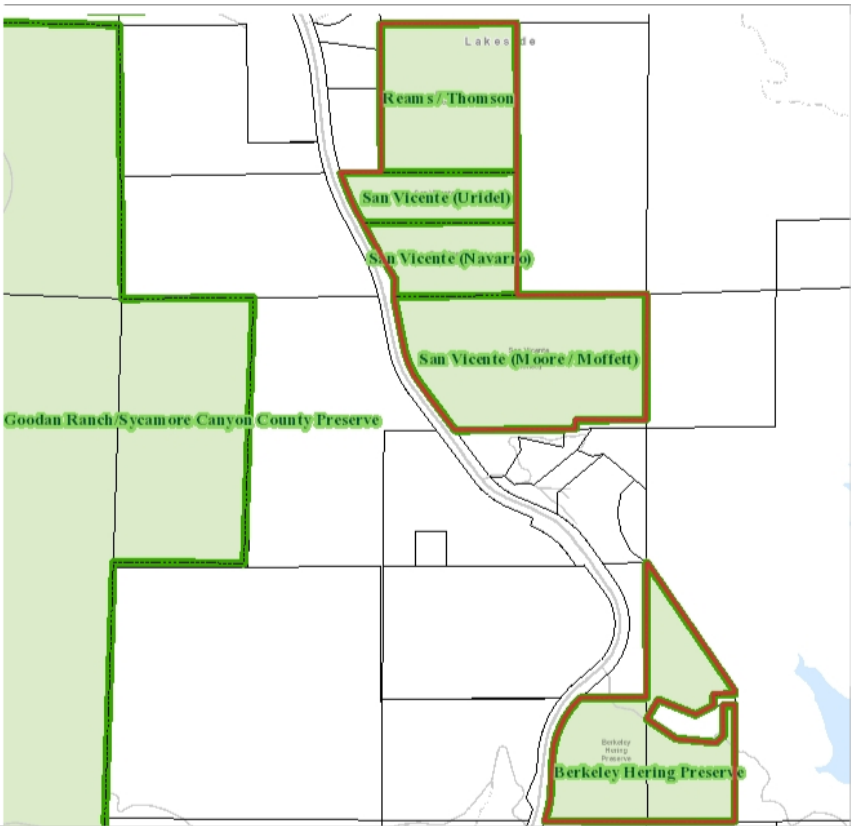
The Preserve is located adjacent to the east side of the SR 67 corridor. From the southern boundary, it follows the SR-67 corridor for approximately 1-1/2 miles, where the northern boundary extends in an easterly direction near the intersection of SR-67 and Foster Truck Trail.

1.1.2 Preserve Description

Between 2003 and 2018, the County of San Diego acquired five properties, totally approximately 214 acres, along the east side of the SR-67 corridor. These properties were used to expand the existing 2713 acre Sycamore Canyon-Goodan Ranch Preserve, which lies west of the SR-67 corridor and somewhat to the northwest of the acquired acreage.

The acquired land is commonly referred to as the following properties:

- Reems-Thompson
- Uridel (San Vicente)
- Navarro (San Vicente)
- Moore-Moffett (San Vicente)
- Berkeley Hering Preserve



Excerpt from Sycamore Canyon-Goodan Ranch Preserve Property Map



Aerial View of Southern Portion of Preserve Lands



Aerial View of Northern Portion of Preserve Lands

The acquired properties have the following San Diego County Assessor's Parcel Numbers:

- 324-050-05
- 324-051-04and -05
- 326-020-23
- 326-020-07

- 326-030-06

As indicated in the aerial views above, two segments of land separated by a development of single family dwellings in a deep, steep-sided drainage, comprise the eastern Preserve property.

For reference purposes, the Southern Preserve Segment are those parcels forming the Berkeley-Herring Preserve.

For reference purposes, the Northern Preserve Segment are the remaining four properties. Three of these parcels form the re-named San Vicente Tract and the fourth, at the distal northern lands of the Preserve, is the Reams-Thompson lands.

The topography of the Preserve consists of prominent, steep sided mountains, multiple moderately steep to extremely steep drainages and canyons and meadows of various degrees of flatness and expansiveness. Topography of the eastern Preserve sites will be discussed more thoroughly in Section 1.1.3.2.

The Preserve lands are located within the boundaries of the South County Multiple Species Conservation Preserve program.

The Sycamore Canyon-Goodan Ranch section of the Preserve, located west of the SR-67 corridor between the communities of Lakeside and Poway, is currently open to the Public for recreational purposes. The recently acquired Properties on the eastern side of the SR-67 corridor are not open to the Public at this time (2019).

1.1.3 Multi-Species Conservation Program Lands

The Preserve lands are located inside the boundaries of the Metro-Lakeside-Jamul Segment of the County of San Diego Multiple Species Conservation Program (MSCP).

The MSCP is a comprehensive, long-term habitat conservation program addressing the needs of multiple species and preservation of natural vegetation communities in San Diego County.

The Program addresses:

- Potential impacts of urban growth
- Natural habitat losses
- Species endangerment
- Creation of a mitigation plan for potential loss of Covered Species and their habitat
- Mitigation of future development of public and private lands within the MSCP area

The combined lands for the Metro-Lakeside-Jamul Segment encompass approximately 44,764 acres. This is the second largest segment for the MSCP in southeastern San

Diego County. The habitat types with the largest amount land remaining to be protected is Coastal Sage Shrub and chaparral communities. In this sub-area, approximately 18,626 acres of Coastal Sage Shrub and 18,619 acres of chaparral have been proposed for permanent conservation.

Conservation levels have been developed for the Metro-Lakeside-Jamul Segment, but no preserve boundaries have been established. Land uses in the Lakeside Segment are limited, especially those that are compatible with permanent protection of natural resources.

1.1.4 – Open Space and Riparian Areas

According to the MSCP, Preserve lands are generally the subject of open space easement and preserve dedications. These dedications permanently transfer the land to the County of San Diego for the purposes assigned to the particular properties by MSCP language. Activities allowed within the Preserve must be consistent with each individual Preserve's Habitat Management Plan and Framework Management Plan.

The following activities are precluded on lands within the established Lakeside MSCP Segment:

- Grading
- Excavation
- Placement of rock, soil, sand, gravel or other materials on the land
- Erection of any building or structure
- Vehicular activities
- Trash dumping
- Any land use other than Open Space or planting of vegetative materials

There are limited exceptions to the precluded activities:

- Selective hand clearing of vegetation for reducing identified fire hazards
- Local, state, federal police and fire protection agency enforcement activities
- Revegetation, habitat management or landscaping plans approved by the Director of the County of San Diego DDS
- Equestrian, hiking and bicycle trails approved by the Plan

Appropriate recreational activities may be approved in dedicated Preserve Open Spaces. Typically approved recreational activities are generally considered "passive" in nature and include hiking, scientific research, bird watching, mountain biking and horseback riding. Off-road vehicle activity is incompatible with natural resource management and preservation, with subsequent strict controls and enforcement.

MSCP preservation processes and procedures are discussed in more detail in Section 4, Environmental Impacts and Constraints.

1.1.5– Off-Site Improvements

1.1.5.1 – Roads

SR-67

SR-67 has a north-to-south configuration, beginning at its intersection with Interstate 8 in the City of El Cajon, and terminating at its intersection with SR-Highway 78 in the community of Ramona.

SR-67 has a four-lane right-of-way corridor starting near the southern boundary of the Preserve, tapering to three lanes near the apex of the Slaughter House Canyon Grade, which continues north toward the Preserve's northern border. With paved shoulders, the road width is approximately sixty-six (66') feet, providing two lanes of travel on its northbound and southbound sides. Along the southern portions of the Preserve, the north- and south-bound lanes of SR-67 are separated by a dedicated concrete K-rail barrier. From the summit of the Slaughter House Canyon grade to the northern border of the Preserve, north- and south-bound lanes are divided by an experimental installation of vertical flexible plastic-rubber and reflectorized traffic cones mounted to the road surface.

Residential Access Driveways

Between the Preserve's Berkeley-Hering Preserve and San Vicente-Moore-Moffet Segments, there is an residential access road extending in a west-to-east configuration from the east side of SR-67.

This road provides access to multiple single family dwellings and descends into the bottom of a major topographical drainage. Pavement widths vary between ten (10') and twenty (20'), with grades exceeding 25% in multiple locations.



Intersection of SR-67 and Sub-standard Residential Roadway, looking East, 13800 Block of SR-Highway 67



Aerial View of Residential Road between Preserve Properties, looking Southeast

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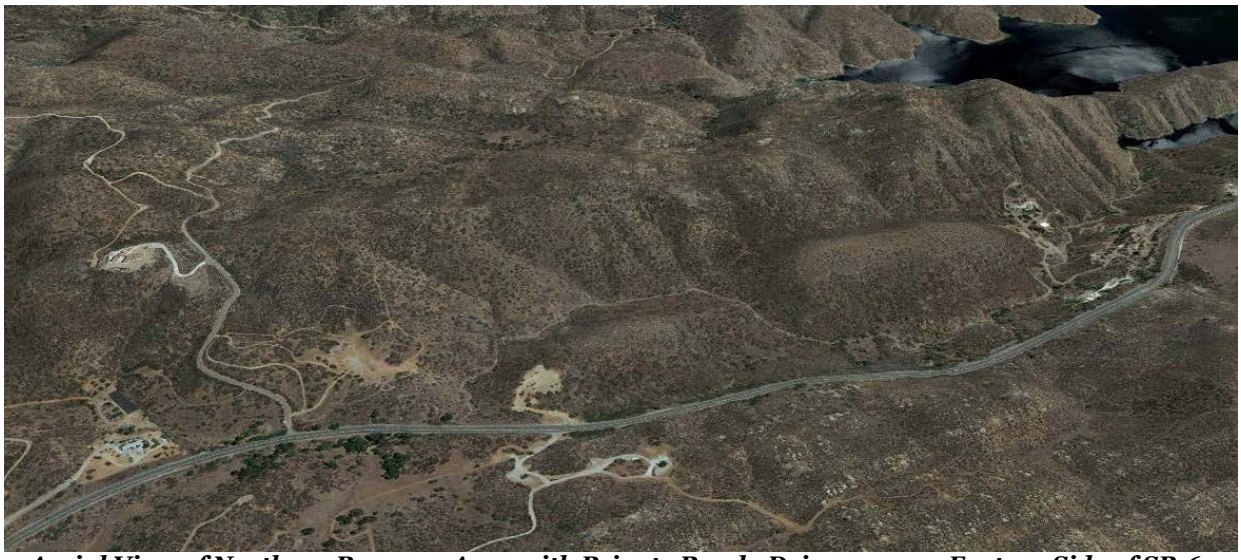
Proceeding north on SR-67, there is one additional west-to-east configured access road installed on the eastern side of the right-of-way corridor. At its intersection with SR-67, the road is initially paved but transitions to graded natural earth surface. The road was originally placed in anticipation of residential development.



Aerial View of Northern Preserve Area with Private Roads-Driveways on Eastern Side of SR-67

1.1.5.2 – Utilities

San Diego Gas & Electric

San Diego Gas & Electric Company, a division of Sempra Energy, maintains electrical transmission and distribution right-of-way on, or immediately adjacent to, the Preserve's parcels.



Sunrise Power Link and Electrical Distribution Right-of-Ways at Preserve Southern Boundary

The Sunrise Power Link is a 500-KVA electrical transmission line originating in Imperial County and traversing San Diego County in a westerly direction until reaching the Wildcat Canyon drainage south and east of the Preserve site.

The transmission lines feature prominent steel aerial towers supporting a minimum of six (6) large-diameter cables.
From the Wildcat Canyon drainage, the right-of-way begins a south-to-north configuration, eventually crossing the southern lands of the Preserve before continuing across SR- 67. The transmission line continues in a northerly direction, paralleling the SR- 67 corridor for approximately two miles. The transmission line turns in a westerly direction and extends across the western portion of the Sycamore-Goodan Ranch Preserve towards a Rancho Bernardo SDGE sub-station.

Distribution lines for residential buildings have a right-of-way paralleling the eastern shoulder of SR- 67, with a south to north configuration, beginning at the bottom of the Slaughterhouse Canyon grade. At the top of the grade, the distribution line drops into the eastern canyon paralleling SR- 67, providing service to the single family dwellings built on the slopes and at the bottom of the drainage.

There are no other electrical distribution lines between the residences and SR-67's intersection with Foster Truck Trail, which is located near the northern boundary of the preserve.

At Foster Truck Trail, residential distribution lines, mounted on steel poles, extend in a west-to-east configuration from the interior spaces of the western portions of the Sycamore-Goodan Ranch Preserve to service rural residential development north and east of this location.

1.1.5.2 Telephone Service Lines

Telephone cables are suspended below the residential distribution electrical lines on the eastern shoulder of SR-67. When the electrical lines descend into the drainage at the top of Slaughter House Canyon, the telephone cable continues in a northerly direction on independent Tel-Co erected wooden poles, positioned along the eastern shoulder of the highway.

1.1.6 Environmental Setting

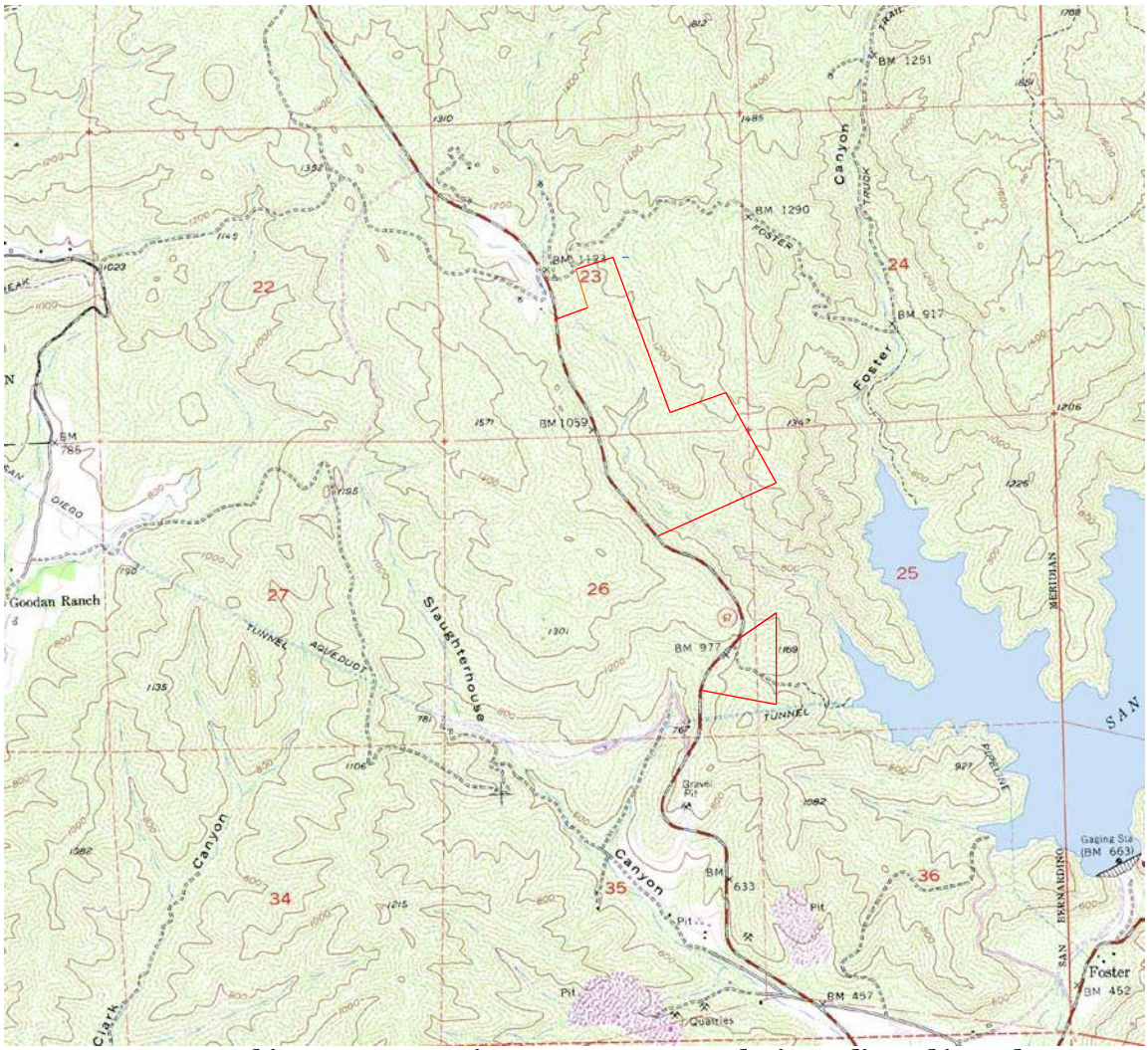
1.1.6.1 Dates of Site Inspections/Visits

The Fire Protection Consultant conducted site inspections/visits on the following dates:

- July 13, 2019
- September 1, 2019
- September 2, 2019
- September 15, 2019

1.1.6.2 Topography

The topography of the Preserve varies dramatically, depending on physical location, but can generally be described as moderately to extremely steep mountain slopes bisected by a number of significant drainages.



Topographic Map – Approximate Preserve Boundaries Indicated in Red

Berkeley-Herring Preserve Area

This area of the Preserve is reached by traveling on the north-bound lanes of SR-67. The highway corridor rises steeply from the base of the Slaughter House Canyon drainage near the intersection of SR- 67 and Vigilante Road, following a path that transects a relatively steep mountainside against the edge of the drainage. The drainage drops sharply downhill on the western side of SR-67 and Preserves sharply upward on the eastern side of the roadway.

The Berkeley-Hering Preserve is located near the top of the drainage, adjacent to the east shoulder of the north-bound lanes of the highway. The base of the hillside adjacent to SR-67 is at an elevation of 801 feet above sea level and rises to 1196 feet ASL over a distance of 736 feet, for a slope gradient of 53.67%.



Berkeley-Hering Preserve Near Peak of SR-67 Slaughter House Canyon Grade

At the northern edge of the Berkeley-Hering Preserve, SR-Highway 67 takes a sharp turn in a northwesterly direction. When the prominent hillside comprising the bulk of this Preserve is passed, the right-of-way corridor follows the edge of a major downhill drainage on the east side of the road, which drops off significantly in a west to east configuration with a 45% declination.



The drainage generally has a southeast to northwest configuration, with several finger canyons branching off in different directions. The southeast portion of the drainage

descends from the highway corridor toward the San Vicente Lake recreation area, located approximately one-half mile below the roadway.

The ridge of the prominent mountain on the east side of the drainage forms the approximate location of the Preserve's boundary line.





SR-67 North of Berkeley-Hering Preserve, Looking Northeast at Preserve Boundary on Ridge Line

Between the Berkeley-Hering Preserve and the southern edge of the San Vicente/Moore-Moffet Area of the Preserve, approximately twenty-two (22) buildings have been built in the drainage and or on the hillsides east of SR- 67. These range in size from single family mobile homes to large single-family wood frame residences accompanied by a number of accessory outbuildings.



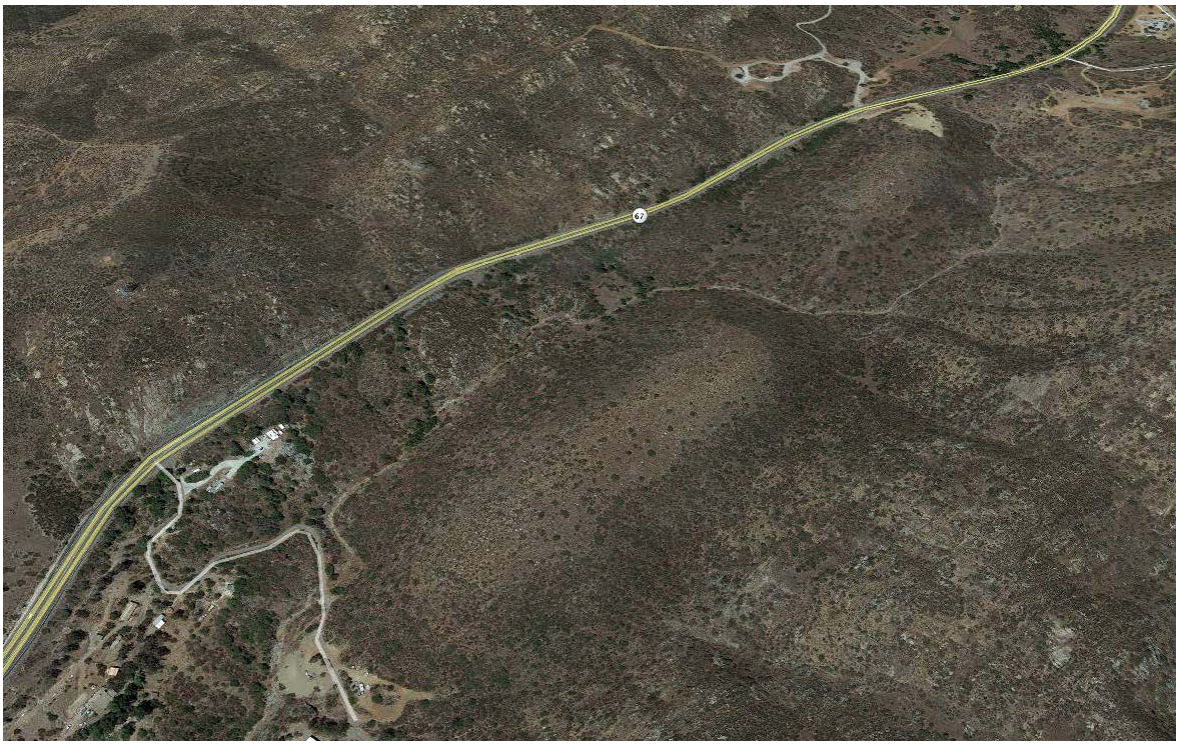
Hillside and Canyon Building Development on East Side of SR-Highway 67
(Approximate San Vicente Preserve Southern Boundary Line Shown in Red)

The average slope on the west side of the drainage below the SR- 67 corridor has a gradient of approximately 31%, with an elevation declination of 261 feet over a distance of 842 feet.

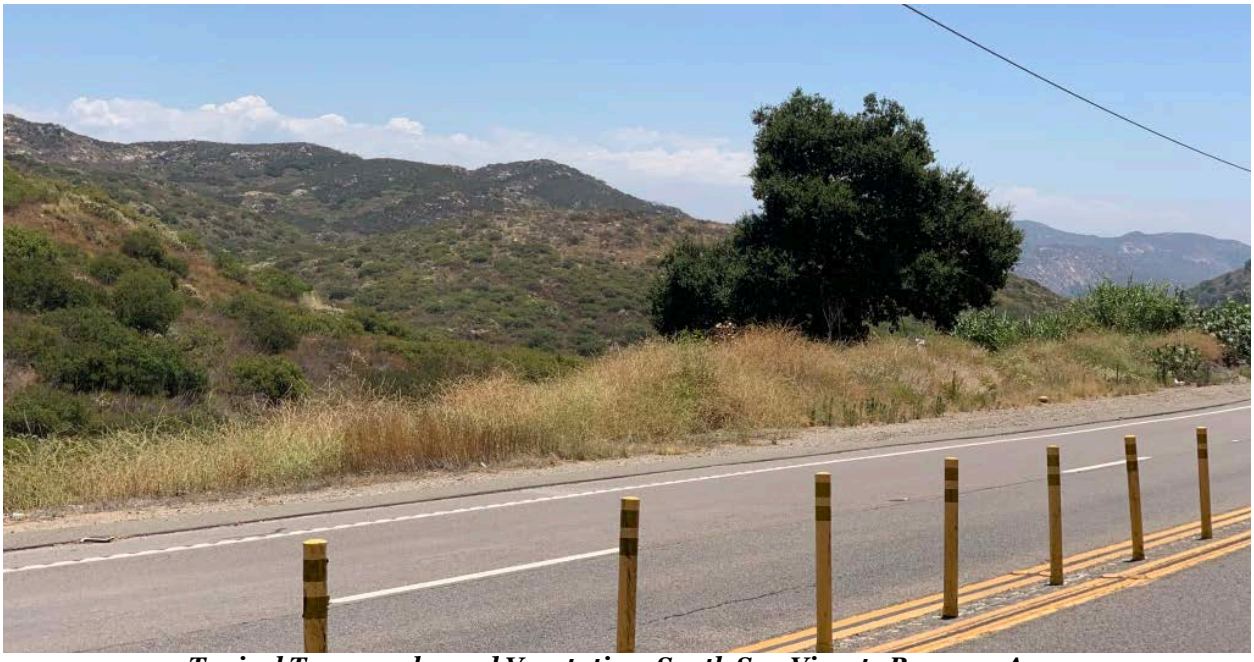
San Vicente Area

Departing from the Berkeley-Hering Preserve area, the highway corridor follows a constructed cut line near the western edge of the canyon drainage. The drainage continues to extend in a southwest to northeast configuration below the right-of-way corridor, winding around the bases of the southerly mountain and a prominent hillside further north and south of Foster Truck Trail. The slopes present in this area are moderately to extremely steep, with gradients ranging between 31 and 48%.

There is no readily available vehicular access to the canyon bottoms and base of the hillsides and slopes in this area. There are a number of bare earth-surfaced walking trails in the drainage bottoms, but these are not regularly maintained.



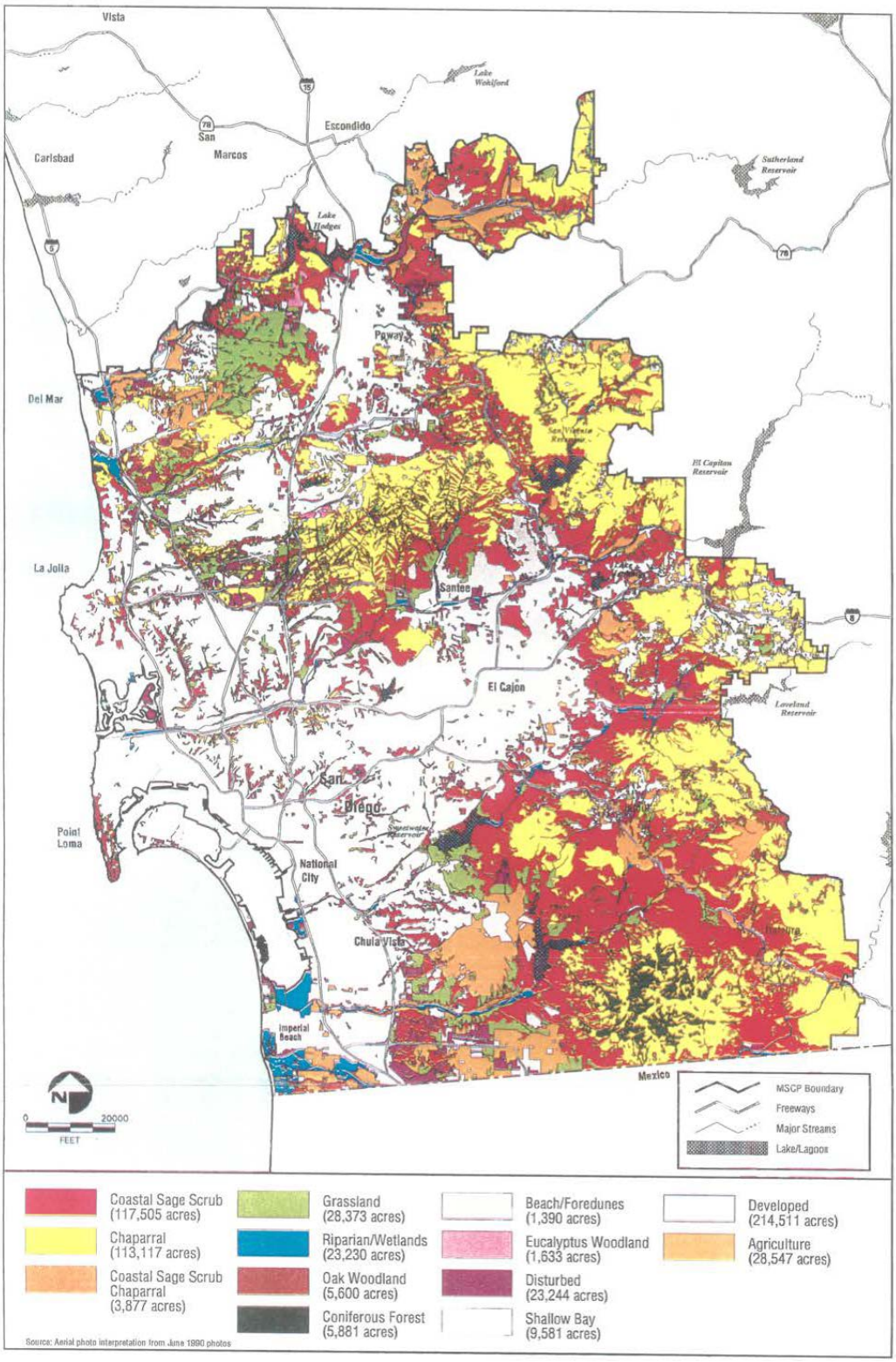
San Vicente Segment of Preserve, Looking Northwest



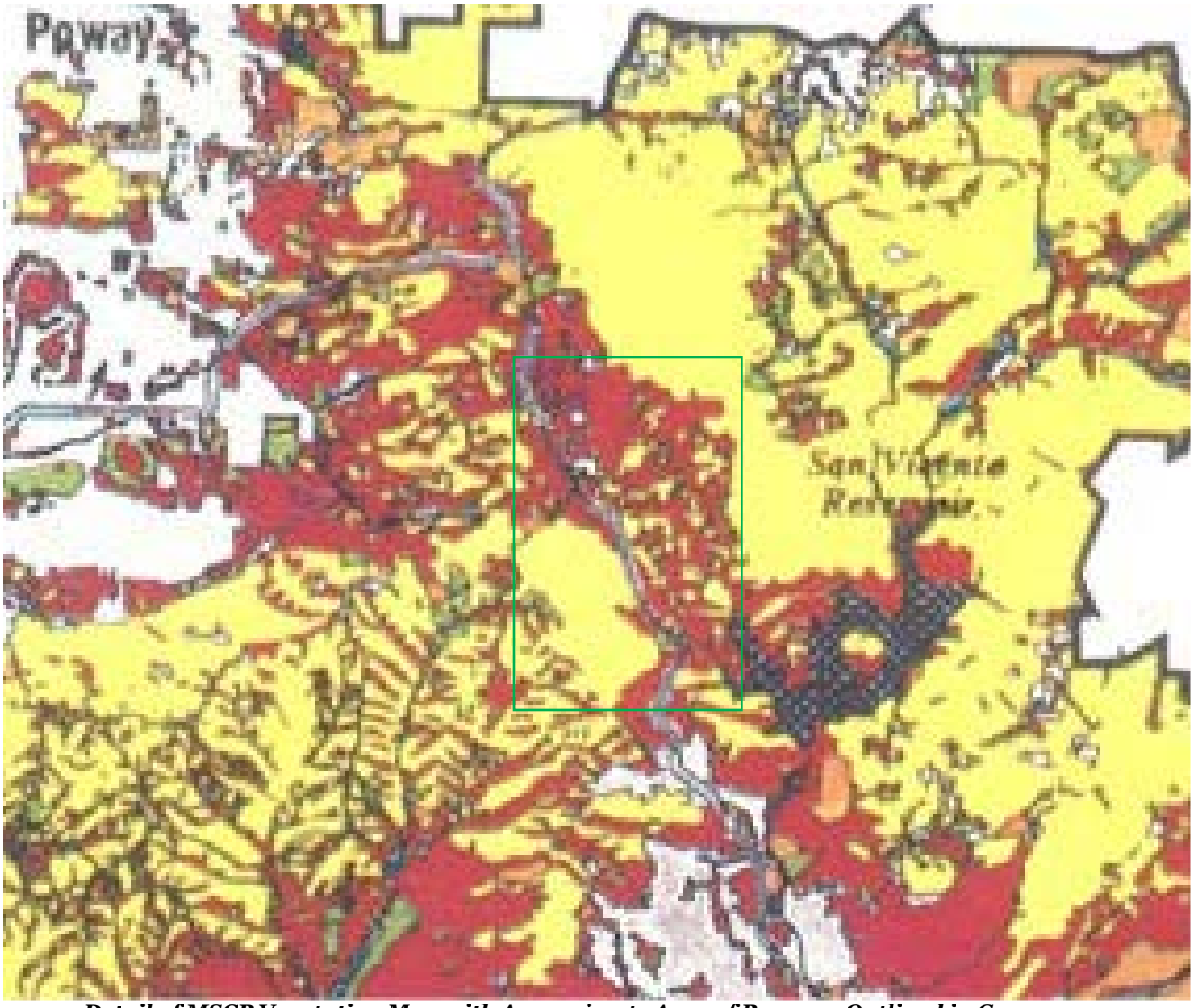
Typical Topography and Vegetation, South San Vicente Preserve Area

1.1.6.3 Vegetation

Vegetation on the Preserve is a mixture of Southern California Chaparral, and Coastal Sage shrub and brush types.

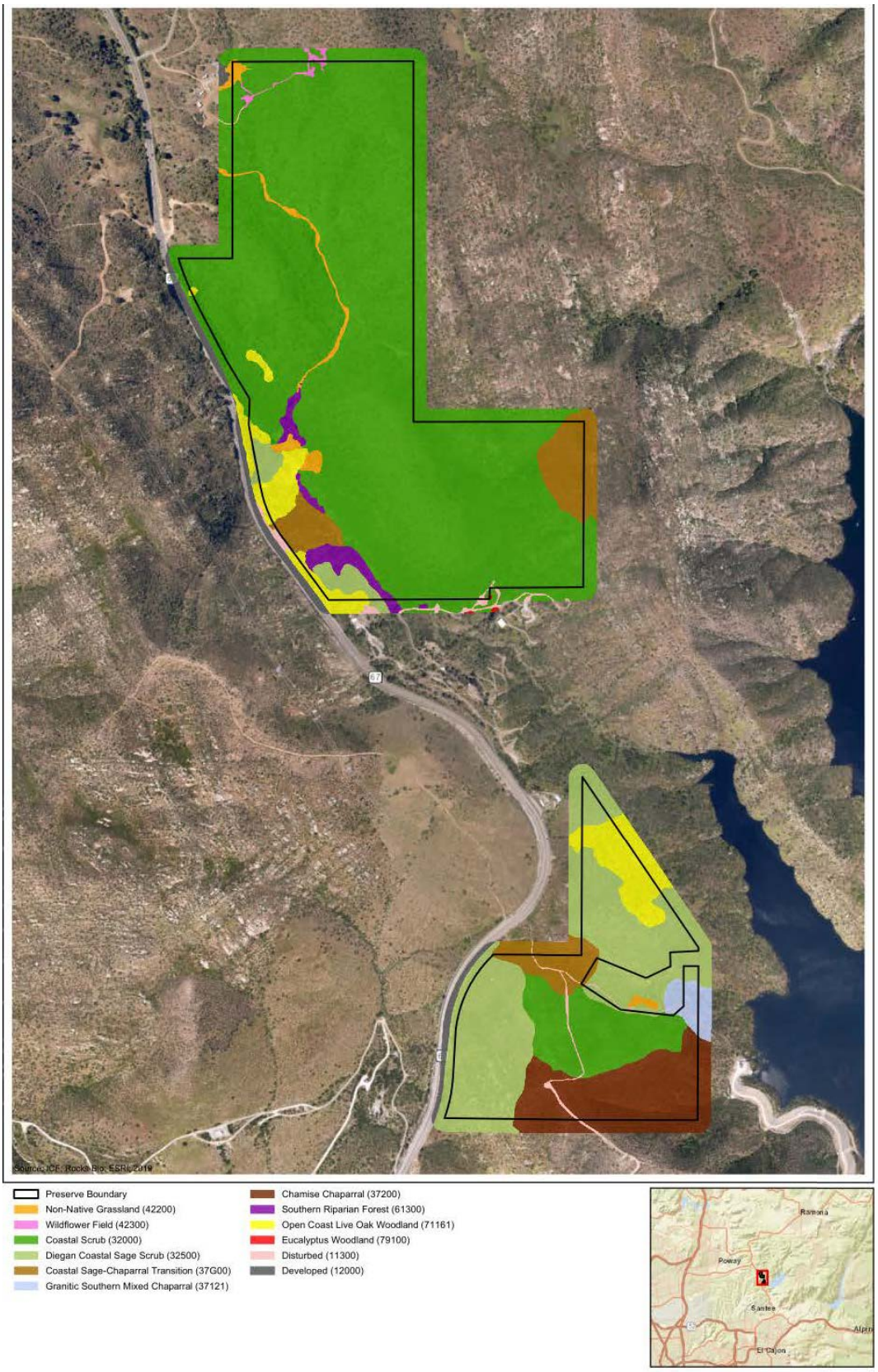


San Diego County MSCP Vegetation Map



Detail of MSCP Vegetation Map with Approximate Area of Preserve Outlined in Green

Vegetation mapping within the Preserve was conducted on April 8 and April 12, 2019, with a follow-up on June 4, 2019. The Preserve supports twelve (12) vegetation communities.



Official Eastern Sycamore Canyon-Goodan Ranch Preserve Vegetation Map (2019)

The habitat types/vegetation communities observed within the Preserve were:

- Non-Native Grassland, Wildflower Field,
- Coastal Scrub,
- Diegan Coastal Sage Scrub
- Coastal Sage-Chaparral Transition,
- Granitic Southern Mixed Chaparral,
- Chamise Chaparral,
- Southern Riparian Forest,
- Open Coast Live Oak Woodland,
- Eucalyptus Woodland

Coastal Scrub was the most common vegetation community, comprising approximately 69 percent of the Preserve. The next most common vegetation community was Diegan Coastal Sage Scrub, comprising approximately 13 percent of the land covering.

The chaparral and brush-shrub type fuels have different continuities, ranging from moderately-interrupted to dense-uninterrupted continuity, with maximum fuel heights exceeding seven (7') feet over extended areas of the Site. The estimated fuel age is five (5) to sixteen (16) years (2019). A significant amount of the vegetation appears to have a high dead-to-live fuel ratio.

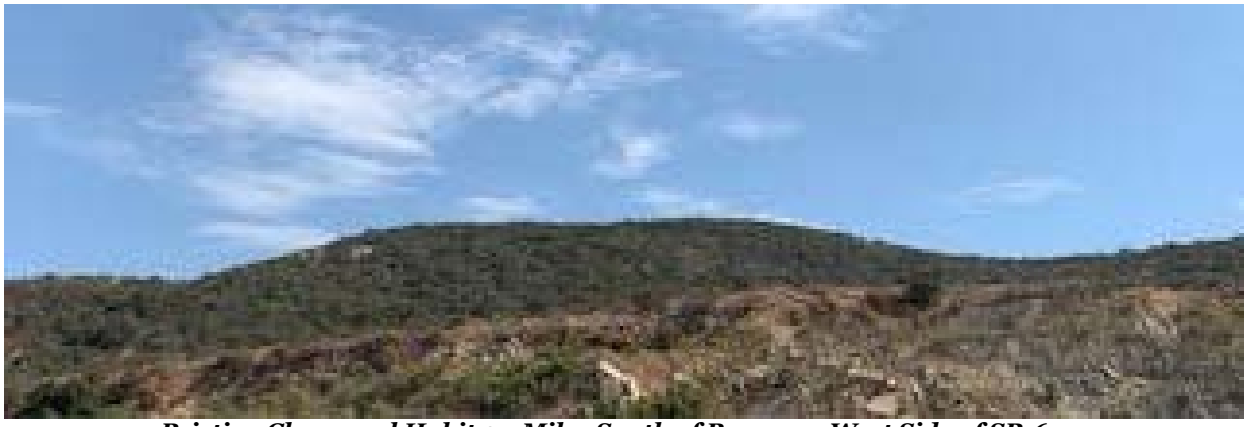
Site visits to the Preserve have determined that the vegetative fuels could be classified as one or more of the following Fuel Types:

- Fuel Model GS-2, Moderate Load, Dry Climate Grass-Shrub
- Fuel Model SH-2, Moderate Load, Dry Climate Shrub
- Fuel Model SCAL-18 Southern California Coastal Sage Shrub

The impact of the 2003 Cedar Fire's destructiveness on vegetation ecology created a generalized type-conversion over an extensive area in the Preserve. Formerly, the vegetation consisted of Fuel Models SH-5, High Load Dry Climate Shrubs and SH-7, Very High Load Dry Climate Shrubs, both of which are equivalent to Fuel Model 4 (Chaparral) in the older Fuel Model literature. The conversion of vegetation types has resulted in prominent Grass-Shrub and Shrub fuel model types that currently cover the Preserve. With time, the vegetative type conversion may revert back to its original high and very high shrub type vegetation conditions.



Very High Load Dry Climate Shrub-Chaparral Habitat – Two Miles North of Preserve on SR-67 (Fifty-three year old fuel age following 1966 Mt. Woodson Fire)



Pristine Chaparral Habit 1.5 Miles South of Preserve, West Side of SR-67 (No Fire History Since 1958)

Most of the current (2019) native vegetative fuels on the site can be classified as GS-2 Moderate Load, Dry Climate Grass-Shrub according to the most current edition of *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model.*

1.1.7 Fire History

The Preserve parcels have been subject to a number of wild fires since the 1970's. Most of these fires were of limited size with acreage burned under fifty (50) acres.

The Preserve Segments are dominated by coastal scrub and chaparral vegetation, which is naturally maintained by infrequent fires. If the natural fire cycle is suppressed, the

scrub habitats can cause a decline in health and diversity. If the fire frequency is increased, vegetation could shift toward disturbed grassland habitats or disturbed shrub communities.

The fire cycles within the area are affected by actions within and adjacent to the preserve. Man-made fires have altered the fire cycles throughout San Diego County.

Review of the San Diego Geographic Information Source indicates there have been several fires on the Preserve Segments, as shown below. In 2003, the Cedar Fire burned two of the five new Properties and the existing Preserve, where it destroyed most of the structures.

Sycamore-Goodan Ranch Fire History

Northern Properties Burn History	**Acreage Burned**
1938	151.3
1984 – Bowles	19.5
1985 – Sycamore	156.2
2003 – Cedar	156.2
2006 – 67	30.2
Southern Properties Burn History	
1981 – Slaughter	56.7
1985 – Sycamore	21.4
1997 – Slaughterhorse	56.2
2003 – Cedar	59
2010 – Slaughterhorse	41.1
2016 – Lakeside	17.6

Evaluation of the Preserve Fire History indicates the following average fire return cycles:

- Northern Segment – 17 years since 1938; 8 years since 1984
- Southern Segment – 7.2 years since 1981
- Typical Fire Return Period -

1.1.7.1 Significant Fire Events

Between 1980 and 1996, a serial arsonist ignited approximately 100 fires in the Ramona and SR-67 corridor areas.

Several of these fires were on the Preserve lands, on both sides (west and east) of the right-of-way corridor. A fire at the northern end of the Preserve burned approximately 1500 acres, spreading from the east side of Highway 67 in an easterly and northeasterly direction across the parcels and other properties to the Mussey Grade area. Fire behavior was of moderate intensity and rates of spread, under influence of the predominant daytime southwestern winds.

A fire in 1985 started in the drainage at the southern end of the San Vicente-Moore-Moffet Preserve. This incident occurred during 90 to 100 degree temperatures and low relative atmospheric humidity values. Under weather influence and lake effect conditions, the fire exhibited extreme fire behavior and spread rates, with long distance fire brand spotting and ignitions. The fire spread upslope on the western side of the prominent drainage and spotted across SR-67, starting an additional fire, also with extreme fire behavior and spread rates, on the west side of the roadway. The combined acreage burned for this fire was approximately 500 acres.

A fire in the late 1997 (Slaughterhouse) started in the valley on the west side of SR-67 south of the Berkeley-Hering Preserve. Parts of this fire exhibited extreme fire behavior while initially isolated in one of the drainages on the west side of the highway. Once out of the drainage, the fire spread in north, northeasterly and northwesterly directions on the prominent slope under typical afternoon southwesterly winds. A momentary wind shift carried fire brands across SR-67 into the Berkeley-Hering preserve, where receptive vegetative fuels ignited. This part of the fire burned across the Preserve to the western edge of San Vicente Lake. Total lands burned was approximately 1000 acres. Approximately fifty-seven (56.7) acres were burned on the Southern Segment of the Preserve.

The entire Preserve was burned over during the 2003 Cedar Fire. This incident occurred during a Santa Ana wind event. The Preserve lands were exposed to a large fire front moving in westerly and southwesterly directions from the Wildcat Canyon area that reached the Preserve in the early morning (6 to 7 a.m.) hours. Extreme fire behavior and rapid rates of spread, typically present during mid-to late-afternoon hours when vegetation has been pre-heated by solar radiation, were present before and after sunrise. Wind conditions were in the 20 to 40 m.p.h. range, driving the fire front rapidly over the topography and causing spotting by deposition of fire brands up to 1.5 miles ahead of the main fire front.

1.1.8 Climate

Like most of Southern California, San Diego County has a Mediterranean Climate typified by warm to hot dry summers and mild to cool winters.

Summer temperatures range between the mid-nineties and low one hundreds during the summer and fall months, with occasional extraordinarily hot, dry spells similar to desert conditions occurring.

Rainfall averages nine to fifteen inches at the lower elevations where the Preserve is located.

Santa Ana winds are one of the most notable weather conditions in Southern California and San Diego County. Typically, these dry winds occur during the late summer and fall months (September through November), but may happen at any time during the year. With combined adiabatic (compression) heating (for every 1000 feet of elevation

decline, temperature increases five degrees) and wind velocities exceeding 40 miles per hour, Santa Ana winds severely exacerbate wildfires, especially during drought conditions.

The U.S. Forest Service Weather Information Management System provides information about weather patterns in San Diego County.

Daily afternoon weather observations in San Diego County were analyzed for forty-four years (1961-2005) at selected fire stations. San Diego County is divided into five climate zones between the coast and desert. Weather data between April and December are used to represent the annual fire season in San Diego County, with the most severe fire weather conditions in September and October. The following table was derived by the analysis of San Diego County's Interior Climate Zone where the Preserve is located.

Worst Case Weather and Burning Conditions, Interior Zone

Period	Temperature	Humidity	Wind Speed	Burning Index
Summer	90-109	5-9%	18 mph	153
Santa Ana	90-109	5-9%	24 mph	168
Peak	90-109	5-9%	56 mph	-

SECTION 2
GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE

2.1 Emergency Services – Availability and Travel Time

2.1.1 Emergency Services Availability

The Preserve is within the jurisdictional boundaries of the Lakeside Fire Protection District.

The Lakeside Fire Protection District is an "all risk" paid-career agency providing 24-7-365 fire protection services to an area of approximately forty-five (45) square miles and 63,000 residents.

The District has four fire stations housing four Type I Structure Fire Engines, a Type II OES Engine Company, a Type III Brush Fire Engine, a medium rescue company, one water tender and two paramedic ambulances.

The District employs fifty-five full-time (55) employees. The career firefighting staff is supplemented by non-paid Reserve Firefighters, a program that augments staffing levels and provides multi-discipline training to pre-employment candidates.

Lakeside is a member of the Heartland Automatic Aid Agreement and San Diego County Fire Mutual Aid Agreement.

The Automatic Aid Agreement supplements Lakeside's emergency resources from surrounding agencies on a closest-engine-basis. Lakeside resources responding to wild land fires in State Responsibility Areas (approximately 60% of the District) are assisted by automatic responses from CAL-FIRE (California Department of Forestry and Fire Protection).

Fire Station Locations

Lakeside FPD Fire Station # 2, located at 12216 Lakeside Avenue, is five (5) miles from the Preserve.

This Station houses the following response apparatus:

- Type I structure Engine Company manned by three firefighters
- Cross-staffed Type I Engine with a 65 foot Telesqurt aerial ladder,
- A fire patrol unit with nominal firefighting capabilities
- A paramedic ambulance.

Average Response time to the Preserve under normal, non-emergency driving conditions is approximately six to seven (6-7) minutes, verified by a driving test conducted by the Consultant on September 15, 2019. The fastest driving time recorded was five minutes and thirty seconds.



Lakeside FPD FS-2

Lakeside FPD Fire Station # 1, located at 8035 Winter Gardens Blvd., is located 7.4 miles from the Preserve. This facility houses one Type I structure Engine Company manned by three firefighters, and a Type I Brush engine (cross-manned). Response time to the Preserve is approximately ten (10) minutes, under normal, non-emergency driving conditions, verified by a driving test conducted by the Consultant on September 15, 2019.



Lakeside FPD FS 1

Lakeside FPD Station # 3, located at 14008 Highway 8 Business, is located 8.6 miles from the Preserve. This facility houses one Type I structure engine company, a medium duty Rescue Company (cross-manned) and a paramedic ambulance. Response to the Preserve is approximately ten (10) minutes, under normal, non-emergency driving conditions, verified by driving test conducted by the Consultant on September 15, 2019.

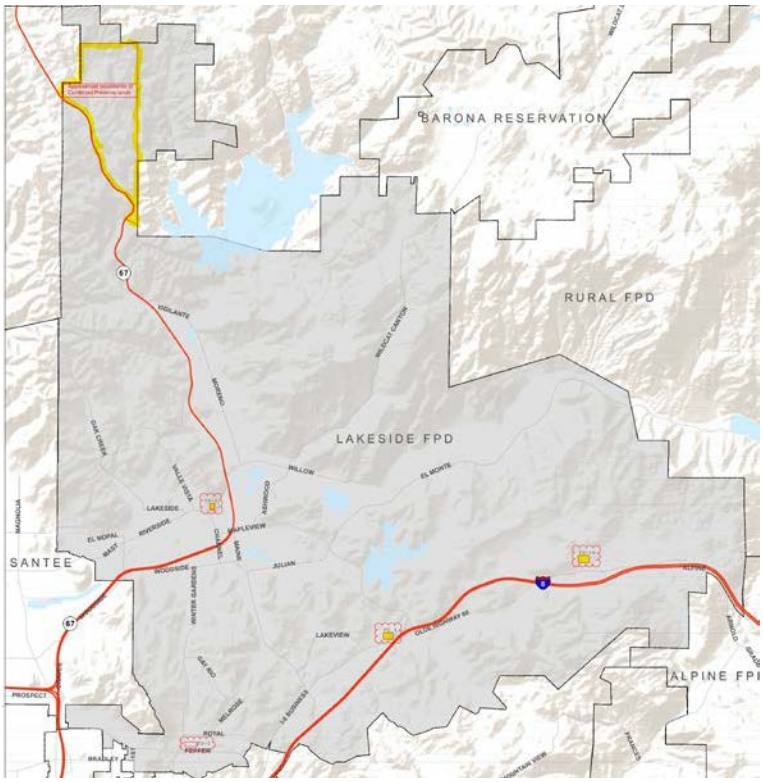


Lakeside FPD FS-3

Lakeside Fire Protection District Station # 26, located at 15245 Oak Creek Road, is approximately 10.4 miles from the Preserve. This facility houses one Type I structure engine company, and one Type I California Office of Emergency Services (OES) engine company, cross-staffed by three firefighters. Average response to the Preserve is approximately thirteen (13) minutes, under normal, non-emergency driving conditions, verified by driving test conducted by the Consultant on September 15, 2019.



Lakeside FPD FS-26



Lakeside FPD Service Area and Fire Station Locations

2.1.2 Fire Response Dispatch Patterns

The Lakeside Fire Protection District is a member of the Heartland Automatic Aid Agreement and San Diego County Fire Mutual Aid Agreement.

The Automatic Aid Agreement supplements Lakeside's emergency resources from surrounding career agencies on a closest-engine-basis.

Heartland resources responding to wild land fires are assisted by automatic responses from CAL-FIRE and, in some areas, the U.S. Forest Service.

2.1.2.1 Structure Fire Alarms

A typical First-Alarm Structure Fire assignment for a fire occurring within the Lakeside Fire District would include Lakeside Engine 2 (three personnel), Lakeside Engine 1 (three personnel), City of Santee Fire Department Engine 4 (four personnel) and Truck 4 (four personnel), one paramedic unit and one Duty Chief.

Second and Third Alarm assignments will double the First Alarm response for a Second Alarm and triple the First Alarm response for a Third Alarm.

2.1.2.2 Vegetation Fire Responses

Three (3) Type I Structure Engines
Two (2) Type III Brush Engines
One (1) medic unit
One Water Tender

One Battalion/Duty Chief

The Preserve is in State Responsibility Area (SRA).

Lakeside FPD vegetation fire response levels reflect a standard Heartland Zone Medium Wildland Dispatch response, with resource levels decreased because of the number of CAL-FIRE fire apparatus and equipment concurrently dispatched to all incidents.

2.1.2.3 CAL-FIRE Vegetation Fire Responses

Low Wildland – Two (2) Type III engines, one (1) Battalion Chief

Medium Wildland – Four (4) Type III engines, one (1) BC, one (1) bulldozer, two (2) hand crews, two (2) helicopters, one (1) air attack, two (2) air tankers

High Wildland – six (6) Type III engines, one (1) BC, two (2) dozers, four (4) hand crews, three (3) helicopters, one (1) air attack, three (3) air tankers

NOTE: These are basic response levels. Response levels are subject to change based on anticipated weather and fire behavior conditions, staffing patterns for unusual events, and State-wide resource commitments.

Finding: *The standard First Alarm Vegetation response provided by the Lakeside Fire District is commensurate to dispatch levels and personnel assignments for other career Fire Departments in San Diego County.*

Finding: *A minimum of fifteen firefighters (five companies with three firefighters) respond with a Command and Control officer to all incidents.*

Finding: *The Lakeside Fire District First Alarm assignments provide an effective initial attack firefighting force.*

2.1.3 – Response Time and Nearest Fire Station

The Response Time Policy of the Lakeside Fire District is to have resources arrive at fire and other emergency incidents within five (5) minutes of initial dispatch, 80% of the time.

San Diego County General Plan Safety Element Table 5-1, Travel Time Standards, indicates that the maximum response time for Rural Lands, residential and commercial properties, is twenty (20) minutes.

Table S-1 Travel Time Standards from the Closest Fire Station*		
Travel Time	**Regional Category (and/or Land Use Designation)**	**Rationale for Travel Time Standards****
5 min	■ Village (VR-2 to VR-30) and limited Semi-Rural Residential Areas (SR-0.5 and SR-1) ■ Commercial and Industrial Designations in the Village Regional Category ■ Development located within a Village Boundary	In general, this travel time standard applies to the County's more intensely developed areas, where resident and business expectations for service are the highest.
10 min	■ Semi-Rural Residential Areas (> SR-1 and SR-2 and SR-4) ■ Commercial and Industrial Designations in the Semi-Rural Regional Category ■ Development located within a Rural Village Boundary	In general, this travel time provides a moderate level of service in areas where lower-density development, longer access routes and longer distances make it difficult to achieve shorter travel times.
20 min	■ Limited Semi-Rural Residential areas (>SR-4, SR-10) and Rural Lands (RL-20) ■ *All* Commercial and Industrial Designations in the Rural Lands Regional Category	In general, this travel time is appropriate for very low-density residential areas, where full-time fire service is limited and where long access routes make it impossible to achieve shorter travel times.

Lakeside Fire Station 2 is located five miles from the Preserve, has a driving time of approximately six to seven minutes. Lakeside Fire Stations 1 and 3 have driving times of approximately ten (10) minutes.

Finding *– The primary secondary and tertiary Fire Stations for the Preserve, under normal, non-emergency driving conditions, will be able to travel to the Preserve within the District's and San Diego County Response Time criteria.*

2.2.1 State Route-Highway 67

Primary emergency access to the Preserve lands is from SR 67, which parallels the western boundary of both the Northern and Southern Preserve Segments.
are within the ten minute response time criteria for semi-rural properties and twenty minute responses times for rural zone areas.

2.2 Emergency Access

SR- 67 is a publicly owned and maintained paved rural highway with a general south to north configuration along its length. SR-67 originates in the City of El Cajon with connector ramps from both east- and west-bound lanes of the Interstate 8 corridor. The highway terminates at the intersection of SR-79/Main Street in the unincorporated town of Ramona, approximately twenty-three (23) miles from its origin.

SR-67, between the southern and northern boundaries of the Preserve lands, has an average width of approximately sixty-six (66') feet, including two full travel lanes in either direction and paved shoulders.

Between the base and top of the Slaughterhouse Canyon grade, the right-of-way is divided into separated opposite directional driving lanes by the installation of a continuous concrete traffic barrier, commonly referred to as "K-rail".

Continuing north from the top of the Slaughter House Canyon grade, the south and north bound lanes are divided from each other by the installation of closely spaced vertical upright plastic reflectorized cones. The reflectorized traffic cone dividing "barrier" extends from the K-rail barrier to Archie Moore Road, a distance of 7.5 miles. The reflectorized cone barriers are interrupted by selected openings at private driveways and at street intersections with SR-67.

The purpose of these traffic cones to is create a visual fence line along the highway corridor that will mitigate the possibilities of head-on traffic collisions along this stretch of roadway. However, the traffic cone fence tends to limit fire department access and turnaround points that responding fire apparatus can use to access properties along the right-of-way.

2.2.1 Evacuation Routes from Preserve and Adjacent Lands

2.2.1.1 Southern Preserve Segment

Because of topographical and infrastructure constraints, it is unlikely that the Southern Preserve Segment will be opened for public use in the foreseeable future.

2.2.1.2 Northern Preserve Segment and Adjacent Residences

Residents of the mid-Preserve residential area and future visitors to the Northern Preserve Segment will have two potential evacuation routes away from the site.

The Northern Preserve Segment is not impacted by the concrete highway division barrier installed at the center line of the SR- 67 corridor. With this flexibility, residents and Preserve visitors may use either south-bound or and north-bound evacuation routes, depending on fire conditions at any given period of time.

2.2.1.2.1 Southern Evacuation Route

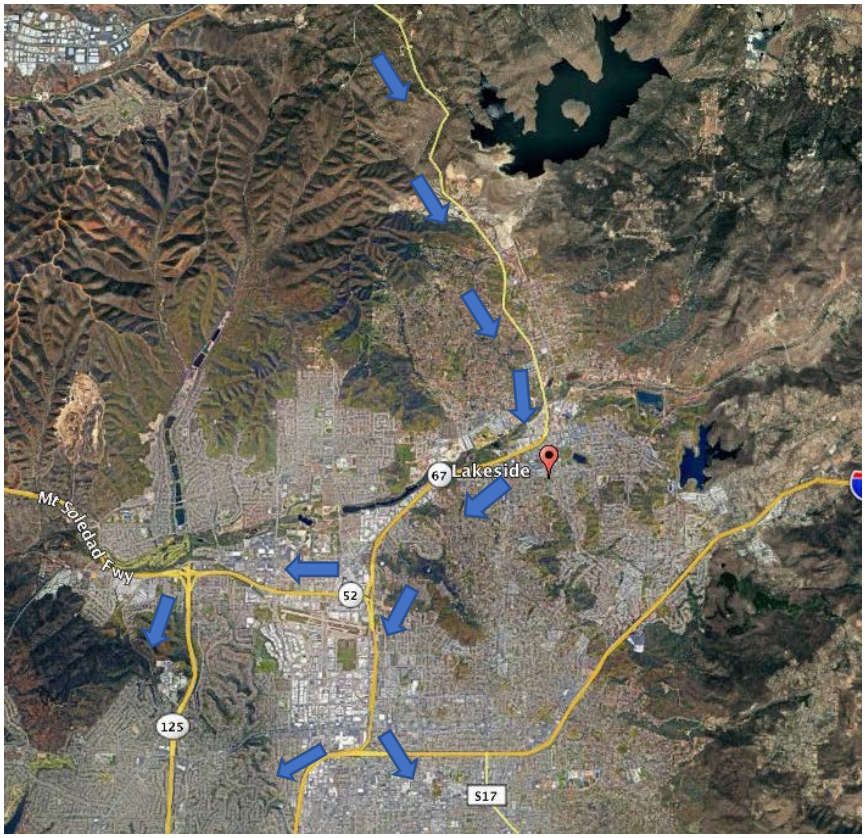
Depending on fire conditions, residents and visitors may have the option of proceeding southbound on SR-67 towards the community of Lakeside.

Although there are many roads intersecting the highway south of the Preserve, it is highly recommended that residents and visitors continue driving south to the SR-Highway 67 intersection with Mapleview Avenue, located at the northern periphery of down-town Lakeside.

At Mapleview Avenue and Highway 67, drivers will have three travel options:

- Continue driving south of SR-Highway 67 towards the City of Santee or City of El Cajon. SR-Highway 67 intersects with Interstate 8 in the City of El Cajon; additional evacuation routes, eventually leading into the City of San Diego will be accessed from the I-8/SR-67 interchange.

- Turning left (east) on Mapleview Avenue and proceeding to El Capitan High School or the Lakeside Rodeo Grounds, designated County emergency evacuation centers for the community of Lakeside. These evacuation centers are co-located one block east of the SR-67/Mapleview Avenue intersection
- Turning right (west) on Mapleview Avenue – drivers will follow Mapleview to the intersection of Mapleview Avenue and Channel Road, where two additional driving directions are available.
- Turning south on Channel Road, drivers can proceed into the business District of Lakeside, where multiple paved parking lots are available for temporary evacuation sites. These are *unofficial* evacuation areas.
- Turning north on Channel Road, drivers proceed past the Channel Road-Lakeside Avenue intersection until reaching Lakeside Farms Elementary School, a San Diego County designated evacuation center.
- Near Lakeside Farms School, at the intersection of Lakeside Avenue and Riverside Drive, drivers have the option of continuing west-bound of Riverside Drive, which eventually provides another access point to the SR-Highway 67 right-of-way corridor.



Overview of Southern Evacuation Route

2.2.1.2.2 Northern Evacuation Route

From the Northern Preserve Segment, residents and visitors have the option of proceeding north-bound on SR-Highway 67 towards the City of Poway and unincorporated community of Ramona.

There are two (2) east-to-west configured major public roadways that intersect with SR-Highway 67 and provide westerly evacuation routes leading into the Cities of Poway and San Diego.

Scripps-Poway Parkway Evacuation Route and Options

Approximately one mile north of the northern boundary of the Preserve, Highway 67 intersects with Scripps-Poway Parkway. Scripps-Poway Parkway nominally has two (2) lanes of east- and west-bound traffic lanes along its entire length between SR-Highway 67 and the Interstate 15 right-of-way corridor, approximately 8-1/2 miles west of SR-Highway 67.

- Approximately 4-1/2 miles west of SR-67, the south-to-north configured Community Road right-of-way corridor provides access to the central business district of the City of Poway with a right (northerly) turn from Scripps-Poway Parkway
- Approximate 5-1/2 miles west of SR-67, the south-to-north configured Pomerado Road provides three alternative directions of travel. Drivers may continue west-bound to the Interstate 15 corridor; drivers may elect to travel southbound on Pomerado Road, eventually reaching the Interstate 15 corridor and the developed Mira Mesa area within the City of San Diego; drivers may turn north on Pomerado Road, travelling into the City of Poway, the Rancho Bernardo community within the City of San Diego or the City of Escondido
- If drivers elect to continue driving west-bound of Scripps-Poway Parkway, they will reach the Interstate 15 corridor in approximately three miles. At I-15, there are two alternative directions of travel.
- Driving southbound on I-15, evacuees are able to travel into the Mira Mesa, Miramar, Clairemont and Tierra Santa areas of the City of San Diego. Near the intersection of I-15 and I-8 is Qualcomm Stadium, a designated evacuation center.
- Driving northbound on I-15 evacuees can travel to the Rancho Penasquitos and Rancho Bernardo communities within the City of San Diego or to the City of Escondido.

Poway Road Evacuation Route

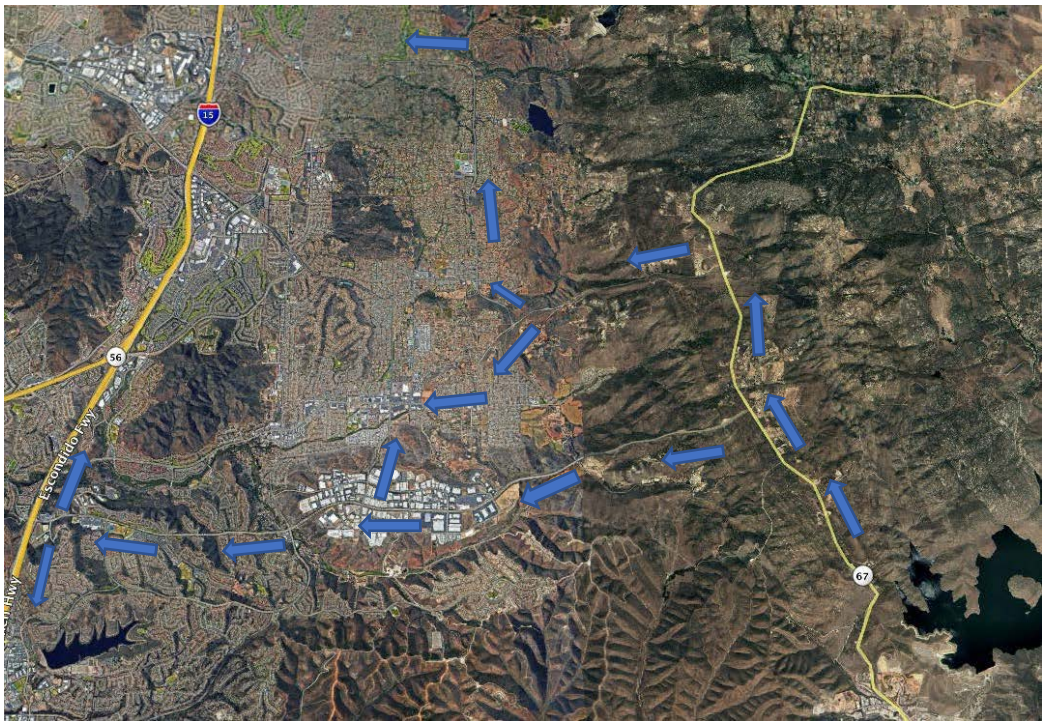
Evacuees may continue driving north-bound on the SR-Highway 67 corridor past Scripps-Poway Parkway for approximately two (2) miles and will reach the intersection of Poway Road, where west-bound travel becomes available. Poway Road is a public paved road with one lane of west and east-bound travel for a distance of approximately 3-1/2 miles. West-bound traffic on Poway Road subjects evacuees to significant

downhill grades along a winding right-of way corridor until the southeast corner of the City of Poway is approached.

Turning west (left) onto Poway Road, evacuees will travel approximately 2-1/2 miles before reaching a south-to-north configured intersection with Espola Road, also designated County Scenic Route 5. Two travel options are available at this intersection:

- Turning northbound (right) onto Espola Road/S-5 provides north bound travel towards the east central and northeast corners of the developed residential areas of the City of Poway
    - Approximately 7/10s of a mile north of the Espola Road/Poway Road intersection, two alternative directions of travel are presented to evacuees.
    - Evacuees may continue driving north bound on Espola Road. Northbound travel will take evacuees to Poway High School, a designated evacuation site. Additional north-bound travel on Espola Road will provide access to the Rancho Bernardo community of San Diego and eventually the I-15 right of way corridor
- Continuing west-bound on Poway Road will take evacuees into the central business district of the City of Poway and eventually to the I-15 right-of-way corridor

Finding: *Continuing northbound towards the community of Ramona on SR-Highway 67 past the Poway Road intersection is not recommended during Santa Ana Wind Events or during periods of extreme fire behavior that could potentially impact safety and driving conditions***.**



Overview of Northern Evacuation Route

2.3 Firefighting Water Supply

2.3.1 - Existing Water Distribution System

With exception of off-site private residential water tanks, there is no existing public water distribution infrastructure installed on or near the Preserve properties along the SR- 67 corridor.

2.3.1.1 Private Water Supply Tanks

Private water tanks, with a minimum 10,000 gallon capacity have been placed on the residential properties located in the drainage between the Southern and Northern Preserve Segments. There are a minimum of six private firefighting reservoir tanks located in this area, for a minimum water supply of approximately 60,000 gallons.

The water tanks are provided with County of San Diego and Lakeside Fire Protection District approved hose connections meeting National Standard Thread fire requirements. The NST fire hose thread specification is common to all fire departments in San Diego County and Southern California.

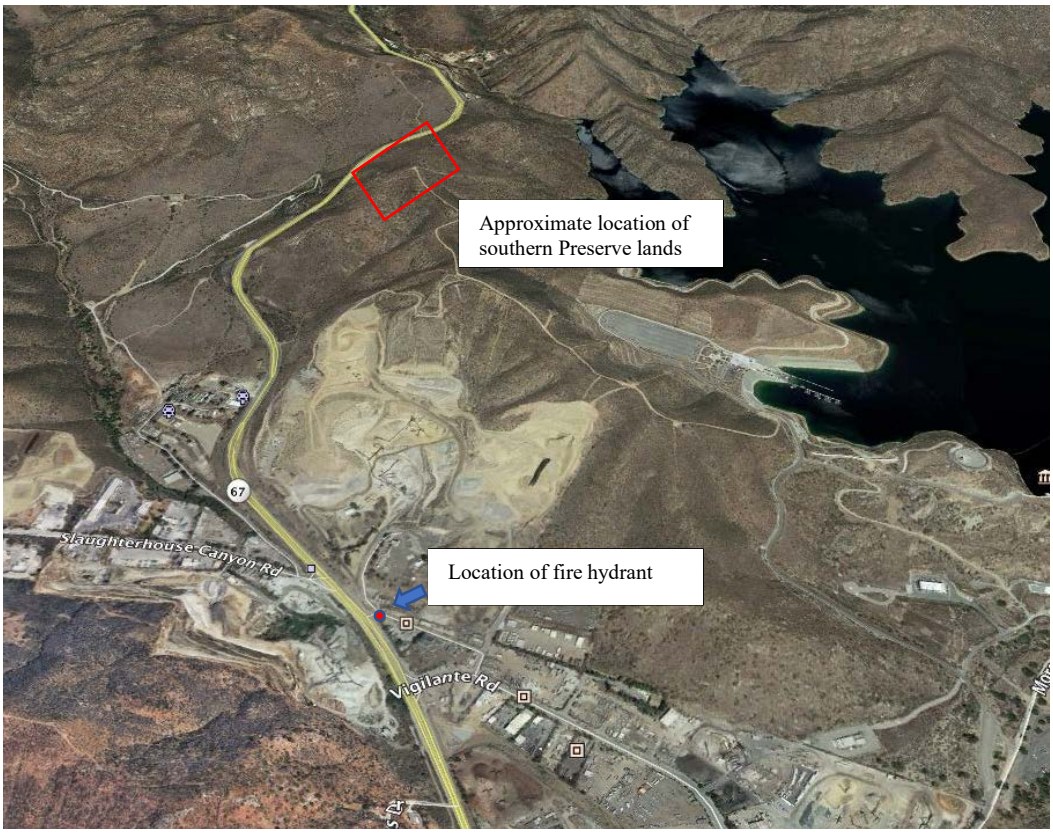
The purpose of these water tanks is two-fold: 1) to provide a water source feeding automatic fire sprinkler systems in their associated buildings; and 2) to provide a source of water supply for both structural and wild fire firefighting operations. The tanks are further provided with electrically powered pumps and self-filling and closing valves to keep the tank reservoir filled and available for firefighting purposed.

2.3.1.2 Public Water Supply Infrastructure

The nearest public fire hydrant is located on the east side of SR-67, between Slaughter House Canyon Road and Vigilante Road.



This hydrant is approximately 1.5 miles south of the southern boundary of the Preserve.



Within the last year, several additional fire hydrants have also been installed in this area:

- Vigilante Road and Highway 67
- Slaughterhouse Canyon Road at San Diego Asphalt Recycling Center
- Slaughterhouse Canyon Road at West Coast Sand & Gravel Facility
- Slaughterhouse Canyon Road at Brewer Crane & Rigging Facility
- Slaughterhouse Canyon Roar at SR-67, TTT Concrete Facility (private hydrant inside of facility compound)

There is an existing hydrant on the south side of Vigilante Road at the Laborer's Lakeside Training Center facility entrance.

2.3.1.3 Fire Department Water Resources

Fire apparatus responding to wild fires on Preserve lands are, by design, capable of providing their own limited supply of water from an on-board, built-in water tank. For engine companies, NFPA standard 1901 requires that each pumping capable vehicle has a minimum three hundred (300) gallon water tank installed.

Lakeside Fire District engine companies have a minimum on-board water tank capacity of five hundred (500) gallons.

Fire department engine companies in the Heartland-Central Mutual Aid Zone that assist the Lakeside Fire District generally have this same five hundred (500) gallon water tank capacity.

Water tender apparatus, commonly referred to as tankers, are available on a mutual aid basis from the San Diego County Water Authority, City of Poway Fire Department and the City of San Diego Fire Department. City of Poway and City of San Diego water tenders have a 3000 gallon tank capacity. San Diego County Fire Authority, which has fourteen (14) water tenders, tank capacity range between 1500 and 3000 gallons.

Water tenders carry portable water reservoirs, which can be deployed at a fire scene for use by primary pumping engines. Once the portable water reservoir is deployed, the water tenders establish a circuitous shuttle-relay operation between the incident scene and the nearest public or private source of water supply. The goal of establishing the shuttle operation is to provide a non-interrupted water supply for the engine companies pumping at the fire scene, with reasonable turnaround and travel times.

A basic Lakeside Fire District wildland-vegetation fire response of three Type I engines, two Type III brush engines and one water tender (conservative approach of 2000 gallons) provides the ability to place approximately 4500 gallons of firefighting water at an incident scene.

With a minimum of two hose lines flowing 60 gallons per minute deployed on each side of vegetation fire, with the objective of surrounding the fire perimeter for containment and control, 4500 gallons of on-board supplied water will allow firefighting operations of approximately thirty-seven (37) minutes.

2.4 Defensible Space and Vegetation Management

2.4.1 Preserve Land Defensible Space Responsibilities

There are no existing (2019) or proposed structures and buildings on the Preserve site.

Any future structures and outbuildings constructed on the Preserve property would be required to provide Code compliant defensible space around the perimeters of all buildings and structures.

Finding: *The MSCP Plan generally restricts construction or development in the MSCP Preserve spaces to very limited land uses that are compatible with permanently protecting natural resources.*

Finding: *The MSCP Plan typically precludes the construction of any building or structure on Open Space Preserve lands.*

2.4.2 Off-Site Defensible Space Responsibilities

There are approximately thirty-six (36) single family dwellings and commercial buildings adjacent to the eastern Preserve lands. These will be directly exposed to fire behavior and spread that either originating on Preserve lands or from off-site wild fires spreading through the Preserve under foreseeable extreme weather conditions.

Finding: *State and local laws require individual property owners to provide and maintain in perpetuity defensible space and fuel modification zones around all inhabitable buildings and structures,*

Finding: *The local Fire Authority Having Jurisdiction is responsible for enforcing defensible space and fuel modification zones within their jurisdictional boundaries.*

Finding: *The Preserve is* ***not*** *responsible for maintaining or providing* ***off-site*** *defensible space and/or fuel modification zones on neighboring parcels of land immediately adjacent to Preserve boundary/property lines.*

2.4.3 General Defensible Space and Vegetation Management Practices

Defensible Space and Vegetation Management practices are regulated by provisions found in the County of San Diego Consolidated Fire Code, California Fire Code, International Wildland Urban Interface Code, California Public Resources Code, California Health and Safety Code and the California Government Code.

Buildings and structures erected in brush covered lands designated as Very High Fire Severity Areas (VHSFA) are generally required to have defensible space and fuel modification zones measuring 100 feet in depth between the building walls and unmanaged vegetation.

Preserve lands are within a State Responsibility Area (SRA) that CAL-FIRE has designated as VHFSA.

On SRA lands, CAL-FIRE has primary responsibility for fire suppression of vegetation fires.

As is common throughout California, local cities and fire protection district lands may be inside of CAL-FIRE administered SRA lands. In these situations, the local fire agency has the responsibility for providing structural fire protection during vegetation fire incidents.

All regulatory provisions contain exception clauses allowing diminished defensible space depth when sufficient clearance cannot be accomplished because of parcel constraints and other restrictions. In such cases, defensible space is provided as "Zone 1" (removal of all native vegetation with replacement consisting of fire- and/or drought-resistant species and "approved", irrigated landscaping) fuel modification zones that extend to established property lines.

Recent revisions to State legislation limits increasing defensible space beyond the prescriptive 100 foot criteria for properties in extra hazardous locations. Defensible space may be extended only *after* an evaluation by CAL-FIRE (or Local Fire Authority)Fire Prevention personnel *and* when *written* justification for extending defensible space depths has been provided to the property owner. Property owners *cannot* be required to provide *off-site* fuel modification zones and defensible space beyond their property lines.

NOTE: *Specific recommendations for Defensible Space and Vegetation Management will be provided in Section 5.*

SECTION 3
ANTICIPATED FIRE BEHAVIOR

3.1 Fire Behavior Model

3.1.1 Summary Narrative

Anticipated Fire Behavior was analyzed after visiting the Preserve and identifying the on- and off-site natural vegetative fuels.

Terrain and topographical inputs were determined by site visits and making comparisons with two- and three-dimensional maps.

Weather inputs were derived from:

- Interior Zone Worst Case Weather and Burning Conditions Table supplied by the County of San Diego Guidelines for Fire Protection Plans
- 2003 Cedar Fire weather and fuel parameters, which were previously established as worst-case fire behavior conditions in San Diego County.

These data inputs were subjected to analysis by the BEHAVE-Plus 5.0.5 Wildland Fire Modeling program to determine potential wild fire behavior on Preserve and adjacent lands.

The BEHAVE-Plus Fire Behavior Prediction and Fuel Modeling System is a computer-based systematic method of predicting wild land fire behavior. It was developed by the U.S. Forest Service at the Intermountain Forest Fire Laboratory, Missoula, Montana, and is used by wild land fire experts and scientists nationwide.

BEHAVE-Plus is designed to predict fire spread and describes fire behavior only at the flame front of a fire.

The primary parameter of the BEHAVE fire behavior calculations are dead fuels less than one-quarter (1/4") inch in diameter that readily carry fire across the landscape. Fuels larger than three (3) inches in diameter are not included in the BEHAVE calculations. The BEHAVE fire model describes a wildfire spreading through surface

fuels, which are the burnable materials within six (6) feet of the ground and contiguous to the ground.

3.1.2 Use of Fire Model Inputs – Caveat

The BEHAVE-Plus Fire Behavior Model is a tool used by fire authorities to estimate the behavior of fire moving towards a structure or other landscape feature under certain assumptions.

The Fire Behavior Model is only an estimate and is not designed to replace the experience of the local Fire Authority, who is familiar with local wildfire behavior. The Behave-Plus fire model is not the only recognized fire model that is available; it is identified in this report only because it is the model currently used by most fire consultants.

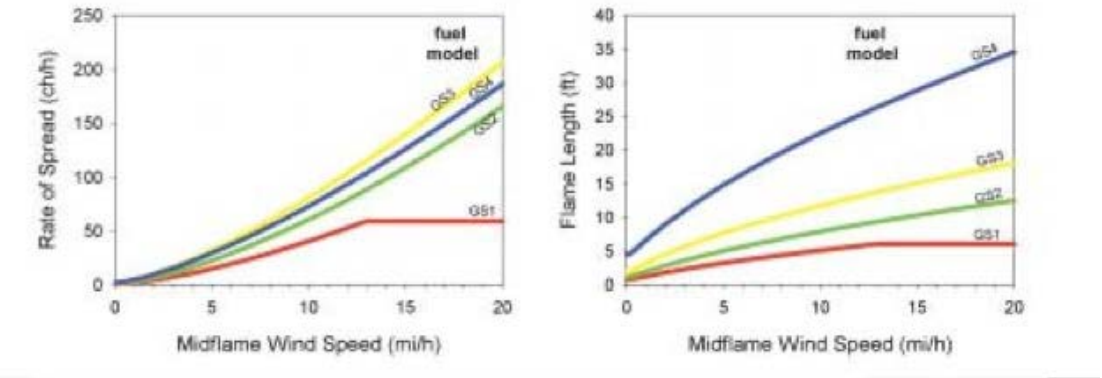
3.2 Vegetative Fuel Fire Assessment

3.2.1 General Assessment of Current Vegetative Fuels

Most of the current (2019) native vegetative fuels on the site can be classified as GS-2 Moderate Load, Dry Climate Grass-Shrub, according to the most current edition of *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model*

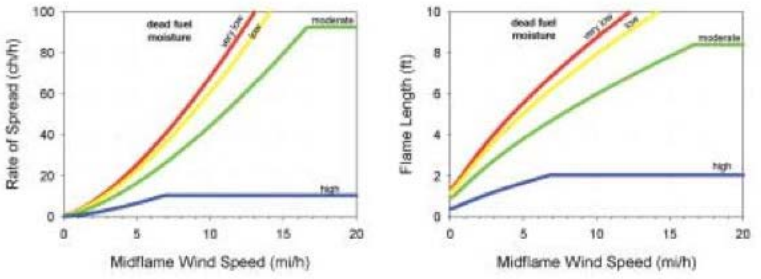
3.2.1.1 Grass-Shrub Fuel Type Models (GS)

The primary carrier of fire in GS models is combined grass and shrub elements. All GS fire models are dynamic, meaning the live herbaceous fuel load shifts from live to dead as a function of moisture content. The effect of live herbaceous fuel moisture content on spread rate and burning intensity is strong and depends on the relative amount of grass and shrub loads in the fuel model.



GS-2 Moderate Load Dry Climate Grass-Shrub

The primary carrier of fire in GS-2 vegetation is the combined grass and shrub elements. Shrubs are usually one (1) to three (feet) high, with a moderate grass load. Spread rates are high and flame lengths are moderate. The plant moisture of extinction is considered low, at a value of 15%. Typical fuel loading is 2.1 tons per acre.



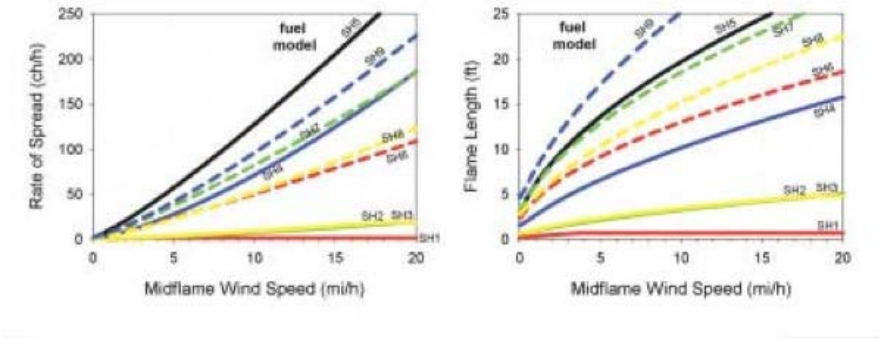
Moderate Load, Dry Climate Grass-Shrub (Dynamic)





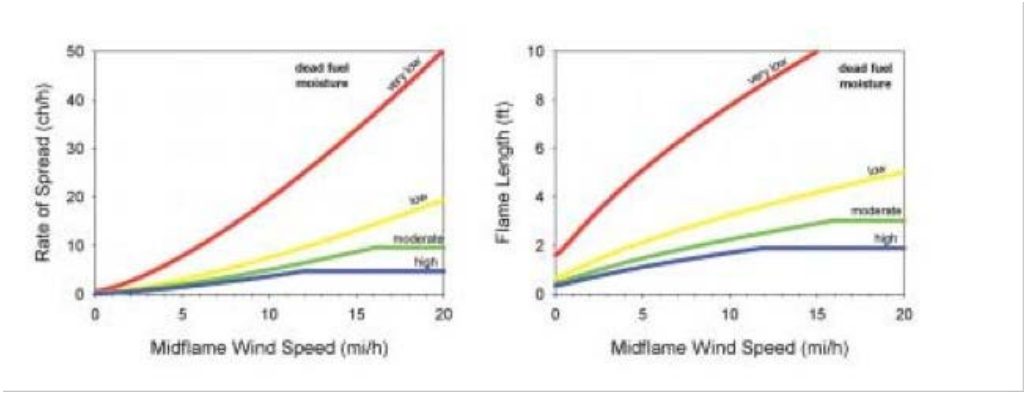
3.2.1.2 Shrub Fuel Type Models (SH)

The primary carrier of fire in the SH fuel models is live and dead shrub twigs and foliage, in combination with dead and down shrub litter. A small amount of herbaceous fuel may be present, especially in SH1 and SH9, which are dynamic models (their live herbaceous fuel load shifts from live to dead as a function of live herbaceous moisture content). The effect of live herbaceous moisture content on spread rate and flame length can be strong in those dynamic SH models.



SH-2, Moderate Load, Dry Climate Shrub

The primary carrier of fire in SH2 is woody shrubs and shrub litter. The vegetative fuel has moderate shrub loading, with an average depth of one (1') foot. The Rate of Spread and flame lengths are considered to be low. Fuel loading is 5.2 tons per acre and the extinction moisture content is low at 15%.



Moderate Load Dry Climate Shrub





3.2.2. General Assessment of Future Vegetative Fuels

The estimated assessment of future vegetative fuel conditions is based on a twenty (20) to forty (40) year span of time after the establishment of the Preserve. In this scenario, the Coastal Shrub and Chaparral communities will grow in an relatively unmanaged manner, assuming there are no major wild fires impacting growth and soil conditions.

Vegetation on the Preserve is a mixture of Southern California Chaparral shrub and brush types. The chaparral and brush-shrub type fuels will have uninterrupted continuity and fuel heights, often exceeding seven (7') feet, over extended areas of the Preserve. A significant amount of the shrub and chaparral to be in an over-grown and decadent state, with a high dead-to-live fuel ratio within the shrub vegetative canopies.

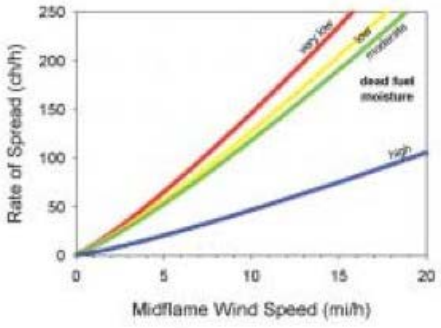
3.2.2.1 Shrub Type Fuels

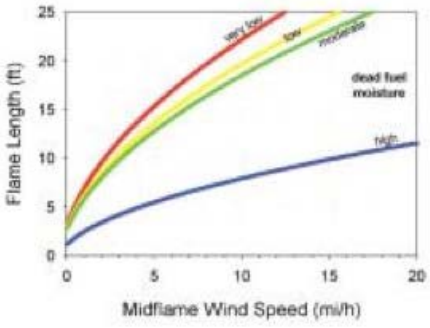
SH-5 Heavy Load, Dry Climate Shrubs

The primary carrier of fire in SH-5 is woody shrubs and shrub litter. There will be a heavy concentration of fuel loading of 6.5 tons or more. Vegetation will have relatively uninterrupted canopies with depths between four (4') to six (6') feet deep and across. The Rate of Spread and Flames Lengths will be very high. The extinction moisture content is low at 15%.









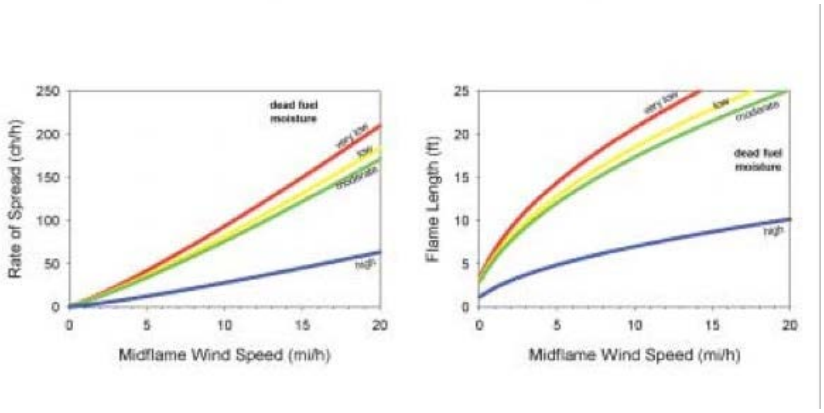
3.2.2.2 Chaparral Type Fuels

SH-7 Very Heavy Load, Dry Climate Shrubs

The primary carrier of fire in SH7 is woody shrubs and shrub litter. The vegetative fuel has very heavy shrub loading, with a depth of four (4 to 6') to six feet. The Rate of Spread, while considered high, is lower than SH-5 fuels, but the flame lengths are similar and usually very high. Fuel loading is 6.9 tons per acre and the extinction moisture content is low at 15%.







Fuel Model 4 – Chaparral

Fuel Model 4, as described in *Aids for Determining Fuel Models for Estimating Fire Behavior*, applies to shrub type vegetation that have high to extreme fire intensities with fast spreading fires that involve the foliage and live and dead fine woody materials in the crowns of a nearly continuous overstory.

Typical FM-4 shrub fuels are stands of mature brush or shrubs, with canopies heights of six (6') feet or more.

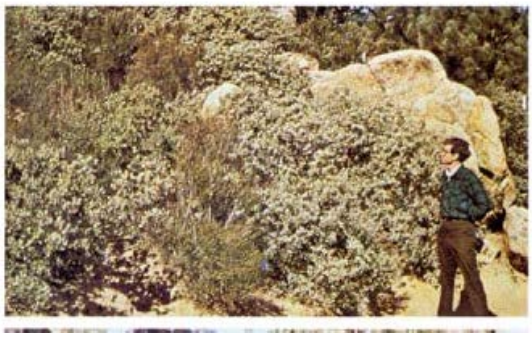
Besides the flammability of foliage, the dead woody material in chaparral stands significantly contributes to fire intensity. A deep litter layer may also hamper fire suppression efforts.

Fuel loading per acre has several variables:

- 3”diameter, dead and live vegetation – 13.0 tons
- ¼” diameter, dead and live vegetation – 5 tons
- Live load foliage – 5 tons
- Total potential fuel loading – 23 tons per acre



Photo 9. Mixed chaparral of southern California; note dead fuel component in branchwood.



Chaparral composed of manzanita and chamise near the Inaja Fire Memorial, Calif.



Fuel Model-4 Chaparral Habitat North of Preserve

3.3 Fire Behavior of Vegetative Fuels

3.3.1 Fire Behavior Modeling

Wildland fire behavior calculations have been modeled for the hazardous vegetative fuels on the Preserve and how they might impact the sparsely developed residential and commercial buildings adjacent to Preserve lands. These fire modeling predictions are based on "worst case" fire scenarios.

The computer-based BEHAVE-Plus Version 5.0.5 was used to develop the fire behavior assessments impacting the Preserve and adjacent lands.

Data input values included the following factors:

- Vegetation Fuel Model
- Slope of terrain/topography
- Preserved wind speed
- Anticipated weather conditions
- Data collected during Preserve site observations
- Vegetative fuel characteristics observed during site observations
- Typical conditions during the local fire season

The BEHAVE Fire Behavior Calculations display the expected:

- Rate of Fire Spread (expressed in feet per minute)
- Fire Line Intensity (Btu/ft./sec)
- Flame Lengths (feet) for the different vegetation fuel models
- Ember shower distances

The fire behavior values are based on peak Santa Ana wind conditions expected in the Preserve's climate zone.

3.3.2 Fire Behavior Modeling Summary

The data was analyzed by BEHAVE modeling for identification of the following fire behavior parameters:

- Rate of Spread, measured in feet per minute
- Flame length in feet, for horizontal depth of flame front
- Ember shower distance
    - Distance in miles (or portions of miles) downwind of flame front
    - Susceptibility of ignition in percentage points

The BEHAVE program output parameters displays Rate of Spread (ROS) in Chains per Hour. A "chain" is a measured distance of sixty-six (66') feet. The ROS per minute is calculated by a) multiplying the chain distance by sixty (66') feet and (b) dividing this new distance by sixty (60) minutes.

As noted above, flame length is the horizontal depth of the flame front and is not to be confused by flame height. Flame height is a measurement, with calculations based on the heat release rate from burning vegetation.

Ember shower distance, termed “Spotting Distance" by BEHAVE, is the distance downwind from the flame front that wind and convection currents will carry burning fire brands, embers or other burning materials before they are deposited by gravity into receptive vegetation fuel beds or other fuels. Susceptibility is a measure of the percentages of ignitions that will occur in the receptive downwind vegetation fuels.

After the BEHAVE modeling was performed, the output data was analyzed and placed in the Tables below.

Table 3.3.2 (a) indicates modeled fire behavior across different Preserve area lands based on the current (2019) Coastal Sage and Chaparral vegetation habitat.
Table 3.3.2 (b) indicates modeled fire behavior across different Preserve area lands based on an anticipated future Coastal Sage and Chaparral vegetation community after vegetation is fully re-established itself following years of recovery and preservation efforts.

Location	Fuel Model	Rate of Spread	Flame Length	Ember Shower Distance/%
SR-67, South Boundary (A)	GS-2	298 ft/min.	18.7’	0.91 miles/ 100
SR-67, South Boundary	SH-2	74 ft/min.	14.9’	0.81 miles/100
Mid-Preserve – Drainage (B)	GS-2	288 ft/min.	18.6’	0.9 miles/100
Mid-Preserve – Drainage	SH-2	68.75 ft/min.	14.3’	0.8 miles/100
Lake Drainage (C)	GS-2	295 ft/min.	18.6’	0.9 miles/100
Lake Drainage	SH-2	70.29 ft./min	14.5’	0.8miles/100

Table 3.3.2(a) –BEHAVE Fire Behavior Analysis, Current Vegetation State

Location	Fuel Model	Rate of Spread	Flame Length	Ember Shower Distance/%
SR-67, South Boundary	SCAL-18	229 ft/min	40.7	1.6 miles/100
SR-67, South Boundary	FM-4	895 ft/min.	68’	2.3 miles/100
SR-67, South Boundary	SH-5	529 ft/min.	42.5’	1.7miles/100
Mid-Preserve – Drainage	SCAL-18	300 ft/min	41’	1.8 miles/100529
Mid-Preserve – Drainage	FM-4	835.45 ft/min.	65.9 ‘	2.3 miles/100
Mid-Preserve Drainage	SH-5	485 ft/min.	40.9’	1.6 miles/100
Lake Drainage	SCAL-18	226. ft//min.	40.4’	1.6 miles/100
Lake Drainage	FM-4	884 ft/min.	67.8’	2.3 miles/100
Lake Drainage	SH-5	485 ft./min.	40.9’	1.6 miles/100

Table 3.3.2(b) – BEHAVE Fire Behavior Analysis - Future Anticipated Vegetation State

3.3.3 Fire Behavior Threat Analysis

An evaluation of the Preserve indicates it may be exposed to the following foreseeable wild fire threats.

The predicted fire behavior is a worst-case scenario anticipated for the environmental and weather parameters on the Preserve and its surrounding areas.

Fuel Model SH-5, Heavy Load Dry Climate Shrub, was selected for the worst-case burning conditions scenarios denoted in the Table 3.3.3 as the most prevalent vegetation type present after a long-term rejuvenation period results in the re-establishment of a heavy, dense chaparral habitat community.

Location	Flame Length	Rate of Spread	Spotting
Berkeley-Herring (A)	41 feet	300 ft./min.	1.6 miles, 100%
Southeast- Lake Drainage (B)	40.9 feet	485 ft./min.	1.6 miles, 100%
Central Drainage ©	40.9 feet	485 ft./minute	1.6 miles, 100%

Table 3.3.3 – Worst Case Fuel Model SCAL-18 Predicted Fire Behavior

The narrative for the fire behavior analysis scenarios stated below are for the anticipated return of unmanaged vegetative fuels to their pre-Cedar Fire growth and habitat states.

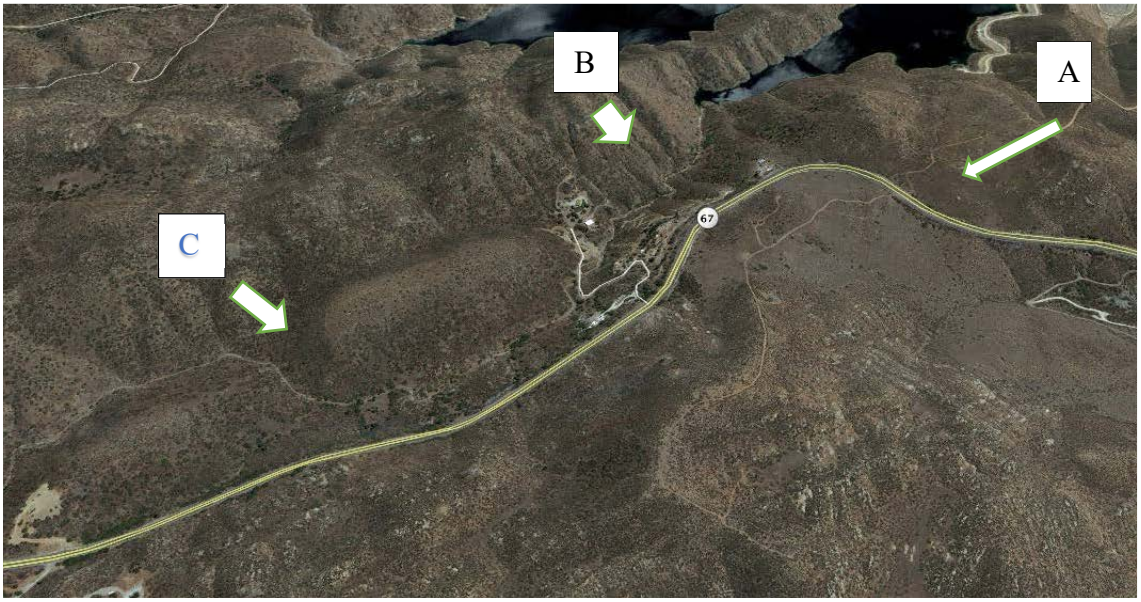


Figure 3.3.4 – Overview of Preserve Site Depicting Topographic Features and Fire Behavior Assessments

3.3.3.1 Fires Originating Along the SR-67 Corridor, Late Afternoon, Summer Southwest Winds

The normal summer, late afternoon south and southwest winds found in the area are occasionally strong and gusty.

These winds tend to be cooler, have relatively moist air and usually have higher relative humidities of 40% or more. They are considered a serious wildfire weather condition when wind speeds are over 20-MPH and when relative humidity is 30% or lower.

For purposes of fire behavior analysis, a fire will start near the southeast corner of the Berkeley-Herring Preserve, immediately adjacent to the SR-67 corridor (indicated by RED cross).



Anticipated Fire Behavior for Fires Starting Along SR-67 During Typical Summer Afternoon Periods

Fires starting at the southwest corner of the Berkeley-Herring Preserve will be influenced by typical summer, late afternoon southwest winds typical to the area. The winds will push the fire in a southwest to northeast direction, away from the SR-67 and through the brush fields toward the top of the prominent and broad ridgeline overlooking the highway.

Once established at the base of the broad mountain side, the fire front will move steadily under continued up- and cross-slope wind influences.

The southern flank of the fire will be the "inactive" side of the fire, as it will be pushing into the southwest wind moving across the landscape, retarding its advance. The flame front can be expected to follow the base of the mountain under the influence of the wind, with moderate to rapid rates of spread. The flame front will create potential direct flame contact, convective and radiant heat exposure to the vegetation on the slope, which pre-heats the fuel canopies, causing faster ignitions and thermochemical reactions as the fire spreads across the landscape

The northern flank of the fire will be more “active side” of the fire, moving under unrestricted and direct wind influences that push the flames through the vegetative fuels> there will be a free influx of continuous air flow; this accelerates burning conditions and fire behavior.
Under continuing upslope wind influences, the Rate of Spread will increase, driving the fire both up- and cross-slope into previously unburned fuels on the mountainside. However, the general fire behavior at the base of the mountain, although moving with rapid rates of spread, will tend to have slower spread rates than on the slopes and canyons as it moves across the landscape to the ridgeline.

Fire entering drainages on the slope will generally progress in a northerly direction toward the ridgeline. As fire enters wind and topography aligned canyons, it will be rapidly drawn through the topographical features toward the ridge lines. Rate of Spread will accelerate in topographical draws as the wind in the narrow canyons are channeled upward, with a major flame front developing and making a run towards the ridge.

When the flame front reaches the ridgeline, fire behavior may change significantly.

Typically, the flame front will run upslope to the ridgeline, where fire progression across the landscape will diminish or stop. This phenomenon happens because of upslope convective wind forces moving along the backside of the mountain meeting the upslope winds on the fire side of the ridge. The cooler, upslope convective winds effectively form an invisible wall at the top of the non-burning slope, preventing or slowing flame progression across the ridge line.

If the flame front continues advancing, fire behavior reverts to a process known as “slope reversal.” The slope reversal process includes the fire backing down the opposite aspect of the mountain under upwind influences, reaching the bottom of the slope, crossing a drainage and then running up the next slope to another ridge. Slope reversal impacts rate of spread and intensity as well as airflows around the fire.

However, upon reaching the ridge, fire behavior may become unpredictable because of the following phenomenon:

- Gusty and erratic winds;
- Wind eddies on ridgelines;
- Long-range spotting with firebrands deposited in receptive vegetation downwind for distances over one mile; and
- Rapid fire extension upslope in natural chimneys.

It is not uncommon for a fire burning near the top of a windward slope to spot and deliver ember showers across the ridge top onto the other nearby slopes where receptive vegetative fuel beds can ignite.

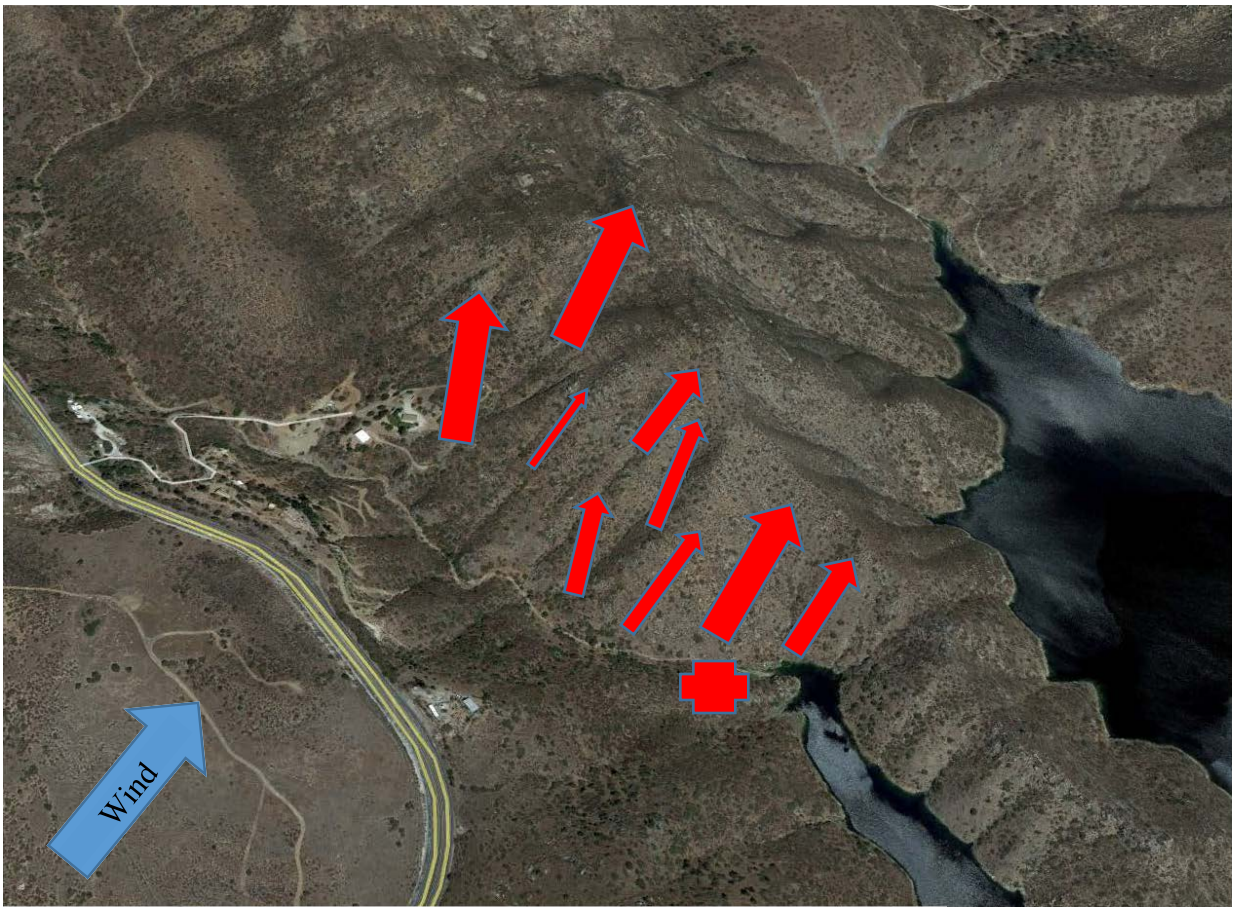
Natural topographic features associated with the development of fire whirls are present on the mountainside, natural drainages, and prominent peaks. Unstable, erratic winds, in combination with topographical outcroppings and unevenly heated ground, could trigger fire whirls, resulting in unpredictable rates of spread and intensity. Fire behavior

at the bottom of the slope will be impacted by the erratic fire behavior developing upslope.

Related to Preserve conditions, and based on previous fire history for the area, firebrands lofted by convective will land in the vegetation on the back side of the mountain and, potentially, in the topographical drainages and fingers formed in the land mass by San Vicente Lake. These spot fires will, because of limited access on all sides by firefighting resources, grow rapidly and burn significant acreages before controlled.

3.3.3.2 Fires in the Southeast Drainage-North San Vicente Lake Finger

For purposes of fire behavior analysis, an accidental human-caused fire will start off-site in the northwest finger of San Vicente Lake (indicated by RED cross).



Fires on the east side of the northwestern San Vicente Lake “finger” drainage will be influenced primarily by the late afternoon southwest winds typical to this area during summer months. The winds will primarily push the fire in a southwest to northeast direction, away from the body of water and up the slopes of the steep mountainside overlooking the southeast to northwest configured topographical drainage in this area.

Once established at the base of the drainage and mountain side, the fire front will move steadily under continued up- and cross-slope wind influences.

The southern flank of the fire will be the "inactive" side of the fire, as it will be pushing into the southwest wind moving across the landscape, retarding its advance. The flame front can be expected to follow the base of the mountain under the influence of the southwest winds, with moderate to rapid rates of spread. The flame front will create potential direct flame contact, convective and radiant heat exposure to the vegetation on the slope, which preheats the fuel canopies and allows for quicker ignition and thermochemical reactions as the fire spreads across the landscape

The northern flank of the fire will be more active side of the fire, moving under unrestricted wind influences that push the flames through the vegetative fuels, with a free influx of continuous air flow that accelerates burning conditions and fire behavior.

Under continuing upslope wind influences, the Rate of Spread will increase, driving the fire both up- and cross-slope into previously unburned fuels on the mountainside. However, the general fire behavior at the base of the mountain, although moving with rapid rates of spread, will tend to have slower spread rates than on the slopes and canyons as it moves across the landscape to the ridgeline.

There are multiple prominent side drainages, with west to east configurations, on the main slope that are direct alignment with the winds influencing fire behavior.

Fire entering these drainages will generally progress in a northeasterly direction toward the ridgeline. As fire enters wind and topography aligned canyons, it will be rapidly drawn through the topographical features toward the ridge lines to the east. Rate of Spread will accelerate in the topographical draw as the wind in the narrow canyon is channeled upward, with a major flame front developing and making a run towards the ridge.

When the flame front reaches the ridgeline, fire behavior may change significantly, as indicated in the previous Sub-Section.

Natural topographic features associated with the development of fire whirls are present on the mountainside, natural drainages, and prominent peaks. Unstable, erratic winds, in combination with topographical outcroppings and unevenly heated ground, could trigger fire whirls, resulting in unpredictable rates of spread and intensity. Fire behavior at the bottom of the slope will be impacted by the erratic fire behavior developing upslope.

Firebrands lofted by convection will land in the vegetation on the back side of the mountain and, potentially, in the topographical drainages and fingers formed in the land mass by, and north of, San Vicente Lake. These spot fires will, because of limited access on all sides by firefighting resources, grow rapidly and burn significant acreages before controlled.

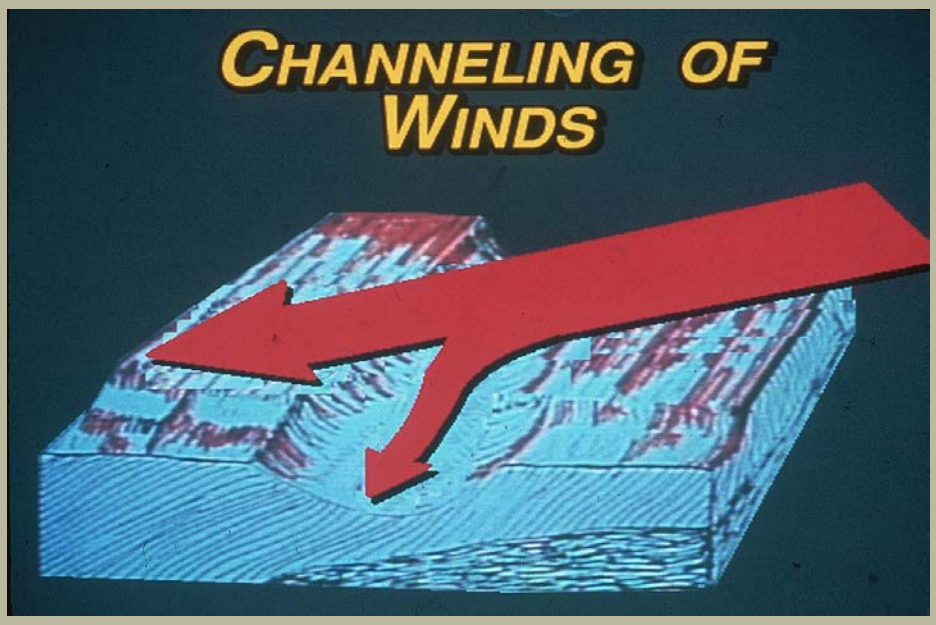
The presence of the narrow, steep-sided side canyons and drainages in this area will also impact fire behavior.

Fires burning on one slope of a narrow canyon radiates and convects a large amount of heat energy towards the opposite non-burning slope. These heat processes can dry and pre-heat susceptible fuels on the non-burning canyon side, making it highly susceptible to ignition from ember showers and, when the flame front reaches the bottom of the canyon, direct flame contact.

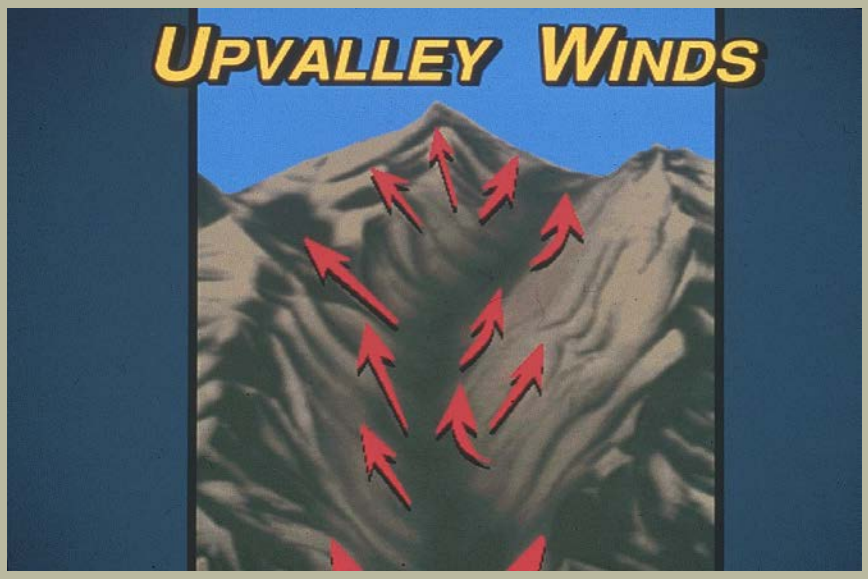
Occasionally, the entire non-burning slope, or large portions of it, can ignite instantaneously (area ignition) or in a matter of a few minutes (a condition identified as a "blow-up"). In other cases, the fire progression may create flame front passage across the drainage bottom at multiple points, creating a hazardous condition for civilians trying to evacuate the area of fire suppression crews working to control the fire.

As noted in the photograph above, the drainage has multiple cross-slope drainages forming what is collectively termed "chimneys." Fires burning into these topographical features create a "chimney effect", with similar effects as occur in a typical building chimney.

A chimney is a steep narrow chute with three walls, similar to a box canyon. The chimney effect occurs when an unstable air mass at the surface, and bottom of the chute, create a convection current through the canyon, drawing air from the bottom of the chute and exhausting it at the top. When the flame front enters the chute, normal upslope winds and convective heat flow rapidly upward and are funneled by the chimney's topographical shape, pre-heating the vegetation within it and predisposing them to rapid ignition and rates of spread.



Diagrams Showing Typical Channeling of Winds Through Canyons





Topographical and Vegetation Characteristics of Southern Canyon Fire Scenario (South Side)



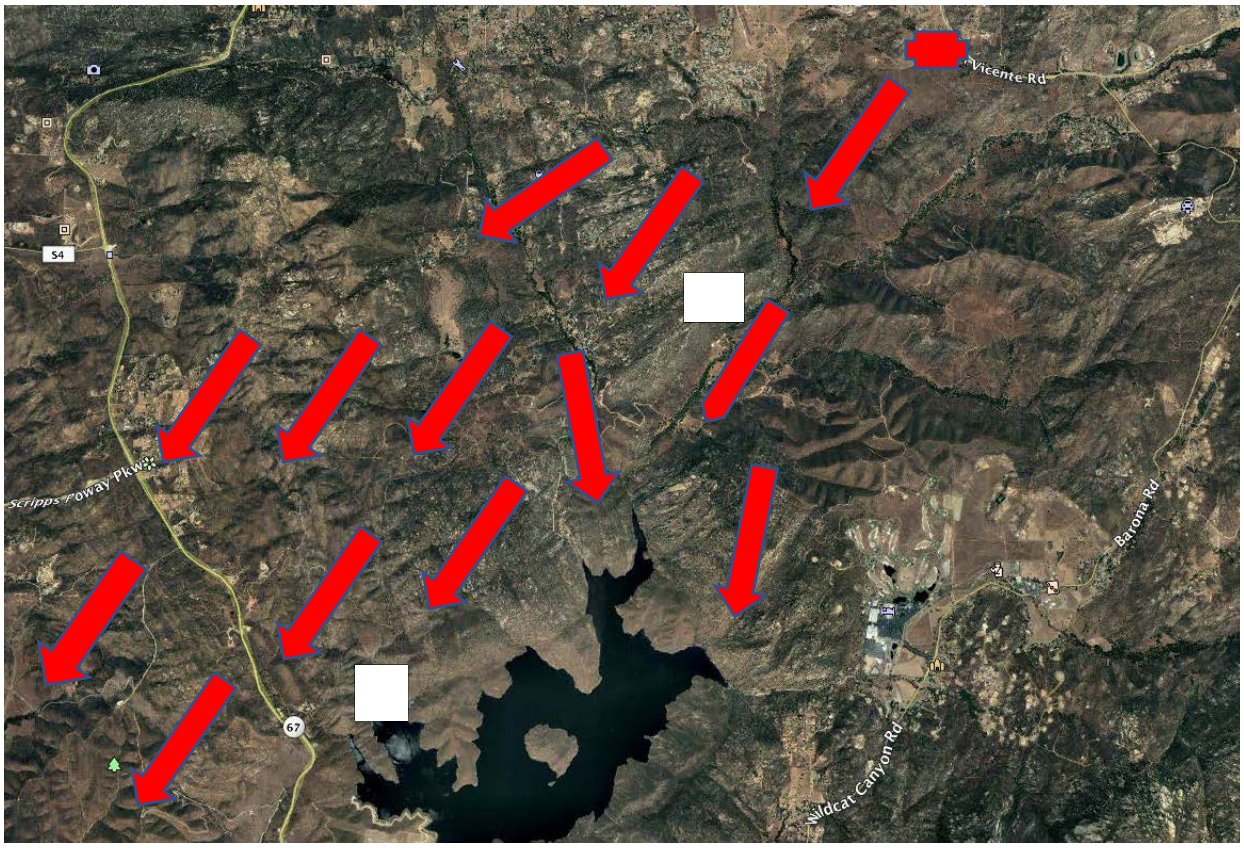
Topographical and Vegetation Characteristics of Southern Canyon Fire Scenario (North Side)

3.3.3.3 Fires in the North Central Drainage, Santa Ana Wind Event Conditions

Santa Ana Northeast winds, with velocities of 30 mph, or more, will influence the fire's head (leading edge of the flame front) and drive the fire across the landscape in a southwesterly direction with a high rate of flame spread. Rate of spread, based on wind speed, topography and vegetative fuel types is anticipated to be 485 feet per minute.

For purposes of the fire behavior analysis, a mid-fall Santa Ana wind event occurs, duplicating the weather and fuel conditions prevalent during the 2003 Cedar Fire.

The fire will start several miles to the northeast of the Preserve and, under high wind velocities and wind-aligned topography, travel in a southwesterly directions across a large swath of San Diego County at extreme rates of spread.



The flame front will move through relatively undeveloped lands, beginning along the San Vicente Road right-of-way corridor south of Ramona and west of San Diego Country Estates before reaching the Preserve lands.

With influence of winds and wind-aligned topography, the flame front will grow to a width of approximately 1.5 miles at Point A, approximately 2.4 miles southwest of the point of origin. The flame front will continue widening, growing to an estimated 2.6

miles wide at the SR-67 corridor, 6.9 miles from the point of origin. The estimated average acreage burned during the cross-country travel is approximately 8390 acres.

For Fuel Model SH-5, Heavy Load Dry Climate Shrub vegetation, forward, straight line rate of spread across the landscape is modeled at 208.9 chains per hour or 13,787.4 feet/2.61 miles per hour. With this rate of spread, the fire will travel between San Vicente Road and SR-67 in 2.65 hours. This is equivalent to burning one 100-yard football field length per minute.

During the Cedar Fire, the calculations for the extreme fire behavior's flame front spread across the landscape in the Wildcat Canyon area east of San Vicente Lake was calculated as ***three football field lengths per minute*** for extended periods of time.

Finding: *The calculated extreme Cedar Fire rate of spread coincides with BEHAVE calculations for assumed Fuel Model 4 Chaparral vegetation at the Preserve's southern boundary:*

- *814.1 chains per hour = 53,730.6 feet per minute*
- *53,730.6 feet per hour = 895.52 feet per minute*
- *895.52 fpm = 298 yards per minute =* ***2.98 football field lengths/minute***

After moving through the undeveloped off-site lands, the flame front will enter the Preserve's eastern perimeter boundary. Natural vegetation in this area will be heavy chaparral fuel types, with heavy canopy loading and unbroken continuity and compactness. Fuel height will vary between six (6') and three and approximately fifteen (15') feet, with the average being nine (9') feet in a fully restored chaparral habitat.

The vegetation in this area can be described as Fuel Model SH-5, High Load Dry Climate Shrub.

A Worst-Case Santa Ana Wind Event fire in this type of fuel will produce flame lengths of approximately forty-one (41') feet. The flame front will progress across the landscape at an average rate of 485 feet per minute and will loft fire brands 1.6miles with 100% ignition in downwind receptive fuel beds.

Under the influence of northeast Santa Ana winds, the flame front will progress rapidly cross-slope and downslope in a southwesterly direction.

Fire behavior may be unpredictable due to gusty winds; erratic winds; wind eddies on ridgelines; long-range spotting with firebrands deposited in receptive vegetation downwind for distances over two miles; and rapid fire extension downslope into natural chimneys. Natural topographic features associated with the development of fire whirls are present along the prominent ridge lines and natural drainages with prominent peaks.

The flame front can be expected to follow the hillside slopes and drainage under the influence of the northeast winds, with rapid rates of spread. The flame front will create potential direct flame contact, convective and radiant heat exposures to all buildings and

structures in the residential enclave that separates the Southern and Northern Segments of the Preserve. Firebrands lofted by convective will land in the vegetation island between these homes, in the Open Space lands inside the Preserve, and in the chaparral and Coastal Sage habitat lands west of SR67, igniting receptive and unmanaged vegetation, and potentially, non-fire resistive buildings and structures that have been built in these areas.

Fires influenced by Santa Ana wind events tend to become large incidents, initially beyond local control efforts.

In 1971, Kerr and associates characterized eight types of large fires, based on their relationship between the fire's convection column and wind effects. These parameters are based on:

- Rates of spread
- Spotting (ember show) ignition potential
- Smoke drift

Number	Type	Dominant Features
I	Towering convection column with light surface winds	Moderate to rapid fire spread persistent until changes in the atmosphere or fuel
II	Towering convection column over a slope	Rapid short-term spread with convection cut-off at ridge crests
III	Strong convective winds with strong surface winds	Fast, shifting spread with short-range spotting
IV	Strong vertical convection cutoff by wind shear	Steady or shifting spread with occasional long-range spotting
V	Leaning convection column with moderate surface winds	Rapid, shifting spread with both short and long range spotting
VI	No rising convection column under strong surface winds	Very rapid spread driven by wind and fire energy; frequent close spotting
VII	Strong surface winds in mountainous topography	Rapid spread both up and down slope with frequent spotting and area ignition
VIII	Multiple head fires (mostly types I through V)	Broad fire front with two or more independent convection columns

Summary of Large Fire Types

Santa Ana wind event fires tend have Type VI, VII and VIII burning characteristics.

A Type VI fires are wind-driven with strong surface winds that prevent the convection column from rising more than a short distance above the ground surface. Smoke is often carried forward in a narrow ribbon for perhaps 100 miles or more with slight dissipation. Spotting is confined to a short distance in front of the flame front.

Type VII fires burn under Type VI conditions but in mountainous terrain. They spread up or down windward slopes with extreme rapidity while showering a great number of fire brands downwind into receptive vegetative fuels. This causes area ignition, coupled with high velocity turbulent winds in lee areas, resulting in a rapid development of mass fire with extreme heat release rates and considerable convection activity. The combination of these factors causes very complex fire behavior patterns.

Type VIII fires have multiple separate flame fronts. Any intensely burning fire having any of the burning characteristics of Type I – VII fires tend to fragment into two or more

heads fires when the flame front becomes long. Causes include fuel variations, changes in terrain, barriers to flame passage and separate convective weather and fire behavior cells within the incident area. Multiple heads can result in unburned islands of vegetation inside of the burned perimeter of the fire.

Finding: *The last major fire to impact the Preserve (October 2003 Cedar Fire) was a Type VIII fire, with a minimum of four separate head fires that crossed over the landscape in a relatively narrow (two mile) area, as witnessed by the Consultant.*

3.3.4 Preserve Fire Behavior

There is a need to characterize rate of spread and intensity of any wild fire that could potentially impact the Preserve lands.

During planning stages, this information can be used to define the conditions under which a prescribed burn could be ignited. The rate of spread of potential fire intensity gives planners the ability to:

- Define stated objectives for the prescribed burn
- Define strategies for maintaining control of the prescribed burn

Predicted rates of spread and intensity are also important for determining fire suppression strategies during a wild fire event.

There is a wide range of fire characteristics, with rate of spread and intensities spanning three magnitudes of order.

3.3.4.1 Rate of Spread

Rate of spread is measured from any point on the fire perimeter in a direction perpendicular to that perimeter. Rate of spread can vary considerably due to changing conditions influencing fire behavior; it is identified as an average value over a given time period.

The fastest rate of spread is at the flame front, with flank spread rates having an intermediate value and backing fires having the slowest figures. However, a backing fire can change quickly with a wind shift, changing a slow spreading flanking fire into a major fast spreading head fire.

Slope and wind affect the rate of spread because both can tip the flame front toward or away from the available fuels. Interaction between wind and slope depends on the magnitude and direction of influence of each. If the wind is blowing upslope, there is a cumulative effect, with the flame front progressing rapidly upslope. During Santa Ana events, the reverse effect may, and often does, occur, with the flame front moving rapidly downslope under wind influences.

ROS (ft/min)	Typical Fire Situation	Equivalent To:
1	Litter fire, no wind, no slope	Line building rate for one person in heavy vegetation
25	Aged medium slash, 100% Slope	Backpacker climbing 100% slope
250	Low sagebrush, Santa Ana winds	Brisk walk on level ground
800	Chaparral, Santa Ana Wind	Good pace for marathon run
1200	Dry short grass, high wind	4 minute mile

Rate of Spread

Finding: *BEHAVE fire modeling indicates that the Rate of Spread for fires on the Preserve range between 74 and 485 feet per minute (excluding FM-4 ROS values)*

3.3.4.2 Intensity and Flame Length

"Intensity" is heat release rate per unit of time.

There are several ways of characterizing intensity. Reference is sometimes made to the intensity of the whole fire, but quantification of intensity for a specific area of the perimeter is appropriate for most applications.

"Reaction Intensity" is a heat release rate per minute from one square foot of fuel while in the flaming zone.

"Heat per Unit Area" is the heat released from a square foot of fuel for the entire time the flaming zone is in that area. Heat per Unit Area is calculated from the reaction intensity times the residence time of the fire moving through the fuel and is a factor of the fuel's diameter.

HEAT LOAD BTU/square foot	FUEL CONSUMED Tons/acre	Energy Release in 1 SF would:
300	0.75 (grass)	Warm up 2 quarts of stew
1200	3 (tall grass)	Boil away 1 pint of water
4000	10 (1 inch of pine duff)	Open car thermostat (5 gallon system)
12000	30 (thinning slash)	Heat 10 Pulaski heads to cherry red
48,000	120 (heavy logging debris)	Melt an aluminum engine block

Total Heat Load

Finding: *BEHAVE fire modeling indicates that the Heat Load for fires on the Preserve ranges between 1629 and 4672 BTU/square foot*

FL (feet)	FIRE LINE INTENSITY (BTU/ft/sec)	FIRE SUPPRESSION INTERPRETATION
<4	<100	Fire can be generally attacked at the head or flanks per persons using hand tools. Handline should hold the fire
4-8	100-500	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Dozers, engines, aircraft can be effective
8-11	500-1000	Fires present serious control problems; control efforts at head probably ineffective
>11	>1000	Crowning, spotting and major runs are probable. Control efforts at head ineffective

Fire Line Intensity Values

Finding: *BEHAVE fire modeling indicates that the minimum flame length for fires on the Preserve ranges between 14.9 and 40.7 feet*

3.3.4.3 Rates of Spread and Firefighter Deployment Operations

Examination of firefighter deaths and near-miss accidents in wild land environments have revealed the presence of a number of common denominators in these incidents:

- Drought conditions
- Temperatures above 90 degrees
- Relative humidity less than 24%
- Fine (grass) fuel moistures less than 6%
- Ignition probability 80-90%
- Frequent spotting occurs
- A significant wind event is in progress

Despite publication of this information over the past few decades, firefighters continue to fail to identify these factors and, further, do *not* identify a time when tactical operations *should* be disengaged under *extreme* burning conditions.

The US Forest Service has developed a Disengagement Guideline Chart to give fire attack crews a rapid reference tool that identifies when fire conditions have reached a critical point where retreat to Safety Zones is necessary. The Chart is intended for Indirect Fire Attack Strategies, operations in patchy and unburned fuels, areas where there is re-burn potential, and where multiple spot fires are occurring.

When disengagement criteria is reached, firefighters *must* retreat via established escape routes to pre-determined Safety Zones or previously burned area where there is no re-burn potential.

The Disengagement Guidelines Chart features four criteria, with different sub-sets of factors to be considered: 1) Mid-flame wind speed; 2) relative humidity levels: 3) Slope steepness; and 4) air temperatures.

The following criteria on the Disengagement Guidelines Chart can be present during Santa Ana – Northeast Wind Events:

- Mid-flame Wind Speeds exceeding 2-8 mph
- Temperatures above 70 degrees
- Slopes exceeding 25%
- Relative humidity below 10%

The Cedar Fire conditions used as worst-case fire behavior conditions for San Diego County have the following parameters:

- Mid-Flame Wind Speeds – 30 mph (before 50% reduction for calculation)
- Temperature – 85 degrees
- Relative humidity – 5 to 8%, depending on weather observation locations
- Fine grass fuel moisture – 1%

Findings: *Comparing Disengagement Criteria and Cedar Fire parameters, fire behavior on Preserve lands under Santa Ana wind event conditions exceeds Disengagement Criteria, indicative of indirect fire suppression operations from long-range distances ahead of the active (and multiple) flame fronts.*

Criteria	Dis-engagement Points	Cedar Fire-Santa Ana Events
Mid-flame Wind Speed	Exceeds 2-8 mph	15-30 mph
Temperatures	Exceeds 70 degrees	85 degrees
Slopes	Exceed 25%	Average 40% on Preserve
Relative Humidity	Below 24%	5 to 8%
Grass Fuel Moisture	Less than 6%	1%
Ignition Probability	80 to 90%	100%

BEHAVE Calculated Rates of Spread

Rates of Spread for SH-2 Moderate Load Dry Climate Shrub fuel model in the canyon and slopes at the center of the Preserve were modeled as being 74 feet per minute or 1.2 feet per second.

The rate of spread for the SH-5, Heavy Load Heavy Load, Dry Climate Shrub environment was modeled as 491.7 feet per minute or 8.195 feet per second.

The rate of spread for Fuel Model # 4 Chaparral fuel environment was modeled as 834 feet per minute or 13.915 feet per second.

3.3.3.4 Hose Lay Production Rates

Training and Certification Production Rates

During Basic CAL-FIRE Firefighter Academies, firefighter candidates are expected to perform a 550 foot-long progressive hose lay in five (5) minutes, or 1.6 feet per second.

Operational Production Rates

During Strike Team deployments, the California Fire Service and Rescue Emergency Mutual Aid System *Strike Team/Task Force Leader Manual* indicates that a three (3) engine company progressive hose lay operation with nine (9) firefighters should have a production rate of 100 feet every four (4) minutes (0.42 feet per second).
The following table shows firefighter travel rates compared to rate of fire spread for various conditions.

Slope (%)	FF Rate of Travel (ft/s)	Wind speed (mi/h) 20'	Fire spread rate, Flame length, Safety zone minimum size											
			Grass[1]			Shrubs[2]			Crown Fire[3]			Surface Fire Beneath Tree Canopies[4]		
			R/S (ft/s)	FL (ft)	SZ (ft)	R/S (ft/s)	FL (ft)	SZ (ft)	R/S (ft/s)	FL (ft)	SZ (ft)	R/S (ft/s)	FL (ft)	SZ (ft)
Flat (0)	4	0	.07	3	12	.07	5	20	.1	10	40	.03	4	16
		10	1.4	11	44	1.6	21	84	1.3	70	280	.2	10	40
		20	3	16	16	4	33	132	3	145	580	.5	14	52
		30	6	20	80	8	42	168	5	220	880	.8	17	68
Low (10-20)	3	0	.1	4	16	.1	7	28	.2	20	80	.05	5	20
		10	1.5	11	44	1.7	21	84	1.4	75	300	.2	10	40
		20	4	16	64	4	33	132	4	150	600	.5	14	52
		30	6	21	84	8	42	168	5	225	900	.8	17	68
Moderate (20-40)	2	0	.4	7	28	.3	11	44	.2	25	100	.1	6	24
		10	1.8	12	48	1.9	23	92	1.7	80	320	.3	11	44
		20	4	17	68	5	34	136	4	160	640	.6	14	56
		30	6	21	84	8	43	172	6	235	940	.8	17	68
Steep (40-60)	1	0	.9	9	36	.7	15	60	1.1	55	220	.2	9	36
		10	2	13	52	2	28	112	2	100	400	.4	12	48
		20	4	18	76	5	35	140	4	175	700	.6	15	60
		30	7	22	88	8	44	176	6	250	1000	.9	18	72

(**Source:** ***Strike Team/Task Force Leader Manual)***

Production in Chaparral Type Fuels

Analysis of rates of fire spread through chaparral type fuels indicate disparities between, hose line production rates and firefighter travel rates:

- BEHAVE modeling of rate of fire spread in SH-5 is 8.195 feet per second
- Training hose line production rate is 1.6 feet per second
- Fire ground hose line production rate is 0.42 feet per second
- Fastest firefighter travel time on flat ground is 4 feet per second,
- Firefighter travel rate reduces to 2 feet per second on moderate steep (20-40%) slopes
- Firefighter travel rate further reduces to one foot per second on steep slopes between 40 and 60%.

This data indicates that a direct fire attack on chaparral type fuels on the slopes in the center canyon area of the Preserve cannot physically stop the advancement of the fire across the landscape. Fire suppression operations under these conditions requires a lengthy extended hose lay operation along the flanks, with indirect attacks, in the form of aerial retardant drops, helicopter water drops and construction of bulldozer lines and other control lines, in advance of the flame front.

SECTION 4
ENVIRONMENTAL IMPACTS & CONSTRAINTS

4.1 San Diego County Multiple Species Conservation

The Preserve is located within the boundaries of the Metro-Lakeside-Jamul MLJS) Segment of the County of San Diego Multiple Species Conservation Program (MSCP).

The MSCP is a comprehensive habitat conservation planning program that addresses multiple species habitat needs and the preservation of native vegetation communities in a 900 square miles area in southwestern San Diego County. It is one of three sub-regional habitat planning efforts that coordinates biodiversity preservation with other habitat programs in Southern California.

4.1.1 – Purpose and Need

Urbanization of San Diego County is severely impacting the region's biodiversity and its long-term biological viability. The dedicated MSCP Area contains a large portion of the County's current or proposed urbanization that threatens the remaining native habitats by development. Many native vegetation habitats are considered sensitive by State and Federal agencies because their natural distribution has been severely reduced by the urbanization process.

San Diego County has over two hundred plant and animal species that are Federally and or State listed as endangered, threatened or rare. More than 50% of these species exist in the MSCP Area, which covers approximately 20% of the total land mass.

The MSCP prioritizes the highest quality coastal sage shrub for preservation, while allowing continued development in less important sage environments. Now approved and effective, the MSCP uses local sub-area plans to replace the Section 4(d) restrictions on coastal sage scrub communities.

4.1.2 - Biological Goals

Southwestern San Diego County's ecosystem has a diverse vegetation habitat that supports a wide variety of plant and animal species.

The MSCP was developed to conserve the biodiversity and functions of the ecosystem through preservation and adaptive management of large blocks of interconnected habitat, with smaller areas supporting rare vegetation communities. It was also designed to conserve specific species at levels that meet the Take Authorization issuance standards of Federal and State Endangered Species Acts. Maintaining ecosystem functions and maintaining and providing for the persistence of existing populations of covered species is the biological goal of the MSCP.

Approximately 41% of the MSCP Area has been developed or urbanized and about 5% is used or agricultural operations. The remaining Area is covered by several distinct vegetation communities or habitat types. With the exception of eucalyptus woodland, non-native grasslands and some forms of chaparral, these native communities are considered sensitive or rare. Some of the habitats have Federal or State regulatory protections, such as wetland habitats, coastal sage scrub and other scrub habitats.

4.1.3 – Guidelines for Land Use in Preserves

The design process of MSCP Preserves incorporates these biological, ownership, land use and economic goals:

- Preservation of optimal amounts of Core Biological Resource Areas and linkages
- Maximize inclusion of public lands with each Preserve
- Maximize inclusion of existing open space areas
- Make Preserves affordable
- Share costs equally among all beneficiaries

Site specific land use compatibility may differ between individual sub-plan area, depending on a number of factors. If there are any inconsistencies or conflicts between the MSCP and local sub-area plans, the specific guidelines or requirements of the sub-area plan take precedence.

4.1.3.1 - Public Use

One of the MSCP key objectives is to provide public recreational and educational opportunities in each Preserve while providing adequate protection of biological resources. Riding and hiking trails, as a passive recreational activity, are allowed in appropriate sections of a Preserve. Other passive activities include:

- Photography
- Bird watching
- Scientific research
- Public education programs
-

Active recreational activities, such as camping, athletic fields or organized sports are usually not compatible with resource preservation efforts. Off-highway vehicle use is not compatible inside of Preserves and linkage areas except on limited designated roads as specified in local plans.

4.1.4.2 - Agricultural Uses

The MSCP deems agricultural uses as compatible with adjacent preserve areas. The Plan recognizes that agricultural lands are important to wildlife needs, providing linkages between native habitats and foraging habitat for raptors. In additional, agricultural lands often provide a transition area between the preserve and intensive development.

4.2 Metro-Lakeside-Jamul Segment Sub-Area Plan

The Metro-Lakeside-Jamul Segment of the County Sub-Area Plan includes lands that are under the jurisdiction of the County of San Diego and that are within the MSCP planning area.

4.2.1 Biological Resources in MLJ Segment

The MSCP Habitat Evaluation Map and the Wildlife Agencies' Biological Resources Core Area and Linkage Map indicate there are biological resources with significant status on the MLJ Segment lands. These areas meet criteria indicating they have significant importance for meeting MSCP biological goals for covered species and vegetation.

The MSCP has established conservation goals for habitat types; the goals for each sub-area and Segment plan were subsequently evaluated by the Wildlife Agencies for completeness and applicability.

The Biological Goals established for the M-L-J Segment are focused on protecting the following habitat communities:

- Coastal sage scrub
- Chaparral
- 85 other species of wildlife and vegetation

4.2.1.1 Public Access and Recreational Activities:

- Allowed in specific areas of the Segment
- Access points, trails, facilities and a Public Control Plan must be included in the area specific habitat management plan and management directives.
- Riding and hiking trails
- Passive recreational activities

4.2.1.2 Land Uses Adjacent to Preserves

Residential land uses are the most common use located next to Preserves, usually with associated roads, manufactured open spaces, recreational facilities and commercial uses.

The following land uses are allowed to be adjacent to the MLJ Segment Preserve Lands:

- Manufactured open spaces
- Recreational facilities
- Water reservoirs
- Agricultural and grazing lands
- Passive recreational activities
- Scientific research
- Golf courses

The following guidelines will be used when planning and implementing uses adjacent to Preserves in the MLJ Segment:

- Plant materials for landscaping manufactured open spaces, road cuts/fills and recreational facilities should consist of native species similar to or compatible with the adjacent habitat in the Preserve. These species should be based on plants with genetic materials of the area
- Areas subject to heavy human use shall be located away from the edge of the preserve
- Lighting shall be confined to areas needed to ensure public safety and limited to low pressure sodium fixtures that are shielded and directed away from the preserve
- Fencing along the preserve boundary is not mandatory but shall conform to existing regulations or included in the applicable Specific Plan
- No buffers are required outside of the preserve system
- All open space requirements for the system shall be incorporated into the preserve

4.3 County of San Diego Resource Protection Ordinance and Steep Slope Requirements

The San Diego County Supervisors has found that the unique topography, ecosystems and natural characteristics of the County are fragile, irreplaceable resources that are vital to the general welfare of all County residents. Further, special controls on development must be established to protect steep slopes and biological habitats, requiring strengthened preservation protections through the County's Resource Protection Ordinance (RPO).

Steep slope lands are defined as all lands having slopes exceeding a natural 25% gradient, with a minimum rise of elevation of fifty (50') feet unless severely disturbed by previous legal grading.

When any portion of a parcel contains environmentally sensitive lands, the RPO stipulations shall be imposed on all portions of the parcel having these sensitive areas. The remainder of the parcel will be subject to RPO stipulations only to the extent necessary to achieve the purpose and intent of the RPO.

If the RPO Study identifies environmentally sensitive lands, one of more of the following mitigations shall be taken:

- Open space easements will be established to all environmentally sensitive lands on the parcel; *or*
- The entire parcel shall be re-zoned to a special designator for sensitive lands; *or*
- Other actions as determined and imposed by the planning decision body

When 10% or more of a parcel contains steep slope lands, that area shall be placed in an open space easement unless the parcel is greater than forty (40) acres or placed in a designated sensitive resource area lot.

The following types of development are allowed on steep slope lands:

- All public roads identified in the County's General Plan Circulation Element, if no less damaging alternatives can be identified
- Local public and private streets necessary for access to development sites, if no less damaging alternatives can be identified
- Public and private utility systems
- Areas with native vegetation that have been cleared or trimmed to protect existing or proposed buildings, provided brush management is the minimum necessary to comply with applicable Fire Codes or orders of fire safety officials. Vegetation must retain its root ball system or have slopes planted with native vegetation having low fuel content. The natural landform may not be altered
- Trails for passive recreational use

4.3.1 Waivers of Open Space Easement

RPO Steep Slope Open Space Easements may be waived when the planning official considering an application makes the following findings:

- The slope is an insignificant visual feature and isolated from other land forms; *or*
- Surrounding properties have been developed on the steep slope lands and the Preserve may be considered an "in-fill"; *and*
- The property is zoned for one-half acre lots or smaller; *and*
- Greater encroachments is consistent with the goals and objectives of the applicable community plan; *and*
- Site Plan reviews are required to ensure consistent design with the RPO regulations

Development, grading, grubbing, clearing or any other activity or use that damages sensitive habitat lands is prohibited. However, the planning authority may allow development when all feasible measures necessary to protect and preserve the sensitive habitat lands are required as a Condition of permit approval and where mitigation provides an equal or greater benefit to the affected species.

4.4 Limitations of Vegetation Management for Fire Protection Purposes

Vegetation management that provides defensible space and fire protection mitigations on MSCP Preserves, linkages and lands are conditioned by the following documents:

- The most current edition of the California Fire Code
- The most current edition of the San Diego County Consolidated Fire Code
- Section 4291 of the California Public Resources Code
- San Diego County MSCP
- San Diego County RPO
- San Diego County Fire Agencies-Wildlife Agency Memorandum of Understanding
- San Diego County Defensible Space for Fire Protection Ordinance

4.4.1 MSCP Provisions

The MSCP document indicates that residential, industrial, institutional and commercial uses are generally separated from Preserves with fuel modification zones of varying widths. The width of fuel modification zones depends on each Preserve's circumstances. The MSCP document also stipulates that specific details for Preserve sites are described in the MSCP base document, in sub-area plans and specific Preserve site documents.

The intent of fuel modification zones is to protect various uses adjacent to the Preserve from wildfires. The fuel modification zone may also protect Preserve resources by controlling certain "edge effects" that would otherwise impact lands inside of the Preserve by fire spreading across the landscape and into Preserve lands.

For Preserve properties controlled by public land trusts, the trust is responsible for maintaining the fuel modification zones.

When fuel modification zones are established, no other fuel management mitigations on residential, industrial, institutional, commercial or other land uses are required.

4.4.1.1 - Fire Management Stipulations

Fire management includes two activities with different objectives:

- Fire management for human safety, protection of property and hazard reduction
- Fire management for biological resources

Many vegetation communities in the MSCP depend on a regular cycle of burning for maintaining the optimal species balance, seed viability and reproduction. The natural fire cycle is affected by human activities by either increasing fire activity over decreased time spans or decreasing fire activity by fire prevention and protection requirements. However, fire management for human safety must continue in a manner compatible with biological resource preservation mandates.

The MSCP strongly suggests that detailed fire management plans should be prepared in a cooperative effort by Preserve managers and the local Fire Authority Having Jurisdiction (FAHJ). This will insure that both fire safety and biological preservation efforts are successfully met and implemented by the involved parties.

The MSCP also infers that brush management to reduce fuel for the protection of urban land uses must be implemented when new or existing development occurs adjacent to Preserves and associated open space lands.

The fuel modification zone between a Preserve and development will have different depths, depending on local conditions, and may or may not be located on Preserve lands. Similarly, ownership and management of fuel modification zone may change depending on local circumstances, with private owners responsible for management on their own properties or the Preserve providing this function on Preserve lands.

Each sub-area plan is responsible for establishing fuel management guidelines and provisions that are acceptable to the local FAHJ. The guidelines will impact Preserve management costs and any public and private liability impacts associated with fire prevention and protection measures.

San Diego County fire authorities have established a Memorandum of Understanding with the State and Federal Wildlife Agencies for implementing county-wide planning, construction and fuel modification zone standards. The objectives of the MOU specifically state that the MOU's stipulations will provide uniform fire management and habitat preservation standards throughout the County.

4.4.2 Metro-Lakeside-Jamul Sub-Area Stipulations

The MLJ Sub-Area Plan has established the following minimum guidelines for establishing and managing Preserve fuel modification zones:

- Vegetation inside the Preserve fuel modification zone may be thinned, mowed, pruned and/or removed as necessary
- The owner may use supplmental planting if it is acceptable to the local fire authority and is a non-invasive species.
- Ownership of actual fuel modification zones may vary according to the site. As appropriate, the fuel modification zone may be incorporated within the boundaries/perimeter of the Preserve itself
- Fuel management responsibilities will change according to the specific requirements of the Preserve or approved Preserve.
- Fencing, lighting and signage are permitted in fuel modification zones at the discretion of the individual land owner or Preserve operator.

4.4.3 San Diego County Fire Jurisdiction-Wildlife Agency MOU Stipulations

The San Diego County Fire Chief's Association Wildland Interface Task Force has prepared and implemented county-wide brush management guidelines in concert with State and Federal Wildlife Agencies. This MOU was executed in February 1997 after completion of aFederal Endangered Species Act Section 7 Consultation by the US Fish and Wildlife Service.

A secondry Memorandum of Agreement is being developed between the Wildlife Agencies, CAL-FIRE and the Bureau of Land Management regarding incident response, fuel and fire management and the use of controlled burns for MSCP management practices.

The combined MOU and MOA establishes the basis for ensuring that fire control activities, fire prevention and controlled fire for vegetation and habitat management are integrated into the MSCP management plan and that the establishment of Preserves will not create additional restrictions on fire protection services.

Fire management activities are permitted within MSCP lands when provided according to a fire management plan approved by the Wildlife Agencies, the County and Fire Districts as part of area-specific management directives. Preparation of a stand-alone fire management plan is an optional alternative and may be instituted by either the MSCP preserve manager, jurisdiction, landowner or Fire District.

Fire suppression personnel and equipment shall use any necessary tactics and strategies necessary to control and extinguish wildfires on, or adjacent to, Preserve lands.

Fire suppression tactics and strategies are permitted adjacent to and within *any* Preserve established by the MSCP. No mitigations are required for any "take" of covered species during any fire fighting operation.

4.4.3.1 – MOU Guidelines

The MOU establishes guidelines that allow San Diego County fire departments to continue to protect lives and property from fires by requiring the abatement of flammable vegetation according to local and County ordinances and municipal codes.

It also establishes a cooperative mechanism to allow the Wildlife Agencies to assess, minimize and help account for potential adverse effects to sensitive species and habitats resulting from vegetation management and abatement programs.

The MOU has the following preliminary determinations about the threat of wildfire in San Diego County:

- Areas immediately surrounding real property improvements, whether undeveloped wildland areas or altered in some manner, do not generally constitute core natural habitat areas
- These areas usually do not support sensitive habitat species because of their proximity to human activities
- Uncontrolled wildfires pose an imminent threat to human lives and property
- Uncontrolled wildfires are a part of the natural disturbance cycle of adjacent wildland areas
- The propensity of wildfires to carry fire into human development areas usually necessitates providing fuel breaks to reduce or eliminate the likelihood of property damage
- Properly maintained fuel modification zones and fire breaks reduce the incidence of non-natural fires spreading from developed lands into natural land and lower the impacts of unseasonable or frequent fires to listed species and their habitats

Under the terms of the MOU, the following regulatory guidelines are established:

1. Fire Districts are responsible for ensuring compliance with District ordinances, California Fire Code, California Health and Safety Code and California Public Resources Code regarding flammable vegetation abatement.

2. CAL-FIRE is responsible for assuring compliance with the California Public Resources Code regarding flammable vegetation abatement
3. The US Fish and Game Service is responsible for enforcing the Endangered Species Act of 1973
4. The California Department of Fish and Wildlife is responsible for enforcing the California Endangered Species Act and Native Plant Protection Act

The management puposes of the MOU include:

1. The *mandatory* provisions of California Public Resources Code Section 4290 for fire protection include:
    a. All measures necessary to implement minimum defensible space fire safety standards on State Responsibility Lands are under the authority of CAL-FIRE.
    b. Measures necessary to implement minimum safety standards related to fuel breaks and greenbelts
    c. Other measures as determined by the Director of CALFIRE

2. *Mandatory* fire protection measures of California Public Resource Code Section 4291 include:
    a. Maintenance of fire breaks around and adjacent to any building in, upon or adjoining any mountainous area or forest covered lands, brush covered lands or grass covered lands or any land covered by flammable materials
        i. Firebreak shall be made by removing and clearing away all flammable vegetation or combustible growth
        ii. For a minimum distance of thirty feet on each side of the building, or to the property line, whichever is closer
    b. Maintenance of an additional firebreak around and adjacent to any building which is located between thirty (30') and one-hundred (100') feet around the building, or to the property line, whichever is closer.
        i. The additional firebreak is required when CAL-FIRE determines that extra hazardous conditions exist and the thirty (30') foot wide fire break is not sufficient to provide reasonable fire safety
        ii. Grass and other vegetation thirty (30') feet or more from the building or structure shall be maintained less than eighteen (18") inches high when necessary to stabilize soil and prevent erosion.

3. Any fire mitigation measures deemed necessary by the Fire Chief according to the Guidelines section of the MOU

4.4.3.1.1 - Specific Fire Mitigation Guidelines

The following guidelines may be implemented by individuals owning or leasing property in the jurisdiction of:

- County of San Diego
- Cities within the County of San Diego
- CAL-FIRE

- Fire Districts

Improved Properties

Property owners, lesses and the Fire Authorities Having Jurisdiction shall be permitted to:

- Clear *all* flammable vegetation within a 100 foot radius of *all* structures
- Use mowing and trimming to accomplish clearing of flammable vegetation
- Expose bare mineral soil while leaving vegetation root balls intact

If the distance from the building to the property line is less than the required clearing distance, adjacent owners, lesses and FAHJs shall be permitted to establish the required fire break to the property line and no further.

The removal of flammable vegetation does not apply to single specimens of trees, ornamental shrubbery or similar plants if the FAHJ determines that they do not form a means of rapidly transmitting fire from native growth to buildings

Unimproved Properties

Property owners, lesses and the Fire Authorities Having Jurisdiction shall be permitted to established fuel breaks on unimproved properties if required, based on written FAHJ Findings, to protect improved properties or public safety.

The FAHJ may *only* declare a fuel break necessary when:

- There is unusually high fuel loading on the subject property
- The property is in a high fire severity area
- The property is in a very high fire severity area
- The findings are presented to the resource protection agencies a minimum of ten (10) days before issuing abatement orders

If the resource protection agencies do not respond to the FAHJ Findings, the parties *may* complete the vegetation abatement and will *not* violate the terms of the MOU

Clearing may be done using methods that leave the plant rootballs intact for soil stabilization. Clearing is not limited to mowing and trimming; discing that exposes bare mineral soil may be used if deemed necessary by the FAHJ.

Biological Surveys

Property owners, lessees and FAHJs are *not* required to perform biological surveys as a conditional precedent to performing fire protection activities.

SECTION 5
DEFENSIBLE SPACE & FUEL MANAGEMENT PRACTICES

5.1 Existing Preserve Conditions

There are no existing or proposed structures and buildings on the Preserve site.

Any future structures and outbuildings constructed on the Preserve property is required to provide Code compliant defensible space around the perimeters of all buildings and structures.

Buildings and structures erected in designated Very High Fire Severity Areas (VHSFA) and State Responsibility Area (SRA) brush-covered lands are required to have defensible space and fuel modification zones. These areas generally have depths measuring 100 feet between the building walls and unmanaged vegetation.

SRA lands are under the jurisdiction of CAL-FIRE for direct fire suppression responsibility of vegetation fires.

As is common throughout California, local cities and fire protection district lands may be included in CAL-FIRE administered SRA zones. The local fire agency is assigned direct responsibility for providing structural firefighting operations during vegetation fire incidents when SRA lands overlap areas within their jurisdiction. Local fire agencies may also engage in wildland fire suppression activities, including, but not limited to, areas where there are extended CAL-FIRE response times because of geographical or geological constraints and conditions.

Preserve lands are in both State Responsibility Area (SRA) and lands that CAL-FIRE has designated as VHFSA.

5.2 Existing Off-Site Defensible Space Conditions

There are approximately thirty-six (36) single family dwellings and commercial buildings adjacent to the eastern Preserve lands.

These will be directly exposed to fire behavior and flame front spread either originating on Preserve lands or from off-site wild fires spreading through the Preserve under anticipated extreme fire weather conditions.

Evaluation of the off-site developed residential parcels indicates that required Defensible Space measures are *not* compliant with applicable Codes and Ordinances, often with sub-standard fuel modification zones that are overgrown with unmanaged flammable vegetation and minimal depths.

All of these parcels were impacted by flame front exposure during the 2003 Cedar Fire. After the fire, burned-down buildings were replaced during the Cedar Fire Recovery Period. Each rebuilt, and subsequently built, buildings were conditioned with mandatory defensible space and fuel modification zones.

The San Diego County Consolidated Fire Code and ordinances of the Lakeside Fire District makes *each* individual property owner, or lessee responsible for providing Code compliant defensible space on parcels under their control and management.

The Preserve is *not* responsible for maintaining adequate defensible space on adjacent properties when an owner or lessee fails to provide adequate and Code compliant fuel modification zones around buildings or on their parcels.

5.3 Defensible Space Prescriptive Code Regulations

Defensible space requirements and specifications are found in the San Diego County Consolidated Fire Code, California Fire Code, California Public Resources Code, California Health and Safety Code and the California Government Code

NOTE: All of these prescriptive regulations have exception clauses that allow diminished defensible space depth if sufficient clearance cannot be accomplished because of parcel constraints.

If there are parcel constraints, "Zone 1" defensible space (the removal of all native vegetation and their replacement with fire- and/or drought-resistant species and "approved", irrigated landscaping) is established between buildings and property lines.

Recent revisions to State legislation *limits* extension of defensible space past a maximum 100 foot deep defensible space depth for properties in extra hazardous locations.

Defensible space may be extended past 100 feet only *after* an evaluation by CAL-FIRE (or Local Fire Authority)Fire Prevention personnel *and* when *written* justification for extending defensible space depth has been given to the property owner.

Property owners *cannot* be required to provide off-site fuel modification zones and defensible space beyond their property lines.

5.4 Defensible Space and Vegetation Management Practices

5.4.1 Preserve Defensible Space and Fuel Modification Zones Requirements

At the time this Fire Protection and Fuel Management Plan (August 2019) was written, both sections of the Preserve were undeveloped and closed to public access. This may be subject to change in the future.

With Preserve lands in an undeveloped and closed to the public state, minimal defensible space and/or fuel modification zone construction requirements are needed to insure public safety.

The major foreseeable defensible space requirements for the Preserve in the immediate and continuing future is providing roadside fuel modification zones along the eastern shoulder of SR-Highway 67 for the entire lengths of both the Southern and Northern Segments of Preserve lands.

5.4.1.1 California Government Code Section 51182

Section 51182 of the California Government Code is referenced in Chapter 49 of the California Fire Code for stipulating the details of minimum defensible space requirements for Very High Fire Severity Areas.

While referenced in the California Fire Code, the California Government Code is a document containing statutory regulations enacted by the State Legislature, and signed by the Governor, instead of being adopted by reference from a consensus model code organization. As a legislated document, the Government Code's regulations and content takes precedence over the content and regulations promulgated in a referenced model code, including those adopted and amended by local governments.

While the Section 51182 requirements are applicable to all buildings and structures in a Very High Fire Severity Area, Section 51184 provides an undeniable exclusion from Section 51182 requirements for habitats for endangered or threatened animal and vegetation species and dedicated open spaces:

(a) Section 51182 shall not apply to any land or water area acquired or managed for one or more of the following purposes or uses:

(1) Habitat for endangered or threatened species, or any species that is a candidate for listing as an endangered or threatened species by the state or federal government.

(2) Lands kept in a predominantly natural state as habitat for wildlife, plant, or animal communities.

(3) Open space lands that are environmentally sensitive parklands.

(4) Other lands having scenic values, as declared by the local agency, or by state or federal law.

(b) This exemption applies whether the land or water area is held in fee title or any lesser interest. This exemption applies to any public agency, any private entity that has dedicated the land or water areas to one or more of those purposes or uses, or any combination of public agencies and private entities making that dedication.

(c) This section shall not be construed to prohibit the use of properly authorized prescribed burning to improve the biological function of land or to assist in the restoration of desired vegetation.

(d) In the event that any lands adjacent to any land or water area described in subdivision (a) are improved such that they are subject to Section 51182 , the obligation to comply with Section 51182 shall be with the person owning, leasing, controlling, operating, or maintaining the occupied dwelling or occupied structure on the improved lands. All maintenance activities and other fire prevention measures required by Section 51182 shall be required only for the improved lands, not the land and water areas described in subdivision (a).

Sub-section d of 51184 *clearly* indicates that defensible space and fuel management requirements apply to lands exempted by 51184 only when:

- Portions of the exempted lands are improved and/or provided with buildings or structures
- Defensible space is only applied to the improved areas within the Habitat or Open Space

The exclusionary language of Section 51184, therefore, applies to the remaining undeveloped portions of the Open Space or Habitat preserve that do *not* have building improvements.

Finding: *The California State Legislature has enacted a law that specifically exempts undeveloped designated animal and vegetation habitats for endangered and threatened species and dedicated Biological Open Spaces from defensible space and fuel modification regulations.*

Finding: *The Legislature exempts all bodies of water and land within a Habitat or Open Space from defensible space regulations in Very High Fire Severity Area except for limited areas around developed buildings and structures on the site.*

Finding: *Legislated statute law takes precedence over local Fire Code regulations under the State Preemption Rule; regulations codified at a local, District or County level have no legal standing when legislated law has been enacted by the State Legislature to cover the same fire and life safety matters as a general State interest applicable throughout California.*

5.4.1.2 Roadside Fuel Modification Zones

Roadside Fuel Modification Zones have been a defensible space requirement in San Diego County since the 2007 Code Adoption Cycle.

Prior to the 2017 County Consolidated Fire edition, Roadside Fuel Modification Zones were a *mandatory* prescriptive requirement. Effective 2017 edition, roadside defensible space became a *discretionary* code enforcement function, as indicated below.

Sec. 4907.2.1 Fuel modification of combustible vegetation from sides of roadways. The FAHJ may require a property owner to modify combustible vegetation in the area within 20 feet from each side of the driveway or a public or private road adjacent to the property to establish a fuel modification zone. The FAHJ has the right to enter private property to insure the fuel modification zone requirements are met.

Exception: The FAHJ may reduce the width of the fuel modification zone if it will not impair access.

The San Diego County Defensible Space Ordinance, Ordinance # 10147, Section 68.404 (c), effective June 9, 2011, requires a minimum road side defensible space width of ten (10') feet:

(c) Defensible Space along Roads and Driveways. No responsible party shall permit on a parcel any accumulation of combustible vegetation, dead, dying or diseased trees, green waste, rubbish, or other flammable materials within 10 feet of each side of the improved width of highways, private roads and driveways, provided, however, the Fire Warden may require, after providing written notice to the responsible party, a distance greater than 10 feet in accordance with the Defensible Space requirements found in the Fire Code at section 96.1.001 et seq. of the San Diego County Code.

The primary purposes of roadside fuel modification zones are to provide sufficient clearance from flaming vegetation adjacent next to roadways so that:

- Residents, or visitors to a property, may safely evacuate without undue exposure to a flames or excessive radiant heat;
- The roadway corridor is not overrun by a flame front while vehicles are using the road; and
- Ingress and emergency egress routes used by fire suppression personnel, equipment and apparatus and other first responders (law enforcement, emergency medical services, etc.) are protected.

The secondary purposes for these defensible space areas are to:

- Prevent ignition of susceptible vegetation next to roadways from purposely or negligently discarded cigarettes and other smoking;
- Prevent ignition of susceptible vegetation next to roadways caused by hot or flaming motor vehicle catalytic converter components, discharges from faulty or failing automotive mechanical operations and hot or flaming carbon particles emitted by diesel engine-powered vehicles proceeding up steep grades under moderate to heavy load conditions.
- Provide improved conditions for fire containment along road way corridors

The basic prescriptive width of roadside fuel modification zones is ten (10') feet on *each* side of *any* driveway and public or private roads.

Determination: *The Lakeside Fire Protection District may recommend the imposition of roadside defensible space, following prescriptive Ordinance requirements, along the length of SR-Highway 67 where it parallels the Preserve's western border and property line(s).*

Determination: *The Department of Parks and Recreation the option of accepting the*

recommendation since prescriptive ordinances have no legal authority over habitats for endangered or threatened species habitats and dedicated Open Spaces, as described in Government Code Section 51184.

If the Department of Parks and Recreation accepts and implements the roadside defensible space recommendations, the following standards apply.

Southern Preserve Segment

The Southern Preserve Segment, based on existing and long-term foreseeable topographical, vegetation and open space conditions that will negate future development of the land, requires a dedicated, in-perpetuity roadside modification zone.

Based on the variable hillside slopes and light vegetative fuel loads adjacent to the north-bound lanes of SR-Highway 67, prescriptive or performance-based design roadside fuel modification zones are required for the Southern Preserve Segment.

1. Roadside fuel modification zones should comply with the prescriptive language of the Lakeside Fire District Ordinances where there are no topographical or safety working constraints.

Prescriptive roadside fuel modification zones should provide Code compliant minimum widths of ten (10') feet.

The width of the roadside defensible space should begin at the edge of pavement for the emergency parking strip, whether painted or not, and shall extend laterally in an easterly direction past the edge of the road's paved surface until the required depth is achieved.

Vegetation adjacent to the paved surface of the highway shall be removed to bare soil, leaving the root structure intact to prevent erosion and provide soil stability. Individual plant specimens that will not contribute to rapid fire spread or heat release potential, may be exempted from this requirement.

2. Roadside fuel modifications may comply with performance-based mitigations, which meet the intent of Lakeside Fire Protection District and County of San Diego Ordinances, where there are topographical or safety working constraints.

Portions of the SR-Highway 67 right-of-way corridor's eastern shoulder have steep, rocky cut-banks that limits or which may not support establishment and continued growth of vegetation. The steepness of these cut banks limits access and safe working conditions for vegetation management personnel using hand and mechanical tools, making construction of fuel modification zones difficult under the best of working conditions.

The shoulder of SR-Highway 67 has a paved, ten (10') foot wide emergency parking lane that runs parallel to the length of the Southern Preserve Segment's western boundary.



Existing SR-Highway 67 Emergency Parking Configuration Approaching Southern Preserve Segment (9-2-19)

Finding: *Asphaltic concrete (asphalt; macadam) driving surfaces have been determined to have non-combustible equivalency consistent with Fuel Modification Zone I specifications*

Northern Preserve Segment

Based on the length of the roadway corridor, multiple steep canyons and hillsides paralleling the north-bound lanes of SR-Highway 67, and the unmanaged vegetative fuels with varying light to high loading, the Lakeside Fire Protection District recommends an in-perpetuity roadside fuel modification zone for the Northern Preserve Segment.

The road shoulder of the Northern Preserve Area has a paved width that varies between three (3') and ten (10') feet. This configuration does not provide a continuous emergency parking lane along the western boundary line of the North Preserve Segment.



Configuration of East Shoulder, South End of Northern Segment (9-2-19)



Central North Preserve Segment, Looking South – Eastern Shoulder has 3' Width

Unlike the southern Preserve area, where the hillsides adjacent to the right-of-way corridor rise up and away from the travel lanes, there are multiple steep sided canyons adjacent to the highway.

Fires on slopes in the Southern Preserve Segment, under normal conditions and uphill wind flows, will travel *away* from the roadway.

The canyons and steep slopes in the Northern Preserve Segment have a west-to-east downslope configuration, placing them below the highway. Fires developing in these canyons, or on their steep slopes, will produce flame fronts with rapid rates of spread, long flame lengths and flame heights and increasingly higher heat energy release rates as they progress upslope. Fires in the canyons and on the slopes will predictively release significant and intense ember showers onto and across the highway and onto any passing vehicles.

Lakeside Fire Protection District Roadside Fuel Modification Zone Recommendations:

Beginning at the southwest corner of the Northern Preserve Segment, a permanent roadside fuel modification zone should be established along the eastern shoulder of the north-bound SR-Highway 67 right-of-way lanes until reaching the extreme northern border of the Preserve.

The minimum required width should be ten (10') feet, unless unobtainable due to topographical constraints. The width of this defensible space shall begin at the end of established pavement and extend laterally to the east across the landscape.

All roadside fuel modification zones shall be maintained as defensible space in-perpetuity, with annual, or as reasonably necessary throughout the year, maintenance provided to assure effective and adequate fire protection for motorists and vehicles using the right-of-way if exposed to fires extending upward on slopes and through the canyons.



Example of Compliant Roadside Fuel Modification Zone on SR-67

5.4.2 Preserve Defensible Space Practices for Exposed Off-site Properties

5.4.2.1 Off-site Property Owner Responsibilities (*Not* Related to Preserve Requirements)

The Preserve is ***not*** responsible for providing ***off-site*** defensible space or fuel modification zones ***on*** adjacent non-Preserve owned, operated or managed properties.

Each individual off-site property owner, lessee or manager is prescriptively required to provide and maintain defensible space on lands under their control.

Fuel Modification Zones must be maintained in perpetuity to fulfill the requirements of the Lakeside Fire Protection District local ordinances, the San Diego County Consolidated Fire Code and provided in an individual property's established Fire Protection Plan.

5.4.2.2 On-Site Preserve Mitigations for Adjacent Properties

As stated above, the Preserve is not *legally* responsible for providing *off-site* defensible space for adjacent non-Preserve owned, operated or managed properties.

However, the Lakeside Fire Protection District has determined that unmanaged Preserve lands will threaten developed off-site residential parcels based on fire history and BEHAVE fire modeling. A flame front moving across the landscape from unmanaged Preserve lands will have high fire intensity/heat release rates and rapid to extreme rates of spread, depending on fuel type.

Fuel Model	ROS – hourly	ROS – minute	ROS - MPH
GS-2	18,328.2 feet	305.47 feet	3.47 mph
SH-5	32,010 feet	485 feet	6.0625 mph
FM-4	31,752.6 feet	528.76 feet	6.01375 mph
SCAL 18	31,336.8 feet	522.28 feet	5.935 mph

While not currently required by the current (2017) edition of the San Diego County Consolidated Fire Code, providing property line fuel modification zones between undeveloped parcels mixed with, or immediately adjacent to, established residential or commercial properties *was* a regulatory practice in previous Code cycles.

The San Diego County FAHJ-Wildlife Agencies MOU also supports this concept by allowing property owners, lesses and the Fire Authorities Having Jurisdiction (FAHJ) to established fuel breaks on *unimproved* properties to protect improved properties or public safety.

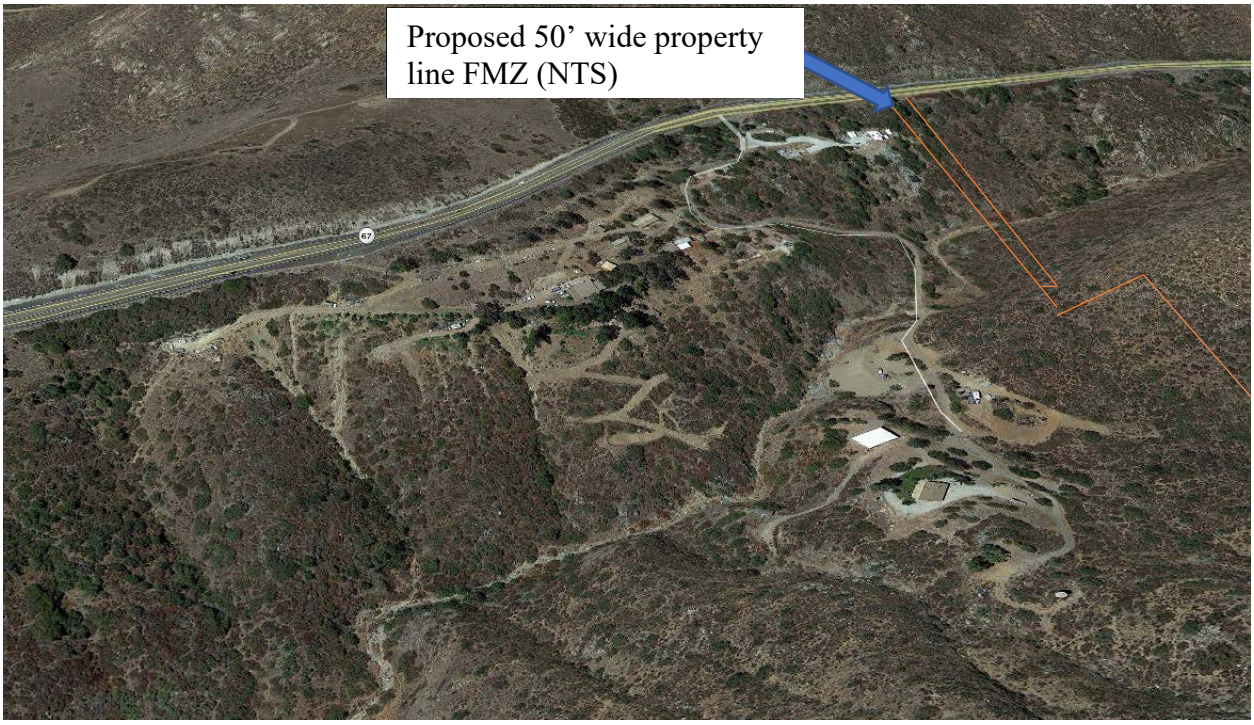
Following the guidelines of the MOU, an FAHJ may declare a property line fuel break necessary when:

- There is unusually high fuel loading on the subject property OR
- The property is in a very high fire severity area

The Preserve currently meets the Very High Fire Severity Area criteria. Conversely, the Preserve is also within the CAL-FIRE designated State Responsibility Area (SRA) lands in southern San Diego County and is considered high risk brush- and grass-covered lands.

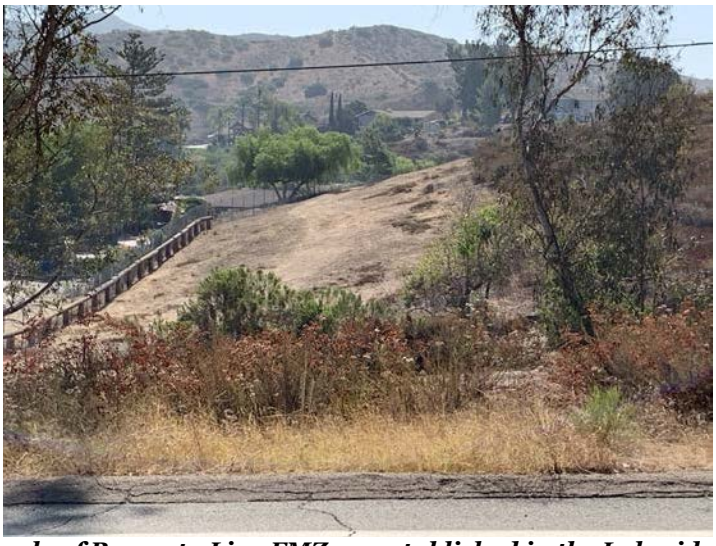
With the establishment of a dedicated Open Space, vegetation management of the interior portions of the Preserve will be minimal, as prescribed in the MSCP guidelines. As such, it is foreseeable that, with time, the former vegetative fuel beds will return to previous fuel loading levels, as were present in the area in the 1960s through 1980s.

Therefore, the Lakeside Fire Protection District may require establishment of a property line modification zone along the north side of the established single family residential properties accessed from the 13800 block of the SR-Highway 67.



The property line fuel modification zone would extend in a west to east configuration, beginning at the eastern shoulder of SR-Highway 67 and descending, initially, into the adjacent canyon below. Upon reaching the canyon bottom, the fuel modification zone will continue upward and eastward along the west-facing slope until reaching the ridge line above. At the ridge line, the fuel modification zone ends.

The objective of the property line fuel modification zone is to reduce flame front rates of spread across the landscape, slowing the penetration of a wind-driven channeling of a fire into the residential development.



Example of Property Line FMZ, as established in the Lakeside FPD

The fuel modification zone will not influence or negate the effects of wind driven ember showers into and across the residential parcels; the objective is to *limit* impacts on the canyon bottom and western slope roadway system, allowing residents to evacuate in a timely manner to the SR-Highway 67 corridor.

The Preserve is ***not*** responsible for providing property line fuel modification zones on the east, west or south sides of the residential areas. These residential property lines are established a significant distance beyond Preserve boundary lines. The Preserve has no property interests in the area between the Southern Preserve Segment and the residential development area.

Property owners in the canyon residential development area are responsible for providing prescriptive defensible space on their individual properties,.

Given the steepness of the canyon sides along the south property line of the Northern Preserve area, it is highly unlikely that mechanical clearing methods (using motorized heavy equipment, i.e., bulldozers or masticators) would effectively provide the recommended defensible space work without exposing operators, or the environment, to unnecessary risks.

Additionally, given the rocky geological conditions in this area, and the existence of moderately to highly combustible vegetative fuels on a year-round basis, it is foreseeable, and highly likely, that mechanical clearing strategies will result in steel-to-rock strikes, which will produce sparks with sufficient heat energy to ignite the surrounding and exposed vegetation. Therefore, defensible space clearing is best accomplished using manual labor, with close attention paid to work practices to insure that accidental ignitions of vegetation do not occur.

Property line fuel modifications shall be developed using methods that leave the plant rootballs intact for soil stabilization. The vegetative canopy of shrub specimens is radically thinned and removed to just above ground level.

Annual grass fuels beneath shrub vegetation is trimmed to remove light fuels capable of sustaining rapid rates of fire spread in the area. The grassy fuels may be trimmed to a suggested level of between six (6") and eighteeen (18") above the ground. Recommended clearing practices for light annual fuel beds include mowing and trimming with hand-held machines using proper fire prevention techniques.

All vegetative debris from the defensible space construction operation shall be removed from the Preserve unless deemed necessary for on-site erosion control or for mulching purposes supporting other Preserve needs.

5.4.3. On-Site Preserve Fuel Modification and Management Practices

At the time of development for this Fire Protection and Fuel Management Plan (August 2019), both sections of the Preserve were undeveloped and closed to public access, but subject to change in the future.

With Preserve lands in an undeveloped and closed public access state, minimal defensible space and/or fuel modification zone construction requirements are needed to insure public safety.

Vegetation management that provides defensible space, fire protection mitigations and environmental stability on MSCP Preserves, linkages and lands are conditioned by the following documents:

- The most current edition of the California Fire Code
- The most current edition of the San Diego County Consolidated Fire Code
- Sections 4291 of the California Public Resources Code
- San Diego County MSCP
- San Diego County RPO
- San Diego County Fire Agencies-Wildlife Agency Memorandum of Understanding
- County of San Diego Defensible Space for Fire Protection Ordinance

The primary intent of providing fuel modification zones on undeveloped lands is to protect various adjacent land uses from wildfires originating on Preserve lands. In its current state, the adjacent lands to be protected are the canyon residential lots sandwiched between the two separate sections of the Preserve.

Fuel modification zones may also protect Preserve resources by controlling certain "edge effects" that would otherwise impact lands inside of the Preserve by fire spreading across the landscape and into the Preserve area. This includes foreseeable fires originating from both accidental and intentional fire starts along the established SR-Highway 67 corridor and, thus, the requirement for roadside fuel modification zones.

5.4.3.1 Characteristics of Major Plant Species on Preserve Lands

The following shrub and chaparral species have been identified as major contributors to the vegetation habitat on Preserve lands:

- Laurel Sumac
- Ceanothus
- Chamise
- Coastal Sage
- Coastal Scrub

Research was conducted on the US Forest Service Fire Effects Information System website to determine their potential hazards. The content of FEIS facilitates the use of research as a basis for sound fuel and fire management of natural vegetation species and habitat communities.

The Fire Effects Information System is an online collection of reviews of the scientific literature about fire effects on plants and animals and about fire regimes of plant communities in the United States.

FEIS reviews are based on thorough literature searches, often supplemented with insights from field scientists and managers. FEIS provides reviews that are efficient to use, thoroughly documented, and defensible.

There are 3 types of FEIS reviews:

1) Species Reviews include information on plant, lichen, and wildlife species' life history, ecology, and relationship to fire. They are available for more than 1,200 species occurring throughout the United States.

2) Fire Studies are summaries of one or more fire research projects at a specific location. Only research that provides detailed descriptions of site characteristics, burning conditions, fire behavior, and fire effects is included in Fire Studies. FEIS contains more than 150 Fire Studies, which complement Species Reviews and provide information on hundreds of species for which a Review is not available.

3) Fire Regime Syntheses provide up-to-date information on fire regimes of ecosystems in the United States. The syntheses provide information from the literature and from LANDFIRE data on historical fire frequency, spatial pattern, extent, and seasonality; historical ignition sources; typical patterns of fire intensity and severity; and contemporary changes in fuels and fire regimes. The detailed analysis in Fire Regime Syntheses supplements the information in Species Reviews and provides fire regime information on plant communities.

The Fire Effects Library houses the literature that supports FEIS reviews. The library contains more than 61,000 references on fire effects and the general biology and ecology of organisms in North America. References are catalogued in an online database, the

Citation Retrieval System (CRS). To add to the library, FEIS staff regularly search scientific abstracts, literature databases, and tables of contents from refereed English-language scientific journals and government publication lists.

5.4.3.1.1 – Laurel Sumac

Laurel sumac occurs in coastal sage scrub, chaparral, and hardwood woodland formations. It occasionally grows in nearly pure stands in coastal sage scrub. More commonly, it co-dominates with California sagebrush (*Artemisia californica*) and black, white, or pursage (*Salvia mellifera, S. apiana, S. leucophylla*), or is a less important community member. Other coastal sage scrub associates are toyon (*Hetermoles arbutifolia*), sugar bush (*Rhus ovata*),lemonade berry (*R. integrifolia*), mission manzanita (*Xylococcus bicolor*), needle grasses (*Stipa spp*.), perennial ryegrass (*Lolium perrenne*), and giant wild rye (*Elymus condensatus*).

In mixed chaparral, it often co-dominates with big pod ceanothus (*Ceanothus megacarpus*) and spiny ceanothus (*C. spinosus*). It is usually an associate in desert scrub and seral chamise (*Ademostoma asciculatum*) communities. Desert scrub associates include desert ceanothus (*C. gregii*), desert almond (*Prunus fasciculata*), bush poppy (*Denromecon rigida),* and flannelbush (*Fremontodendron californicum*). Besides chamise, common chamise chaparral associates include hoaryleaf ceanothus (*C. crassifolius)*, hairy ceanothus (*C. obliganthus*), California scrub oak (*Quercus dumosa*), Eastwood manzanita (*Arctostaphylos glandulosa*), and bigberry manzanita (*A. glauca*).

In woodlands, laurel sumac is an understory associate in Engelmann oak (*Quercus engelmannii*), valley oak (*Q. lobata*), coast live oak (*Q. agrifolia*), and California black walnut (*Juglans californica*). Riparian associates include California bay (*Umbellularia californica*), holly leaf cherry (*Prunus ilicifolia*), poison-oak (*Toxicodendron diversilobum*), and toyon. It is also found in riparian California sycamore (*Platanus racemosa*)-white alder (*Alnus rhombifolia*) associations bordering chaparral.

Common fire-follower associates are deerweed (*Lotus scparius*), sticky nama (*Nama parryi*), and bush lupine (*Lupinus longifolius*).

SITE CHARACTERISTICS :

Laurel sumac occurs in maritime, Mediterranean, and semiarid climate. Insular populations, exposed to the maritime climate, undergo little seasonal fluctuation in the mild temperatures. Summer drought occurs, but the effects are moderated by frequent fog and low clouds. Populations in Mediterranean and semiarid climates receive 90 percent of annual rainfall from November to April. Precipitation in the Santa Monica Mountains, where a Mediterranean climate predominates, averages 30 inches per year. Hot, dry Santa Ana foehn winds occur in coastal mountains during fall.

Soils supporting laurel sumac are acidic to neutral, well-drained, dry, and often rocky or gravelly. In riparian zones laurel sumac is most common on gravelly outwash areas. Soil

textures in which laurel sumac is found are sand or sandy loam. Parent materials include diorite, shale, sandstone, and sandstone with conglomerate. Laurel sumac does not occur on unconsolidated sand, limestone-, or serpentine-derived soils. It is favored on soils with high exchangeable potassium levels. Peak abundance occurs on coastal sites with heavy litter layers. Laurel sumac is less frequent inland. Slope varies from 0 to 80 degrees; it is most common on southern exposures. Laurel sumac occurs at elevations below 3,000 feet.

FIRE ECOLOGY

Fire Ecology:

Historical documents show that prior to fire suppression, southern California chaparral usually burned in summer. Fires typically crept down slopes by means of falling brands and coals, and only occasionally formed the hot runs on steep slopes that are typical of today's fires. Large fuels often smoldered for months.

This fire behavior resulted in a mosaic of numerous small burns throughout the landscape. This landscape pattern is still evident in northern Baja California, where fire suppression is not practiced. In contrast, most contemporary southern California fires occur in fall during Santa Ana Winds, and consume large patches of chaparral. There is a sharp increase in the size of individual burns north of the international border. Fire suppression has reduced the number of fires, but because of the increase in burn size, total acreage burned is approximately the same on either side of the border.

Southern California chaparral fires typically crown out, burning all or most of the aboveground portions of shrubs. Natural fire frequency varies from a few years to as long as sixty (60), although shrubs cannot survive many short-interval fires. Chaparral stands become extremely flammable within thirty (30) to sixty (60) post-fire years, depending upon stand productivity, climate, and topography.

Laurel sumac has several botanical features which encourage fire.

Aromatic compounds in the leaves increase fire intensity. Elapsed time before ignition of partially dry laurel sumac foliage was 1.80 seconds at 1,382 degrees Fahrenheit (750 deg C) under laboratory conditions. The high surface-to-volume ratio of leaves (126 cm sq/cu cm) transfers heat to the plant's interior branches following ignition, resulting in more rapid combustion of the shrub. Also, mature laurel sumac stands have deep litter layers. A study of litter accumulation in chaparral in southern California and northern Baja California showed that laurel sumac produced the deepest litter of the seven chaparral species measured.

Plant Adaptations:

Laurel sumac's adaptations to fire include the ability to sprout from the lignotuber after aboveground portions are burned and postfire seed germination. Like most chaparral shrubs, laurel sumac stores photosynthate reserves in the extensive roots. These

reserves are metabolized during post-fire sprouting. Laurel sumac also stores photosynthate reserves in its large lignotuber. This extra store of reserves probably gives laurel sumac a post-fire competitive edge over many chaparral species.

The seed coats of laurel sumac seeds in the seedbank are cracked by fire, resulting in postfire seedling recruitment.

FIRE EFFECTS

Immediate Fire Effects on Plant:

Laurel sumac is typically top-killed by fire, although hot fire may result in some shrub mortality.

A summer wildfire on Otay Mountain, San Diego County, completely top-killed all laurel sumac. A fall wildfire in the Topanga-Tuna Canyon of the Santa Monica Mountains burned 100 percent of the plants. Most shrubs were top-killed by this fire, but some were completely killed. Many laurel sumac snags were noted when the burn site was inspected at post-fire year 3. Westman and O'Leary reported that if fire line intensity is over 4,400 BTU/min/sq ft (199 kcal/sec/sq m), laurel sumac lignotubers fail to sprout.

Discussion and Qualification of Fire Effects:

The majority of the literature reports that laurel sumac is completely top-killed by fire; occasionally, however, a few stems survive. An "intense" wildfire started on November 3, 1949, in the San Gabriel Mountains; ambient temperature was 90 degrees Fahrenheit (32 deg C), humidity was 9 percent, and fuel moisture was 0.5 percent. Despite these conditions, the largest branches of older laurel sumac leafed out the next year.

Plant Response to Fire:

Top-killed plants sprout quickly.

Twenty-two percent (22%) of the laurel sumac top-killed by an October wildfire in mixed chaparral in the Santa Monica Mountains sprouted within 15 days after fire. By April of the following year, 100 percent of the lignotubers of burned shrubs had sprouted. Sprout length at the end of the first postfire growing season was 4.3 feet (1.3 m).

Plumb reported a similar response following a July wildfire on the San Dimas Experimental Forest of the San Gabriel Mountains. One hundred percent of top-killed laurel sumac sprouted by November, and 97 percent of sprouts were greater than 12 inches (30 cm) in length by December. Seventy-four percent of lignotubers supported 12 or more sprouts. Postfire stem elongation through December is common

when fall rains are sufficient to support continued growth. Chlorosis often occurs in the leaves of the rapidly growing sprouts.

Post-fire seed germination is moderate. Density of seedlings following a spring wildfire in the Santa Monica Mountains in mixed chaparral was 0.6 plants per square yard (0.7 plants/sq m).

Post-fire seedling mortality is high unless rainfall is steady. The year following this wildfire was a drought year, and only 0.6 percent of seedlings survived through summer. Seedlings that germinated following the previously mentioned October fire in the Santa Monica Mountains exhibited the same response. Seedling survival at the end of the first post-fire growing season was 51.5 percent with precipitation at 110 percent of normal. The next year, with precipitation at 53 percent of normal, survival dropped to 1.6 percent.

5.4.3.1.2 – Ceanothus

In California. buck brush is the dominant shrub species in the ceanothus chaparral vegetation type. It is commonly encountered in most chaparral vegetation types and several forest communities throughout California and Baja California. While sometimes found in pure stands representing the dominant vegetation, buckbrush more often co-dominates or associates with other species in shrub stands or is a substantial understory species of pine (*Pinus* spp.) forests or oak (*Quercus* spp.) woodlands

In California buckbrush is the dominant shrub species in the ceanothus chaparral vegetation type. Shrub species that may associate with buckbrush include chamise (*Adenostoma fasciculatum*), hoary leaf ceanothus (*Ceanothus crassifolius*), hairy ceanothus (*C. oliganthus*), blue blossom (*C. thyrsiflorus*), Nuttall's scrub oak (*Q. dumosa*), toyon (*Heteromeles arbutifolia*), and sugar sumac (*Rhus ovata*)

Chamise chaparral is the most common type of chaparral in California occurring in the north and central Coast Ranges, Sierra Nevada foothills, southern California and northern Baja mountain ranges. This type of chaparral is usually dominated by chamise, although in many stands, buckbrush co-dominates with chamise and/or white leaf manzanita (*Arctostaphylos viscida*). Stands where chamise and buckbrush codominant are sometimes referred to as mixed chaparral. Species that associate with buckbrush in this cover type include trees such as blue oak (*Q. douglasii*) and California buckeye (*Aesculus californica*), shrubs such as red shank (*Adenostoma sparsifolium*), Nuttall's scrub oak, birchleaf mountain-mahogany (*Cercocarpus betuloides*), laurel sumac (*Malosma laurina*), white and black sage (*Salvia mellifera, S. apiana*), sugar sumac, Our Lord's candle (*Yucca whipplei*), and herbs such as giant wildrye (*Leymus condensatus*), and Eastern Mojave buckwheat (*Eriogonum fasciculatum*).

The coastal sage scrub habitat type is dominated by California sagebrush (*Artemisia californica*) and includes buckbrush in areas in or near low elevation coastal aspects. Other species that may associate with buckbrush in this cover type include white, black,

and purple sage (*Salvia leucophylla*), California brittlebush (*Encelia californica*), eastern Mojave buckwheat, and thickleaf yerba santa.

FIRE ECOLOGY OR ADAPTATIONS:

Fire adaptations:

Flammability of chaparral species has been suggested as an adaptation to fire. Mature buckbrush is highly flammable. Since the seeds of buckbrush is stimulated by scarification by fire, flammability is thought to be an adaptation that assists in the germination and establishment of buckbrush.

Burning by Native Americans:

Before European settlement, burning by Native Americans impacted fire intervals and vegetation structure, especially in areas where buckbrush occurs. This is especially apparent in chaparral stands or oak woodlands where buckbrush and other chaparral shrub species are common in the understory.

In California, observations in oak woodlands in the mid-twentieth century found increasing densities of chaparral species, including buckbrush, in the understory of oaks. This is believed to be due to suppression of native American burning practices and wildfire. Burning by aboriginals in California was thought to be primarily for maintenance of hunting grounds and prevention of large "devastating" fires in mature stands of buckbrush, a species recognized by natives to be very important to wildlife.

Native Americans probably ignited low-intensity grassfires during the spring in oak woodlands and winter range of regional ungulate species, to prevent buckbrush from being consumed by intense, naturally-ignited fires that typically occurred during mid-summer. The extent and rationale of burning in chaparral by natives is in need of further study, especially in the context of ecological restoration.

Fire regimes:

Opinions among chaparral scientists conflict on the degree to which chaparral is dependent on fire. Historical fire intervals of thirty (30) to 100 years appear most favorable for buckbrush stand maintenance. Theoretically, longer fire intervals favor buckbrush by allowing larger quantities of annually-deposited, long-lived seed to accumulate. This provides better chances for postfire establishment . This is counter to many land management fire prescriptions, especially in wildland-urban interface areas, where hazardous fuel reduction is a priority.

Human caused ignitions, intentional and unintentional, cause fire intervals of twenty (20) to thirty (30) years, especially in stands in close proximity to towns or cities. These intervals may be too short for sufficient seed accumulation.

FIRE MANAGEMENT CONSIDERATIONS:

Wildfire suppression:

Fire Suppression policies during the 20th century have interrupted the natural fire cycle of many types of chaparral including those where buckbrush occurs.

Current management of chaparral stands includes the use of prescribed fire to maintain natural fire regimes.

However, large areas of continuous "decadent" buckbrush chaparral exist where fire has not occurred for over a century. Fires in these areas burn with high intensity over large areas, potentially beyond historical levels of severity. Consequently, fire suppression's overall effects are thought to reduce the numbers of wildfires, but increase overall area burned.

Frequency of burning:

Research conducted during the mid-20th century focused on using frequent fires to reduce buckbrush and chamise stands for browse habitat improvements.

Stands of buckbrush can be decimated when fires are frequent enough to kill postfire seedlings that have not matured enough to produce a seed crop. One experimental burn conducted 3 years after burning on a young stand of buckbrush resulted in 100% mortality of all stems and 0% postfire establishment of new buckbrush seedlings the following spring. This phenomenon has been called "shock stagnation," a semi-permanent degradation of the native vegetation in which exotic grasses and/or forbs dominate. This tactic was frequently used during the mid-1900s.

The duration of time that buckbrush can exist without fire is unknown.

Seasonality of Burning:

Buckbrush seedlings must develop considerable root systems during the spring before the cessation of seasonal rains. Middle- to late-spring burns may result in very high buckbrush seedling mortality.

Buckbrush exhibited successful rates of establishment when burning was conducted before winter. The authors believe burning before the cool season allows seedlings of buckbrush to establish before annual herbaceous species arrive, giving buckbrush a competitive moisture advantage and subsequent higher rates of survival through the following dry season. However, low fire intensities commonly associated with prescribed fires during the cool season are also directly correlated with high coverages of herbaceous species during the 1st year postfire. Most prescribed fires occur during the cool season due to safety issues. It may be difficult to use prescribed fire for ecological restoration while addressing safety needs. Further research is needed on the effects of seasonality of burning and establishment buckbrush.

Postfire establishment and interference:

One concern following fire is possible interference from herbaceous species. Postfire mortality of buckbrush seedlings suggests competition of water and nutrient resources from nearby herbaceous plants is an important factor influencing initial survival rates. This effect may be less common in areas with low rainfall.

Schultz and others in the Sierra Nevada of central California found the abundance and vigor of buckbrush seedlings were negatively associated with increasing densities of herbaceous species, especially grasses. Postfire establishment of grasses in this area usually precedes buckbrush, quickly creating a mass of roots difficult for shrub species to push young roots through.

Competition between grasses and buckbrush seedlings for moisture during establishment is responsible for dramatic reductions in numbers of buckbrush seedlings 1 year postfire. In a study, three (3) months after emergence, buckbrush growing without interference from other species developed roots to a depth of forty-three (43”) inches and had twenty-six (26”) inches of lateral growth.

In contrast, under the same watering regime, buckbrush seedlings growing along with Italian ryegrass (*Lolium multiflorum*) had a maximum root depth of 11.5 inches, with very little lateral growth. Buckbrush seedling mortality was highest when density of Italian ryegrass was >39% at maturity.

Biswell found that native herbaceous density > 65% severely affected survival of buckbrush and other chaparral shrubs. Contrary to Schultz and others,

Beyers and others found no significant differences in buckbrush stem densities in plots in southern California that either had or had not been reseeded with Italian ryegrass five (5) years postfire. However, in this study grass densities were low and rainfall less than average.

Post-fire competition for light often controls shrub species dominance in chaparral. In ecotonal regions between coastal sage and chaparral, stands thirty (30) years post-fire showed declining density of purple sage in mixed stands with buckbrush. This was not caused by allelopathy but by competition for light. During stand maturity buckbrush grows taller and shades purple sage. Similar results have been found from comparable research using different *Ceanothus* species.

Fire intensity and postfire establishment:

Buckbrush establishment is associated with areas where the pre-fire canopy was dense and consequently high fire severity occurred. Soil heating is the primary trigger to end dormancy for buckbrush.

A study hypothesized that in the absence of fire, abnormally large accumulations of fuel over a period of time would result in extreme fire severities, reducing numbers of buried

viable seed. However, the seed of buckbrush was found to be very resistant to heat and high fire severity. Prescribed fires in chaparral types are conducted during the fall after the onset of the rainy season and generally exhibit lower fire intensity than typical wildfires during late summer or early fall. Effects of low intensity burns on germination rates of buckbrush are not well known.

Most fire ecology studies conducted in chaparral vegetation have focused attention on the fire ecology of stands that exist on sandstone-derived soils, leaving the fire ecology of stands on serpentine soils largely uninvestigated. Buckbrush is found in serpentine soils, though it is more common and more abundant on non-serpentine soils. This could be due to lower fire severities. Serpentine soils generally support lower densities of chaparral species, have lower concentrations of fuel, and burn with lower severity than fires on non-serpentine soils. These fires may not break seed dormancy in buckbrush.

Findings:

1. *Ceanothus, as a species, is a dominant California chaparral vegetation type and has a high degree of flammability.*
2. *Flammability is an adaptation needed for seed germination and habitat establishment.*
3. *In the absences of fires, abnormally large accumulations of fuel over time will result in extreme fire severity*
4. *Historical fire intervals of 30 to 100 years will be interrupted by human-caused ignitions in ceanothus vegetative fuel beds shortens fire intervals to the twenty to thirty year range.*

5.4.3.1.3 – Chamise

Chamise is the most characteristic and widely distributed chaparral species in California. It is most extensively distributed in the southern Coast Range, but occurs in the Coast, Transverse and Peninsular ranges from Mendocino County to Baja California. It also occurs in the Sierra Nevada foothills and on the Channel islands. *Adenostoma fasciculatum* variety *obtusifolium* is restricted to southwestern San Diego County and Baja California.

GENERAL BOTANICAL CHARACTERISTICS:

Chamise is a diffusely branched, resinous, native shrub from two (2) and twelve (12) feet tall. Plants are unarmed, spreading, and branch very close to the ground. The many slender stems are erect and generally lack permanent branches. Young stems have reddish bark; bark becomes gray and shredded with age. Linear, needlelike leaves occur in alternate fascicles along the stem. Leaves are 0.25 inch long, sharp-pointed, heavily sclerified, and evergreen. The inconspicuous, bisexual flowers are white and occur in showy, one (1”) to four (4”) inch-long terminal cluster. The fruit is an achene.

Although rooting habit is variable, roots are usually deeply penetrating, much branched, and wide spreading. The root system is extensive in relation to the crown. Chamise typically develops several taproots which penetrate fractured rock to depths of ten (10’) to twelve (12’) feet; extensive laterals originate from the lignotuber. Longevity of chamise is estimated at 100 to 200 years.

SITE CHARACTERISTICS:

Chamise is the most common chaparral species throughout the foothills and coastal mountains of California. It is present in approximately seventy (70%) percent of California chaparral. It is most often associated with hot, xeric sites over a wide range of elevations, soils, latitudes, and distances from the coast. In southern California it is a ubiquitous dominant on outwash plains, mesas, ridges, and dry, south- and west-facing slopes at elevations up to 6,000 feet.

Sites supporting chamise commonly receive between ten (10) and forty (40) inches of annual precipitation, and have a temperature range from 32 to 100 degrees Fahrenheit.

In the southern Coast Ranges, where average annual rainfall ranges from sixteen (16”) and twenty(20”) inches, chamise occurs abundantly on all slopes and exposures and grows on deep, fertile soils as well as shallow, rocky ones. As precipitation increases farther northward, chamise is largely restricted to the poorer soils and the drier, more exposed sites.

Chamise occurs in both pure and mixed stands. Nearly pure (>80%) stands of chamise are impenetrable and are referred to as "chamisal". Such stands usually have shallow, rocky soils with a southern aspect.

Chamise is a long-lived, shade-intolerant shrub which dominates lower elevation chaparral throughout much of California
.
Disagreement exists over whether its dominance is a reflection of a climatic climax or is a fire-induced sub-climax. Hanes stated that chamise chaparral is unable to perpetuate itself in a vigorous condition without recurrent fire and terms it a true "fire-type vegetation". Chamise stands older than 60 years of age are sometimes termed " decadent". Old stands have low species diversity and produce little annual growth, with dead stem biomass far exceeding live stem.

Stand stagnation has been attributed to the accumulation of biochemicals in the soil that inhibit decomposition, humification, and nitrification. Limited nutrient availability, especially of nitrogen, may partially contribute to the decline of chamise chaparral. Fire rejuvenates stagnant stands by removing phytotoxic substances from the soil, increasing the concentration of available nutrients, and stimulating sprouting of adults and germination of dormant seed.

Chamise is present soon after fire and remains present in all stages of succession. It achieves initial postfire dominance through vigorous sprout production and establishment of large numbers of seedlings. Typical vegetal cover on 1-year-old chamise chaparral burns also includes a high percentage of herbaceous vegetation and the seedlings and sprouts of associated shrubs and sub-shrubs. As chamise seedlings and sprouts grow during the first postfire decade, herbaceous vegetation rapidly

declines; likewise, subshrubs and short-lived shrubs are restricted to smaller and smaller openings.

A dense stand of chamise typically develops within approximately eight (8) to ten (10) years, with chamise frequently comprising one-third of total cover. Stands often exhibit complete canopy closure by twenty-two (22) years of age. In pure stands of chamise in southern California, chamise may reach 25 percent, 50 percent, and 55 percent cover within ten (10), forty (40), and seventy (70) years of fire, respectively.

FIRE ECOLOGY OR ADAPTATIONS:

Following fire, chamise sprouts from dormant buds on the lignotuber. The lignotuber has a stored supply of carbohydrates, nutrients, and water which support vigorous growth. Chamise also produces abundant seedlings from fire-activated, soil-stored seed. Chamise rapidly reoccupies the postfire community.

Chamise possesses a number of adaptations that enhance its flammability. These adaptations result in intense, fast-spreading, potentially large fires which have an increased probability of occurring as a stand matures. Chamise chaparral produces fuel loadings capable of supporting a moderately intense fire within approximately fifteen (15) years.

Adaptations which enhance flammability are discussed below.

FIRE EFFECTS

Immediate Fire Effect on Plant:

Chamise is a fire-sensitive species and mortality may be substantial following fire. Perennating buds are located just beneath the soil surface and are quite susceptible to fire damage. Mortality patterns are related to season of fire, fire intensity and severity, and fire frequency.

Season of burning:

Season of fire affects chamise lignotuber survival.

Spring or summer fires may kill up to 50 percent of plants, while fall fires result in relatively little mortality. Differential mortality is related to seasonal fluctuations in the carbohydrate reserves of lignotuber and large roots. High starch concentrations are apparently necessary for the onset of sprouting. Starch concentrations may be insufficient to ensure sprouting when chamise is burned in the late spring or summer, since carbohydrate reserves have been depleted during spring growth. Over the summer months, however, starch reserves are recharged as carbohydrates are translocated to the lignotuber, and most plants sprout following fall fires. In dry years, major carbohydrate mobilization does not take place; under these

conditions, spring or summer fires might produce lower level mortality than in more "normal" years.

Fire intensity:

Mortality increases with increasing fire intensity.

Following low-, moderate-, and high-intensity June fires in old-growth chamise in Sequoia National Park, approximately 46, 64, and 80 percent of chamise plants died, respectively.

Seasonal patterns of fire mortality are further accentuated by differences in fire severity associated with spring/summer versus fall fires. Early season fires move slowly through a stand and the downward heat pulse is greater than that produced by rapidly carrying, fall fires. As a result, fall fires are generally less severe than spring/early summer fires and produce less mortality. In one case, a moderately intense spring (June) fire resulted in 64 percent chamise mortality, whereas a moderately intense fall (October) fire resulted in only 14 percent mortality.

Fire frequency:

Chamise is extremely susceptible to short-interval fires. High mortality of both seedlings and sprouts is likely when fires recur on burns seeded to annual grasses.

Chamise density (seedlings and sprouted individuals) was reduced up to 97 percent following a grass fire on a 1-year-old burn.

Chamise seedlings are more sensitive to frequent fire than sprouted plants. In northern California, Hedrick reburned 1-, 2-, and 3-year-old burn sites which had been seeded to grass and mustard. Mortality of established chamise was 77 percent on the 1-year-old burns, 24 percent on the 2-year-old burns, and 34 percent on the 3-year-old burns.

Seedling mortality was 99, 98, and 100 percent on the 1-, 2-, and 3-year-old burns, respectively. Fires occurring at very short intervals may completely eradicate postfire seedling reproduction if the soil seed reserve is not well established and reproductive maturity has not been reached. Although sprouts are generally capable of heavy seed production by the second year after fire, chamise seeds exhibit poor viability. A number of years are required to build up the seedbank.

Seedbanks:

Chamise seed is sensitive to high temperatures.

Depending on fire intensity and seed position in the soil, a large portion of the seedbank may be destroyed as the soil temperature rises during burning. While abundant seed is

present beneath the shrub canopy and in gaps between shrubs, burning modifies the seedbank by concentrating readily germinable seed in the shrub interspaces. Soil temperatures during burning are lower in the shrub interspaces, and more seeds survive fire in these interspaces than below the canopy.

Fire sensitivity is increased if seeds have imbibed water, and seed mortality is high following spring fires, which are often severe. Reduced seed mortalities can be expected when fires occur under dry soil conditions associated with late summer and fall.

Discussion and Qualification of Fire Effects:

Small plants with a pre-fire biomass between two (2) and eleven (11) pounds are particularly prone to fire mortality because of their shallow lignotubers and presumably smaller carbohydrate reserves.

Individuals with larger lignotubers are generally more fire tolerant, although large shrubs which have survived previous fires may have more dead material in their crowns, making them more prone to fire mortality.
Fire susceptibility of larger plants also increases in older stands where high fuel loads produce severe fires.

Mean lignotuber area of fire-killed plants in a 90-year-old stand was thirty-five (35) square inches compared to twelve (12) square inches for plants in a twenty-three-year-old stand. Very large chamise lignotubers tend to rot in the center and are less capable of sprouting after fire. While young seedlings are readily killed by most fires, fire tolerance increases with age. In southern California, large numbers of four-year-old chamise sprouted following intense summer grassfires.

PLANT RESPONSE TO FIRE:

Post-fire regeneration in chamise involves a combination of sprout regeneration and seedling recruitment.

<u>Vegetative Regeneration</u>:

Although considerable plant mortality may occur following fire, at least some percentage of the chamise population survives and sprouts. Residual plants typically sprout within 6 weeks of fire regardless of season.

On sites in southern California, chamise along moist ravines sprouted within 10 days of a hot July wildfire. Sprouts originate on the lignotuber from a narrow band of tissue located 0.2 to 1 inch (0.5-2.5 cm) below the soil surface. Perennating buds along the periphery of the lignotuber are the first to initiate sprouts, followed by buds near the base of charred stems. Sprout production varies by lignotuber size. Large plants usually possess large lignotubers which produce as many as 500 sprouts. During the first year sprout numbers are drastically reduced as larger stems gain dominance.

Sprouts use stored carbohydrate reserves to achieve rapid growth. Rapid shoot elongation typically occurs during the first spring following fire.

After fires in northern California, sprouts averaged 20 inches (50 cm) by the end of the first post-fire growing season. Shrubs with a large pre-fire biomass typically produce the most vigorous sprouts and can be expected to dominate the post-fire community.

Baker and others indicated that sprout biomass of residual plants at the end of post-fire year 1 is positively correlated with pre-fire biomass. Stem growth slows during post-fire years 2 and 3, and growth during subsequent years decline until it is almost negligible by twenty (20) years after fire. Horton and Kraebel reported that 5-year-old sprouts reached an average height of 33.6 inches while 20-year-old sprouts were only 40.4 inches tall.

The pattern of post-fire sprout growth usually follows that of mature plants. Time of fire, however, may alter the initial pattern of post-fire shoot growth. On sites in the southern Sierra Nevada, plants burned in late June or early August produced sprouts that grew continuously until the second postfire summer. The reduced leaf area of sprouted plants limited transpiration losses and resulted in higher shoot water potentials, permitting shoot growth through the summer drought period. While summer fires (at a time of reduced carbohydrate reserves) initially resulted in significantly shorter plants, shoot heights of plants burned in different seasons were similar by the end of the second postfire year.

Seedling regeneration:

Chamise produces an abundant crop of seedlings from soil-stored seed. While a flush of initial seedling establishment may occur immediately following fire, subsequent mortality is quite high.

On sites in southern California, seedling densities in March ranged from 91,427 to 180,383 seedlings per acre but dropped to 29,652 to 34,594 per acre by June.

The degree to which seedlings contribute to the postfire recovery of chamise is quite variable and appears related to site conditions, amount of fire-induced adult mortality, and stand age. On sites where the majority of plants survive fire, pre-fire shrub density is maintained and little seedling establishment occurs. Conversely, seedling establishment is often substantial and critically important in regaining pre-fire levels on sites where adult survival is low.

Recovery:

Because of hot, dry site conditions, post-fire growth of chamise chaparral is slow compared to other chaparral types.

Initial sprouting response may be substantially reduced following intense summer fires, since more of the meristematic tissue in the lignotuber is killed.

Four months after a July wildfire in southern California, chamise plants produced up to twelve (12) sprouts per plant but sprouts rarely exceeded twelve (12) inches in length.

In southern California chamise communities, chamise rapidly dominates the post-fire community and commonly comprises at least 33 percent of the vegetation on 10-year-old burns. In stands 22 to 40 years of age, it reaches a maximum of approximately 50 percent of the total vegetative cover.

Discussion and Qualification of Plant Response:

Since chamise sprouts following fire, reproduction from seed is generally considered facultative.

Chamise relies primarily on vegetative reproduction for postfire establishment on foothill sites in the southern Sierra Nevada. Although as many as 2.73 million seedlings per hectare may emerge following fire, they are usually outcompeted by faster growing sprouts. Likewise, vegetative reproduction is the pre-dominant mode of postfire regeneration at higher elevations in southern California mountains.

As chaparral sites become increasingly arid, however, sprouting tends to be less successful and seedling recruitment more prevalent following fire. On droughty, low elevation sites in southern California, chamise depends to a large degree on successful seedling establishment for population replacement after fire.

Howe and Carothers found that chamise seedlings grew vigorously and contributed significantly to postfire stands at elevations between 1,312 and 1,968 feet near Newhall, California, in Los Angeles County. Chamise seedlings comprised approximately 86 percent of the chamise population on six (6) to nine (9) year-old-burn sites. Although seedlings grew more slowly than sprouts during the first few post-fire seasons, they reached heights equal to that of sprouted plants within eight (8) to nine (9) years. On 6-year-old, north-facing burns, however, vegetative reproduction was the predominant mode of regeneration.

Hanes indicated that altitude also influences mode of postfire reproduction. He found that seedlings comprised a higher proportion of the postfire vegetation on burn sites between 1,000 and 2,000 feet than between 2,000 and 4,000 feet.

FIRE MANAGEMENT CONSIDERATIONS:

<u>Fire frequency:</u>

Chamise is adapted to a fire cycle range from ten (10) to 100 years. However, it can regenerate after fire intervals of over 100 years. Its capacity for canopy rejuvenation without fire allows chamise to persist through long fire-free intervals. Stohlgren and Rundel suggested thirty (30) to eighty (80) years as a "typical" fire frequency for chamise chaparral communities in Sequoia National Park.

Influence of ryegrass seedings:

Ryegrass (*Lolium multiflorum*) is often seeded onto recently burned chaparral as a means of emergency revegetation. Ryegrass, however, inhibits growth and development of chamise seedlings, and ryegrass substantially reduces post-fire chamise seedling establishment. On seeded burns in southern California, almost no chamise seedlings established where first-year ryegrass cover ranged between 40 and 90 percent.

Ryegrass seedings also produce an easily ignitable fuel bed that increases the likelihood of an early reburn. Fires occurring at short intervals have the potential to cause significant changes in species density and composition within chamise chaparral. Not only do frequent fires produce high mortality of sprouted plants, but post-fire seedlings (derived from the previously dormant seedbank) are also killed, thereby depleting the on-site seed reserve.
Consequently, chamise is unable to reestablish, and gaps in the shrub matrix are subject to invasion by coastal sage scrub species such as black sage, California sagebrush, and California buckwheat. The site may be dominated by coastal sage scrub species for 100 years or more.

Deer browse:

Deer use of chamise is often extensive immediately following fire. Browse value of sprouts lasts for only two (2) to three (3) years because plants quickly mature to less nutritious stages or die from overuse. To enhance deer use of sprouts, cattle access to burns should be restricted during the first postfire season.

Because of the lack of adequate escape cover, only the periphery of large burns receive extensive deer use prior to the second postfire season. The center of large burns are rarely if ever utilized during the first several seasons. Close utilization within the first year may kill chamise, and mortalities of up to 64 percent are possible under intense browsing pressure.

Late winter or early spring fires are most favorable for production of deer browse because succulent sprouts with a high nutrient value are produced almost immediately, and subsequent sprout growth is rapid during the spring growth period. If fires are conducted after mid-September in northern California, sprouting may not be profuse until the following spring. Fires resulting in total plant consumption produce the most usable browse, since deer tend to avoid burned chamise with main scaffold branches remaining.

5.4.3.1.4 Coastal Sage

Various sub-species of sage are a shrub component of coastal sage scrub, chaparral, and desert scrub communities throughout much of California.

Coastal sage scrub includes a mixture of the following species: California sagebrush (*Artemisia californica*),California buckwheat (*Eriogonum fasciculatum*), white sage, purple sage, California encelia (*Encelia californica),* common deerweed (*Lotus scoparius),* lemonade sumac (*Rhus integrifolia),*chaparral yucca (*Yucca whipplei),* bush monkeyflower (*Mimulusaurantiacus),* blue dick (*Brodiaea pulchella*), brome (*Bromus spp.),* filaree (*Erodium spp.),* mustards *(Brassica spp.), and* schismus *(Schismus spp.).*

In chaparral habitat, the following species may be intermixed with Cleveland Sage: chamise (*Adenostoma fasciculatum*), white sage, ceanothus (*Ceanothus spp.),* manzanita (*Arctostaphylos spp*.), laurel sumac (*Malosma laurina*), California buckwheat, and poison-oak (*Toxicodendron diversilobum*).

SITE CHARACTERISTICS:

Sage typically occurs at low elevations on the coastal and inland sides of the California Coast Range. Sites include dry slopes and benches below 3,000 feet (915 m).

Dominant Salvia species segregate by moisture preference within coastal sage scrub communities. Relative to other Salvias, Cleveland sage is common on coarse-textured soils including those derived from unconsolidated sand, limestone, sandstone, and serpentine.

SUCCESSIONAL STATUS:

Cleveland sage is a shade-intolerant species that produces self-perpetuating stands within coastal sage scrub communities.

Continual seedling recruitment within intact stands and basal sprouting by established individuals allows black sage to maintain vigorous, mixed-aged stands during extended fire-free intervals.

Stands unburned for 60 years attained highest cover with tall canopies and substantial litter buildups.

Sage typically occupies gaps within the chaparral canopy. Although seedlings rapidly invade recent burns within drier chaparral communities, maximum cover occurs during post-fire years 3 and 4 and subsequently declines as the stand matures. In chaparral stands over twenty (20) years of age, sage recruits seedlings in canopy gaps and may form enclaves.

SEASONAL DEVELOPMENT:

Sage is a herbaceous perennial that becomes woody at the base. Plants die back somewhat in the winter and produce new growth in the spring. Like many associated coastal sage scrub dominants, sage is a semideciduous or seasonally dimorphic species. Large
leaves develop on main shoots during the winter when moisture is most abundant and these are dropped over the summer drought period. Smaller, axillary leaves are produced immediately following the formation of main-shoot leaves but are retained until the following winter.

FIRE ECOLOGY OR ADAPTATIONS:

Sage sprouts from dormant buds on the root crown following low severity fires. It is also establishes abundant seedlings from soil-stored seed. As a result, sage is able to rapidly re-occupy recent burns within coastal sage scrub and chaparral communities. Seasonal dimorphism in leaf duration apparently enhances sage survival on drier chaparral sites during early years of post-fire succession.

POSTFIRE REGENERATION STRATEGY:
Small shrub, adventitious-bud root crown
Ground residual colonizer (on-site, initial community)
Initial-offsite colonizer (off-site, initial community)

FIRE EFFECTS

IMMEDIATE FIRE EFFECT ON PLANT:

Sage is a fire-sensitive species that may suffer considerable post-fire mortality.

Perennating buds on the root crown are presumably very near the soil surface and are susceptible to fire damage. Initial estimates of the belowground heat tolerance of sage indicate that root crowns fail to sprout at fire reaction intensities over 200 kcal/sec/m sq.,

Sage is likely to survive the majority of fires in coastal sage scrub communities (calculated fire reaction intensities of 170 to 200 kcal/sec/m sq.), but substantial mortality can be expected following higher intensity chaparral fires.

PLANT RESPONSE TO FIRE:

Post-fire regeneration in sage involves a combination of sprout regeneration and seedling recruitment. Predominant mode of post-fire reestablishment varies geographically. Post-fire recovery within coastal sage scrub communities is primarily through sprouting.

Westman and others found that sprouting potential of coastal sage scrub species is generally greater on lower elevation, maritime sites than at high elevations inland. They indicate that ecotypic variation may be responsible for this differential sprouting

response. Following higher severity chaparral fires, sage is usually a non-sprouter and relies on the previously dormant seed bank for rapid post-fire establishment.

Findings:

1. *Cleveland Sage, as a species, is a dominant California chaparral vegetation type and has a high degree of flammability.*
2. *Flammability is an adaptation needed for seed germination and habitat establishment.*
3. *In the absences of fires, abnormally large accumulations of fuel over time will result in extreme fire severity*
4. *Historical fire intervals of 30 to 100 years will be interrupted by human-caused ignitions in ceanothus vegetative fuel beds shortens fire intervals to the twenty to thirty year range.*

Recommendation: *Remove the Cleveland Sage species from the proposed landscaping plant list for compliance with the Acceptable List and Undesirable Lis as published by San Diego County.*

5.4.3.1.5 Non-Native Invasive Vegetation

Invasive plant species mapping was conducted concurrently with vegetation mapping and rare plant surveys. Seven (7) priority invasive, nonnative plants, , were mapped on the Preserve.

These species included:

- purple false brome (*Brachypodium distachyon*),
- giant reed (*Arundo donax*),
- stinkwort (*Dittrichia graveolens*),
- sweet fennel *(Foeniculum vulgare*),
- crown daisy (*Glebionis coronaria*),
- perennial veldt grass (*Ehrharta calycina*),
- and milk thistle (*Silybum marianum*).

The San Diego Management and Monitoring Program's *Management Priorities for Invasive Non-Native Plants* establishes five Management Levels:

Level	Distribution	Scale of Management[1]	Feasibility	Goal
1- Surveillance	Not present	Region-wide	High: low effort required to achieve goal	Regional surveillance, early detection, rapid response
2- Eradication	Limited; few individuals or populations	Region-wide	High: moderate effort required to achieve goal	Eradication with regionally coordinated control program
3- Containment	Variable	Watershed or management unit	Medium: Funding typically available for re-treatments or control of small populations	Eradication with coordinated programs by management unit or watershed
4-Directed Management	Wide; abundant	Sub- management unit or reserve	Medium: area may be managed effectively, with slow re-invasion	Control within reserve or sub-management unit to benefit NCCP resources
5- Directed Suppression	Wide; abundant	Reserve or site	Low: control is typically of short term benefit (rapid re-invasion) without active restoration	Suppression, typically to allow recovery of disturbed site, improve re-vegetation success, or benefit NCCP resources

CAL-IPC was 1992 to address the problem of invasive plant species, which is one of California's top environmental threats.

CAL-IPC maintains the California Invasive Plant Inventory, a comprehensive list of plants based on their environmental impacts. Each plant is assessed to determine if they will endanger habitats or will become an invasive species in the future. Plants that do not pose a significant current risk or have an insufficient risk of becoming invasive in the future are not listed in the inventory. Plants that are determined to be a current or future risk are then assigned a management priority.

CAL-IPC Management Priorities

High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate – These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their

reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Alert – An Alert is listed on species with High or Moderate impacts that have limited distribution in California but may have the potential to spread much further.

Watch – These species have been assessed as posing a high risk of becoming invasive in the future in California.

A number of the invasive species have SDMMP or Cal-IPC moderate or high management priorities. These will be described below

5.4.3.1.5.1 Crown daisy (Glebionis coronaria)

This is a flowering annual that commonly invades riparian areas, coastal dunes, prairies and scrub. It is a common ornamental plant that escapes garden settings and easily invades disturbed areas. The seeds of crown daisies sprout very quickly after rain, even in relatively dry areas. Seedlings may grow to be up to five feet tall and may form dense stands that crowd out native vegetation. Dead plant mass can remain in place for many years, preventing native plants from recolonizing. Crown daisy was mapped at 11 locations within the Northern property, totaling approximately 0.004 acres.

Crown daisy has a Limited Cal-IPC Rating and a SDMMP Management Level 5 designation.

5.4.3.1.5.2 Giant Reed (Arundo Donax)

This is a tall perennial grass that typically forms dense stands on disturbed sites, sand dunes, riparian areas, and wetlands. *Arundo donax* is threatening California's riparian ecosystems by outcompeting native species, such as willows, for water. One (1) giant reed population was within the Northern property near the Highway 67, totaling approximately 0.101 acres.

Arundo has a High CAL-IPC Rating and has a SDMMP Management Level 3 designation.

FIRE MANAGEMENT IMPLICATIONS:

Arundo is a perennial grass listed as a noxious, non-native species that displaces native vegetation and associated wildlife species because of the large colonies it forms.

Dense growth presents an on-going fire hazard near urbanized areas, doubling the available vegetative fuels available for fires and promoting post-fire regrowth of even greater quantities of giant reed.

BEHAVE fire modeling of the arrundo/giant reed growth adjacent to the Project Site indicates that it exhibits the following fire behavior characteristics:

- Flame lengths (depth) for six (6') foot tall Arrundo – 81 feet
- Rate of Spread – 1134 feet per minute
- Fire Line Intensity – 4242 BTU/foot/second
- Down-wind spotting and ignition in receptive vegetation – 100% for two (2) miles
- Ignition of stucco wall surfaces – results in 1.29 hours compared to 3.53 hours for annual grass fuels
- The GR-9 Giant Reed vegetation exhibits extreme fire behavior compared to the GR-2 Annual Low-Load Grass fuels on the Project Site.

Because of its invasive nature, associated environmental problems and the fire hazards presented by this vegetation, it is the Fire Protection Consultant's recommendation that Arundo should be eliminated because of its on-going and global fire threat to the Preserve as a whole.

Arrundo Control and Mitigation

Manual Methods: These may be used for minor infestations, especially when sensitive native plants or wildlife may be involved.

New plants-

- Hand-pulling is effective with new plants under six (6') feet tall are present
- Use of hand tools is effective in combination with cutting of stems near the base of individual plants
- Stems and roots must be removed from the site
- Assure that all rhizome materials are collected and removed from the site

Large Infestations, Accessible Lands:

- Rotary brush cutters, chain saws and tractor mounted mowers can be used effectively to remove bio-mass
- Follow up the removal of bio-mass with thorough rhizome material collection and removal

Mechanical Methods – mechanical eradication is extremely difficult as subterranean rhizome material (with depths up to ten feet) can readily re-sprout. Removal of all such materials is not feasible, especially where extension soil disturbance is disruptive.

Prescribed Burning – should ***not*** be attempted. Controlled burning will not destroy the underground rhizome materials and favors giant reed generation in post-fire circumstances.

Burning giant reed in place is problematic:

- Risks of uncontained fires

- Possibility of damage to beneficial vegetation species
- Difficulty of fire extension through patchy and disturbed reed stands
- Air pollution issues

Chemical Control – In many, if not all, situations, it may be necessary to use chemical methods to achieve eradication, especially in combination with mechanical removal. The most common herbicidal treatment for giant reed is glyphosate, in the product Rodeo A, which is approved for use in wetlands.

- Care should be taken to avoid overspray of the chemical onto nearby desirable vegetation
- The most effective application is post-flowering and pre-dormancy cycles, usually in later August to early November
- Foliar uptake and kill may be achieved by spray application during growth periods- late spring to early fall

5.4.3.1.5.3 Blessed milk thistle (Silybum marianum)

This is a winter annual or biennial with prickly leave that is widely spread throughout California in overgrazed pastures and along fence lines and other disturbed areas. Blessed milk thistle produces tall, dense stands that outcompete native species. Blessed milk thistle was mapped at 4 locations within the Northern property, totaling approximately 0.044 acres.

Blessed Milk Thistle has a Limited CAL-IPC Rating and has a SDMMP Management Level 4 designation.

5.4.3.1.5.4 Purple Veldt grass (Ehrharta calycina)

This is a perennial grass found in disturbed grasslands, roadsides and coastal habitats in California's south and central west regions. Purple veldt grass is spreading very rapidly in the central coast region, where it invades dunes and shrublands. It was originally imported to California for use as a pasture grass and for erosion control. Purple veldt grass displaces native vegetation and converts coastal scrub and chaparral communities to grasslands. It resprouts after fires and may increase fire frequency. Purple veldt grass was mapped at 1 location within the Northern property.

Blessed Milk Thistle has a High CAL-IPC Rating and has a SDMMP Management Level 3 designation

5.4.3.1.5.5 Purple False Brome (Brachypodium distachyon)

This is a winter annual grass that is locally abundant in certain areas of California, especially those with rocky soils. Purple false brown was mapped at 22 locations – scattered around the Northern property and near the Highway 67 in the Southern Property, totaling approximately 0.75 acres.

Only purple false brome was found in the southern properties; the northern Properties had all seven species (Figure 4-4).

Purple False Brome has a Moderate CAL-IPC Rating and has a SDMMP Management Level 4 designation

FIRE MANAGEMENT IMPLICATIONS:

Fine Fuels Fire Management Objectives

Nonnative bromes and schismus are generally necessary for fire spread and are an annual species that can produce enough biomass and continuous cover of fine fuels that persist into the fire season.

Fine fuels from large forbs contribute to fire continuity and spread, although large annual forbs did not produce enough biomass to sustain fire. Large forbs that contribute to fire spread include nonnative Asian mustard, short pod mustard, tall tumble mustard, London rocket, and flix weed tansy mustard. Native bristly fiddleneck also contributed to fire spread.

Large nonnative forbs are especially common along roads, where fires often start, and are expanding their range into roadless areas. Large non-native forbs may present a greater fire hazard in the future.

Annual litter also contributes to fine fuel loads, and thick litter layers often develop where non-native bromes and schismus are present. Thick litter leads to high fire temperatures, long flame residence times, and continuous burn.

With the exception of bristly fiddleneck, native annuals do not greatly affect fuel loads. Small non-native forbs such as red stem stork's bill, and annual grasses besides bromes and schismus, do not contribute substantiality to fuel loads either. Pre-fire coverage and frequency of native six weeks grass and nonnative small six weeks grass were low. By summer, dead plant matter from these annual grass species are mostly crumbled and scattered, while biomass of dead brome and schismus are not.

Other fire management implications:

Non-native bromes fuel hot, fast-moving, continuous fires, whereas schismus fuels cooler, slower-moving, patchy fires. However, schismus can facilitate fire spread between brome patches.

Non-native bromes, especially red brome, may be exceedingly dense in years of above-average rainfall.

Minimizing outbreaks and spread of non-native annual grasses and large forbs is critical for reducing fire occurrence and spread. Human ignition sources should be minimized, especially where non-native annuals are abundant and topography is conducive to fire

spread. Limiting or restricting livestock grazing and off-road vehicle use may reduce rate of nonnative seed spread. Monitoring roadways, washes, and other corridors for nonnative invasion, and controlling new outbreaks, may slow rate of nonnative grass invasion. On infested sites, controlling nonnative grasses in interspaces can reduce fuel continuity and reduce fire spread.

5.4.3.1.5.6 Stinkwort (Dittrichia graveolens)

This is a fall-flowering, sticky aromatic annual that appears to be rapidly expanding its range in California. One (1) population of stinkwort was mapped in the access road outside the Northern Property's boundary, totaling approximately 1000 individuals.

Stinkwort has a Moderate CAL-IPC Rating and has a SDMMP Management Level 4 designation

5.4.3.1.5.7 Sweet Fennel (Foeniculum vulgare)

This is an erect perennial herb that is s very common throughout California. It can drastically alter the composition and structure of many plant communities, including grasslands, coastal scrub, riparian, and wetland communities. It is still unclear whether culinary varieties of fennel are invasive. One sweet fennel plant was mapped near the Northern edge of the Southern Property.

Sweet Fennel has a Moderate CAL-IPC Rating and has a SDMMP Management Level 4 designation.

5.4.3.1.5.8 Eucalyptus

The eucalyptus wood land area should be considered as an invasive target and high fire hazard species that should be removed. This species is identified as a High Priority target species that is recommended for mitigation and control.

This priority is based on an evaluation using the following criteria:

- Current land coverage and distribution in the Preserve
- Potential for invading sensitive habitat
- Potential for increasing detrimental fire intensities

Eucalyptus trees are native to Tasmania and southeastern Australia. It was introduced in California in 1856 and has since become a naturalized species. The planted range extends from Humboldt County to San Diego. Most dense Eucalyptus groves in California are almost devoid of understory vegetation except for hardy grass type fuels.

Eucalyptus is highly flammable and should not be placed near homes or other buildings. The leaves release a number of terpenes and phenolic acids. The trees are deciduous and generally grow to heights of 98 to 180 feet; some groves in California have trees of up to 260 feet tall.

Fire Ecology:

Eucalyptus communities in Australia have evolved in the presence of periodic fires. The trees are highly flammable but are seldom killed by fires. The bark catches fire readily and deciduous bark streamers tend to carry fire into the canopy of trees and disseminate fire ahead of the main fire front in the form of aerial fire brands.

Other features of eucalyptus trees that promote fire spread include heavy litter fall, flammable oils in foliage, and open crowns with pendulous branches that encourage maximum convective updrafts. Fire history in California indicates that fire build up occurs very rapidly in unmanaged eucalyptus stands.

Findings:

1. *Unmanaged eucalyptus tree groves can have up to 900 individual trees per acre; other species of trees generally maximize at 30-50 trees per acre.*
2. *Grassy fuels contain one (1) to four (4) tons of vegetation per acre; eucalyptus trees have twenty (20) to fifty (50) tons of foliage per acre.*
3. *In addition to foliage mass, eucalyptus trees produce between eight (8) and twelve (12) tons of ground litter and debris in Australia and up to thirty (30) tons in California.*
4. *Eucalyptus produces 10,000 BTUs per pound when burning, which is approximately 1500 BTU/lb. more than other wildland vegetative fuels produce. Coyote bush, an early succession plant that replaces eucalyptus in unshaded areas averages 8000 BTUs/lb.*
5. *The US Forest Service designates eucalyptus with an ignition rating of "1" (same as grass) out of 10, with 1 being the highest rating for ease of ignition.*

Fuel Model TU-5 Very High Load, Dry Climate Timber Litter-Shrub

Evaluation of the eucalyptus woodland area indicates that it best corresponds to Fuel Model TU-5, Very High Load, Dry Climate Timber-Shrub environment.

The primary carrier of fire in TU5 is heavy forest litter with a shrub or small tree understory. Spread rate is moderate; flame length moderate. US Forest Service documentation estimates fine fuel load is 7.0 tons per acre, with an extinction moisture content of 25 percent.

The eucalyptus is well-established and is currently unmanaged. It supports a number of individual tree specimens with estimated crown heights of thirty feet or more.

The under-story vegetation is similarly unmanaged, with a moderate to dense loading of shrub, brush and grass type fuels. The understory fuels create a "ladder" fuel arrangement where ground based fuels readily transmit ground fires up to the overhead vegetated crown of the trees.

Further analysis of the vegetation indicates that the primary carrier of fire in the eucalyptus grove at ground level will be the forest litter, smaller tree understory and the

herbaceous shrub fuels. The herbaceous fuel load has both live and dead vegetative matter that is a function of fuel moisture content. The effect of live herbaceous moisture content on spread rate and intensity is strong and depends on the relative amount of grass and shrub load in the fuel model. Fire spread rates and flame lengths will be moderate to rapid, as projected and confirmed by BEHAVE fire modeling.

BEHAVE fire modeling indicates that grove understory fuels are capable of firebrand showers at considerable distances. This fuel type most closely matches Fuel Model TU-5 and was modeled as such.

BEHAVE fire modeling does not analyze non-ground type fuels or fuels with diameters of more than one (1") inch. Therefore, torching and fire behavior in the actual eucalyptus tree canopies was not conducted under ta BEHAVE fire modeling assessment. It should be noted, however, that under a typical Santa Ana wind events, eucalyptus tree canopies, when ignited, will deposit embers and firebrands for a mile or more downwind in receptive vegetation fuel beds, causing suppressible fires.

BEHAVE FIRE MODELING, EUCALYPTUS WOODLAND, FM TU-5

Wind	ROS	Flame Length	Spotting
Northeast, 20 mph	39.6'/min.	15.6 feet	0.6 mile/100%

Eucalyptus groves commonly have up to 900 trees per acre, compared to thirty to fifty trees for other species. The Preserve grove encompasses 2.75 acres, with a foreseeable potential of 2475 trees in various stages of growth and has a significant amount of dead and dying materials present in the area.

Experiments in Australia indicate that each eucalyptus tree has the potential of releasing a peak Heat Release Rate (HRR) between 50 and 300 kW/$m^{2,}$ (0.05 to 0.3 megawatts), depending on internal fuel moisture. Total elapsed time heat release rate for the grove, with fuel moisture at 0% and based on 2475 trees in the area, is approximately 742.5 megawatts. This is in addition to the ground-based fire beneath the trees.



Ground Litter and Debris Fire in Typical Eucalyptus Grove

The *Strike Team/Task Force Leader Manual* issued by the CAL-OES indicates the following fire behavior is applicable to vegetation canopy crown fires in the eucalyptus grove for fires occurring on relatively flat ground under Santa Ana wind event conditions:

- Rate of Spread – five (5') feet per second (300 feet per minute)
- Flame Length – 220 feet
- Downwind ember show – greater than 1 mile

Analysis of rates of fire spread through canopy fuels with 30 M.P.H. winds indicate the following hose line production rates and firefighter travel rates:

- Production Table rate of fire spread is five (5) feet per second
- Training hose line production rate is 1.6 feet per second
- Fire ground hose line production rate is 0.42 feet per second
- Fastest firefighter travel time on flat ground is 4 feet per second

This data indicates that an indirect fire attack on canopy crown fires on relatively flat ground beneath the eucalyptus grove cannot physically stop the advancement of the fire across the landscape.

Additionally, ground-based firefighters beneath a well-established canopy fire cannot survive the exposure to a potential 742 megawatt fire.

According to the National Fire Academy's *Fire Dynamics Course Guide* and the *SFPE Handbook of Fire Protection Engineering,* the following radiation heat flux damage

occurs to the human body:

- Skin burns occur between 4.7 and 5.0 kW/m^2
- Pain threshold is at 1.5 kW/m^2
- Potential debillitating pain at one minute elapsed time occurs at 2.1 kW/m^2

A 5 kW/m^2 heat flux measurement is 0.00006739% of a 742 MW heat flux exposure.



Crown and Ground Fire, Australian Eucalyptus Grove

Analysis of rates of fire spread through the woodland type ground fuels indicate the following hose line production rates and firefighter travel rates:

- BEHAVE modeling of rate of fire spread in TU-5 is 0.66 feet per second
- Production Table indicates rate of fire spread is six (6) to eight (8) feet per second
- Training hose line production rate is 1.6 feet per second
- Fire ground hose line production rate is 0.42 feet per second
- Fastest firefighter travel time on flat ground is 4 feet per second

This data indicates that an indirect fire attack on woodland fuels below the eucalytpys grove may not effectively stop the advancement of the fire across the landscape, particularly if the fire is well established in the fuel bed prior to the arrival of fire suppression resources.

Eucalyptus Conclusions

While the CAL-IPC inventory analysis indicates that eucalyptus has a rating of "limited" or "moderate", the species should be ranked as a "high priority" for removal and control. This priority is based on:

- Eucalyptus' tendency to displace native vegetation communities
- The extent of their presence on the Preserve
- The ability to produce thousands of saplings in a small area over a short period of time

In addition to the biological threat to established habitat, eucalyptus has severe, unwanted fire behavior characteristics:

- Resin content can increase fire intensity
- Unmanaged ground debris encourages laddering of fire involving combustible fuels into tree crowns
- Transition from a slow moving, moderate intensity ground fire to a high intensity, fast-moving crown fire
- Propagation of downwind ember showers into susceptible ground vegetation by dislodgement of canopy materials during windy conditions

Eucalyptus Control and Mitigation

The best control mitigation treatment for eucalyptus trees is removal from the habitat by mechanical means and by herbicidal treatments.

Eucalyptus trees may be cut and then immediately sprayed with an appropriate herbicide or alternately removed through girdling followed by herbicidal treatment. Herbicides should be applied with the first one or two minutes after cutting. Trees can be girdled past the xylem/phloem and then treated with a herbicide. Follow-up herbicidal treatments are necessary due to sucker growth development soon after the trees are cut or girdled.

A certified herbicide technician shall treat non-native vegetation with herbicides. A biological monitor will be on-site during all treatment, removal and restoration to ensure that other sensitive species and habitat communities are not negatively impacted by the proposed actions.

5.4.3.2 Fire Management Stipulations for Undeveloped Preserve Lands

Fire management includes two activities with different objectives:

- Fire management for human safety, protection of property and hazard reduction
- Fire management for biological resources

5.4.3.2.1 Controlled Burning of Vegetation Habitats for Fire Management

Many vegetation communities in the MSCP habitats depend on a regular cycle of burning for maintaining the optimal species balance, seed viability and reproduction.

The natural fire cycle is affected by human activities by either increasing fire activity over decreased time spans or decreasing fire activity by fire prevention and protection requirements.

However, fire management for human safety must continue in a manner compatible with biological resource preservation mandates. As a result, and because of the proximity of the adjacent residential development, closeness of suburban population and commercial areas and the history of extreme and erratic fire behavior in the immediate and surrounding areas, neither CAL-FIRE nor the Lakeside Fire Protection District considered or allowed planned controlled burning of vegetation on Preserve lands for biological maintenance and enhancement purposes. This trend is likely to continue well into the future.

5.4.3.2.2 General Vegetation Management Guidelines

The MSCP document indicates that brush management to reduce fuel for the protection of urban land uses must be implemented when new or existing development occurs adjacent to Preserves and associated open space lands.

Fuel modification zones between the Preserve and development may have different depths, and may, or may not, be located on Preserve lands.

Management of fuel modification zones depends where the defensible space resides on the landscape:

- Private property owners are responsible for providing fuel modification zones their own individual properties; and
- The Preserve is responsible for fuel modification zones on Preserve lands and;
- If required, the Preserve will provide and manage property boundary lines defensible space when adjacent to private property with development and established buildings

Each MSCP sub-area is responsible for establishing fuel management guidelines and provisions that are acceptable to the local FAHJ. The guidelines will impact Preserve management costs and any public and private liability impacts associated with fire prevention and protection measures.

The Sycamore Canyon-Goodan Ranch Preserve west of the SR-Highway 67 right-of-way corridor has established a Resource Management Plan. Vegetation Management planning guidelines, based on the western Sycamore Canyon-Goodan Ranch, will be modified and incorporated into this Fire Protection and Fuel Management Plan.

5.4.3.2.3 San Diego County MOU for Fuel Modification Zones

San Diego County fire authorities have established a Memorandum of Understanding with the State and Federal Wildlife Agencies for implementing county-wide planning, construction and fuel modification zone standards.

The objectives of the agreement state that MOU's stipulations provide uniform fire management and habitat preservation standards throughout the San Diego County.

5.4.3.2.4 San Diego County Steep Slope Ordinance

The following types of development are allowed on steep slope lands but are *not* regulated by the Encroachment Limitation Table:

- All public roads identified in the County's General Plan Circulation Element, if no less damaging alternatives can be identified
- Local public and private streets necessary for access to development sites, if not less damaging alternatives can be identified
- Public and private utility systems
- Areas with native vegetation that have been cleared or trimmed to protect existing or proposed buildings, provided brush management is the minimum necessary to comply with applicable Fire Codes or orders of fire safety officials. Vegetation must retain its root ball system or have slopes planted with native vegetation having low fuel content. The natural landform may not be altered
- Trails for passive recreational use

5.4.3.2.5 Metro-Lakeside-Jamul Sub-Area Fuel Modification Zone Stipulations

The Metro-Lakeside-Jamul Sub-Area Plan has established the following minimum guidelines for establishing and managing Preserve fuel modification zones:

- Vegetation inside the Preserve fuel modification zone may be thinned, mowed, pruned and/or removed as necessary
- The owner may use supplmental planting if it is acceptable to the local fire authority and is a non-invasive species.
- Ownership of actual fuel modification zones may vary according to the site. As appropriate, the fuel modification zone may be incorporated within the boundaries/perimeter of the Preserve itself
- Fuel management responsibilities will change according to the specific requirements of the Preserve or approved Preserve.
- Fencing, lighting and signage are permitted in fuel modification zones at the discretion of the individual land owner or Preserve operator.

5.4.3.3 Vegetation Management for Biological Resources

This sub-section is derived from the existing Sycamore Canyon-Good Ranch Preserve Vegetation Management Element Plan, as published for Preserve lands west of the SR-Highway 67 right-of-way.

This plan element will describe essential vegetation management practices for biological

resources, without introducing management principles involving controlled burning across the landscape.

5.4.3.3.1 Habitat Restoration

The Preserve generally has a high-quality habitat that provides essential habitat for special-status species that are covered under the South County MSCP.

However, a variety of target invasive, nonnative plants are present at the Properties. These plants have altered native habitat at the Properties and have the potential to further alter and degrade habitat.

If resources are available, active invasive, nonnative plant removal and restoration would improve the native plant cover and composition and improve habitat values for a variety of native and sensitive animal species. Any proposed restoration activity should use current accepted techniques and avoid or minimize impacts on sensitive species or native habitats. In addition, revegetation activities should use only local, native plant seed or container stock plants that have been propagated from plant material from central San Diego County.

The removal of scattered invasive, nonnative species would not require revegetation, as natural recruitment would be sufficient in small areas. However, in larger areas, revegetation should be considered.

Habitat restoration involving restoring degraded habitat to protect and enhance populations of rare and sensitive species through stabilization of eroded lands and strategic vegetation.

To implement habitat restoration, the Department of Parks and Recreation will be responsible for assessing the need for actual and potential habitat restoration inside of the Preserve boundaries.

The analysis for investigating the need for Preserve restoration activities will be determined by habitat monitoring by DPR personnel and biology consultants.

Habitat monitoring will be conducted at five (5) year intervals or annually for five years following fires occurring on the Preserve lands.

The objective of cyclical habitat monitoring is to identify any adverse changes in vegetation community distribution and habitat quality caused by:

- Changes from fire activity
- Non-native plan invasions
- Decline of existing species

The primary focus of habitat monitoring is minimization of impacts to sensitive habitats, such as:

- Black sage scrub alliances
- California sage brush-California buckwheat-laurel sumac alliances

Which are important to the California gnatcatcher, southern California rufous crowned sparrow and other sensitive species.

Habitat monitoring will indicate if and when modifications to current management practices are needed. The primary result from habitat monitoring will be reports discussing monitoring objectives, monitoring methods to meet the objectives and updated vegetation community maps.

During the habitat monitoring process, DPR Staff will perform weed and erosion control in any disturbed areas where natural "recruitment" of native plant species is actively occurring.

5.4.3.3.2 Non-Native Plant Species Removal and Control

Native and naturalized plan species dominate the vegetation communities in the Preserve.

The Preserve lands east of SR-Highway 67 have burned many times, with a complete burn-over during the 2003 Cedar Fire. As a result of these fires, the Preserve has become infested with invasive non-native plants that have been targeted for removal or in immediate need for removal and control.

Any tree removal must be done outside of the breeding season(s) to avoid impacts to nesting birds.

Removal of non-native plant species is to be coordinated with the Management Priorities for Invasive Plants, A Strategy for Regional Implementation (Dendra Inc., 2012)

DPR Staff will implement the treatment and removal of any high and moderate priority invasive non-native plants as identified in the established Sycamore Canyon-Goodan Ranch Preserve's Vegetation Management Plan.

The removal and treatment of invasive non-native plant species will be conducted through mechanical and chemical methods and passive restoration.

The management of the mechanical and chemical methods for invasive removal and restoration should followed the guidelines outlined in the Habitat Restoration Plan and Non-Native Plant Removal Guidelines for the Otay Valley Regional Park, as stipulated in the Western Preserve Resource Protection Guidelines document.

A certified herbicide technician shall treat non-native vegetation with herbicides. A biological monitor will be on-site during all treatment, removal and restoration to ensure that other sensitive species and habitat communities are not negatively impacted by the proposed actions.

5.4.3.3.2.1 Specific Nonnative Invasive Species Removal and Control Methods

These seven species of non-native plants all have the capacity to displace or are currently displacing native vegetation and altering the functions and services of native vegetation communities.

All seven invasive, nonnative species were found in the northern Properties; only purple false brome was found in the southern Properties. Methods of control for each species is presented below.

Purple False Brome and **Perennial Veldt Grass** s

These invasive plant colonies should be treated with herbicide before they set seed in the spring. In large patches, foliar spray can be used. In areas with more scattered distribution, spot spraying can be used.

Both of these species are persistent and will require follow-up treatment. Mowing timed before these species set seed in the spring can also be used instead of chemical treatment but mowing or hand removal can take many years to deplete the seed bank. The level of effort for this method makes it impractical in most situations but should be considered when there is concern for nearby sensitive plant species.

Stinkwort

Stinkwort has a shallow root system that allows control by hand pulling. Plants should be bagged and removed from the site, as seeds can ripen on cut or pulled plants. Stinkwort flowers in the fall from September to December.

Mowing can be used in spring after germination, but follow-up mowing may be necessary in late summer, as low branches below mowing can continue to grow.

Herbicide can also be effective and should be used in the spring when the plants are rapidly growing.

Sweet Fennel

Sweet fennel can be removed using hand methods, but is very labor intensive due to its deep, thick taproot. Repeated mowing or cutting of re-sprouts may be needed. Herbicide is effective against sweet fennel when applied before flowering. Retreatment is often needed.

Crown Daisy

Crown daisy can be controlled with herbicide, as foliar spray for dense populations or spot spraying for scattered individuals. Herbicide should be applied in spring while plants are rapidly growing and before setting seed.

Milk thistle

Milk thistle should be treated using herbicide and a two-treatment method is recommended, with one foliar or spot application between October and January and a second treatment in May to June.

Managing expansion of invasive, non-native flora in the Preserve when

opened to public use

If, and when, the Eastern Preserve lands are opened for public use, DPR Staff will implement an educational program for visitors and residents adjacent to the Preserve to discourage the introduction of invasive, non-native plants into the Preserve. The information provided will include identification of harmful invasive plants and prevention methods.

If the Preserve is opened for equestrian use, DPR Staff will also implement a program about potential negative impacts to native ecosystems from the accumulation of non-point source pollutants in staging areas and on frequently used trails. This can be accomplished through signage or interaction with rangers and/or other trail users.

5.4.3.3.3 Fire Prevention, Control and Management

Chaparral and coastal sage scrub plant species are adapted to fire. However, too frequent of a return interval can cause type conversion to nonnative grassland and too infrequent of return interval can create a fire hazard.

Fuel management should be conducted along the edges of the dirt access roads to prevent the spread of human-caused fires onto the Preserve. Fuel management activities should be avoided during the bird breeding season (February 15 to August 30), in coastal sage scrub vegetation, to prevent impacts on coastal California gnatcatchers and other species protected by State and Federal laws. Roots should be left intact to avoid soil erosion. Cut vegetation can be mulched in place or removed from the site but must not be placed in stream courses.

Fuel management near drainages and woodland areas should be conducted in ways to reduce impacts on sensitive wildlife species. Old, woody vegetation should only be removed if it poses a threat to dwellings or public safety, as dead wood serves beneficial ecosystem functions. Fuel management near streams should be avoided during the riparian bird breeding season (March 15 to August 15).

Signage prohibiting smoking, camping, and campfires/open flames should be posted within the Preserve and kept in good order. These measures may include installing safety signs and identifying emergency evacuation procedures, such as vehicular access and helicopter landing areas.

The Preserve is not currently open to the public and not open at night; therefore, safety lighting is not necessary.

In 2012, CAL-FIRE designated the Preserve lands as a Very High Fire Severity Area (VHFSA).

With the Preserve closed to public use, two fuel modification zones may need to be established and maintained in perpetuity:

- Along the southern boundary of the Northern Segment, providing property line defensible space between the Preserve and the adjacent rural residential development
- A road-side fuel modification zone along the east shoulder of the SR-Highway 67

right-of-way corridor

With no buildings or other development on either site, no fuel modification zones have been established for the internal portions of the Preserve lands.

If buildings or internal roadway or trail infrastructure is developed internally in the future if and when the Preserve is opened to the public, Code compliant defensible space will be established, as reasonably required by the Lakeside Fire District. This corresponds to the prescriptive requirements of Government Code Section 51184.

5.4.3.3.4 Fire and Defensible Space Management

The Preserve will provide the following fire management activities for the protection of sensitive natural resources.

SR-Highway 67 Driveway Intersection

There is a driveway intersection that was established on the east shoulder of SR-Highway 67 corridor prior to Department of Parks & Recreation acquisition of the land. The driveway was configured between the 1980s and present (2019) by previous landowners on parcels previously considered for resale and development.



With the inclusion of the parcels into the Preserve and becoming dedicated open space lands, the driveway requires access point security, fire department accessibility standards and defensible space measures.

1. It is highly recommended that substantial permanent metal gates be placed across developed driveways
    a. Gates are to be installed at least thirty (30') feet inboard of the intersection "tee", allowing fire apparatus to safely pull completely into the driveway

space without blocking on-coming traffic on the SR-Highway 67 right-of-way.

b. Gates will be secured by DRP and Fire Department Knox Box padlocks. Padlocks will be fastened in a linked manner so that independent operation of one of the padlocks will allow the gate to open without interfering with the locked position of the other lock.



Example of Security Gate Configuration to Prevent Unauthorized Access to Preserve Property Sycamore-Goodan Ranch Preserve

2. Roadside fuel modification zones will be established on all sides of the driveway intersection "tees"

a. Roadside defensible space shall have a minimum width of ten (10') feet.

b. Roadside defensible space, once established, will be maintained annually, but no later than June 30th of each successive year

Fire Safety Vegetation Best Fuel Management Practices

Fuel Management in Areas with Natural Woody Vegetation (around homes and commercial buildings)	• Remove or thin natural vegetation using hand tools and hand-held power tools. • Do not use motorized vehicles for clearing • Limit fuel management to the limits established by the Wildlife-Fire Agencies MOU (generally 100 feet of dwellings and commercial buildings and within 30 feet of driveways. • Leave shrub roots intact to prevent soil erosion • Do not remove single specimen trees (i.e., oaks) unless they present a fire danger to a building • Dispose of cut vegetation by removing it from the site or leaving it in place (chipped or crushed) as mulch or composting • Do not dispose of cut vegetation in stream courses – decaying vegetation can contaminate water quality and create fire hazards • Avoid fuel management activities during bird breeding season(s) in coastal sage scrub vegetation (February 15th – August 20th)
Fuel Management in Areas with non-woody vegetation (around homes and commercial buildings)	• Remove or thin grassy areas in ways that minimize soil and root disturbance (mowing, raking, cutting) • Use heavy equipment only when necessary – when the FAHJ requires disking of an area • Limit fuel management to the limits established by the Wildlife-Fire Agencies MOU (generally 100 feet of dwellings and commercial buildings and within 30 feet of driveways. • Leave shrub roots intact to prevent soil erosion • Do not remove single specimen trees (i.e., oaks) unless they present a fire danger to a building • Dispose of cut vegetation by removing it from the site or leaving it in place (chipped or crushed) as mulch or composting • Do not dispose of cut vegetation in stream courses – decaying vegetation can contaminate water quality and create fire hazards • Avoid fuel management activities during bird breeding season(s) (February 15th – August 20th)
Fuel Management along roads and trails	• Avoid fuel management activities during bird breeding season(s) (February 15th – August 20th) • Leave roots intact to prevent soil erosion • Dispose of cut vegetation by removing it from the site or leaving it in place (chipped or crushed) as mulch or composting • Do not dispose of cut vegetation in stream courses – decaying vegetation can contaminate water quality and create fire hazards • Use of heavy machinery is allowed in these areas to maintain low growth of vegetation within 10 to 30 feet of roadways. This also serves to protect natural areas from roadside ignition sources • Trimming or removal of trees is allowed to maintain roadway safety (i.e., emergency vehicle access; elimination of falling hazards; eliminating barriers to traffic visibility)
Fuel Management Around Streams and Other Wetlands	• Within wetlands areas, avoid vegetation management activities. These are sensitive habitat areas for wild life and water quality. • Remove only woody materials that are definitely dead and only if the

	materials present a fire hazard to dwellings. Use hand tools (including power hand tools – chainsaws and weed whips). • Do not use motorized vehicles for clearing • Avoid fuel management activities during bird breeding season(s) in coastal sage scrub vegetation (February 15th – August 20th) • Avoid fuel management activities during raptor breeding season(s) (January 1st through September 15th) • Do not remove live vegetation within stream courses or other wetlands without first consulting the County Department of Planning and Development Services. • If a landowner suspects the occurrence of rare, threatened or endangered species on their property in areas subject to fuel modification, Calif. Department of Fish and Game and US Fish and Wildlife Service prior to performing fuel modification activities.

Post Burn-Over Event Measures

After fire events, DPR staff will provide mitigations in the burned areas to stabilize soils and minimize erosion.

Erosion control best management practices (BMPs) such as mechanical rehabilitation treatments, including straw, hay bales and jute rolls, should be placed as soon as possible after a fire and before the winter rainy season. The BMP materials should be carefully inspected to insure they are not potential sources of introducing non-native invasive plants onto Preserve lands.

Coordination with Fire Agencies

DPR will provide a liaison contact with the Lakeside Fire District to coordinate fire response guidelines and policies and the implementation measures outlined in this document. This will ensure that activities and programs are up-to-date and adequate for effective fire response within the Preserve.

DPR shall conduct fuel management under the direction of the Lakeside Fire District. DPR will review fire history maps for the Preserve at least once every ten (10) years to determine if Preserve lands are within natural fire return intervals and to estimate fuel age class parameters.

DPR will cooperate with public safety personnel to achieve their agency goals while helping to reduce or eliminate impacts to biological or cultural resources in the Preserve.

DPR will allow law enforcement officials and all fire, medical, rescue and other emergency agencies to access Preserve property as necessary for law enforcement activities and to carry out all operations necessary to protect the health, safety and welfare of the public. DPR will coordinate with the applicable agencies to inform their field personnel of the locations of particularly sensitive biological and significant cultural resources and how to minimize damage to these resources.

Unauthorized Public Uses of Preserve Lands

Fires can ignite naturally or be caused by people. In coniferous forests, lightning caused fires are far less important than in Southern California lower elevation shrublands where

lightning is uncommon and humans cause most fires. Over 95% of Southern California fires are started by people which has increased fire frequency and increased the changes of ignition during Santa Ana wind events.

In general, more people move to the shrublands than to forests, since most of San Diego County, and the Preserve, is on the coastal plain and foothills. People living in shrublands, traveling on roads and recreating in wild land areas can inadvertently ignite fires. Additionally, wild land fires are sometimes ignited by arsonists. All these situations create more opportunities for wildland fire potential and danger to people, buildings and the environment.

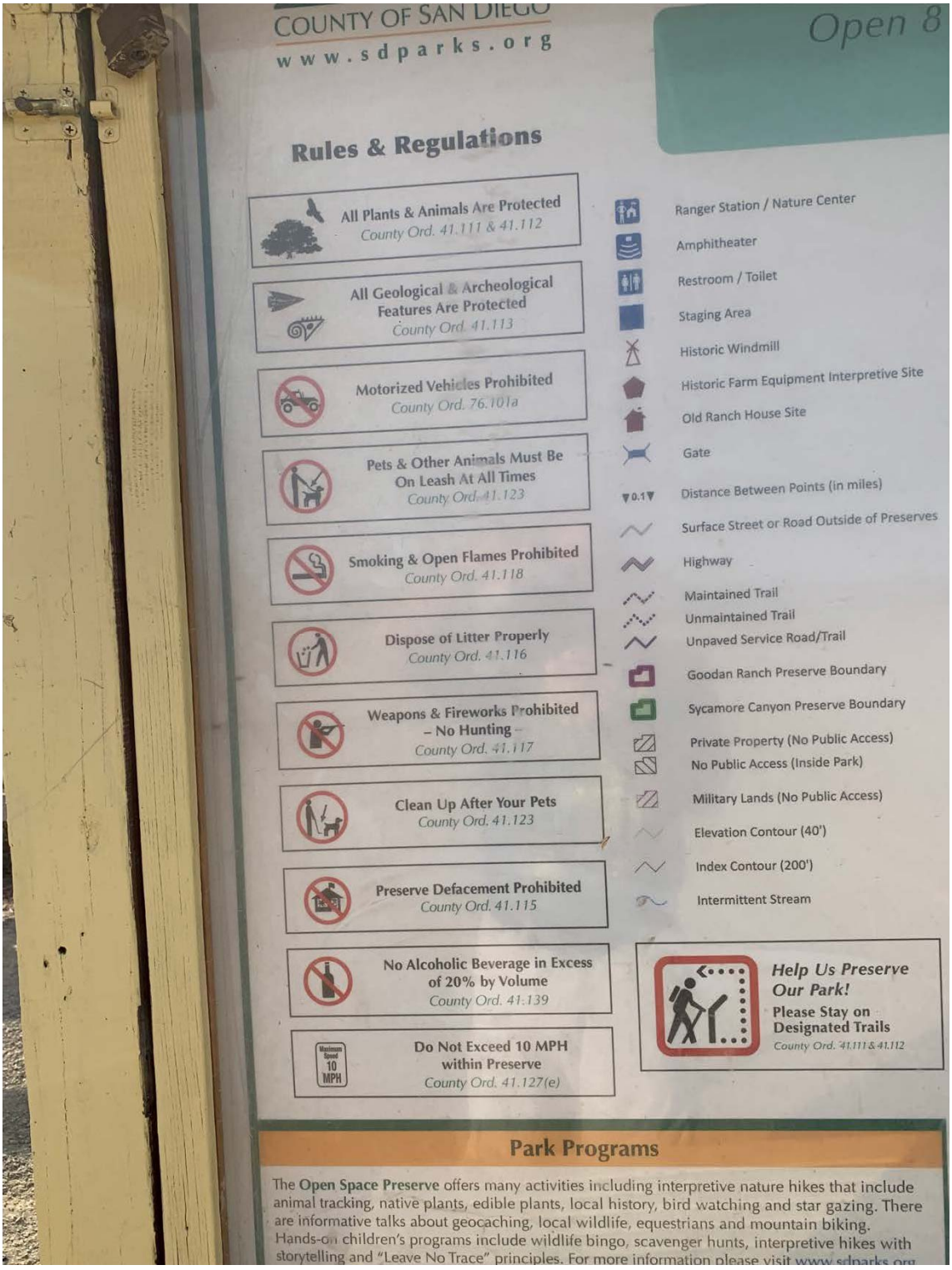
DPR Rangers will document any illegal access and inform unauthorized persons conducting prohibited activities on Preserve lands that such uses are not allowed. Rangers are responsible for enforcing Preserve restrictions and may call the Sheriff's Department for legal enforcement as necessary or appropriate.

The following public uses impact vegetation and habitat management and fire and life safety matters:

1. Off-road recreational vehicle and off-road/cross-county on-road vehicle activities are incompatible with MSCP preserve use and prohibited on all Preserve lands. The exceptions are for law enforcement, Preserve management and/or fire and other emergency purposes.
2. Hunting and discharge of firearms is incompatible in MSCP preserves and is prohibited by San Diego County Ordinances. The exception is for law enforcement and/or emergency purposes.
3. Camping, including homeless or migrant workers
4. Smoking
5. Campfires and open flames
6. Littering and dumping



County DPR Signage for Fire Hazards – Sycamore-Goodan Ranch Preserve



County DPR Signage Notifying Preserve Users of Public Safety Regulations
Sycamore-Goodan Ranch Preserve



Typical County DPR Signage Stating Preserve Regulations – Sycamore-Goodan Ranch

Manage Public Access in Sensitive Biological and/or Cultural Resource Areas

The Preserve lands east of SR-Highway 67 are not currently open to the public.

If, in the future, DPR proposes public access to the eastern Preserve lands, DPR will ensure that any proposed trail system is compatible with MSCP objectives and the approved San Diego County Community Trails Master Plan.

All future trails will undergo environmental CEQA reviews prior to any public use of new trails in the Preserve.

When, and if, the eastern Preserve lands become available to the public, the following Public Access procedures will be established.

1. DPR shall identify and map sensitive vegetation communities, special status plant and wildlife species and any cultural resource sites in the Preserve before the lands

are opened for Public use. This will enable DPR personnel to monitor these areas so they are avoided by Public visitors.

2. DPR will ensure that any and all new public-use trails and roads are designed and constructed to avoid and minimize impacts to sensitive biological and cultural resource areas.
3. Points of unauthorized access and sensitive species impacts will be continuously identified in conjunction with habitat, plant, wildlife and access road monitoring activities.
4. If necessary, fences and gates may be used, within MSCP guidelines and directives, to control unauthorized access if designed and located so they do not impede wildlife movement or impact cultural resources.



County DPR Signage Identifying Sensitive Habitat & Restrictions
Sycamore-Goodan Ranch Preserve



Example of County DPR Access Control Gates to Sensitive Habitat Areas
Sycamore-Goodan Preserve

SECTION 6
FIRE MITIGATIONS FOR FUTURE DEVELOPMENT

6.1 Fire Apparatus Access Roads

There are no existing/dedicated fire department access roads on the eastern Preserve lands.

The driveway near the center of the Northern Preserve Segment extends in a west-to-east configuration for a short distance before transforming into degraded mineral soil tracks with marginal widths and weight-bearing capacities. If properly developed and maintained, the driveway and their dirt extensions could be used as fire apparatus access points or for fire suppression operation anchor points from which to begin hose lays into the interior portions of Preserve lands.

6.1.1 Interior Access Roads to Future Preserve Recreational Buildings and Sites

Preserve roads and driveways serving future recreational buildings, sites, staging areas and parking lots shall be provided with an approved all-weather paved surface.

Road and driveway slopes shall not exceed 15% without additional mitigation consisting of a minimum of three (3") of concrete that is brushed perpendicular to the driving surface to provide additional traction.

Road and driveway widths shall have a minimum improved paved surface of twenty (20') feet and maximum slope shall not exceed 20%.
Angle of approach and departure at the intersection of driveways and roads shall not exceed 7 degrees or a 12% slope.

6.1.1.1 Fire Apparatus Access Road Obstructions

All interior roads with an improved paved width of less than thirty-six (36') shall be considered Fire Apparatus Access Roads (Fire Lanes).

Fire Lanes shall be provided with red curbs and posted signs that identify the presence of the Fire Lane.

Red curbs shall be supplied with white stenciled letters that are plainly visible from vehicles, which indicate the presence of the Fire Lane and prohibit parking. Fire Lane Signs shall be posted at appropriate distances apart, further identifying the presence of the Fire Lane and mandating "No Parking" within the Fire Lane.

Signs, posting, red curbs and white stenciling shall comply with the requirements of Section 22500.1 of the California Vehicle Code. Signs, posts, red curbs and white stenciling shall be maintained in perpetuity.



Typical Approved Fire Lane/No Parking Sign

As an alternative to the above requirements, Alternate Means of Compliance signage may be provided under the following guidelines.
Roadways may be identified by approved signs placed at the established and gated entrances to Preserve lands. The language of these signs shall indicate that all roads and driveways within the Preserve are fire apparatus access roads (fire lanes) and that no parking, standing or stopping is permitted on any of the established fire lanes.

Entry gate Alternate Means of Compliance Fire Lane signage shall be maintained in perpetuity.



Example of Approved Fire Lane/No Parking Entry Point Signs

NOTE: *The content of the example sign does not necessarily indicate the language specifically needed for Preserve fire lanes. Content and format of the signs is open for discussion between representatives of the Lakeside Fire District, Department of Parks and Recreation, CAL-FIRE and the San Diego County Fire Authority.*

6.2 – Water Supply Mitigations

There are no existing buildings requiring fire department water supply infrastructure on Preserve lands. As noted in Section 2.3, water supply for firefighting operations, until buildings are erected on the Preserve, are derived from water tanks carried on fire apparatus and off-site fire hydrant located approximately 1.5 miles south of the Preserve in the commercial-industrial development sites adjacent to the SR-Highway 67-Vigilante Road-Slaughterhouse Canyon Road intersections.

6.2.1 Proposed Water Supply Mitigations

Future buildings erected on the Preserve will require the installation of permanent fire water storage tanks, with fire department connections, adjacent to the buildings and readily available for fire department operations.

Capacity of each fire water storage tank will depend on the size of the buildings that the water tank will service.

6.2.1.1 California Fire Code Water Storage Requirements

Section 507 of the California Fire Code indicates that the required amount of water storage required depends on the required fire flow for the building, based on building construction type and building foot print.

For a Type-V wood-frame construction recreation building with a footprint of less than 3600 square feet, the minimum fire flow is 1500 g.p.m for a minimum flow period of two (2) hours. This is equivalent to 180,000 gallons required in a storage tank installed on the premises.

6.2.1.2 San Diego County Water Storage Requirements

The San Diego County Fire Authority published a Water Tank Standards for Fire Protection Document (CFA # 600) that was last updated on March 15, 2013.

This Fire Protection Standard provides minimum water storage requirements for dwellings, other buildings and structures in unincorporated San Diego County lands where adequate public or private water supply infrastructure is not available.

Table 903.3.2 of the San Diego County Consolidated Fire Code indicates that a fire flow of 250 g.p.m.is acceptable where the exposure distance to a Preserve building from an adjacent property is one hundred (100') feet.

TABLE NO. 903.3.2

Building Square Feet	Gallons Per Minute Water Flow	Capacity Gallons	Duration Minutes
Up to 1,500	250	5,000	20
Over 1,500	250	10,000	40

When exposure distance is one hundred feet (100') or less from adjacent property, the following minimum fire flow shall be adhered to. Increases in water storage may be required by the Chief, depending on the square footage of the exposed structure. When protecting exposures within 100 feet or less, the minimum flow duration shall not be less than two (2) hours unless otherwise approved by the Chief.

EXPOSURE DISTANCE	MINIMUM FIRE FLOW
Over 100 Ft.	250 Gallons Per Minute
31 Ft. – 100 Ft.	500 – 750 Gallons Per Minute
11 Ft. – 30 Ft.	750 – 1000 Gallons Per Minute
10 Ft. or less	1000 – 1500 Gallons Per Minute

Finding: *Based on existing Preserve configuration and conditions, the fire exposure distances to the nearest adjacent properties exceeds 100 feet.*

Finding: *For a recreational building, with a limited building footprint below 1500 square feet and a minimum separation distance of over 100 feet from the nearest*

structure or building, a 250 gpm fire flow is an acceptable mitigation for the full 1500 gpm fire flow required by Table B-105.1 of the California Building Code.

Finding: *Based on the limited fire load in an isolated recreational building, with limited fire exposures, a 10,000 gallon water tank with a 250 gpm fire flow for forty minutes, exceeds the minimum 5,000 gallon water tank requirement of SDCCFC Table 903.3.2 but provides a 100% reserve for unforeseen fire conditions.*

Recommendation: *The Preserve shall install a minimum 10,000 gallon fire water storage tank adjacent to any proposed future recreational buildings to be erected on Preserve recreational use areas.*

6.2.1.3 Proposed Water Supply Mitigations

Future buildings erected on Preserve lands will, foreseeably, be for combined recreational and educational purposes. These buildings would be considered as Light Hazard occupancies for fire protection classification purposes and, based on MSCP directives, have limited floor plan footprints.

For buildings with a floor plan footprint of up to 1500 square feet, fire water tank capacity is 5,000 gallons, designed to support a 250 gallon per minute hose stream for a minimum of twenty (20) minutes of operation.

For buildings with a floor plan footprint of over 1500 square feet, fire water tank capacity is 10,000 gallons, designed to support a 250 gallon per minute hose stream for a minimum of forty (40) minutes of operation.

Each fire water storage tank, regardless of size, will be provided with following approved components and equipment:

- Fire department connections, either at the base of the tank or installed next to the fire apparatus access road adjacent to the tank location
- Electric driven pump for tank filling and discharge purposes
- An automatic fill mechanism
- Vehicle protection measures, as necessary because of tank location constraints in relationship to fire apparatus access road location. Vehicle protection measures shall be in accordance with Section 312 of the California Fire.

Finding: *The County Consolidated Fire Code stipulates that when full fire flow capabilities are not feasible, the FAHJ may allow substitution of fire flow for other alternative means of fire safety compliance. These alternative mitigations include:*

- *Enhanced fire resistive fire construction techniques*
- *Setback distances for building sites from hazardous brush areas*
- *Irrigation systems for landscaping and fuel modification zones*
- *Enhanced fuel modification zone depths*

6.3 – Ignition Resistant Construction and Automatic Fire Sprinkler Mitigations

6.3.1 Existing Structures

There are no buildings or structures on the proposed Preserve Site.

6.3.2 Proposed Mitigations

6.3.2.1 Automatic Fire Sprinklers

Unless otherwise determined by the Lakeside Fire Protection District, all new buildings and structures shall be provided with automatic commercial fire sprinklers complying with National Fire Protection Standard 13.

Finding: *Publicly owned recreational buildings do not qualify for the installation of residential fire sprinklers covered by NFPA Standards 13-D and 13-R.*

Finding: *NFPA 13 fire sprinkler design will have flow and pressure demands that may exceed the capacity and pumping abilities of the water infrastructure mitigations proposed in Section 6.2.2.*

Recommendation – Based on the remote location of future buildings that may be erected on Preserve lands, no existing or future proposed water distribution infrastructure system that will support NFPA 13 Commercial Automatic Fire Sprinklers, fire department response time(s), limited building size and footprint, California Building Code Chapter 7-A construction methods, minimal fire load of proposed buildings, it is recommended that automatic fire sprinkler requirements be waived under an Alternate Means of Compliance and Methods Request submitted to the Lakeside Fire Protection District.

Discussion – Isolated Restroom Facilities

Restroom facilities, which could be proposed for construction in the Preserve, would most likely have Ignition Resistant Type V wood frame construction and wall coverings and a footprint less than 500 square feet.

For purposes of prescriptive Code appliances and because it is not associated with other uses and is not attached to another building or structure, the occupancy designation for a restroom facility will most likely be a Group U, “Other Occupancy.”

A Group U Occupancy is a building or structure of accessory character that are not classified in any other occupancy designations.

As an isolated Group U occupancy, proposed restroom facilities will have limited internal combustible fire loading, will not store, use or dispense hazardous materials or ignitable liquids, and will have limited floor footprints.

The California Fire Code, and its base-line International Fire Code derivative, generally do ***not*** require the installation of automatic fire sprinklers in Group U Occupancies.

The San Diego Consolidated Fire Code provides the following exemptions to the requirements for installing automatic fire sprinkler systems:

- Group U occupancies not greater than 500 square feet, when the building is ten (10') or more from an adjacent structure or property line
- Accessory buildings and structures no greater than 1000 square feet, and not otherwise considered enclosed buildings/structures, which are of ignition resistant construction or as determined by the fire code official to not present a significant fire hazard.

Finding: *A restroom facility will be a detached accessory building that is more than ten (10') feet from another building or property line.*

Finding: *A restroom facility, as a stand-alone building, can be considered a Group U Occupancy because it does not match any other Occupancy group classification*

Finding: *Restroom facilities with less than the 500 or 1000 square foot footprint, depending on the installation parameter used, do not require the installation of automatic fire sprinklers.*

Finding*: With a limited fire load, limited building footprint, ignition resistant construction and non-hazardous use and storage characteristics, a restroom facility will not present a significant hazard to surrounding buildings.*

Finding: *The Fire Separation Distance between the rest room facility and other buildings and structures will be more than 100 feet.*

Finding: *A restroom building, with a building footprint less than 500 and 1000 feet, minimal internal fire loading and no hazardous materials or ignitable liquid use, storage or dispensing, qualifies as a low hazard Group U Occupancy that is exempt from automatic fire sprinkler system installation requirements, based on California Fire Code and San Diego County Consolidated Fire Code prescriptive exemptions.*

6.3.2.2 Building/Structure Construction

All new and future buildings and structures will be required to conform to Chapter 7-A of the County of San Diego Building Code for Ignition Resistant Building Construction Standards for Wildland-Urban Interface Areas and California Building Code Chapter 7-A construction standards.

Examples of detailed, but not-all-inclusive, requirements for building construction in Very High Severity Areas are included in ***Appendix C.***

6.4 - Defensible Space and Fuel Modification Mitigations

As previously stated, Fuel Modification Zones on properties are areas where vegetation has been removed, planted with alternative landscaping or modified in other ways to increase the likelihood that structures will survive a wildfire, improve defensible space around the structure for firefighting activities and prevent flame contact with the building from spreading fires.

The fuel model sets currently used by fire scientists, fire behavior analysts and Fire Protection Plan consultants do not have the ability to simulate fire behavior changes created by various fuel treatments. Fuel Models are based on fully cured vegetation at or near their seasonal extinction moistures and, concurrently, at the worst part of the annual fire season. This tends to produce over-prediction of fire spread rates and other fire behavior parameters, especially in annual grass fuels.

6.4.1 – Proposed Mitigations for Future Preserve Buildings

If, in the future, Preserve lands are opened to the public access, and recreational activity or maintenance support buildings *are* provided, fire defensible space will be required around these structures and all vehicle access roads (and potential parking areas) leading to their locations.

However, it is important to remember that following Fuel Modification principles does ***not*** guarantee structure survivability during wildfires. This strategy merely increases the chance of survivability to a *reasonable* level of *relative* safety.



Typical Recreation Site Shade Structure, Sycamore-Goodan Ranch Preserve



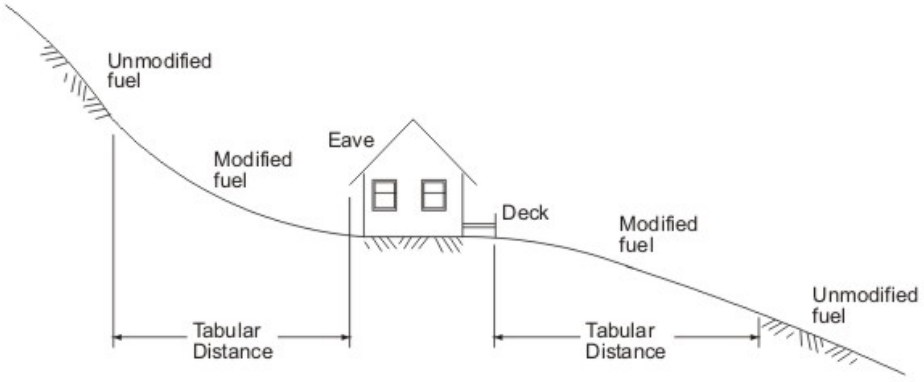
Typical Recreational Building With Compliant Defensible Space (SR-67 at Poway Road)

Because of the nature of Southern California soils, it is imperative to consider the potential for hillside erosion and the need for slope stabilization. Every effort should be made to avoid the need for total removal of native vegetation on hillsides.

Efforts should be made to use modified native vegetation on slopes as much as possible to provide adequate hillside stabilization. Native plants are better adapted to local topography and provide important wildlife habitat and protection from erosion.

Erosion concerns, combined with the need to address water conservation measures, require the careful selection of plant species as well as the placement of pathways, retaining walls and other landscaping features so that a well-designed fire-wise landscape provides an environment that accomplishes more than achieving the goal of fire safety mitigation.

Defensible space can be accomplished in ways other than plant modification. Paved brick, gravel pathways, rock borders, dry streambeds, water features, and other features made of non-combustible materials can contribute to a structure's defensible space. Structural survivability can also be improved through the use of fire resistive building construction standards as outlined in Chapter 7-A of the California Building Code.



Example of Fuel Modification Zone configuration for 100' depth between structure and unmodified fuel beds

"Tabular distance" is the required <u>lateral</u> distance, without regard to distances produced by slope inclination or declination, from the edge of buildings to the unmanaged vegetative fuel bed.

<u>6.4.1.2.1 Fuel Modification Zone 1</u>

Fuel Modification Zone 1 comprises the first defensible space surrounding a building and has a minimum width of 50 feet. Fuel Modification Zone 1 includes the level building pad.

If fifty feet is not obtainable around every building, the Preserve owner and staff remain responsible for maintaining defensible space perimeters for fifty (50') feet around any flat building pads and on natural slopes or manufactured slopes around the buildings with irrigated or fire resistant landscaping.

The fire-resistant landscaping should be permanently irrigated and maintained at all times. Plants with high moisture content levels are less likely to burn. Thick succulent or leathery leaf plant species are the most fire resistant' plants; paper-thin leaves and small twiggy branches are the least fire resistant.

Plants in this defensible space zone will ***not*** include ***any*** pryophytes, which have high oil and resin content. This includes coastal sage and other scrub and chaparral species and eucalyptus, cedar and juniper tree species.

Proposed trees must be planted and maintained so that when they reach maturity the distal ends of their drip line branches are at least 10 feet away from any structure.

Regular maintenance and continued irrigation is very important in Zone 1.

The irrigated landscaping in FMZ-1 consists of native and non-native fire resistant and maintained plantings less than 18 inches high. This Zone may also contain fire resistant specimen size trees or single well-spaced ornamental shrubs taller than 18 inches, intermixed with ground covers

Although all plants will burn under extreme fire conditions, research has shown that some types of plants, including many natives, are more fire resistant than others.

The County of San Diego Recommended Plant List includes examples of low fuel volume, non-oily, non-resinous plants commonly refered to as "fire resistant". This term comes with the caveat that these plants must be annually pruned, all dead or dying vegetative materials removed, with all grasses or other plant material removed from beneath the circumference of their canopies.

The Recommended Plant List includes native species that are not considered undesirable from either a biological or wildfire risk management perspective if they are properly maintained by June 1st of each year.

6.4.1.2.2 Fuel Modification Zone 2

Fuel Modification Zone 2 starts at the outer perimeter boundary of Zone 1 and extends outward for an additional 50 feet. The combination of two fifty (50') foot zones provides the prescriptive San Diego County Code requirement for a minimum total defensible space with 100 feet of depth.

However, Zone 2 may extend beyond the minimum required depth of 50 feet, depending on local conditions and fire behavior threats.

Zone 2 Fuel Modifications removes materials from fifty percent (50%) of vegetation canopies, especially in undesirable plants**.**

Zone 2 requires the removal of dead and dying materials in vegetation canopies; thinning, lacing and pruning of branches; and mowing and weed-whipping of grasses and weedy plants. Landscaping and maintenance of plantings will include limited irrigation to ensure establishment of fire-resistant landscaping (ground covers, shrubs and trees).

6.4.1.2.3 Defensible Space Around Buildings

Fuel modification zones are required around every building designed for human habitation.

Fuel modification zones shall comply with the following requirements:

(a) When a building is located 100 feet or more from the property line, the fuel modification zone shall have a depth of 100 feet from habitable buildings. The area within the first fifty (50') feet of buildings shall be cleared of non-fire resistive vegetation and re-planted with fire-resistant plants or approved irrigated landscaping. In the area between 50 to 100 feet from a building, all dead and dying vegetation shall be removed. Native vegetation may remain in this area if the vegetation is modified and thinned so that combustible vegetation does not occupy more than 50% of the area. Trees may remain in both areas provided that the horizontal distance between crowns of adjacent trees and crowns of trees and structures is not less than 10 feet.

(b) When a building or structure in a hazardous fire area is setback less than 100 feet from the property line, the requirements above shall be met to the extent possible in the area between the building and the property lines.

(c) The building official and the FAHJ may provide lists of prohibited and recommended plants.

(d) When the subject property contains an area designated to protect biological or other sensitive habitat or resource, no building or other structure requiring a fuel modification zone shall be located so as to extend the fuel modification zone into a protected area.

e.) Fuel Modification Zones and Defensible Space shall be maintained in perpetuity.

f.) Representatives of the Lakeside Fire Protection District shall have the right to enter private property to insure the fuel modification zone requirements are met.

SECTION 7
CONCLUSIONS

7.1 Significant Impacts Mitigated by Fire Protection Plan Requirements

Due to the severity of impacts from the improper management of wild land areas, the existing laws are stringent and regulate all aspects of wild land fire including building standards, fuel modification, water availability/flow, and access.

7.1.1 Emergency Services

The Preserve is served by the Lakeside Protection District. The District is an all-hazard fire protection agency that provides services year-round. The fire protection services provided by the District meet or exceed the requirements to reduce the Significant Impact of providing adequate emergency services.

The Preserve is a dedicated Open Space with potential future recreational uses property. Its location and size place the Preserve parcels in the Rural Land Use Category.

Maximum fire travel time for Rural Land Use Designation for Single Family Dwellings is twenty (20) minutes.

LAND USE CATEGORY	MAXIMUM TRAVEL TIME	LAND USE CATEGORY DEFINED
Town	5 minutes	Single-family residential lots of less than two acres, or more intensive uses such as multi-family residential. Includes all industrial development and all commercial development except neighborhood commercial
Estate	10 minutes	Single-family residential lots from two to four acres in size. Includes neighborhood commercial development.
Rural	20 minutes	Large lot single-family residential and agricultural development. Lot sizes of greater than four acres.

Finding: *Documentation and field evaluations have determined that the Emergency Services provided to the Preserve's fire protection meets or exceeds the requirements for reducing this Significant Impact.*

7.1.2 Access and Evacuation

The primary road providing emergency access and egress for the Preserve meets the minimum Fire Code width, paving and slope requirements.

There are currently no fire department access roads on Preserve lands.

If, and when, the Preserve is opened for public use and buildings or other facilities are erected or constructed on Preserve lands, DPR is required to provide appropriate and Code and MSCP compliant fire department access roads.

These roads and driveways will be provided with sufficient width to allow simultaneous passage of civilian vehicles and fire apparatus.

All interior Preserve roadways will be designated as Fire Apparatus Access Roads/Fire Lanes. These roads shall be established under the requirements of this Fire Protection be maintained in perpetuity according to the requirements of Section 22500.1 of the California Vehicle Code, allowing local law enforcement and fire officials the ability to enforce fire lane regulations without restrictions.

***Finding**: When these Conditions are met, the Fire Protection Plan provisions for Access and Evacuation will meet or exceed the requirements for reducing the Significant Impacts in this category.*

7.1.3 Water Supply

Based on the limited fire load in an isolated recreational building, with limited fire exposures, a 10,000 gallon water tank with a 250 gpm fire flow for forty minutes, shall be installed for any proposed future recreational buildings erected on Preserve recreational use areas.

A 10,000 gallon fire water tank exceeds the minimum 5,000 gallon water tank requirement of SDCCFC Table 903.3.2 but provides a 100% reserve for unforeseen fire conditions.

***Finding:** When these Conditions are met, the Fire Protection Plan provisions for Water Supply will meet or exceed the requirements for reducing the Significant Impacts in this category.*

7.1.4 – Ignition Resistant Construction

All new buildings and structures erected on the Preserve will be required to meet the County of San Diego Building Code Chapter 7-A requirements for Wildland Urban Interface Areas and Chapter 7-A requirements of the California Building Code.

Unless otherwise stipulated by the Lakeside Fire District, these requirements mandate the installation of automatic fire sprinkler systems compliant with NFPA Standard 13 for commercial fire.

Roof composition is an important factor in structural survivability.

One study shows that typical single family dwellings with non-combustible roofs and thirty-three (33) to sixty-six feet of fuel clearance have a 95% chance of survival (Howard, et.al.,1973).

A second study in Santa Barbara counted revealed that houses with a non-combustible roof and thirty-three to sixty feet of vegetation clearance had an 86% chance of survival (Foote, 1994).

Any proposed building erected on Preserve lands will be required to have Class A non-combustible roof decks or assemblies**.**



The above Power Point slide, from a presentation given by the San Diego County DPLU Fire Marshal's Office, indicates a 96 to 98% survivability rate for buildings erected under Enhanced Fire Resistive Construction/Chapter 7A and 7B requirements during actual, extreme fire behavior conditions in similar and more hazardous vegetation types than found on the Preserve site.

Finding: *The building standards proposed by this Fire Protection Plan will provide a reasonable degree of ignition resistant buildings at the Preserve site and reduce the Significant Impact caused by less resistive construction standards.*

7.1.5 Defensible Space and Fuel Modifications

Fire behavior, under the mitigations strategies recommended by this Fire Protection Plan, is expected to significantly diminish when a wildfire encroaches upon the Fuel Modification Zones adjacent to unmanaged vegetative fuels**.**

Vegetation management beyond a building's immediate vicinity has little effect on building ignitions unless a minimal break of continuous surface fuels is maintained around the perimeter of that particular building.

For this reason, building site protection includes eliminating continuous ground fuels that lead from wild land fuel beds to the building. This can be accomplished with rock landscaping, cement sidewalk, green grass or by removing dried vegetation and tree needles (Jack Cohen, USFS).

In 1997, Cohen conducted a full-scale experiments that revealed that a typical Type V-B combustible wall thirty-three meters (108 feet) from a crown fire in 43 foot (13 meter) tall Black Spruce trees. These fires produced flame heights of 20 meters or 65.616 feet. Twenty meter long flame heights are produced by a 100 megawatt fire. The walls on the test site only ignited when actually touched by flames. These full-scale fire tests are the basis for the 100 foot wide Fuel Modification Zones mandated by the County of San Diego.

A flame front moving through the Preserve's Coastal Sage shrub and chaparral habitats environment will produce a 3.5502631035 megawatt fire. This heat energy release rate is approximately 4% of the energy produced by Cohen's full scale test fires.

The BEHAVE Fire Modeling calculation for the Preserve indicate that a wild fire moving through Fuel Model 1-GR-1 native and invasive species annual grasses will produce a Fire Line Intensity of 2868 BTU/foot/second. This value can be anecdotally applied to irrigated lawns and used to determine ignition times for recreational building construction materials by using various formulas and tables.

For example, using the formula:

$$t_{ig} = \pi \, kpc \, (T_{ig} - T_o) / 2q_e$$ (National Fire Academy *Fire Dynamics* pg. 5-3)

where

t_{ig} = time to ignition, seconds
kpc = thermal inertia of material
T_{ig} = temperature of ignition source
T_o = surface temperature of exposed material
q_e = incident heat flux to the material

The ignition time of solid materials can be estimated.

7.1.5.1 Typical California Building Code Chapter 7-A Compliant Stucco Sided Building Ignition Times

7.1.5.1.1 Exposure to a Fuel Model SH-5 Heavy Load Shrub Fire Front

For a gypsum based one hour fire resistive or non-combustible stucco plaster wall (as required by Chapter 7A of the County and California Building Codes) with a surface temperature of 37 degrees C (solar exposure), having a kpc of 5.8 x 10^5 q_e (*Fire Dynamics,* pg. 2-15), exposed to radiative heat from a 1400 degree C flame front thirty feet (30') away producing 2235 BTUs, ignition time would be 543171.9037 seconds or ***150.8810844 minutes (2.514 hours)***

7.1.5.1.2 Exposure to a Fuel Model SH-7 Very Heavy Load Shrub Fire Front

For a gypsum based one hour fire resistive or non-combustible stucco plaster wall (as required by Chapter 7A of the County and California Building Codes) with a surface temperature of 100 degrees (solar exposure), having a kpc of 5.8 x 10^5 q_e (*Fire Dynamics,* pg. 2-15), exposed to radiative heat from a 1400 degree flame front thirty feet (30') away producing 2955 BTUs, ignition time would be 40016.176. seconds or ***116.67116 minutes (2.51468474 hours)***.

7.1.5.1.3 Exposure to a Fuel Model 4 Heavy Load Chaparral Fire Front

For a gypsum based one hour fire resistive or non-combustible stucco plaster wall (as required by Chapter 7A of the County and California Building Codes) with a surface temperature of 100 degrees (solar exposure), having a kpc of 5.8 x 10^5 q_e (*Fire Dynamics,* pg. 2-15), exposed to radiative heat from a 1400 degree flame front thirty feet (30') away producing 3677 BTUs, ignition time would be 337543.5953 seconds or ***93.762 minutes (1.56 hours)***.

Finding: *The above exposure-ignition times are calculated using a worst-case flame temperature of 1400 degrees C, which is a determination based on small, well-mixed diffusion flames with higher temperatures than typical large, poorly mixed flames typical of hydrocarbon involved fires (950-1100 degrees C).*

Finding: *Ignition times elicited in the Northwest Territory Forest experiments were for wood-sided buildings, with piloted ignition occurring at approximately* ***twenty-seven (27) minutes*** *of radiant and convective heat exposure.*

Finding: *The duration of the high intensity flame fronts elicited by the Northwest Territory Forest experiments and being 96% greater than the anticipated heat release rate of chaparral and shrub vegetation, lasted less than one minute.*

Finding: *No ignitions or significant charring of wood sided walls beyond a separation distance of twenty meters (20m or 66 feet)*

Finding: S*ome wall surfaces at 10 meters (10m or 33 feet) charred but did not ignite during the full scale flame front experiments. Wall surfaces that did ignite could not sustain flame production once the crown fires burned out after one minute.*

The BEHAVE Fire Modeling Calculation indicates that non-irrigated Fuel Model 1/GR-1 light fuels under worst case 2003 Cedar Fire Event burning conditions will produce 2868 BTUs, equivalent to 840.324 watts or **.840324 kilowatts**.

Fuel Model SH-5 Scrub vegetation produces a heat release rate of 2235 BTUs or 2235 watts (2.235 kilowatts).

Fuel Model SH-7 Scrub Fuels produce a heat release rate of 2955 BTUS or 2955 watts (2.955 kW)

Fuel Model 4 chaparral vegetation produce a heat release rate of 3677 BTUs or 3677 watts (3.677 kW)

Referring to *Fire Dynamics* Figure 2-5 *Damage Caused by Radiation* below, the calculated fire crossing into the Preserve from adjacent properties will not produce sufficient radiant heat to cause significant damage of any proposed new recreational or auxiliary buildings.

Damage Description	**Heat Flux – kW/m²**
Skin burns	4.7 to 5.0
Pain threshold	1.5
Pain at one minute	2.1
Plastic melts	12.0
Cable insulation degrades	18.0 to 20.0
Piloted ignition occurs:	
Wood	**14.6**
Painted Wood	**16.7**
Wood spontaneously ignites	**33.5**

Type of Heat Exposure	**Heat Flux Value**
Flame Radiation	0-200 kW/m²
Flame Convection	10-20 kW/m²
Hot Gas Convection	0-10 kW/m²
Hot Gas Radiation	0-150 kW/m²

Table 5.5 Heat Flux **Direct Contact** *Values, NFA* Fire Dynamics

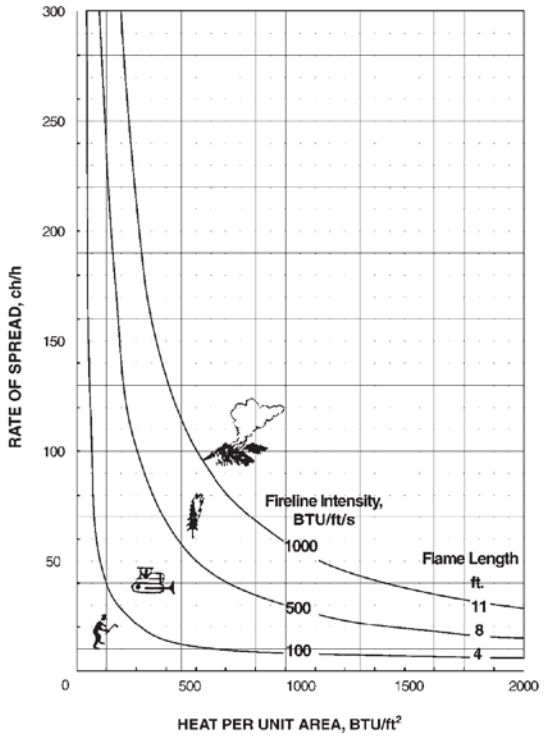
Irrigated lawns or other fire resistant plant species, if proposed as part of the defensible space guidelines for buildings on the Preserve, will have fuel moisture contents of at least 120%.

Fuel moisture contents of 120% result in green, non-cured vegetation, with all herbaceous materials remaining in the “live” fuel categories.

As a result, irrigated grassy fuels , for example, with high fuel moistures will produce flame lengths of one (1') or less and have a rate of spread of approximately 5 chains (330 feet) per hour when exposed to a 20 m.p.h. mid-flame wind.

The fire behavior characteristics of irrigated landscaping vegetation is well within the capabilities of fire suppression forces using non-mechanized firefighting tools to control fires in this vegetation type.

The change of burning characteristics and intensity as fire moves across the irrigated landscaping fuels will provide more opportunities for responding resources to take defensive suppression action at the established Fuel Modification Zones around the Preserve recreational and auxiliary buildings (see the Fire Behavior Characteristics Chart below).



7.2 Concluding Statement

This fire protection plan demonstrates compliance with the applicable regulations.

It will ensure adequate compliance with codes/regulations and significance standards, including required fuel modifications and construction resistive materials.

In addition, it can be incorporated by reference into the Preserve's Final Conditions of Approval.

SECTION 8
LIST OF PREPARERS AND PERSONS AND ORGANIZATIONS CONTACTED

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SECTION 9
ATTACHMENTS & REFERENCES

ATTACHMENT A
BEHAVE FIRE MODELING

BehavePlus 5.0.5 Thu, May 02, 2019 at 12:02:27 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY SH2
Fuel/Vegetation, Surface/Understory		
Fuel Model		sh2
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	53
Ridge-to-Valley Elevation Difference	ft	395
Ridge-to-Valley Horizontal Distance	mi	0.14
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are only for the direction of maximum spread [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind is blowing upslope [SURFACE].

Output Variables

Surface Rate of Spread (maximum) (ch/h) [SURFACE]

Heat per Unit Area (Btu/ft2) [SURFACE]

(continued on next page)

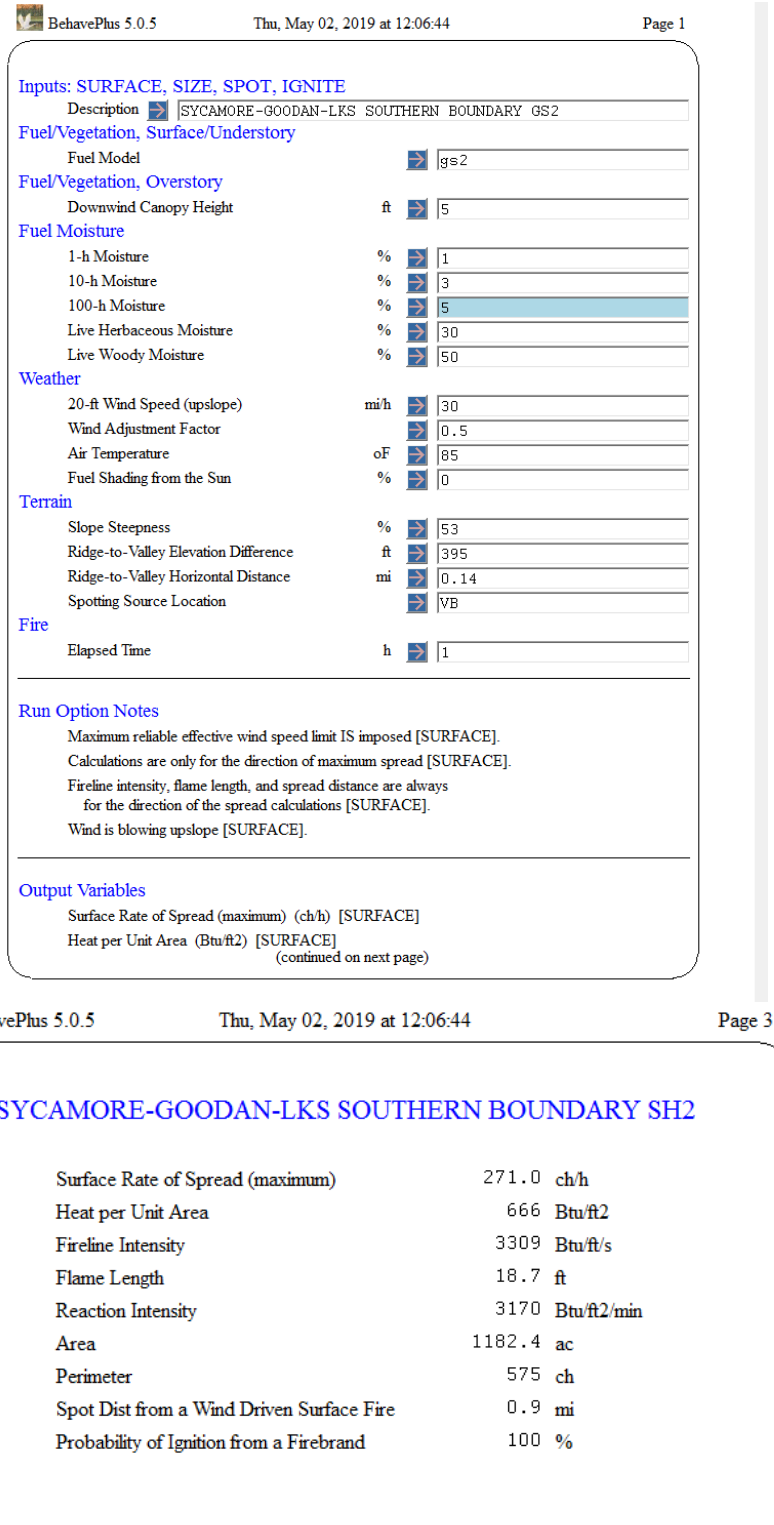
Previous page

BehavePlus 5.0.5 Thu, May 02, 2019 at 12:02:27 Page 3

SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY SH2

Surface Rate of Spread (maximum)	67.2	ch/h
Heat per Unit Area	1629	Btu/ft2
Fireline Intensity	2006	Btu/ft/s
Flame Length	14.9	ft
Reaction Intensity	7092	Btu/ft2/min
Area	71.8	ac
Perimeter	142	ch
Spot Dist from a Wind Driven Surface Fire	0.8	mi
Probability of Ignition from a Firebrand	100	%

Southern Preserve Boundary, BEHAVE Modeling, Fuel Model SH-2



BehavePlus 5.0.5 Thu, May 02, 2019 at 12:06:44 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY GS2
Fuel/Vegetation, Surface/Understory		
Fuel Model		gs2
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	53
Ridge-to-Valley Elevation Difference	ft	395
Ridge-to-Valley Horizontal Distance	mi	0.14
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].
Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].
Wind is blowing upslope [SURFACE].

Output Variables

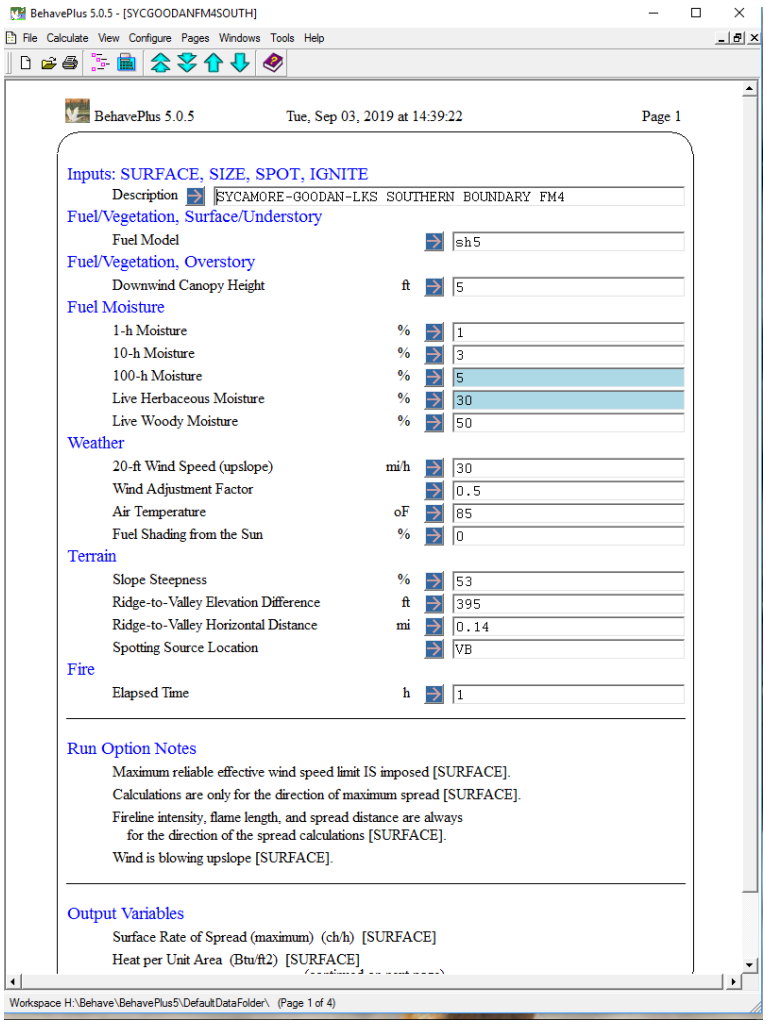
Surface Rate of Spread (maximum) (ch/h) [SURFACE]
Heat per Unit Area (Btu/ft2) [SURFACE]
(continued on next page)

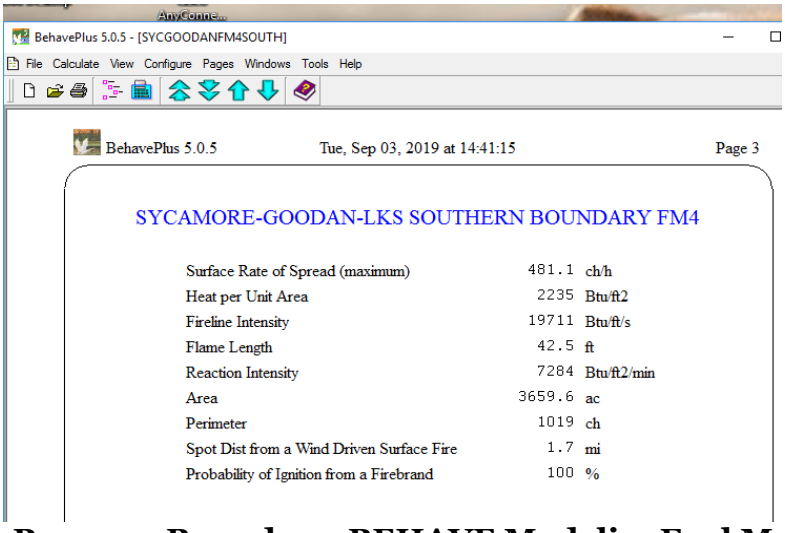
BehavePlus 5.0.5 Thu, May 02, 2019 at 12:06:44 Page 3

SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY SH2

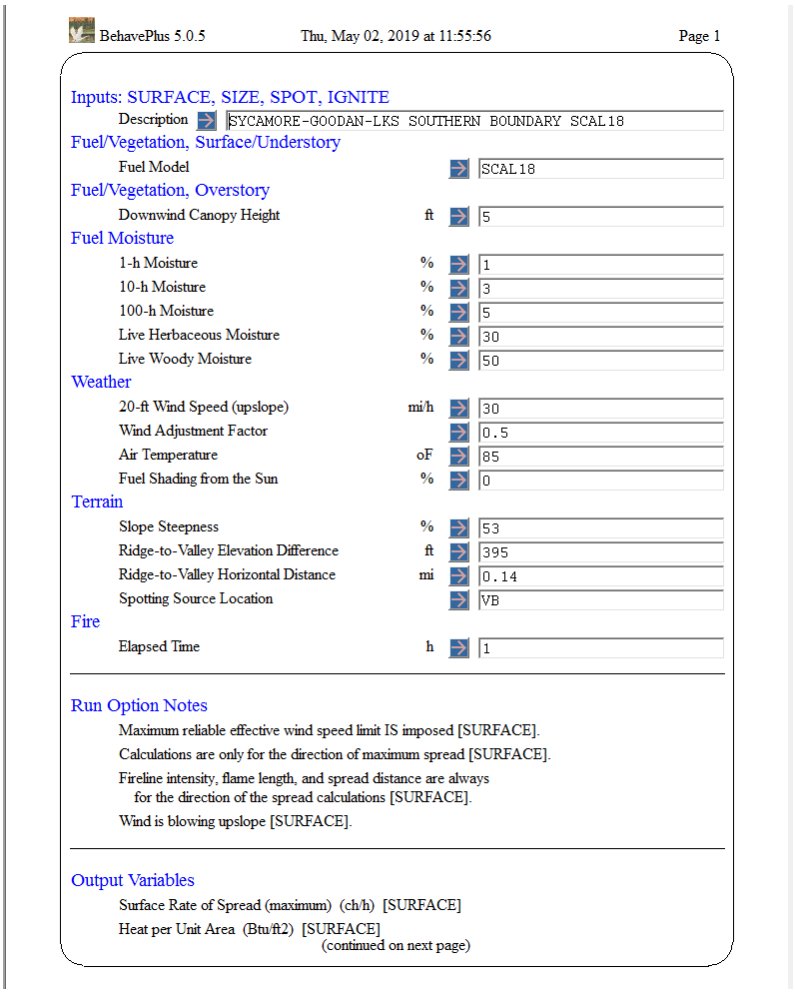
Surface Rate of Spread (maximum)	271.0	ch/h
Heat per Unit Area	666	Btu/ft2
Fireline Intensity	3309	Btu/ft/s
Flame Length	18.7	ft
Reaction Intensity	3170	Btu/ft2/min
Area	1182.4	ac
Perimeter	575	ch
Spot Dist from a Wind Driven Surface Fire	0.9	mi
Probability of Ignition from a Firebrand	100	%

Southern Preserve Boundary, BEHAVE Modeling, Fuel Model GS-2





Southern Preserve Boundary, BEHAVE ModelingFuel Model SH-5



BehavePlus 5.0.5 Thu, May 02, 2019 at 11:55:56 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY SCAL18
Fuel/Vegetation, Surface/Understory		
Fuel Model		SCAL18
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	53
Ridge-to-Valley Elevation Difference	ft	395
Ridge-to-Valley Horizontal Distance	mi	0.14
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are only for the direction of maximum spread [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind is blowing upslope [SURFACE].

Output Variables

Surface Rate of Spread (maximum) (ch/h) [SURFACE]

Heat per Unit Area (Btu/ft2) [SURFACE]

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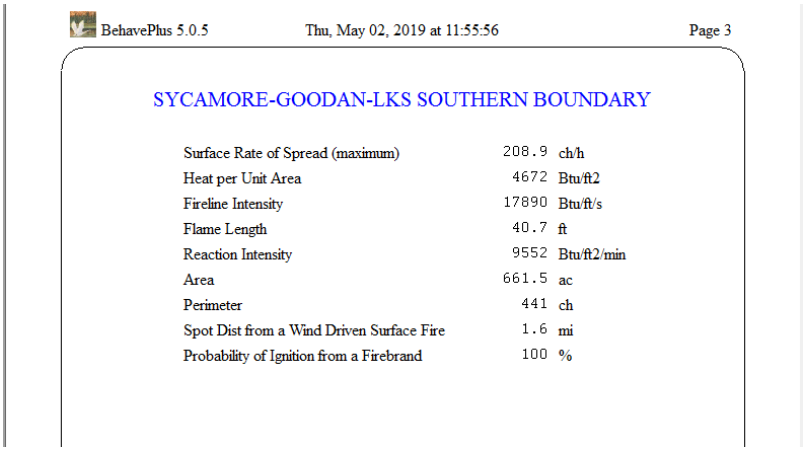
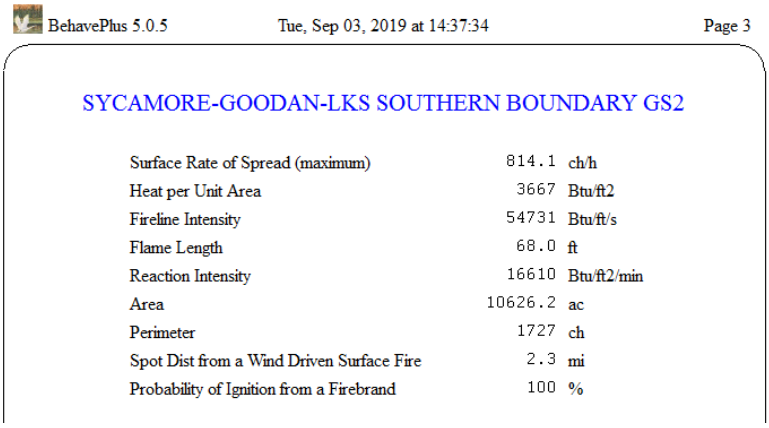


BehavePlus 5.0.5 Thu, May 02, 2019 at 11:55:56 Page 3

SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY

Surface Rate of Spread (maximum)	208.9	ch/h
Heat per Unit Area	4672	Btu/ft2
Fireline Intensity	17890	Btu/ft/s
Flame Length	40.7	ft
Reaction Intensity	9552	Btu/ft2/min
Area	661.5	ac
Perimeter	441	ch
Spot Dist from a Wind Driven Surface Fire	1.6	mi
Probability of Ignition from a Firebrand	100	%

Southern Preserve Boundary BEHAVE Modeling, Fuel Model SCAL 18



Southern Preserve Boundary BEHAVE Modeling, Fuel Model 4

BehavePlus 5.0.5 Thu, May 02, 2019 at 12:21:54 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SV LAKE N FINGER GS2
Fuel/Vegetation, Surface/Understory		
Fuel Model		gs2
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	49
Ridge-to-Valley Elevation Difference	ft	503
Ridge-to-Valley Horizontal Distance	mi	0.34
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].
Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].
Wind is blowing upslope [SURFACE].

Output Variables

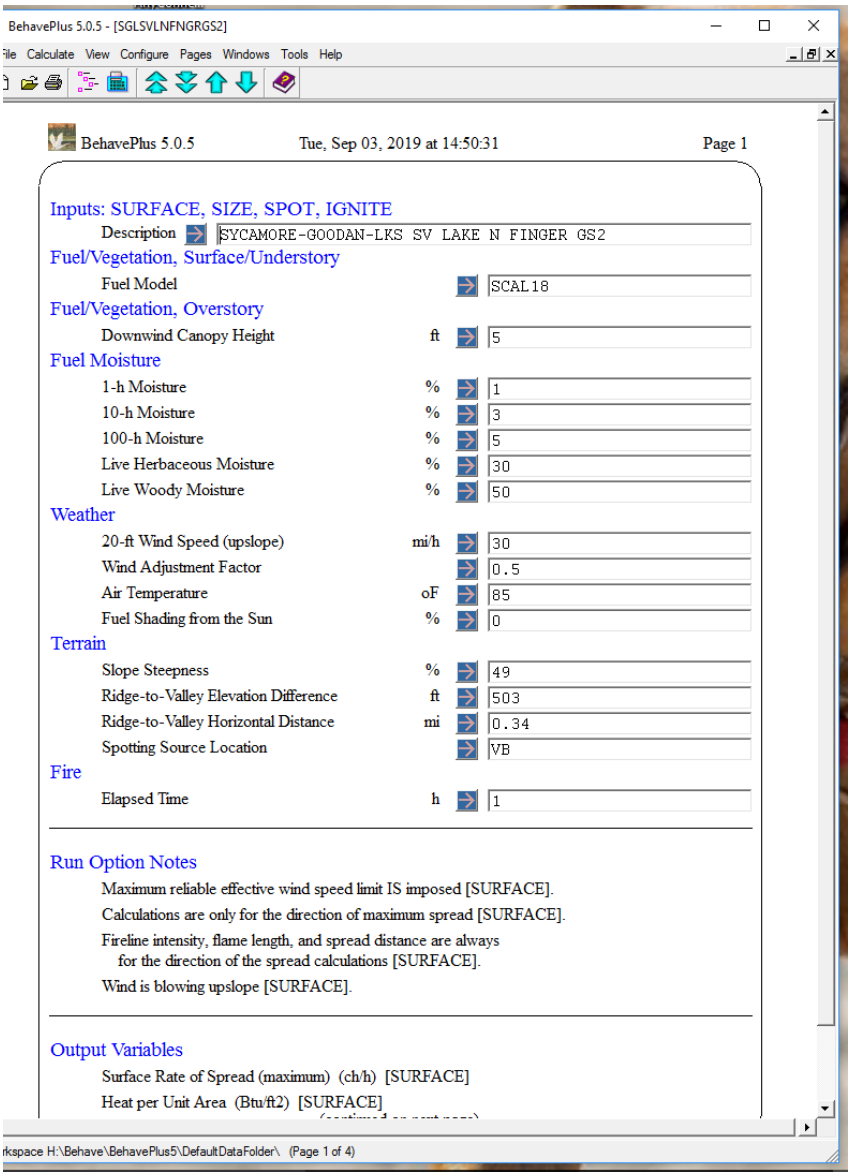
Surface Rate of Spread (maximum) (ch/h) [SURFACE]
Heat per Unit Area (Btu/ft2) [SURFACE]
(continued on next page)

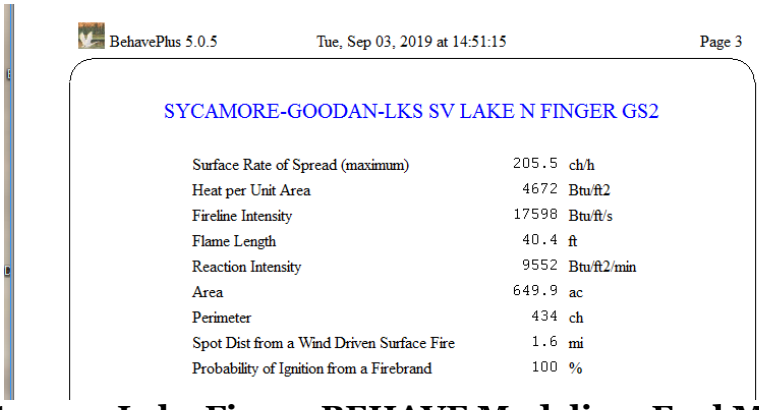
BehavePlus 5.0.5 Thu, May 02, 2019 at 12:21:54 Page 3

SYCAMORE-GOODAN-LKS SOUTH CYN GS2

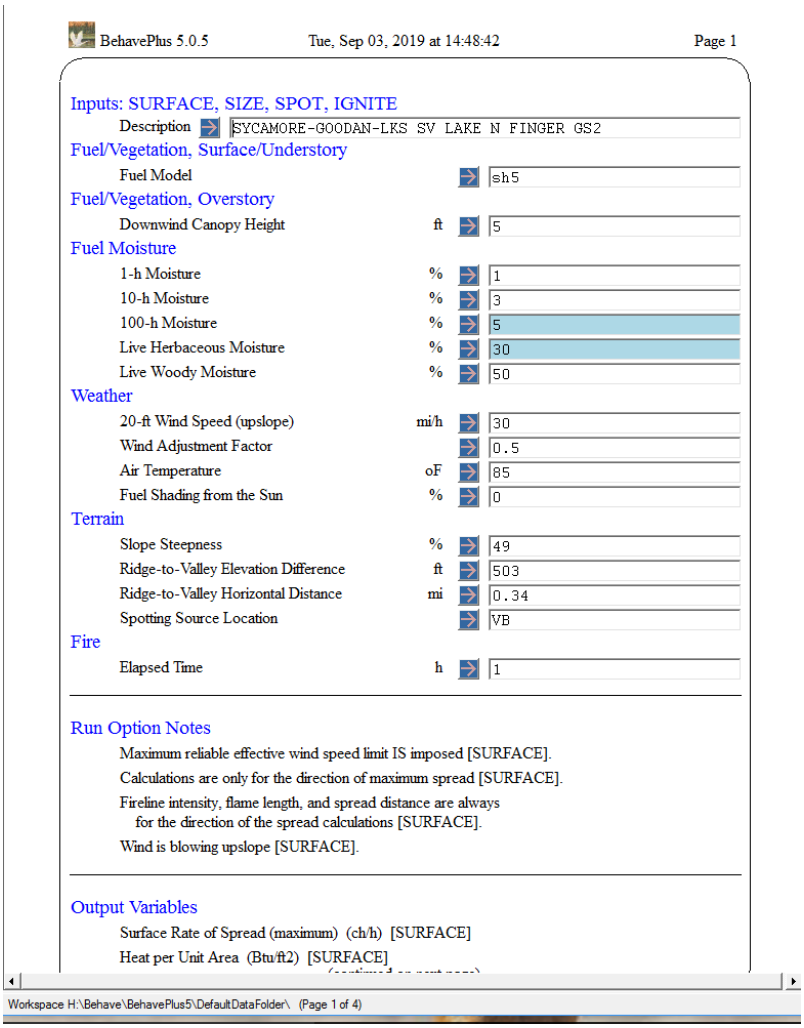
Surface Rate of Spread (maximum)	267.7	ch/h
Heat per Unit Area	666	Btu/ft2
Fireline Intensity	3270	Btu/ft/s
Flame Length	18.6	ft
Reaction Intensity	3170	Btu/ft2/min
Area	1162.5	ac
Perimeter	569	ch
Spot Dist from a Wind Driven Surface Fire	0.9	mi
Probability of Ignition from a Firebrand	100	%

Southern Canyon-Lake Finger BEHAVE Modeling, Fuel Model GS-2





Southern Canyon-Lake Finger BEHAVE Modeling, Fuel Model SCAL -18



BehavePlus 5.0.5 Tue, Sep 03, 2019 at 14:48:42 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SV LAKE N FINGER GS2
Fuel/Vegetation, Surface/Understory		
Fuel Model		sh5
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	49
Ridge-to-Valley Elevation Difference	ft	503
Ridge-to-Valley Horizontal Distance	mi	0.34
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].
Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].
Wind is blowing upslope [SURFACE].

Output Variables

Surface Rate of Spread (maximum) (ch/h) [SURFACE]
Heat per Unit Area (Btu/ft2) [SURFACE]

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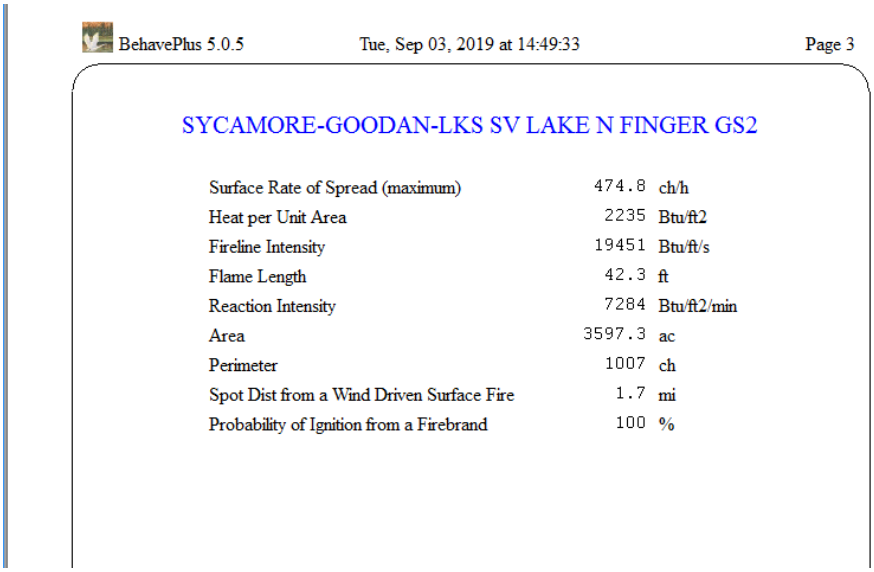
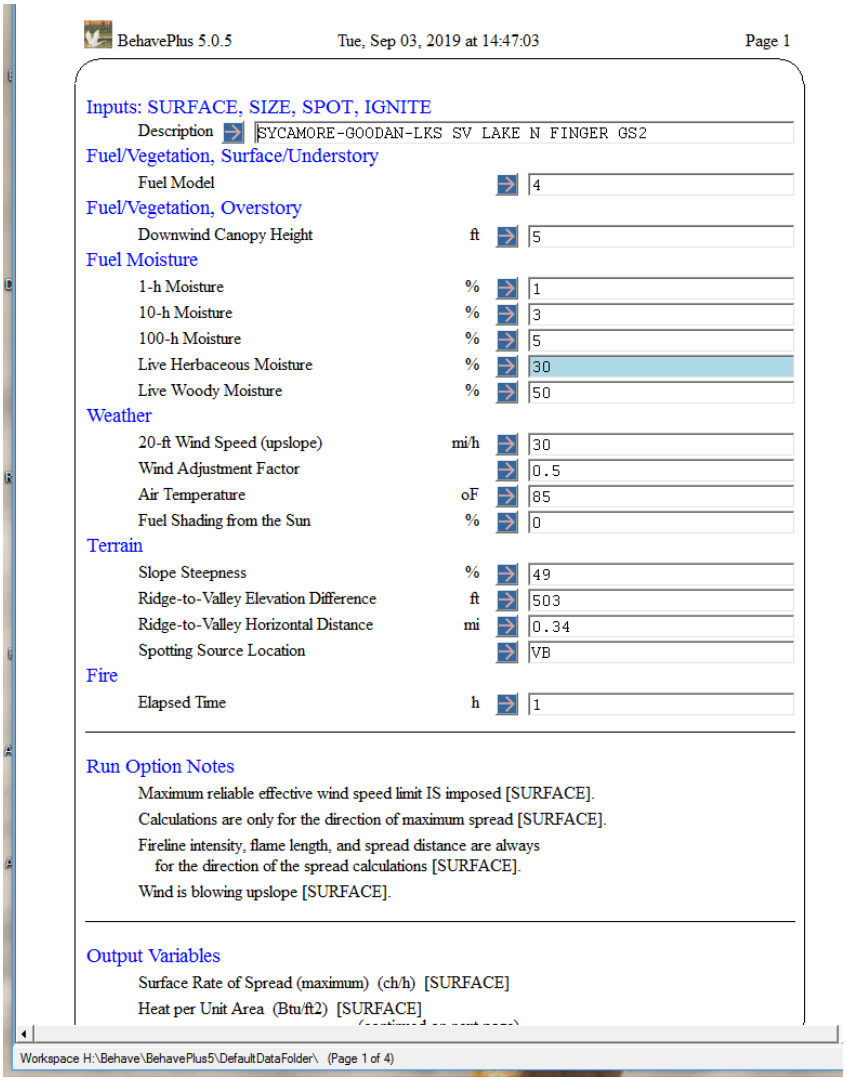


BehavePlus 5.0.5 Tue, Sep 03, 2019 at 14:49:33 Page 3

SYCAMORE-GOODAN-LKS SV LAKE N FINGER GS2

Surface Rate of Spread (maximum)	474.8	ch/h
Heat per Unit Area	2235	Btu/ft2
Fireline Intensity	19451	Btu/ft/s
Flame Length	42.3	ft
Reaction Intensity	7284	Btu/ft2/min
Area	3597.3	ac
Perimeter	1007	ch
Spot Dist from a Wind Driven Surface Fire	1.7	mi
Probability of Ignition from a Firebrand	100	%

Southern Canyon-Lake Finger, BEHAVE Modeling, Fuel Model SH-5



BehavePlus 5.0.5 Tue, Sep 03, 2019 at 14:47:03 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SV LAKE N FINGER GS2
Fuel/Vegetation, Surface/Understory		
Fuel Model		4
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	49
Ridge-to-Valley Elevation Difference	ft	503
Ridge-to-Valley Horizontal Distance	mi	0.34
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].
Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].
Wind is blowing upslope [SURFACE].

Output Variables

Surface Rate of Spread (maximum) (ch/h) [SURFACE]
Heat per Unit Area (Btu/ft2) [SURFACE]

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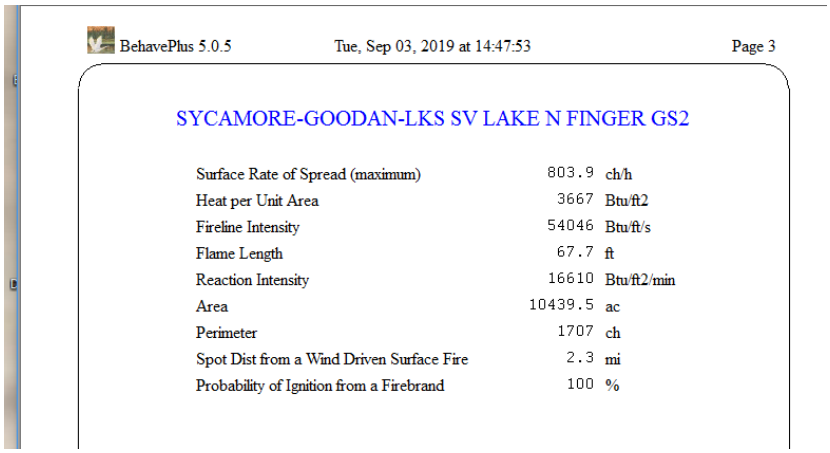


BehavePlus 5.0.5 Tue, Sep 03, 2019 at 14:47:53 Page 3

SYCAMORE-GOODAN-LKS SV LAKE N FINGER GS2

Surface Rate of Spread (maximum)	803.9	ch/h
Heat per Unit Area	3667	Btu/ft2
Fireline Intensity	54046	Btu/ft/s
Flame Length	67.7	ft
Reaction Intensity	16610	Btu/ft2/min
Area	10439.5	ac
Perimeter	1707	ch
Spot Dist from a Wind Driven Surface Fire	2.3	mi
Probability of Ignition from a Firebrand	100	%

Southern Canyon-Lake Finger, BEHAVE Modeling, Fuel Model 4

ATTACHMENT B
ACCESS ROAD REQUIREMENTS

All major roadways (public dedicated streets, highways) serving this Preserve shall be a minimum of twenty-four (24) feet improved paved width.

Subject to the provisions of the San Diego County Consolidated Fire Code and the California Fire Code, as adopted and amended by the Lakeside Fire Protection District, fire apparatus access roads driveways shall have the following minimum improved paved widths:

- Private driveways - sixteen (16') feet
- General fire apparatus access roads (California Fire Code, Section 503.2.1 – twenty (20') feet
- Fire apparatus access roads serving parcels in CAL-FIRE State Responsibility Area (SRA) – per California Code of Regulations, Title 14
    - Access Roads – twenty feet (two 10' wide lanes), Section 1273.01
    - Driveways – ten feet, with fourteen feet horizontal clearance, Section 1273.10
    - One Way roads – twelve feet (12') wide traffic lane Section 1273.08

The gradient of all fire apparatus access roads shall not exceed 20%. Any road or driveway between 15 and 20 percent may be required to install a concrete driving surface, with a deep broom finish perpendicular to the direction of travel to enhance traction.

All dead-end roads in excess of 150 feet in length shall be provided with approved provisions for the turning around of fire apparatus at appropriate length intervals:

All roads providing direct access to entry gates to the Preserve shall be all-weather paved street capable of supporting fire apparatus weighing up to 50,000 pounds.

Once inside of entry gates, fire apparatus access roads serving Preserve have three surface options:

- All-weather paved surface, asphalt or brushed concrete
- Preserve parcels less than twenty (20) acres – the preferred driving surface would be asphalt or concrete, depending on slope gradients, or graded decomposed granite (DG) or other natural earthen soils
- Preserve parcels exceeding twenty (20) acres are permitted to have an all-weather, graded decomposed granite (DG) or other natural earth soil surface.

Gates Across Roads - Currently, are no entrance gates planned for the Preserve.

If a future gate is desired, the following shall be required:

- Gates shall be closed and provided with a heavy duty chain tamper-proof padlock shield assembly

- The chain shall be securely connected by a fire department approved keyed padlock inside of the tamper-proof lock shield assembly
- Gates shall be constructed of substantial steel tubing or pipe, with welded joints and connections
- Gates shall conform to other Lakeside FPD requirements, which may include , but not limited to, San Diego County design requirements DS-17, 18, and 19.

Fire Apparatus Access Roads having improved paved width less than thirty-six (36') feet shall be designated Fire Apparatus Access Roads (Fire Lanes). Fire Lanes shall be identified by prominent signage at the entrance to the roadway indicating that the entire length of the roadway is a Fire Lane and that Parking is prohibited. Signage shall face the direction of entrance approach and be clearly visible from the interior of approaching vehicles.

Fire apparatus access roads with narrow graded widths permitted by CCR Title 14, shall provide approved turnout spaces at approved distance intervals

ATTACHMENT C
IGNITION RESISTANT CONSTRUCTION & FIRE PROTECTION SYSTEMS

Several pre-cautionary ignition-resistant construction measures can be used to reduce potential ignition of proposed or future Preserve buildings, used for maintenance, exhibits, restrooms and other auxiliary functions, from wild fires and firebrands.

All structures shall be built with approved Class A roof coverings.

The exterior wall surface materials shall be non-combustible, or an approved alternate, and protected by solid blocking between rafters at all roof overhangs or by stucco boxed-in eaves.

Attic or foundation ventilation louvers or ventilation openings shall not exceed 144 square inches per opening and shall be covered with 1/8-inch mesh corrosion-resistant metal screening or other approved material that offers equivalent protection.

Attic ventilation openings or ventilation louvers in soffits, eave overhangs, between rafters at eaves, or in other overhanging areas shall not be permitted.

Paper-faced insulation shall be prohibited in attics or ventilated spaces.

Glass or other transparent, translucent or opaque glazing, including skylights, shall be constructed of tempered glass or multi-layered panels with at least one tempered pane or glass block construction. Exterior glazing shall have a minimum fire-resistance rating of not less than 20 minutes.

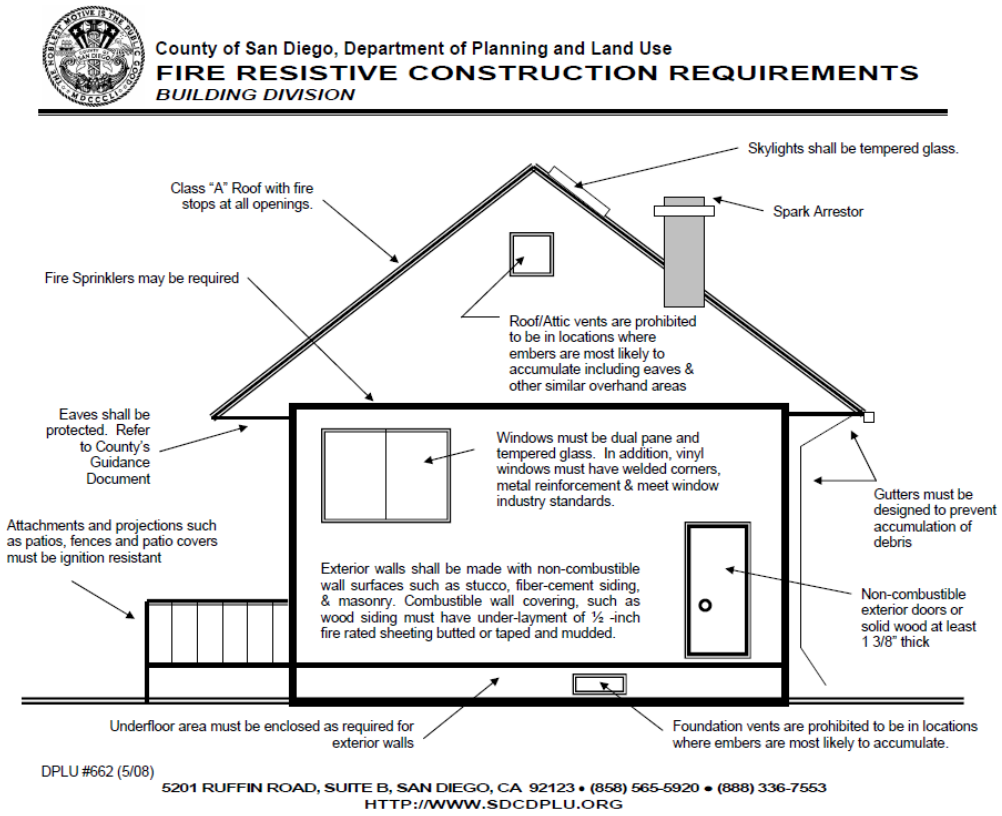
Rain gutters, down spouts and gutter hardware will be constructed from metal or other approved non-combustible material. Gutters will be designed to reduce the accumulation of leaf litter and debris.

All projections (patio covers, unenclosed roofs and floors, and similar architectural appendages) will be of non-combustible construction, one-hour fire resistive construction on the underside, or heavy timber construction. When such appendages and projections are attached to exterior fire-resistive walls, they will be constructed to maintain the fire-resistive integrity of the wall.

Exterior balconies and decks will be of non-combustible construction, one-hour fire resistive construction on the underside, or heavy timber construction. Exterior decks shall be completely enclosed from the bottom of the deck surface to ground level and covered with approved non-combustible construction materials.

Exterior doors will be approved non-combustible construction, solid core wood not less than 1-3/8 inches thick (or equivalent) and have a fire resistive rating of not less than 20 minutes.

Any damaged or replacement window, siding, roof coverings, and other mitigation measures will meet or exceed the original intent of the fire protection discussed in this Plan.



ATTACHMENT D
FIRE WATER TANK STORAGE REQUIREMENTS

San Diego County Fire Authority

WATER TANK STANDARDS FOR FIRE PROTECTION

MINIMUM WATER STORAGE TO PROVIDE PROTECTION FOR DWELLINGS AND OTHER STRUCTURES, WHERE ADEQUATE PUBLIC/PRIVATE WATER SUPPLY IS NOT AVAILABLE

NOTE: In areas where water can be supplied by pumps from a domestic source, such systems must be reviewed by the Fire Authority Having Jurisdiction (FAHJ).

TABLE NO. 903.3.2

Building Square Feet	Gallons Per Minute Water Flow	Capacity Gallons	Duration Minutes
Up to 1,500	250	5,000	20
Over 1,500	250	10,000	40

When exposure distance is one hundred feet (100') or less from adjacent property, the following minimum fire flow shall be adhered to. Increases in water storage may be required by the Chief, depending on the square footage of the exposed structure. When protecting exposures within 100 feet or less, the minimum flow duration shall not be less than two (2) hours unless otherwise approved by the Chief.

EXPOSURE DISTANCE	MINIMUM FIRE FLOW
Over 100 Ft.	250 Gallons Per Minute
31 Ft. – 100 Ft.	500 – 750 Gallons Per Minute
11 Ft. – 30 Ft.	750 – 1000 Gallons Per Minute
10 Ft. or less	1000 – 1500 Gallons Per Minute

If buildings are contiguous, a minimum of 2,500 gallons per minute shall be required.

Water Tank Location:

1. Tank elevation shall be equal to or higher than the fire department connection on the premises. Regardless of domestic use, all tanks shall be equipped with a device that will ensure that the tank contains the designated amount of water for fire flow duration as determination by the fire department. Tank size may be increased to serve multiple structures on a single parcel.
2. Supply outlet shall be at east 4 inches in diameter from the base of the tank to the point of outlet at the fire department connection. The fire department connection shall be at least one 4-inch National Standard Thread (male), reduce to one 2½ inch National Standard Thread (male). Additional outlets may be required.
3. Location of the fire department outlet to be determined on the plot plan when submitted to the fire department. Consideration will be given to topography, elevations, and distance from structures, driveway access, prevailing winds, etc.
4. The outlet shall be located along an access roadway and shall not be closer than 50 feet nor further than 150 feet from the structure.
5. All exposed tank supply pipes shall be of an alloy or other material listed for above ground use. Adequate support shall be provided.
6. Water storage tanks shall be constructed from materials approved by the Fire Marshal and installed per manufacturer recommendations.
7. The Chief may require any necessary information to be submitted on a plot plan for approval.
8. Vessels previously used for products other than water shall not be permitted.

CFA #600 (REV 3/15/2013)
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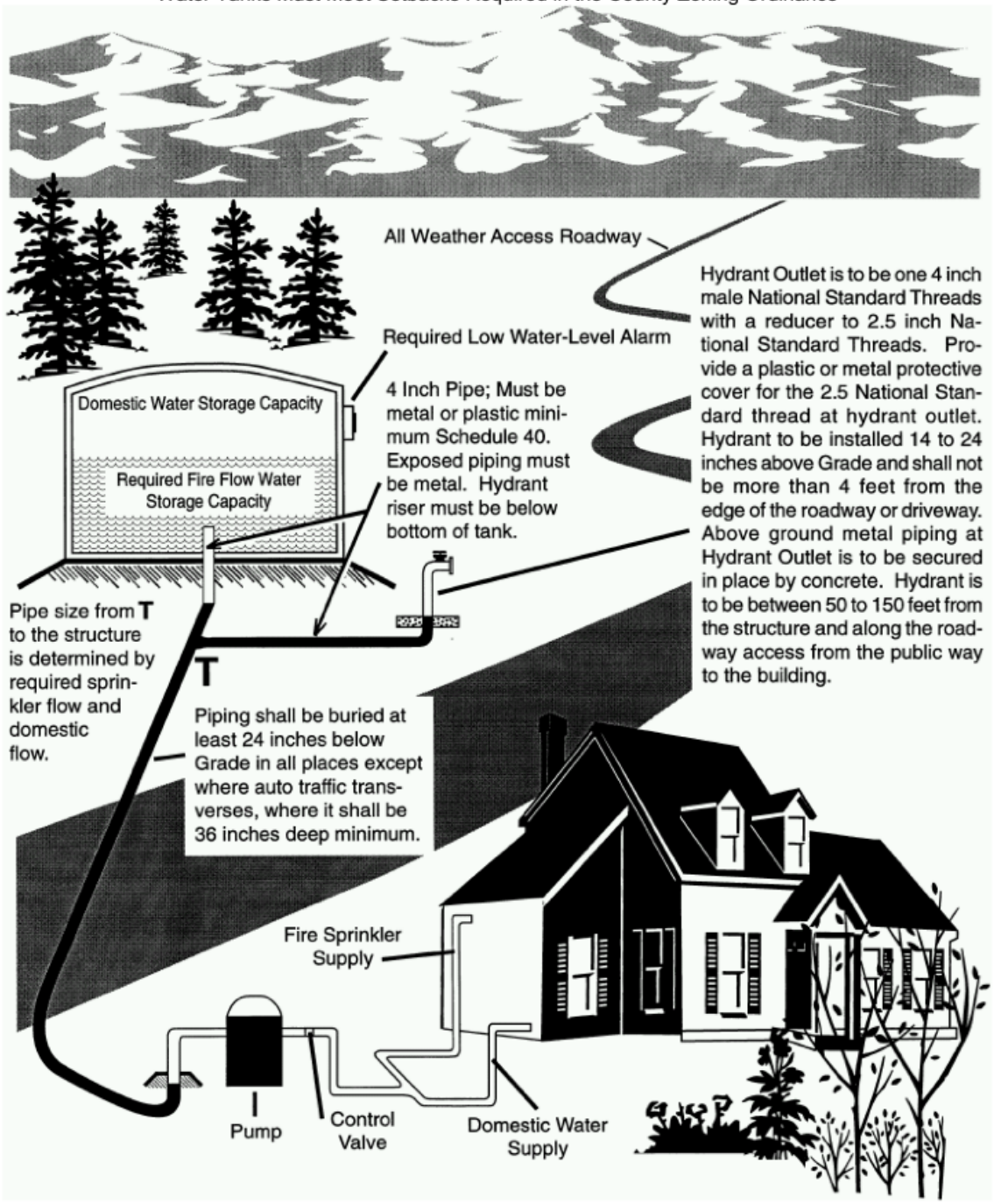
http://www.sdcounty.ca.gov/sdcfa/

Fire Protection Water Tank Installation Standards

Water Tanks Must Meet Setbacks Required in the County Zoning Ordinance



CFA #600 (REV 3/15/2013)

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http://www.sdcounty.ca.gov/sdcfa/

ATTACHMENT E
COUNTY OF SAN DIEGO APPROVED PLANT LISTS

Providing enough fire protection for rural areas of San Diego County has become difficult. This is due to the large number of residents who are moving to the rural areas of the County and the increasing amounts of brush, weeds and other vegetation that provide fuel for wildfires and cause them to burn hotter. While its important to protect the wild native vegetation in the County's rural areas it's also important to take steps for adequate fire protection for structures. Legally clearing vegetation protects the other wild native plants and at the same time eliminates the fire hazards.

During the October 2003 Firestorms, it was painfully evident that there was insufficient "Defensible Space" on many properties which led to destroyed homes and other structures. As a result, San Diego County has amended an ordinance to require residents to keep their property free of fire hazards that include certain vegetation, green waste and rubbish. Residents can comply with these ordinances by creating a "Defensible Space" and taking other preventative steps on their property.

WHAT IS DEFENSIBLE SPACE?
This is the area around a structure where combustible vegetation, that can cause fire, has been cleared, reduced or replaced. This space acts as a barrier between an advancing fire and a structure.

HOW DO I CLEAR LEGALLY?
Combustible vegetation can only be removed by mowing, cutting and grazing as long as the root structure is left intact. Any trees you remove shall have the stumps cut no higher than 8" above the ground. The only exception would be an orchard. Orchard trees may have their stumps completely removed.

CAN I CLEAR INTO AN OPEN SPACE EASEMENT?
If an open space easement is located on your property you may legally clear the 100' even if it takes you into that easement.

WHAT IS COMBUSTIBLE VEGETATION?
This is any material that in its natural state will readily ignite, burn and cause fire to move to any structure or other vegetation. This would include dry grass, brush, weeds, litter and waste. This would not include fire resistant landscaping some of which can be found in the "Suggested Plant List For Defensible Space" on page 4 of this handout.

HOW LARGE SHOULD THE DEFENSIBLE SPACE BE?

- You need to clear combustible vegetation in a 100' radius from any structure. Only the fire agency may authorize you to clear more. You are not required to

cross your property line in order to clear the 100'. The neighboring property owner may be required to clear the additional distance by the fire agency.

HOW DO I MAINTAIN THE DEFENSIBLE SPACE?

- You may plant fire-resistant, irrigated, landscaping in the first 50'of the 100' from your structure. These plants need to be maintained all year around.
- You need to keep natural vegetation in the remaining 50' of the 100' space. This would be the area furthest away from your structure. The plants need to be thinned and cut back to no more than 6" above the ground. You may need to do this several times a year since the plants grow back.
- Do not completely remove all vegetation which would leave the ground bare. Some vegetation is necessary to prevent erosion.
- Remove dead and dying vegetation.
- Trim trees that overhang or touch your structures.

WHAT TYPES OF FIRE-RESISTANT PLANTS SHOULD I CHOOSE FOR MY DEFENSIBLE SPACE?

You will find a list of suggested plants for Defensible Space on page 4 of this handout. Generally these plants:

- Grow close to the ground.
- Have a low sap or resin content
- Grow without accumulating dead branches, needles or leaves.
- Are easily maintained and pruned
- Are drought-tolerant

WHAT TYPES OF PLANTS SHOULD I NOT PLANT OR KEEP ON MY PROPERTY?

On page 16 of this handout you will find an extensive list of plants that you should avoid. These plants and trees burn easily since they have large amounts of oil, sap, rough bark and other material that is flammable.

WHAT OTHER THINGS SHOULD I DO TO PROTECT MY PROPERTY AGAINST FIRE?

- You should clear combustible vegetation on your property if it is within 30' of your property line.
- Vary the height of plants and adequately space them. Taller plants need to be spaced wider apart.
- Existing trees and large shrubs should be pruned by cutting off any branches up to 6' above the ground to prevent ground fires from spreading upwards into trees.
- For fire truck access, remove vegetation within 10' of each side of your driveway.
- Remove any tree limbs within 10' of your chimney
- Work with your neighbors to clear common areas between houses, and prune areas of heavy vegetation that are a fire threat to both properties.
- Avoid planting trees under or near electrical lines. They may grow into, or make contact with overhead lines under windy conditions, causing fire.

- If you have a heavily wooded area on your property, remove some of the trees to which will lower the fire hazard. You will improve growing conditions for your trees if you remove dead, weak, or diseased trees. This will leave you with a healthy mixture of both new and older trees.
- Any removed trees may be chipped and left on your property if they don't present a fire hazard. Contact your local fire agency to find out how to do this.
- Don't forget to legally despose of all your cut vegetation. You may contact your local landfill to inquire about green waste recycling. Open burning may not be allowed. Contact your fire agency for more information.
- Stack firewood and scrap wood piles at least 50' from any structure and clear away any combustible vegetation within 10' of the piles. Many homes have "survived" as a fire moved past it, only to burn later from a wood pile that caught fire after the firefighters had moved on to protect other homes.
- Check and clean your roofs and gutters on all structures several times during the spring, summer and fall to remove debris that can easily ignite from a spark.

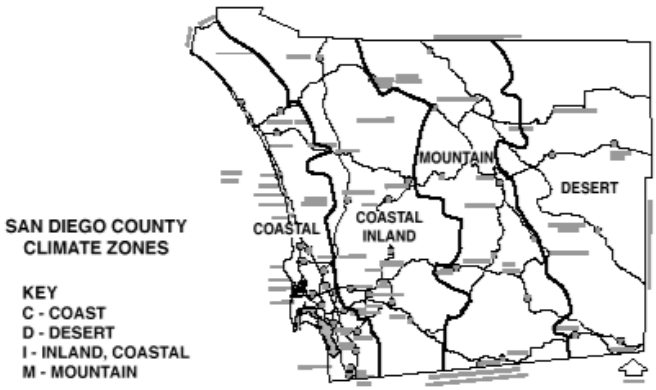
ACCEPTABLE PLANTS FOR A DEFENSIBLE SPACE IN FIRE PRONE AREAS

All plants on the following list are considered drought-tolerant in the climate zone indicated. Remember, however, that no plant is totally fire resistant. Drought-tolerant plants are trees, shrubs, groundcovers, and other vegetation that can grow and reproduce with only natural moisture such as rainfall. Occasional irrigation is necessary only in extreme drought situations.

Plants that are indicated by the **"R"** are the least drought-tolerant plants on the list. These plants grow best in riparian areas. Riparian areas can be described as areas where the water table is very near the surface of the ground. Although the ground may be dry, the plants growing there will be green and lush all year around.

When first planting drought-tolerant plants, you need to water deeply to encourage the roots to find natural moisture in the soil. This type of watering needs to continue for at least three years. More water should be provided in summer and less (if any) in the winter. After three years, you should be watering the plants less and depending more on the natural rainfall to provide moisture.

Plants on the list which are noted with ** are San Diego County native or naturalizing plant species. These are types of plants native to or brought into the San Diego County area. These plants are able to grow and reproduce in the local climate and the natural rainfall is enough moisture.



SUGGESTED PLANT LIST FOR A DEFENSIBLE SPACE

BOTANICAL NAME	COMMON NAME	Climate Zone
TREES		
Acer		
platanoides	Norway Maple	M
rubrum	Red Maple	M
saccharinum	Silver Maple	M
saccarum	Sugar Maple	M
macrophyllum	Big Leaf Maple	C/ (R)
Alnus rhombifolia	White Alder	C/I/M (R)
Arbutus		
unedo	Strawberry Tree	All zones
Archontophoenix		
cunninghamiana	King Palm	C
** Arctostaphylos spp.	Manzanita	C/I/D
Brahea		
armata	Blue Hesper Palm	C/D

edulis	Guadalupe Palm	C/D
Ceratonia siliqua	Carob	C/I/D
Cerdidium floridum	Blue Palo Verde	D
** Cercis occidentalis	Western Redbud	C/I/M
Cornus		
nuttallii	Mountain Dogwood	I/M
stolonifera	Redtwig Dogwood	I/M
Elaeagnus		
angustifolia	Russian Olive	I/M
Eriobotrya		
japonica	Loquat	C/I/D
Erythrina caffra	Kaffirboom Coral Tree	C
Gingko biloba "Fairmount"	Fairmount Maidenhair Tree	I/M
Gleditisia triacanthos	Honey Locust	I/D/M
Juglans		
californica	California Walnut	I
hindsii	California Black Walnut	C/I
Lagerstroemia indica	Crape Myrtle	I/D/M
Ligustrum lucidum	Glossy Privet	I
Liquidambar styraciflua	Sweet Gum	C/I/M
Liriodendron tulipifera	Tulip Tree	I
Lyonothamnus floribundus		
ssp. asplenifolius	Fernleaf Catalina Ironwood	C
Melaleuca spp.	Melaleuca	C/I/D

Myoporum spp.	Myoporum	C/I
Nerium oleander	Oleander	C/I/D
Parkinsonia aculeata	Mexican Palo Verde	D
Pistacia		
chinensis	Chinese Pistache	C/I/D
vera	Pistachio Nut	I
Pittosporum		
phillyraeoides	Willow Pittosporum	C/I/D
viridiflorum	Cape Pittosporum	C/I
Platanus		
acerifolia	London Plane Tree	All zones
** racemosa	California Sycamore	C/I/M
Populus		
alba	White Poplar	D/M
** fremontii	Western Cottonwood	I
trichocarpa	Black Cottonwood	I/M
Prunus		
xblireiana	Flowering Plum	M
caroliniana	Carolina Laurel Cherry	C
cersifera 'Newport'	Newport Purple-Leaf Plum	M
** ilicifolia	Hollyleaf Cherry	C
** lyonii	Catalina Cherry	C
serrulata 'Kwanzan'	Flowering Cherry	M
yedoensis 'Akebono'	Akebono Flowering Cherry	M

Quercus		
** agrifolia	Coast Live Oak	C/I
** engelmannii	Engelmann Oak	I
suber	Cork Oak	C/I/D
Rhus		
** lancea	African Sumac	C/I/D
** Salix spp.	Willow	All zones (R)
Tristania conferta	Brisbane Box	C/I
Ulmus		
parvifolia	Chinese Elm	I/D
pumila	Siberian Elm	C/M
** Umbellularia californica	California Bay Laurel	C/I
SHRUBS		
Agave	Century Plant	D
americana	Desert Century Plant	D
deserti	Shaw's Century Plant	D
** shawii		
** Amorpha fruticosa	False Indigobush	I
Arbutus		
** menziesii	Madrone	C/I
** Arctostaphylos spp.	Manzanita	C/I/D
** Atriplex		
canescens	Hoary Saltbush	I
lentiformis	Quail Saltbush	D

** Baccharis		
glutinosa	Mule Fat	C/I
pilularis	Coyote Bush	C/I/D
Carissa grandiflora	Natal Plum	C/I
** Ceanothus spp.	California Lilac	C/I/M
Cistus spp.	Rockrose	C/I/D
** Cneoridium dumosum	Bushrue	C
** Comarostaphylis		
diversifolia	Summer Holly	C
Convolvulus cneorum	Bush Morning Glory	C/I/M
Dalea		
orcuttii	Orcutt's Delea	D
** spinosa	Smoke Tree	I/D
Elaeagnus		
pungens	Silverberry	C/I/M
** Encelia		
californica	Coast Sunflower	C/I
farinosa	White Brittlebush	D/I
Eriobotrya		
deflexa	Bronze Loquat	C/I
Eriophyllum		
** confertiflorum	Golden Yarrow	C/I
staechadifolium	Lizard Tail	C
Escallonia spp.	Escallonia	C/I

Feijoa sellowiana	Pineapple Guava	C/I/D
Fouqueria splendens	Ocotillo	D
** Fremontodendron		
californicum	Flannelbush	I/M
mexicanum	Southern Flannelbush	I
Galvezia		
juncea	Baja Bush-Snapdragon	C
speciosa	Island Bush-Snapdragon	C
Garrya		
elliptica	Coast Silktassel	C/I
** flavescens	Ashy Silktassel	I/M
** Heteromeles arbutifolia	Toyon	C/I/M
Lantana spp.	Lantana	C/I/D
Lotus scoparius	Deerweed	C/I
Mahonia spp.	Barberry	C/I/M
Malacothamnus		
clementinus	San Clemente Island Bush Mallow	C
** fasciculatus	Mesa Bushmallow	C/I
Melaleuca spp.	Melaleuca	C/I/D
** Mimulus spp.	Monkeyflower	C/I (R)
Nolina		
parryi	Parry's Nolina	I
parryi ssp. wolfii	Wolf's Bear Grass	D
Photinia spp.	Photinia	All zones

Pittosporum		
crassifolium		C/I
rhombifolium	Queensland Pittosporum	C/I
tobira 'Wheeleri'	Wheeler's Dwarf	C/I/D
undulatum	Victorian Box	C/I
viridiflorum	Cape Pittosporum	C/I
Plumbago auriculata	Cape Plumbago	C/I/D
Prunus		
caroliniana	Carolina Laurel Cherry	C
** ilicifolia	Hollyleaf Cherry	C
** yonii	Catalina Cherry	C
Puncia granatum	Pomegranate	C/I/D
Pyracantha spp.	Firethorn	All zones
Quercus		
** dumosa	Scrub Oak	C/I
Rhamus		
alaternus	Italian Blackthorn	C/I
** californica	Coffeeberry	C/I/M
Rhaphiolepis spp.	Rhaphiolepis	C/I/D
Rhus		
continus	Smoke Tree	M
** integrifolia	Lemonade Berry	C/I
laurina	Laurel Sumac	C/I
lentii	Pink-Flowering Sumac	C/D

** ovata	Sugarbush	I/M
** trilobata	Squawbush	I
Ribes		
viburnifolium	Evergreen Currant	C/I
** speciosum	Fuschia-Flowering Gooseberry	C/I/D
Romneya coulteri	Matilija Poppy	I
Rosa		
** californica	California Wild Rose	C/I
minutifolia	Baja California Wild Rose	C/I
** Salvia spp.	Sage	All zones
** Sambucus spp.	Elderberry	C/I/M
** Symphoricarpos mollis	Creeping Snowberry	C/I
Syringa vulgaris	Lilac	M
Tecomaria capensis	Cape Honeysuckle	C/I/D
Teucrium fruticans	Bush Germander	C/I
** Toxicodendron		
diversilobum	Poison Oak	I/M
Verbena		
lilacina	Lilac Verbena	C
Xylosma congestum	Shiny Xylosma	C/I
** Yucca		
schidigera	Mojave Yucca	D
whipplei	Foothill Yucca	I
GROUNDCOVERS		

** Achillea	Yarrow	All zones
Aptenia cordifolia	Aptenia	C
** Arctostaphylos spp.	Manzanita	C/I/D
** Baccharis		
pilularis	Coyote Bush	C/I/D
** Ceanothus spp.	California Lilac	C/I/M
Cerastium tomentosum	Snow-in-Summer	All zones
Coprosma kirkii	Creeping Coprosma	C/I/D
Cotoneaster spp.	Redberry	All zones
Drosanthemum hispidum	Rosea Ice Plant	C/I
Dudleya		
brittonii	Britton's Chalk Dudleya	C
** pulverulenta	Chalk Dudleya	C/I
virens	Island Live-Forever	C
** Eschscholzia californica	California Poppy	All zones
Euonymus fortunei		
'Carrierei'	Glossy Winter Creeper	M
'Coloratus'	Purple-Leaf Winter Creeper	M
** Ferocactus viridescens	Coast Barrel Cactus	C
Gaillardia grandiflora	Blanket Flower	All zones
Gazania spp.	Gazania	C/I
** Helianthemum spp.	Sunrose	All zones
Lantana spp.	Lantana	C/I/D

Lasthenia		
** californica	Common Goldfields	I
glabrata	Coastal Goldfields	C
** Lupinus spp.	Lupine	C/I/M
Myoporum spp.	Myoporum	C/I
Pyracantha spp.	Firethorn	All zones
Rosmarinus officinalis	Rosemary	C/I/D
Santolina		
chamaecyparissus	Lavender Cotton	All zones
virens	Santolina	All zones
Trifolium frageriferum	O'Connor's Legume	C/I
Verbena		
rigida	Verbena	All zones
** Viguiera laciniata	San Diego Sunflower	C/I
Vinca		
major	Periwinkle	C/I
minor	Dwarf Periwinkle	M
VINES		
Antigonon leptopus	San Miguel Coral Vine	C/I
Distictis buccinatoria	Blood-Red Trumpet Vine	C/I/D
** Keckiella cordifolia	Heart-Leaved Penstemon	C/I
Lonicera		
japonica 'Halliana'	Hall's Honeysuckle	All zones
** subspicata	Chaparral Honeysuckle	C/I

Solanum jasminoides	Potato Vine	C/I/D
PERENNIALS		
Coreopsis		
gigantea	Giant Coreopsis	C
grandiflora	Coreopsis	All zones
** maritima	Sea Dahlia	C
verticillata	Coreopsis	C/I
Heuchera maxima	Island Coral Bells	C/I
** Iris douglasiana	Douglas Iris	C/M
** Iva hayesiana	Poverty Weed	C/I
Kniphofia uvaria	Red-Hot Poker	C/I/M
Lavandula spp.	Lavender	All zones
Limonium californicum		
var. mexicanum	Coastal Statice	C
perezii	Sea Lavender	C/I
Oenothera spp.	Primrose	C/I/M
** Penstemon spp.	Penstemon	C/I/D
Satureja douglasii	Yerba Buena	C/I
Sisyrinchium		
bellum	Blue-Eyed Grass	C/I
californicum	Golden-Eyed Grass	C
Solanum		
xantii	Purple Nightshade	C/I

** Zauschneria		
californica	California Fuschia	C/I
cana	Hoary California Fuschia	C/I
'Catalina'	Catalina Fuschia	C/I
ANNUALS		
** Lupinus spp.	Lupine	C/I/M

UNDESIRABLE PLANT LIST

The following species are highly flammable and should be avoided when planting within the first 50 feet adjacent to a structure. The plants listed below are more susceptible to burning, due to rough or peeling bark, production of large amounts of litter, vegetation that contains oils, resin, wax, or pitch, large amounts of dead material in the plant, or plantings with a high dead to live fuel ratio.

BOTANICAL NAME	COMMON NAME
Abies species	Fir Trees
Acacia species	Acacia (trees, shrubs, groundcovers)
*Adenostoma sparsifolium***	Red Shanks
*Adenostoma fasciculatum***	Chamise
Agonis juniperina	Juniper Myrtle
*Anthemis cotula****	Mayweed, Stinking Chamolile
Araucaria species	Monkey Puzzle, Norfolk Island Pine
*Arctostaphylos species***	Manzanita
*Artemesia californica***	California Sagebrush
Arundo donax	Giant Cane
Bambusa species	Bamboo
*Brassica species****	Mustard
Callistemon species	Bottlebrush
Calocedrus decurrens	Incense Cedar
*Cardaria draba****	Hoary Cress, Perennial Peppergrass
Ceanothus species	Ceanothus
Cedrus species	Cedar
Chamaecyparis species	False Cypress
Cinnamomum species	Camphor Tree
*Cirsium vulgare****	Wild Artichoke
*Conyza Canadensis****	Horseweed
Coprosma pumila	Prostrate Coprosma
Cortaderia selloana	Pampas Grass
Cotoneaster lacteus	Cotoneaster
Cryptomeria japonica	Japanese Cryptomeria
Cupressocyparis leylandii	Leylandii Cypress
Cupressus forbesii	Tecate Cypress
Cupressus glabra	Arizona Cypress
Cupressus macrocarpa	Monterey Cypress
Cupressus sempervirens	Italian Cypress
*Cynara cardunculus****	Artichoke Thistle
Cytisus species	Scotch Broom, French Broom,etc.
Dodonea viscosa	Hopseed Bush

Elaeagnus angustifolia	Russian Olive
Elaeagnus pungens	Silverberry
*Eriogonum fasciculatum***	Common Buckwheat
Eucalyptus species	Eucalyptus
*Gensita species****	Broom
*Heterotheca grandiflora***	Telegraph Plant
Jubaea chilensis	Chilean Wine Palm
Juniperus species	Junipers
*Lactuca serriola****	Prickly Lettuce
Larix species	Larch
Lonicera japonica	Japanese Honeysuckle
Miscanthus species	Eulalia Grass
*Muehlenbergia species***	Deer Grass
Nicotiana species	Tree Tobacco
Palmae species	Palms
Pennisetum setaceum	Fountain Grass
Picea species	Spruce Trees
*Pickeringia Montana***	Chaparral Pea
Pinus species	Pines
Podocarpus species	Fern Pine
Pseudotsuga menziesii	Douglas Fir
Ricinus communis	Castor Bean
Rosmarinus species	Rosemary
*Salsola australis****	Russian Thistle, Tumbleweed
*Salvia species***	Sage
Schinus molle	California Pepper
Schinus terebinthifolius	Brazilian Pepper
*Silybum marianum****	Milk Thistle
Spartium junceum	Spanish Broom
Tamarix species	Tamarisk
Taxodium species	Cypress
Taxus species	Yew
Thuja species	Arborvitae
Trachycarpus fortunei	Windmill Palm
Tsuga species	Hemlock
*Ulex europea****	Gorse
*Urtica urens***	Burning Nettle
Washingtonia species	California/Mexican Fan Palm

** San Diego County native species
*** Introduced weeds to San Diego County

California Department of Forestry and Fire Protection (619) 590-3100
United States Forest Service (619) 674-2901
County Fire Service Coordinator (858) 495-5092
County Farm and Home Advisor (858) 694-2845
Insurance Information Network of California -- Brochures

(www.iinc.org <http://www.iinc.org>) or call (800) 397-1679

REFERENCES

- Combustible Vegetation and Other Flammable Materials Ordinance. Sections 68.401 thru 86.406 of the County of San Diego's Zoning Ordinance.
- California Department of Fish and Game (858) 467-4201
- U.S. Fish and Wildlife Service (760) 431-9440
- Protecting Your Property From Soil Erosion (www.sdcounty.ca.gov/dpw/docs/fire/homeerosion.pdf <http://www.sdcounty.ca.gov/dpw/docs/fire/homeerosion.pdf>)
- Homeowner's Guide for Flood, Debris, and Erosion Control After Fires (www.sdcounty.ca.gov/dpw/docs/fire/AfterFire.pdf <http://www.sdcounty.ca.gov/dpw/docs/fire/AfterFire.pdf>)
- Burn Institute (www.burninstitute.org)

REFERENCES

National Wildfire Coordinating Group Publications:

Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model, General Technical Report RMRS-GTR-153. June 2005. Joe H. Scott, Robert E. Burgan, United States Department of Agriculture - Forest Service, Rocky Mountain Research Station, Missoula, Montana.

BEHAVE PLUS: Fire Modeling System Version 5.0.3 April 5, 2010. Patricia L. Andrews, United States Department of Agriculture - Forest Service, Rocky Mountain Research Station – Fire Sciences Lab, Missoula, Montana and Collin D. Bevins, System for Environmental Management, PO Box 8868, Missoula, Montana, 59807. Web site: http://fire.org/

National Wildfire Coordinating Group - *S-290 Intermediate Fire Behavior* Manual

National Wildfire Coordinating Group – *S-390 Introduction to Wildfire Calculations* Manual

Aids to Determining Fuel Models for Estimating Fire Behavior, Hal E. Anderson, United States Department of Agriculture Forest Service Intermountain Forest and Range Experiment Station General Technical Report INT-122, April 1982

Physics-Based Modeling for WUI Fire Spread – Simplified Model Algorithm for Ignition of Structures by Burning Vegetation, USDA Fire Research Division, NISTIR 7179

NFPA Publications:

National Fire Protection Association - NFPA 13-D, Standard *for the Installation of Sprinkler Systems in One – and Two-Family Dwellings and Manufactured Homes*, 2010 and 2013 Editions.

National Fire Protection Association - NFPA 1142 *Standard on Water Supplies for Suburban and Rural Fire Fighting*, 2012 Edition.

National Fire Protection Association - NFPA 1144 *Standard for Reducing Structure Ignition Hazards from Wildfire* (2008).

National Fire Protection Association - NFPA 1141, 2008 Edition. Table C.11 (b) Time-Distance Table Using an Average Speed of 35 mph.

National Fire Protection Association Pamphlet 299 *Protection of Life and Property from Wildfire*

National Fire Protection Association *Assessing Structural Ignition Potential from Wildfire*, November 2017

State of California Regulatory Documents

California Code of Regulations, Title 14, Natural Resources, SRA Requirements

California Public Resources Code, sections 4201 through 4204

California Government Code, sections 51175 through 51189.

2016 California Fire Code, CCR Title 24 Part 9, including Local Amendments and Appendices

2016 California Building Code, CCR Title 24, Part 2

The California State and Local Responsibility Area Fire Hazard Severity Zone Map.

Local Codes and Ordinances

2017 San Diego County Consolidated Fire Code

County of San Diego *Guidelines for Determining Significance and Report Format and Contents Requirements*, San Diego County DPLU Land Use and Environment Group, Second Revision, August 31, 2010

San Diego County General Plan, Chapter 7 – Safety Element

San Diego County Ordinance 10147,Title 6, Chapter 4, Division 8 – *Defensible Space Ordinance for Fire Protection*

Other References:

An Introduction to Fire Dynamics, 3rd Edition, Dougal Drysdale, John Wiley & Sons LTD Publications, 2011

Structural Design for Fire Safety, 2nd Edition, Andrew H. Buchanan, John Wiley & Sons LTD Publications, 2017

SFPE Handbook of Fire Protection Engineering, 5th Edition, Morgan J Hurley Editor-in-Chief, Springer Publications, 2016

Fire Dynamics Course Guide, FEMA/USFA/NFA Publication, May 1999

Fire, Chaparral and Survival in Southern California, Richard W Halsey, Sunbelt Publications, 2005

Wildland-Urban Interface Code, 2018 Edition, International Code Council

California Code of Regulations, 2016 *California Residential Code*

San Diego County Native Plants Third Edition, James Lightner

U.S. Department of Agriculture Effects Information System (FEIS), *www.feis-crs.org*

ICF Baseline Biodiversity Report, Sycamore-Good Ranch Preserve, January 2020

Management Priorities for Invasive Non-Native Plants, Dendra Inc. , September 2012

Sycamore Canyon Preserve Vegetation Management Plan, Dudek, May 2011

Preliminary Multiple Species Conservation Program, North County Plan, County of San Diego, February 19, 2009

Fire Perimeters: Wildfires 1950-2018, CAL-FIRE Fire & Resource Assessment Program Mapping Database, 2018

BehavePlus 5.0.5 Thu, May 02, 2019 at 12:02:27 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY SH2
Fuel/Vegetation, Surface/Understory		
Fuel Model		sh2
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	53
Ridge-to-Valley Elevation Difference	ft	395
Ridge-to-Valley Horizontal Distance	mi	0.14
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are only for the direction of maximum spread [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind is blowing upslope [SURFACE].

Output Variables

Surface Rate of Spread (maximum) (ch/h) [SURFACE]

Heat per Unit Area (Btu/ft2) [SURFACE]

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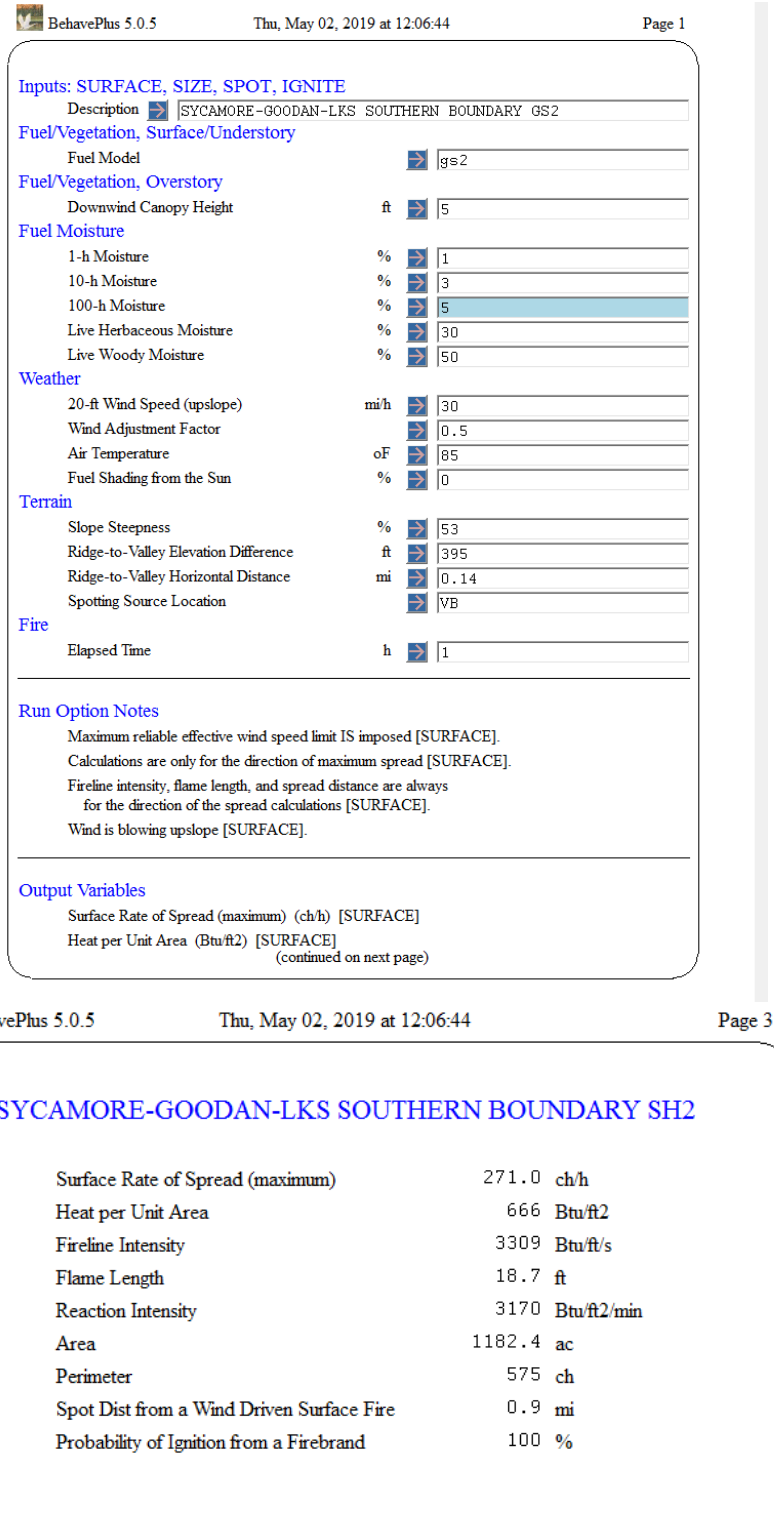
Previous page

BehavePlus 5.0.5 Thu, May 02, 2019 at 12:02:27 Page 3

SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY SH2

Surface Rate of Spread (maximum)	67.2	ch/h
Heat per Unit Area	1629	Btu/ft2
Fireline Intensity	2006	Btu/ft/s
Flame Length	14.9	ft
Reaction Intensity	7092	Btu/ft2/min
Area	71.8	ac
Perimeter	142	ch
Spot Dist from a Wind Driven Surface Fire	0.8	mi
Probability of Ignition from a Firebrand	100	%

Southern Preserve Boundary, BEHAVE Modeling, Fuel Model SH-2



BehavePlus 5.0.5 Thu, May 02, 2019 at 12:06:44 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY GS2
Fuel/Vegetation, Surface/Understory		
Fuel Model		gs2
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	53
Ridge-to-Valley Elevation Difference	ft	395
Ridge-to-Valley Horizontal Distance	mi	0.14
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].
Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].
Wind is blowing upslope [SURFACE].

Output Variables

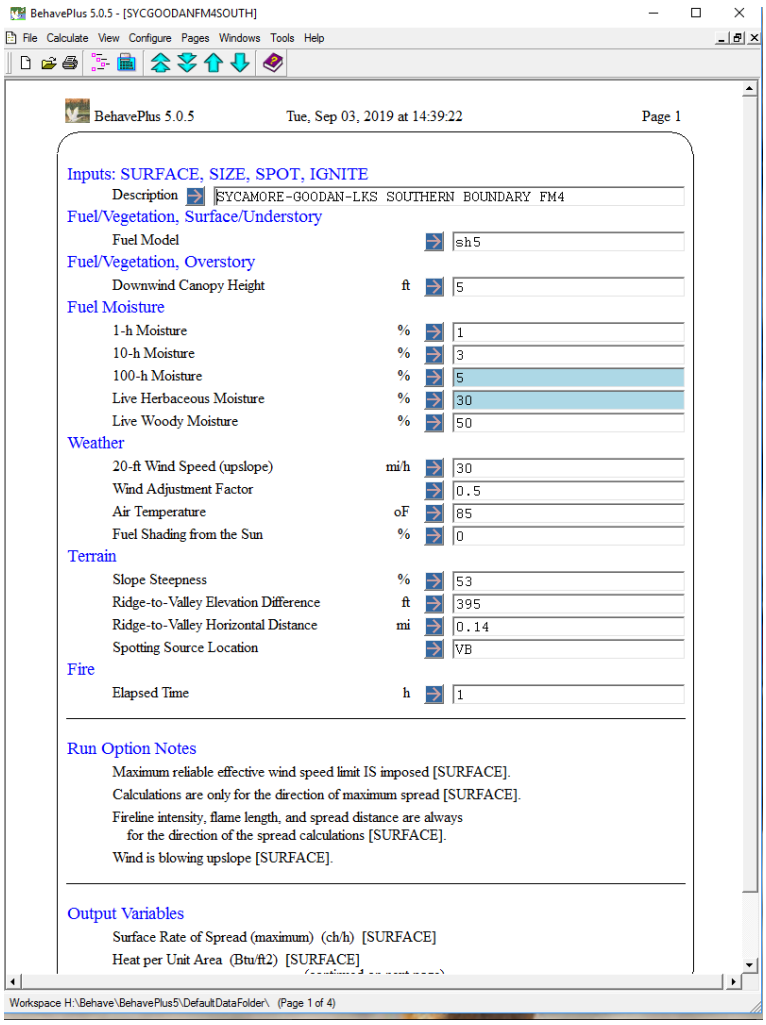
Surface Rate of Spread (maximum) (ch/h) [SURFACE]
Heat per Unit Area (Btu/ft2) [SURFACE]
(continued on next page)

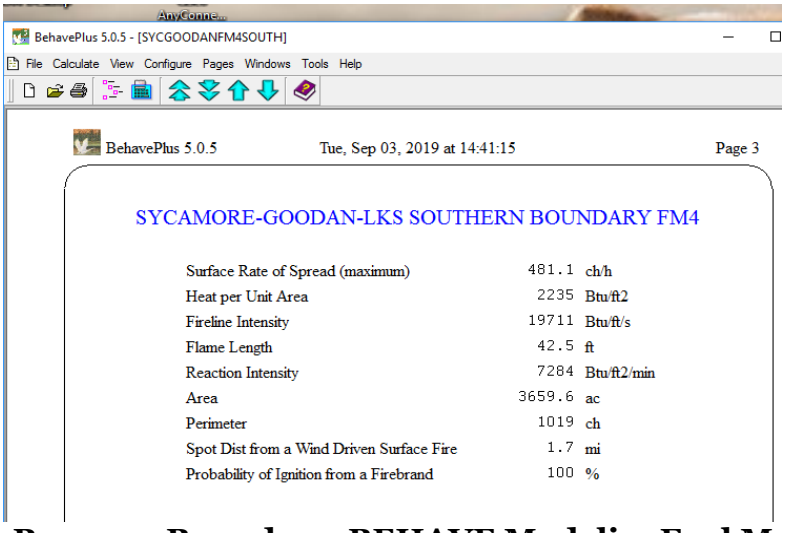
BehavePlus 5.0.5 Thu, May 02, 2019 at 12:06:44 Page 3

SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY SH2

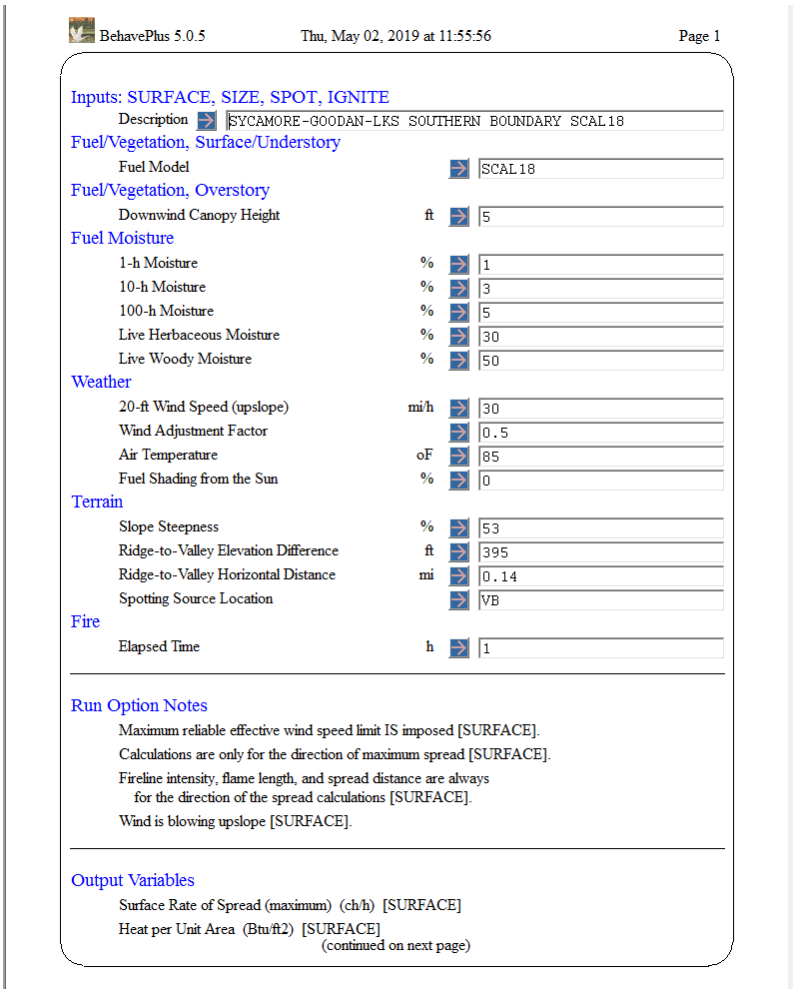
Surface Rate of Spread (maximum)	271.0	ch/h
Heat per Unit Area	666	Btu/ft2
Fireline Intensity	3309	Btu/ft/s
Flame Length	18.7	ft
Reaction Intensity	3170	Btu/ft2/min
Area	1182.4	ac
Perimeter	575	ch
Spot Dist from a Wind Driven Surface Fire	0.9	mi
Probability of Ignition from a Firebrand	100	%

Southern Preserve Boundary, BEHAVE Modeling, Fuel Model GS-2





Southern Preserve Boundary, BEHAVE ModelingFuel Model SH-5



BehavePlus 5.0.5 Thu, May 02, 2019 at 11:55:56 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY SCAL18
Fuel/Vegetation, Surface/Understory		
Fuel Model		SCAL18
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	53
Ridge-to-Valley Elevation Difference	ft	395
Ridge-to-Valley Horizontal Distance	mi	0.14
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are only for the direction of maximum spread [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind is blowing upslope [SURFACE].

Output Variables

Surface Rate of Spread (maximum) (ch/h) [SURFACE]

Heat per Unit Area (Btu/ft2) [SURFACE]

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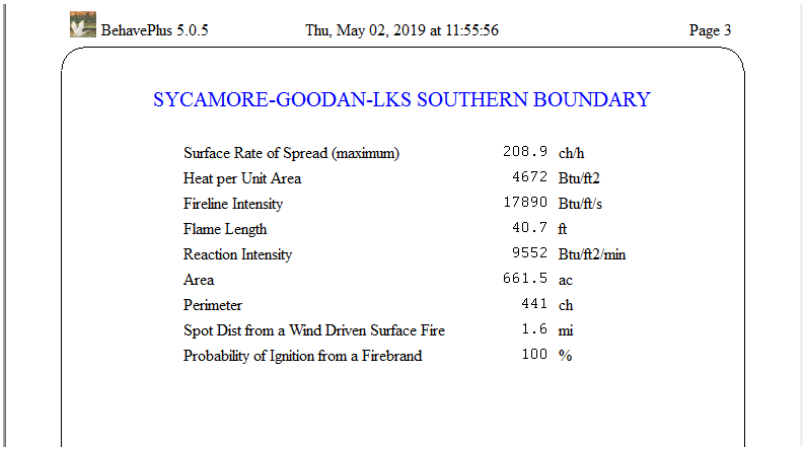
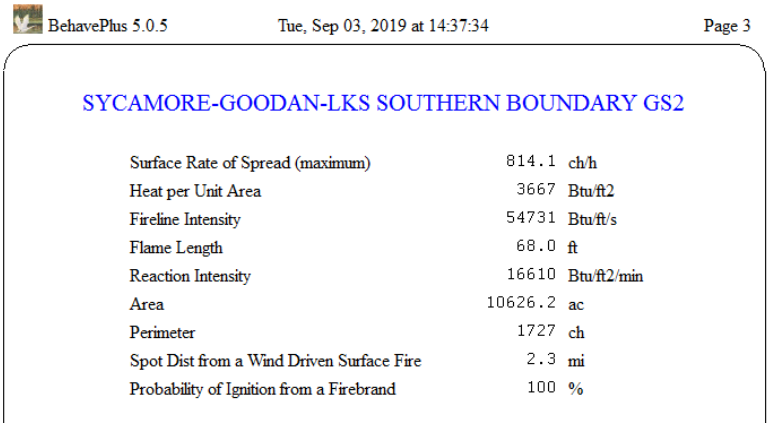


BehavePlus 5.0.5 Thu, May 02, 2019 at 11:55:56 Page 3

SYCAMORE-GOODAN-LKS SOUTHERN BOUNDARY

Surface Rate of Spread (maximum)	208.9	ch/h
Heat per Unit Area	4672	Btu/ft2
Fireline Intensity	17890	Btu/ft/s
Flame Length	40.7	ft
Reaction Intensity	9552	Btu/ft2/min
Area	661.5	ac
Perimeter	441	ch
Spot Dist from a Wind Driven Surface Fire	1.6	mi
Probability of Ignition from a Firebrand	100	%

Southern Preserve Boundary BEHAVE Modeling, Fuel Model SCAL 18



Southern Preserve Boundary BEHAVE Modeling, Fuel Model 4

BehavePlus 5.0.5 Thu, May 02, 2019 at 12:21:54 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SV LAKE N FINGER GS2
Fuel/Vegetation, Surface/Understory		
Fuel Model		gs2
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	49
Ridge-to-Valley Elevation Difference	ft	503
Ridge-to-Valley Horizontal Distance	mi	0.34
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].
Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].
Wind is blowing upslope [SURFACE].

Output Variables

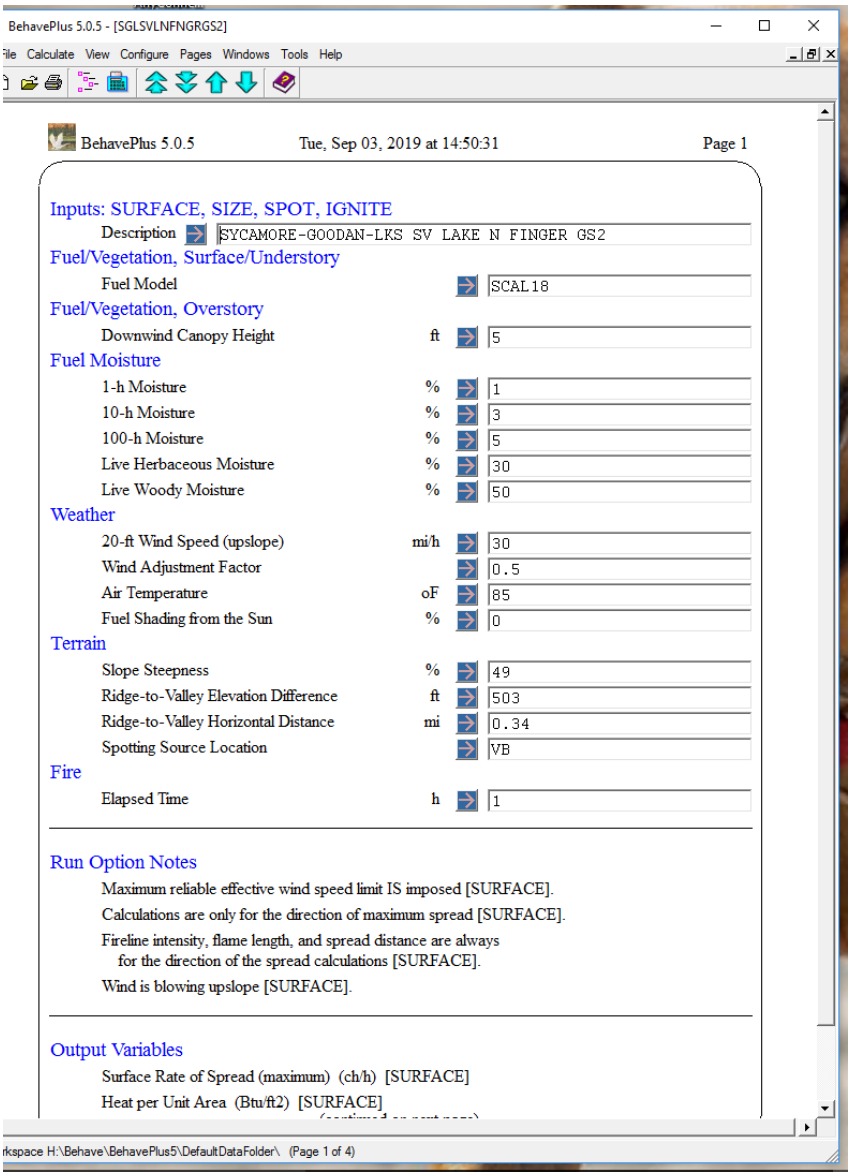
Surface Rate of Spread (maximum) (ch/h) [SURFACE]
Heat per Unit Area (Btu/ft2) [SURFACE]
(continued on next page)

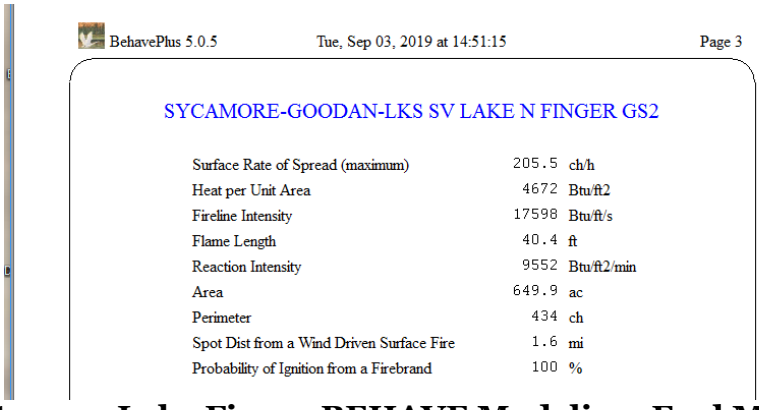
BehavePlus 5.0.5 Thu, May 02, 2019 at 12:21:54 Page 3

SYCAMORE-GOODAN-LKS SOUTH CYN GS2

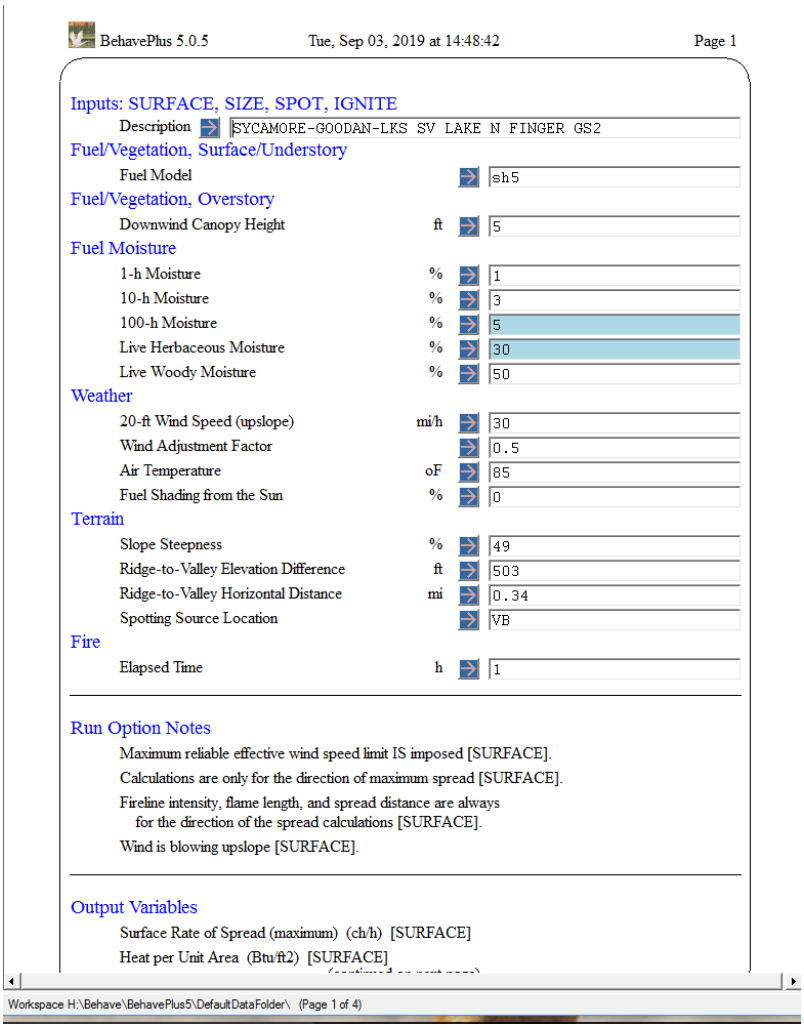
Surface Rate of Spread (maximum)	267.7	ch/h
Heat per Unit Area	666	Btu/ft2
Fireline Intensity	3270	Btu/ft/s
Flame Length	18.6	ft
Reaction Intensity	3170	Btu/ft2/min
Area	1162.5	ac
Perimeter	569	ch
Spot Dist from a Wind Driven Surface Fire	0.9	mi
Probability of Ignition from a Firebrand	100	%

Southern Canyon-Lake Finger BEHAVE Modeling, Fuel Model GS-2





Southern Canyon-Lake Finger BEHAVE Modeling, Fuel Model SCAL -18



BehavePlus 5.0.5 Tue, Sep 03, 2019 at 14:48:42 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SV LAKE N FINGER GS2
Fuel/Vegetation, Surface/Understory		
Fuel Model		sh5
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	49
Ridge-to-Valley Elevation Difference	ft	503
Ridge-to-Valley Horizontal Distance	mi	0.34
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].
Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].
Wind is blowing upslope [SURFACE].

Output Variables

Surface Rate of Spread (maximum) (ch/h) [SURFACE]
Heat per Unit Area (Btu/ft2) [SURFACE]

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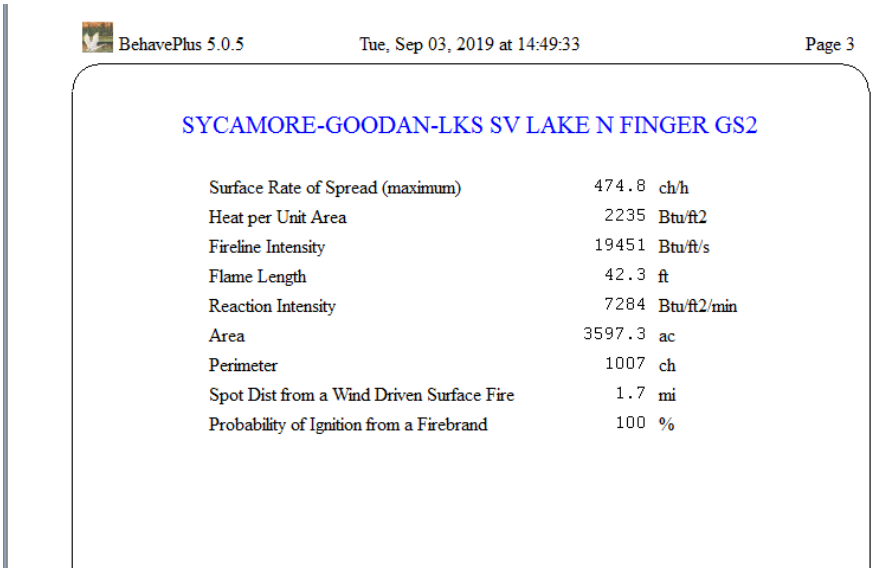
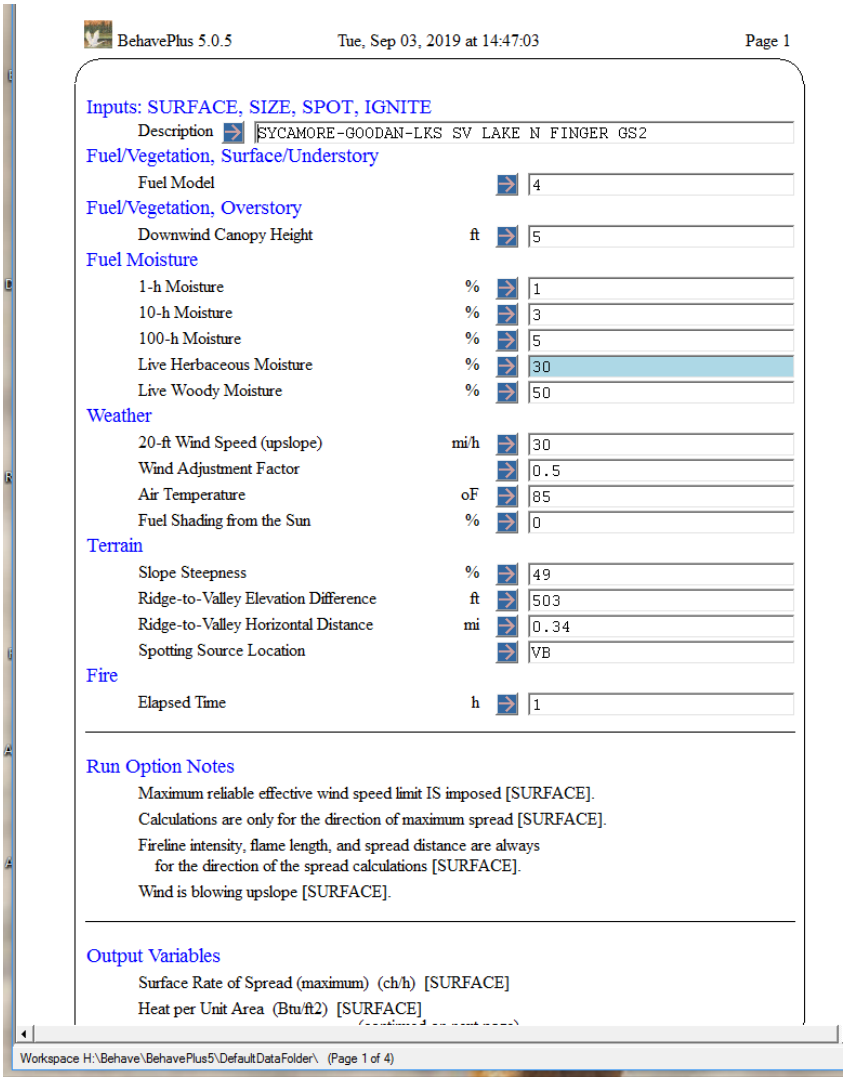


BehavePlus 5.0.5 Tue, Sep 03, 2019 at 14:49:33 Page 3

SYCAMORE-GOODAN-LKS SV LAKE N FINGER GS2

Surface Rate of Spread (maximum)	474.8	ch/h
Heat per Unit Area	2235	Btu/ft2
Fireline Intensity	19451	Btu/ft/s
Flame Length	42.3	ft
Reaction Intensity	7284	Btu/ft2/min
Area	3597.3	ac
Perimeter	1007	ch
Spot Dist from a Wind Driven Surface Fire	1.7	mi
Probability of Ignition from a Firebrand	100	%

Southern Canyon-Lake Finger, BEHAVE Modeling, Fuel Model SH-5



BehavePlus 5.0.5 Tue, Sep 03, 2019 at 14:47:03 Page 1

Inputs: SURFACE, SIZE, SPOT, IGNITE

Description		SYCAMORE-GOODAN-LKS SV LAKE N FINGER GS2
Fuel/Vegetation, Surface/Understory		
Fuel Model		4
Fuel/Vegetation, Overstory		
Downwind Canopy Height	ft	5
Fuel Moisture		
1-h Moisture	%	1
10-h Moisture	%	3
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50
Weather		
20-ft Wind Speed (upslope)	mi/h	30
Wind Adjustment Factor		0.5
Air Temperature	oF	85
Fuel Shading from the Sun	%	0
Terrain		
Slope Steepness	%	49
Ridge-to-Valley Elevation Difference	ft	503
Ridge-to-Valley Horizontal Distance	mi	0.34
Spotting Source Location		VB
Fire		
Elapsed Time	h	1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].
Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].
Wind is blowing upslope [SURFACE].

Output Variables

Surface Rate of Spread (maximum) (ch/h) [SURFACE]
Heat per Unit Area (Btu/ft2) [SURFACE]

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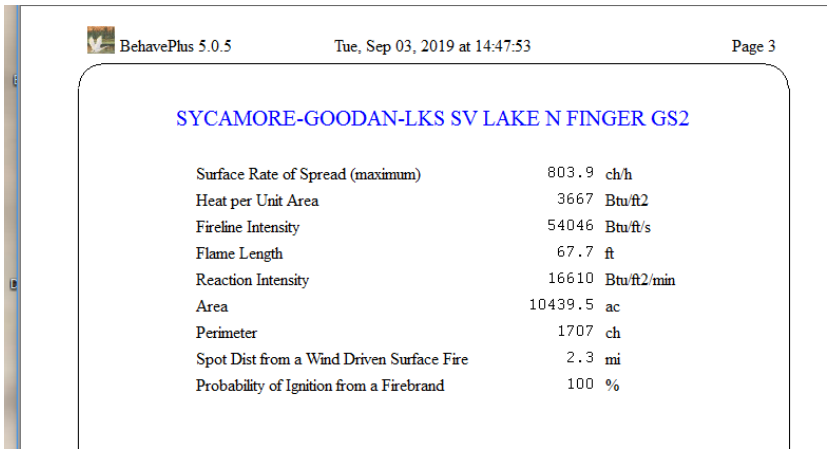

BehavePlus 5.0.5 Tue, Sep 03, 2019 at 14:47:53 Page 3

SYCAMORE-GOODAN-LKS SV LAKE N FINGER GS2

Surface Rate of Spread (maximum)	803.9	ch/h
Heat per Unit Area	3667	Btu/ft2
Fireline Intensity	54046	Btu/ft/s
Flame Length	67.7	ft
Reaction Intensity	16610	Btu/ft2/min
Area	10439.5	ac
Perimeter	1707	ch
Spot Dist from a Wind Driven Surface Fire	2.3	mi
Probability of Ignition from a Firebrand	100	%

Southern Canyon-Lake Finger, BEHAVE Modeling, Fuel Model 4

APPENDIX D
Fire Behavior Modeling Results

FUELS CLASSIFICATION

Reliable estimates of fire behavior must consider the relationship of fuels to the fire environment and the variations in these fuels. Natural fuels are made up of the various components of vegetation, both live and dead, that occur on a site. The type and quantity will depend upon the soil, climate, geographic features, and the fire history of the site. The major fuel groups of grass, shrub, trees, and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels. Fire behavior is affected by seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content and chemical properties.

All vegetation is considered fuel. All vegetation will burn; however, some species require more heat in order to ignite and propagate flame. The moisture content of vegetation is an important component; dry vegetation will ignite more rapidly, whereas green vegetation must lose its moisture before it will ignite. Consequently, shrubland vegetation with high oil content (above 6%) will burn more quickly and hotter than vegetation with high leaf moisture levels and low oil content levels. More than 90% of the flaming front of a wildfire is composed of fuel less than 0.5 inch in diameter and is consumed in minutes. Fuels larger than 1 inch in diameter are termed "residual" fuel and may require several hours to burn out. This larger fuel does not contribute to the forward rate of spread of the fire. The following factors describe the relationship between vegetation characteristics that affect fire behavior:

Fuel loading is defined as the oven dry weight of fuels in a given area, usually expressed in tons per acre. Natural fuel loading varies greatly by vegetative or fuel types in addition to the different size classes of fuel particles. Vegetation types can be rated as light, moderate, or heavy. Each rating is an estimate of the dead or live surface fuels that are less than 3 inches in diameter. Although specific measurements were not taken, based on the vegetation types identified in the cursory survey of the Sycamore Canyon and Goodan Ranch Preserves (Preserve), the different vegetation types can generally be assigned a moderate to high rating.

> Measuring the intensity, force, and destructive potential of wildfire is accomplished by observing flame lengths produced by burning vegetation. A direct relationship exists between the amount of energy released during burning (per second) and the length of flame generated. The standard for measuring energy release in the United States is the British Thermal Unit (BTU). One BTU is defined as the amount of energy required to increase the temperature of 1 pound of water 1°F (a standard kitchen match or candle flame is approximately one BTU).

Size and shape affect the surface area to volume ratio of fuels. Small fuels have a greater surface area to volume ratio than larger fuels. Dead fuels are separated into four size classes: (1) grasses, litter, or duff less than 0.25 inch diameter; (2) twigs and small stems 0.25– to 1-inch diameter; (3) branches 1- to 3-inch diameter; and (4) large stems and branches greater than 3-inch diameter. The fine fuels less than 0.25-inch diameter are most important for fire behavior analysis because their ignition time is less, and their fuel moisture content changes rapidly. This characteristic is typical for the grasses that were identified within and adjacent to the Preserve.

> The arrangement, size, and surface area of vegetative fuels play an important role in fire behavior and spread potential. Dense, concentrated biomass may burn evenly; however, when overall size decreases and surface area increases (as seen in native shrub stands), burning patterns change, resulting in faster ignition and spread. Live shrubland and grassland vegetation generally exhibit high surface to volume ratios. Standing grass, coastal sage scrub, and chaparral have high surface area to volume ratios, whereas forest litter and chipped or cut biomass exhibit very low surface to volume ratios.

Compactness, or spacing between fuel particles, affects the rate of combustion. For example, fuel particles that are closely compacted have less surface area exposed and less air circulation between particles and thus are slower to combust. The thick duff layer found underneath a mixed forest is an example of a tightly compacted fuel, whereas the open, dead branches on sagebrush or chaparral are considered a loosely compacted fuel. With the exception of the on-site oak woodlands, the fuels on the Preserve are loosely spaced with adequate air circulation required to carry a fire.

Horizontal continuity is the extent of horizontal distribution of fuels at various levels or planes. The vegetative types within various portions of the Preserve were analyzed for horizontal continuity and vertical arrangement. Fuels are either rated as uniform or patchy. Uniform fuels are evenly distributed and occur in a continuous, non-interrupted cover across the landscape. Patchy fuels are not continuous.

Vertical arrangement is defined as the relative heights of fuels above the ground, as well as their vertical continuity. Both of these vegetation characteristics influence the ability of fire to reach various fuel levels or strata. Vegetation of various heights that can transport fire from the low-level brush to tree canopies is called a fuel ladder and may create what is called a “crown fire.” When tall grasses and shrubs grow around trees with low hanging branches, the result is a fuel ladder. When a ground fire climbs the fuel ladder into the crowns of trees, it can spread canopy to canopy, creating higher fire intensity and firebrands.

Fuel moisture content is defined as the amount of water in fuels. The moisture content of plant materials plays a major role in the ignition, development, and spread of fires. Fuel moisture controls the current flammability of fuels both living and dead. During the most active growing periods of spring, the moisture content of plant foliage may be quite high. As the season progresses, a plant's moisture content declines until late summer or early fall when the plant becomes dormant or completely dies. Fine fuels, less than 0.25 inch thick, are most responsible for the spread of fire and have highly variable fuel moisture contents depending on the relative humidity of the air. Live fuel moisture content during the peak fire season (October through December) is estimated to be 60% to 80% in the drier open areas. This can potentially drop to less than 60% under extreme, dry wildfire conditions.

> There are two types of fuel moisture values to consider: (1) dead fuel moisture, with measurements of 1-, 10-, 100-, and 1,000-hour time-lag; and (2) live fuel moisture.

Dead fuel moisture percentages are determined by temperature, aspect, time of day, relative humidity, and time of year. One-hour time-lag fuel is less than 0.5 inch thick, 10-hour time-lag fuel is between 0.5 inch and 1 inch thick, 100-hour time-lag fuel is between 1 and 3 inches thick, and 1,000-hour time-lag fuel is greater than 3 inches thick. One-hour time-lag fuel can reach equilibrium with the surrounding atmosphere in 1 hour, or within minutes when air temperature exceeds 80°F and relative humidity is below 25%. One-hour time-lag fuel moisture may be calculated using a set of tables that reference time of day, month, aspect, slope, temperature, and relative humidity. Ten-hour, 100-hour, and 1,000-hour time-lag fuel can take up to 10 hours, 100 hours, or 1,000 hours to reach equilibrium with the surrounding atmosphere, respectively. In Southern California, 1-hour, 10-hour, and 100-hour time-lag fuels are usually given equal value. One thousand hour time-lag fuel, which occurs in more heavily wooded environments (i.e., timber), is generally used in measuring drought effects. Forests are considered "critical" when 1,000-hour fuel measurements are less than 15% (as a frame of references, kiln-dried wood moisture averages 22%).

> Despite variations in the topography and disturbance history of the Preserve, vegetative cover is classified into four main types: grass, chaparral, coastal sage scrub, and woodland. Frequent fires have created low-volume fuel beds throughout much of the Preserve. Although most fuels occur in the 1-hour size class, pockets of 10- and 100-hour fuels can be found, primarily in the woodland vegetation types on site.

Live fuel moisture is described as the moisture in leaves and woody portions of a plant. Field measurements of live fuel moistures are calculated by cutting small branches (less than 3 inches in diameter), weighing the branch, placing it in a low- temperature oven for 12 hours, removing the branch, and weighing it again. The difference in weight is the loss of moisture in the leaves

and woody portion of the branch. Consequently, live fuel moisture may exceed 100% of the dry weight of the plant. Live fuel moisture is the highest in the spring and early summer, and the lowest in late summer, fall, and early winter. This measurement is a valuable tool in predicting wildfire potential for a general area.

> Chaparral and coastal sage scrub are common Southern California vegetation types found in many upland locations and generally have reduced fuel moisture levels. Conversely, riparian vegetation, including willow (*Salix* spp.), coast live oak (*Quercus agrifolia*), and mulefat (*Baccharis salicifolia*), has higher leaf moisture values than vegetation growing in drier, more xeric sites. The importance of fuel moisture in examining fire hazard is that higher moisture levels ultimately require higher BTU output to ignite or sustain ignition. Consequently, fuel arrangement, along with fuel chemical/moisture content, plays an important role in wildfire combustion, spread, and heat output. Fuel moisture is a significant component, as vegetation requires external heat and energy to reduce moisture levels before it will ignite. High winds, low relative humidity, and/or high temperatures begin the process of removing fuel moisture, thus allowing vegetation to ignite and burn more rapidly. Consequently, lower fuel moisture values, including both dead and live fuel moistures, result in increased fire intensity. Moisture-laden fuels inhibit complete combustion while simultaneously producing excessive smoke output.

Fuel chemical properties include the presence of volatile substances such as oils, resins, wax, and pitch. These also affect the rate of combustion. Chaparral and sage scrub vegetation have high amounts of these volatile substances that contribute to rapid rates of spread and high fire intensities.

> Oil and moisture contents vary between fuels and fluctuate depending on the time of year. For example, black sage may have an oil content approaching 20% of its weight in dry summer or autumn months, but, in the spring, when sufficient groundwater is available, moisture content values can exceed 300%. When stressed during extreme dry weather conditions, numerous chaparral and coastal sage scrub species may react explosively when moisture falls below 60%, whereas larger shrubs may require higher energy to sustain ignition.

FUEL MODELS

All nine fuels characteristics are descriptors that help define the 13 standard fuel models (Anderson 1982), the more recently developed 40 fuel models (Scott and Burgan 2005), and five custom fuel models developed for Southern California (Weise and Regelbrugge 1997). Six fuel

models (models 1, 8, 9, SCAL 18, SH5, and TU5) were used in the FlamMap analysis for the Preserve and are required inputs for the mathematical fire spread computations. Additionally, one non-burnable model (model 0) was utilized to represent non-fuel areas (e.g. roads)). Table 1 provides details of the six fuel models used in the analysis conducted for Preserve.

Table 1
Fuel Model Characteristics

Fuel Model	Description	Tons/acre; Btu/lb	Fuel Bed Depth (Feet)
1	Short grass	0.7 tons/acre; 8,000 Btu/lb	1.0
8	Closed timber litter	5.0 tons/acre; 8,000 Btu/lb	0.2
9	Hardwood litter	3.5 tons/acre; 8,000 Btu/lb	0.2
SCAL18	Sage/buckwheat	9.7 tons/acre; 9,200 Btu/lb	3.0
SH5	High load dry scrub	8.6 tons/acre; 8,000 Btu/lb	6.0
TU5	Very high load, dry climate timber-shrub	14.0 tons/acre; 8,000 Btu/lb	1.0

WILDLAND FIRE BEHAVIOR MODELING

Fire behavior was analyzed for the Preserve site using FlamMap fire behavior modeling software and local topographic, fuels, and weather data. The FlamMap output data provide an indication of how vegetative fuels will burn under specific fuel, weather, and topographical conditions. The FlamMap (version 5.0) fire behavior software package (Finney et al. 2012) is a geographic information system (GIS)-driven computer program that incorporates fuels, weather, and topography data in generating static fire behavior outputs, including values associated with flame length, rate of spread, and fireline intensity. It is a flexible system that can be adapted to a variety of specific wildland fire planning and management needs.

The calculations that result from FlamMap are based on the BehavePlus Fire Modeling System algorithms but result in a geographically distinct data set based on GIS inputs. FlamMap model outputs allow wildland resource managers to predict rate of spread, fireline intensity, and flame length, which provide important insights about the characteristics of wildfire spread within and adjacent to high-value areas, whether residential structures or preserved sensitive habitats. Each of the input variables used in FlamMap remain constant at each location, meaning that the input variables are applied consistently to each grid cell and the fire behavior at one grid cell does not impact that at a neighboring grid cell. Essentially, the model presents a “snapshot” in time and does not account for temporal changes in fire behavior or the movement of fire across the landscape. As such, the results of the models contained herein should be utilized as valuable information sources and tools to prioritize fuel treatment options rather than an exact representation of how a fire would behave on the Preserve.

The basic assumptions and limitations of FlamMap are:

- The fire model output describes fire behavior only in the flaming front. The primary driving forces in the predictive calculations are the dead fuels less than 0.25 inch in diameter. These are the fine fuels that carry fire. Fuels greater than 1 inch in diameter have little effect to carry fire, and fuels greater than 3 inches in diameter have no effect.
- The model bases calculations and descriptions on a wildfire spreading through surface fuels that are within 6 feet of the ground and contiguous to the ground. Surface fuels are often classified as grass, brush, litter, or slash.
- The software assumes that fuel moisture conditions are uniform. However, because wildfires almost always burn under non-uniform conditions, length of projection period and choice of fuel must be carefully considered to obtain useful predictions.
- WindNinja software (v. 2.1.0), which is incorporated into FlamMap, allows for the generation and incorporation of gridded wind data in the FlamMap simulation.
- The FlamMap fire behavior computer modeling system provides the average length of the flames, which is a key element for determining defensible space distances for minimizing structure ignition.

Fuel models used in the FlamMap analysis are classified into four groups based upon fuel loading (tons/acre), fuel height, and surface to volume ratio. Fuel model classifications were made during field analysis and in conjunction with available vegetation maps of the Preserve. The following list of fuel types describes the classification of fuel models based on vegetation type:

- Grasses Fuel, Models 1 through 3. These models represent the fast moving, light, flashy fuels found in grassland landscapes.
- Brush Fuel, Models 4 through 7, SCAL 14 through 18. These models are designed to represent the higher-intensity chaparral and sage scrub dominated landscapes.
- Timber Fuel, Models 8 through 10. Timber models are selected to represent the riparian woodland or ornamental forested landscapes.
- Logging Slash, Fuel Models 11 through 13. These models are used to represent slash; none were utilized for the Preserve.

FLAMMAP FUEL MODEL INPUTS

FlamMap software requires a minimum of 5 input files that represent field conditions in the study area, including elevation, slope, aspect, fuel model, and canopy cover. Each of these files was created as a raster geographic information system (GIS) file in ArcGIS 10.0 software,

exported as an ASCII grid file, then utilized in creating a FARSITE Landscape file that served as the base for the FlamMap runs. The resolution of each grid file and associated ASCII file that was used in the models described herein is 10 meters, based on available digital elevation models (DEMs). In addition to the Landscape file, wind and weather data are incorporated into the model inputs. The output files chosen for each of the modeling runs included flame length (feet) and fireline intensity (BTU/ft/sec). Figures D-1 through D-4 depict the results of each of the four modeling runs and exhibit each of these output variables.

The following provides a description of the input and output variables used in processing the FlamMap models. In addition, data sources are cited and any assumptions made during the modeling process are described.

1. ***Elevation.*** Elevation data were derived from a 10 meter resolution Digital Elevation Model (DEM) acquired from the San Diego Association of Governments (SANDAG). This data set was utilized to create an elevation grid file, using units of feet above mean sea level. The elevation data are a necessary input file for FlamMap runs and are necessary for adiabatic (i.e., a process that happens without loss or gain of heat) adjustment of temperature and humidity and for conversion of fire spread between horizontal and slope distances (Finney et al. 2012).
2. ***Slope.*** Using Spatial Analyst tools, a slope grid file was generated from the elevation grid file. Slope measurements are represented in percent of inclination from horizontal. The slope input file is necessary for computing slope effects on fire spread and solar radiance (Finney et al. 2012).
3. ***Aspect.*** Using Spatial Analyst tools, an aspect grid file was generated from the elevation grid. Aspect values are presented in azimuth degrees and are important in determining solar exposure.
4. ***Fuel Model.*** Vegetation coverage data in the form of a GIS shapefile were used in this analysis to create a fuel model file. Derived from Dudek's vegetation mapping data, the vegetation types were classified according to existing National Forest Fire Laboratory (NFFL) and BehavePlus fuel models, and the data file was converted to a grid file for inclusion in FlamMap modeling. Table 2 presents the vegetation and associated fuel type classifications for the Preserve.
5. ***Canopy Cover.*** Canopy cover is a required file for FlamMap operations. It is necessary for computing shading and wind reduction factors for all fuel models. Canopy cover is the horizontal percentage of the ground surface that is covered by tree crowns. Canopy cover is measured as the horizontal fraction of the ground that is covered directly overhead by tree canopy. Crown closure refers to the ecological condition of relative tree crown density. Stands can be said to be "closed" to recruitment of canopy trees but still

only have 40% or 50% canopy cover (Finney et al. 2012). Coverage units can be categories (0–4) or percentage values (0–100). Table 2 presents canopy cover assignments for each vegetation type/fuel model

Table 2
Fuel Models and Associated Canopy Cover Values

Vegetation Community/Land Cover	Fuel Model	Canopy Cover Value
Chamise Chaparral	SH5	0
Chaparral	SH5	0
Coastal Live Oak Woodland	8	3
Coastal Scrub	SCAL18	0
Diegan Coastal Sage Scrub: Inland Form	SCAL18	0
Disturbed Habitat	1	0
Eucalyptus Woodland	TU5	3
Non-Native Grassland	1	0
Orchards and Vineyards	9	2
Scrub Oak Chaparral	SH5	0
Southern Willow Scrub	8	2
Southern Maritime Chaparral	SH5	0
Southern Mixed Chaparral	SH5	0
Southern Riparian Woodland	8	3
Urban/Developed	0	0

Weather

Weather and fuel moisture inputs incorporated into fire behavior modeling for the site were determined by utilizing the guidelines and standards presented by the County of San Diego, Department of Planning and Land Use. These guidelines identify acceptable fire weather inputs for extreme fire conditions during summer months and Santa Ana fire weather patterns. The County analyzed and processed fire weather from Remote Automated Weather Stations (RAWS) between April 15 to December 31 in order to represent the general limits of the fire season. Data provided by the County's analysis included temperature, relative humidity, and sustained wind speed and is categorized by weather zone, including Maritime, Coastal, Transitional, Interior, and Desert.

To determine fuel moisture values for the analysis area, Dudek utilized the Fine Dead Fuel Moisture tool within the BehavePlus (v. 5.0.5) fire behavior modeling software package. The temperature, relative humidity, and wind speed data for the Transitional weather zone were utilized for this analysis based on the Preserve location. Reference fuel moistures were calculated in BehavePlus for two weather scenarios (Summer and Peak) and were based on site-specific topographic data inputs. Table 3 summarizes the fuel moisture calculations utilized for this analysis.

Table 3
Fine Dead Fuel Moisture Calculation

Variable	Summer Weather	Peak Weather
Dry Bulb Temperature	90 -109 deg. F	90 -109 deg. F
Relative Humidity	10 - 14 %	5 - 9 %
Reference Fuel Moisture	2 %	1 %
Month	May June July	Feb Mar Apr Aug Sept Oct
Time of Day	14:00 - 15:59	14:00 - 15:59
Elevation Difference	Level (within 1,000 ft.)	Level (within 1,000 ft.)
Slope	30+ %	31+ %
Aspect	South	South
Fuel Shading	Exposed (< 50% shading)	Exposed (< 50% shading)
Fuel Moisture Correction	1 %	1 %
Fine Dead Fuel Moisture	3 %	2 %

The fine dead fuel moisture values were incorporated into the Initial Fuel Moisture file used as an input in FlamMap. Initial wind direction and wind speed values for the two FlamMap runs were manually entered during the data input phase. WindNinja software (v. 2.1.0), which is incorporated into FlamMap, allows for the generation and incorporation of gridded wind data in the FlamMap simulation. The input wind speed and direction is roughly an average surface wind at 20 feet above the vegetation over the analysis area. The WindNinja-generated wind data was included in the modeling effort and provides a more detailed data set for modeling the effect of wind speed and direction on fire behavior across the modeling area. Table 4 presents the weather and fuel moisture input variables used for fire behavior modeling efforts.

Table 4
FlamMap Weather Input Variables

Model Variable	Summer Weather	Peak Weather
1 h fuel moisture	3%	2%
10 h fuel moisture	4%	3%
100 h fuel moisture	6%	5%
Live herbaceous moisture	60%	30%
Live woody moisture	90%	60%
20 ft wind speed (mph)	19 mph	41 mph
Wind direction	225 degrees	45 degrees
Slope steepness	Variable by location	Variable by location

mph = miles per hour

FlamMap Fuel Model Outputs

Two output grid files were generated for each of the two FlamMap runs, and include representations of flame length (feet) and fireline intensity (BTU/feet/second), as shown in Figures D-1 through D-4. The aforementioned fire behavior variables are an important component in understanding fire risk and fire agency response capabilities. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion zone to the average tip of the flames (Andrews and Bevins 2009). It is a somewhat subjective and non-scientific measure of fire behavior, but is extremely important to fireline personnel in evaluating fireline intensity and is worth considering as an important fire variable (Rothermel 1991). Fireline intensity is a measure of heat output from the flaming front, and also affects the potential for a surface fire to transition to a crown fire and is another important variable in initial attack and fire suppression efforts. The information in Table 5 presents an interpretation of these fire behavior variables as related to fire suppression efforts.

Table 5
Fire Suppression Interpretation

Flame Length (feet)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4	Under 100	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4 to 8	100 to 500	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8 to 11	500 to 1000	Fires may present serious control problems—torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11	Over 1000	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

Source: BehavePlus 5.0.5 fire behavior modeling program (Andrews and Bevins 2009)

The fire behavior analysis results for the Preserve vary depending on fuel type. As FlamMap utilizes site-specific digital terrain data (including slope, vegetation, aspect, and elevation data) slight variations in predicted flame length and fireline intensity values can be observed based on fluctuations of these attributes across the landscape. As presented, wildfire behavior in each of the fuel types varies depending on weather conditions. Given the climatic, vegetation, and topographic characteristics along with the fire history and fire behavior modeling results discussed in this VMP, the Preserve is determined to be vulnerable to wildfire starting in, burning onto, or spotting onto the site. Based on this information, adjacent residential development, and the fire history of the area, it is expected that wildfires will occur on the Preserve in the future.

Under Peak weather conditions, fire can move rapidly through the site's fuels. Worst-case flame lengths were calculated at approximately 43 feet in chaparral vegetation types and approximately 41 feet in sage scrub vegetation on slopes exceeding 50% throughout the Preserve. Spread rates on site may exceed 8 miles per hour in dry flashy fuels (grasses and scrub) under extreme weather and slope conditions. Finally, under extreme weather and wind conditions, fireline intensity values may exceed 19,000 Btu/feet/second limiting the options for fire response personnel and emphasizing the importance of fuel modification and defensible space for adjacent residences.

It should be noted that the modeling results depict values based on inputs to the FlamMap system. Variations in weather or pockets of different fuel types are not accounted for in this analysis. Additionally, the scale of analysis (10 square meters) limits fine-scale analysis and interpretation. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns that could not be obtained for this analysis.

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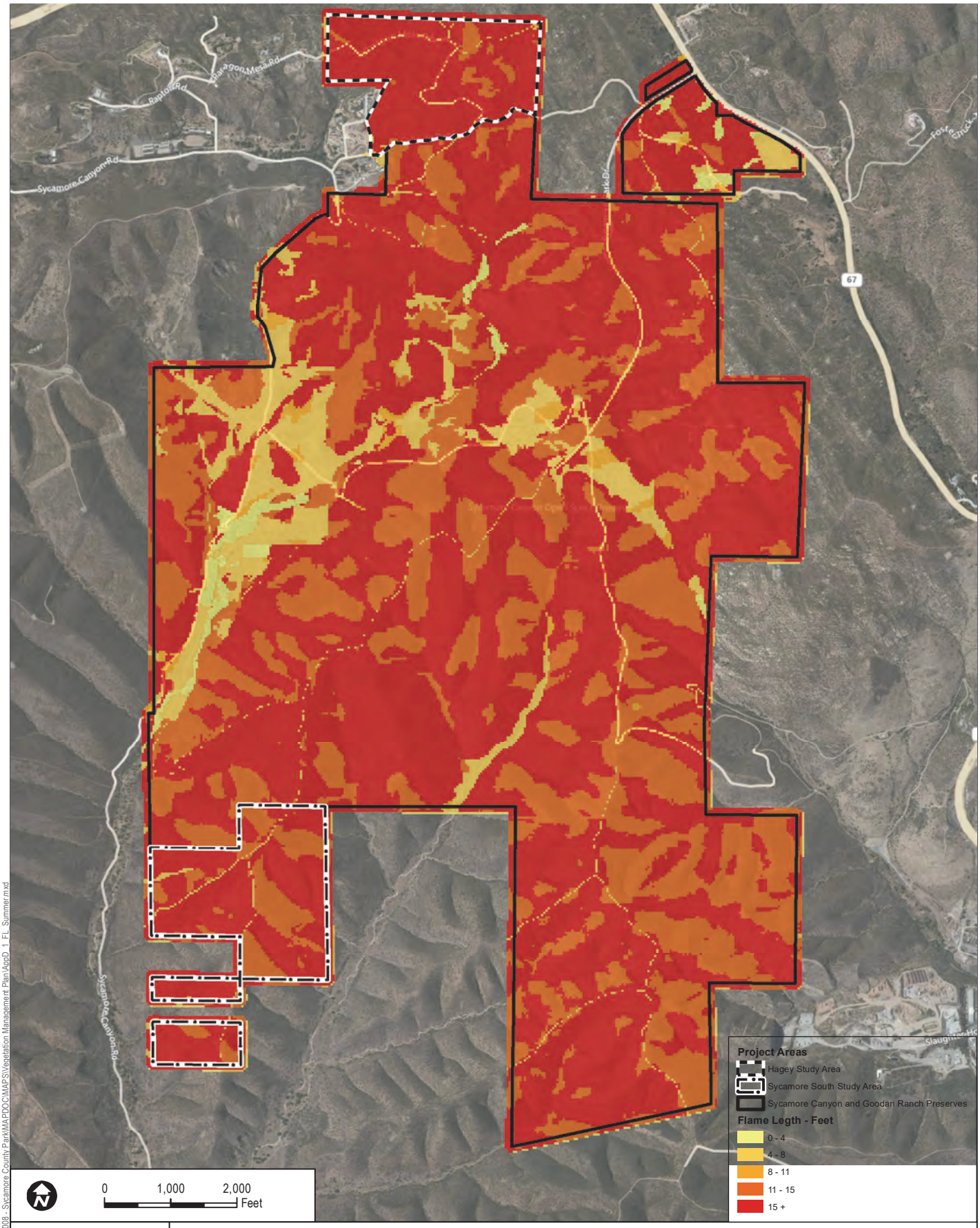

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APPENDIX D-1

Flame Length, Summer Fire

Sycamore Canyon and Goodan Ranch Preserves - Vegetation Management Plan

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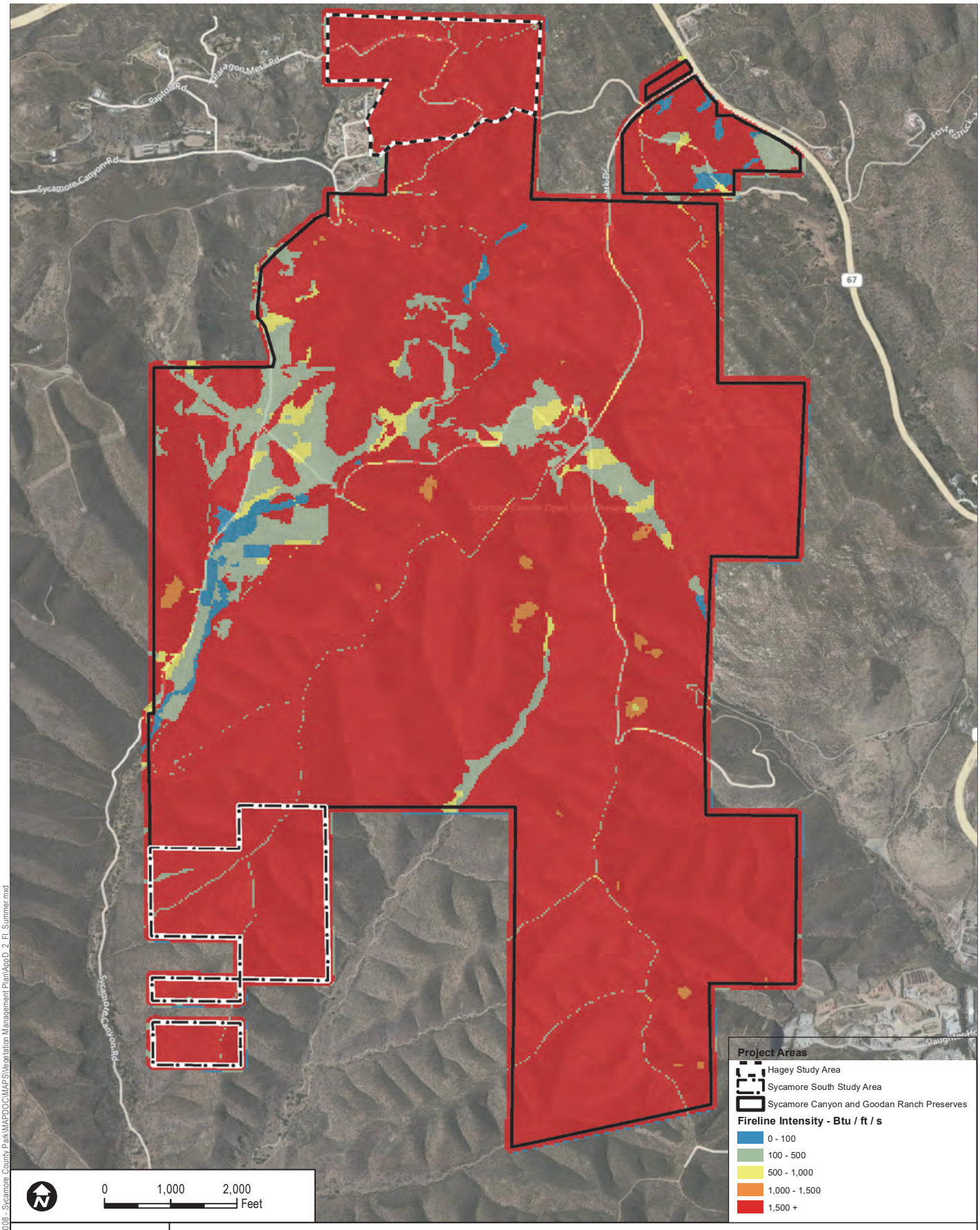

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APPENDIX D-2

Fireline Intensity, Summer Fire

Sycamore Canyon and Goodan Ranch Preserves - Vegetation Management Plan

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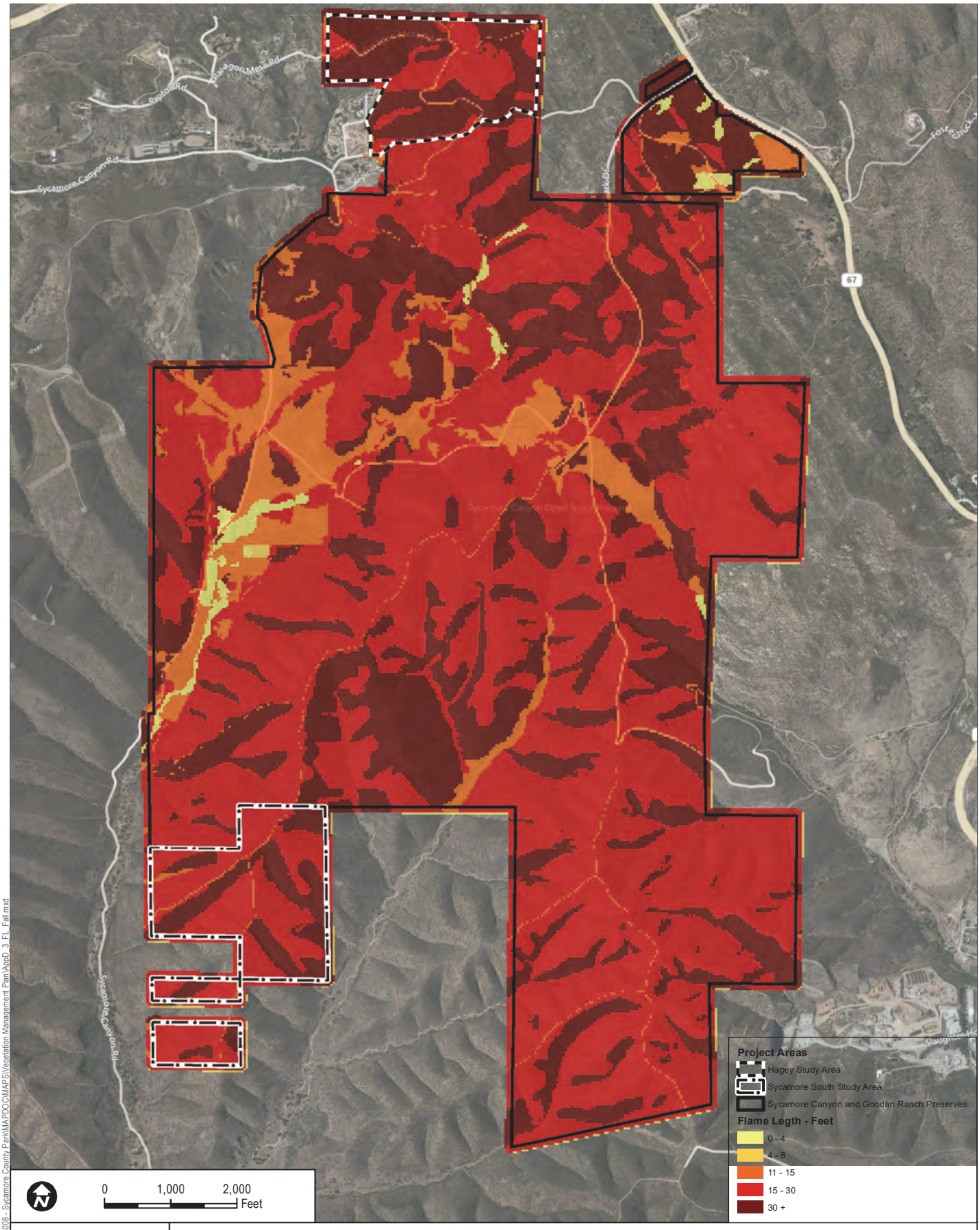

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APPENDIX D-3

Flame Length, Fall Fire

Sycamore Canyon and Goodan Ranch Preserves - Vegetation Management Plan

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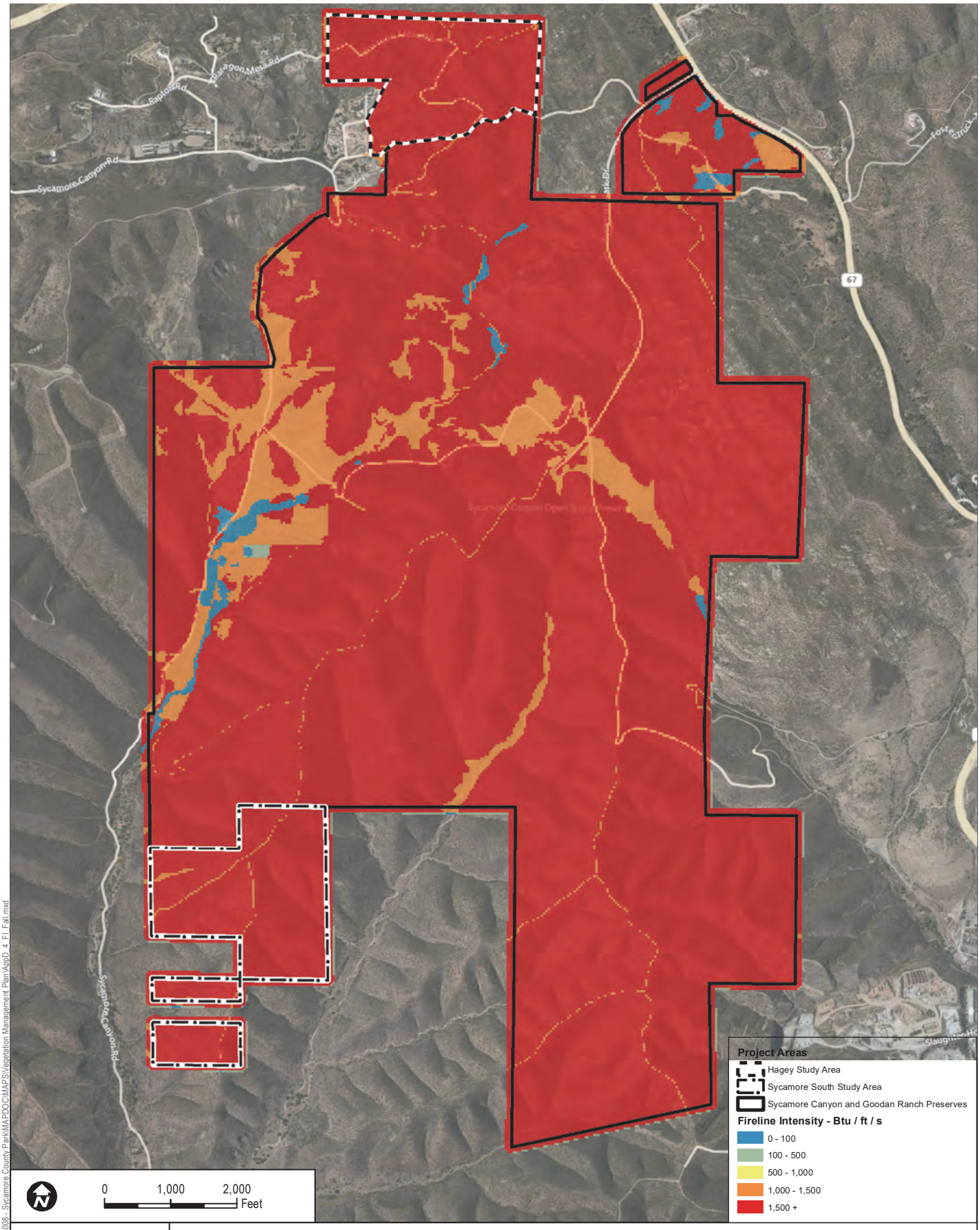

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APPENDIX D-4

Fireline Intensity, Fall Fire

Sycamore Canyon and Goodan Ranch Preserves - Vegetation Management Plan

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Appendix F
Fire Behavior Modeling Results

The fire effects on the Wu and Cielo Properties (Properties) and the behavior of fire in relation to the vegetation that exists on the Property is an important consideration for a VMP for the Property. Information for the behavior of fire on the Property was generated utilizing the standardized model results information in the *County of San Diego Report Format and Content Requirements, Wildland Fire and Fire Protection* (2010). The following are excerpts from these report format and content requirements.

Analysis of 44 years of weather data (1961–2005) from the USDA Forest Service's Weather Information Management System (WIMS) provides a sampling of weather patterns across San Diego County. San Diego County is divided into five climate zones from the coast to the desert: Climates of San Diego County, Agricultural Relationships, University of California, Agricultural Extension Service, and U.S. Weather Bureau. Daily afternoon weather observations were manually taken at selected fire stations across the county between 1961 and the early 1990s. Remote Automated Weather Stations (RAWS) replaced manual observations beginning in 1992. (http://famweb.nwcg.gov/weatherfirecd/).

Fire Family Plus software (USDA Forest Service) was used to summarize and analyze historical daily fire weather observations and to compute fire danger indices based on the National Fire Danger Rating System (NFDRS).

Weather data from April 15 through December 31 were chosen to represent the general limits of the fire season. Fires have occurred between January 1 and April 14; while dangerous fire weather conditions occur during this period, they typically are not as severe as September and October weather conditions. Including winter weather records would dilute the data and add numerous winter storms that require manual interpretation. Summer fire conditions were derived from records beginning June 15 and ending September 15.

Maximum wind speed data were checked for reasonableness by comparing speed with surrounding stations. Winds associated with winter storms were identified by cross checking with precipitation and relative humidity observations and then excluded. The Santa Ana wind season is assumed to start on September 15. Wind speed is measured at 20 feet above the ground and averaged for at least 10 minutes.

Maximum wind speed was calculated by taking the difference between the maximum recorded wind speed and the 99th percentile wind speed, adding this difference to the 99th percentile wind, adding 10% for a safety margin, and rounding the answer up. This had the effect of throwing out the outliers while including the highest reasonable winds. A table showing days with winds over the 99th percentile is included for each zone. Peak wind for each zone is the highest recorded wind by a RAWS during the Cedar fire (October 26, 2003).

The program for calculating fire behavior and spread requires temperature and relative humidity ranges as inputs. Temperature ranges of 90°–109°F and relative humidities of 5%–9% are reasonable for most areas of the county under Santa Ana conditions. The Burning Index represents the relative difficulty of controlling a wildfire and is calculated from temperature, wind, relative humidity, fuel (vegetation), moisture, and wind.

Utilizing the information described above, the County of San Diego prepared zone level analysis of the behavior of fire utilizing the BEHAVE Plus fire behavior model. The Wu and Cielo Properties are located within the transitional zone as shown in the following Table 1 and Table 2.

Table 1
BEHAVE Plus 5.0.1
Worst-case Sustained Winds (10-minute average and peak) Fuel Model 1 at 50% Slope

Zone	Period	Temperature	Relative Humidity	Sustained Wind Speed	Burning Index (99%)	Rate of Spread Feet/min	Flame Length
Transitional	Summer	90-109°F	10-14%	19 mph	119	430	9
	Santa Ana	90-109°F	5-9%	28 mph	145	730	13
	Peak	90-109°F	5-9%	41 mph	-	730	13

Table 2
BEHAVE Plus 5.0.1
Worst-case Sustained Winds (10-minute average and peak) Fuel Model 4 at 50% Slope

Zone	Period	Temperature	Relative Humidity	Sustained Wind Speed	Burning Index (99%)	Rate of Spread Feet/min	Flame Length
Transitional	Summer	90-109°F	10-14%	19 mph	119	615	54
	Santa Ana	90-109°F	5-9%	28 mph	145	1100	73
	Peak	90-109°F	5-9%	41 mph	-	1600	87

Under extreme fire conditions, worst-case scenario modeled using BEHAVE Plus 5.0.1 indicates that the rate of spread of a fire through a transitional zone location such as the Wu and Cielo Properties will reach 1,600 feet or more than a quarter-mile per minute with 87-foot flame length. However, under more normal conditions, the spread rate would be 730 feet per minute with flame lengths of 13 feet.

References:

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