FINAL

Vegetation Management Plan for Potrero Mason Property

Prepared for:

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
AA	airtactical aircraft
amsl	above mean sea level
APN	Assessor's Parcel Number
ASMD	Area Specific Management Directives
BLM	Bureau of Land Management
BMP	Best Management Practices
CAL FIRE	California Department of Forestry and Fire Protection
Cal-IPC	California Invasive Plant Council
CDFG	California Department of Fish and Game
CRHR	California Register of Historic Places
CRPR	California Rare Plant Rank
CSC	California Species of Special Concern
DPR	County of San Diego Department of Parks and Recreation
FRAP	Fire and Resource Assessment Program
GIS	Geographic Information System
mph	miles per hour
MSCP	Multiple Species Conservation Program
MSDS	Material Safety Data Sheets
RMP	Resource Management Plan
RPO	Resource Protection Ordinance
SAP	Subarea Plan
SDRFPD	San Diego Rural Fire Protection District
SRA	State Responsibility Area
USGS	U.S. Geological Survey
VCM	Vegetation Classification Manual
VMP	Vegetation Management Plan
VMU	Vegetation Management Unit
WL	Watch List
WUI	Wildland–Urban Interface

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1.0 INTRODUCTION

The Potrero Mason Property (Property) is approximately 480-acres located within the unincorporated community of Potrero, in south-central San Diego County. The Property is owned by the County of San Diego Department of Parks and Recreation (DPR) and management for the Property will be under the direction of a Resource Management Plan (RMP), including Area-Specific Management Directives (ASMDs). The Property will be included in the East County Multiple Species Conservation Program (MSCP) preserve system and contains both a developed park and relatively undisturbed native habitats.

The majority of the Property supports high quality native vegetation communities; however, invasive non-native plants are present primarily within three discrete areas adjacent to present or historical human development. Some of these invasive non-native plant species have the potential to outcompete native plant species and reduce biological functions and values of these communities. The entirety of the Property most recently burned during the 2007 Harris Fire. Most vegetation on site has recovered, and is considered high quality habitat.

Aside from invasive non-native plant species control in a few isolated areas, there are no areas of the Property in need of restoration. However, two small disturbed areas were identified for passive restoration; one located near the reservoir, and the other along the southeastern border of the Property near an existing residence just outside the Property boundary. Additionally, DPR staff should evaluate disturbance related to brush management on the perimeter of the Property, and coordinate with adjacent land owners on brush management activities to ensure that it occurs in accordance with County guidelines.

1.1 Purpose and Need

The purpose of this Vegetation Management Plan (VMP) is to describe current conditions within the Property and provide recommendations for vegetation management including: 1) invasive non-native plant species management, 2) habitat restoration, and 3) fire management. While this VMP is intended to be a stand-alone document, the information and recommendations presented will be used by DPR in preparation of an RMP and associated ASMDs for the Property. In addition, the VMP provides fire response personnel with critical site information for emergency fire response within and immediately adjacent to the Property boundaries and identifies targeted fuel management actions that can be implemented as preventative measures.

The Invasive Species Management section of this VMP lists the invasive non-native plant species mapped within the Property, identifies and prioritizes target species for removal, and outlines standard removal methods. The Habitat Restoration section of this VMP evaluates

potential restoration opportunities within the Property and outlines standard restoration methods. The Fire Management section of this VMP outlines a framework to address wildfire risk and enables environmental documentation of strategic fuels management that may be needed. The framework includes discussion of fire prevention, suppression, and post-suppression fire-control activities within and adjacent to the Property.

The goals and objectives as well as the recommendations in this VMP are consistent with the County's MSCP and the County of San Diego Vegetation Management Report (County of San Diego 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 5 years, as needed, in conjunction with anticipated Property RMP updates.

1.2 Site Location and Description

The Property is located within the unincorporated community of Potrero, in south-central San Diego County (Figure 1). Specifically, it is located north of Potrero Park Drive, west of Harris Road, and south of Potrero Valley Road. The Property is mapped within the U.S. Geological Survey (USGS) 7.5-minute Potrero quadrangle Township 18 South, Range 4 East, Sections 8, 9, 10, 15, 16, and 17 (Figure 2).

The Property is composed of the following Assessor Parcel Numbers (APNs): 653-111-03, 653-111-06, 653-120-06, 653-120-19, 653-120-20, 653-120-27, 653-120-28, and 654-030-02.

The Property is surrounded by private property that is mostly undeveloped, although some properties have been lightly developed for rural residential or farming practices. Conserved lands are located north and east of the Property, including San Diego Mountain Ranch Open Space, Bureau of Land Management (BLM) Conserved Lands, and Cleveland National Forest. The Property contains one primary dirt road that crosses the northern portion, and the developed park in the western region contains several paved roads and human-altered habitats. There is a Nature Trail in the Park portion of the Property that is currently open for public access.

The Property is located within the boundaries of the Draft East County MSCP. Preparation of the MSCP was halted in 2008 due to budget and staffing constraints; as it is the intention of the County to have all areas in its jurisdiction located within an MSCP, this report assumes that the Draft East County MSCP will be finished and finalized at a later date.

The Property is dominated by chamise chaparral alliance and is classified as a Very High Fire Hazard Severity Zone by the California Department of Forestry and Fire Protection (CAL FIRE) (FRAP 2012). The entirety of the Property is designated a state responsibility area (SRA). Therefore, the Property lies within the service area of CAL FIRE.

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FIGURE 1

Regional Map

Potrero Mason Property - Vegetation Management Plan

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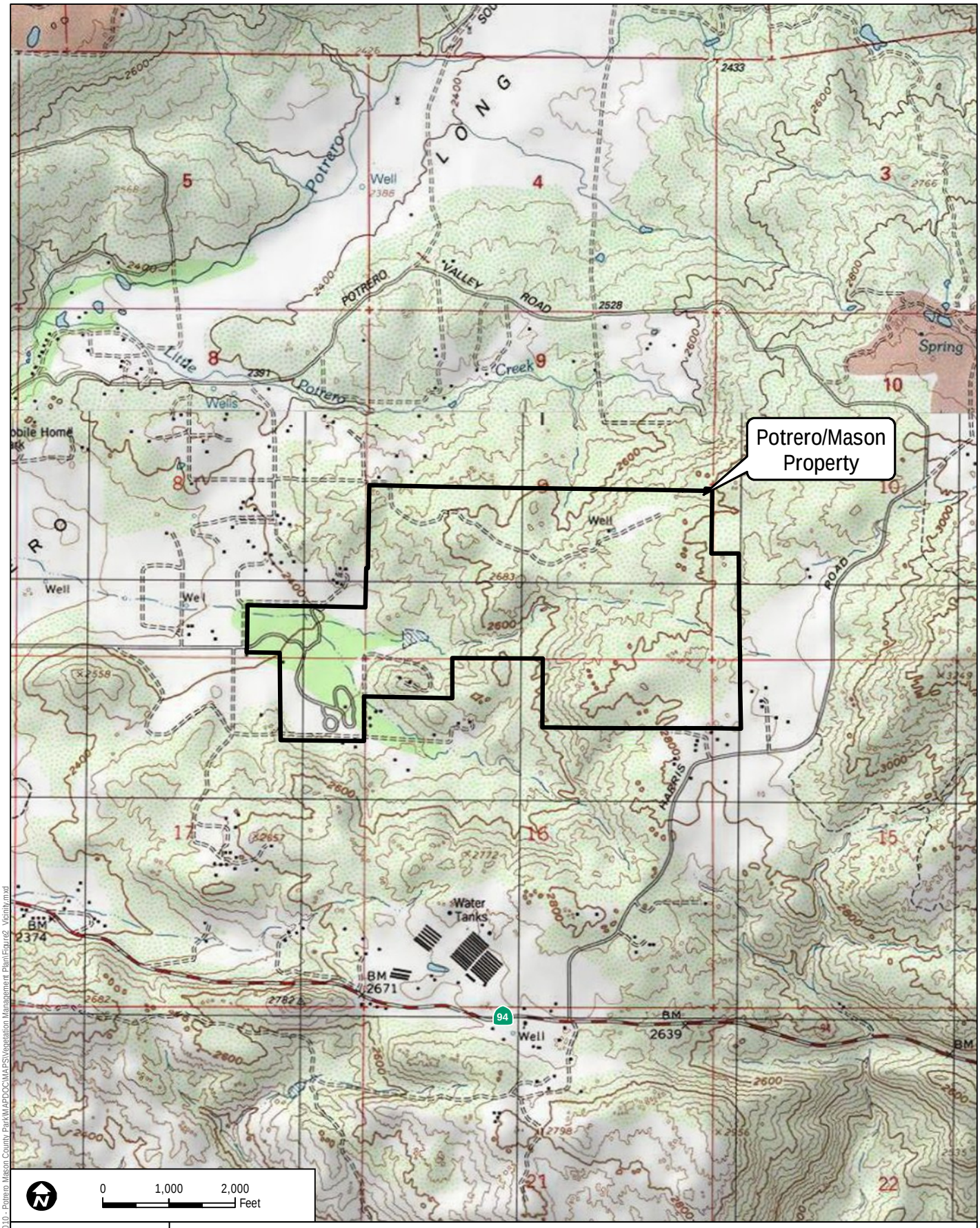

SOURCE: USGS topo 7.5-Minute Series Quadrangle

FIGURE 2

Vicinity Map

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Potrero Mason Property - Vegetation Management Plan

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The Property is located in the foothills of the Laguna Mountains of Southern California. The Property is composed of sloping or hilly terrain (the majority of the Property has a slope gradient less than 20º) ranging in elevation from approximately 725 to 870 meters above mean sea level (AMSL) (2,380 to 2,853 feet). The topography of the Property is determined primarily by proximity to the Peninsular Range, which creates relatively hilly terrain. The Property is situated between Hauser Mountain to the east and Potrero Peak to the west. The Property contains two drainages that run east to west and converge near the western border, and several narrow ephemeral channels scattered throughout.

The Park portion of the Property has campground facilities, a playground, picnic areas, and a ranger station. DPR staff is on site.

1.3 Vegetation Management Goals and Objectives

This VMP aims to develop management strategies consistent with the County's MSCP and the County of San Diego Vegetation Management Report (County of San Diego 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 Property are focused on environmental resource preservation and enhancement of existing native habitat. The vegetation management goals for the Property include the following:

- Ensure the long-term viability and sustainability of native ecosystem function and natural processes;
- Manage invasive non-native plant species to ensure native vegetation community and resource preservation;
- Restore and/or enhance the quality of degraded vegetation communities in a manner consistent with overall species or habitat preservation goals; and
- Develop fuel-load reduction methods that are consistent with overall Property management goals.

To achieve these long-term vegetation management goals for the Property, the following objectives have been formulated to achieve desired levels of resource protection and public and firefighter safety:

1. Maximize the extent of appropriate habitat for native target species by the removal or control of invasive nonnative plant species:
    - Maximize native vegetation community quality through invasive non-native plant species management;
    - Identify and prioritize removal/control of invasive non-native plant species within the Property;
    - Provide methods for removal/control of invasive non-native plant species.

2. Provide a framework for the restoration of disturbed areas within the Preserve:

    - Avoid or minimize adverse impacts to sensitive and high-value habitats during brush management activities and trail building activities;
    - Identify and address current and long-term vegetation community restoration needs;
    - Monitor restoration success and follow-up to ensure target restoration goals are achieved.

3. Provide a fire management strategy that will include planning for wildland fires:

- Utilize available fuel and invasive non-native plant reduction techniques, such as mowing, herbicide application, and thinning, consistent with Property goals for habitat preservation, enhancement, and restoration, and cultural resource protection;
- Provide site information about fire behavior to local fire agencies, including CAL FIRE San Diego Unit and San Diego Rural Fire Protection District, for inclusion in wildland pre-response plans;
- Establish vegetation management units (VMUs) based on topography or other clearly discernible landscape boundaries to facilitate fire management;
- Minimize likelihood of Property-wide, catastrophic wildfires by limiting ignition potential, reducing fuel loads in key areas, limiting illegal access, and increasing public awareness;
- Provide local fire agencies maps of sensitive biological and cultural resources to be avoided to the maximum extent possible;
- Prepare Property maps depicting relevant fire management data, including property boundaries, topography, vegetation and fuel types, and access;
- Prepare fire restoration management guidelines for each VMU including discussion of prevention, suppression, and post-suppression activities; and
- Provide appropriate contact information to responding fire personnel in the event fire management activities may affect priority resources.

2.0 ENVIRONMENTAL RESOURCES

Baseline biological surveys of the Property were conducted in 2012 (Dudek 2012a). Field studies included vegetation communities mapping, rare plant surveys, invasive plant species mapping, butterfly surveys and habitat assessment for Quino checkerspot (*Euphydryas editha quino*) and Hermes Copper (*Lycaena hermes*) butterflies, herpetological pitfall trap and coverboard 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 Property during the baseline surveys are provided below.

2.1 Biological Resources

2.1.1 Vegetation Communities

Vegetation community classification was based on two separate systems, including the Vegetation Classification Manual for Western San Diego County (VCM) (San Diego Association of Governments [SANDAG] 2011) and the Holland (1986) (as modified by Oberbauer et al. 2008) classification system. The field mapping was conducted according to the VCM and then cross-walked to the Holland/Oberbauer classification system. The predominant vegetation community within the Property is chamise chaparral alliance; however, fifteen other plant alliances, associations, or semi-natural stands have been mapped within the Property including eucalyptus woodland semi-natural stands, coast live oak woodland alliance, chamise chaparral alliance, chamise chaparral – coastal sage scrub association, chamise chaparral – deerweed association, bigberry manzanita – chamise chaparral association, California sagebrush – California buckwheat scrub alliance, chaparral white-thorn association, mountain-mahogany provisional association, California buckwheat association, snapdragon bush penstemon scrub alliance, deerweed association, scrub oak chaparral – chamise chaparral alliance, annual brome grasslands semi-natural stands, and California deer grass association (Table 1, Figures 3a and 3b). Unvegetated habitat was also mapped in the Property, including disturbed habitat and urban/developed land. Vegetation communities according to the Holland/Oberbauer classification system are included as Figure 3b.

Table 1
Vegetation Communities and Land Covers

VCM Code	VCM Alliance/Association	VCM Common Name	Holland Code	Holland Classification	Acres on Site[1]
Riparian Forests and Woodlands					
3.6	*Quercus agrifolia* Alliance	Coast Live Oak Woodland Alliance	71160	Coast Live Oak Woodland	46.04
				Riparian Forests and Woodlands Total	*46.04*

Table 1
Vegetation Communities and Land Covers

VCM Code	VCM Alliance/Association	VCM Common Name	Holland Code	Holland Classification	Acres on Site[1]
Upland Forests and Woodlands					
3.2	*Eucalyptus (globulus, camaldulensis)* Semi-Natural Stands	Eucalyptus Woodland Semi-Natural Stands	79100	Eucalyptus Woodland	0.17
				Upland Forests and Woodlands Total	*0.17*
Evergreen Shrublands					
4.1	*Adenostoma fasciculatum* Alliance	Chamise Chaparral Alliance	37200	Chamise Chaparral	153.90
4.1.2	*Adenostoma fasciculatum–(Eriogonum fasciculatum Artemisia californica, Salvia mellifera)* Association	Chamise Chaparral–Coastal Sage Scrub Association	37G00	Coastal Sage–Chaparral Transition	2.40
4.1.5	*Adenostoma fasciculatum–Lotus scoparius* Association	Chamise Chaparral–Deerweed Association	37200	Chamise Chaparral	79.02
4.5.1	*Arctostaphylos glauca–Adenostoma fasciculatum* Association	Bigberry Manzanita–Chamise Chaparral Association	37130	Northern Mixed Chaparral	0.82
4.16.1	*Ceanothus leucodermis* Association	Chaparral Whitethorn Association	37120	Southern Mixed Chaparral	16.36
4.20.1	*Cercocarpus minutiflorus* Association	Mountain Mahogany Provisional Association	37120	Southern Mixed Chaparral	0.36
4.38	*Quercus berberidifolia–Adenostoma fasciculatum* Alliance	Scrub Oak Chaparral–Chamise Chaparral Alliance	37900	Scrub Oak Chaparral	94.30
				Evergreen Shrublands Total	*347.16*
Drought-Deciduous Shrublands					
4.23.1	*Eriogonum fasciculatum* Association	California Buckwheat Association	32500	Diegan Coastal Sage Scrub	13.44
4.31	*Keckiella antirrhinoides* Alliance	Snapdragon Penstemon Scrub Alliance	37120	Southern Mixed Chaparral	15.52
4.32.1	*Lotus scoparius* Association	Deerweed Association	32000/37000	Coastal Scrub/Chaparral	9.65
4.7	*Artemisia californica–Eriogonum fasciculatum* Alliance	California Sagebrush–California Buckwheat Scrub Alliance	32500	Diegan Coastal Sage Scrub	1.70
				Drought-Deciduous Shrublands Total	*40.31*
Upland Herbaceous Vegetation					
5.8	*Bromus (diandrus, hordaceus)–Brachypodium distachyon* Semi-Natural Stands	Annual Brome Grasslands Semi-Natural Stands	42200	Non-Native Grassland	15.84

Table 1
Vegetation Communities and Land Covers

VCM Code	VCM Alliance/Association	VCM Common Name	Holland Code	Holland Classification	Acres on Site[1]
5.22.1	*Muhlenbergia rigens* Association	California Deer Grass Association	42400	Foothill/Mountain Perennial Grassland	0.50
				Upland Herbaceous Vegetation Total	*16.34*
		Unvegetated			
N/A	*N/A*	N/A	11300	Disturbed Land	17.42
N/A	*N/A*	N/A	12000	Urban/Developed	12.62
				Unvegetated Total	*30.04*
				Grand Total	**480.06**

2.1.2 Sensitive Plant Species

Five special-status plant species have been documented within the Property (Dudek 2012a). These species are all proposed for coverage under the Draft East County MSCP. Table 2 presents the sensitive plant species identified in the Property. Sensitive plant species locations are presented in Figure 4.

Table 2
Special-Status Plant Species Known to Occur in the Property

Common Name	Scientific Name	Status[1]
Engelmann oak	*Quercus engelmannii*	CRPR 4.2, County List D, MSCP
Pride-of-California	*Lathyrus splendens*	CRPR 4.3, County List D, MSCP
Rush-like bristleweed	*Xanthisma junceum*	CRPR 4.3, County List D, MSCP
Sticky geraea	*Geraea viscida*	CRPR 2.3, County List B, MSCP
Tecate tarplant	*Deinandra floribunda*	CRPR 1B.2, County List A, MSCP

[1] **CRPR (California Rare Plant Rank):**
- 1A Plants Presumed Extinct in California
- 1B Plants Rare, Threatened, or Endangered in California and Elsewhere
- 2 Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
- 3 Plants About Which We Need More Information - A Review List
- 4 Plants of Limited Distribution - A Watch List

Threat Ranks:
- 0.1 Seriously threatened in California
- 0.2 Fairly threatened in California
- 0.3 Not very threatened in California

County Designations:
- County List A Plants rare, threatened, or endangered in California and elsewhere
- County List B Plants rare, threatened, or endangered in California but common elsewhere
- County List C Plants which may be rare, but need more information to determine their true rarity status
- County List D Plants of limited distribution and are uncommon, but not presently rare or endangered
- MSCP Covered under the Draft East County MSCP

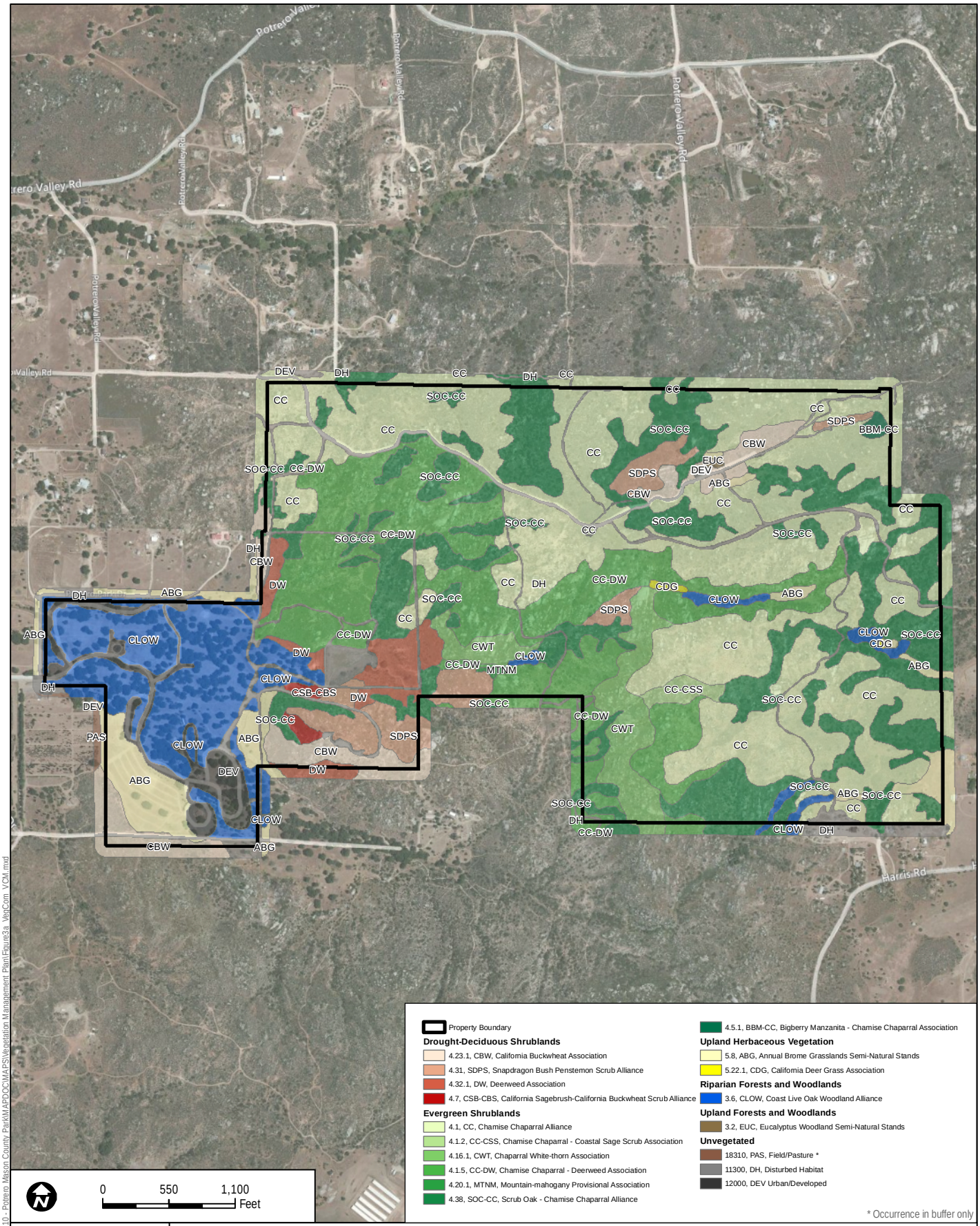
2.1.3 Sensitive Animal Species

Overall, 22 special-status wildlife species were observed or detected within the Property (Dudek 2012a). Table 3 presents the sensitive animal species observed in the Property. Sensitive animal species locations are also presented on Figure 5.

Table 3
Special-Status Wildlife Species Known to Occur in the Property

Common Name	Scientific Name	Status (Federal/State/County/MSCP)[1]
Herpetofauna		
Coast horned lizard	*Phrynosoma blainvillei* ssp. *coronatum*	None/CSC/Group 2, MSCP
Coastal western whiptail	*Aspidoscelis tigris stejnegeri*	None/None/Group 2
Birds		
Barn owl	*Tyto alba*	None/None/Group 2
Loggerhead shrike	*Lanius ludovicianus*	None/CSC/Group 1, MSCP
Prairie falcon	*Falco mexicanus*	None /WL/Group 1
Red-shouldered hawk	*Buteo lineatus*	None/ None/ Group 1
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	None /WL/Group 1, MSCP
Turkey vulture	*Cathartes aura*	None /None/Group 1, MSCP
Western bluebird	*Sialia mexicana*	None/None/Group 2
White-tailed kite	*Elanus leucurus*	None/FP/Group 1, MSCP
Mammals		
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	None/CSC/Group 2
Northwestern San Diego pocket mouse	*Chaetodipus fallax fallax*	None/CSC/Group 2
San Diego desert woodrat	*Neotoma lepida intermedia*	None/CSC/Group 2
Long-legged myotis	*Myotis volans*	None/None/Group 2
Pallid Bat	*Antrozous pallidus*	None/CSC/Group 2, MSCP
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	None/CSC/Group 2
Townsend's big-eared bat	*Corynorhinus townsendii*	None/CSC/Group 2, MSCP
Western mastiff bat	*Eumops perotis californicus*	None/CSC/Group 2
Western red bat	*Lasiurus blossesvillii*	None/CSC/Group 2
Western small-footed myotis	*Myotis ciliolabrum*	None/None/Group 2
Western yellow bat	*Lasiurus xanthinus*	None/CSC/None
Yuma myotis	*Myotis yumanensis*	None/None/Group 2

[1] **Federal Designations**
FT: Federally Threatened
State Designations
CSC: California Species of Special Concern (CDFG)
FP: State Fully Protected
WL: State Watch List
County Designations
Group 1: Animals of high sensitivity (listed or specific natural history requirements)
Group 2: Animals declining, but not in immediate threat of extinction or extirpation
MSCP: Covered under the Draft East County MSCP



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SOURCE: Bing 2012

FIGURE 3a

Vegetation Communities and Land Cover Types (VCM)

Potrero Mason Property - Vegetation Management Plan

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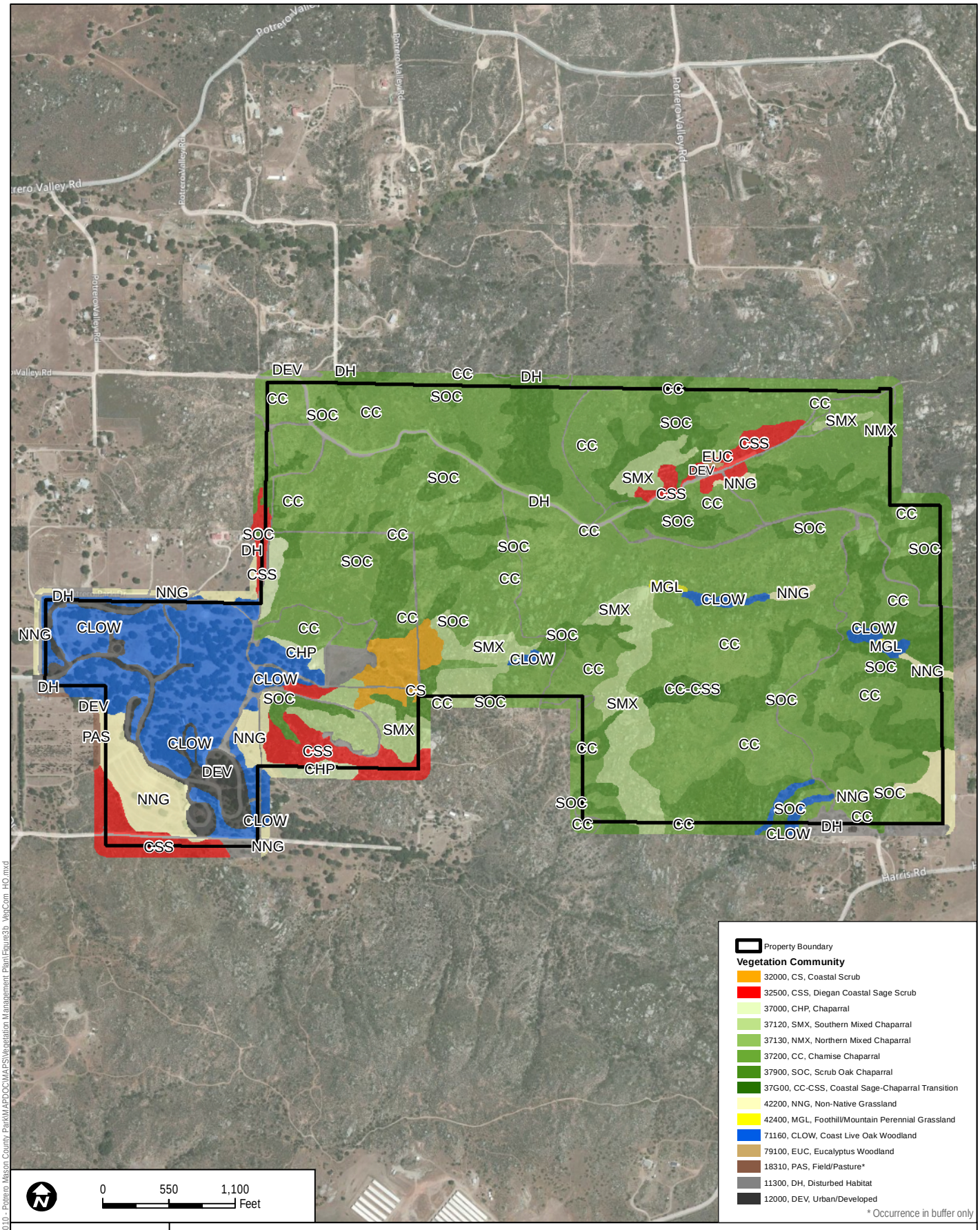

SOURCE: Bing 2012

FIGURE 3b

Vegetation Communities and Land Cover Types (Holland)

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Potrero Mason Property - Vegetation Management Plan

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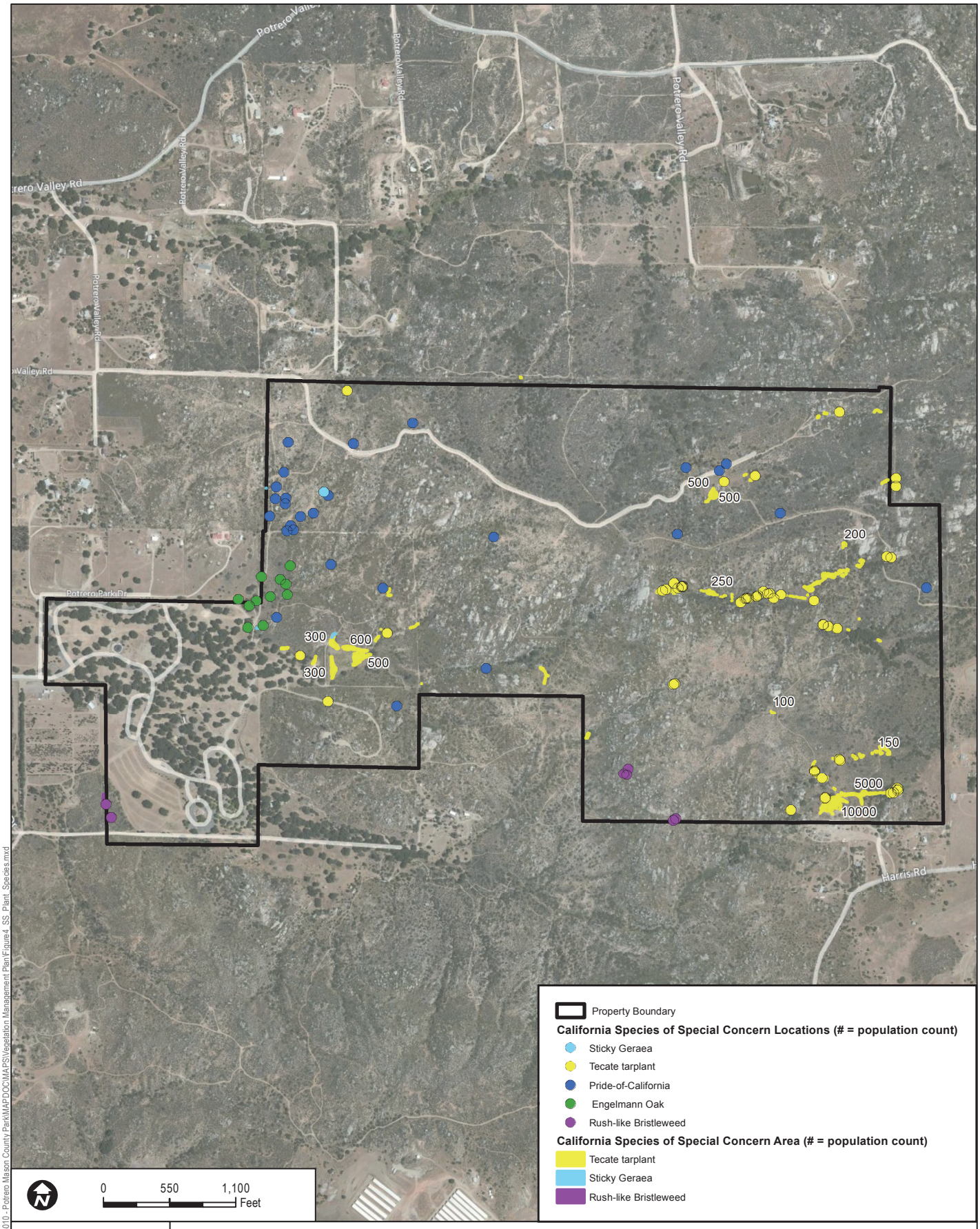

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SOURCE: Bing 2012

FIGURE 4

Special-Status Plant Species

Potrero Mason Property - Vegetation Management Plan

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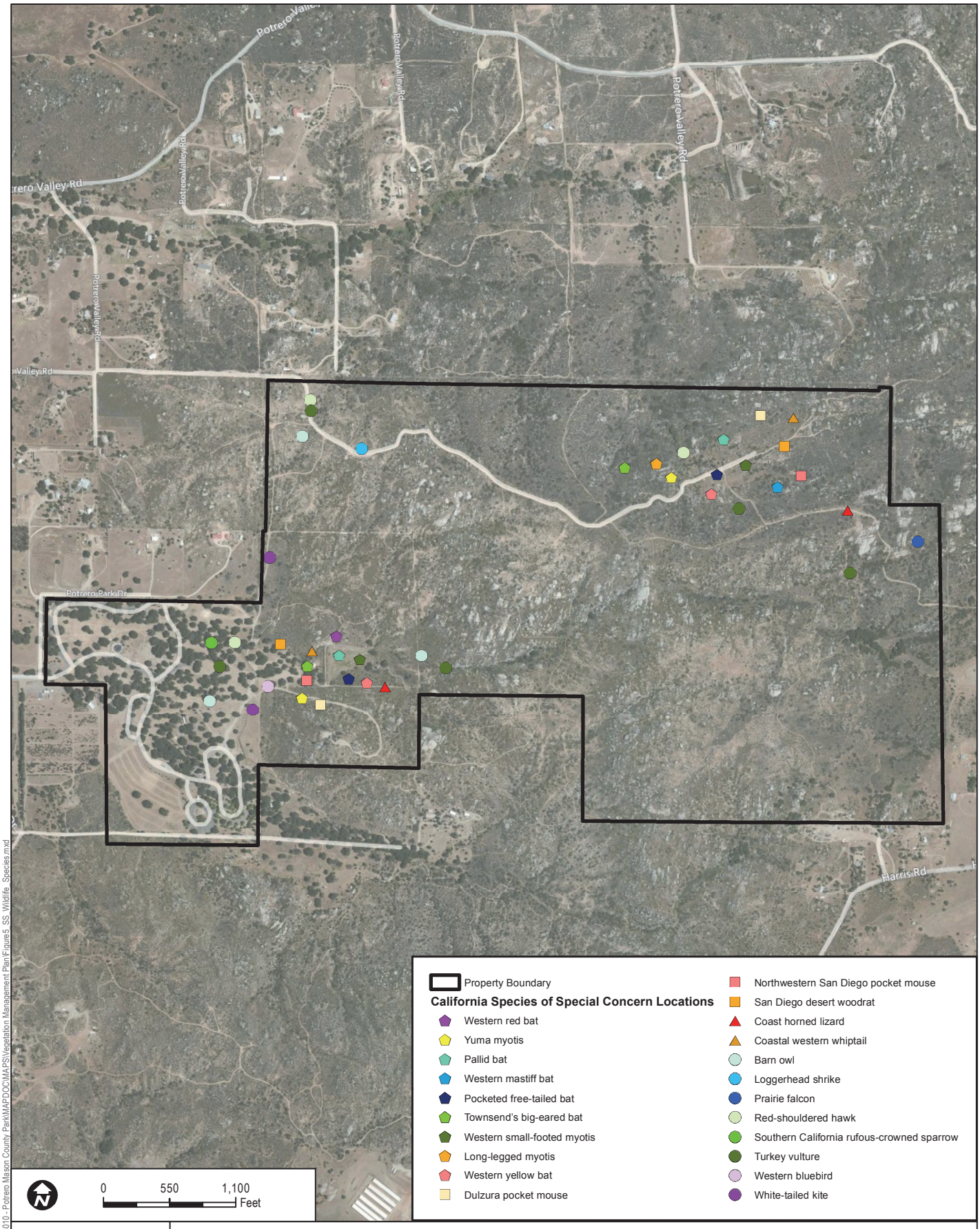

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SOURCE: Bing 2012

FIGURE 5

Special-Status Wildlife Species

Potrero Mason Property - Vegetation Management Plan

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2.2 Cultural Resources

Sixteen cultural resources have been identified within the Property including trash scatter, one prehistoric habitation area, bedrock milling features, ceramic/lithic scatters, and a single family residence in addition to historic and prehistoric isolates (ASM 2012). These cultural resources are discussed in greater detail in the *Archaeological Survey Report for the Potrero/Mason Property, San Diego County, California* (Archaeological Survey Report; ASM 2012). Locations of documented cultural resources in the Property are presented in the confidential appendices included in the Archaeological Survey Report. Table 4 presents the sensitive cultural sites identified within the Property.

Table 4
Cultural Resources Sites found on the Property

Primary or Trinomial Site#	Description	Significance Evaluation
CA-SDI-20,696	Historic trash scatter	Not evaluated for California Register of Historical Resources (CRHR); significant under County Guidelines
CA-SDI-20,697	Prehistoric habitation area, lithic scatter, ceramic scatter, bedrock milling features	Not evaluated for CRHR; significant under County Guidelines; possibly significant under County Resource Protection Ordinance (RPO) (possible human remains)
CA-SDI-20,698	Prehistoric bedrock milling feature	Not evaluated for CRHR; significant under County Guidelines
CA-SDI-20,699	Prehistoric lithic scatter, ceramic scatter, bedrock milling features	Not evaluated for CRHR; significant under County Guidelines
CA-SDI-20,700	Prehistoric bedrock milling feature	Not evaluated for CRHR; significant under County Guidelines
P-2	Historic single family residence, water tower, refuse scatter	Not evaluated for CRHR; significant under County Guidelines
P-37-032663	Historic isolate - medicine bottle fragment	Not eligible (as an isolate)
P-37-032664	Historic isolate – two glass fragments, brick fragment	Not eligible (as an isolate)
P-37-032665	Prehistoric isolate – volcanic interior flake, volcanic secondary flake	Not eligible (as an isolate)
P-37-032666	Prehistoric isolate – volcanic interior flake	Not eligible (as an isolate)
P-37-032667	Prehistoric isolate – volcanic interior flake	Not eligible (as an isolate)
P-37-032668	Historic isolate – two clear glass fragments	Not eligible (as an isolate)
P-37-032669	Historic isolate – sanitary can	Not eligible (as an isolate)
P-37-032670	Prehistoric isolate – volcanic interior flake, volcanic shatter	Not eligible (as an isolate)
P-37-032671	Prehistoric isolate – volcanic hammerstone fragment, bifacial granitic hand stone fragment	Not eligible (as an isolate)
P-37-032672	Prehistoric isolate – volcanic scrapper fragment	Not eligible (as an isolate)

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3.0 INVASIVE SPECIES MANAGEMENT

In 2012 invasive non-native plant species were surveyed and mapped within the Property. 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. Invasive non-native plants have few ecological controls on their population sizes, and they tend to thrive under disturbed conditions. 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).

Invasive non-native plant species with a California Invasive Plant Council (Cal-IPC) Inventory rating of Limited, Moderate or High were identified within the Property. With the exception of six non-native annual grasses (which are the dominant component of non-native annual grassland mapped on site and are impractical to map on an individual species basis), all other species were mapped within the Property (Figure 6). Additionally, perennial, invasive, non-native plant species with a rating of Limited were mapped within the Property, although they are not considered a significant management concern (Figure 6).

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 control. However, populations of many of the mapped invasive non-native plant species, particularly annual species, can fluctuate dramatically from season to season depending on rainfall. Therefore, the mapped quantities of invasive non-native plants should only be considered an indication of the presence and relative abundance of the species.

Table 5 lists the 24 invasive non-native plant species with a California Invasive Plant Council (Cal-IPC) Inventory rating of Limited, Moderate or High that were identified within the Property, along with their associated rating.

Table 5
Invasive Non-native Plant Species with a Cal-IPC Rating
Observed on the Property

Common Name	Scientific Name	Cal-IPC Rating*
Compact brome**	*Bromus madritensis*	High
Saltcedar	*Tamarix ramosissima*	High
Slender oat**	*Avena barbata*	Moderate
Ripgut brome**	*Bromus diandrus*	Moderate
Italian plumeless thistle	*Carduus pycnocephalus* ssp. *pycnocephalus*	Moderate
Maltese star-thistle	*Centaurea melitensis*	Moderate

Table 5
Invasive Non-native Plant Species with a Cal-IPC Rating Observed on the Property

Common Name	Scientific Name	Cal-IPC Rating*
Bull thistle	*Cirsium vulgare*	Moderate
Redstem stork's bill	*Erodium cicutarium*	Moderate
Tasmanian blue gum	*Eucalyptus globulus*	Moderate
Rat-tail fescue**	*Festuca myuros*	Moderate
Italian ryegrass**	*Festuca perennis*	Moderate
Shortpod mustard	*Hirschfeldia incana*	Moderate
Mouse barley**	*Hordeum murinum*	Moderate
London rocket	*Sisymbrium irio*	Moderate
Soft brome**	*Bromus hordeaceus*	Limited
River red gum	*Eucalyptus camaldulensis*	Limited
Smooth cat's ear	*Hypochaeris glabra*	Limited
Horehound	*Marrubium vulgare*	Limited
Olive	*Olea europaea*	Limited
Annual rabbitsfoot grass**	*Polypogon monspeliensis*	Limited
Curly dock	*Rumex crispus*	Limited
Peruvian peppertree	*Schinus molle*	Limited
Brazilian peppertree	*Schinus terebinthifolius*	Limited
Common Mediterranean grass**	*Schismus barbatus*	Limited

* **Source:** Cal-IPC California Invasive Plant Inventory Database, updated June 2012. Overall rating listed for southwest region, factoring impact, invasiveness, distribution, and documentation level.

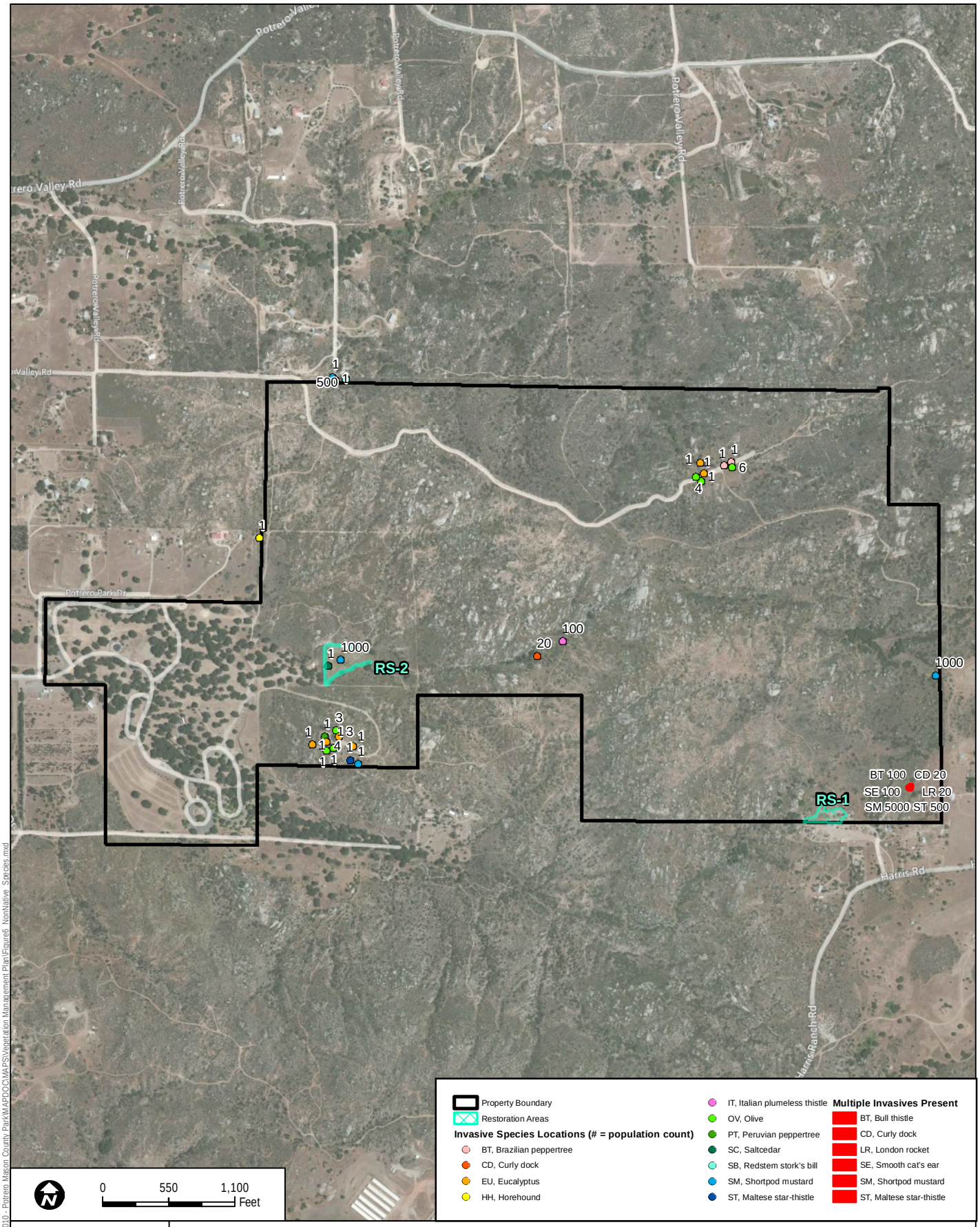
Inventory Categories

High: Species have severe ecological impacts, are conducive to moderate to high rates of dispersal/establishment and most are widely spread.

Moderate: Species have substantial and apparent, but generally not severe, ecological impacts, are conducive to moderate to high rates of dispersal, though establishment is generally dependent on ecological disturbance, and distribution may range from limited to widespread.

Limited: Species are invasive but their ecological impacts are minor on a statewide level, or there was not enough information to justify a higher score, have low to moderate rates of invasiveness, and are generally limited but may be locally persistent and problematic.

** Species were not mapped within the Property, and are found as part of the non-native annual grassland mapped on site.



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SOURCE: Bing 2012

FIGURE 6

Invasive Plant Species Locations

Potrero Mason Property - Vegetation Management Plan

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3.1 Target Invasive Non-native Plant Species

Forty-seven invasive non-native plant species were identified within the Property and fourteen species have been identified as target species in need of removal and control. Those species prioritized for removal and their removal priority ranking are listed in Table 6. 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.

Table 6
Removal Priority of Mapped Invasive Non-Native Plant Species on the Property

Common Name	Scientific Name	Removal Priority
Saltcedar	*Tamarix ramosissima*	High
Italian plumeless thistle	*Carduus pycnocephalus* ssp. *pycnocephalus*	Moderate
Maltese star-thistle	*Centaurea melitensis*	Moderate
Bull thistle	*Cirsium vulgare*	Moderate
Gum tree	*Eucalyptus globulus; E. camaldulensis*	Moderate
Redstem stork's bill	*Erodium cicutarium*	Low
Shortpod mustard	*Hirschfeldia incana*	Low
London rocket	*Sisymbrium irio*	Low
Smooth cat's ear	*Hypochaeris glabra*	Low
Horehound	*Marrubium vulgare*	Low
Olive	*Olea europaea*	Low
Curly dock	*Rumex crispus*	Low
Peruvian peppertree	*Schinus molle*	Low
Brazilian peppertree	*Schinus terebinthifolius*	Low

There is a reasonably good chance of eradicating perennial invasive non-native plant species (e.g., saltcedar, gum tree, peppertree) within the Property. However, many of the annual species would require ongoing management for effective control (e.g., Italian plumeless thistle, Maltese star-thistle, Bull thistle, etc.).

Remaining non-native plant species not mapped or prioritized for removal, such as soft brome, annual yellow sweetclover (*Melilotus indicus*), or common catchfly (*Silene gallica*), among others, should be included as species to monitor and control as components of general habitat management, but not targeted for control. These species are generally spread throughout the Property and management for these species would most likely not be cost-effective or successful.

General recommendations for control include manual and mechanical removal, application of herbicides, and cut and daub. However, the appropriate removal methodology should ultimately be determined with consideration of many variables, including time of year, severity of infestation, presence of sensitive 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. Species ranked as moderate and low priority for removal are discussed in Appendix B.

3.1.1 High Priority Species for Removal

Saltcedar (*Tamarix ramosissima*)

Saltcedar is a shrub or tree typically found along waterways, drainages, and riparian areas (Cal-IPC 2012). It is commonly associated with dramatic changes in geomorphology, groundwater availability, soil chemistry, fire frequency, plant community composition, and native wildlife diversity (Cal-IPC 2012). Saltcedar presents the greatest risk of reducing habitat quality within riparian areas and vegetated ephemeral drainages, which are limited in presence within the Property. The Cal-IPC inventory categorizes saltcedar as having an overall rating of High. It is ranked as high priority for control due to its ability to spread rapidly and displace native habitat. Because saltcedar can become a large shrub or tree, it can be difficult to control manually. Therefore, large shrubs or trees may need to be removed mechanically. Within the Property, all individuals observed were small shrubs. Application of an appropriate herbicide is recommended to control the species since root fragments can regenerate. Cut and daub treatment is likely the most effective means of control. Foliar applications of herbicide achieve the best results when applied in late spring to early fall (Bossard 2000). One individual of this species was observed in the southwestern portion of the Property on the edge of a small reservoir (Figure 6).

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, the presence of sensitive plants and wildlife, the degree of intermixing of invasive species with sensitive native habitats, access, and proximity to surface water. General recommendations for the Property are provided below.

3.2.1 Manual Removal

Manual vegetation removal (e.g., hand pulling, grubbing, and hoeing) is a low-impact 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 Property. Appropriate applications for manual removal are for small occurrences of annual weeds 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 proximity of sensitive plant species prevents safe application (e.g., overspray or drifting of herbicides). All removed invasive non-native plant material that is feasible (portions of trees may be too large to remove without significant effort or impact) should be disposed of in a manner that does not promote spread or infestation of the species into new areas.

3.2.2 Mechanical Removal

Mechanical removal may be necessary for control of some larger target invasive non-native plant species, such as eucalyptus, pampas grass, and saltcedar, and is recommended to be combined with herbicide application. 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

The application of herbicides to control target invasive non-native plant species may be used on its own or as a secondary treatment following manual or mechanical removal for controlling sprout growth and regeneration. Herbicide application is recommended following removal of all target invasive tree species and other perennial species with the ability to regenerate from root fragments when 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 are available for such types of treatment. Herbicide labels and material safety data sheets (MSDS) 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 laws.

3.2.4 Cut and Daub

Cut and daub treatment is recommended for larger invasive plants to control regrowth and kill the portion of the plant remaining belowground. Cut and daub involves the cutting of invasive plant stalks or trunks and then the direct application of an appropriate herbicide directly to the freshly cut stump. Other related methods include drill and fill where holes are drilled into the

trunk of a tree and herbicide is injected. It is critical that the herbicide treatment occur 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.

4.0 HABITAT RESTORATION

The goal of habitat restoration is to reestablish or enhance the biological functions and values of vegetation communities that have been degraded by either human or natural causes. Restoration methods range from active revegetation (involving soil preparation and planting), to passive management (involving weed control and allowing time for natural recruitment to occur). Active restoration may assist the recovery of an area that has been disturbed and is showing difficulty in recovering. Any proposed restoration activity should utilize current, accepted techniques, avoid/minimize impacts to sensitive species or native vegetation communities and should use only local native species. The purpose of restoration is to reclaim native vegetation community acreage lost or compromised due to human or other induced disturbance involving the clearing or grading of native vegetation. Restoring disturbed areas will provide an overall increase of acreage of native vegetation, connectivity of existing native vegetation, and erosion control in areas of disturbance. Restoration of degraded areas is important to the integrity of the surrounding vegetation communities, as cleared areas can provide opportunity for non-native species to colonize (many non-native annuals are flashy fuels that can increase fire danger), provide opportunity for erosion by exposing the soil surface, reduce acreage of native vegetation communities, and sever connectivity among vegetation communities.

4.1 Proposed Restoration Areas

The Property is composed of high-quality native vegetation communities. No active habitat restoration opportunities were identified within the Property. However, two small disturbed areas were identified for passive restoration; one located near the reservoir, and the other along the southeastern border of the Property near an adjacent residence (Figure 6). These two areas are both in close proximity to Tecate tarplant, a special-status plant species (Table 2 and Figure 4). Thus, passive restoration is proposed to reduce weed competition and enhance native vegetation communities nearby the special-status plant species. Additional passive restoration opportunities may arise with the implementation of the Public Access Plan for the Property (Dudek 2012b), wherein trail and road segments may be recommended for closure. Additionally, if habitat restoration opportunities arise as a result of future disturbance or as accompanied by invasive non-native plant species control, general guidelines are provided herein.

4.2 Restoration Methods

Two methods of restoration are available when habitat restoration opportunities arise within the Property: (1) passive restoration, and (2) active restoration. These methods are described in greater detail below.

4.2.1 Passive Restoration

Passive restoration involves performing weed control in disturbed areas where natural recruitment of native plant species is actively occurring. The weed control activities may be accompanied by some erosion control efforts, but directed planting and seeding is not necessary because the areas would be expected to reestablish naturally over time. Passive restoration would be appropriate for areas where invasive non-native weed control is targeted within the Property. Passive restoration areas may require multiple years of invasive non-native plant control to minimize competition from weeds and encourage reestablishment of the native community. For the two areas identified for passive restoration, as well as road or trail segments proposed for closure and restoration, soil compaction may be an issue that prevents re-establishment of native species. Should natural recruitment slow or stop over time, and it appears that the areas will not recover without intervention, soil decompaction may be necessary and seed application and/or container plants may need to be incorporated, as described in the following section.

4.2.2 Active Restoration

Active restoration involves soil preparation and planting of disturbed or degraded areas where native vegetation recruitment is not actively occurring, and/or significant soil/vegetation disturbance is required in preparation for revegetation (such as extensive invasive non-native plant control or grading). These areas may have been previously cleared or compacted and are not showing significant natural recruitment of native plant species, and/or may be degraded from erosion. These areas may require site preparation prior to planting by decompaction or recontouring to approximate the natural gradient expected at the site. Decompaction would require ripping or tilling compacted soil to loosen and aerate topsoil. Decompaction should occur at a depth of 12 inches or greater. In general, unless the topsoil has been removed from the site, fertilizer is not recommended since this can favor establishment of faster growing, annual invasive non-native plants. Appropriate erosion-control measures should be installed after site preparation activities to limit erosion and soil loss during the establishment period.

Upon completion of site-preparation activities, native seed and container plants could be installed. Plant materials should be native species from San Diego County and planting palettes should be composed of species that are representative of the target vegetation community. Plant quantities, rates, and composition should be determined on an individual basis, based on the existing plant composition around the restoration sites.

Because of the limited access into the portion of the Property east of the developed Park and the steep and rugged terrain, it is unlikely that a temporary irrigation system would be practical for use in habitat restoration. Therefore, restoration should prioritize seed application over container plant installation. Seed application should occur prior to the onset of the winter rainy season to take advantage of the full growing season. An example of an effective seed application technique would be to clear weedy vegetation and thatch from the soil surface, hand broadcast seed, rake seed into the soil, and cover with a fine mulch seed topper at approximately 1/4-inch depth. The fine mulch seed topper will help protect the seed from getting eaten by birds and rodents, and also helps keep the soil moist during the rainy season.

Invasive non-native plant control should be performed regularly for the first few years to allow new seedlings and container plants to establish and transition the area to its intended native vegetation community.

If container plants are installed, they should be installed in the fall at the onset of the rainy season. Without supplemental irrigation, installation of container plants will likely have limited success. Standard planting procedures should be employed for installing container plants. All container plants should be checked for viability and general health prior to installation. Holes approximately twice the size of the root ball of the plant should be dug using a shovel, post-hole digger, or power auger. Holes should be filled with water and allowed to drain immediately prior to planting. Container plants should be installed so that the top of the root ball is at grade or slightly above grade. A small soil berm should be installed around the downhill side of the planted container plant to capture rainfall and runoff. Plants should be monitored regularly for signs of stress, particularly during dry periods. Many species native to Southern California are adapted to seasonal drought conditions, but require soil moisture for a prolonged period to become established. In the months following planting, and especially if dryer-than-average conditions exist, periodic hand watering may be necessary to help establish the plants. Alternatively, container plants could be installed with Dry Water™ to aid establish under unirrigated conditions. Most coastal scrub and chaparral container plants typically require at least 1 year, and up to 3 years, to become established. Therefore, ongoing maintenance of the plants for 1–3 years would be necessary to ensure survival.

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5.0 FIRE MANAGEMENT

5.1 Current Fire Management Practices

Fire management practices in the Property currently include maintenance of fuel modification zones and defensible space in and around the DPR facilities (i.e., park ranger office and living quarters) and campgrounds as follows:

- Annually, before fire season, on-site DPR staff mows the grasses and black mustard (*Brassica nigra*) surrounding and within the understory of on-site Coast Live Oak Woodland.
- San Diego County Department of Public Works maintains a 10 foot fuel treatment area along both sides of Potrero Park Road (a two-lane asphalt road) from Potrero Valley Road to the Property entrance.
- Gold-spotted oak borer (*Aqrilus coxalis*), a flat-head borer, is attacking the trunks and branches of the mature oaks in the campground and picnic areas. DPR is actively monitoring the health of the trees. Dead trees are removed immediately to reduce the potential for tree failure and fire hazard near the campgrounds and picnic/day-use areas.

Additionally, there are other activities associated with fire management that are implemented on the Property. These activities are related to emergency response and access and include:

- Infrequent maintenance of the existing trail/access road system north of Potrero Valley Road. This area would provide a means for fire control and firing out operations.
- Existing perimeter gates have DPR padlocks and no other fire agencies have the means to unlock any other gate.

5.2 Fire Environment

Several factors comprise the fire environment. 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 understanding the potential for fire within and around the Property.

Wildfires are a regular and natural occurrence in most of Southern California. However, increasing numbers of fires and acres burned annually has been experienced over the last decade. 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 6-month drought period each year, and (3) ignitions via anthropogenic sources have increased or are increasing in many wildland or WUI areas.

Based on available information and an understanding of the fire environment of the region, it is expected that large wildfires will occur again and will burn within the Property. In addition, the Property is located within a Very High Fire Hazard Severity Zone (FRAP 2012). 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. The Fire Hazard Severity Zones were created by the Fire and Range Assessment Program of CAL FIRE (CAL FIRE 2011) per State of California Public Resources Code, Sections 4201-4204.

5.2.1 Climate

As with most of Southern California, the regional climate in the vicinity of the Property 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 2012a). 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 2012a). However, a continental desert regime prevails in the vicinity of the Property. Warmer summers and colder winters, greater daily and seasonal temperature ranges, and lower relative humidity are characteristic of continental, as opposed to maritime, locales. The location of the Property within the foothills of the Peninsular Range and just west of the Colorado Desert contributes to these climatic factors.

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 in size.

However, there is some local variance in the typical Southern California climate. The influence of the Pacific Ocean is lessened due to the inland location of the Property. As such, temperatures are subject to much more variability on a daily and seasonal basis. The average high temperature calculated from July 1948 to June 2012 for the surrounding Campo area is approximately 76.3º Fahrenheit (F), with higher temperatures in summer and early fall (June through September) reaching up to an average of 93.8°F (WRCC 2012b). The average low temperature is 40.79°F, and winter low temperatures are routinely around 30°F. The mean annual precipitation for the area is 14.83 inches, with the most rainfall concentrated in the months of January (3.04 inches), February (2.77 inches), and March (2.30 inches) (WRCC 2012b). Rainfall is much less during summer months of May (0.32 inches), June (0.06 inches), and July (0.33 inches) (WRCC 2012b). Snow is periodically reported in Campo, with an annual average snowfall of 0.6 inches. In Campo, the 2011-2012 season (July through June), cataloged 15.84 inches of rain while the 2010-2011 season cataloged 20.85 inches of rain (WRCC 2012b).

The regional 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 Property, 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 Campo weather station[1], as presented above. 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,

[1] The Campo station is located in Campo, approximately 7 miles east of the Property. The following summarizes the location and available data ranges for the Campo weather station: Latitude: 32.617; Longitude: -116.467; Elevation: 2,630 feet; Data years: 1948 to 2012.

Department of 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 Property. The fire weather variables and an analysis of fire behavior for the Property are presented in Section 5.0 and Appendix D.

5.2.2 Topography

The Property is located in the foothills of the Laguna Mountains of Southern California and is composed of sloping or hilly terrain ranging in elevation from approximately 725 to 870 meters above mean sea level (AMSL) (2,380 to 2,853 feet). The topography of the Property is determined primarily by proximity to the Peninsular Range, which creates relatively hilly terrain. The Property is situated between Hauser Mountain to the east and Potrero Peak to the west and is characterized by two drainages that run east to west and converge near the western border. The drainages on the Property contain slopes with gradients reaching up to 48% (approximately 25°) in some areas, although the majority of the Property has a slope gradient less than 35% (approximately 20º).

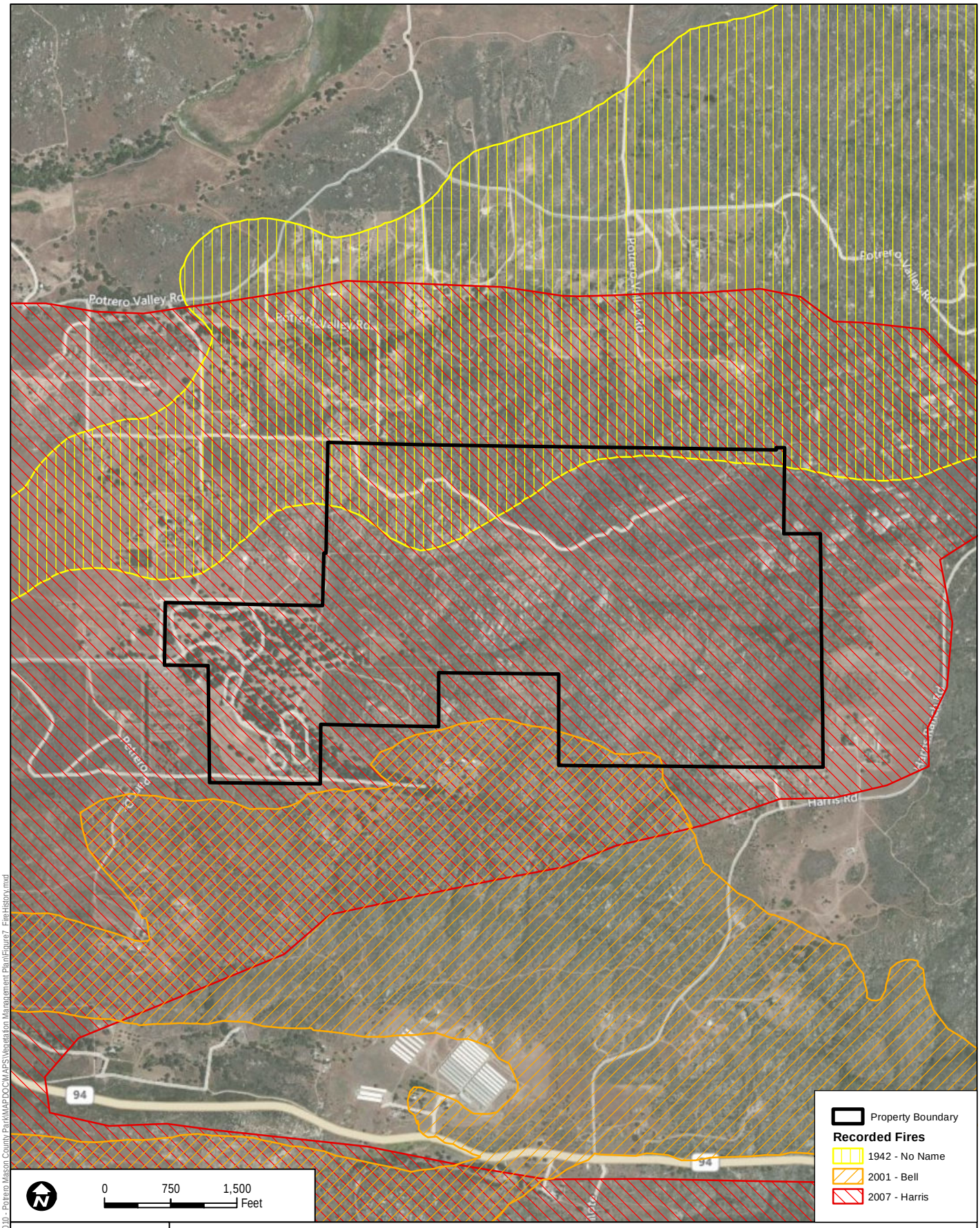
Topographic features that may present a fire spread facilitator are the narrow drainages and sub-drainages which may serve to funnel winds, thus increasing their velocity and potential for influencing extreme fire behavior. From a regional perspective, the alignment of nearby Potrero Valley and other smaller canyons and drainages associated with Hauser Mountain are conducive to channeling and funneling wind, thereby increasing the potential for more extreme wildfire behavior in the region.

5.2.3 Watershed Description

The Property is located within the Tijuana Watershed. Water within the Property generally drains towards and eventually flows into Potrero Creek. This creek discharges into the Tijuana River and flows southwest from the Property to the Tijuana Estuary in Imperial Beach, California (Project Clean Water 2012). The majority of the watershed is located within Mexico, with approximately 25% occurring in California (Project Clean Water 2012).

5.2.4 Fire History

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 Property combine to create a unique situation capable of supporting large-scale, high-intensity wildfires, such as the Harris Fire in 2007. The history of wildfires on the Property is graphically portrayed in Figure 7.



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SOURCE: Bing, SanGIS 2012

FIGURE 7

Fire History

Potrero Mason Property - Vegetation Management Plan

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Based on historical fire perimeter data (FRAP 2012)[2], the entire Property has burned at least once during the recorded data period, with fires occurring in 1942, 2001, and 2007. Some areas of the Property have burned twice over the course of the recorded fire history. Table 7 presents the quantity of times the Property has burned by land area (acreage).

Table 7
Quantity of Times Burned for the Property

Quantity of Times Burned*	Acreage	Percentage
1	413.2	86.1%
2	66.9	13.9%
Total	**480.1**	**100.0%**

Source: FRAP 2012

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 Property was calculated at 32 years with intervals ranging between 6 and 59 years. However, within a 1-mile radius of the Property, the average interval between wildfires was calculated at 9.5 years, with intervals ranging from 0 (multiple fires in the same year) to 32 years. Based on this analysis, it is expected that the Property would be subject to wildfire occurrence approximately every 10 years, with the realistic possibility of shorter interval occurrences. Table 8 presents fire history and fire return interval data for the Property.

Table 8
Fire History and Return Intervals for the Property

Fire Year*	Fire Name	Interval (years)	Acreage Burned on Property	Percent of Property Burned**
1942	Unnamed Fire	N/A	61.13	12.7%
2001	Bell Fire	59	5.74	1.2%
2007	Harris Fire	6	480.03	100.0%

*FRAP 2012
** Based on total Property acreage of 480.03

[2] Based on polygon geographic information system (GIS) data from CAL FIRE's Fire and Resource Assessment Program (FRAP), which includes data from CAL FIRE, U.S. Department of Agriculture Forest Service Region 5, Bureau of Land Management, National Park Service, Contract Counties and other agencies. The data set is a comprehensive fire perimeter GIS layer for public and private lands throughout the state and covers fires 10 acres and greater between 1878 and 2011.

Based on an analysis of the fire history, vegetation age classes on the Property are consistent across the site due to the extent of burning in 2007. Specifically, 100% of the vegetation on the Property is 5 years old, burning during the Harris Fire in 2007. The exception to this is the coast live oaks which are within the burn perimeter but were not consumed by fire. While younger vegetation is generally considered less susceptible to fire than the 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.

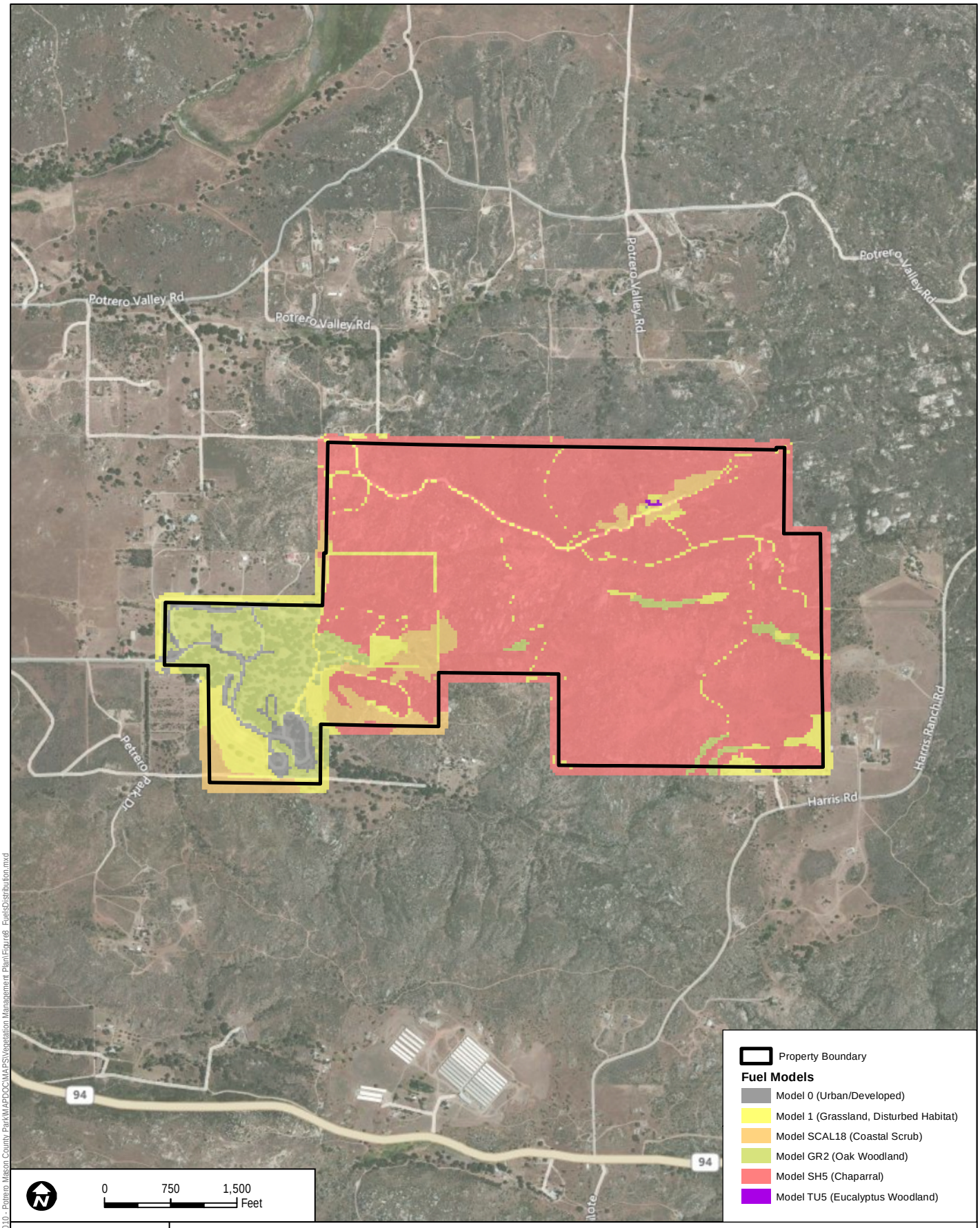
5.2.5 Vegetation Dynamics and Fuel Loads

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 9 by vegetation type and are graphically presented in Figure 8. Certain vegetation types increase fire hazard based on plant physiology (resin content), biological function (flowering, retention of dead plant material), and/or physical structure (leaf size, branching patterns). Chaparral and sage scrub communities typically contain plant species which exhibit these attributes.

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). Non-native invasive species of the greatest concern within the Property include saltcedar, bull thistle, Maltese star-thistle, Italian plumeless thistle, and gum trees (Figure 6).

Table 9
Vegetation Communities and Associated Fuel Models for the Property

Vegetation Community/Land Cover	Fuel Model	Acres	Percentage
Chamise Chaparral	SH5	232.92	48.5%
Coast Live Oak Woodland	GR2	46.04	9.6%
Coastal Sage-Chaparral Transition	SH5	2.40	0.5%
Coastal Scrub/Chaparral	SH5	9.65	2.0%
Diegan Coastal Sage Scrub	SCAL18	15.14	3.2%
Disturbed Habitat	1	17.42	3.6%
Eucalyptus Woodland	TU5	0.17	0.0%
Foothill/Mountain Perennial Grassland	1	0.50	0.1%
Non-Native Grassland	1	15.84	3.3%
Northern Mixed Chaparral	SH5	0.82	0.2%
Scrub Oak Chaparral	SH5	94.30	19.6%
Southern Mixed Chaparral	SH5	32.24	6.7%
Urban/Developed	0	12.62	2.6%
	Total	**480.06**	**100.0%**



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SOURCE: Bing, SanGIS 2012

FIGURE 8

Fuel Distribution

Potrero Mason Property - Vegetation Management Plan

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Vegetation Dynamics

Vegetation plays a significant role in fire behavior and is an important component of the fire behavior models discussed in this VMP. 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. 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, is highly dependent on fire characteristics, including intensity, duration, and return interval.

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 non-native species or the continued degradation of scrublands and persistence of annual grasses.

The Property is dominated by chaparral (approximately 75%) and oak woodland vegetation communities (approximately 10%), with smaller patches of sage scrub (approximately 6%) and grassland (approximately 3%) scattered throughout the Property. Oak woodland habitat on site is found at lower elevations and concentrated primarily in the flatter areas in the western portion of the Property (developed Park). 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).

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.

Chaparral Fire Effects

Chaparral communities are dominant on site covering 360.3 acres. This vegetation type typically ranges from 1–3 meters (3–10 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 to100+ 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).

Live Oak Woodland Effects

Coast live oak woodland covers approximately 46 acres of the Property. 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 (Lawson, Zedler and Sieger 1997). Recovery of coast live oaks may take up to 3 years, so post-fire cutting of affected trees should be postponed to verify 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 favors woodland/forest expansion into neighboring communities (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.

Sage Scrub Fire Effects

Sage scrub is fairly limited on site and occupies 27.2 acres of the Property (including sage/chaparral transition communities). Following fire, typical sage scrub succession includes a predominance of annual herbs during the first year. Non-native species may dominate a landscape after wildfire due to their success in establishing quickly and out-competing many native species. Non-native 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 the first few years following fire. New species continue to become established in recovering sage scrub, reaching a peak at 5–10 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 Property's vegetation age is almost entirely consistent, with nearly 91% of vegetation being 9 years old at the time of this report. Shrub cover will continue to increase in volume, and within approximately 11 years, the fire hazard will increase corresponding with fuel age (Keeley 2005). Changes in land use will also affect the vegetation distribution pattern.

Fire Behavior

Fire behavior modeling provides reasonably accurate representations of how wildfire would move through available fuels in high-fire hazard areas. 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 Property. 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 Property. 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 Property are presented in Appendix D.

5.3 Fuel Management Methods

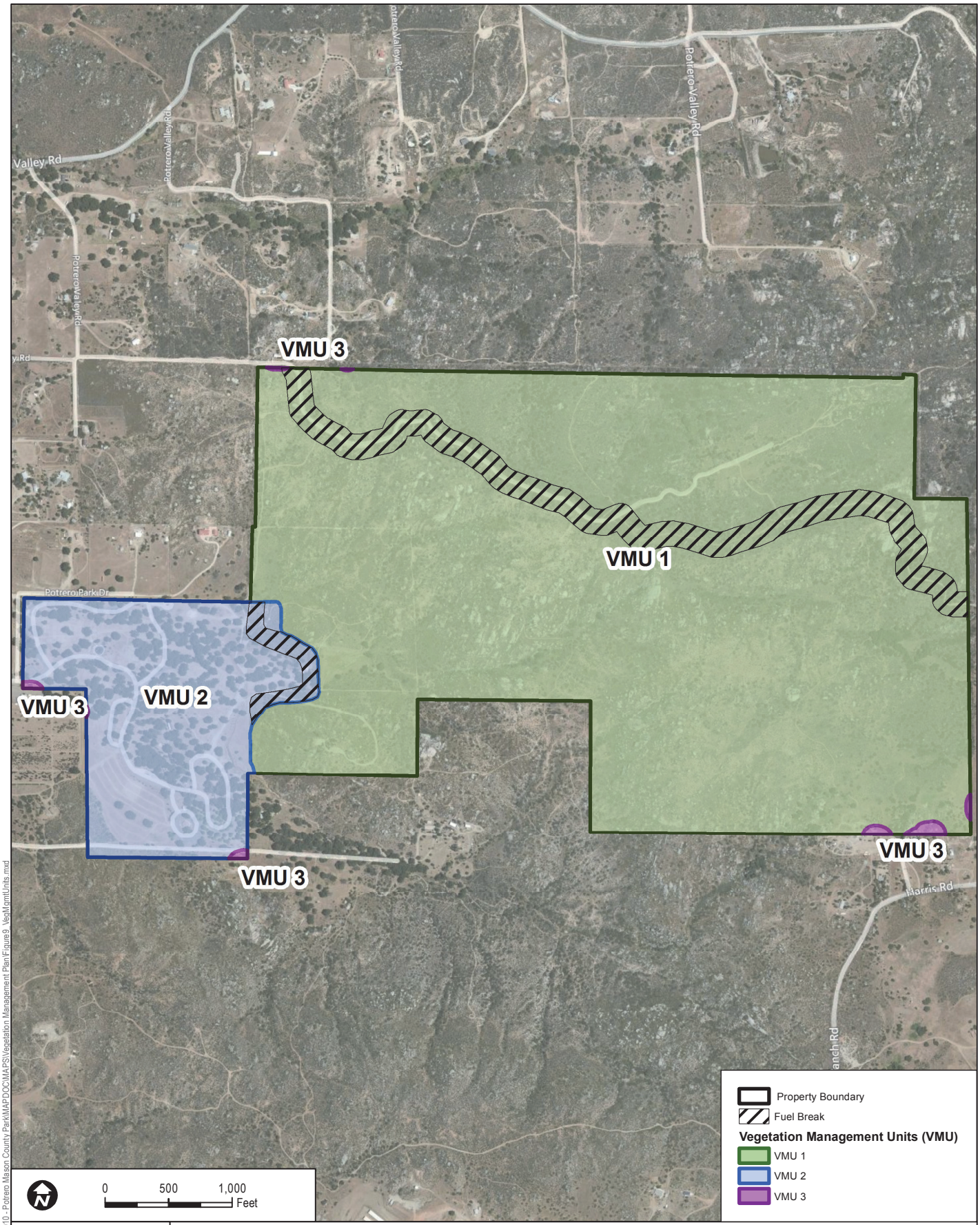
Successful fire management requires preplanning and utilization of fire prevention techniques and strategies. As the entire Property has been fire-free for 5 years, management of fuels is an important component of overall Property management. To that end, VMUs, based on topography or other clearly discernible landscape boundaries, have been delineated to assist with fuel management planning. Figure 9 illustrates the VMU boundaries. VMU specific fuel management recommendations are provided in Section 6.3. A list of general fuel management methods and their suitability for use on the Property are discussed as follows.

5.3.1 Grazing

Grazing is an effective fuel reduction method and can be compatible with Property management goals. Focused grazing is a feasible alternative on this Property, but it would need to be highly managed to avoid introducing and spreading non-native species, overgrazing, or escape grazing. 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 are considered fuel modification zones.

5.3.2 Mowing/Line Trimming

Mowing and line trimming are one of the most common and successful methods for reducing fuel loads, and are compatible with Property management goals, but are of limited use in rocky and rugged terrain. DPR currently mows the grasses and black mustard within the campground and picnic areas on site. Line trimming is also a feasible option for the Property to meet fuel modification goals. However, annual mowing/trimming may convert shrub dominated areas to grasslands over time. Therefore, mowing/trimming should be conducted in late spring after weedy annuals have stopped growing, but have not yet produced viable seed (Bell 2009).



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SOURCE: Bing, SanGIS 2012

FIGURE 9

Vegetation Management Units and Fuel Breaks

Potrero Mason Property - Vegetation Management Plan

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5.3.3 Herbicides

Chemical means to control fuels/non-native plants are an effective method, but one that has a negative connotation, potential toxicity for humans and wildlife, and can affect water quality. Focused chemical selection and application minimizes the detrimental effects and makes the use of chemicals, such as glyphosate and other selective chemicals, a feasible alternative.

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 natural fire occurs on the Property 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 fire authority 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 permit from CAL FIRE or under contract with CAL FIRE under the statewide Vegetation Management Program.

Prescribed fire on the Property is not currently considered a high priority for fuel management in 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. 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 2009 County of San Diego Vegetation Management Report, 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 fire. 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 or park management facilities. Thinning is appropriate anywhere on the Property where insect or disease outbreaks and frost or drought kill occurs, 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. Responding agencies 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 and roads. These locations then serve as a defensive position for fighting the fire. The dirt road extending onto the Property from Potrero Valley Road is recommended to serve as a fuel break with modified vegetation on either side such that a 200-foot wide break is provided across the northern portion of the Property (Figure 9). Additionally, a fuel break along the eastern edge of the Park portion of the Property is recommended to minimize the potential for crown fire occurrence in the adjacent oak woodland to the west (Figure 9).

5.3.7 Tree Removal

Tree removal may be necessary to mitigate the impact of gold-spotted oak borer on the Property's oak trees. DPR is actively monitoring the health of the oak trees and dead trees are removed. Continued monitoring of tree health is recommended and removal of dead trees should be completed routinely to minimize dead fuel loads on the Property and reduce the potential for tree failure near the campgrounds and picnic/day-use areas.

5.4 Fire Response Plan

CAL FIRE would be the primary responder to the Property for wildland fire suppression. CAL FIRE has three fire stations that would respond to a wildfire on the Property: Station #39 (Potrero); Station #4 (Lake Moreno-Campo); and Station #35 (Dulzura). Other nearby agencies that may assist via mutual aid agreements include the San Diego Rural Fire Protection District (SDRFPD), the Campo Fire & Rescue Department (Station #46), and the Campo Reservation Fire Protection District. CAL FIRE provides response to wildfires in state responsibility area (SRA), including the Property. 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 Property, including:

- Air tankers
- Helicopters

- Airtactical aircraft (AA)
- Various engine types
- Crew transports
- Bulldozers
- Communications centers.

CAL FIRE utilizes three levels of dispatch and response based upon 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 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 dispatch occurs during the normally declared fire season, June through October. There is some variation in the timing of the dispatch levels, based entirely on weather.

CAL FIRE currently employs the following firefighting apparatus with associated firefighting personnel in the vicinity of the Property:

- Structure protection type I pumpers
- Type III brush engines
- Water tender
- Command vehicles.

Fire Response

This VMP stresses the need for firefighting response to minimize impacts to natural resources, when possible, by using preplanned fire suppression tactics and actions within the Property. Fire suppression is considered the top priority on the Property due to the proximity of structures and the shortened fire return interval for the site.

Fire suppression air support with fire retardant drops may be a component of responses to the entire Property for achieving goals and objectives, especially under conditions that would accelerate wildfire spread. Under extreme conditions, or at night, air support may not be available, and in these situations, response categories may become secondary to public safety. Fires occurring within open space areas have demonstrated the potential to move into urban areas, consequently overwhelming available fire resources.

Response to a fire within the Property will likely be limited to the main entrance road, Potrero Park Drive, Petrero Park Drive, and the internal paved road network associated with the developed Park portion of the Property for firefighting personnel, type I engines (limited to paved roadways), type III engines, fire crews, air attack and fire retardant, helicopters, and air tankers. Fire suppression actions may include one or more of the following: direct attack with engines, fire crews, helicopters, and firing operations. Line construction activities within the Property would be best carried out by hand crews. Dozers/road graders may be activated but should not be put into operation on the Property itself unless necessary for improving existing roads for engine access or constructing a line or secondary line for preservation of high-value resources, including plant and animal species, habitats, people, or property.

There is an existing access road at the northern portion of the Property (off of Potrero Valley Road) that may be utilized for fire containment efforts by fire agency personnel including using the road as a fuel break or as an anchor point from which to conduct operations. However, this road is not wide enough to provide acceptable fire spread slowing during wind driven wildfires. Additionally, the existing dirt roads from Potrero Valley Road to the Property's northeast boundary are unmarked and not maintained. Locating the Property from the north is difficult and at times the roads are not distinguishable.

5.4.1 Fire Hazard and Current Fire Management Practices Evaluation

Based on site-specific data analysis, discussions with fire agencies responsible for fire suppression, and fire behavior modeling results, the Property includes 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 Property. This information was collected during initial site analysis and reviews of project data, fire behavior modeling results, and high-resolution aerial imagery and was integrated into the preparation of this document and associated recommendations.

1. Based on topography, vegetation, and fire history of the region, a large conflagration during Santa Ana wind conditions will likely enter the Property from the east, traveling down Potrero Valley or from the undeveloped area associated with Hauser Mountain. Fires during typical onshore wind patterns are likely to enter the site from either the adjacent semi-rural areas or roadways, or from open space areas south or west of the Property.

2. A wildland-urban intermix threat exists along the western and northwestern boundaries of the Property. Residential development in these areas is semi-rural and housing density is low. Potential ignitions include a variety of residential related sources including structure fire, hot works, and yard machines, among others. Ignition sources not associated with residential development include vehicular associated ignitions (e.g., car fire, catalytic converter, tossed cigarette) along adjacent roads, including Potrero Valley Road, Potrero Park Drive, and Harris Ranch Road, target shooting, and other human-caused ignitions resulting from authorized or unauthorized access to the Property.
3. Wildfires fueled by Santa Ana winds may move rapidly across the Property. Chaparral fuels will be the predominant carriers of fire across the site with flame lengths exceeding 20 feet. Steep slopes typify the topography of the eastern portion of the Property. Fires in chaparral fuels will produce heat output in excess of 5,000 British thermal units.
4. A fire originating in a structure within an approximately 1-mile radius of the Property could result in burning embers landing within the Property before they decay to the point of being unable to ignite fuels, potentially resulting in vegetation ignition if there is a receptive fuel bed.

Based on accessibility, firefighting in the eastern portion of the Property may be difficult as the only potential road (extension of Potrero Valley Road) is not maintained and the route from the closet asphalt road is not marked. In addition, this road is a dead end, has limited turnaround capability, and not designed to accommodate typical responding fire apparatus. Consequently, air attack will be an important component but may not be available or usable, depending on the extent of the fire event and/or the time of day and weather conditions.

The catastrophic wildfire threat for the Property 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. The Property is located in Fire Weather Zone 250, San Diego County Inland Valleys. Accordingly, Red Flag Warnings are issued when humidity is 15% or lower (for at least 6 hours) and sustained winds are 25 miles per hour (mph) (with gusts greater than or equal to 35 mph) (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 Property. No active fuels management activity or other fire prevention practices are currently employed on site.

5.4.2 Primary Actions and Contacts for Wildfire Emergency

The following persons/agencies should be contacted in the event of a wildfire on the Property 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/

5.4.3 Roads/Access

The main access into the County Park (southwest corner of the Property) is Potrero Park Drive which is a two-lane, asphalt paved road. Road access in the eastern portion of the Property is limited only to an unimproved, unmaintained dirt road that extends southward and east from the end of Potrero Valley Road. The open area east of the County Park campground can also be accessed by a dirt road that begins at the east end of the campground and connects with a dirt road extending from Potrero Valley Road. As mentioned, these roads, in their current condition, are not recommended for fire apparatus, unless significant road improvements are completed. Hiking and equestrian trails are also found in the Property, but are not recommended for emergency travel.

Fire apparatus access to the central portion of the Property is limited due to rocky and steep terrain. Property access is presented in Appendix C.

5.4.4 Fuel Breaks

No maintained fuel breaks currently exist on the Property. The dirt road extending onto the Property from Potrero Valley Road is recommended to serve as a fuel break with modified vegetation on either side such that a 200-foot wide break is provided across the northern portion of the Property. The need for additional fuel breaks will be 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 DPR District 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

Staging areas, important for incident command and to organize, plan, and implement firefighting strategies, typically cause higher ground disturbance from personnel, vehicles, and equipment in confined areas. The County Park campground and picnic areas already have suitable sites for staging emergency apparatus and personnel as well as setting up a command post or base camp. However, staging areas for fires that affect the Property will likely occur off site.

5.4.6 Fire Hydrants

The County Park portion of the Property has three fire hydrants (standpipes) with one, 2-1/2-inch fire department connection that are located in the campground area. Water for the hydrants is supplied by a 60,000 gallon above ground tank in the southwest corner of the Property. Wildland fire response to the Property should include water tenders for additional water supply to remote areas of the Property.

5.4.7 Other Water Sources

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

- Morena Reservoir, approximately 5.2 miles from the furthest reaches of the Property, providing helicopter dipping access.
- Barrett Lake, approximately 5.3 miles from the furthest reaches of the Property, providing helicopter dipping access.

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6.0 MANAGEMENT DIRECTIVES

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

6.1 Invasive Plant Species Removal

The following short-term management directives 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—Remove and Control High Priority Invasive Non-native Plant Species. Control aggressive, invasive non-native plant species and those with a high fire hazard within the Property, such as saltcedar and gum trees as soon as possible.

Management Directive Invasive 2—Identify and Pursue Funding for Long-Term Invasive Non-native Plant Control. Coordinate with other agencies, non-profit organizations, and/or volunteer groups in order to seek funding and implement invasive, non-native plant control projects for moderate and low priority invasive non-native plant species within the Property.

Management Directive Invasive 3—Conduct Invasive Non-native Plant Species Monitoring. Continue to monitor for new locations of invasive non-native plant species within the Property to determine whether additional removal efforts are necessary in order to maintain and/or improve the quality of the existing native vegetation communities on site.

Management Directive Invasive 4—Educational Outreach. Prepare and implement an invasive non-native plant species educational outreach program/materials for visitors and adjacent property owners in order to discourage introduction of invasive non-native plants into the Property.

6.2 Restoration

The primary management directives for native vegetation community restoration include:

Management Directive Restoration 1—Restore Native Vegetation Community Quality and Function. No active habitat restoration opportunities were identified within the Property. However, two locations were identified for passive restoration and

additional passive restoration opportunities may arise as components of the Public Access Plan. Additionally, the Property contains invasive non-native plant species that should be controlled. Invasive non-native plant species control efforts could be a component of a passive restoration approach, as identified in Section 6.1 above. If additional habitat restoration opportunities arise in the future, this management objective is to restore degraded areas to reestablish and/or enhance the biological functions and values of native vegetation communities.

> **1A–Passive Restoration.** Perform weed and erosion control as needed in disturbed areas where natural recruitment of native plant species is actively occurring, as described in Section 4.2.1. Areas identified for passive restoration include the area around the reservoir (between the high water line and adjacent vegetation communities), the disturbed habitat in the southeast corner located outside of the 100-foot defensible space zone of the nearby residence, and trails/roads sections proposed for closure in the Public Access Plan.
>
> **1B–Active Restoration.** Conduct soil preparation and native planting of disturbed or degraded areas where native vegetation recruitment is not actively occurring, as described in Section 4.2.2.

Management Directive Restoration 2—Address Long-Term Habitat Restoration Needs. Habitat 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 Property, 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;
- Native vegetation community enhancement;
- Removal of invasive plants when they are young;
- Application of herbicides, pesticides, and fertilizers if needed; and
- Application of supplemental irrigation if needed.

Management Directive Restoration 3—Monitor Invasive Non-native Plant Removal Sites. 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 Property using comparative vegetation mapping over time and evaluation of potential type conversions.

Management Directive Restoration 5—Monitor Pests and Disease. Monitor the presence of disease or pest levels to determine outbreaks and prescribe an active treatment, as appropriate.

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 Property must prioritize public safety while meeting habitat management goals. Management directives are as follows. Fuel management activities by VMU are also presented in Table 10.

Management Directive Fire 1 – Fire Suppression: Fire suppression, in combination with other management methods in targeted habitat management areas, is the priority for the Property. 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. It may be difficult to achieve longer fire return intervals given the current and projected ignition sources that may affect the Property. However, results of site 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.

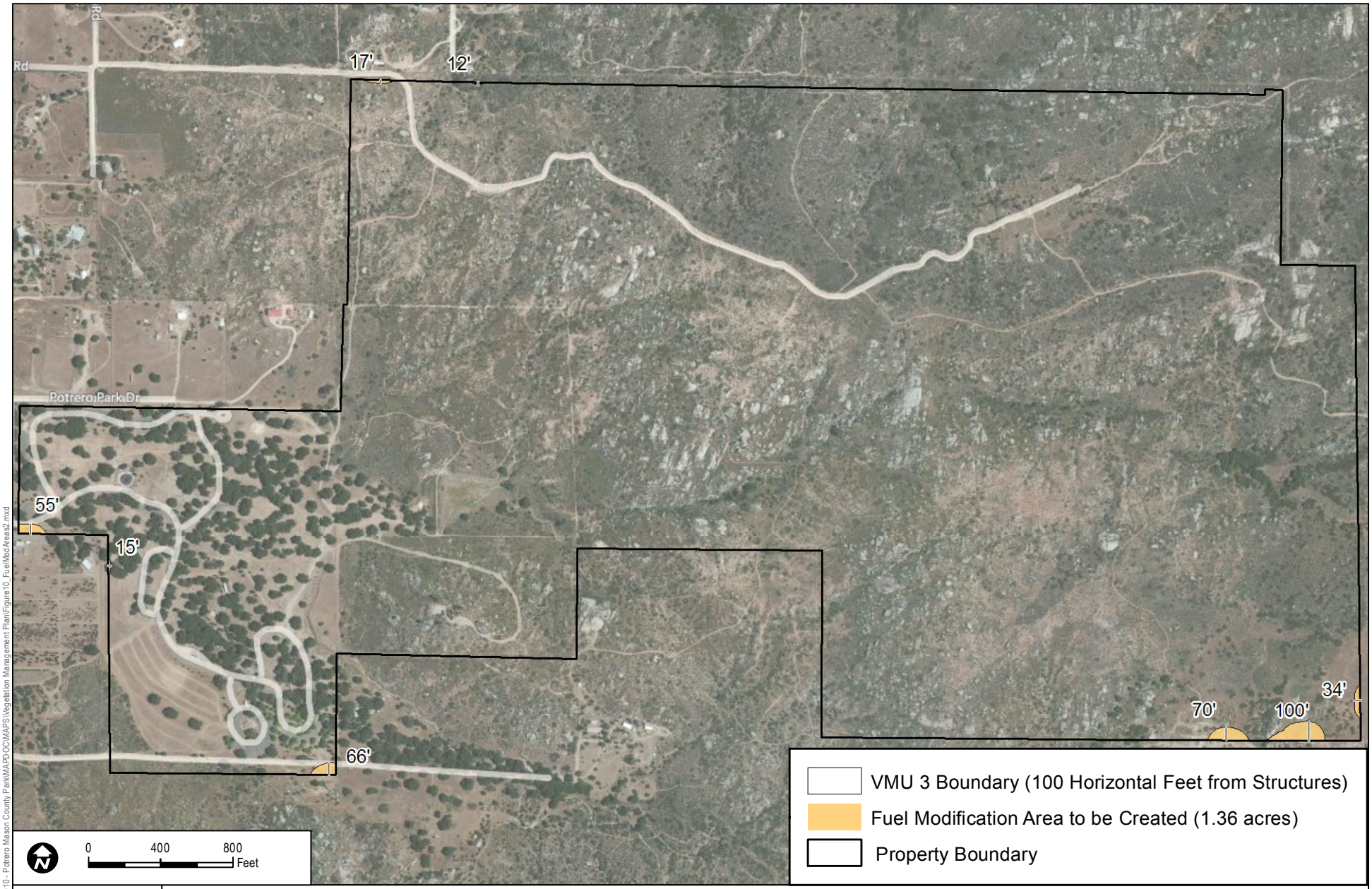
Management Directive Fire 2 – Create Fuel Modification Zones on the Property. Establish and annually maintain fuel modification zones to 100 feet around on-site buildings and facilities (park maintenance buildings, cabin in northeast corner of Property) (Figure 9; VMU 1 and 2). Additionally, establish and annually maintain fuel modification zones along the Property boundaries that function as extensions of off-site residential structure fuel modification zones (Figure 10; VMU 3), as identified in Table 10.

Management Directive Fire 3 – Maintain Roadside Fuel Treatment Areas. County of San Diego Department of Public Works Road Division shall annually maintain the existing 20-foot wide fuel treatment area along Potrero Drive from Potrero Valley Road to the County Park entrance. DPR staff shall annually maintain a 20-foot wide fuel treatment area along all interior park roads in the Park portion of the Property. Maintenance should focus on flashy fuel trimming/removal (grasses) and removal of dead plant material. This effort will minimize roadside ignitions along an evacuation route from the Property and on-site campgrounds.

Management Directive Fire 4 – Establish/Maintain Fuel Breaks. Establish and/or maintain a 200-foot wide fuel break in the northern portion of the Property. The fuel break should utilize the existing dirt road extending onto the Property from Potrero Valley Road and the previously used fuel break extending from this road eastward along the ridge top toward Harris Ranch Road. The fuel break should include fuel treatment within 100-feet of each side of the road and should include brush thinning to at least 50% cover and regular mowing/trimming of grasses and weeds. Additionally, establish a fuel break along the eastern edge of the Park portion of the Property adjacent to the existing oak woodland. This fuel break should be 120-150 feet wide and fuel treatment should include brush thinning to at least 50% cover and regular mowing/trimming of grasses and weeds. Thinning/mowing should also provide vertical separation between ground fuels (shrubs/grasses) and tree canopies such that a vertical clearance of 3 times the understory plant height is maintained (for example, a 6-foot separation should be provided between a 2-foot tall shrub and the bottom of the tree canopy) (Figure 9; VMU's 1 and 2).

Management Directive Fire 5 – Access Data Sharing. Local fire agency gate locks should be installed by local fire agencies and DPR staff shall report any notice of removed or missing locks to the appropriate fire agency. DPR staff shall 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 fire responders not familiar with the area, such as out of County or out of state responders, will improve firefighter safety.

Management Directive Fire 6 – Control Illegal Access. Off-highway vehicles and firearms (two uses not authorized on County property) are potential ignition sources that will be managed through restricting access (e.g., use of fence, gates, signage) and by establishing a high profile presence of DPR staff. Installation of a gate lock is recommended at the northern Property boundary where it intersects the dirt road extension of Potrero Valley Road.



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6680-10

SOURCE: Bing, SanGIS 2012

FIGURE 10

Focused Fuel Modification Areas (VMU 3)

Potrero Mason Property - Vegetation Management Plan

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Management Directive Fire 7 – Educational Outreach. Private property owners in the wildland-urban intermix area located adjacent to the Property 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 Property, such as mowing and herbicide application, as applicable. As such, this VMP recommends a concerted effort to reach property owners who are situated in locations that may be affected by wildfire on the Property or whose properties and actions may serve as ignition sources. Educational material can be customized for these homeowners to include discussion of the importance of the Property. Standard measures for implementing a 100-foot defensible space zone around private residences can be provided from materials available from CAL FIRE or from the County of San Diego Department of Planning and Development Services[3]. As part of the public education program, private property owners should be encouraged to participate as "eyes on the Property" to help curb illegal access and report potential problems.

Management Directive Fire 8 – Reduce Ignition Sources: Ignition sources are present within and adjacent to the Property. Adjacent sources include roadways with vehicular travel, especially Potrero Valley Road, adjacent residences, and recreational users, among many others. Interior ignition sources include trail users and camp fires, to a limited extent. As such, it is not possible to remove all sources of ignition. Rather, reducing the potential spread of wildfire onto or throughout the Property is recommended. Fuel modification and roadside buffers on the Property edges near existing homes and roadways will need to be maintained.

Management Directive Fire 9 – Post-fire Management and Erosion Control. Provide controls following fire events to stabilize soils in the burn area and minimize potential for erosion. Erosion control best management practices (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 plants. The use of certified weed-free hay should be followed (Bell 2009).

[3] Available on-line at http://www.fire.ca.gov/cdfbofdb/pdfs/4291finalguidelines2_23_06.pdf and http://www.sdcounty.ca.gov/dplu/fire_resistant.html

Table 10
Fuel Management Activities by VMU

VMU	Sensitive Resources	Fuel Reduction Practice
1	Sensitive Animal Species: Barn Owl Coastal Horned Lizard Coastal Whiptail Dulzura pocket mouse Loggerhead shrike Long-legged Myotis Northwestern San Diego pocket mouse Pallid Bat Pocketed Free-tailed Bat Prairie falcon Red-shouldered Hawk San Diego desert woodrat Townsend's big-eared bat Turkey Vulture Western Mastiff Bat Western Red Bat Western Small-footed Myotis Western Yellow Bat White-tailed Kite Yuma Myotis Sensitive Plant Species: Engelmann Oak Pride-of-California Rush-like Bristleweed Sticky Geraea Tecate tarplant Cultural Sites: CA-SDI-20700 CA-SDI-20699 P-37-032672	VMU 1 consists of the southwestern portion of the Property associated with Potrero Regional Park. Vegetation is predominantly coast live oak woodland and grassland. Terrain is relatively flat. Access to and within the VMU is good via the park entrance at Potrero Park Drive and along paved park access roads circulating throughout the VMU. The following management actions are recommended within VMU 1: • Continue annual weed abatement program underneath and around oak trees. • Maintain infrastructure, fire hydrants, and asphalt and dirt roads for fire suppression operations. • Maintain fuels within 20 feet on each side of Potrero Park Drive and interior, paved park roads. • Create and maintain vertical and horizontal separation between oak canopies and shrub communities at the eastern edge of the VMU to minimize the likelihood of crown fire transition. • Routinely monitor tree health and remove dead trees as necessary.
2	Sensitive Animal Species: Barn Owl Coastal Whiptail Northwestern San Diego pocket mouse Red-shouldered Hawk Rufous-crowned Sparrow San Diego desert woodrat Townsend's big-eared bat Turkey Vulture Western Blue Bird White-tailed Kite Sensitive Plant Species:	VMU 2 consists of the majority of the western portion of the Property. Vegetation is 5 years in age and is comprised almost entirely of chaparral communities, with scattered pockets of sage scrub, grassland, and woodland. Access to VMU 2 is very limited with access at the end of Potrero Valley Road in the northern portion of the VMU. 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 species removal. Strategic understory shrub thinning/crown raising may be implemented along the chaparral/oak woodland interface at the western edge of the VMU to minimize the potential for crown fire occurrence in the Park area. Thinning/vegetation reduction may be necessary to reduce potential for catastrophic fire near sensitive resources. Sensitive resource

Table 10
Fuel Management Activities by VMU

VMU	Sensitive Resources	Fuel Reduction Practice
	Engelmann Oak Pride-of-California Rush-like Bristleweed Sticky Geraea Tecate tarplant <u>Cultural Sites:</u> CA-SDI-20,696 CA-SDI-20,697 CA-SDI-20,698 P-2 P-37-032663 P-37-032664 P-37-032665 P-37-032666 P-37-032667 P-37-032668 P-37-032669 P-37-032670 P-37-032671	locations should be flagged and avoided to the maximum extent possible. Vegetation should be removed via manual methods in these areas.
3 (WUI Fuel Modification Zones)	<u>Residences</u>	Residential development is adjacent to this VMU along the southern, western and northern edges of the Preserve (Figure 9). Fuel modification zones shall be created to accommodate the required 100-foot buffer around adjacent residences. Fuel reduction by manual thinning, mowing, and invasive non-native plant removal should be conducted routinely to minimize fire spread and ignition potential from residential development. No sensitive species or cultural sites have been identified in this VMU.

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APPENDIX A

Glossary of Terms

APPENDIX A
Glossary of Terms

TERMS

BehavePlus: Fire behavior prediction and fuel modeling computer program designed to model fire behavior characteristics based on fuel, weather, and topographic inputs. Model outputs include flame length values, fire spotting potential, and rate of fire spread.

Brush: A collective term that refers to stands of vegetation dominated by shrubby, woody plants or low-growing trees; usually of a vegetation type undesirable for livestock or timber management.

Brush Fire: A fire burning in vegetation that is predominantly shrubs, brush, and scrub growth.

Burning Conditions: The state of the combined factors of the environment that affect fire behavior in a specified fuel type.

Canopy: The stratum containing the crowns of the tallest vegetation present (living or dead), usually above 20 feet.

Closure: Legal restriction, but not necessarily elimination, of specified activities such as smoking, camping, or entry that might cause fires in a given area.

Combustible: Any material that, in the form in which it is used and under the conditions anticipated, will ignite and burn.

Conflagration: A raging, destructive fire. Often used to describe a fire burning under extreme fire weather. The term is also used when a wildland fire burns into a WUI, destroying structures.

Crown Fire: A fire that advances from top-to-top of trees or shrubs more or less independent of a surface fire.

Defensible Space: An area either natural or man-made where material capable of allowing a fire to spread unchecked has been treated, cleared, or modified to slow the rate and intensity of advancing wildfire. This will create an area for housing increased emergency fire equipment, for evacuating or sheltering civilians in place, and a point for fire suppression to occur.

Duff**:** The layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles and leaves and immediately above the mineral soil.

Exposure: (1) Property that may be endangered by a fire burning in another structure or by a wildfire; (2) direction in which a slope faces, usually with respect to cardinal directions; (3) the general surroundings of a site with special reference to its openness to winds.

Extreme Fire: A level of fire behavior characteristics that ordinarily precludes methods of direct control. One or more of the following is usually involved: high rates of spread, prolific crowning and/or spotting, presence of fire whirls, a strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environments and behave erratically, sometimes dangerously.

Fine Fuels: Fast-drying dead fuels that are less than 0.025-inch in diameter and are generally characterized by a comparatively high surface area to volume ratio. These fuels (grass, leaves, needles, etc.) ignite readily and are consumed rapidly by fire when dry.

Fire Behavior: The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire Department: Any regularly organized fire department, fire protection district or fire company regularly charged with the responsibility of providing fire protection to the jurisdiction.

Fire Front: That part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified, it is assumed to be the leading edge of the fire perimeter.

Fire Hazard: A fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of ease of ignition and of resistance to control.

Fire Hydrant: A valved connection on a piped water supply system having one or more outlets that is used to supply hose and fire department pumpers with water.

Fire Prevention: Activities, including education, engineering, enforcement, and administration that are directed at reducing the number of wildfires, the costs of suppression, and fire-caused damage to resources and property.

Fire Protection: The actions taken to limit the adverse environmental, social, political, and economic effects of fire. Protection is relative, not absolute.

Fire Regime*:* Periodicity and pattern of naturally occurring fires in a particular area or vegetative type, described in terms of frequency, biological severity, and area of extent.

Fire Retardant: Any substance, except plain water, that by chemical or physical action reduces flammability of fuels or slows their rate of combustion.

Fire Season: (1) Period(s) of the year during which wildland fires are likely to occur, spread, and affect resource values sufficient to warrant organized fire management activities; (2) a legally enacted time during which burning activities are regulated by state or local authority.

Fire Storm: Violent convection caused by a large continuous area of intense fire. Often characterized by destructively violent surface indrafts, near and beyond the perimeter, and sometimes by tornado-like whirls.

Fire Triangle: Instructional aid in which the sides of a triangle are used to represent the three factors (oxygen, heat, fuel) necessary for combustion and flame production; removal of any of the three factors causes flame production to cease.

Fire Weather: Weather conditions which influence fire starts, fire behavior, or fire suppression.

Fire Whirl: Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame. Fire whirls range in size from less than 1 foot to over 500 feet in diameter. Large fire whirls have the intensity of a small tornado.

Firebrand: Any source of heat, natural or human made, capable of igniting wildland fuels. Flaming or glowing fuel particles that can be carried naturally by wind, convection currents, or gravity into unburned fuels. Examples include leaves, pine cones, glowing charcoal, and sparks.

Firebreak: A natural or constructed barrier used to stop or check fires that may occur or to provide a control line from which to work.

Firefighter: A person who is trained and proficient in the components of structural or wildland fire.

Flame: A mass of gas undergoing rapid combustion, generally accompanied by evolution of sensible heat and incandescence.

Flammability: The relative ease with which fuels ignite and burn regardless of the quantity of the fuels.

Fuel Break: An area, strategically located for fighting anticipated fires, where the native vegetation has been permanently modified or replaced so that fires burning into it can be more easily controlled. Fuel breaks divide fire-prone areas into smaller areas for easier fire control and to provide access for firefighting.

Fuel Loading: The volume of fuel in a given area generally expressed in tons per acre.

Fuel Model: Simulated fuel complex for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.

Fuel Modification: Any manipulation or removal of fuels to reduce the likelihood of ignition or the resistance to fire control.

Fuel Modification Zone: A strip of land, typically 100 feet wide or more, between an improved property and wildlands, where combustible vegetation has been removed, thinned, or modified and may be partially or totally replaced with approved drought-tolerant, fire-resistant, and/or irrigated plants to provide an acceptable level of risk from vegetation fires. Fuel modification reduces radiant and convective heat, thereby reducing the amount of heat exposure on the roadway or structure and providing fire suppression forces a safer area in which to take action.

Fuels: All combustible material within the WUI or intermix, including vegetation and structures.

Hazard: The degree of flammability of the fuels once a fire starts. This includes the fuel (type, arrangement, volume, and condition), topography, and weather.

High Value Resource: High Value Resources are natural or man-made resources, including plant and animal species, cultural resources, and residences that form the basis for fire management planning on the Property.

Ignition Time: Time between application of an ignition source and self-sustained combustion of fuel.

Invasive Plant Species: A plant species that is not native to the region and has demonstrated the ability to aggressively outcompete native plant species that would normally colonize a given area.

Ladder Fuels: Fuels that provide vertical continuity allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease.

Overstory: That portion of the trees in a forest that forms the upper or uppermost layer.

Peak Fire Season: That period of the year during which fires are expected to ignite most readily, to burn with greater than average intensity, and to create damages at an unacceptable level.

Prescribed Burning: Controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions, which allows the fire to be confined to a predetermined area, and to produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives.

Prescribed Fire: A fire burning within prescription. This fire may result from either planned or unplanned ignitions.

Red Flag Warning Conditions: A **Red Flag Warning** is a forecast warning issued by the United States National Weather Service to inform area firefighting and land management agencies that conditions are ideal for wildland fire ignition and propagation. After drought conditions, and when humidity is very low, and especially when high or erratic winds that may include lightning are a factor, the Red Flag Warning becomes a critical statement for firefighting agencies, which often alter their staffing and equipment resources dramatically to accommodate the forecast risk.

Responsibility Area: That area for which a particular fire protection organization has the primary responsibility for attacking an uncontrolled fire and for directing the suppression action. Such responsibility may develop through law, contract, or personal interest of the fire protection agent. Several agencies or entities may have some basic responsibilities without being known as the fire organization having direct protection responsibility.

Restoration **(of native vegetation communities):** The act of restoring ecological functions and values of vegetation communities that have been adversely affected by human- or nature-induced impacts, causing decrease in ecological functions and values.

Sensitive Species: A plant or animal species with a special status listing from federal, state, or local regulatory agencies.

Slope: The variation of terrain from the horizontal; the number of feet rise or fall per 100 feet measured horizontally, expressed as a percentage.

Smoke: (1) The visible products of combustion rising above a fire; (2) term used when reporting a fire or probable fire in its initial stages.

Spotting: The ignition of unburned fuels ahead of the fire front as a result of ignition by firebrands. Spotting enhances the spread of wildfires.

Structure Fire: Fire originating in and burning any part of all of any building, shelter, or other structure.

Suppression: The most aggressive fire protection strategy, it leads to the total extinguishment of a fire.

Surface Fuel: Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants.

Tree Crown: The primary and secondary branches growing out from the main stem, together with twigs and foliage.

Uncontrolled Fire: Any fire that threatens to destroy life, property, or natural resources and that (a) is not burning within the confines of firebreaks or (b) is burning with such intensity that it could not be readily extinguished with ordinary, commonly available tools.

Understory: Low-growing vegetation (herbaceous, brush or reproduction) growing under a stand of trees. Also, that portion of trees in a forest stand below the overstory.

Urban Interface: Any area where wildland fuels threaten to ignite combustible homes and structures.

Vegetation Management Unit: Delineated Property unit based on topography, vegetation or other features used for internal invasive species, restoration, and fire management planning.

Weed: A plant species that interferes with a desired management objective. This term does not denote the native or non-native status of a plant species. Both native and non-native plants have the ability to interfere, depending on the objective (i.e., native cattails can be considered a weed for flood control management objectives).

Wildfire: An unplanned and uncontrolled fire spreading through vegetative fuels, at times involving structures.

Wildland: An area in which development is essentially nonexistent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered.

Wildland Fire: Any fire occurring on the wildlands, regardless of ignition source, damages or benefits.

Wildland–Urban Interface (WUI): The area where structures and other human developments meet or intermingle with undeveloped wildland (as defined in the County Fire Code, County Consolidated Fire Code, and County Building Code).

Sources: www.firewise.org and County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements, Wildland Fire and Fire Protection (2010).

APPENDIX B

Moderate and Low Priority
Invasive Non-Native Plant Species for Removal

APPENDIX B
Moderate and Low Priority
Invasive Non-Native Plant Species for Removal

Moderate Priority Species for Removal

Italian plumeless thistle (*Carduus pycnocephalus* ssp. *pycnocephalus*)

Italian plumeless thistle is an annual forb found in disturbed or open areas throughout California, including road edges, annual grasslands, and pastures (Cal-IPC 2012). In San Diego County, it is commonly found in disturbed drainages and riparian areas. This species has a Moderate Cal-IPC Inventory Rating (Cal-IPC 2012). It is rated as a moderate priority for control within the Property due to its ability to spread rapidly in disturbed habitats. The species was mapped within the south-central region of the Property where there are approximately 100 individuals (Figure 6). 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 to control.

Maltese star thistle (*Centaurea melitensis*)

Maltese star thistle is widespread in open or disturbed areas in the western United States. This species will occupy grasslands, open woodlands, roadsides, and agricultural fields (Cal-IPC 2012). This species has a Moderate Cal-IPC Inventory Rating (Cal-IPC 2012). The species was mapped in two locations in the Property, one in the southwestern corner and one along the northwestern border of the Property (Figure 6). The species is particularly prevalent in the southeastern corner of the Property where approximately 500 individuals were mapped in the vicinity of several other non-native species (Figure 6). The species is rated as "moderate" priority for control within the Property due to its ability to spread rapidly in disturbed habitats. Maltese star thistle is a common component of many communities, but was mapped herein for control where its presence was particularly abundant. A total of 11,200 individuals were mapped within the northern and southern regions of the Property (Figure 6), but additional scattered individuals are likely present. 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 to control.

Bull thistle (*Cirsium vulgare*)

Bull thistle is common in coastal grassland, marsh, and forest habitats, although it is of particular management concern in areas that are repeatedly disturbed, including overgrazed pastures or areas of recent burns (Cal-IPC 2012). Bull thistle outcompetes native species for limited

resources, such as water, nutrients, and space (Cal-IPC 2012). This species has a Moderate Cal-IPC Inventory Rating (Cal-IPC 2012). A patch of bull thistle was mapped within the southeastern region of the Property, in the vicinity of several other non-native species, where there are approximately 100 individuals (Figure 6). It is rated as a "moderate" priority for control within the Property due to its ability to spread rapidly in disturbed habitats. 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 to control.

Gum trees (*Eucalyptus camaldulensis, E. globulus*)

Gum trees (also called Eucalyptus trees) are found throughout California, and some species can be invasive in coastal California areas (Cal-IPC 2012). They are historically the most common exotic landscape trees in the County of San Diego (Lightner 2011). Leaf litter from this species has allelopathic effects, and excludes native species from taking root below the canopy (Cal-IPC 2012). The two most common species in San Diego County are blue gum (*Eucalyptus globulus*) and river red gum (*Eucalyptus camaldulensis*). Both species are considered invasive by Cal-IPC and can spread rapidly, particularly in riparian habitat. Blue gum has a Moderate Cal-IPC Inventory Rating and river red gum has a Limited rating (Cal-IPC 2012). Gum trees are ranked as a moderate priority for removal/control in the Property because of their tendency to displace native vegetation communities and spread into new areas, particularly along riparian corridors. In addition, this species is of concern for fire hazard since its physical characteristics (resin content) can increase fire intensity, transition ground fire to crown fires, and propagate spot fires through the dislodging of canopy material during windy conditions.

A total of 13 gum trees occur within the Property that were planted nearby two historic habitations; one in the southwest corner of the Property, and the other in the northeast corner of the Property (Figure 6). The gum trees were not mapped to species, but both blue gum and river red gum were observed on site. The best treatment for eucalyptus removal is through mechanical removal and herbicidal treatments (Bossard 2000). Treatment can occur any time of year, but best results have been achieved when cutting occurs in fall (Bossard 2000). Eucalyptus trees may be cut and sprayed with the appropriate herbicide, or trees may be removed with the use of girdling and herbicidal treatment. Herbicides should be applied within the first 1 to 2 minutes following cutting. Follow-up herbicidal treatment may be necessary since sucker growth may occur. Small saplings or seedlings can be removed by manually removing from the soil by hand pulling.

Low Priority Species for Removal

Redstem stork's bill (*Erodium cicutarium*)

Redstem stork's bill is small, aggressive annual/biannual in the Geraniaceae family that is very widespread throughout California and is commonly found along roadsides, grasslands, fields, and semi-desert areas (Cal-IPC 2012). It often carpets large areas, out-competing native grasses and forbs (Cal-IPC 2012). This species has a Moderate Cal-IPC Inventory Rating (Cal-IPC 2012). Redstem stork's bill is ubiquitous in San Diego County and was observed occasionally within the Property. It was mapped in the northwest corner of the Property, where there are at least 500 individuals (Figure 6). The species was ranked as low priority for control within the Property due to its limited ability to displace coastal scrub and chaparral communities. However, the species has the ability to spread and re-establish quickly in disturbed areas and should be controlled as feasible. Control of this species could include either mechanical or herbicide treatment. Control should be focused during the winter and early spring months before the species develops seed. Plants can be pulled or treated with an appropriate herbicide to control.

Shortpod mustard (*Hirschfeldia incana*)

Shortpod mustard is a biennial or perennial forb found in coastal scrub and grassland habitats (Cal-IPC 2012). This species has a Moderate Cal-IPC Inventory Rating (Cal-IPC 2012). Shortpod mustard is prevalent in San Diego County and was observed sporadically within the Property and occasionally within concentrated areas. One thousand individuals of shortpod mustard were mapped in the southwestern region of the Property and 1,000 individuals were mapped in annual brome grasslands along the east-central border (Figure 6). An additional 5,000 individuals were mapped within the southeastern region of the Property. The species was ranked as low priority for control within the Property due to its limited ability to displace coastal scrub and chaparral communities. However, the species has the ability to spread and reestablish quickly in disturbed areas and should be controlled as feasible. Control of this species could include either mechanical or herbicide treatment. The species produces abundant seed. Thus, removal of plant material that has seed present is important. 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 to control.

London rocket (*Sisymbrium irio*)

London rocket is a winter annual forb in the Brassicaceae family. The species can be found in abandoned fields, waste places, roadsides, and orchards (Cal-IPC 2012). It matures earlier in the year than native species, allowing it to out-compete them (Cal-IPC 2012). London rocket is not abundant on the Property, but approximately 20 individuals were observed in annual brome

grasslands in the southeast corner (Figure 6). The species was ranked as low priority for control within the Property due to its limited presence in the Property and limited ability to displace coastal scrub and chaparral communities. However, the species has the ability to spread and reestablish quickly in disturbed areas and should be controlled as feasible. Control of this species could include either mechanical or herbicide treatment. The species produces abundant seed. Thus, removal of plant material that has seed present is important. 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 to control.

Smooth cat's ear (*Hypochaeris glabra*)

Smooth cat's ear is an annual flowering herb in the Asteraceae family found throughout California, except in the Great Basin and desert (Cal-IPC 2012). Smooth cat's ear prefers disturbed places, such as roadsides, orchards and landscaped areas, as well as grasslands, woodland and scrub and is commonly found in overgrazed rangeland (Cal-IPC 2012). Smooth cat's ear is prevalent in San Diego County but was observed only occasionally within the Property. Approximately 100 individuals of smooth cat's ear were mapped in the southeastern corner of the Property (Figure 6). The species was ranked as low priority for control within the Property due to its limited presence in the Property and limited ability to displace coastal scrub and chaparral communities. Control of this species could include either mechanical or herbicide treatment. Control should be focused during the winter and early spring months before the species develops seed. Young plants can be pulled or treated with an appropriate herbicide to control.

Horehound (*Marrubium vulgare*)

Horehound is a shrub in the Lamiaceae family that is commonly found in disturbed areas in California, including grasslands and riparian areas (Cal-IPC 2012). This species most likely only has a minor impact on native species, but can become locally prevalent in disturbed areas. It has a Limited Cal-IPC Inventory Rating (Cal-IPC 2012). One individual was mapped within the western border of the Property (Figure 6). Recommended control for this species includes manual or herbicide control. Since it is a shrub species, pulling the plants will likely not be effective unless they are young. Therefore, manual control would require digging the plants out of the ground to remove the roots. Alternatively, the stems of the shrub could be severed and then treated with an herbicide to control.

Olive (*Olea euopaea*)

Olive is a common agricultural crop in California, but it can spread to open space areas (Cal-IPC 2012). Olives produce hundreds of seeds that are easily dispersed. This species has invaded throughout Southern California and the Central Valley (Cal-IPC 2012). Olive has a Limited Cal-IPC Inventory

Rating (Cal-IPC 2012). Five individuals were mapped in the southwestern region of the Property, and eleven individuals were mapped in the northeastern corner, apparently associated with historic habitations (Figure 6). It is ranked as a low priority for removal/control within the Property due to its limited distribution and low potential to colonize the surrounding area. Recommended control of this species includes mechanical removal and treatment of the stump with an appropriate herbicide.

Curly dock (*Rumex crispus*)

Curly dock is a perennial forb that grows in grassy areas, roadsides, flood plains, and agricultural areas (Cal-IPC 2012). In San Diego County, this species is particularly prevalent in disturbed drainages and riparian areas. This species has a Limited Cal-IPC Rating (Cal-IPC 2012). The species was mapped in the south-central region and also in the southeastern region of the Property where approximately 40 individuals were documented (Figure 6). 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 prior to the development of mature seed heads. Should control not occur prior to 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.

Peruvian peppertree (*Schinus molle*)

Peruvian peppertree is an aromatic, evergreen shrub or tree. Peruvian peppertree has escaped cultivation to become invasive in central and Southern California (Cal-IPC 2012). This species has a Limited Cal-IPC Inventory Rating (Cal-IPC 2012). One Peruvian peppertree was mapped in the southwestern region of the Property, and was likely planted (Figure 6). It is ranked as a low priority for removal/control within the Property due to its low potential to colonize into surrounding upland areas, and limited abundance in the Property. Recommended control methods include mechanical removal and application of an appropriate herbicide to remaining stump and plant parts. Follow-up herbicide control may be required.

Brazilian peppertree (*Schinus terebinthifolius*)

Brazilian peppertree is not currently a large problem in California, but it has been an aggressive invader in Hawaii and Florida (Cal-IPC 2012). This species is found in riparian areas, canyons, fields and roadsides in areas where water is available. Brazilian peppertree has a Limited Cal-IPC Inventory Rating (Cal-IPC 2012). Within the Property, there are two individuals mapped in northeastern corner, and were likely planted (Figure 6). It is ranked as a low priority for removal/control within the Property due to its low potential to colonize into surrounding upland areas, and limited abundance in the Property. Recommended control methods include mechanical removal and application of an appropriate herbicide to remaining stump and plant parts. Follow-up herbicide control may be required.

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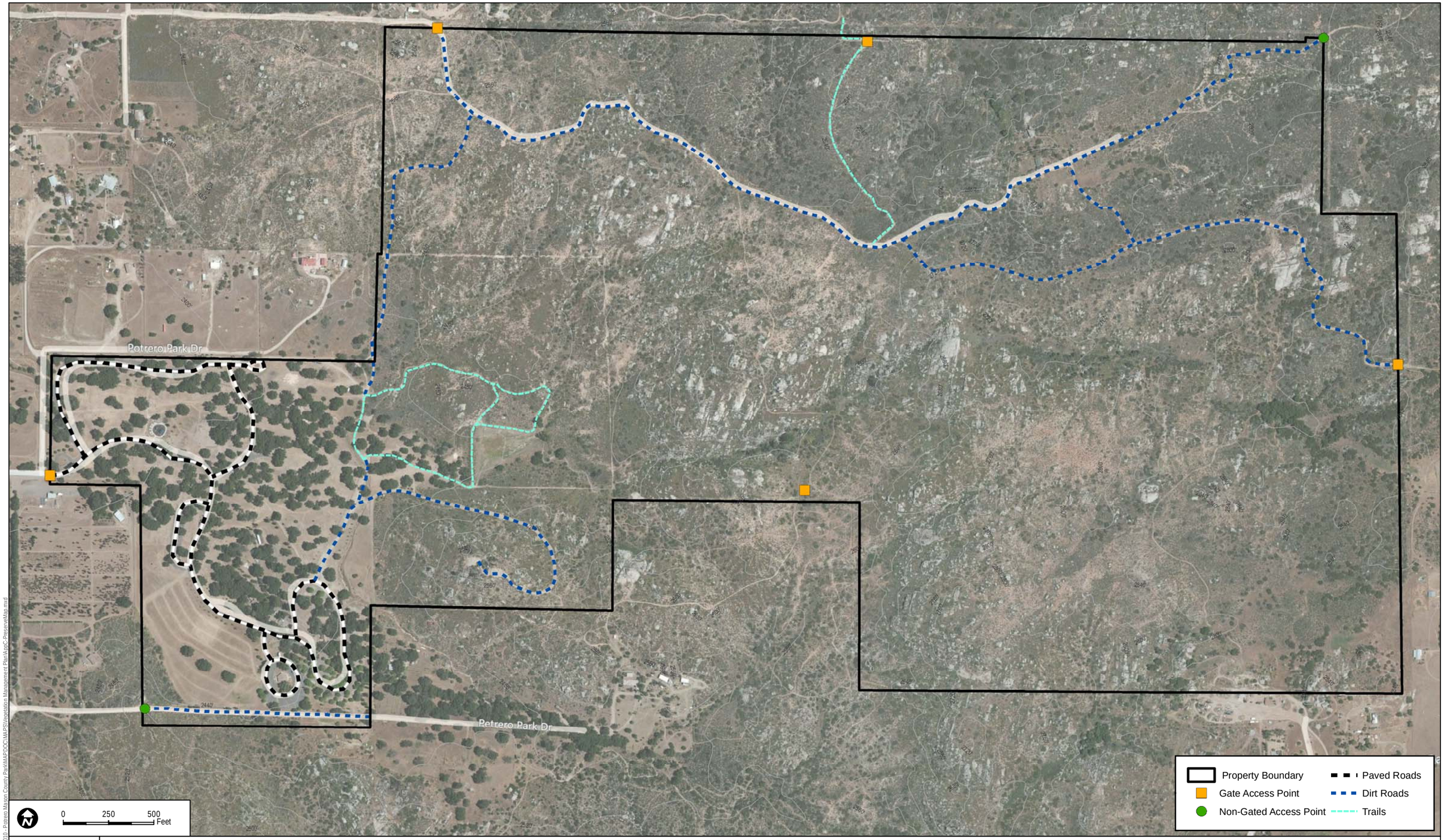
APPENDIX C

Property Map with Access Points



Path: Z:\Projects\6680010\668010 - Potrero Mason County Park\MAPDOC\MAPS\Vegetation Management Plan\MapInfo Preserve Map.mxd

DUDEK

6680-10

SOURCE: Bing,SanGIS 2012

APPENDIX C

Preserve Map with Access Points

Potrero Mason Property - Vegetation Management Plan

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APPENDIX D

Fire Behavior Modeling Results

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 Potrero Mason Property (Property), 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 Property.

> 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. In general, the fuels on the Property 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 Property 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 Property, vegetative cover is classified into four main types: grass, chaparral, sage scrub, and woodland. Recent fires have created low-volume fuel beds throughout much of the Property. 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). Five fuel models (models 1, GR2, SCAL18, SH5, and TU5) were used in the FlamMap analysis for the Property 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 five fuel models used in the analysis conducted for Property.

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
GR2	Low load, dry climate grass	1.1 tons/acre; 8,000 Btu/lb	1.0
SCAL18	Sage/buckwheat	9.7 tons/acre; 9,200 Btu/lb	3.0
SH5	High load, dry climate 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 Property 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 Property.

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 Property. 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 Property.

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 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 C-1 through C-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 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 (Dudek 2012), 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 Property.
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
Coast Live Oak Woodland	GR2	3
Coastal Sage-Chaparral Transition	SH5	0
Coastal Scrub	SCAL18	0
Diegan Coastal Sage Scrub	SCAL18	0
Disturbed Habitat	1	0
Eucalyptus Woodland	TU5	3
Field/Pasture	1	0
Foothill/Mountain Perennial Grassland	1	0
Non-Native Grassland	1	0
Northern Mixed Chaparral	SH5	0
Scrub Oak Chaparral	SH5	0
Southern Mixed Chaparral	SH5	0
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–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 Property 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	5 - 9 %	5 - 9 %
Reference Fuel Moisture	1 %	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	2 %	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	2%	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)	18 mph	56 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 C-1–C-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 Property 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 Property is determined to be vulnerable to wildfire starting in, burning onto, or spotting onto the site. Based on this information, potential ignition sources in the region, and the fire history of the area, it is expected that wildfires will occur on the Property in the future.

Under Peak weather conditions, fire can move rapidly through the site's fuels. Worst-case flame lengths were calculated at approximately 45 feet in chaparral vegetation types and approximately 42 feet in sage scrub vegetation on slopes exceeding 45% throughout the Property. 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 21,000 Btu/feet/second limiting the options for fire response personnel.

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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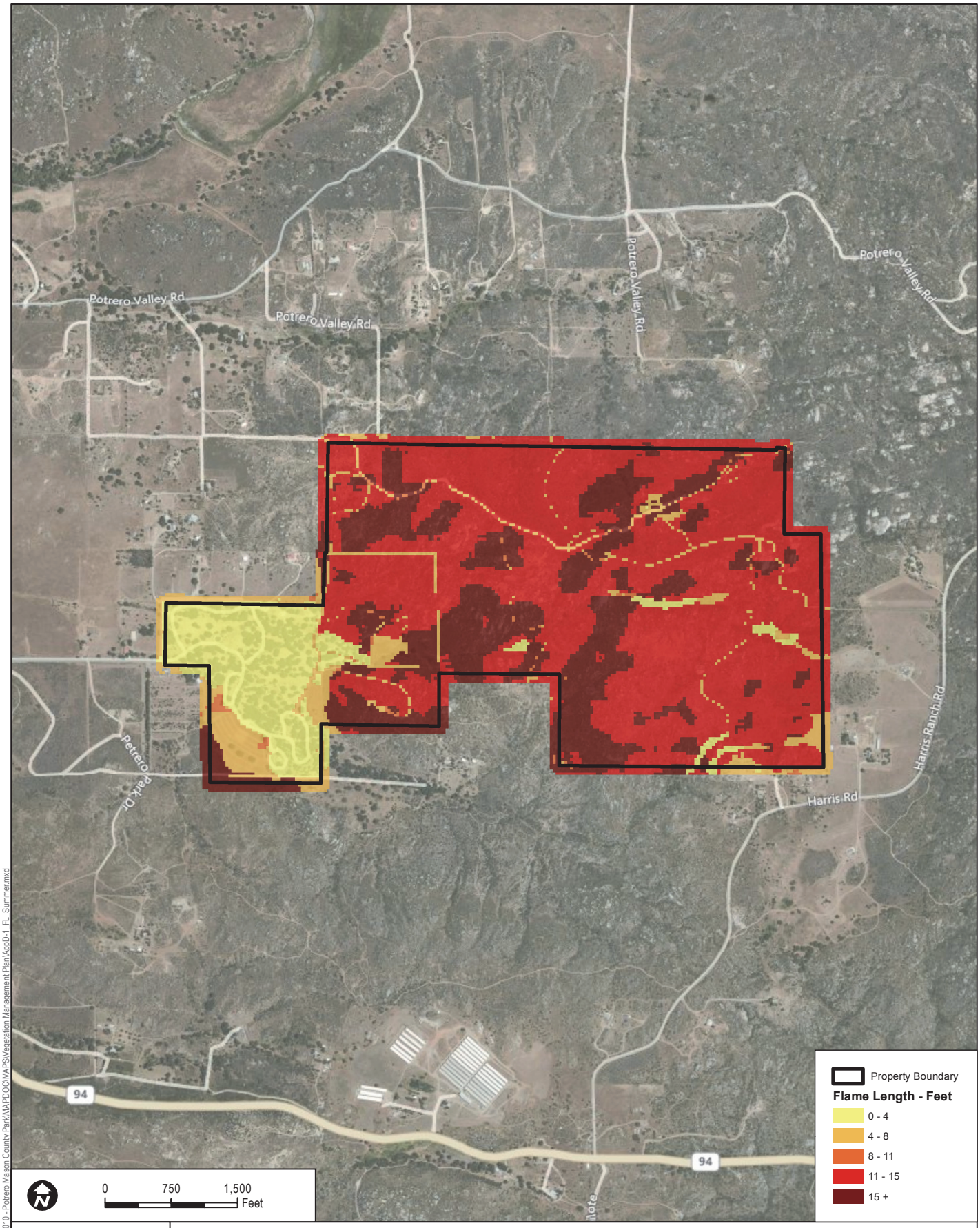

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6680-10

SOURCE: Bing

APPENDIX D-1

Flame Length, Summer Fire

Potrero Mason Property - Vegetation Management Plan

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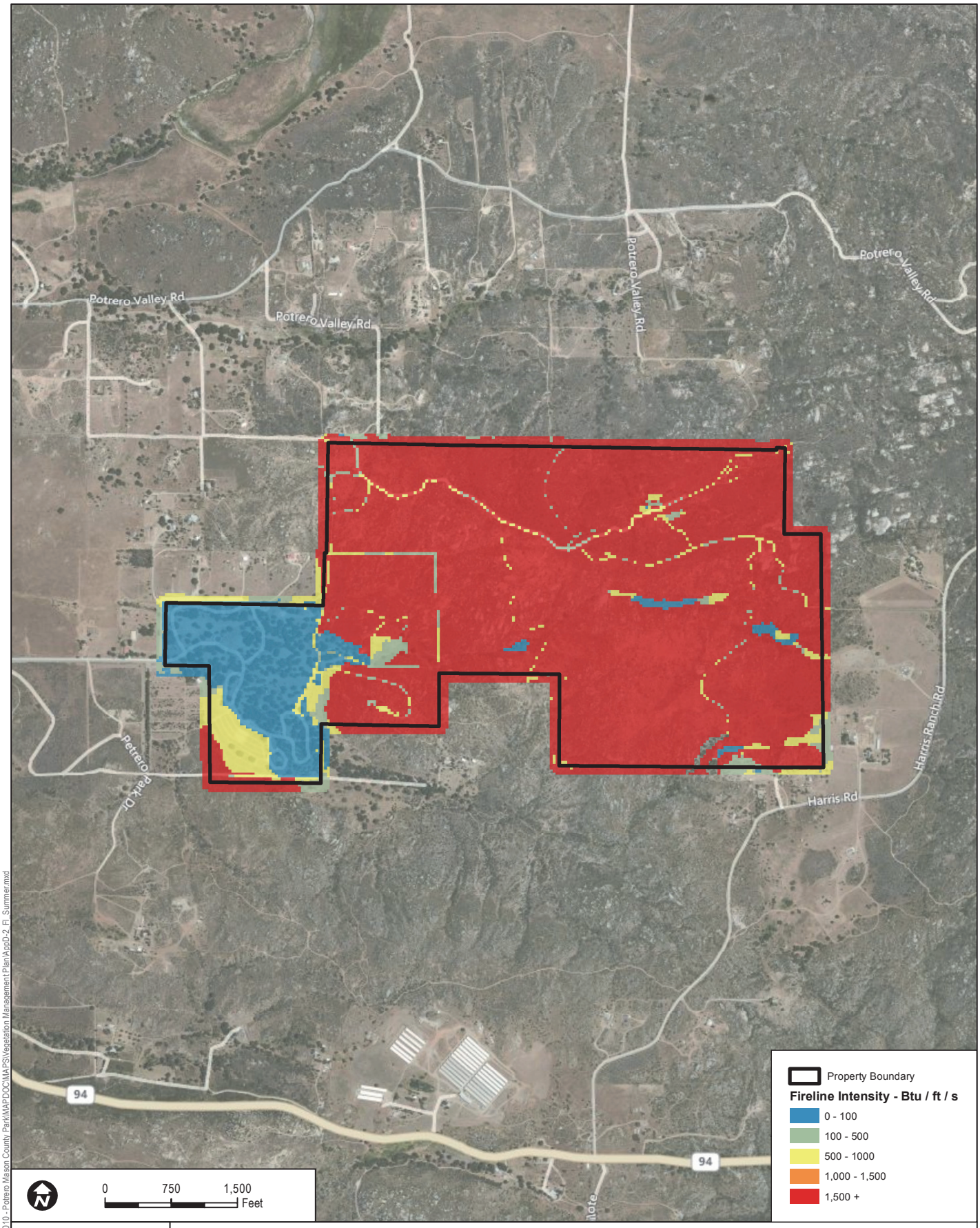

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SOURCE: Bing

APPENDIX D-2

Fireline Intensity, Summer Fire

Potrero Mason Property - Vegetation Management Plan

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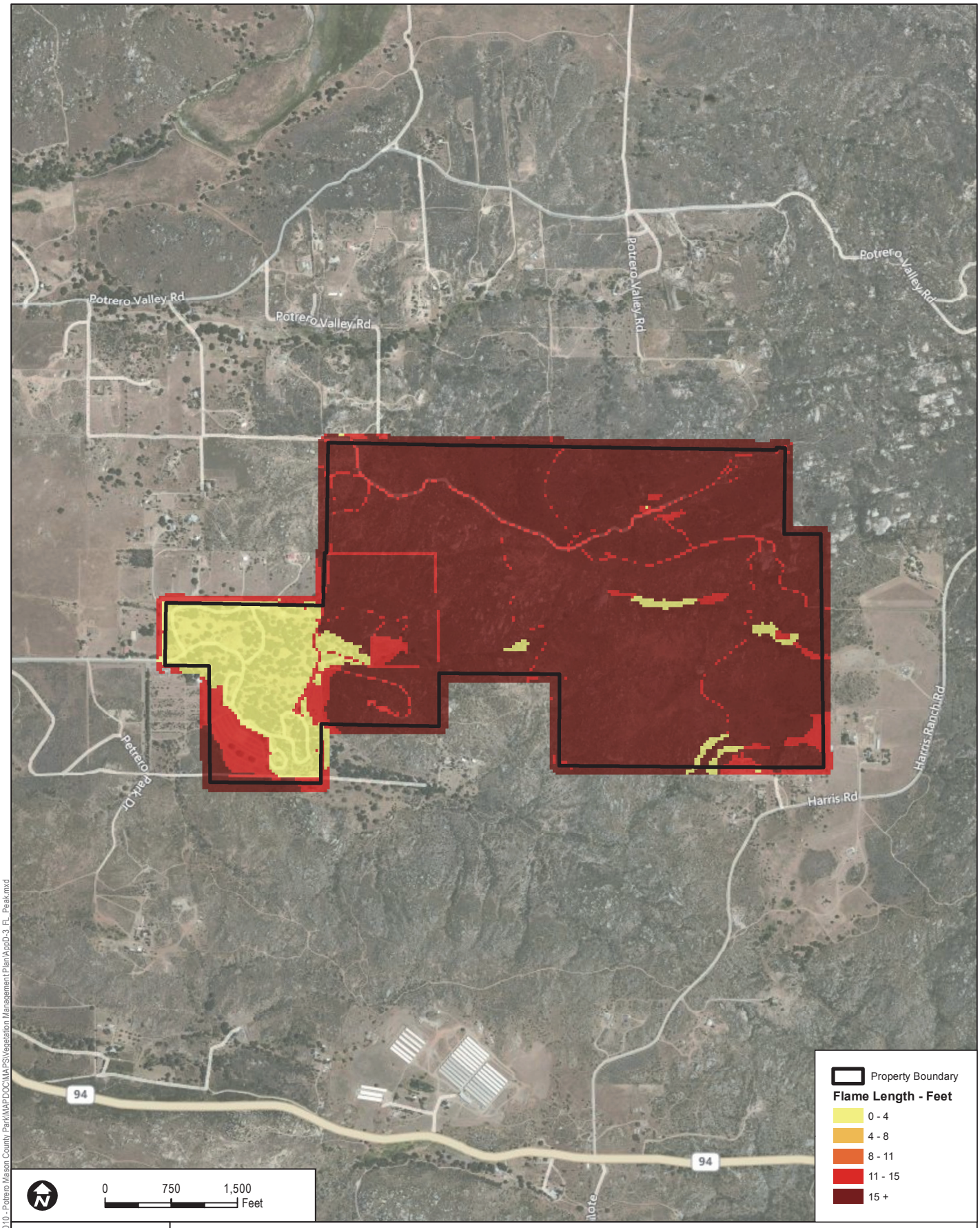

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SOURCE: Bing

APPENDIX D-3

Flame Length, Fall Fire

Potrero Mason Property - Vegetation Management Plan

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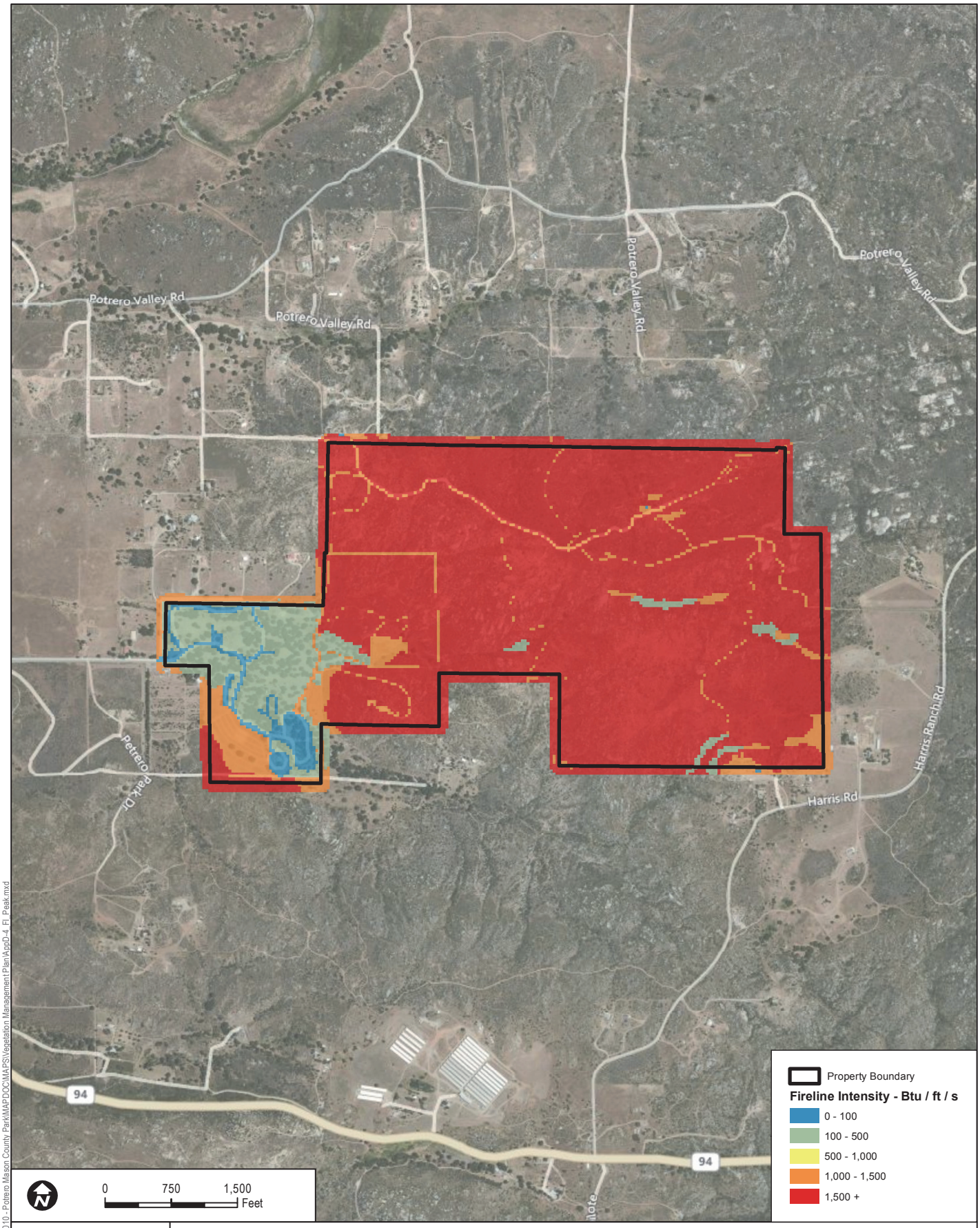

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SOURCE: Bing

APPENDIX D-4

Fireline Intensity, Fall Fire

Potrero Mason Property - Vegetation Management Plan

Path: Z:\Projects\6680010\6680010 - Potrero Mason County Park\MAPDOC\MAPS\Vegetation Management Plan\AppD-4_FI_Peak.mxd

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