Vegetation Management Report
for the Wilderness Gardens Preserve
San Diego County, California

Pala, California, USGS 7.5-minute Topographic Quadrangle Map
Township 9 South, Range 1, 2 West, Sections 31-36

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Table of Contents

List of Tables

List of Exhibits

GLOSSARY OF TERMS AND ACRONYMS

°F	degrees Fahrenheit
APN	Assessor's Parcel Numbers
CalFire	California Department of Forestry and Fire Protection
DPR	Department of Parks and Recreation
EPA	U.S. Environmental Protection Agency
FMU	Fire Management Unit
FRA	Federal Responsibility Area
GIS	Geographic Information System
I	Interstate
MBA	Michael Brandman Associates
mph	miles per hour
SR	State Route
SRA	State Responsibility Lands
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WUI	Wildland Urban Interface

EXECUTIVE SUMMARY

Michael Brandman Associates (MBA) prepared this Vegetation Management Report for the Wilderness Gardens Preserve (Preserve) as part of the ongoing effort of the County of San Diego Department of Parks and Recreation (DPR) to manage the vegetation communities, biological and cultural resources within their park system. The Preserve is located approximately nine miles east of Interstate (I) 15 and immediately south of State Route (SR) 76/Pala Road, in the northern portion of San Diego County, California. The 732.4-acre Preserve is owned and managed by the County of San Diego. (The assessor's parcel data lists the Preserve as 737.07 acres; however, calculations generated from GIS data show the Preserve as 732.4. Therefore, this report references the property as 732.4 acres.)

This Vegetation Management Report characterizes current site conditions, biological and cultural resources, and provides recommendations for invasive species control, habitat restoration, and fire management. Vegetation management within the Preserve is aimed at both controlling non-native, invasive plant species, and managing vegetation fuel loads. The majority of the Preserve supports native plant communities that benefit from natural wildfires. However, a few areas support limited stands of non-native invasive plants that should be managed to suppress competition for resources and enhance native species survival in preserved wildlands and restored areas. Active vegetation fuel load management will focus on wildland-urban interface areas, such as trails, roads, and other public access areas.

Sensitive biological and cultural resources to be protected in this report were identified in the Baseline Biodiversity Report (MBA 2010) and Cultural Resource Inventory (MBA 2009), respectively. Biological and cultural surveys were conducted in 2009 to establish the baseline inventory that serves as the foundation for this report.

1.0 INTRODUCTION

Wilderness Gardens Preserve (Preserve) is an approximately 732.4-acre open space preserve owned and managed by the County of San Diego (County). The County designated the Preserve in 1973 and it is the oldest open space preserve in San Diego County. The Preserve has approximately four miles of designated trails and access roads and is currently open for public recreational use.

1.1 Purpose and Need

This Vegetation Management Report characterizes current site conditions and provides recommendations for invasive species control, habitat restoration, and fire management. These recommendations will ultimately be included in a Resource Management Plan for the Preserve.

1.2 Site Location and Description

The Preserve is generally located north of SR-78, south of SR-76, east of I-15, and west of Cleveland National Forest (Exhibit 1). It can be found on the Pala, California, United States Geological Survey (USGS) 7.5-minute topographic quadrangle map, Section 31 of Township 9 South, Range 1 West; Section 36 of Township 9 South, Range 2 West; and Section 6 of Township 10 South, Range 1 West (Exhibit 2). The Preserve is specifically located immediately south of SR-76/Pala Road between Pauma Ridge Road and Pala Mission Road (Exhibit 3).

The preserve is located adjacent to Pala Mountain and the San Luis Rey River, and is comprised of the following Assessor's Parcel Numbers (APNs):

110-190-040	110-190-120	111-070-220
110-190-050	110-190-150	
110-190-080	110-190-170	

Wildland Urban Interface

The Wildland Urban Interface (WUI) lands contain scattered rural residences with agricultural orchards north of SR-76. The community of Pala and Pala Resort and Spa Casino are approximately one mile west of the Preserve. Pauma Indian Reservation lands are approximately 1.5 miles southeast of the Preserve.

There is a gated public access road off SR-76 leading into the Preserve that is open on a limited daily basis. There are a several administrative buildings located adjacent to the staging area near the historic Sickler's Grist Mill on the Preserve.

Structure Density

There are administrative buildings located within the Preserve (Exhibit 4) and several historic features are scattered throughout the Preserve. A residence associated with an orchard is immediately adjacent to the Preserve entrance off SR-76. No buildings occupy private ground immediately adjacent to the property to the north, east or west, but to the northeast, across SR-76, many orchards and agricultural fields exist.

1.3 Vegetation Management Goals and Objectives

Vegetation management within the Preserve is aimed at both controlling non-native, invasive plant species, and managing vegetation fuel loads. The majority of the Preserve supports native plant communities that benefit from natural wildfires, which clear the accumulated fuel and under-brush. However, a few areas support limited stands of non-native, invasive plants that should be managed to suppress competition for resources and enhance native species survival in preserved wildlands and restored areas.

The majority of the non-native, invasive species observed on the Preserve are located within the San Luis Rey River floodplain and have been targeted for removal. Active vegetation fuel load management will focus on WUI areas, such as buildings, trails, roads, and other public access areas. Several methods for non-native, invasive plant species removal and for reduction of vegetation fuel loads are provided below in Section 3.2.

Source: Census 2000 Data, The CaSIL, MBA GIS 2009.

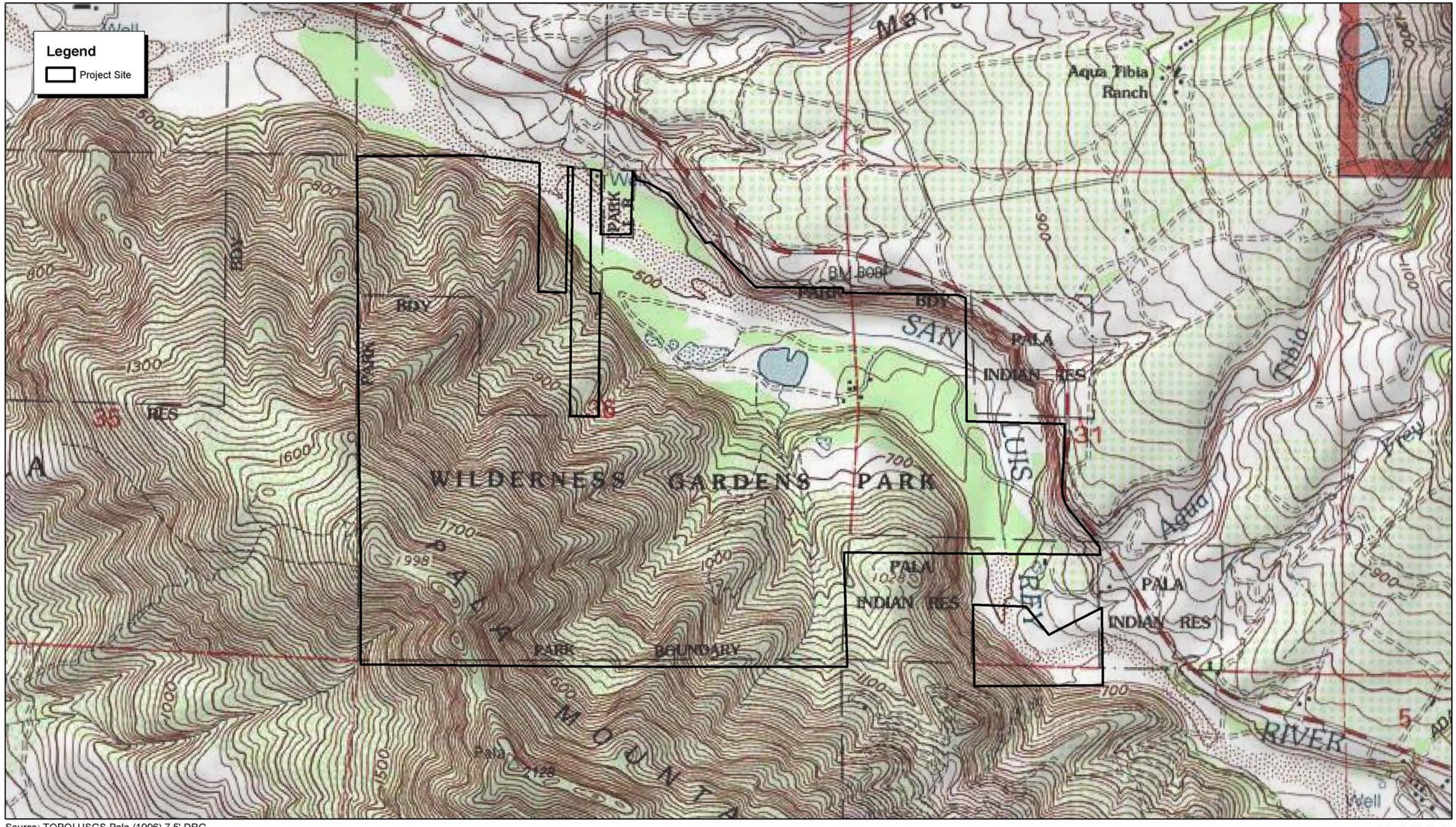
NORTH

5 2.5 0 5

Miles

Michael Brandman Associates

Exhibit 1
Regional Location Map



Source: TOPO! USGS Pala (1996) 7.5' DRG.

NORTH

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Michael Brandman Associates

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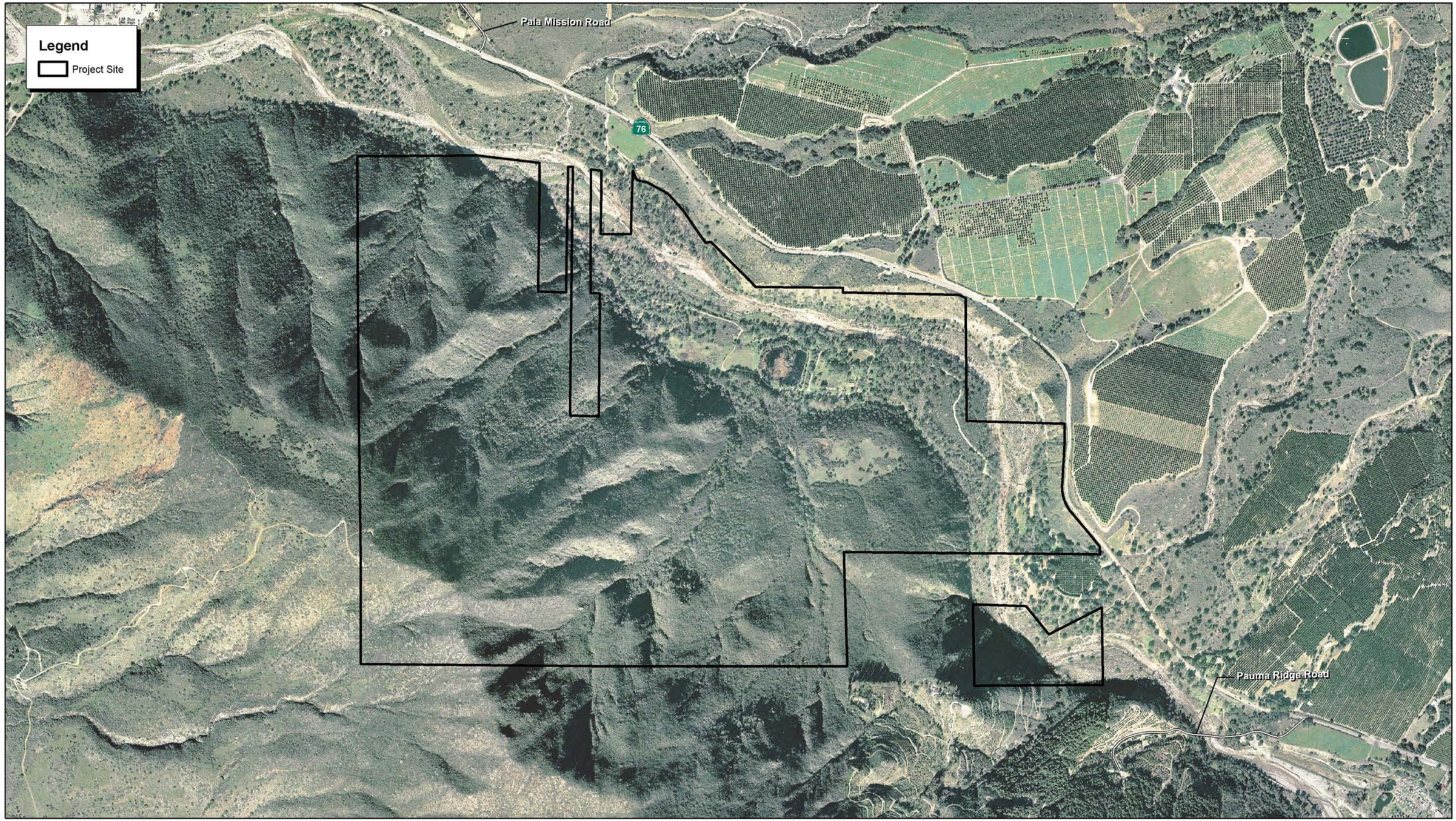
Exhibit 2
Local Vicinity Map
Topographic Base



Source: San Diego North Aerial, 2005.

NORTH

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Michael Brandman Associates

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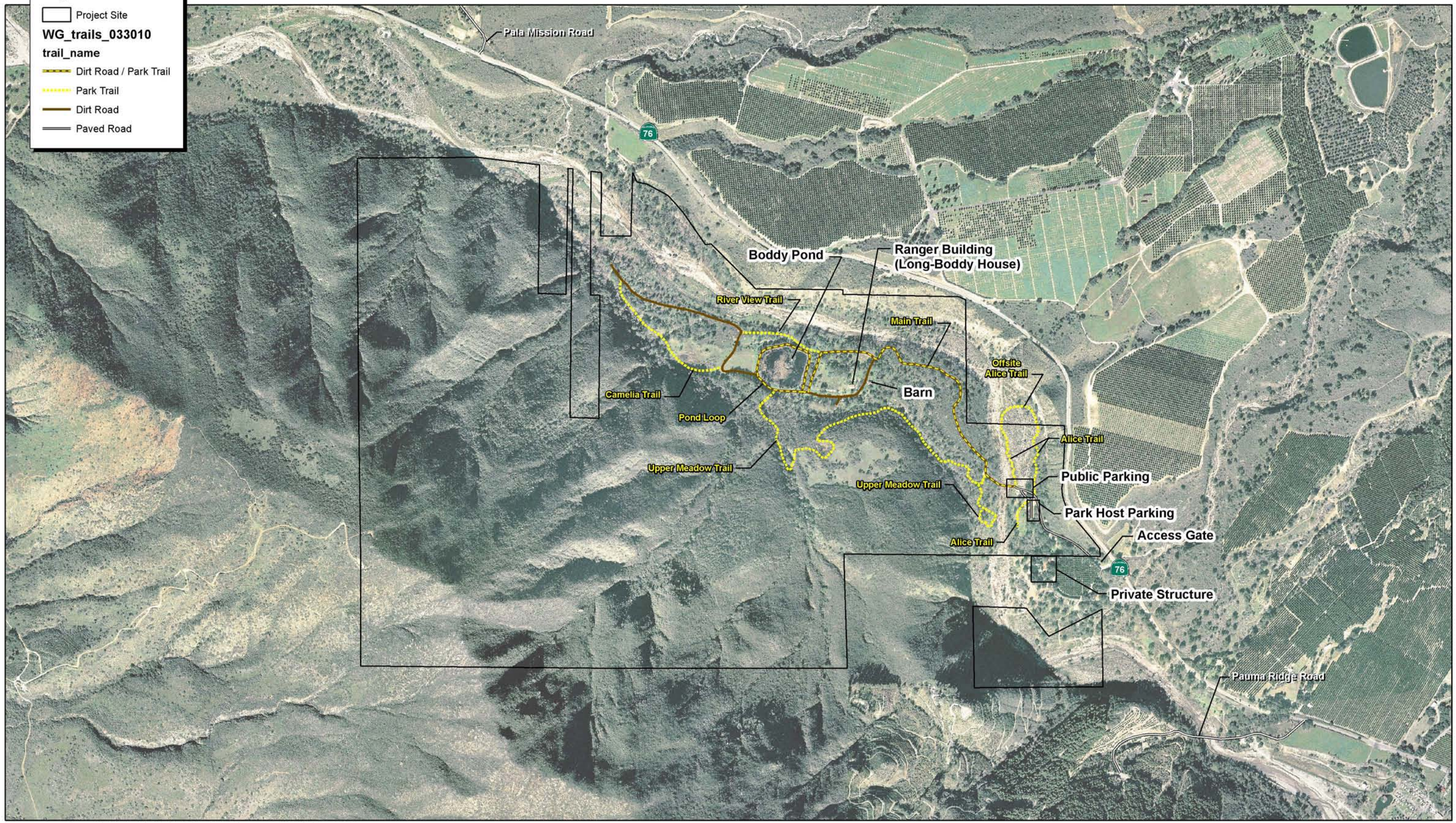
Exhibit 3
Local Vicinity Map
Aerial Base



Source: San Diego North Aerial, 2005. MBA Field Survey and GIS Data, 2009.

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Michael Brandman Associates

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Exhibit 4
Preserve Facilities

2.0 ENVIRONMENTAL RESOURCES

Baseline surveys were conducted from May through September 2009 to determine the biological and cultural resources present within the Preserve.

2.1 Biological Resources

Baseline biological surveys identified 15 habitat types, 169 plant taxa including two special-status species, and 161 wildlife species including nine special-status species, as occurring within the Preserve during the 2009 baseline surveys (MBA 2010).

2.1.1 Vegetation Communities

Table 1 reflects the vegetation communities/habitat types found within the Preserve. A total of 15 vegetation communities or habitat types occur within the Preserve including, chamise chaparral, dense coast live oak woodland, Diegan coastal sage, disturbed habitat, freshwater marsh, native grassland, non-native grassland, non-vegetated channel, open coast live oak woodland, open water, ornamental woodland, southern mixed chaparral, southern riparian forest, and developed land. Table 1 below provides a summary of the vegetation community acreages as illustrated in Exhibit 5.

Table 1: Vegetation Communities Found in the Wilderness Gardens Preserve

Vegetation Community/Habitat	Approximate Area (acres)
granitic chamise chaparral (37210)	42.47
dense coast live oak woodland (71162)	28.23
Diegan coastal sage scrub (32500)	38.08
disturbed habitat (11300)	5.90
freshwater marsh (52400)	2.37
mule fat scrub (63310)	0.34
native grassland (42100)	1.84
non-native grassland (42200)	40.49
non-native vegetation (11000)	1.64
non-vegetated channel (64200)	18.75
open coast live oak woodland (71161)	74.90
open water (64100)	1.05
southern mixed chaparral (37120)	473.11
southern riparian forest (61300)	2.12
developed land (12000)	1.11
Total	**732.4**

2.1.2 Sensitive Plant Species

Two special-status plant species were observed during the 2009 baseline surveys conducted by MBA and include heart-leaved pitcher sage (*Lepechinia cardiophylla*) and thread-leaf brodiaea (*Brodiaea filifolia*). Rainbow manzanita (*Arctostaphylos rainbowensis*) was previously recorded as occurring within the Preserve (CNDDB 2009), but was not verified during the surveys.

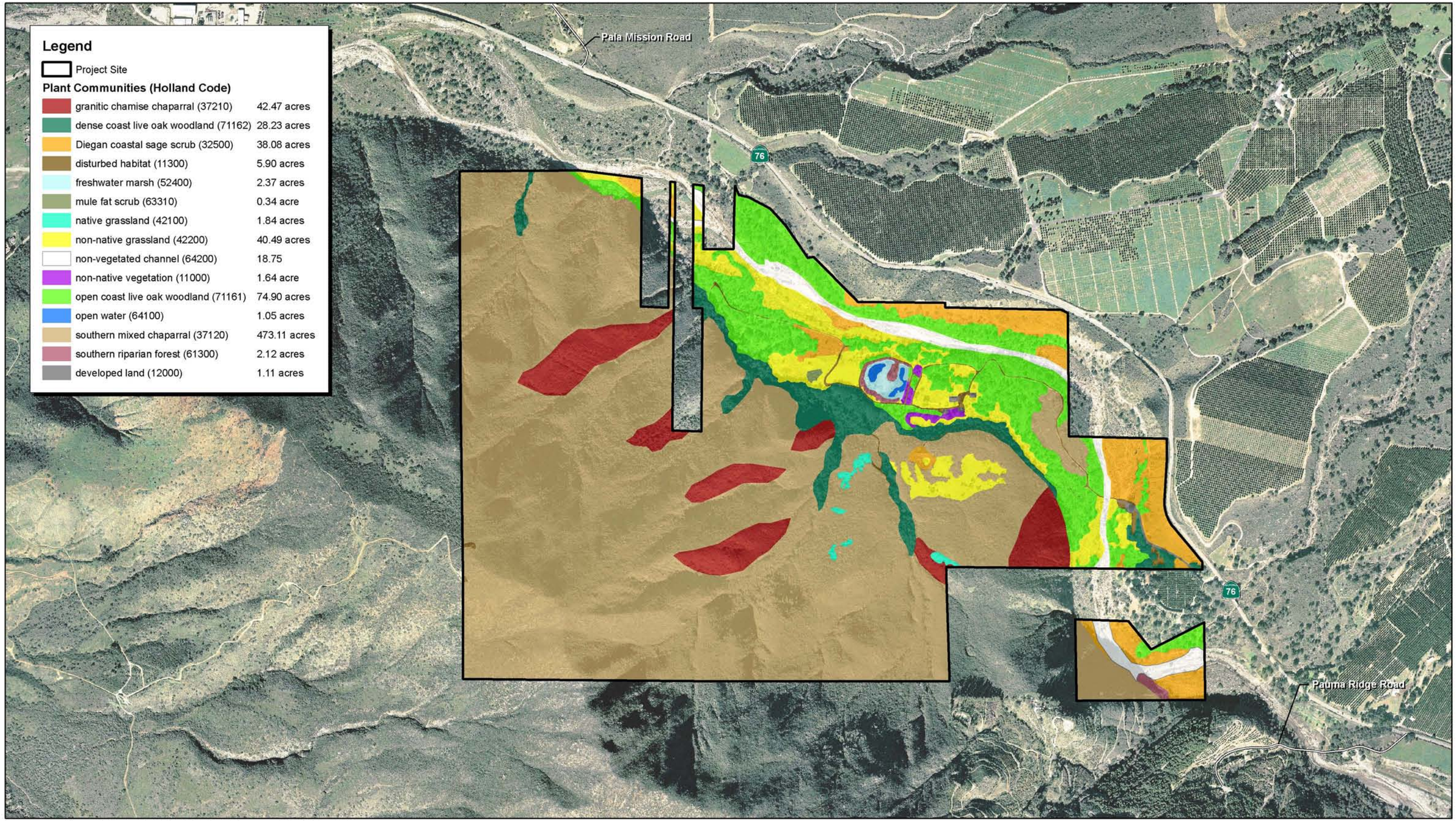
2.1.3 Sensitive Animal Species

Nine special-status wildlife species were observed or detected during the surveys conducted by MBA. These species observed include:

- orange-throated whiptail (*Cnemidophorus hyperythrus*)
- Coronado skink (*Eumeces skiltonianus interparietalis*)
- San Diego ringneck snake (*Diadophis punctatus* ssp. *similis*)
- Cooper's hawk (*Accipiter cooperii*)
- turkey vulture (*Cathartes aura*)
- San Diego desert woodrat (*Neotoma lepida*)
- California pocket mouse (*Chaetodipus californicus*)
- Mexican long-tongued bat (*Choeronycteris mexicana*)
- pallid bat (*Antrozous pallidus*)

2.2 Cultural Resources

The Preserve contains both prehistoric and historic cultural resources including the Sickler's Grist Mill, which is listed as a San Diego County Historic Property. Based on the results of the record searches, background information, and the results of field survey, all prehistoric cultural resource sites in the Preserve are considered significant by County Guidelines (MBA 2009).



Source: San Diego North Aerial, 2005. MBA Field Survey and GIS Data, 2010.

NORTH

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Exhibit 5
Vegetation Communities Map

COUNTY OF SAN DIEGO PARKS • WILDERNESS GARDENS PRESERVE
VEGETATION MANAGEMENT REPORT

3.0 INVASIVE SPECIES MANAGEMENT

Invasive plants are opportunistic species that rapidly colonize large areas, particularly when there has been recent disturbance. These species should be managed to suppress competition for resources and enhance native species survival in preserved wildlands and restored areas.

3.1 Target Invasive Species

The majority of the non-native, invasive plant species observed within the Preserve are located within the floodplain of the San Luis Rey River and surrounding the pond (Exhibit 6). Table 2 lists the species targeted for removal that were observed at the Preserve during the baseline surveys conducted in 2009.

Table 2: Target Invasive Plant Species Observed at Wilderness Gardens

Scientific Name	Common Name	Cal-IPC Invasive Rank
Arundo donax	giant reed	High
Centaurea solstitialis	yellow star thistle	High
Nerium oleander	oleander	*
Nicotiana glauca	tree tobacco	Moderate
Olea europaea	European olive	Limited
Schinus molle	Peruvian pepper tree	Limited
Ricinus communis	castor bean	Limited
Tamarix ramosissima	Mediterranean tamarisk	High
* While not listed as invasive, oleander is a non-native ornamental species originally planted in many areas, and should be removed to restore natural habitat.		

3.2 Removal Methods

Depending on the species and volume of weeds that appear on the site, several weed control methods may be used effectively, including manual pulling, and/or selective herbicide applications as described below.

3.2.1 Manual Removal

All non-native, invasive weeds should be removed manually, if feasible. Plants should be completely uprooted manually before they reach six inches tall and before they produce seed, whichever comes first. Pulled weeds should be placed on a tarp or similar device to prevent the seeds from touching the ground and aid in off-site removal. All weed debris should be disposed of off-site as permitted by law.

3.2.2 Herbicides

In circumstances where manual control is not effective, appropriate systemic herbicides such as Rodeo, Roundup, etc. may be used. Herbicides applied near or in aquatic sites, must first be approved by the U.S. Environmental Protection Agency (EPA) for use. Foliar herbicide application should be conducted when wind speeds are less than five miles per hour to avoid unintentional spray of adjacent vegetation.

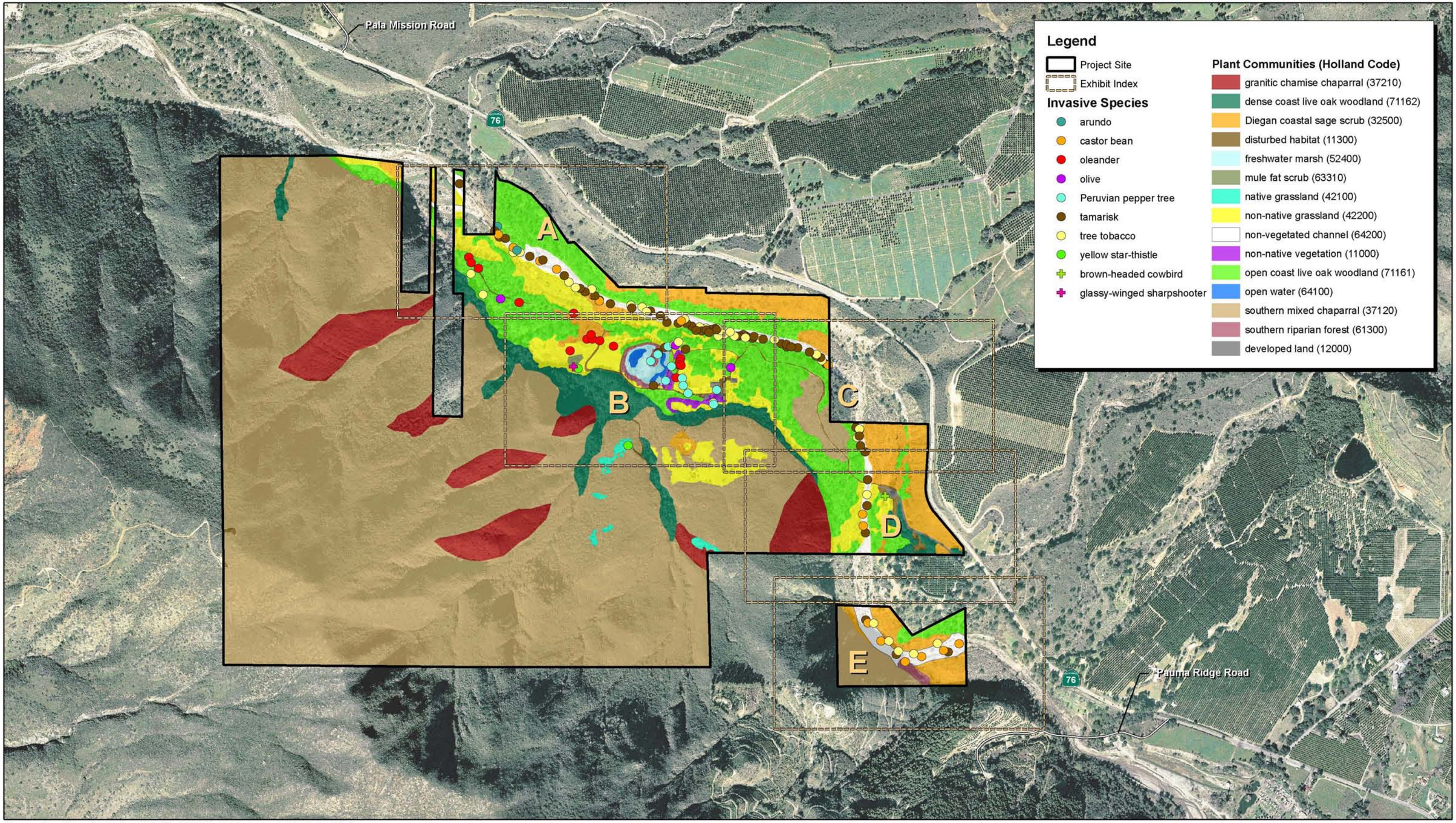
Since the invasive species are located within the San Luis Rey River floodplain, herbicide application within the Preserve is not advised. However, if recommended by a qualified biologist, appropriate herbicides may be used when more than 25 percent of the area is occupied by weeds greater than six inches in height. Herbicides should be applied selectively, and supervised by maintenance personnel familiar with native vegetation, to avoid damaging native plant species.

3.2.3 Mechanical Removal

Mechanical removal is often useful when extensive areas have been invaded by large non-native species such as giant reed (*Arundo donax*), or pepper trees (*Schinus* sp.), or in areas that are already subject to significant human disturbance. The Preserve does not currently exhibit these characteristics; however, mechanical removal may be employed if recommended by a qualified biologist in the future.

3.2.4 Cut and Daub

The cut and daub method is often used to control large tamarisk (*Tamarix* sp.) plants when they do not respond to foliar herbicide application. The plant is cut to the stump and herbicide is daubed on the entire cut area within 30 seconds. The Preserve currently supports tamarisk within the San Luis Rey River flood plain and around the pond; therefore, this method may be used on larger individuals.



Source: San Diego North Aerial, 2005. MBA Field Survey and GIS Data, 2010.

Michael Brandman Associates

NORTH

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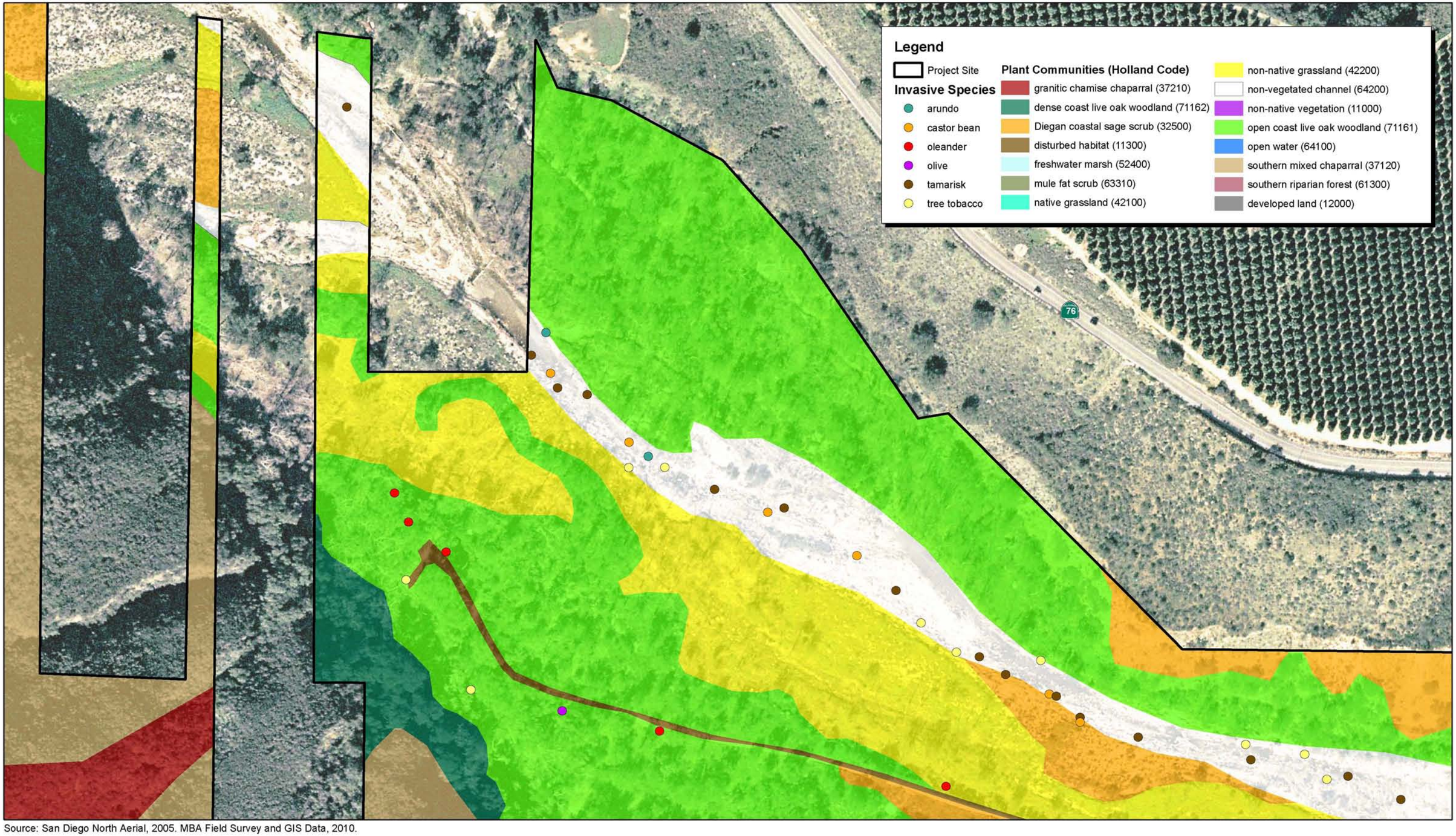
Exhibit 6
Invasive Species Index Map



Source: San Diego North Aerial, 2005. MBA Field Survey and GIS Data, 2010.

NORTH

190 95 0 190

Feet

Michael Brandman Associates

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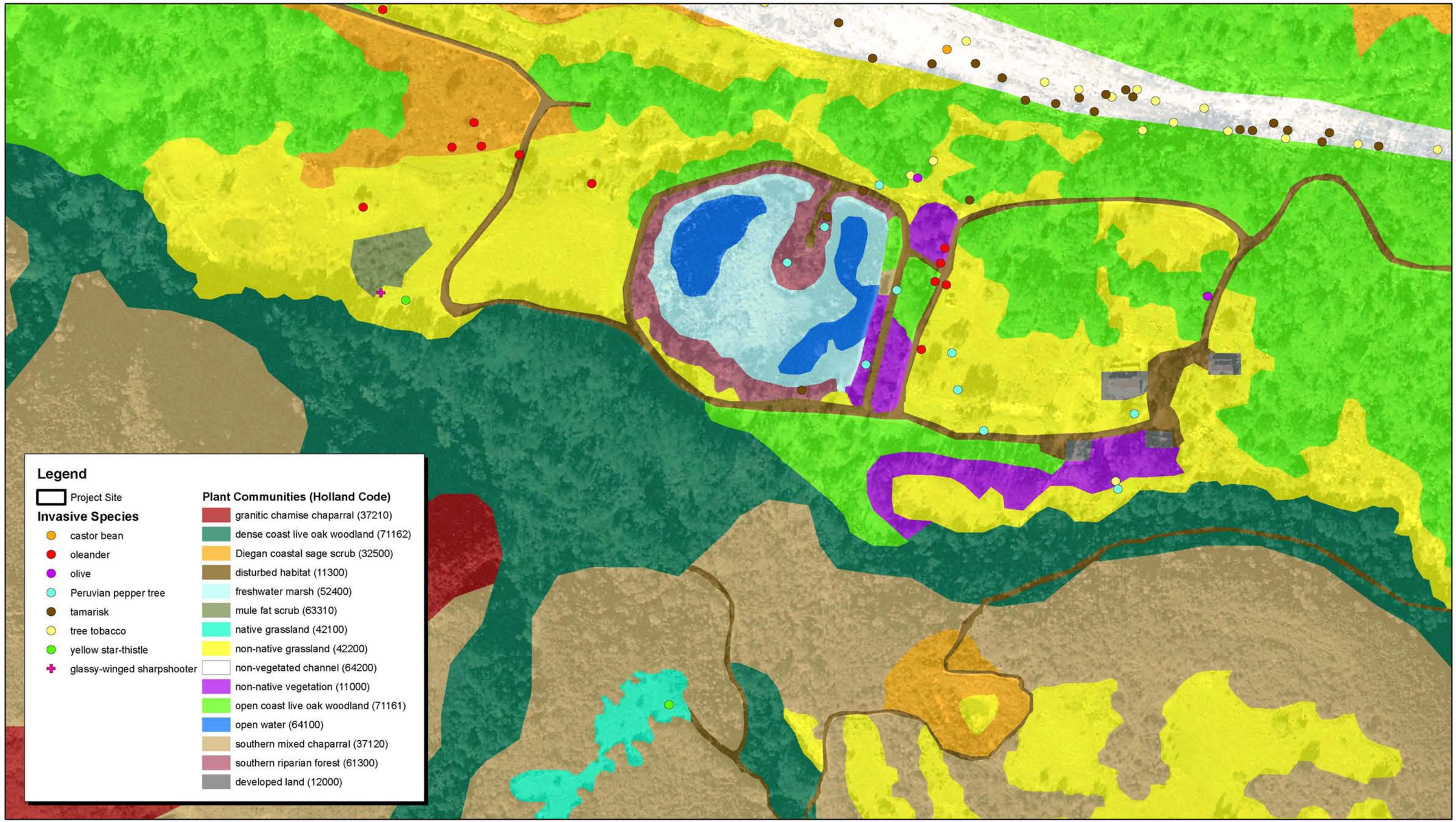
Exhibit 6a
Invasive Species Location Map



Source: San Diego North Aerial, 2005. MBA Field Survey and GIS Data, 2010.

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Feet

Michael Brandman Associates

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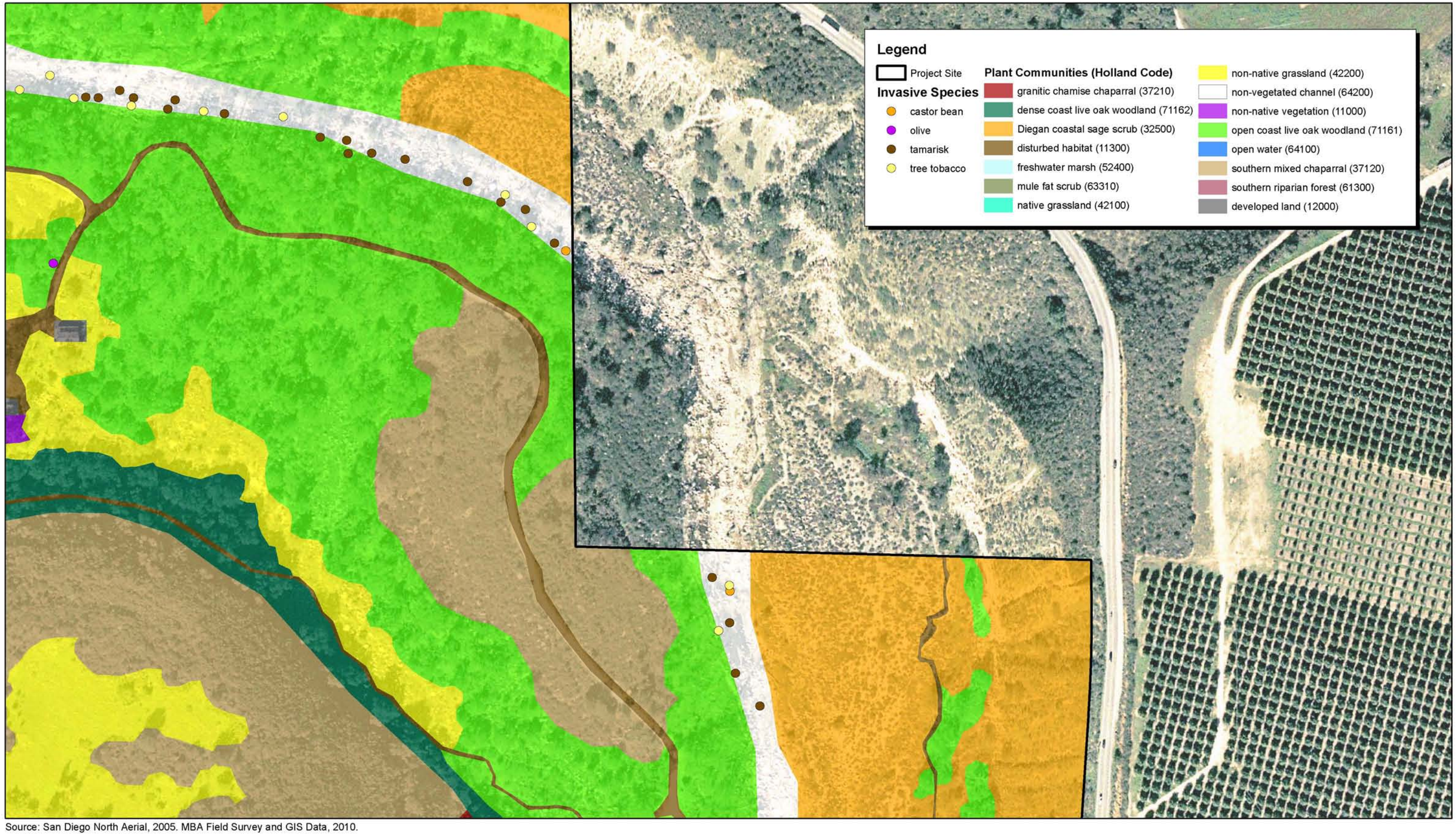
Exhibit 6b
Invasive Species Map



Source: San Diego North Aerial, 2005. MBA Field Survey and GIS Data, 2010.

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Feet

Michael Brandman Associates

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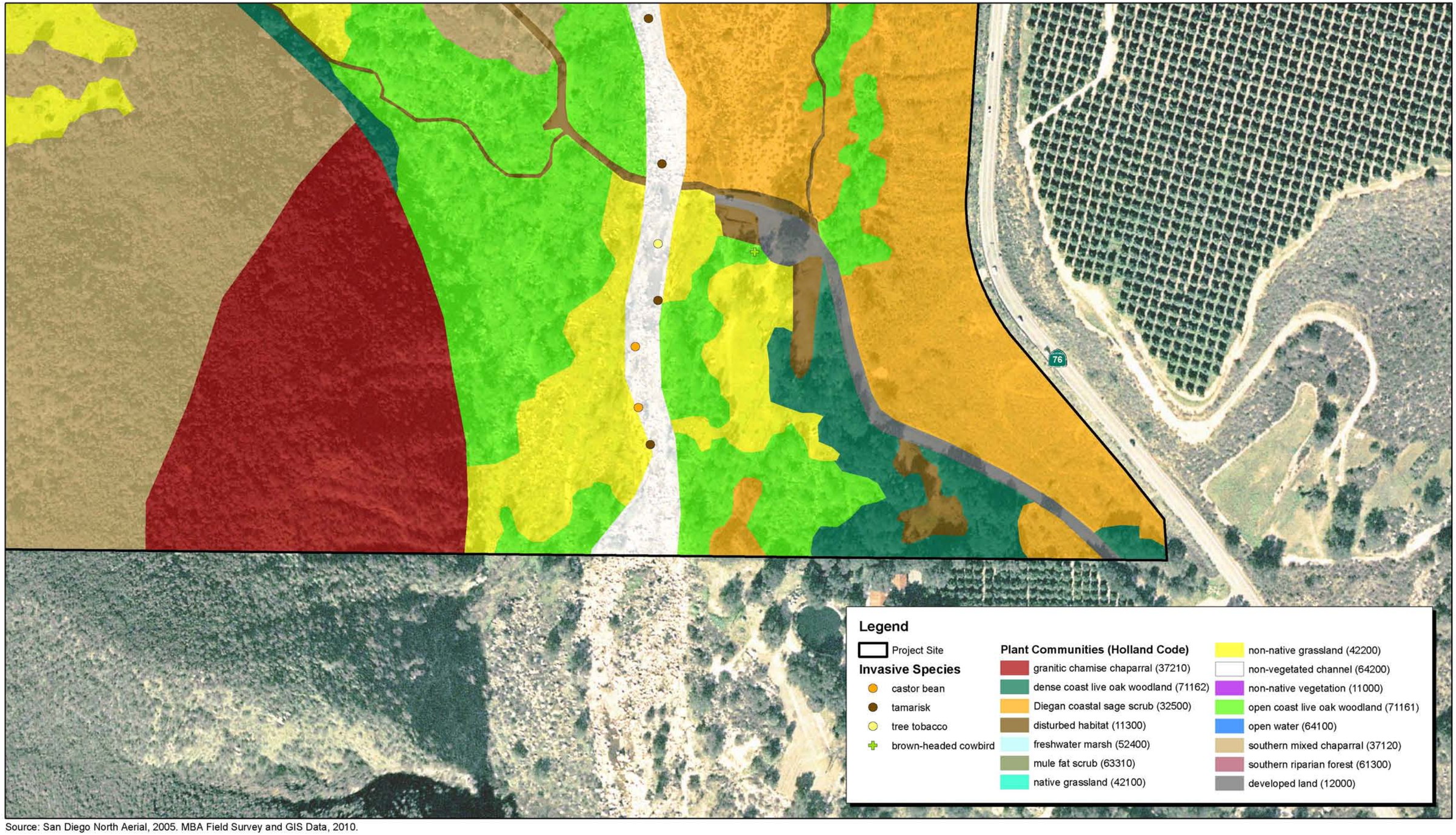
Exhibit 6c
Invasive Species Map



Source: San Diego North Aerial, 2005. MBA Field Survey and GIS Data, 2010.

NORTH

190 95 0 190

Feet

Michael Brandman Associates

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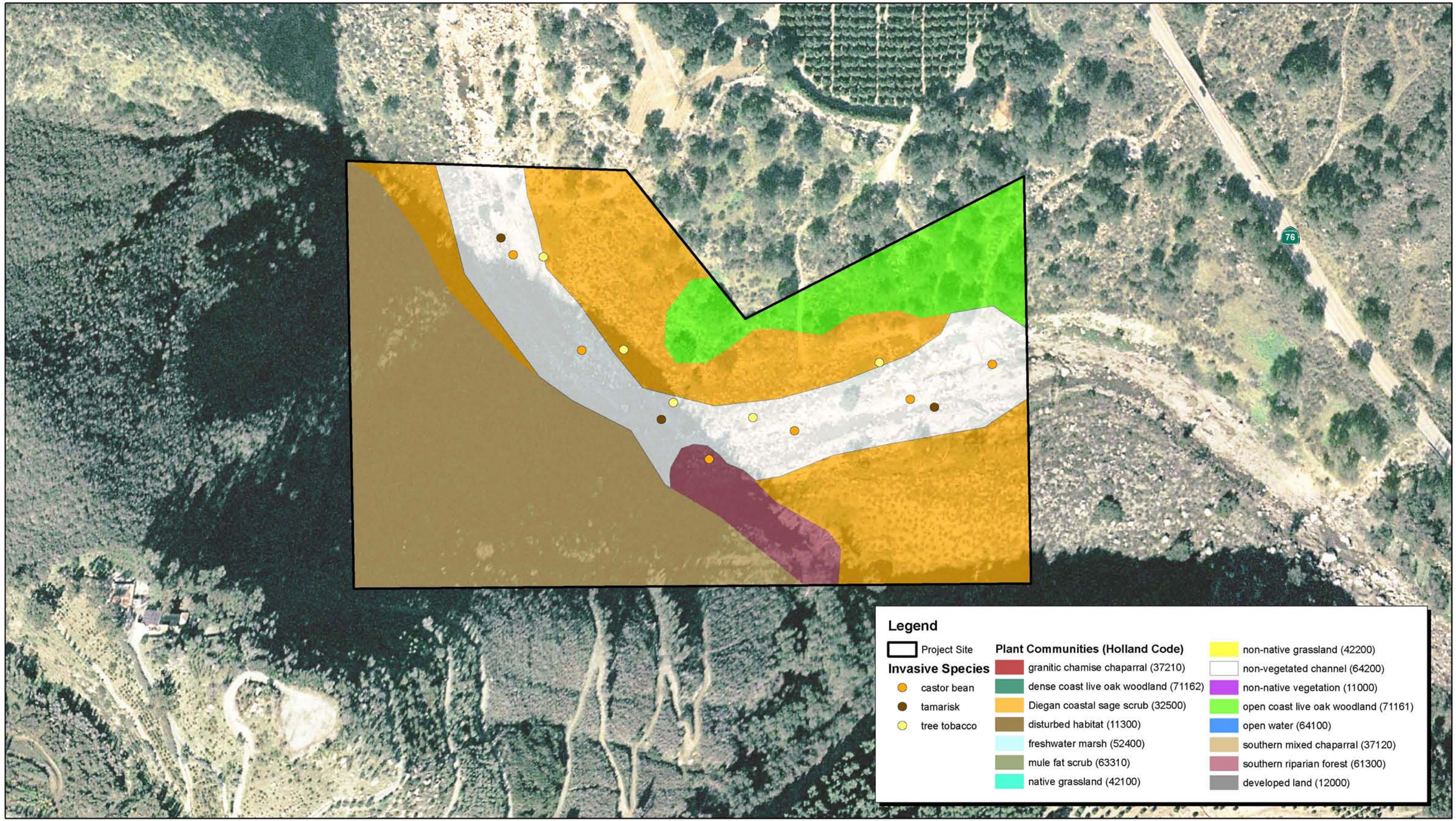
Exhibit 6d
Invasive Species Map



Source: San Diego North Aerial, 2005. MBA Field Survey and GIS Data, 2010.

NORTH

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Feet

Michael Brandman Associates

00700035 • 04/2010 | 6e_invasive_species.mxd

Exhibit 6e
Invasive Species Map

4.0 HABITAT RESTORATION

Non-native, invasive vegetation often does not provide the quality of habitat required by native wildlife. In addition, increased urban development has caused significant loss and fragmentation of native habitats. Finally, developments with a WUI have allowed increased wildland edges where pedestrian and vehicle traffic often provide a dispersal mechanism for non-native vegetation. Therefore, it is important to both preserve wildlands and to reverse the effects of human intrusion where possible. Restoration at the Preserve should focus on areas that do not currently provide native habitat for native wildlife.

4.1 Proposed Restoration Areas

Areas proposed for restoration include those depicted on Exhibit 6 with a focus on the invasive species. These areas currently support a mixture of native vegetation with patches of the non-native species listed in Table 2 above.

4.2 Restoration Methods

Restoration begins with weed removal and control, after which native species are seeded or planted to restore native habitat similar to the surrounding plant community. Due to limitations for irrigation at the site, installation of container stock is not feasible, however seeding can be done by hand. Where seed is to be applied to a slope, a rake may be used to push dirt into a shelf, or a shallow cut in the slope may be made where seed can be applied. These raked shelves or cuts in the slope should be created in a regular pattern throughout the area to be seeded. Seed should be applied between November and January, preferably one day prior to a rain event, and no more than three days prior to a rain event. Seed may need to be applied for several years depending on the amount of germination.

4.2.1 Coast Live Oak Woodland

The upper terrace above the San Luis Rey River channel supports open coast live oak woodland. Currently, large stands of non-native grassland including yellow star-thistle, and a few stands of tree tobacco, oleander, olive, and tamarisk are present on the Preserve (see Exhibit 6a). Removal of these species with restoration efforts in these areas will result in a more vigorous oak woodland.

The following species are candidates for hand seeding at the site:

- coast live oak (*Quercus agrifolia*)
- scrub oak (*Quercus dumosa*)
- toyon (*Heteromeles arbutifolia*)
- laurel sumac (*Malosma laurina*)
- lemonade berry (*Rhus integrifolia*)
- sugarbush (*Rhus ovata*)

- purple needlegrass (*Nassella pulchra*)
- small flowered needlegrass (*Nassella lepida*)
- Pacific fescue (*Vulpia microstachys* var. *pauciflora*)
- pine bluegrass (*Poa secunda* ssp. *secunda*)
- hairy rattail fescue (*Vulpia myuros* var. *hirsuta*)
- California hedgenettle (*Stachys bullata*)
- sticky monkeyflower (*Mimulus aurantiacus*)
- wild cucumber (*Marah fabaceus*)

Handling and planting of coast live oak and scrub oak acorns is different than seed for other species and should be conducted as follows:

Acorns should be collected directly from on-site trees to obtain the healthiest stock and preserve local genetic traits. Acorns can be hand picked from the tree or, after placing tarps on the ground, acorns can be knocked to the ground using long poles. Acorns should be collected in early fall, just as they are turning from green to brown and after some have started to fall; the caps should be easy to remove when the acorns are ripe. The acorns should feel heavy and moist.

After collection, acorns should be stored in closed containers that hold no more than a quart of acorns together (plastic quart-size sealable bags can be used), and refrigerated (do not freeze) until planting. Planting should occur as soon as possible, preferably within a month of collection and after the first fall rain. Immediately prior to planting, acorns should be submerged in water and any floating acorns or acorns that have holes or cracks be discarded; acorns that sink to the bottom are more likely to be viable.

Acorns should be planted between November, after the first rain event, and January. Dig or auger a planting hole at least six inches deep and six inches wide, then backfill. In order to ensure that at least one seedling survives, place three to four acorns on their side, one to two inches below the soil surface in a planting hole prepared as described above. After seedlings have reached a minimum of twelve inches tall, each planting site can be thinned to contain only the strongest seedling. Thinning should be done by clipping the unwanted seedlings at the base of the root crown as close to the soil surface as possible. Seedlings should not be pulled because they may uproot adjacent desirable seedlings.

Planting of native grasses should be conducted in such a way as to prevent non-native grasses from re-establishing in the area from surrounding seed sources and the seed bank in the soil. For example, after eliminating the seed bank from the soil, native grasses can be hand seeded into patches within the restoration area that have been surrounded by silt fence. Establishment of dense patches of native grasses are more likely to survive than if seed is spread over a large area.

4.2.2 Southern Riparian Forest

The area surrounding the man-made pond supports southern riparian forest. Currently, a few stands of Peruvian pepper trees and oleander are present around the pond (see Exhibit 6b). Restoration in these areas will result in southern riparian forest.

The following species are candidates for installation as cuttings around the man-made pond:

- arroyo willow (*Salix lasiolepis*)
- cottonwood (*Populus fremontii*)
- red willow (*Salix laevigata*)
- mulefat (*Baccharis salicifolia*)

Additionally, desert wild grape (*Vitis girdiana*) can also be hand seeded surrounding the pond.

4.2.3 Diegan Coastal Sage Scrub

The upper terrace above the San Luis Rey River channel supports a few upland areas vegetated with Diegan coastal sage scrub. Currently, a few scattered stands of tamarisk, tree tobacco, castor bean and non-native grassland are present between the coast live oak woodlands on the terrace (see Exhibits 6a, 6b, and 6e). Restoration in these areas will result in Diegan coastal sage scrub.

The following species are candidates for hand seeding on the upper terrace of the San Luis Rey River:

- California sagebrush (*Artemesia californica*)
- California buckwheat (*Eriogonum fasciculatum*)
- white sage (*Salvia apiana*)
- black sage (*Salvia mellifera*)
- saw-toothed goldenbush (*Hazardia squarrosa*)
- deerweed (*Lotus scoparius*)

4.2.4 San Luis Rey River Channel

The active channel of the San Luis Rey River is largely unvegetated. However, a few stands of tamarisk, tree tobacco, arundo, and castor bean, have established (see Exhibits 6a-e). Removal of these non-native species will restore these areas to the natural condition of the channel. Hand seeding of native species is not necessary as this channel is naturally lacking in vegetation due to frequent scouring during storm events.

Removal of these non-natives plant species from the San Luis Rey River will naturally promote the re-establishment of native species to maintain the riparian plant community. These restoration efforts along the San Luis Rey River are consistent with the conservation goals as detailed in the Draft North County Framework Resource Management Plan (County of San Diego 2009, Appendix G) to maintain riparian habitat along the river for water quality and to protect sensitive species such as least

Bell's vireo, Southwestern willow flycatcher, and arroyo toad that have a potential to occur along this section of the river.

5.0 FIRE MANAGEMENT

5.1 Current Fire Management Practices

Current vegetation management activities are limited to reducing flammable vegetation along vehicle access roads and trails, and maintaining fuel modification zones. Vegetation reduction occurs around the access roads, parking area and administrative building locations. In addition, DPR also maintains the established fuel modification zones on the eastern portion of the Preserve property adjacent to the existing residential structure that is within 100 feet of the Preserve boundary.

5.2 Fire Environment

Many environmental factors can contribute to fire behavior and/or fire suppression including weather, topography, vegetation as well as historical or previous burns to the area.

5.2.1 Climate

General

San Diego County has a Mediterranean to semi-arid climate, which is characterized by warm, dry summers and mild wet winters. Although temperatures can drop below freezing, it is typically for a short time and it is not likely that this area sustains any significant snowstorms. The growing season is generally considered to be year round.

Seasonal

Regional temperature data recorded at the Temecula (KCATEMEC5) weather station (coordinates: +33.302763, -117.01255) for 2006 through 2009 average between a low of 25 degrees Fahrenheit (°F) and a high of 85°F for the month of January. The month of June ranges from a low of 48 to a high of 101°F. The average precipitation ranges from 0.15 and 5.90 inches in January to a range of 0.00 to 0.20 inches in June.

Fire Weather

Generally, the prevailing wind patterns flow from a southwest to westerly pattern under the typical Pacific high-pressure system. However, in this southern California location, Santa Ana winds generally result from a large high-pressure cell over the Great Basin and a low-pressure trough located off the southern California coast. Winds generated from this combination of events create the Santa Ana winds that are very hot and dry. Wind velocities can reach speeds greater 60 miles per hour (mph) (Sugihara 2006). These winds are often erratic in direction and velocity, but generally follow a north, northeasterly, and/or eastern direction.

The fire season for the Preserve generally runs June through October. This period can be extended as Santa Ana wind conditions occur later in the season. While the typical wind conditions usually occur during September and October, November can be an additional month for such winds. However,

these Santa Ana wind conditions can occur at anytime during the year, extending the actual fire season.

5.2.2 Topography

The Preserve is located in northwestern San Diego County adjacent to Pala Mountain. The Preserve ranges in elevation from 500 to 2,000 feet above mean sea level. The lowest elevation within the Preserve occurs along the San Luis Rey River that flows along the northeastern boundary. The highest elevation within the Preserve occurs along the ridge of Pala Mountain located at the southwestern corner.

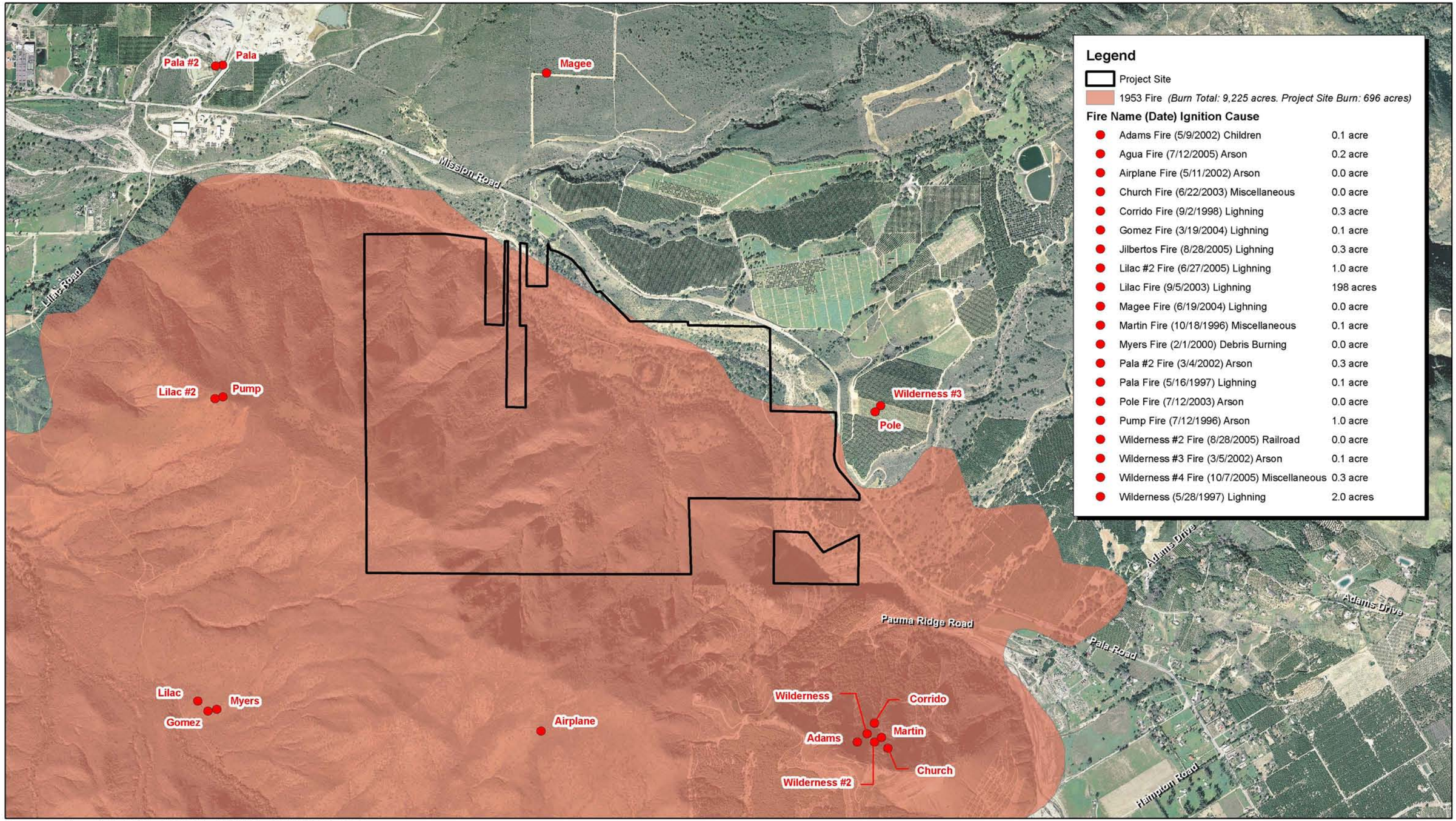
5.2.3 Watershed Description

The Preserve is located within the San Luis Rey River Watershed. The San Luis Rey River Watershed is subject to agricultural and urban uses and receives urban runoff. The San Luis Rey River is the main drainage feature that flows through the Preserve along the northern boundary. The San Luis Rey River was once a perennial drainage feature, but is currently an intermittent stream that only flows during significant rain events. Frey Creek and Agua Tibia Creek flow into San Luis Rey River just upstream of the Preserve from the north. Marion Canyon Creek flows into San Luis Rey River just downstream of the Preserve also from the north. In addition to the San Luis Rey River, one man-made pond occurs within the Preserve.

No special-status species were observed within these aquatic resources. However, changes in water quality due to fire within the man-made pond feature and San Luis Rey River may affect commonly occurring species through the introduction of sediment; the potential for increasing nitrates; the possible introduction of heavy metals from soils and geologic sources within the burned area; and the introduction of fire retardant chemicals into the stream and pond that can reach levels toxic to aquatic organisms (Neary 2005). The magnitude of the effects of fire on water quality is dependant more on fire severity rather than fire intensity.

5.2.4 Fire History

The Preserve has experienced one major wildfire of 9,225 acres that occurred in 1953. No specific details exist on the cause of this wildfire. At the time, 696 acres of the Preserve burned. The unburned portions were two small areas located along the river bottom. No wildfires of major consequence have occurred since 1953 (Exhibit 7). Records indicate that from 1996 through 2008 no wildfire ignitions have occurred on the Preserve. However, numerous ignitions have occurred adjacent and outside of the Preserve (CalFire FRAP GIS Data 2009).



Source: San Diego North 2005 Aerial. CALfire FRAP data. MBA GIS data, 2009.

NORTH

1,500 750 0 1,500 Feet

Michael Brandman Associates

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Exhibit 7
Fire History and Ignitions Map

COUNTY OF SAN DIEGO PARKS • WILDERNESS GARDEN PRESERVE
VEGETATION MANAGEMENT REPORT

Fire Intensity, Fuel Models and Fire Behavior Projections

Approximately 70 percent of the Preserve is covered by southern mixed chaparral and chamise chaparral. Both shrub cover types are considered to be in Fuel Model SH 7. Fuel Model SH 7 reflects a fuel condition that is a dry climate shrub containing very high fuel loads. The primary carrier for fire is composed of woody shrubs and shrub litter; contains very heavy shrub loading with depths of four to six feet in height. Fire spread rates are high and flame lengths are very high (Forest Service, GTR; RMRS-GTR-153, 2005). The fuel model for the Preserve is based upon visual observation in the field reflecting heavy fuel loads. These fuel loads are comprised of woody shrubs (in a decadent stage) and shrub litter that is the primary carrier of fire.

Under moderate fire weather conditions, this particular fuel model burning under 10 mph wind conditions, is expected to have mid-flame lengths of approximately 15 to18 feet. However, under extreme weather conditions, with winds exceeding 20 mph, the mid-flame length would be in excess of 25 feet. Spread rates in this fuel type would be approximately 100 chains/hour (one chain equals 66 feet) with a 10 mph wind speed; at 20 mph the spread rate would exceed 150 chains/hour (Forest Service, GTR; RMRS-GTR-153, 2005).

The remaining, 30 percent of the Preserve, is covered by a combination of vegetative types: dense coast live oak woodland (28 acres); Diegan coastal sage (38 acres); native grassland (2 acres); non-native grassland (40 acres); open coast live oak woodland (75 acres); non-native vegetation (2 acres); and southern riparian forest (2 acres). The balance of the area, twenty-nine (29 acres) is comprised of undisturbed, open water, non-vegetated channel, fresh water marsh, and urban/developed areas. The grasslands and disturbed areas are not of sufficient size and continuity to place in a fuel model.

The coast live oak woodland would be designated as the same fuel model for the southern mixed chaparral, which is Fuel Model SH 7. The total acreage of the coast live oak woodland is not found in a single continuous block, but rather distributed over three parcels. The principle severity and burning intensities in this vegetative species would be somewhat less, the same flame lengths and rates of spread would not be significantly different because of the surrounding mixed chaparral and the high level of understory shrubs. The grasslands are of insufficient size to classify, but must be recognized as a fine fuel type that burns rapidly.

Suppression Efforts

Suppression resources have difficulty in these fuel types (Fuel Model SH 7 and in particular southern mixed chaparral) unless the incident receives rapid initial attack. Report time and travel time are critical to making an effective response. As a fire begins to burn, there are a variety of factors (e.g., current fire weather, location, slope, aspect, fuel conditions) that influence the size and ultimate degree of difficulty that suppression resources have in affecting control action. As seen in Table 3 below, the increase of mid-flame length from a small fire that progresses to a larger fire indicates the increasing degree of difficulty that suppression resources would have in affecting incident control.

Table 3: Fire Suppression Limitations Based On Flame Length

Flame Length (in feet)	Suppression Resource Capability
< 4	Persons using hand tools can generally attack fires at the head or flanks. Handline should hold the fire.
4 to 8	Fires are too intense for direct attack on the head by persons using hand tools.
8 to 11	Fires may present serious control problems; torching out, crowning and spotting. Control efforts at the head will probably be ineffective.
>11	Crowning, spotting and major fire runs are probable. Control efforts at the head of the fire are ineffective.

5.2.5 Vegetation Dynamics and Fuel Loads

Vegetation

The primary plant community within the Preserve is southern mixed chaparral. Many chaparral plant species contain volatile oils, which produce a strong odor and increase their flammability. These native species include ceanothus, manzanita, sage, sumac, toyon, and chamise. Chaparral ecosystems are very efficient at controlling erosion and protecting watersheds. The deep root systems of these plants help to stabilize slopes and allow them to thrive in the dry Mediterranean climate of Southern California. Chaparral plant communities depend upon fire as an integral part of their life cycle, and periodic burning is essential in order for these communities to rejuvenate. As unburned plants grow older, the amount of dead material increases dramatically. By age 50, as much as 50 percent of an individual plant may be dead. Where chaparral plants are uniformly old, and cover a broad area, fires tend to be large and devastating.

Although the scenic quality of the landscape may be greatly reduced after a burn and may cause changes in the physical characteristics of the soil, chaparral is a successional plant community that benefits after a fire. Some chaparral seeds need scarification, which fire often provides. Besides heat-shock scarification, smoke-induced germination is important to many chaparral species.

Fire Response of Plant Communities and Populations

The chaparral plant community succeeds many other plant communities found within the Preserve. Species composition within the plant community can shift drastically after a fire depending on which plant species set seed before or after the fire. The concept of chaparral being a fire climax refers to a delicate balance between characteristics of the chaparral species within the Preserve and the fire regime. Fire frequency and timing can change the balance so that chaparral can be overtaken by herbaceous vegetation types such as annual grasses or highly volatile semi-woody group of shrubs that may otherwise be found in a sage scrub plant community. After a year, annual grasses may dominate the plant community. However, five years after a fire, chaparral shrubs once again would dominate the ecosystem.

Fires occurring in oak woodland generally burn most of the understory species rather quickly, either to the root crown or in its entirety. However, the thick-barked oaks require a fire of longer duration and intensity to kill the tree. Successional understory species in this community generally consist of non-native grasses that flourish in the newly open canopy. These species may soon be crowded out by native shrubs that experience re-growth from the root crown or as the seed bank in the soil begins to germinate.

Fires occurring within the grassland plant communities on the Preserve can cover large areas in a short amount of time, especially during the seasonal Santa Ana wind conditions. Grassland fires usually do not burn as intensely when compared to the chaparral plant community. Due to the relatively small size and close proximity of the grassland communities in relation to the chaparral plant community, the fire would move quickly to chaparral and greatly intensify.

Likewise, the southern riparian forest and coast live oak woodland contains a large fuel load due to the woody nature of the plant communities, the amount of leaf litter within the communities, and the large overstory canopy layer. However, damage to these woody trees, such as coast live oak and Fremont's cottonwood, located within these communities will vary greatly depending on the severity and intensity of the fire.

5.3 Fire Response Plan

5.3.1 Fuel Management Units

Fire Management Unit 1

Fire Management Unit (FMU) 1 encompasses the entire San Luis Rey River flood plain and includes the areas of coast live oak vegetation that borders the river bottom. The isolated parcel found to the southeast of the main Preserve area is also included in this FMU. This area includes the day use site, administrative buildings, and the historic Sickler's Grist Mill site. The topography of the area is relatively flat. The westerly portion of FMU 1 is the beginning of relatively steep slopes found in FMU 2.

Fire Management Unit 2

Fire Management Unit 2 encompasses the major part of the Preserve. The vegetative species in this unit is predominately southern mixed chaparral with some interspersing of chamise-chaparral and coast live oak of very small acreages. This FMU has relatively steep to extremely steep slopes. The coast live oak is typically found along the minor drainages.

5.3.2 Short-term Fire Suppression Response Plan

Emergency Services

The California Department of Forestry and Fire Protection (CalFire) provides emergency services for fire suppression in the area of the Preserve. San Diego County Sheriff Department provides for Search and Rescue, which includes medical emergency responses in wildland areas.

Fire Suppression and Management Responsibility

CalFire, which provides emergency services for fire suppression, has direct suppression responsibility for all wildland incidents occurring within the Preserve. Federal Responsibility Areas (FRA) are present on west and south as depicted in Exhibit 8.

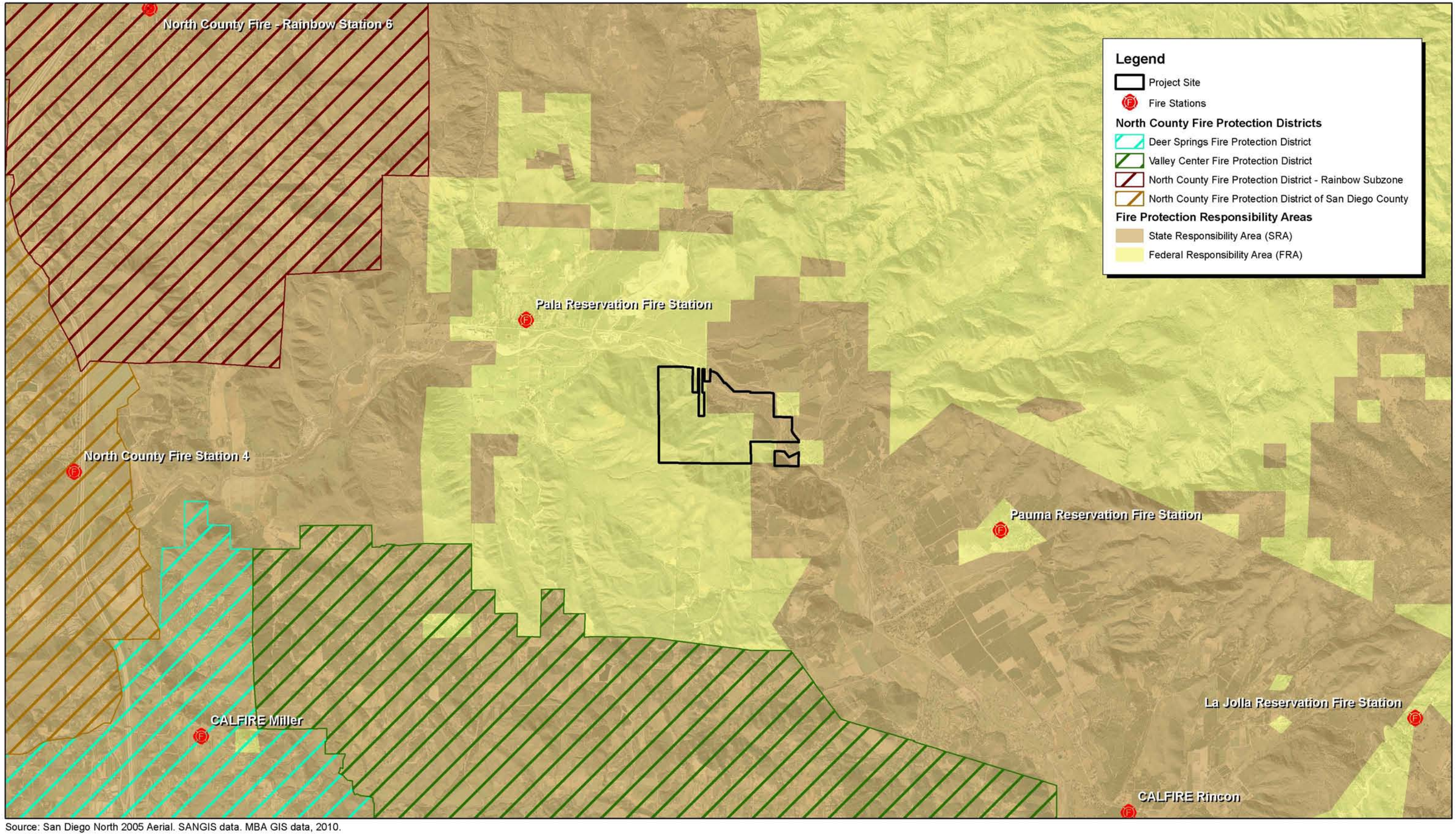
Table 4: Typical Suppression Responses for the Preserve Area

Resource Type CalFire Units	April thru November Medium Response	December thru March Medium Response	Santa Ana Conditions Any time Response
Type III engines	5	3	10
Hand Crews	2	1	4
Dozers	1	1	2
Air Tankers	2	0	2
Helicopters	2	1	2
Source: CalFire FRAP GIS Data, 2009			

CalFire units located close to the Preserve are CalFire Miller located at 9127 W. Lilac Road Escondido (760.728.8532) and CalFire Rincon located at 16971 Highway 76, Pauma Valley (760.742.3243). These stations would serve as first responders. Wildfire incidents in close proximity, or threatening, to local areas of responsibility that could potentially respond as additional resources are (Exhibit 8):

- Pala Reservation Fire Station
- Paula Reservation Fire Station
- La Jolla Reservation Fire Station
- North County Fire Rainbow Station #1
- North County Fire Station #4

The locations of fire stations in close proximity to the Preserve are shown in Exhibit 8. North County fire units would remain in their specific county jurisdiction unless CalFire determines that a mutual aid request is necessary. These mutual aid requests are activated when incidents exceed the resource capability of normal dispatch levels. Daily fire danger ratings, wind conditions at the incident site, and overall fire weather are additional factors considered with regard to additional resource requests (Pina 2009). Additionally, it must be noted that the primary responder or specific suppression resources dispatched are based upon incident location and the closest resources available to that incident location. Under the statewide mutual aid agreement with the Forest Service, resources are also available from the adjacent Cleveland National Forest.



Source: San Diego North 2005 Aerial. SANGIS data. MBA GIS data, 2010.

Michael Brandman Associates

NORTH

1 0.5 0 1 Miles

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Exhibit 8
Fire Protection Responsibility Areas and Fire Station Locations

5.3.3 Primary Actions and Contacts for Wildfire Emergency

Fire District Jurisdictional Boundaries

CalFire is the responsible agency providing suppression responses for all wildland fire incidents that occur on State Responsibility Lands (SRA) unless deemed otherwise under state statutes. The Preserve is under SRA and FRA protection; however, CalFire provides primary suppression resources (Exhibit 8).

There are also local fire units that do not have jurisdiction responsibilities, such as the Pala Reservation Fire Units, but provide suppression resources when requested under a mutual aid agreement. The San Diego County Sheriffs Department is responsible for providing all Search and Rescue responses to the Preserve. This includes medical emergencies in wildland areas (San Diego County Sheriff Department 2009).

5.3.4 Roads/Access

Currently there is limited public access to the Preserve. The Preserve is accessible via a private road off of SR-76. This paved road provides direct access through a gated entrance to the Preserve day use staging area. The electric entrance gate is left open during the regular operating hours of the Preserve (8:00 a.m. to 4:00 p.m., Thursday through Monday). However, entrance into the Preserve outside of these hours requires an entry code. In addition, several dirt roads occur within the Preserve and provide access to northern portions of the Preserve adjacent to the San Luis Rey River floodplain including the existing trails, man-made pond and historic Grist Mill site.

5.3.5 Fuel Breaks

The construction of fuel breaks for the Preserve was considered. Effective fuel breaks require construction from anchor points, usually roads, and are placed along topographic features such as ridgelines connecting with roads. However, because of the existing broken topographic features and excessive slopes found within the Preserve, the construction of fuel breaks would not be effective because of inadequate anchor locations and is therefore not a recommended action.

5.3.6 Emergency Staging Areas

There is reasonable space in the day use area and near the administrative site to use as an emergency staging area. However, access to and from State Route (SR) 76/Pala Road is through a locked gate; is narrow and has only a single lane of traffic; and is difficult for access into/out of the area.

5.3.7 Fire Hydrants

There are no fire hydrants on the Preserve. The development for a hydrant system would be questionable based upon water availability and cost of implementation.

5.3.8 Other Water Sources

The pond within the Preserve may provide an adequate supply of water to protect the existing structures onsite. Vail Lake in southern Riverside County is approximately 10 miles to the northeast, and small ponds on the San Luis Rey River are approximately 4.5 miles to the west of the Preserve.

6.0 MANAGEMENT DIRECTIVES

6.1 Invasive Species Removal

The locations of non-native, invasive plant species within the Preserve were mapped during the 2009 baseline surveys and are shown in Exhibit 6. An intensive weed control program should be implemented for a minimum of three years during which invasive species should be maintained at a level of five percent cover or less. Timing is often the most important factor in obtaining effective and efficient control. Generally weedy vegetation sprouts quickly from April through June and again from October through December when temperatures are cooler and more moisture is available. During the first three years, weed abatement activities should be conducted every six months or more frequently during the growing months if deemed necessary by a qualified biologist to prevent establishment and subsequent dispersal into native plant communities that exist within the Preserve. Weed abatement activities can occur annually thereafter if the first year of abatement activities are determined to be successful. After the initial three years of active maintenance, weed control will be on an as-needed basis as determined during monitoring.

All field crews conducting weed abatement should be trained in the identification of the target invasive plant species and the appropriate method for removal when these invasive species are in close proximity to native plants. Likewise, staff working within the Preserve should be familiar with identification of the target invasive plant species in an effort to increase the likelihood of their detection. Target invasive species should be removed before seed production occurs and before average weed height reaches six inches. Weed debris should be removed from the Preserve and disposed of as permitted by law.

6.2 Restoration

Restoration activities should occur for a minimum of five years or until a qualified biologist determines that the site has been successfully restored. Restoration in the Preserve should occur in all areas where non-native, invasive plant removal is to take place. Prior to restoration activities, all non-native, invasive vegetation within the restoration site should be removed using the methods outlined in Section 3.2. Weed eradication should occur as needed between April and May, with a follow-up visit(s) between October and December to eliminate all weeds on the restoration site. Immediately after the final weed abatement activities are concluded for the year, preferably one day prior to the first rain event and no more than three days prior, hand seeding and acorn installation should occur following the methods described in Section 4.2 under the supervision of a qualified biologist. The biologist should determine the appropriate seed mix and ratio based on observed conditions each year.

6.3 Fire Management

Vegetation management within the Preserve should consist of removal of non-native, invasive plant species (Exhibit 6), and the continued thinning of vegetation along trails, access roads, staging areas,

and the Preserve boundary. These activities minimize the fuel load within the Preserve to reduce the fire threat to WUI areas. Vegetation removal for fuel management may be conducted by one of the following methods: mechanical brush removal, chemical application, or hand clearing.

6.3.1 Fire Management Directives

The following actions are recommended for fuel reduction and management along roadsides and trails and the boundary of the Preserve:

1. Continue to thin vegetation along each side of the trails and roadways up to two feet, or as needed.
2. Identify and remove any dead snags identified as a hazard. Otherwise, snags will remain for wildlife purposes.
3. Continue to control the vegetation surrounding Sickler's Grist Mill site and the administrative buildings up to 100 feet.
4. Non-native, invasive vegetation identified in Exhibit 6 should be completely eliminated from the site.

Continue to maintain the established fuel modification zone on the eastern portion of the Preserve property adjacent to the existing residential structure that is within 100 feet of the Preserve boundary.

5. In areas where dense vegetation is to be removed, caution should be taken to ensure that any undiscovered, potential cultural sites are not disturbed. Maintenance crews removing the vegetation should be trained to identify possible cultural sites and other sensitive resources that may be present.

6.4 Maintenance and Monitoring

Implementing a monitoring program is essential in determining the frequency of maintenance required to successfully manage the vegetation adjacent to the trails, roads, and Preserve boundaries as well as to effectively eliminate non-native, invasive plant species.

The Preserve contains approximately four miles of trails and roads, which require vegetation thinning approximately two feet on either side. This equates to approximately 21 acres in addition to 20 acres of vegetation adjacent to the administrative buildings. Therefore, assuming that approximately 25 acres can be maintained each year, the vegetation thinning and removal should occur bi-annually. On-going maintenance and monitoring should also occur along the trails and roads and any fallen branches, trees, or other obstacles should be removed promptly to allow for proper access. During this on-going monitoring effort, if it is determine that vegetation thinning is required more frequently, then the maintenance needs should be adjusted accordingly.

On-going monitoring of non-native, invasive species should occur on a regular basis in areas that have been cleared of vegetation or where thinning has occurred. Barren soils recently void of

vegetation allows many weedy plant species to become established due to the lack of competition with native species. Maintenance weed abatement activities will need to occur on an on-going basis to prevent establishment and subsequent dispersal into native plant communities that exist within the Preserve. Adaptive management is key, and weed abatement activities and the frequency of monitoring can be adjusted based on observations as recommended by a qualified biologist.

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Appendix A:
Site Photographs

Photograph 1: View along lower stretch of Upper Meadow Trail.

Photograph 2: View along Camelia Trail.

Source: Michael Brandman Associates, 2009.

Michael Brandman Associates

Appendix A
Site Photographs 1 and 2

Photograph 3: View of Southern Chaparral along Pala Mountain.

Photograph 4: Downed timber and Non-Native Grassland ignition sources.

Source: Michael Brandman Associates, 2009.

Michael Brandman Associates

Appendix A
Site Photographs 3 and 4