Vegetation Management Report
for the
Mount Olympus Preserve Project
San Diego County, California

Pechanga, California, USGS 7.5-minute Topographic Quadrangle Map
Township 9 South, Range 2 West, Sections 4, 8, 9, and 10

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GLOSSARY OF TERMS AND ACRONYMS

°F	degrees Fahrenheit
AMSL	above mean sea level
APE	Area of Potential Effect
APN	Assessor's Parcel Number
BLM	United States Department of the Interior Bureau of Land Management
CalFire	California Department of Forestry and Fire Protection
DPR	Department of Parks and Recreation
FRA	Federal Responsibility Areas
GIS	geographical information system
I	Interstate
MBA	Michael Brandman Associates
MPH	miles per hour
SR	State Route
SRA	State Responsibility Areas
USGS	United States Geological Survey
UTM	Universal transverse mercator
WUI	Wildland-Urban Interface

EXECUTIVE SUMMARY

Michael Brandman Associates (MBA) has prepared this Vegetation Management Report for the Mount Olympus Preserve (Preserve) as part of the ongoing effort of the County of San Diego Department of Parks and Recreation (DPR) to manage vegetation communities, biological and cultural resources within their park system. The Preserve is located approximately six miles south of the City of Temecula and east of the Community of Rainbow in the northern portion of San Diego County, California. The 707-acre open space Preserve is owned and managed by the County of San Diego (County).

This Vegetation Management Plan 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 must be managed to suppress competition for resources and enhance native species survival in preserved wild-lands 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 within the Preserve 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

Mount Olympus Preserve (Preserve) is an approximately 707-acre open space preserve owned and managed by the County of San Diego (County). The County's Department of Parks and Recreation (DPR) began acquiring the properties that make up the Preserve beginning in the 1990s with the most recent property added in 2008. The Preserve is currently closed to the public; however, the conceptual use plan for the Preserve is for a passive recreation facility with a multi-use trail system.

1.1 Purpose and Need

This Vegetation Management Plan 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

Mount Olympus Preserve is generally located north of State Route (SR) 76, south of SR-79, east of Interstate (I) 15 and west of the Cleveland National Forest in unincorporated San Diego County, California (Exhibit 1). The Preserve is specifically located north of Arouba Road, south of Rainbow Heights Road, east of Rainbow Crest Road, and west of Pala Temecula Road (Exhibit 3).

The Preserve is located in the Pechanga, California, United States Geological Survey (USGS) 7.5-minute topographic quadrangle in Sections 4, 8, 9, and 10 of Township 9 South, Range 2 West (Exhibit 2). The Preserve is comprised of the nine Assessor's Parcel Numbers (APNs):

109-080-12	109-080-22	109-081-07
109-081-08	109-280-03	109-280-42
109-300-08	109-371-03	109-412-06

The Preserve is located on and surrounding Mt. Olympus in the northwestern portion of unincorporated San Diego County. The Preserve ranges in elevation from 790 to 2,224 feet above mean sea level (AMSL). The lowest elevation within the Preserve occurs in the southeastern corner. The highest elevation is at the top of Mt. Olympus, which is located in the center of the Preserve along the western boundary. The Preserve is approximately 20 miles northeast of the Pacific Ocean. No bodies of water or significant drainage features occur on the Preserve.

Wildland-Urban Interface

Scattered rural residences, including narrow paved and dirt roads, occur within one mile of the boundaries of the Preserve and Pala Temecula Road, a major paved highway, parallels the eastern side of the Preserve. The Wildland-Urban Interface (WUI) area contains dense southern mixed chaparral, which covers much of the adjacent private land.

Currently there is no authorized public access to the Preserve. Access for administrative purposes is from the southern boundary and along the eastern boundary, both from Pala Temecula Road. Both access points cross private property through locked gates. Access from the west is also possible from a road that provides access to a transmission line owned and operated by San Diego Gas & Electric Company. There are BLM lands on the northwest side of the Preserve, and those lands are under a special use permit with the California Department of Corrections and Rehabilitations for the Rainbow (Women's) Correctional Facility.

Structure Density

The only standing structures within the Preserve are unoccupied and are located in the northeast corner of the Preserve in an area referred to as the Compound (Exhibit 4). Approximately 20 buildings or structures are located on the grounds of the Compound and other features may be hidden beneath heavy vegetation (MBA 2009).

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 underbrush. However, a few areas support limited stands of non-native, invasive plants that must 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 within the Preserve are located near the Compound area and have been targeted for removal with the exception of mature, ornamental specimens that augment the location of cultural resources. Active vegetation fuel load management will focus on WUI areas, such as 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 in Section 3.0 below.

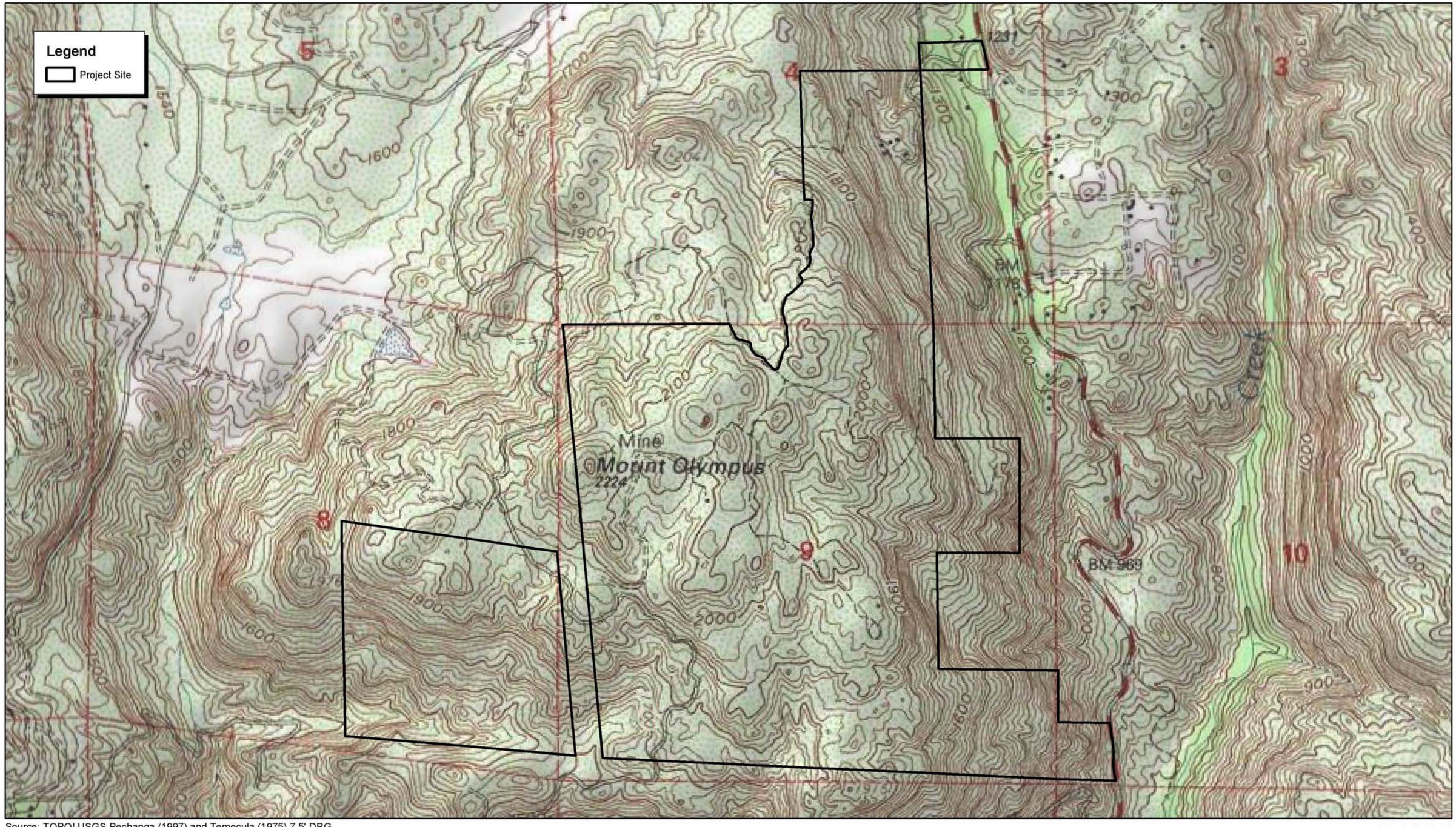
Source: Census 2000 Data, The CaSIL, MBA GIS 2009.

NORTH

5 2.5 0 5 Miles

Michael Brandman Associates

Exhibit 1
Regional Location Map



Source: TOPO! USGS Pechanga (1997) and Temecula (1975) 7.5' DRG.

NORTH

1,000 500 0 1,000
Feet

Michael Brandman Associates

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Exhibit 2
Local Vicinity Map
Topographic Base

Source: San Diego North Aerial, 2005.

NORTH

1,250 625 0 1,250 Feet

Michael Brandman Associates

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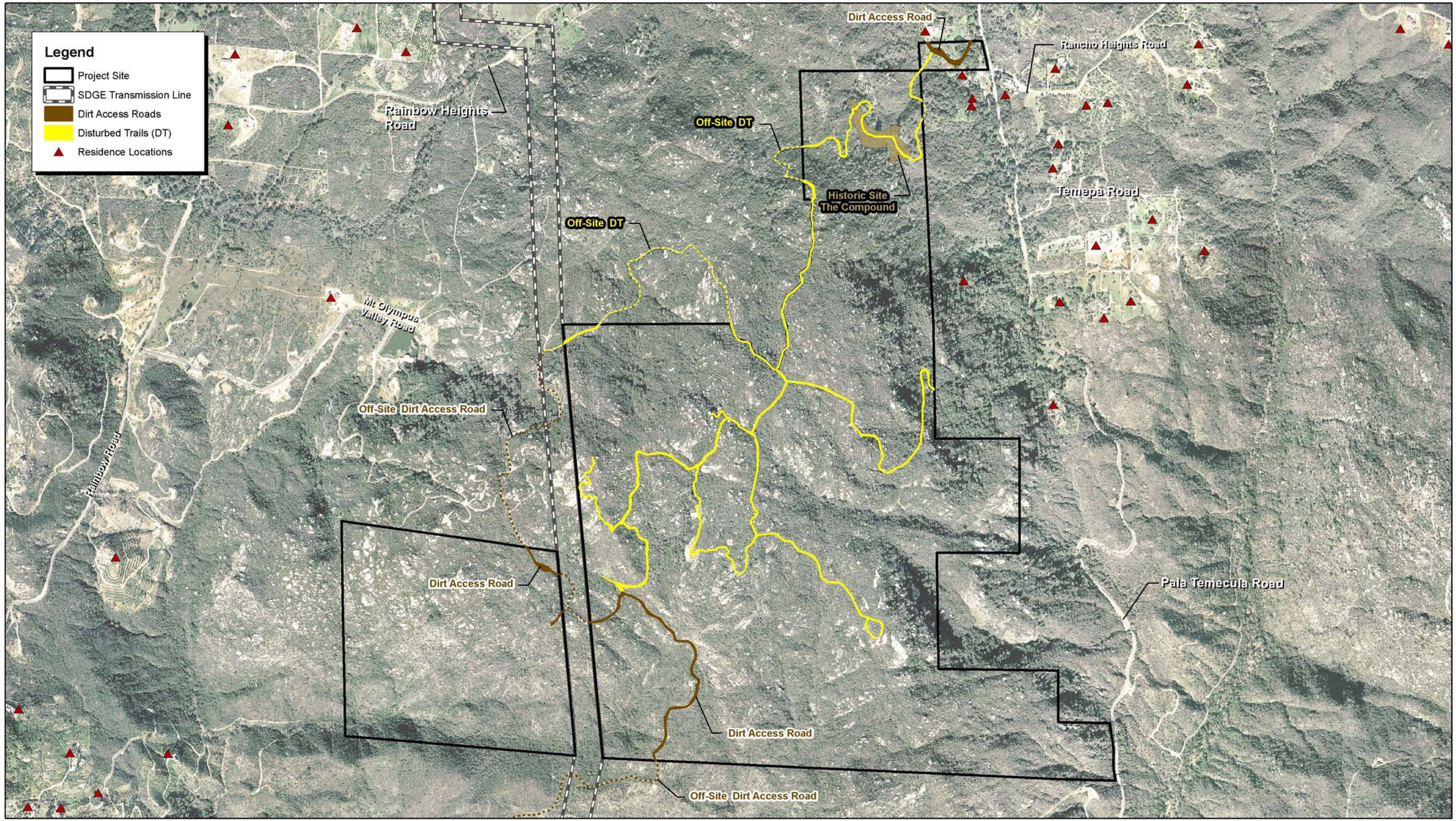
Exhibit 3
Local Vicinity Map
Aerial Base



Source: San Diego North Aerial, 2005. MBA Field Survey Data, 2009. MBA GIS Data, 2010.

NORTH

1,000 500 0 1,000

Feet

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Exhibit 4
Infrastructure

COUNTY OF SAN DIEGO PARKS • MOUNT OLYMPUS PRESERVE
VEGETATION MANAGEMENT REPORT

2.0 ENVIRONMENTAL RESOURCES

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

2.1 Biological Resources

Baseline biological surveys identified six habitat types and detected a total of 281 plant and wildlife species within the Preserve. A total of 133 plant taxa, 67 invertebrate species, one amphibian species, 11 reptile species, 42 bird species, and 27 mammal species (10 bats, nine small mammals, and eight medium to large mammals) were documented within the Preserve. Three sensitive plants and 13 sensitive wildlife species were included in this list of observed species (MBA 2010).

2.1.1 Vegetation Communities

The Preserve exhibits 98.7 percent native plant communities and/or natural rocky outcrops. The remaining 1.3 percent of the Preserve contains non-native or disturbed habitats. Table 1 reflects the plant communities found on the site (Exhibit 5). The majority of the Preserve, approximately 661.4 acres, consists of dense mixed brush chaparral. Coast live oak woodland occupies approximately 36.5 acres of the Preserve and is scattered in small pockets along the eastern side of the area. Approximately 2.5 acres of native and non-native grasslands are found in the northeastern portion of the Preserve. In addition, rocky outcrops are scattered throughout the vegetation communities and are generally found in the more elevated regions of the Preserve (MBA 2010).

Table 1: Vegetation Types by Acres in the Mt. Olympus Preserve

Vegetation Community/Habitat Type	Approximate Area (acres)
Southern Mixed Chaparral (37120)	661.4
Coast Live Oak Woodland (71160)	36.5
Disturbed Habitat (11300)	6.7
Non-Native Grassland (42200)	2.3
Non-Native Vegetation (11000)	0.5
Native Grassland (42100)	0.2
Total	707.6

2.1.2 Sensitive Plant Species

Three special-status plant species were observed during the 2009 baseline surveys. The species observed include Orcutt's brodiaea (*Brodiaea orcuttii*), heart-leaved pitcher sage (*Lepechinia cardiophylla*), and Engelmann oak (*Quercus engelmannii*). None of these species were previously recorded in the vicinity of the Preserve.

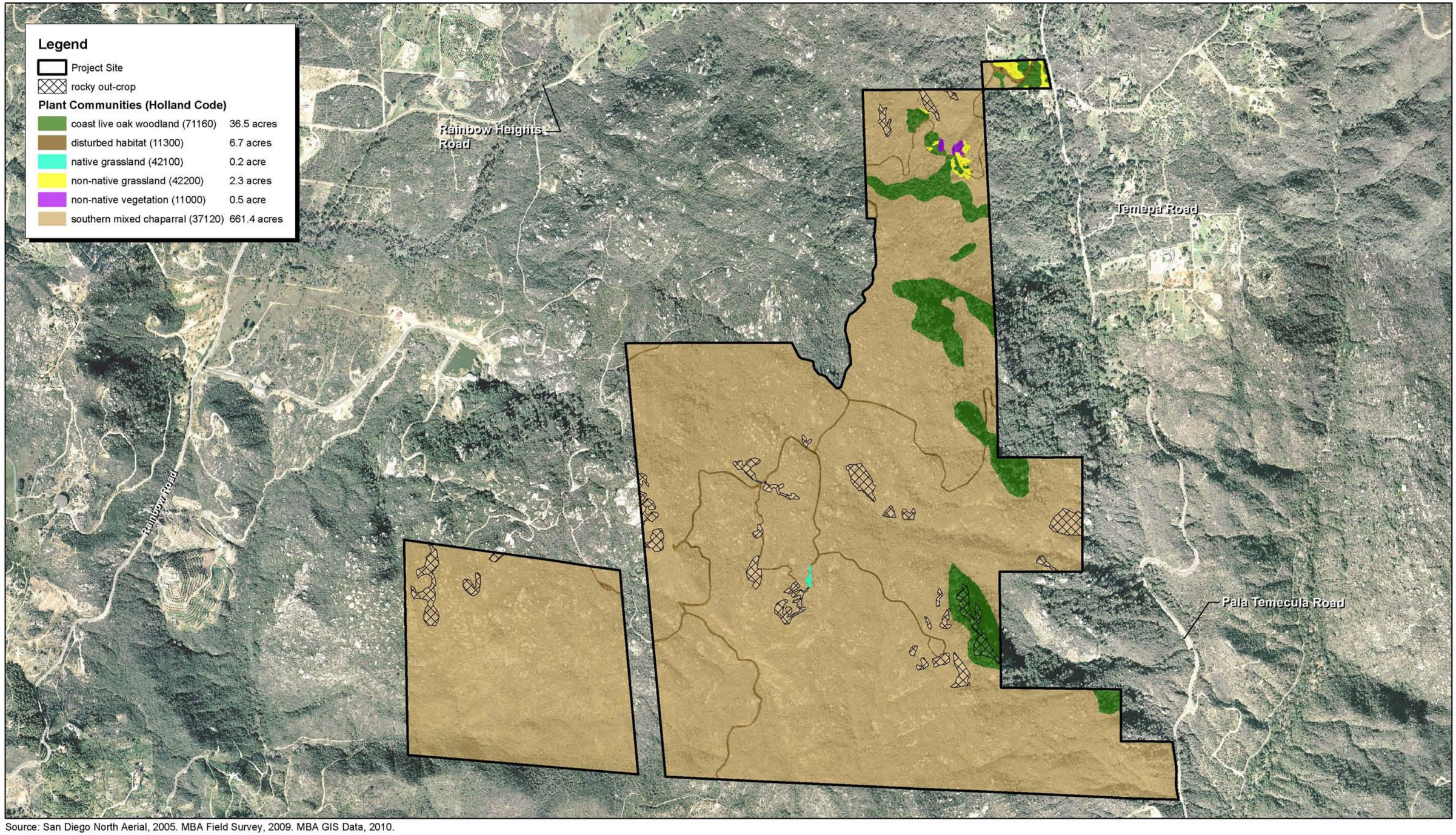
2.1.3 Sensitive Animal Species

Thirteen special-status wildlife species were observed or detected during the 2009 surveys conducted by MBA. The species observed include:

- Orange-throated whiptail (*Cnemidophorus hyperythrus*)
- San Diego ringneck snake (*Diadophis punctatus* ssp. *similis*)
- Coronado skink (*Eumeces skiltonianus interparietalis*)
- San Diego horned lizard (*Phrynosoma coronatum*)
- Cooper's hawk (*Accipiter cooperii*)
- Turkey vulture (*Cathartes aura*)
- Northern harrier (*Circus cyaneus*)
- California pocket mouse (*Chaetodipus californicus*)
- Pallid bat (*Antrozous pallidus*)
- Small-footed myotis (*Myotis leibii*)
- Yuma myotis (*Myotis yumanensis*)
- Greater western mastiff bat (*Eumops perotis*)
- Western red bat (*Lasiurus blossvillii*)

2.2 Cultural Resources

The Preserve also contains several new cultural resources that were detected during the 2009 survey and Primary Records have been provided to the South Coast Information Center for review and number issuance. Several historic resources were recorded within the Preserve; the most prominent is a compound of historic structures clustered in the northern portion of the Preserve. 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 the County Guidelines. None of the historic resources were determined to be significant (MBA 2009).



Source: San Diego North Aerial, 2005. MBA Field Survey, 2009. MBA GIS Data, 2010.

NORTH

1,000 500 0 1,000 Feet

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Exhibit 5
Vegetation Communities Map

COUNTY OF SAN DIEGO PARKS • MOUNT OLYMPUS 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 must 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 Preserve contains native plant communities with the exception of a few stands of non-native, invasive plants including the species listed in Table 2. The stands of non-native, invasive vegetation currently are limited and have not begun to invade any of the surrounding plant communities. All of the non-native, invasive species were observed adjacent to the remnant buildings on the northern portion of the Preserve near the abandoned Compound site, with the exception of a small stand of yellow star-thistle in the native grassland area (Exhibit 6).

The majority of the non-native, invasive species are annual plants that were observed near the Compound area and should be targeted for removal. Several ornamental, perennial species near the Compound area should not be removed, however, because they augment the location of cultural sites, and are not ranked as weedy or invasive. These species include oleander (*Nerium oleander*), Indian fig (*Opuntia ficus-indica*), polka-dot cactus (*Opuntia micordasys*), lemon (*Citrus limonia*), blue gum (*Eucalyptus globulus),* black locust (*Robinia pseudoacacia)* and century plant (*Agave americana variegate*). Of the ornamental species near the Compound area, blue gum (*Eucalyptus globulus*) and black locust (*Robinia pseudoacacia*) are ranked as invasive by the California Invasive Plant Council (Cal-IPC). Therefore, mature blue gum and black locust trees associated with the historic Compound site should remain, while new sprouts or young plants that have established from the original trees should be targeted for removal. The yellow star-thistle located within the native grassland site should also be targeted as a high priority for removal.

Table 2 lists the species targeted for removal that were observed at the Preserve during the Baseline Biodiversity Surveys conducted in 2009.

Table 2: Target Invasive Plant Species Observed at Mount Olympus

Scientific Name	Common Name	Cal-IPC Invasive Rank
Centaurea solstitialis	yellow star-thistle	High
Silybum marianum	milk thistle	Moderate
Nerium oleander	oleander	*
Eucalyptus globulus	blue gum	Moderate

* 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 must 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 must 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. If herbicides are to be applied near or in aquatic sites, it must have been approved by the U.S. Environmental Protection Agency (EPA) for use in such areas. Foliar herbicide application must be conducted when wind speeds are less than five miles per hour to avoid un-intentional spray of adjacent vegetation.

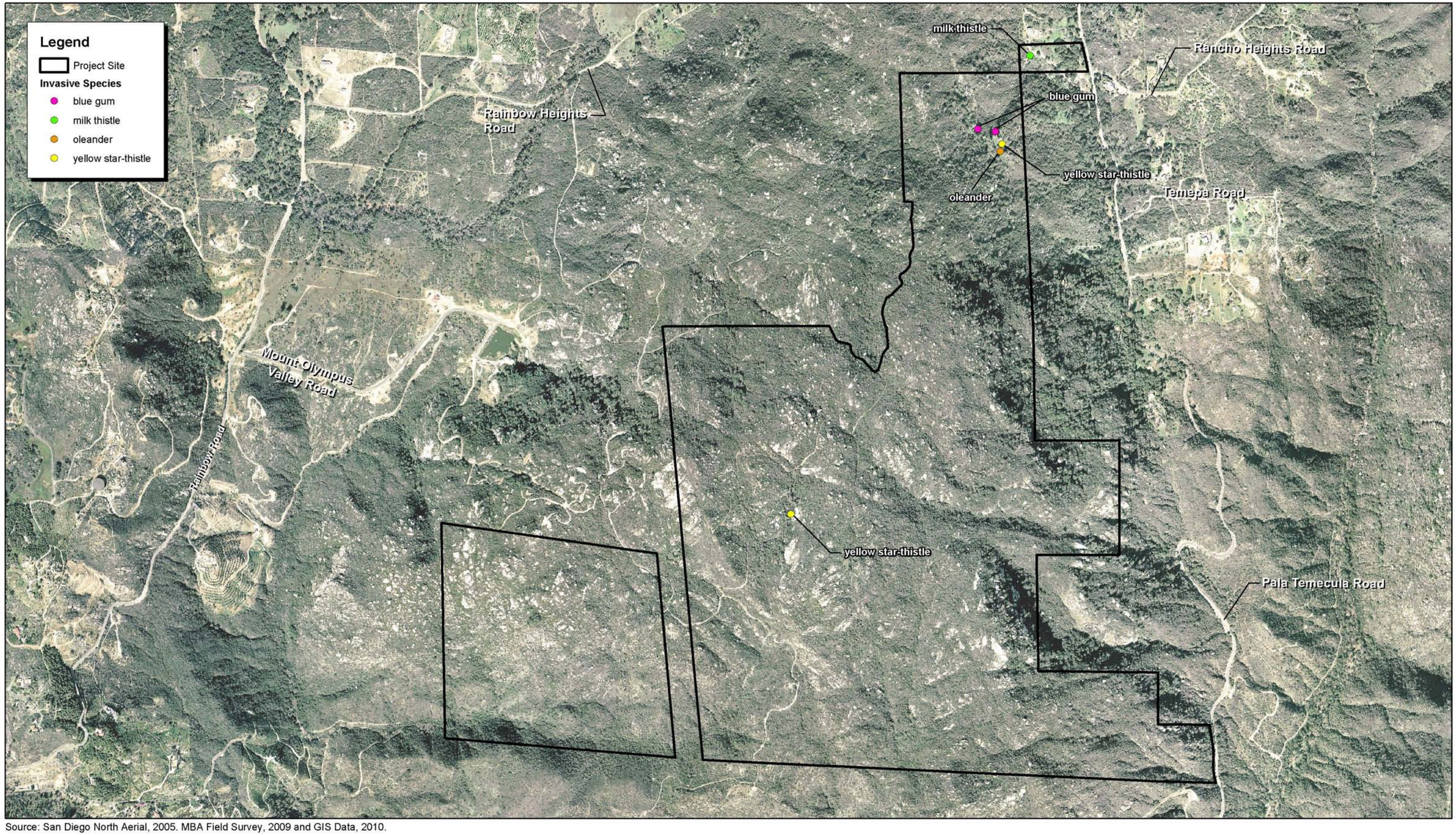
Herbicide application is preferred when more than 25 percent of the area is occupied by weeds greater than six inches in height. Herbicides must be applied selectively, and supervised by maintenance personnel familiar with native vegetation, to avoid damaging native plant species.

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 situations and is not expected to in the foreseeable future, therefore, mechanical removal is not advised within the Preserve.

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 does not currently support any tamarisk plants; therefore, this method is not currently necessary. However, if large tamarisk individuals are observed in the future, this method can be used.



Source: San Diego North Aerial, 2005. MBA Field Survey, 2009 and GIS Data, 2010.

NORTH

1,000 500 0 1,000 Feet

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Exhibit 6
Invasive Species Location Map

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VEGETATION MANAGEMENT REPORT

4.0 HABITAT RESTORATION

Non-native, invasive vegetation often does not provide the habitat required by most 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 within the Preserve should focus on areas that do not currently provide native habitat for wildlife.

4.1 Proposed Restoration Areas

Areas proposed for restoration include the area near the Compound area and the parking area off Pala-Temecula Road. These areas currently support a mixture of native vegetation with patches of the non-native, invasive 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 restricted access to the restoration 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. Due to site constraints, artificial irrigation is not feasible; therefore, 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 Compound area supports coast live oak woodland at the highest elevations, which intergrades with southern mixed chaparral at lower elevations. Currently, there are several disturbed areas within the Compound area. Restoration in these areas will result in coast live oak woodland intergrading with southern mixed chaparral.

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

- Toyon (*Heteromeles arbutifolia*)
- Laurel sumac (*Rhus laurina*)
- Chamise (*Adenostoma fasciculatum*)
- Eastwood's manzanita (*Arctostaphylos glandulosa*)
- Bigberry manzanita (*Arctostaphylos glauca*)

- Hoary leaf ceanothous (*Ceanothus crassifolius*)
- Buck brush (*Ceanothus cuneatus* var. *cuneatus*)
- Hairy ceanothous (*Ceanothus oliganthus*)
- Coast live oak (*Quercus agrifolia*)
- Scrub oak (*Quercus dumosa*)

Handling and planting of coast live oak and scrub oak acorns is different than seed for other species and must be conducted as described below.

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 must 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 must be stored in closed containers that hold no more than a quart of acorns together (quart plastic 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 must be submerged in water and any floating acorns or acorns that have holes or cracks must be discarded; acorns that sink to the bottom are more likely to be viable.

Acorns must 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 must be done by clipping the unwanted seedlings at the base of the root crown as close to the soil surface as possible. Seedlings must not be pulled because they may uproot adjacent desirable seedlings.

5.0 FIRE MANAGEMENT

With the use of fire management efforts, the public, natural landscape and resources, wildlife habitat, and plant communities can safely and effectively be protected. Management activities include fire suppression, preparedness, and fuels management.

5.1 Current Fire Management Practices

Current vegetation management activities are limited to reducing flammable vegetation along vehicle access roads and maintaining fuel modification zones. Vegetation reduction occurs along the access road off Pala Temecula Road along the eastern boundary and Rainbow Heights Road along the western boundary. DPR also maintains the established fuel modification zones on the northeast portion of the Preserve property adjacent to the existing residential structures that are 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 and Weather

Generally, the prevailing wind patterns flow in 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 et al. 2006). These winds are often erratic in direction and velocity, but generally flow in a north, northeasterly, and/or eastern direction.

The fire season for the region 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 and December can be additional months for such winds, extending the fire season to much later in the year.

5.2.2 Topography

The Preserve is located on and surrounding Mount Olympus in the northwestern portion of unincorporated San Diego County. The Preserve ranges in elevation from 790 to 2,224 feet above sea level (AMSL). The highest elevation is at the top of Mount Olympus, which is located in the center of the Preserve.

5.2.3 Watershed Description

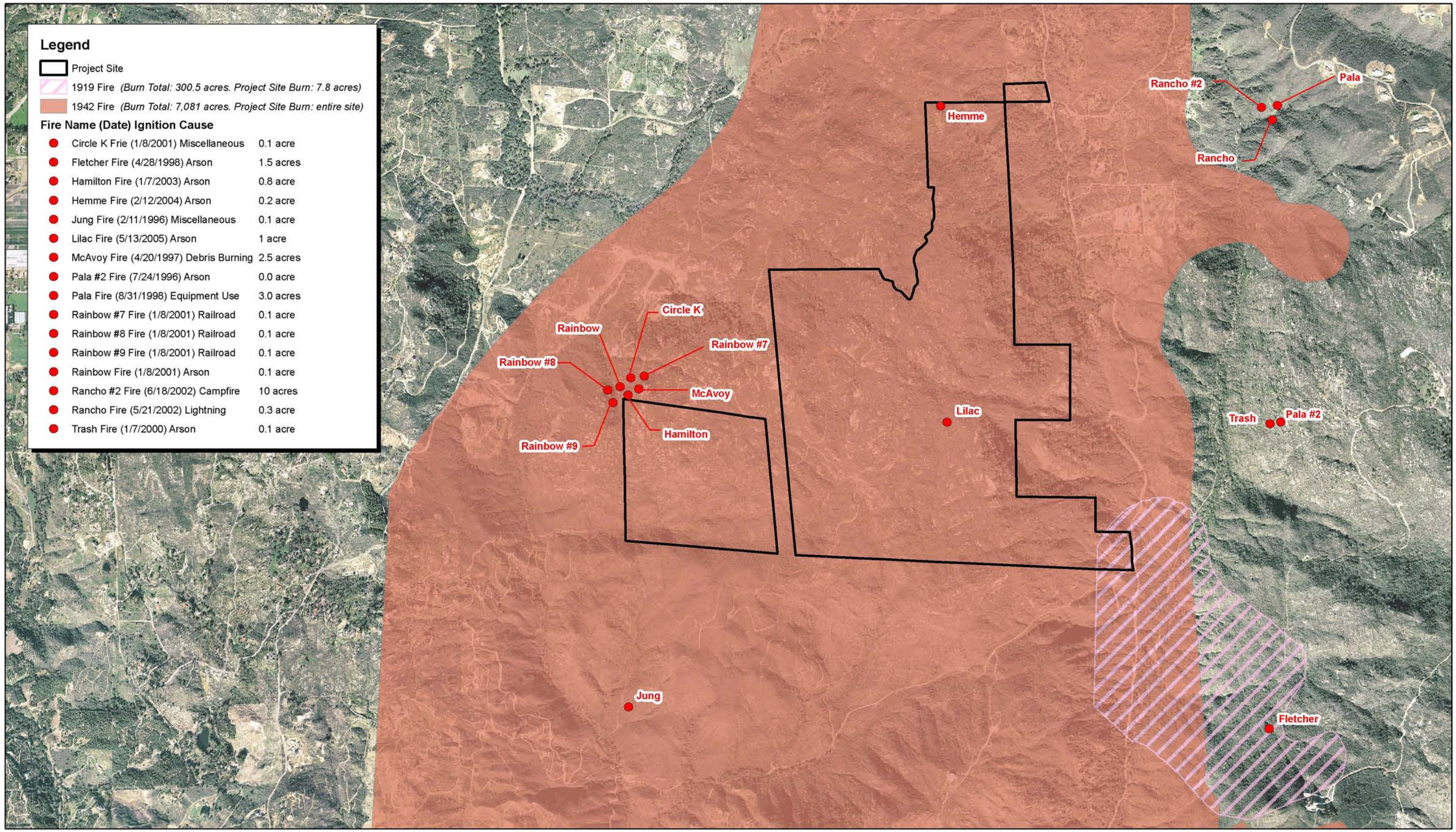
The Preserve is located within the San Luis Rey River Watershed approximately 20 miles northeast of the Pacific Ocean. There are no bodies of water or significant drainage features that occur within the boundaries of the Preserve; however, Pala Creek is a north-south drainage, which occurs east of the Preserve. Gomez Creek is a southeast running drainage that occurs southwest of the Preserve. Sheet flows from the Preserve flow into these drainage features.

5.2.4 Fire History

The Preserve has experienced two large wildfires. The first occurred in 1919, burning approximately eight acres of the Preserve in a 300-acre fire along the most southeasterly corner of the area. The second, a 7,081-acre fire, occurred in 1942 and burned the entire Preserve (Exhibit 7). No fires of major consequence have occurred since 1942 (San Diego North 2005 Aerial, SanGIS data; MBA geographical information systems [GIS] data, 2009). Historical records reflect that from 1996 through 2008, there have been two ignitions on the Preserve and there have been numerous ignitions adjacent to and in close proximity to the Preserve (CalFire FRAP GIS Data 2009). The fires on the Preserve (Hemme and Lilac) were confined to one acre or less (Exhibit 7).

Fire Intensity, Fuel Models, and Fire Behavior Projections

Approximately 91 percent of the Preserve is covered by southern mixed chaparral, which has very high fire intensity and is 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.



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

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NORTH

1,500 750 0 1,500 Feet

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Exhibit 7
Fire History and Ignitions Map

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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 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 nine percent of the area is covered with coast live oak woodland (34 acres); rocky out crops (19 acres); less then four acres of grassland, and seven acres identified as disturbed lands. Rocky outcrops are not classified in a fuel type for obvious reasons.

The grasslands and disturbed areas are not of sufficient size and continuity to place in a fuel model. The grasslands are of insufficient size to classify, but must be recognized as a fine fuel type that burns rapidly.

The coast live oak woodland is 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 the nine parcels. The principle severity and burning intensities in the coast live oak woodland would be somewhat less, the same flame lengths and rates of spread would not be significantly different because of the surrounding mixed chaparral.

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 burning, 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 of the fire. As seen in Table 3, 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 including coast live oak woodland, non-native grassland, and native grassland. 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 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 outcompeted by native shrubs that experience regrowth 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. Grass provides a low quality of fuel, and therefore, grassland fires usually are not intense. 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.

5.3 Fire Response Plan

5.3.1 Fuel Management Units

Approximately 91 percent of the area is composed of southern mixed chaparral and the remaining nine percent is composed of scattered parcels of other vegetative types. Therefore, defining a fuel management area would be limited to only a single unit.

5.3.2 Short-term Fire Suppression Response Plan

Emergency Services

The California Department of Forestry and Fire Protection (CalFire) and North County Fire Protection District provide 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 and the North County Fire Protection District, which provide emergency services for fire suppression, has direct suppression responsibility for all wildland incidents occurring within the Preserve. The typical SRA suppression response is reflected in the Table 4. The North County Fire Protection District provides suppression response along with CalFire along the western portions of the Preserve. Federal Responsibility Areas (FRA) are limited to the northern boundary of the Preserve and are depicted in Exhibit 7.

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.			

Non-typical responses, particularly associated with a high response would be dependant on other fire activities and responses in the region. Additional resources that could potentially respond when wildfire incidents are in close proximity, or threatening, to local areas include:

- Pala Reservation Fire Station
- CalFire Rainbow Camp
- CalFire Red Mountain
- North County Fire Rainbow Station #6

The western portion of the Preserve is within the North County Fire Protection District. Units from this district would remain in their specific county jurisdiction unless CalFire determines that a mutual aid request is necessary. 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 are dispatched based upon incident location and the closest resources available to the incident location. Under the statewide mutual aid agreement with the Forest Service, resources are also available from the adjacent Cleveland National Forest.

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 Areas (SRA) unless deemed otherwise under state statutes. The Preserve is under SRA protection and CalFire as well as North County Fire Protection District provides suppression resources (Exhibit 7). The first responder for CalFire would be the Rainbow Camp located at 8215 Rainbow Heights Road in Fallbrook (760.728.7492) or the Red Mountain Station located at 3660 East Mission Road in Fallbrook (760.728.1323). The nearest North County Fire Protection District Station is located at 2309 Rainbow Valley Road in Fallbrook (760.723.2005).

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 Sheriff Department is responsible for providing all Search and Rescue responses to the area. This includes medical emergencies in wildland areas (San Diego County Sheriff Department, website; 2009).

5.3.4 Roads/Access

Site Access

The Preserve can be accessed from the eastern, western, and southern boundaries. The eastern access point is from Pala Temecula Road, and requires unlocking a pipe gate to enter the Preserve. Access from the west is from a road that provides access to a transmission line owned and operated by SDG&E. Southern access is from Farra Street, which is reachable via Arouba Road off Pala Temecula Road. This access crosses private property and also requires unlocking a gate.

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

Based upon the steep and broken topography, and difficult road access, there are no areas that can be considered as emergency staging areas within the confines of the Preserve.

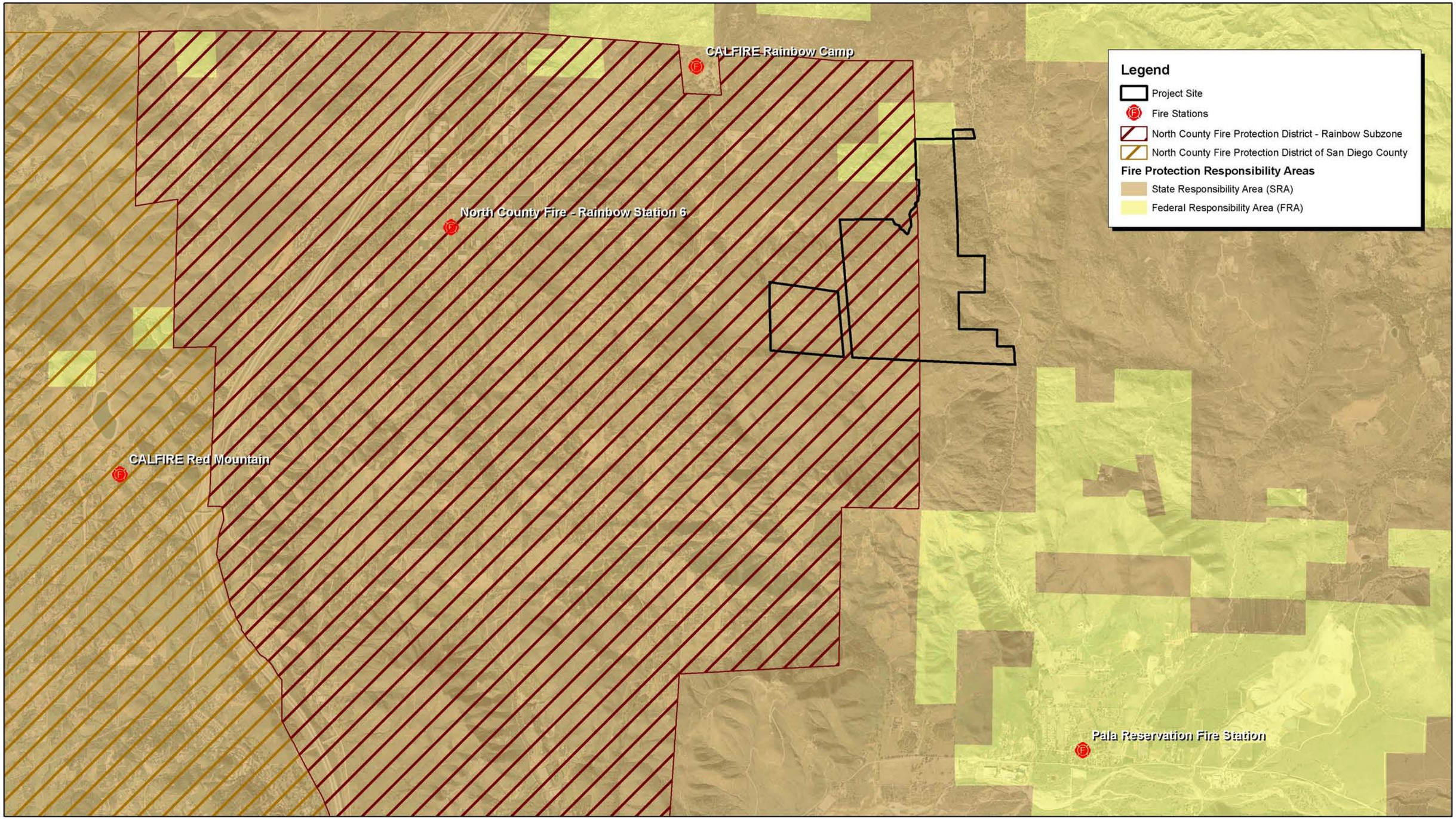
Helispot construction on the Preserve was also considered. Emergency responses by CalFire and the San Diego County Sheriffs Department, Search and Rescue do not utilize helispots when responding to emergencies within this area (Pina 2009). Therefore, the construction and maintenance of helispots is not recommended.

5.3.7 Fire Hydrants

There are no fire hydrants on the Preserve. The water delivery system required for the installation of a fire hydrant system is not available to the Preserve or in the surrounding area.

5.3.8 Other Water Sources

There are no known water sources that would be available for fire suppression actions within the Preserve. Vail Lake in southern Riverside County is approximately nine miles to the northeast, and small ponds on the San Luis Rey River are approximately four miles to the south of the Preserve.



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

NORTH

3,100 1,550 0 3,100 Feet

Michael Brandman Associates

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Exhibit 8
Fire Protection Responsibility Areas and Fire Station Locations

6.0 MANAGEMENT DIRECTIVES

6.1 Invasive Species Removal

The locations of non-native, invasive plant species within the Preserve have been mapped in the Baseline Biodiversity Report and are included in Exhibit 6. An intensive weed control program will be implemented for a minimum of three years during which invasive species will 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 will need to be every six months or more frequently during the growing months if deemed necessary by the biologist to prevent establishment and subsequent dispersal into native plant communities that exist within the Preserve. The weed abatement activities can occur annually thereafter if the first year of abatement activities is 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 must to 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 (6) 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 disturbed areas as well as in areas where non-native, invasive plant removal is to take place (Exhibit 6). 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 will consist of removal of non-native, invasive plant species (Exhibit 6), and thinning of vegetation along trails, access roads, staging areas, and the Preserve boundary. These activities will minimize the fuel load within the Preserve to reduce the fire threat to surrounding 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. Thin vegetation along each side of proposed trails as identified in the Public Access Plan (MBA 2010b) and roadways up to two feet, except where slopes are less severe, then thin up to 30 feet.
2. Identify and remove any dead snags identified as a hazard. Otherwise, snags will remain for wildlife purposes.
3. The vegetation surrounding the buildings located at the historic Compound site (remaining or removed from the site) up to 100 feet should be treated by thinning with vegetation chipped, cut, or pile and burned.
4. Thin and remove vegetation up to 100 feet along Preserve boundary on the north side where a private structure abuts the property line to comply with fuel modification requirements.

In areas where dense vegetation is to be removed, caution should be taken to ensure that any undiscovered, potential cultural resources are not disturbed. Maintenance crews removing the vegetation should be trained in identifying possible cultural resources 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 5.3 miles of disturbed trails, which may be considered for use as a designated trail system if, in the future, the Preserve is opened to the public. Any future designated public use trails would require regular maintenance and vegetation thinning in accordance with the County's Community Trails Master Plan (2009) guidelines. It is anticipated that any trails within the Preserve would be designated as Type C - Primitive trails, which would require clearing two feet

along each side of the trail and up to 12 feet in height. On-going maintenance and monitoring should 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 determined that vegetation thinning is required more frequently or greater than two feet from the trail edge, 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.

7.0 REFERENCES

Andrews, P.L., R.C. Rothermel. Charts for Interpreting Wildland Fire Behavior Characteristics. General Technical Report INT - 131. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station.

Brown, J.K., Jane Kapler Smith, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS - GTR - 42 - vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Research Station.

CalFire FRAP GIS Data. 2009.

County of San Diego. 2005. County Trails Program: Community Trails Master Plan (updated 2009). Website: http://www.co.san-diego.ca.us/reusable_components/images/parks/doc/toc09.pdf

County of San Diego. 2009a. Multiple Species Conservation Program: Draft North County Plan. San Diego County, California.

County of San Diego. 2009b. Vegetation Management Report, a Report on Vegetation Management in the Unincorporated Area of San Diego, County.

Hann, W.J., David C. Bunnell. 2001. Fire and land management planning and implementation across multiple scales. Int. J. Wildland Fire. 10:389-403.

Hardy, C.C., K.M. Schmidt, J.M. Menakis, and N.R. Samson. 2001. Spatial data for national fire planning and fuel management. International Journal of Wildland Fire 10:353-372.

Michael Brandman Associates. 2009. Mt. Olympus Preserve Cultural Resources Inventory. October 2009.

Michael Brandman Associates. 2010a. Mt. Olympus Preserve Baseline Biodiversity Report. March 2010.

Michael Brandman Associates. 2010b. Mt. Olympus Public Access Plan. March 2010.

Neary, D.G., Kevin C. Ryan, and Leonard DeBano. 2005. Wildland fire in ecosystems: effects of fire on soils and water. Gen. Tech. Rep. RMRS-GTR-42-vol.4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 250 p.

Pina, D. CalFire. Personal communication. October 21, 2009.

Robichaud, P.R. 1996. Spatially-varied erosion potential from harvested hillslopes after prescribed fire in the Interior Northwest. Ph.D. dissertation Moscow, ID: University of Idaho.

Robichaud, P.R. 2000. Forest Fire Effects on Hillslope Erosion: What We Know. USDA - Forest Service, Rocky Mountain Research Station, Moscow, Idaho.

San Diego County Sheriff. 2009. Website: http://www.sdsheriff.net/sar/units.htmland. 2009.

San Diego County USDA NAIP, 2005. MBA Field Survey Data, 2009.

Schmidt, K.M., Colin C. Hardy, Wendel J. Hann, and David L. Bunnell. Development of coarse-scale spatial data for wildland fire and fuel management. General Technical Report RMRS-GTR-87. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Scott, J.H. and R.E. Burgen. 2005. Standard Fire Behavior Fuel Models: A Comprehensive Set for Use With Roethermel's Surface Fire Spread Model. USDA Forest Service, General Technical Report, RMRS-153, Rocky Mountain Research Station, Ft. Collins, CO.

Smith, J.K. 2000. Wildland fire in ecosystems: effects of fire on fauna. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, 83 p.

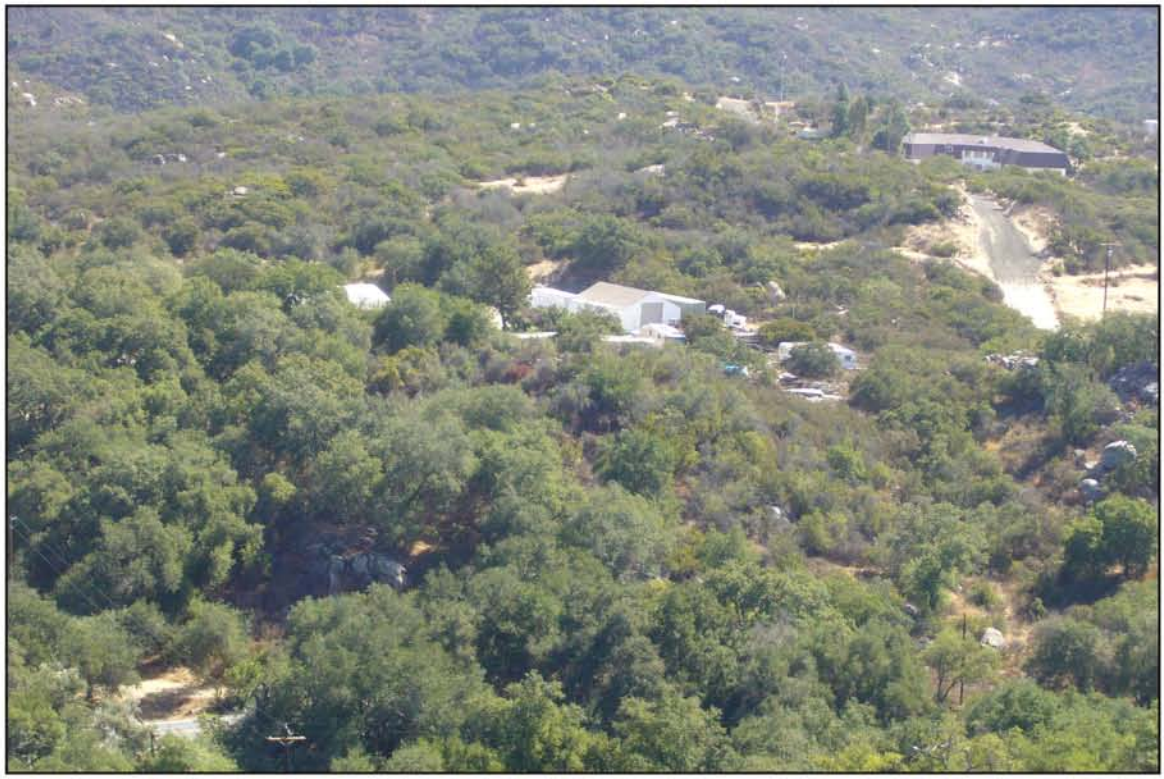
Sugihara, N.G., Jan W. Van Wagtendonk, K.E. Shaffer, Joann Fites-Kaufman, Andrea E. Thode. 2006. Fire in California's Ecosystems. University of California Press. Berkeley, California.

United States Department of Agriculture (USDA) Forest Service. 2002. General Technical Report RMRS-GTR-87.

United States Department of Agriculture (USDA) Forest Service. 2005. General Technical Report; RMRS-GTR-153.

Weather Underground. 2009. http://www.wunderground.com/ October 2009

Appendix A:
Site Photographs



Photograph 1: View looking east from trail 2.

Photograph 2: Structures and downed timber - “The Compound”.

Source: Michael Brandman Associates, 2009.

Michael Brandman Associates

Appendix A
Site Photographs