Carmel Mountain and Del Mar Mesa Preserves Resource Management Plan

Prepared for

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1.0 Introduction

1.1 Purpose of the Plan

This plan has been prepared to provide guidelines for the protection and maintenance of preserved natural open space on the Carmel Mountain Preserve and the Del Mar Mesa Preserve (Preserves) (Figures 1-1 and 1-2). The natural open space of the Preserves harbors extremely sensitive and depleted vegetation communities and species unique to the San Diego region. The primary resources to be protected on these Preserves are vernal pools; southern maritime chaparral; the continuity of habitat for wildlife movement and gene flow and the federally and state listed flora and fauna (particularly the short-leaved dudleya, *Dudleya blochmaniae ssp. brevifolia).*

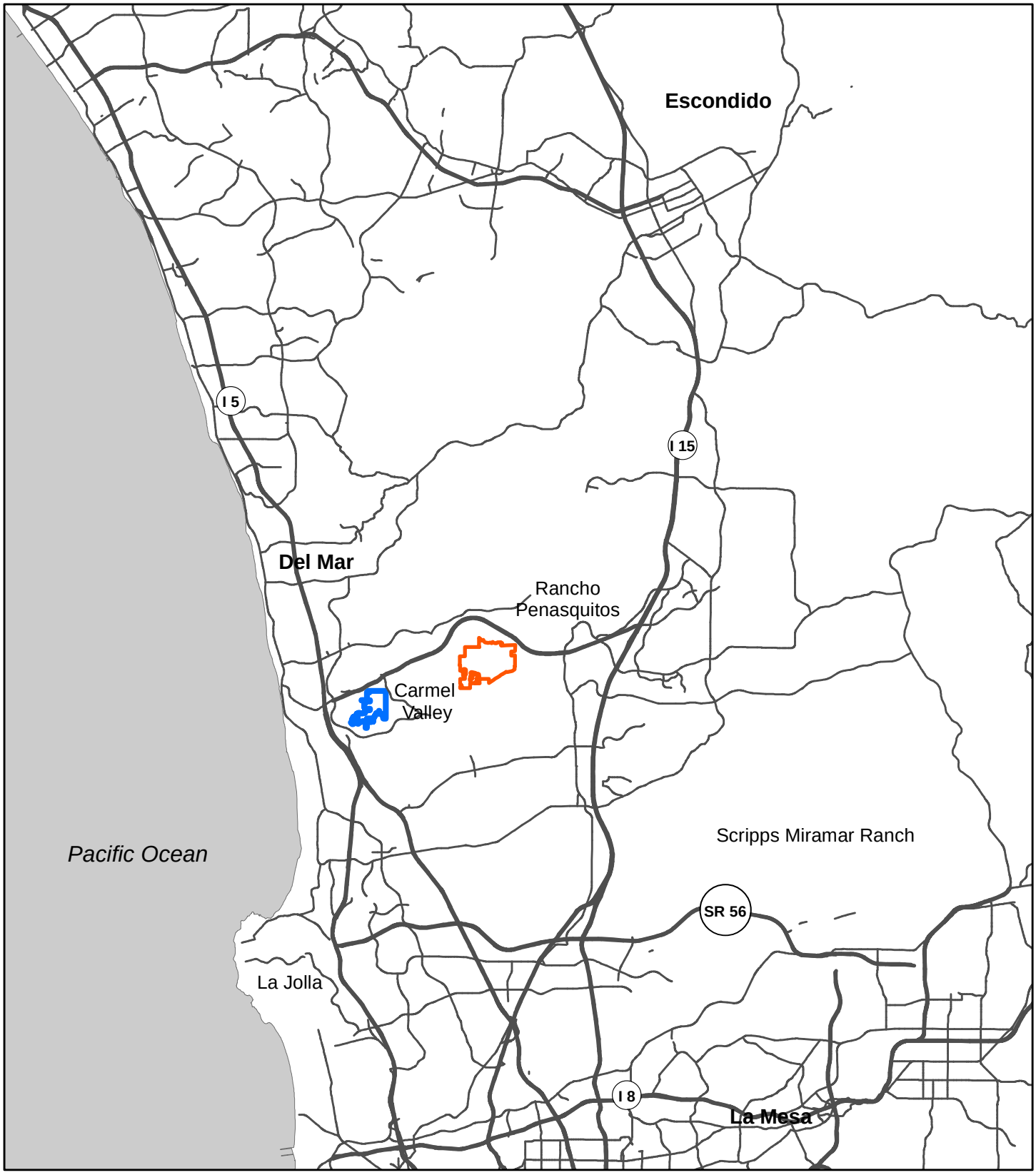
The Preserves also act to protect the quality of life for residents of San Diego County and the quality of the experience for visitors by adding to the feeling of openness and interaction with nature that San Diego fosters.

The City of San Diego Multiple Species Conservation Program (MSCP) provides a framework for preserving and protecting natural resources in the San Diego region. The City of San Diego (City) prepared a Subarea Plan under the MSCP to meet the requirements of the California Natural Communities Conservation Planning (NCCP) Act of 1992 and the federal Endangered Species Act of 1973. The Carmel Mountain Preserve and Del Mar Mesa Preserve Resource Management Plan (RMP) describes the tasks that will ensure management and maintenance of the Preserves in accordance with the MSCP and the Subarea Plan.

1.2 Implementation of the Resource Management Plan

1.2.1 Management Approach

Management of the Preserves will be adaptive to allow management and monitoring tasks to be changed based on the results of studies and management tasks. Planning, acting, monitoring, and evaluating are the key elements in a continuous process where all the stakeholders interact. Communication and sharing information is the basis for adapting management and monitoring tasks to reflect what has been learned, thereby providing the best Preserve management based on the most up-to-date monitoring and evaluation methods.



Legend

Del Mar Mesa Preserve

Carmel Mountain Preserve

0 1.75 3.5

Miles

FIGURE 1-1
Regional Location of the Preserves

Legend

Del Mar Mesa Preserve

Carmel Mountain Preserve

0 0.475 0.95

Miles

FIGURE 1-2
Vicinity of the Preserves

The broad goals of adaptive management are to:

1) Improve the quality of decisions;
2) Contribute to building long-term relations;
3) Incorporate citizens' ideas and knowledge in decisions, as appropriate; and
4) Learn, be innovative, and share results with others.

The adaptive management strategy is based upon a framework presented by Shindler et al. (1999).

Science and policy come together when developing natural resource management tasks. Natural resource managers develop implementable methods of complying with existing mandates for conserving natural resources. Often, policy moves faster than science, and the capacity of resource managers and scientists to provide information may require more time than policymakers are willing or able to accept (Clark et al. 1998). The natural resource managers for Carmel Mountain and Del Mar Mesa Preserves must rely on existing scientific information, or gather additional information quickly, so they can make sound decisions regarding ecosystem and sensitive species conservation.

1.2.2 Options for Managing the Preserves

The Preserves will be managed by a person or persons who have biological resource management experience. The Preserves can be managed in a number of different ways. In each of the alternative management designs described in this section, a management committee with representatives from each of the agencies, jurisdictions, and other property owners would be formed and would oversee the Habitat Manager. The Habitat Manager could be one person, one organization, or a committee.

1.2.2.1 One-Person Habitat Manager

One person could be the habitat manager of both Preserves, or, since the system of managing the two Preserves could be different, each Preserve could be managed by a separate person.

1.2.2.2 Management Committee

A Management Committee could be the Habitat Manager. The committee would meet regularly and decide on management strategies. Each landowning agency, jurisdiction, or organization would be responsible for implementing the management strategies on their own properties.

1.2.2.3 Memorandum of Agreement

A Memorandum of Agreement (MOA) could be developed among the responsible parties. A management committee of agency, jurisdiction, and landowner representatives would be assembled to:

a. Hire a Habitat Manager who would implement the management directives, or
b. Assign one owner the primary responsibility to manage the Preserve(s) as the Habitat Manager under a cooperative agreement.

Each of these options would be directed and overseen by the management committee.

1.2.2.4 City of San Diego Open Space Manager

The management committee could defer to the City of San Diego to act as Habitat Manager of the Preserve(s) as part of their City of San Diego open space lands management program. Management would adhere to the MSCP requirements and the Carmel Mountain Preserve and Del Mar Mesa Preserve Management Plan. The City would coordinate all maintenance and management with funding from the City of San Diego open space management program and the other parties.

1.2.2.5 Non-profit Land Trust

The management committee could decide to assign the management of the Preserve(s) to a non-profit land trust who would be the Habitat Manager. The agencies, jurisdictions, and other land owning organizations would still oversee the management of their own lands to meet their own goals and requirements.

1.2.3 Volunteers

Volunteers could be recruited to assist in managing the preserves. Volunteers could patrol the Preserves, potentially through a Community Planning Group position that rotates yearly or other means, with training provided by Park Rangers. Volunteers could also monitor trail use, domestic pet trespassing, and invasive plant invasions. They could also be natural history interpreters and lead field trips.

1.3 History

A Public Scoping Meeting was held by the City of San Diego on February 27, 2001 to hear the issues of concern by agencies, jurisdictions, and public stakeholders. At the meeting, City staff described the intention of preparing a management plan for the Carmel Mountain and Del Mar

Mesa Preserves and each person in attendance identified the issues they thought should be addressed in the plan.

A list of attendees and the issues they introduced was prepared by the City (Appendix 1). The Resource Management Plan addresses these issues and others identified after the scoping meeting. Issues introduced fall into these categories:

- Multiple jurisdictions having different requirements
- Habitat restoration
- Open space protection enforcement
- Trails and access
- Natural resource protection
- Cultural resource protection
- Allowable recreational uses
- Private property access
- Format of the plan
- Funding for implementing the plan
- Fire management
- Education program
- Interim planning
- Management monitoring
- Adjacent development and other edge effects
- Threats to the natural and cultural resources
- Volunteer involvement
- Park design
- Public use
- Urban encroachment
- Easements
- Erosion and sedimentation
- Brush management
- Miscellaneous

2.0 Ownership and Applicable Management Plans

Carmel Mountain is owned by the City of San Diego with the exception of two private inholdings (Figure 2-1). Ownership of Del Mar Mesa is split among private land holders and four public land owners/managers: City of San Diego, County of San Diego (County), California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS). Each of these entities has mandates that direct their management of open space preserves.

Seven parcels on Del Mar Mesa Preserve, totaling 160.0 acres, have been preserved for mitigation by 1) the Metropolitan Wastewater Department, 2) The Environmental Trust (owned/managed by the City following the bankruptcy of The Environmental Trust), 3) Mira Mesa Market Center, 4) Environmental Services, 5) the Deer Canyon Mitigation Bank, 6) the SANDAG/CalTrans Environmental Mitigation Program (Figure 2-2), and 7) McCaw Residence. The City of San Diego Subarea Plan of the MSCP states that, if possible, the Del Mar Mesa area should be managed as a single unit rather than split into separate entities according to ownership (i.e., County, various City departments, easements). This RMP treats Del Mar Mesa as a single unit; however, each property owner is responsible for managing the property under their ownership until such time as an MOU for management is adopted.

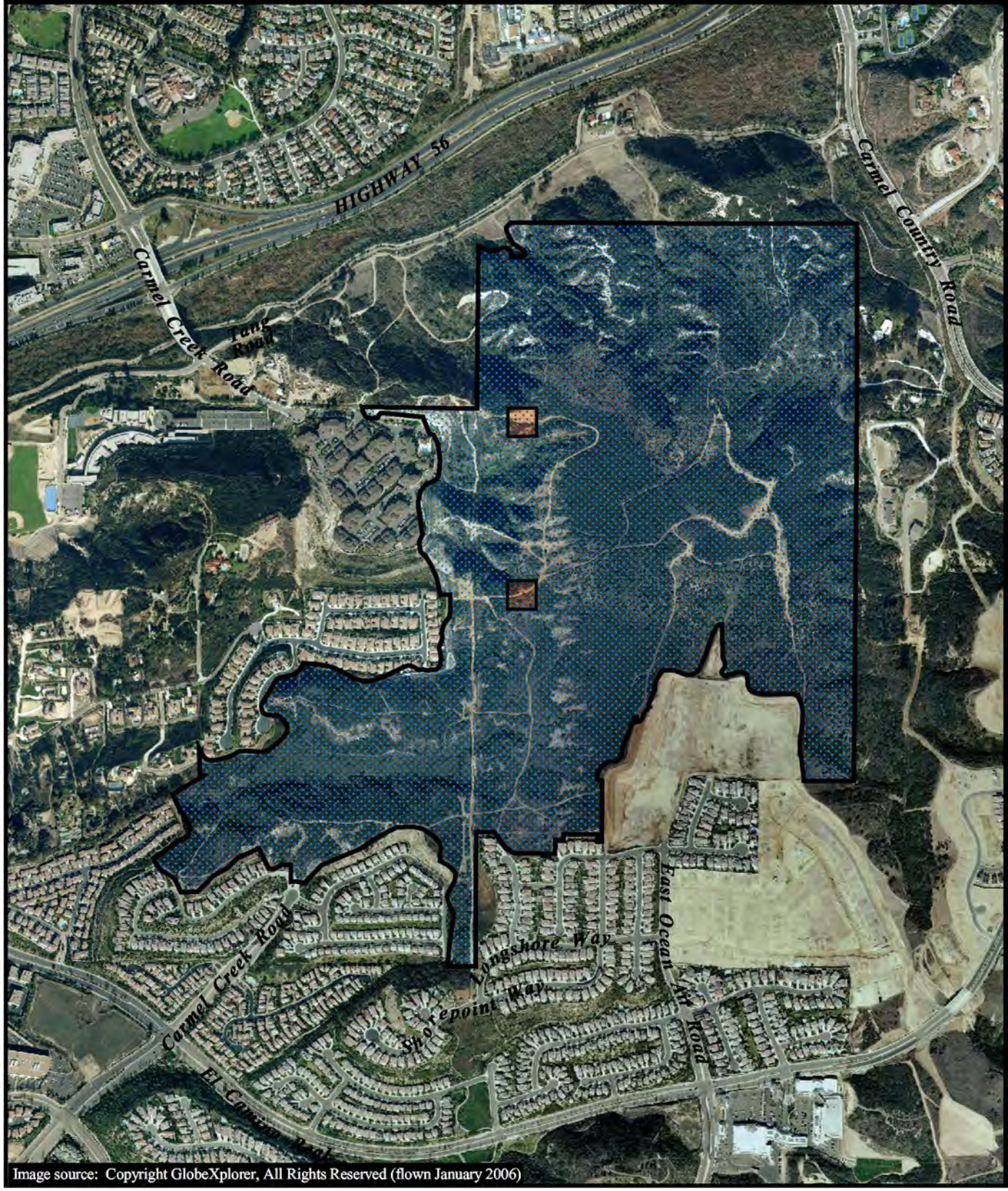
TABLE 2-1
OWNERSHIP ON THE PRESERVES

Owners	Carmel Mountain Preserve (Acres)	Del Mar Mesa Preserve (Acres)
City of San Diego	300.4	537.0
County of San Diego	–	27.0
CDFW	–	81.6
USFWS	–	75.4
Private	2.0	69.0
TOTAL	302.4	790.0

2.1 City of San Diego

2.1.1 Ownership

The City of San Diego owns 300.4 acres of the Carmel Mountain Preserve and 537.0 acres of the Del Mar Mesa Preserve.



Carmel Mountain Preserve

Ownership
Private
City of San Diego

0 Feet 1000

FIGURE 2-1

Ownership on Carmel Mountain Preserve

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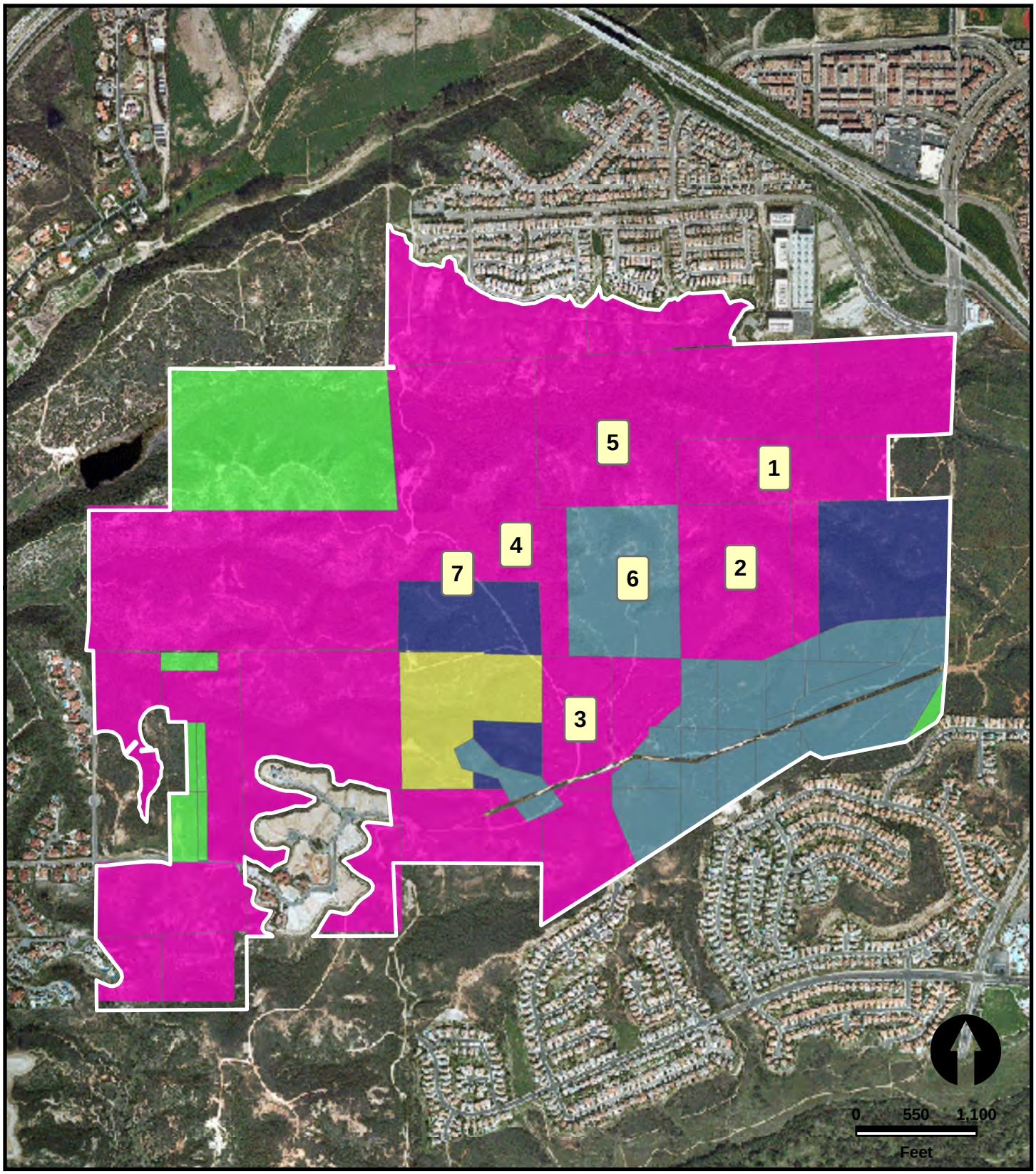


Legend

Property Ownership

- CDFG Preserve
- City of San Diego
- County of San Diego
- Private Property
- USFWS NWR

Parcels Used for Mitigation

1 - Metropolitan Waste Water Division
2 - The Environmental Trust
3 - Mira Mesa MarketCenter
4 - Environmental Services Department
5 - Deer Canyon Mitigation Bank
6 - TransNet Environmental Mitigation Program
7 - McCaw Residence

FIGURE 2-2
Ownership and Parcels Used for Mitigation in the Del Mar Mesa Preserve

2.1.2 Applicable Plans

The City of San Diego Subarea Plan of the MSCP is designed to identify lands that would conserve habitat for federal and state endangered, threatened, or sensitive species. Implementation strategies, preserve design, and management guidelines are also included in the MSCP. The City of San Diego prepared a subarea plan to guide implementation of the MSCP within its corporate boundaries. The City of San Diego adopted its MSCP Subarea Plan in March 1997.

The assessment of the sensitivity of vegetation communities and species follows the guidelines presented in the MSCP Subarea Plan and the City's Land Development Code, including the Significance Determination Guidelines under the California Environmental Quality Act dated January 2012 and the Land Development Code, Biology Guidelines dated April 23, 2012. The Multi-Habitat Planning Area (MHPA) lands are those that have been included within the City's MSCP Subarea Plan for habitat conservation. These lands have been determined to provide the necessary habitat quality, quantity, and connectivity to sustain the unique biodiversity of the San Diego region. The MHPA lands are considered by the City to be sensitive biological resources.

Under the MSCP Subarea Plan and the City's Land Development Code, Biology Guidelines (2012), upland vegetation communities have been divided into four tiers.

A total of 85 sensitive plant and wildlife species are considered to be adequately protected within MHPA lands. These sensitive species are MSCP-covered species and are included in the Incidental Take Authorization issued to the City by federal and state governments as part of the City's MSCP Subarea Plan Implementing Agreement.

There are 15 plants that are considered "narrow endemic species" based on their limited distributions in the region. These narrow endemics are sensitive biological resources. All 15 narrow endemic plants are also MSCP-covered species and some are state or federally listed as threatened or endangered species. The City's requirements for land management on Del Mar Mesa and Carmel Mountain Preserves under the MSCP Subarea Plan are given in Appendix 2.

In addition, the Carmel Valley Neighborhood 8A Specific Plan/Precise Plan provides land use policies for the Carmel Mountain Preserve, and the Del Mar Mesa Specific Plan provides land use policies for the Del Mar Mesa Preserve.

2.2 County of San Diego

2.2.1 Ownership

The County of San Diego owns 27.5 acres within Del Mar Mesa Preserve.

2.3. California Department of Fish and Wildlife

2.3.1 Ownership

CDFW owns 81.6 acres of land on Del Mar Mesa. In the fall of 1986, the California Department of Transportation (Caltrans) established a vernal pool preserve of 40 artificial pools and additional natural pools on the CDFW portion of Del Mar Mesa to mitigate for the loss of San Diego Mesa mint from the Highway 52 extension and Interstate 15 (I-15) construction (Black and Zedler 1998).

2.3.2 Applicable Plans

CDFW approved the MSCP in 1996, and the CDFW follows the MSCP guidelines for resource management.

2.4. USFWS – San Diego National Wildlife Refuge Complex

2.4.1 Ownership

The USFWS San Diego National Wildlife Refuge (SDNWR) owns 75.4 acres within the Del Mar Mesa Preserve.

2.4.2 Applicable Plans

The National Wildlife Refuge System Administration Act of 1966 was derived from Sections 4 and 5 of Public Law [P.L.] 89-669 (October 15, 1966; 80 Stat. 927), which constitutes an “organic act” for the refuge system. It was amended by P.L. 105-57, “The National Wildlife Refuge System Improvement Act of 1997.” The new law amends and builds upon the act of 1966 to ensure that the National Wildlife Refuge System is managed as a national system of related lands, waters, and interests for the protection and conservation of the nation’s wildlife resources.

The 1997 amendment gives guidance to the Secretary of the Interior for the overall management of the Refuge System. The Act's main components include:

- a strong and singular wildlife conservation mission for the Refuge System;
- a requirement that the Secretary of the Interior maintain integrity, diversity, and environmental health of the Refuge System;
- a new process for determining compatible uses of refuges;
- a recognition that wildlife-dependent recreational uses involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation, when determined to be compatible are legitimate and appropriate public uses of the Refuge System;
- that these compatible wildlife-dependent recreational uses are the priority general public uses of the Refuge System; and
- requirements for preparing comprehensive conservation plans.

USFWS has established that the mission of the Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

They have also established goals of the Refuge System, which are:

1) To preserve, restore, and enhance in their natural ecosystems when practical, all species of animals and plants that are endangered or threatened with becoming extinct;
2) To perpetuate the migratory bird resource;
3) To preserve a natural diversity and abundance of fauna and flora on refuge lands; and
4) To provide an understanding and appreciation of fish and wildlife ecology and our role in the environment and to provide refuge visitors with high-quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established. Any specific management requirements must be managed in coordination with the Refuge System. If there is a conflict with the Refuge System regulations, those regulations of the Refuge must be implemented.

2.5 Private Landowners

2.5.1 Ownership

There are two acres of privately owned land currently on Carmel Mountain and 69 acres of privately owned land on Del Mar Mesa. Legal access to privately owned lands on Carmel Mountain and Del Mar Mesa must be maintained until the land is conserved or a written statement is received from the landowner stating that legal access to their property is no longer required.

Potential access for private property owners on Carmel Mountain can be provided through a gate on the western side of the future park site located south of the Preserve. The design of the park shall ensure that legal access to private property owners on Carmel Mountain is not prevented. A key to the gate will be provided to private property owners. Additional environmental review will be required for access and development of private lands on Carmel Mountain.

Access to private property on Del Mar Mesa can be obtained through existing SDG&E access roads (see Figure 9-2 in Chapter 9.0). Any restoration along or within private property access will not be conducted until the land is conserved or will be limited so it does not interfere with the private landowners' access rights. Additional environmental review will be required for access and development of private lands on Del Mar Mesa.

Privately owned lands within Carmel Mountain and Del Mar Mesa are not included within the preserves until such time as the land is conserved in perpetuity by the land owner or acquired by a public or non-profit agency for the purposes of conservation. **Any trails, habitat restoration, or other activities described in this plan will not be implemented until the land is conserved or written permission is obtained from the landowner.**

2.6 San Diego Gas & Electric

San Diego Gas & Electric (SDG&E) has an easement for power lines running north-south on the Carmel Mountain Preserve. The lands within their easements are covered by the SDG&E Subregional NCCP (USFWS Take Permit PRT 809637, December 18, 1995) and their Implementing Agreement/California Endangered Species Act Memorandum of Understanding, which states that "implementation of the Subregional Plan is independent of other NCCP/HCP's and the Covered Species for which the Incidental Take is authorized under the Take Authorizations is not dependent upon the implementation of such plans." These documents cover a total of 110 plant and animal species. In addition, the NCCP Subregional Plan mitigation measures relating to vernal pools were clarified in an agreement with SDG&E, USFWS, and CDFW (May 26, 2004).

3.0 Existing Conditions

3.1 Carmel Mountain Preserve

The resources on Carmel Mountain Preserve have been studied extensively for development projects and for scientific research. The results of the studies and surveys have been compiled and are presented in this chapter.

3.1.1 Physical Setting

Carmel Mountain Preserve is situated south of Highway 56 and east of Interstate 5 (I-5), between Carmel Creek and Carmel Country Roads. This area includes Carmel Mountain and facilitates an important wildlife corridor adjoining it to Peñasquitos Canyon and to the Los Peñasquitos Lagoon. Given that the region is in such a unique location, it provides for an important inland-coastal habitat linkage.

3.1.1.1 Topography

The topography of the Preserve (Figure 3-1) can be described as generally level coastal terraces that are slightly westward tilting. The central portion of the Preserve is a fairly level mesa, varying from 380 to 430 feet above sea level. Several small drainages dissect the margins of the mesas.

3.1.1.2 Geology

Carmel Mountain is composed of sedimentary rocks. The oldest strata exposed within the boundaries of the Carmel Mountain Preserve are Torrey Sandstone deposited during the mid-Eocene epoch, between 40 and 50 million years ago. The medium to coarse-grained sandstone is white to light brown and is mostly quartz, with a small amount of orthoclase. Concretions are caused by deposition of calcite and iron oxide cements that have dissolved and run down through the sandstone from higher layers of rock. Rainwater dissolves the cements from the sandstone and the rocks above it during wet times and deposits them during dry times. The Torrey Sandstone is thought to have been formed from an arch-shaped barrier beach. With a maximum thickness of about 180 feet, the Torrey Sandstone crops out around the base of Carmel Mountain, from approximately 100 mean sea level (MSL) to 300 MSL, and forms the small wind caves that can be seen on the eroded lower slopes of Carmel Mountain.

Above the Torrey Sandstone is a thin layer of the Scripps Formation, a pale yellowish-brown, medium-grained sandstone with occasional cobble-conglomerate inclusions. It was deposited after the Torrey Sandstone during the mid-Eocene epoch. The Scripps Formation is composed mostly of quartz and potassium feldspar and can be difficult to differentiate from the Torrey Sandstone, as it, too, is often stained by the iron rich solutions from rock layers above. It was originally deposited as thin layers of mud.

The Lindavista Formation is the hard red rock on top of the flat areas in the Preserve. It resists erosion more than the Torrey Sandstone under it so it acts as a cap rock, protecting the softer rock of the Torrey Sandstone and the Scripps Formation. The steep, red blocky sandstone cliffs near the mesa top of Carmel Mountain are formed in the Lindavista Formation. Its characteristic red color and resistance to erosion are caused by the iron oxide that cements the sand grains. When the Lindavista erodes, marble sized concretions formed by cycles of solution and deposition like the larger concretions in the Torrey Sandstone are left on top of the rock. The lower edges of the Lindavista Formation on the mesa top of Carmel Mountain were formed from nearshore deposits, whereas, the very top of the mountain was formed from beach deposits.

3.1.1.3. Soils

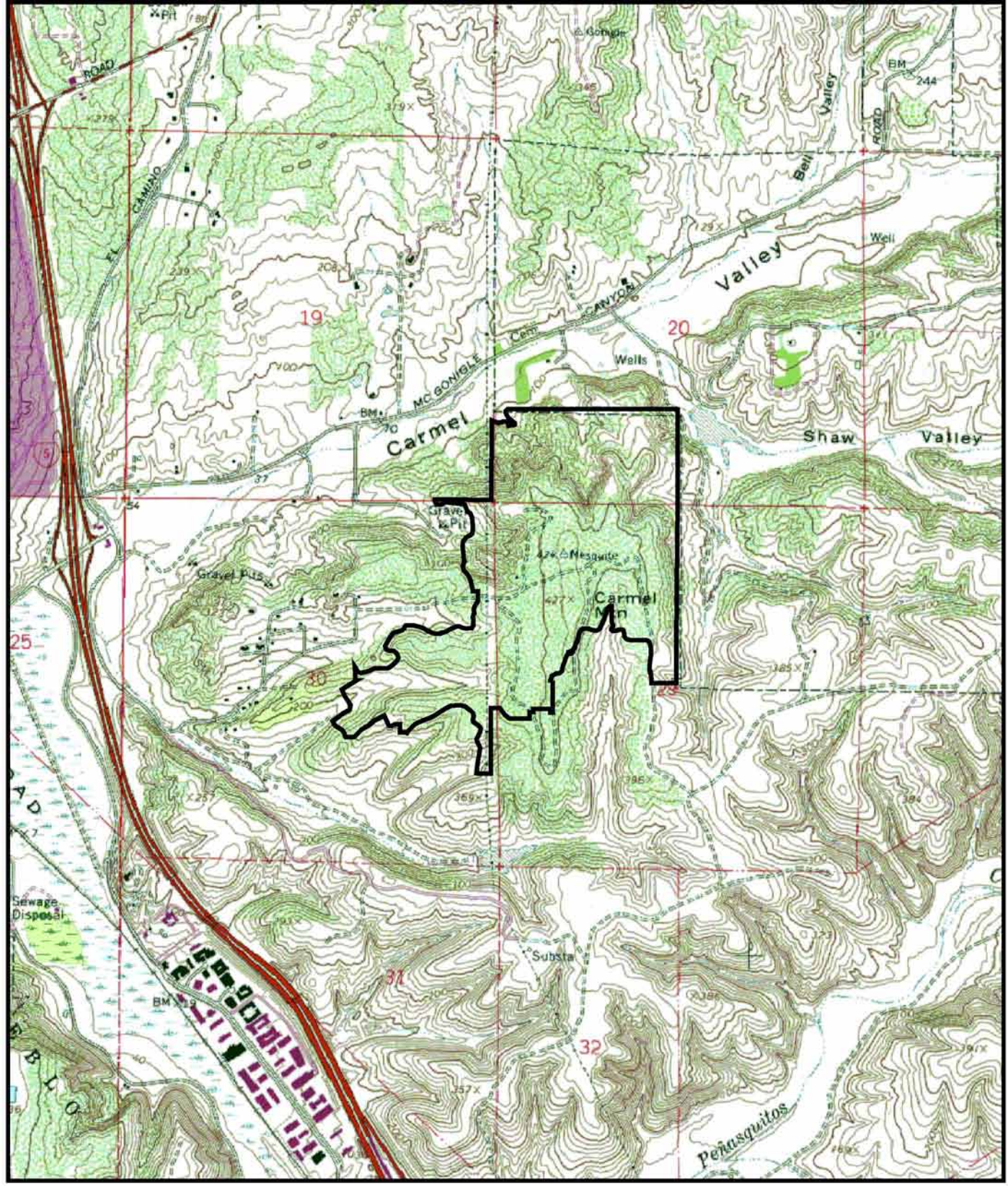
Soils mapped for the Preserve (Figure 3-2) by the U.S. Department of Agriculture (1973) are as follows:

Carlsbad Series (Carlsbad gravelly loamy sand, 5 to 9 percent slopes). This series consists of moderately well-drained to well-drained gravelly loamy sands that are moderately deep over a hardpan. Vegetation typically associated with this series includes chamise, black sage, laurel sumac, annual forbs, and grasses. The surface layer is typically 21 inches thick.

Carlsbad gravelly loamy sand (5 to 9 percent slopes) occurs in the south-central to mid-central portions of the Preserve. This soil type has moderately good drainage, with permeability moderately rapid above the hardpan and very slow in the pan. Water-holding capacity is between 4.0 and 4.5 inches. Runoff is slow to medium, and erosion hazard is slight to moderate.

Corralitos Series (Corralitos loamy sand 5 to 9 percent slopes, 9 to 15 percent slopes). The Corralitos series consists of somewhat extensively drained, very deep loamy sand formed in alluvium and derived from marine sandstone. These soils are typically found in narrow valleys and on small alluvial fans. Vegetation is typically red brome, ripgut brome, California buckwheat, and shrubs.

Corralitos loamy sand (5 to 9 percent slopes) occurs on the Preserve in a small patch on the northeast corner. This is a moderately sloping soil. Runoff is slow to



Map Source: USGS 7.5 minute topographic map series,
Del Mar quadrangle

Carmel Mountain Preserve

1:24,000

0 Feet 2000

FIGURE 3-1

Topography of Carmel Mountain Preserve

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medium, and the erosion hazard is slight. This soil type is similar to Corralitos loamy sand, 9 to 15 percent slopes.

Corralitos loamy sand (9 to 15 percent slopes) is a strongly sloping soil that occurs in narrow valleys; slopes are somewhat concave and average 12 percent. Permeability is rapid and fertility is medium. Water-holding capacity ranges from 3.7 to 5 inches, with medium runoff and moderate erosion hazard.

Gaviota Series (Gaviota fine sandy loam, 30 to 50 percent slopes). The Gaviota series is marked by well-drained, shallow, fine sandy loams that formed in material weathered from marine sandstone. These soils are on uplands and have slopes of 9 to 50 percent. Vegetation is primarily chamise, cactus, scrub oak, laurel sumac, California buckwheat, annual grasses, and forbs.

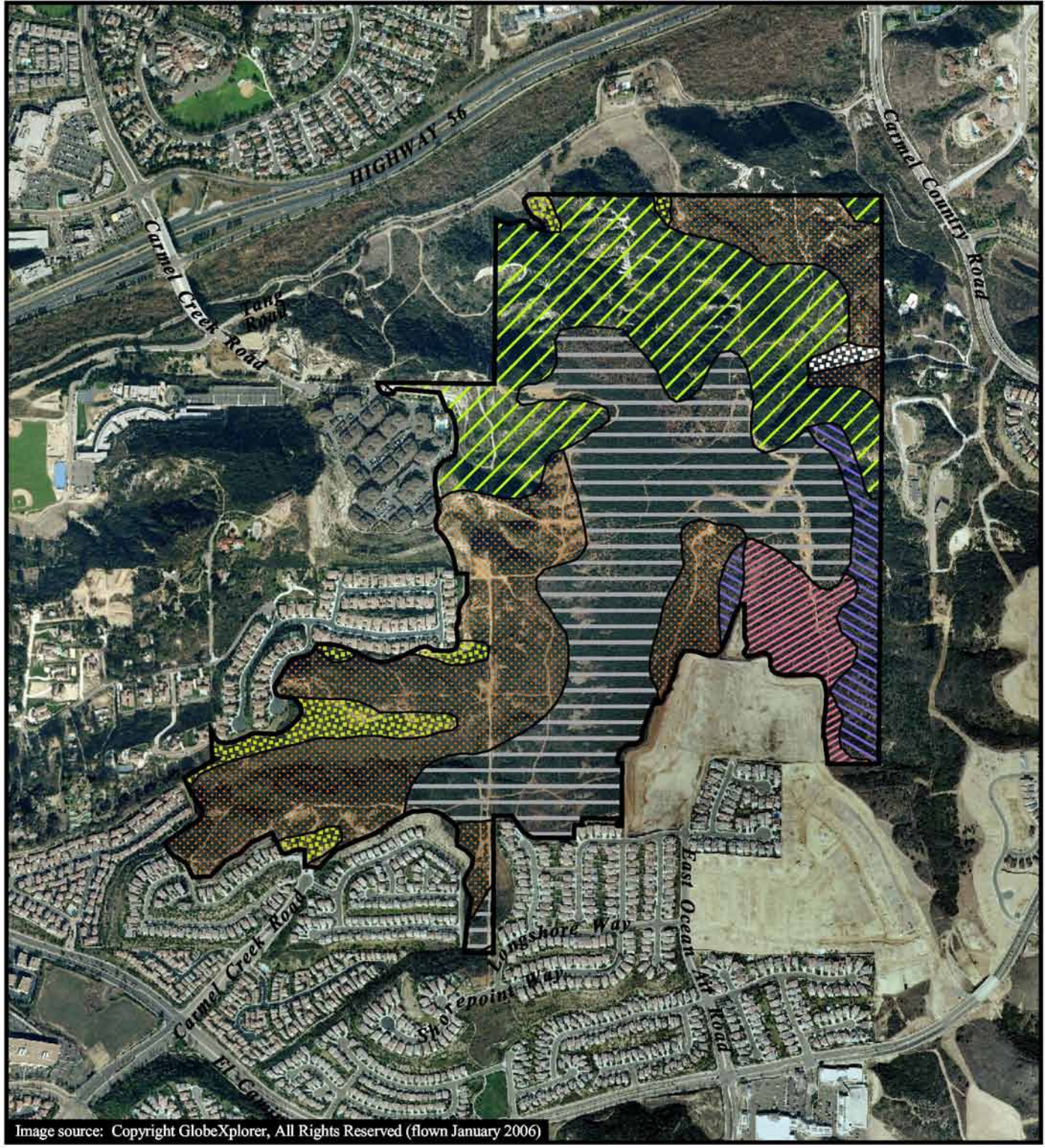
Gaviota fine sandy loam (30 to 50 percent slopes) occurs on the southeastern side of the Preserve. This is a steep soil around 9 to 18 inches deep over the underlying hardpan. Runoff is rapid, with a high erosion hazard.

Loamy alluvial land-Huerhuero complex (9 to 50 percent slopes, severely eroded). Loamy alluvial sand consists of somewhat poorly drained, very deep, dark brown to black silt loams and sandy loams. This type of sand is usually found on old coastal ridges, ranging from strong sloping to steep, severely eroded soils and alluvial fill along drainages. The elevation ranges from sea level to roughly 500 feet. Huerhuero and Carlsbad soils are generally severely eroded. Sparse coastal chaparral grows on these soils. This complex occurs on the southwestern, south-central, and northeastern portions of the Preserve.

Redding Series (Redding gravelly loam, 2 to 9 percent slopes). The Redding series consists of well-drained, undulating to steep gravelly loams that have a gravelly clay subsoil and a hardpan. These soils formed in old mixed cobbly and gravelly alluvium. Vegetation typically associated with this series includes chamise, California buckwheat, laurel sumac, scrub oak, and annual forbs and grasses. The surface layer is typically yellowish-brown and light brown, with medium and strongly acidic gravelly loam about 15 inches thick. The subsoil is yellowish-red and red, of very strong acid gravelly clay loam and gravelly clay.

The Redding gravelly loam, is an undulating to gently rolling soil, with an average slope of 3 percent. The topography consists of low, broad mounds, which are locally known as mima mounds. This soil occurs on the southeastern portion of the Preserve.

Terrace Escarpments. Terrace escarpments consist of steep to very steep escarpments and escarpment-like landscapes, which occur on nearly even fronts of terraces or alluvial fans. In most places, 4 to 10 inches of loamy or gravelly soil overlay soft marine sandstone, shale, or gravelly sediments. Vegetation may consist of sparse cover of brush and annual forbs and grasses on south-facing slopes while fairly dense cover may reside on north-facing slopes. Terrace escarpments occur on the north-central portion of the Preserve.



Carmel Mountain Preserve

Soil Types

- Carlsbad gravelly loamy sand, 5 to 9 percent slopes
- Corralitos loamy sand, 5 to 9 percent slopes
- Corralitos loamy sand, 9 to 15 percent slopes
- Gaviota fine sandy loam, 30 to 50 percent slopes
- Loamy alluvial land-Huerhuero complex, 9 to 50 percent slopes, severely eroded
- Redding gravelly loam, 2 to 9 percent slopes
- Terrace escarpments

0 Feet 1000

FIGURE 3-2

Soils on Carmel Mountain Preserve

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3.1.2 Biological Resources

3.1.2.1 Vegetation Communities

Four vegetation communities as classified by Holland (1986) are present within the area: southern maritime chaparral, Diegan coastal sage scrub, vernal pool, and mesic meadow (Figure 3-3). Roads, cleared areas, sand extraction pits, and other disturbed areas, which total 21.7 acres, are mapped as disturbed. Plant species known to occur on the Preserve are listed in Appendix 3a.

Southern Maritime Chaparral. Southern maritime chaparral covers 247.8 acres of the Preserve. This is a low, fairly open vegetation community, typically dominated by wart-stemmed ceanothus (*Ceanothus verrucosus*) and Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*). This community occurs on weathered sands in the coastal fog belt and appears to depend on fire for reproduction of many species (Holland 1986).

Photograph 3-1. Southern Maritime Chaparral on the Terrace Slopes of Carmel Mountain

Dominant shrubs on-site include chamise (*Adenostoma fasciculatum*), lemonadeberry (*Rhus integrifolia*), mission manzanita (*Xylococcus bicolor*), and Nuttall's scrub oak (*Quercus dumosa*). Characteristic southern maritime chaparral indicator plant species, including Del Mar manzanita, wart-stemmed ceanothus, summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*), sea dahlia (*Coreopsis maritima*), and Torrey pine (*Pinus torreyana* ssp. *torreyana*), are also present.

The vegetation varies in structure and composition with slope and soil characteristics. Vegetation emerging after a 1986 fire in chaparral on part of the mesatop included post-fire specialist plants, such as large–flowered phacelia (*Phacelia grandiflora*), western dichondra (*Dichondra occidentalis*), and golden eardrops (*Dicentra chrysantha*) (RECON1994). Non-native weedy species were absent in this post-fire community, an indicator of the relatively undisturbed nature of the site.

Diegan Coastal Sage Scrub. Diegan coastal sage scrub is composed of low, soft-woody subshrubs that grow actively in the winter and early spring. Diegan coastal sage scrub often occurs on sites with limited soil moisture, such as steep, dry slopes or on clay soils that release water slowly. Dominant plants are California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), and white sage (*Salvia apiana*) (Holland 1986).

Diegan coastal sage scrub is the second-most abundant community on-site, occupying 26.2 acres, primarily along south-facing slopes in the large canyon, at the southeastern base of Carmel Mountain, and in chaparral openings on the west side of the mountain.

Carmel Mountain Preserve

Vegetation Communities (RECON, 1996)
- Diegan coastal sage scrub
- Southern maritime chaparral
- Mesic meadow, seeps and *Selaginella*
- Disturbed

Burn area (1990's)
Burn area (1986)

0 Feet 1000

FIGURE 3-3
Vegetation on Carmel Mountain Preserve

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Coyote bush (*Baccharis pilularis*) and broom baccharis (*Baccharis sarothroides*) are commonly present within the canyon bottom on the southwestern portion of the Preserve. Other dominant species on-site are California sagebrush, California buckwheat, common encelia (*Encelia californica*), and black sage (*Salvia mellifera*).

Mesic Meadow and/or Seeps. Mesic meadow is similar in vegetation composition to montane meadows and freshwater seeps. Soil in the mesic meadows is moist only during the rainy season, and is dry during summer months. On Carmel Mountain Preserve, areas that can best be described as mesic meadows and seeps are dominated by mariposa rush (*Juncus dubius*) and blue-eyed grass (*Sisyrinchium bellum*). These mesic meadows and seeps transition into an herbaceous community dominated by ashy spike-moss (*Selaginella cinerascens*). Shooting stars (*Dodecatheon clevelandii*), dot-seed plantain (*Plantago erecta*), popcorn flower (*Plagiobothrys* spp.), wavy-leaved soap plant (*Chlorogalum parviflorum*) are also present. These areas also contain vernal pools with typical plant species, including toad rush (*Juncus bufonius*), grass poly (*Lythrum hyssopifolia*), and woolly marbles (*Psilocarpus brevissimus*) (RECON 1994).

3.1.2.2 Vernal Pools

Vernal pools occur in the central and southern portion of the Carmel Mountain Preserve, east of the SDG&E easement (City of San Diego 1998, 2004) (Figure 3-4). These vernal pools are disturbed to varying degrees; those within dirt roads and trails have little vegetation, others are scattered among the chaparral shrubs and have both native and invasive exotic species. Several sensitive plant and animal species also occur within these disturbed vernal pools.

Photograph 3-2. Vernal Pool on Carmel Mountain, 2005

During the 2002 and 2003 seasons, City staff conducted an inventory of all the vernal pools within the City's jurisdiction. The vernal pool inventory was funded by the U.S. Fish and Wildlife Service and was created to provide a current, accurate account of all vernal pools and rare vernal pool plants and animals in the City of San Diego. Baseline data collection by City staff included identification of all vernal pool plant and animal species present in each pool. Species that characterize vernal pools (indicator species), which were observed in the vernal pools on the Carmel Mountain Preserve (City of San Diego 2004) include:

Plants
Water star-wort
Callitriche marginata
Stonecrop
Crassula aquatica
Quillwort
Isoetes howellii
Flowering quillwort
Lilaea scilloides
Plantain
Plantago elongata
Short woolly marbles
Psilocarphus brevissimus

Fairy Shrimp
Branchinecta spp.
San Diego fairy shrimp
Branchinecta sandiegonensis

In addition, two amphibians were observed in some of the pool basins: Western spade-foot (*Spea hammondii*) and Pacific treefrog (*Pseudacris regilla*).

3.1.2.3 Wildlife

Carmel Mountain Preserve supports diverse wildlife species, including at least 11 mammal, 51 bird, 4 reptile, 1 amphibian, and 1 invertebrate species. The diversity of animals observed and expected to occur in this area is typical of relatively undisturbed native habitat in coastal San Diego County and include California ground squirrel (*Spermophilus beecheyi*), southern pocket gopher (*Thomomys umbrinus*), woodrats (*Neotoma* spp.), brush rabbits (*Sylvilagus bachmani*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), southern mule deer (*Odocoileus hemionus fuliginata*), red-tailed hawks (*Buteo jamaicensis*), California quail (*Callipepla californica californica*), mourning doves (*Zenaida macroura marginella*), Anna's hummingbirds (*Calypte anna*), California towhees (*Pipilo crissalis*), western fence lizard (*Sceloporus occidentalis*), San Diego horned lizard (*Phrynosoma coronatum blainvillii*), red diamond rattlesnake (*Crotalus ruber*), and San Diego fairy shrimp (*Branchinecta sandiegonensis*). Wildlife species that have been observed at Carmel Mountain Preserve are listed in Appendix 3b.

3.1.2.4 Sensitive Biological Resources

The assessment of the sensitivity of vegetation communities and species follows the guidelines presented in the MSCP Subarea Plan. The MHPA lands are those that have been included within the City's MSCP Subarea Plan for habitat conservation. These lands have been

determined to provide the necessary habitat quality, quantity, and connectivity to sustain the unique biological diversity of the San Diego region. The MHPA lands are considered by the City to be a sensitive biological resource.

A total of 85 sensitive plant and wildlife species are considered to be adequately protected within MHPA lands. These sensitive species are MSCP-covered species and are included in the Incidental Take Authorization issued to the City by federal and state governments as part of the City's MSCP Subarea Plan. There are 15 plants that are considered "narrow endemic species" based on their limited distributions in the region. These narrow endemics are sensitive biological resources. All 15 narrow endemic plants are also MSCP-covered species and some are state or federally listed as threatened or endangered species.

All species listed by state or federal agencies as rare, threatened, or endangered or proposed for listing are considered sensitive biological resources. The habitat that supports a listed species or a narrow endemic species is also a sensitive biological resource.

Species that are not MSCP-covered species, but are on Lists 1B or 2 of the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2001), California fully protected species, and California species of special concern are also considered sensitive. Impacts to these species, if considered significant, may require mitigation according to California Environmental Quality Act (CEQA) guidelines.

Assessments for the potential occurrence of sensitive species are based upon known ranges, habitat preferences for the species, species occurrence records from the Natural Diversity Data Base (NDDB), and species occurrence records from other sites in the vicinity of the Preserve. Locations of sensitive species that have been observed at Carmel Mountain during various surveys are shown on Figure 3-4. Some locations where sensitive species were observed during past surveys were not mapped when the species was encountered.

a. Sensitive Plant Species on the Carmel Mountain Preserve

Sensitive plant species that have been observed on Carmel Mountain Preserve are listed in Appendix 3c. Appendix 4 is the complete list of species covered by the MSCP Subarea Plan.

Those species that have been observed or detected on Carmel Mountain and that are covered by the MSCP Subarea Plan are described below and have specific management directives prescribed in Section 7.3.1, Resource Management, Enhancement and Restoration Guidelines.

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Carmel Mountain Preserve

Vernal Pools
(This map shows general location of vernal pools. See Chapter 8 for detailed vernal pool mapping.)
Source: City of San Diego, revised in part by RECON (2001/2002)

Sensitive Plants
Adolphia californica
Source: Recon
Arctostaphylos glandulosa ssp.*crassifolia*
Source: Dudek
Source: MSCP
Brodiaea orcuttii
Source: Recon
Source: MSCP
Calandrinia maritima
Source: Recon
Ceanothus verrucosus
Source: Dudek
Source: MSCP
Coreopsis maritima
Source: Recon
Lessingia filaginifolia var. *filaginifolia*
Source: MSCP
Dichondra occidentalis
Source: Recon
Dudleya brevifolia
Source: MSCP
Source: City of San Diego
Ferocactus viridescens
Source: MSCP
Muilla clevelandii
Source: MSCP
Ophioglossum californicum
Source: Recon
Pinus torreyana ssp. *torreyana*
Source: MSCP
Selaginella cinerascens
Source: Recon

Sensitive Animals
Source: City of San Diego (NDDB)
G Coastal California gnatcatcher
Source: MSCP
W Belding's orangethroat whiptail
H San Diego horned lizard
D Southern mule deer
L Mountain lion
Source: Recon
S Bell's sage sparrow
F San Diego fairy shrimp
R Southern California rufous-crowned sparrow
T Western spade foot toad

FIGURE 3-4

Sensitive Species on Carmel Mountain Preserve

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They are:

Del Mar manzanita
Arctostaphylos glandulosa var. *crassifolia*
Orcutt's brodiaea
Broadiaea orcuttii
Wart-stemmed ceanothus
Ceanothus verrucosus
Del Mar sand aster
Lessingia filaginifolia var. *filaginifolia* (=*Corethrogyne filaginifolia* var. *incana*)
Short-leaved dudleya
Dudleya blochmaniae ssp. *brevifolia*
Coast barrel cactus
Ferocactus viridescens
San Diego goldenstar
Bloomeria clevelandii
Torrey pine
Pinus torreyana

One federally endangered plant species, Del Mar manzanita, and one state endangered plant species, short-leaved dudleya, are present on-site.

Additional species on the CNPS List 1B and 2, and considered eligible for state listing by CDFW and considered CEQA-significant, have been identified on-site:

California adolphia
Adolphia californica
Summer holly
Comarostaphylis diversifolia ssp. *diversifolia*
Sea dahlia
Coreopsis maritima
San Diego goldenstar
Bloomeria clevelandii
Nuttall's scrub oak
Quercus dumosa

Three other plant species considered by CNPS to have limited distribution (List 4 species) are also found on-site:

Western dichondra
Dichondra occidentalis
Seaside calandrinia
Calandrinia maritima
California adder's-tongue fern
Ophioglossum californicum

Sensitive plant species that are not covered by the MSCP Subarea Plan are described in Appendix 3d. Several other sensitive plant species that have not been observed on Carmel Mountain Preserve could occur there and may be found during future monitoring and studies.

Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*). Del Mar manzanita is federally listed as an endangered species (USFWS 1996) as well as a covered species under the MSCP Subarea Plan. This shrub is in the heath family (Ericaceae), and can be distinguished from the common Eastwood manzanita (*A. glandulosa* ssp. *glandulosa*) by its shorter stature (to four feet) and by leaf and bract characters. This subspecies occurs in southern maritime chaparral on sandstone terraces and bluffs in central coastal San Diego, and in northern coastal Baja California, Mexico. Urban expansion and clearing for agriculture have been responsible for most of the loss of this species. Del Mar manzanita is scattered throughout southern maritime chaparral on Carmel Mountain Preserve, and along the north side and southwest portion of Carmel Mountain.

Orcutt's brodiaea (*Brodiaea orcuttii*). Orcutt's brodiaea is a CNPS List 1B species. Orcutt's brodiaea is considered sensitive and is a MSCP-covered species. It is found only in San Diego, Riverside, and Orange Counties and in Baja California, Mexico. This herbaceous perennial in the lily family (Liliaceae) sprouts from corms. Its preferred habitat in San Diego County is vernally moist grasslands, mima mound topography, vernal pools edges, and occasionally along stream banks. It is known to occur in clay, and sometimes serpentine, soils including Stockpen gravelly loam on Otay Mesa and Redding gravelly loam on Mira Mesa (Reiser 2001). This species occurs in seasonal wetlands on Carmel Mountain Preserve, including meadows and vernal pools.

Photograph 3-3. Wart-stemmed Ceanothus

Wart-stemmed Ceanothus (*Ceanothus verrucosus*). Wart-stemmed ceanothus is in the buckthorn, or Rhamnaceae, family. It is conditionally covered under the MSCP Subarea Plan, and a CNPS List 2 species. This large evergreen shrub occurs along coastal San Diego County and northern Baja California, Mexico (Reiser 2001). Wart-stemmed ceanothus is found as a component of southern mixed chaparral or southern maritime chaparral communities (Holland 1986). This species produces clusters of small white lilac-like flowers that appear between January and April. The small thick leaves and corky "warts" on the stem are characteristic of the species (Munz 1974). This plant is threatened by loss of habitat to development. Wart-stemmed ceanothus is common on Carmel Mountain Preserve, where hundreds of these shrubs are present in the southern maritime chaparral.

Short-leaved dudleya (*Dudleya blochmaniae* ssp. *brevifolia* = [*Dudleya brevifolia*]). Short-leaved dudleya is a perennial succulent plant species that is found in small disjunct populations in San Diego County (Moran 1951; Munz 1974; Hickman 1993). It occurs on Torrey sandstone in Carlsbad gravelly loam sand (Reiser 2001) in the vicinity of Del Mar and La Jolla. Short-leaved dudleya is a state listed endangered species as well as being covered by the MSCP Subarea Plan. It is listed as endangered by the State of California.

Photograph 3-4. Short-leaved Dudleya Blooming at Carmel Mountain, Spring 2001

Photograph 3-5. Short-leaved Dudleya Flowers were Dense in Spring 2001

This tiny perennial succulent herb in the stonecrop family (Crassulaceae) is restricted to only five locations in the Del Mar and La Jolla areas in San Diego County. It is found on Carlsbad gravelly loam derived from Torrey sandstone in open areas of chaparral or Torrey pine forest. Ashy spike-moss is one of the few plants that occurs with it in these openings. Small iron-bearing concretions are present in the soil where short-leaved dudleya has been found (Reiser 2001). Short-leaved dudleya can be distinguished from the less rare Blochman's dudleya (*D. blochmaniae* ssp. *blochmaniae*) by its smaller spoon-shaped leaf of about 7–15 millimeters long, and from variegated dudleya (*D. variegata*) by its white, rather than yellow, flowers. Three sub-populations occur within the Preserve.

The City of San Diego monitors the populations of short-leaved dudleya on Carmel Mountain every year as required by the MSCP Subarea Plan. Based on the results of monitoring, the number of individual plants on Carmel Mountain could be higher than 123,200, the highest number of plants estimated during the monitoring.

The number of plants counted represents only those corms that sprouted in that year; not all corms underground sprout every year. The number of plants that are visible each year varies depending on weather; wetter years produce more, and drier years fewer. Therefore, the number of plants at a particular location in a particular year is only a portion of the number that are actually there.

During the fifteen years that the plants have been monitored, the lowest number of plants was in 2002, when the rainfall was the lowest. In 2005, the highest number of plants was counted and it was the highest rainfall year.

Results for plants that could be observed during the MSCP monitoring are:

Year	Number of Plants	Rainfall (inches)
1999	27,317	6.5
2000	23,487	5.7
2001	66,637	8.6
2002	1,446	3.0
2003	111,313	10.4
2004	18,907	4.2
2005	123,200	22.81
2006	260	6.04
2007	no data	2.18
2008	4900	7.25
2009	2538	9.15
2010	3799	10.57
2011	26673	12.6
2012	14892	8.03
2013	9663	6.55
2014	1460	5.01

Coast barrel cactus (*Ferocactus viridescens*). Coast barrel cactus is a CNPS List 2 species and an MSCP-covered species. This perennial stem succulent in the cactus family (Cactaceae) ranges coastally from San Diego County southward into northern Baja California, Mexico. The preferred habitat for coast barrel cactus is in Diegan coastal sage scrub, particularly around rock outcrops or in cobbles on warm dry slopes with a southerly exposure. It is associated with Stockpen gravelly clay loam, Miguel-Exchequer rocky silt loam, and Redding gravelly loam soils (Reiser 2001). This species is found associated with rock outcrops and open areas on the Preserve. Coast barrel cactus is threatened by urbanization, crushing by vehicles, and horticultural collecting.

Del Mar sand aster (*Lessingia filaginifolia* var. *filaginifolia* [=*Corethrogyne filaginifolia* var. *linifolia*]). Del Mar sand aster is a CNPS List 1B species, with the highest rating for rarity, endangerment, and limited distribution (3-3-3) and is covered by the MSCP Subarea Plan. This perennial herb with gray-green leaves is a member of the sunflower family (Asteraceae) and has violet ray flowers and yellow disk flowers that appear in summer. Del Mar sand aster is found in open coastal sage scrub and southern maritime chaparral on weathered sandstone-derived soils. It is endemic to San Diego County from Batiquitos Lagoon in Carlsbad, south to Del Mar Mesa, Carmel Mountain, and Torrey Pines State Park. Del Mar sand aster is present in Diegan coastal sage scrub adjacent to existing trails along the western and southwest portions of the Preserve. The City of San Diego conducted a baseline survey in 2001 for this species.

San Diego golden-star (*Bloomeria clevelandii*). San Diego golden-star is a member of the plant family Liliaceae. This herbaceous perennial is an MSCP-covered species and is on List 1B of the CNPS *Inventory of Rare and Endangered Vascular Plants.* San Diego golden-star is found only in southwestern San Diego County and northern Baja California, Mexico, where it

occurs on clay soils in coastal sage scrub, chaparral, and grassland habitats (Munz 1974). It is a perennial bulb threatened by loss, degradation, and conversion of habitat. One population has been documented on the Carmel Mountain Preserve.

Torrey pine (*Pinus torreyana*). Torrey pine is a CNPS List 1B species and is covered by the MSCP Subarea Plan. Torrey pine is a tall, five-needled tree in the pine family (Pinaceae). Its range is restricted to the foggy coastal region near Del Mar in San Diego County, where the more moist climate and regular temperatures allow the pine to persist. Torrey pines grow on sandstone bluffs in the chaparral and pine forest (Reiser 2001) on Huerhuero soils, Terrace escarpments, and Corralitos loamy sand. Healthy populations occur at both the southern and northern portion of Torrey Pines State Reserve, with peripheral populations on nearby private lands. Torrey pine has been widely planted in the area. All trees outside of historically documented groves and under 200 years of age are likely introduced (Reiser 2001). Seedlings have generated from planted trees on the northwestern slope of Carmel Mountain.

b. Sensitive Animal Species on the Carmel Mountain Preserve

Sensitive wildlife species that are known to occur on Carmel Mountain are listed in Appendix 3e. Those that are covered by the MSCP Subarea Plan are described below; those not covered are described in Appendix 3d. A complete list of the species covered by the MSCP Subarea Plan is provided in Appendix 4. The covered species have specific management treatments prescribed in Section 7.3.1. They are:

San Diego fairy shrimp
Branchinecta sandiegonensis

Belding's orange-throated whiptail
Aspidoscelis hyperthra beldingi

San Diego horned lizard
Phrynosoma coronatum blainvillii

Northern harrier
Circus cyaneus

Cooper's hawk
Accipiter cooperi

Western burrowing owl
Athene cunicularia hypugaea

California gnatcatcher
Polioptila californica californica

Southern California rufous-crowned sparrow
Aimophila ruficeps canescens

Mountain lion
Felis concolor

Southern mule deer
Odocoileus hemionus fuliginata

The following species are covered by the MSCP Subarea Plan:

i. Invertebrates

San Diego fairy shrimp (*Branchinecta sandiegonensis*). The San Diego fairy shrimp is federally listed as endangered and was covered as a "no take" species by the City of San Diego's MSCP Subarea Plan; however, the City relinquished federal coverage for vernal pool associated species following the Brewster lawsuit. A vernal pool HCP that includes coverage for San Diego fairy shrimp has been drafted and would provide "take" coverage for this species if adopted. This species is restricted to vernal pools in coastal southern California and south to northwestern Baja California, Mexico (USFWS 2000). The life cycle of fairy shrimp is relatively simple, with larvae hatching out of resting eggs after being covered with water for a prescribed period of time, developing into adults, and mating and laying eggs before the pool dries. The development time is influenced both by the water temperature and the species-specific responses to environmental cues. San Diego fairy shrimp are found in vernal pools that are generally less than 30 centimeters deep. This species takes between three and eight days to hatch, and development to the adult stage takes between seven and 20 days. They are generally found in pools without other fairy shrimp but have been found with versatile fairy shrimp (*Branchinecta lindahli*) and Riverside fairy shrimp (*Streptocephalus woottoni*). San Diego fairy shrimp have been identified in vernal pools along existing trails in the southern portion of the Preserve.

ii. Reptiles

Photograph 3-6. San Diego Horned Lizard

San Diego horned lizard (*Phrynosoma coronatum blainvillii*). The San Diego horned lizard is a CDFW species of special concern and an approved MSCP covered species (species management directives are in Chapter 9.0). This lizard ranges from coastal southern California to the desert foothills and into Baja California, Mexico. It is often associated with coastal sage scrub, especially areas of level to gently sloping ground with well-drained loose or sandy soil (Mills 1991). This animal usually avoids dense vegetation, preferring 20 to 40 percent bare ground in its habitat. Populations along the coast and inland have been severely reduced by loss of habitat. Where it can be found, the San Diego horned lizard can be locally abundant, with densities near 20 adults per acre. They are largely dependent on harvester ants for food, which contributes to about half their diet. Adults are active from late March to late August; young are active from August to November or December. This species has been detected throughout the Preserve in chaparral and coastal sage scrub.

Belding's orange-throated whiptail (*Cnemidophorus hyperythrus beldingi*). The Belding's orange-throated whiptail is a CDFW species of special concern and an MSCP-covered species

(species management directives are in Chapter 9.0). This species ranges from southwestern San Bernardino County to the tip of Baja California, Mexico, in areas of low, scattered brush and grass with loose sandy loam soils. It can be found in open coastal sage scrub, chaparral, washes, streamsides, and other sandy areas with rocks, patches of brush, and rocky hillsides (Stebbins 1985). The orangethroat whiptail feeds primarily on subterranean termites. It is active during the spring and summer months and hibernates during the fall and winter. Adult orange-throated whiptails generally hibernate from late July or early August until late April. The immature whiptail has a shorter inactivity period, usually hibernating from December through March. Hibernation sites are on soft, well-drained slopes with southern exposure and little or no vegetation cover, and road cuts tend to be suitable. The orange-throated whiptail has declined within its range as a result of habitat loss and fragmentation (McGurty 1980). This species is anticipated to occur in various parts of the Preserve. It has been detected on the northern portion of the Preserve.

iii. Birds

Northern harrier (*Circus cyaneus*). Northern harriers are a CDFW species of special concern, and nesting sites are considered sensitive by CDFW. This raptor is also an MSCP-covered species (species management directives are in Section 7.3.1). This species is a fairly common winter visitor and a formerly widespread breeder throughout California. The northern harrier hovers close to the ground while foraging in grasslands, agricultural fields, and coastal marshes. The northern harrier nests on the ground, with the nest concealed by marsh plants or other dense vegetation, in marshes and also on grasslands, in fields, or in areas of sparse shrubs (Unitt 2004; Zeiner et al. 1990). This species has been nearly eliminated as a nesting species in southern California because of disturbance and loss of suitable habitat (Small 1994). The local breeding population undoubtedly varies much with rainfall and the abundance of prey, and in San Diego County, was estimated in 2004 to be 25–75 pairs (Unitt 2004).

Cooper's hawk (*Accipiter cooperi*). The Cooper's hawk is an MSCP-covered species (species management directives are in Section 7.3.1); however, some local ornithologist's feel they are not adequately conserved (Unitt 2004). Cooper's hawks range throughout most of the United States (National Geographic Society 1983). In San Diego County, they are widespread over the coastal slope wherever there are stands of trees. They traditionally nest in oak woodlands and sometimes in riparian habitats, but also will use eucalyptus trees (Unitt 1984). During the bird atlas project (Unitt 2004) observers found twice as many nests in eucalyptus as in oaks. Cooper's hawks nest high in trees but beneath the canopy. The Cooper's hawk is most numerous in lowland and foothill canyons and in the urban areas of the city of San Diego (Unitt 2004), where it forages primarily on songbirds but is also known to eat small mammals (National Geographic Society 1983). The breeding habitat on Carmel Mountain Preserve is marginal for Cooper's hawks; however, there is a low to moderate potential for Cooper's hawk to forage within the Preserve.

Western burrowing owl (*Athene cunicularia hypugaea*). The western burrowing owl is a CDFW species of special concern, and an MSCP-covered species (species management

directives are in Section 7.3.1). This species is primarily restricted to the western United States and Mexico (National Geographic Society 1983). Once common throughout coastal San Diego County, the burrowing owl is now an uncommon and declining resident. It ranged throughout the coastal lowlands in grasslands, agricultural areas, and coastal dunes (Unitt 1984); however, its range is now greatly restricted (Unitt 2004). The burrowing owl appears to have been extirpated from the vicinity of the Carmel Mountain Preserve. The bird atlas study (Unitt 2004) did not report burrowing owls along the coast between North Island Naval Air Station and Camp Pendleton Marine Corps Station, and none were observed on the Carmel Mountain Preserve during surveys in 2001 for this management plan. It was found on Carmel Mountain during 1994 surveys (RECON 1994). The burrowing owl is nocturnal and perches during daylight at the entrance to its burrow or on low posts. Loss of habitat to urbanization, proliferation of terrestrial predators, and high mortality from collisions with cars has greatly reduced the population of burrowing owls in San Diego County.

Coastal California gnatcatcher (*Polioptila californica californica*). The coastal California gnatcatcher is federally listed as threatened, a CDFW species of special concern, and an MSCP-covered species (species management directives are in Section 7.3.1). This resident species occurs below the 2,400-foot elevation level, with 90 per cent of the birds at locations below 1,000 feet. The San Diego County population exceeds 2,000 pairs, with fires in 1996 and 2003 temporarily reducing the carrying capacity of several of the habitat cores for this species (Unitt 2004). Wildfires of October 2003 affected four percent of the known coastal California gnatcatcher occurrences, 16 percent of its designated critical habitat, and 28 percent of the USFWS model for suitable habitat (Bond and Bradley 2004, as cited in Unitt 2004).

Coastal California gnatcatchers occur in the coastal slopes of southern California from Ventura County and the Los Angeles basin south to Baja California, Mexico (Atwood 1980; Jones and Ramirez 1995). It breeds only in coastal sage scrub vegetation preferring patches dominated by California sagebrush and flat-top buckwheat and avoiding those dominated by sage, laurel sumac, and lemonadeberry (Weaver 1998a, as cited in Unitt 2004). A breeding pair's territory ranges from less than 1 hectare along the coast to over 9 hectares farther inland, and is about 80 percent larger during the non-breeding season (Unitt 2004). During dry months, the species will forage in adjacent riparian areas. The coastal California gnatcatcher population in southern California has been reduced through loss of habitat to urban and agricultural development of the coastal slopes. Nest predation by various animals and brood parasitism by brown-headed cowbirds (*Molothrus ater*) is also reducing the population (Atwood 1980; Unitt 1984 and 2004). This species was documented in Diegan coastal sage scrub and southern maritime chaparral habitat on the Preserve during surveys in1994 (RECON 1994).

Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*). The southern California rufous-crowned sparrow is a CDFW species of special concern and an MSCP-covered species (see Section 7.3.1 for species management directives). This resident bird ranges throughout coastal southern California, from Santa Barbara County south to San Diego County and into northwestern Baja California, Mexico (Grinnell and Miller 1944). Nests

are most often made on the ground at the base of bunchgrasses or low shrubs. Generally they begin nesting during the third week of March, with a few pairs starting earlier or later (Unitt 2004). Habitat affiliations are coastal sage scrub, chaparral, and adjacent grassy areas (Unitt 1984). The birds remain in their established territories for life, with juveniles probably dispersing only a few miles from where they were hatched (Unitt 2004). Insects are the primary food item of this species. Urbanization has decreased the amount of habitat suitable for southern California rufous-crowned sparrows. This species was documented during surveys in 1994, in southern maritime chaparral and Diegan coastal sage scrub (RECON 1994).

Figure 3-5; COLOR–OVERSIZE

Wildlife Corridors

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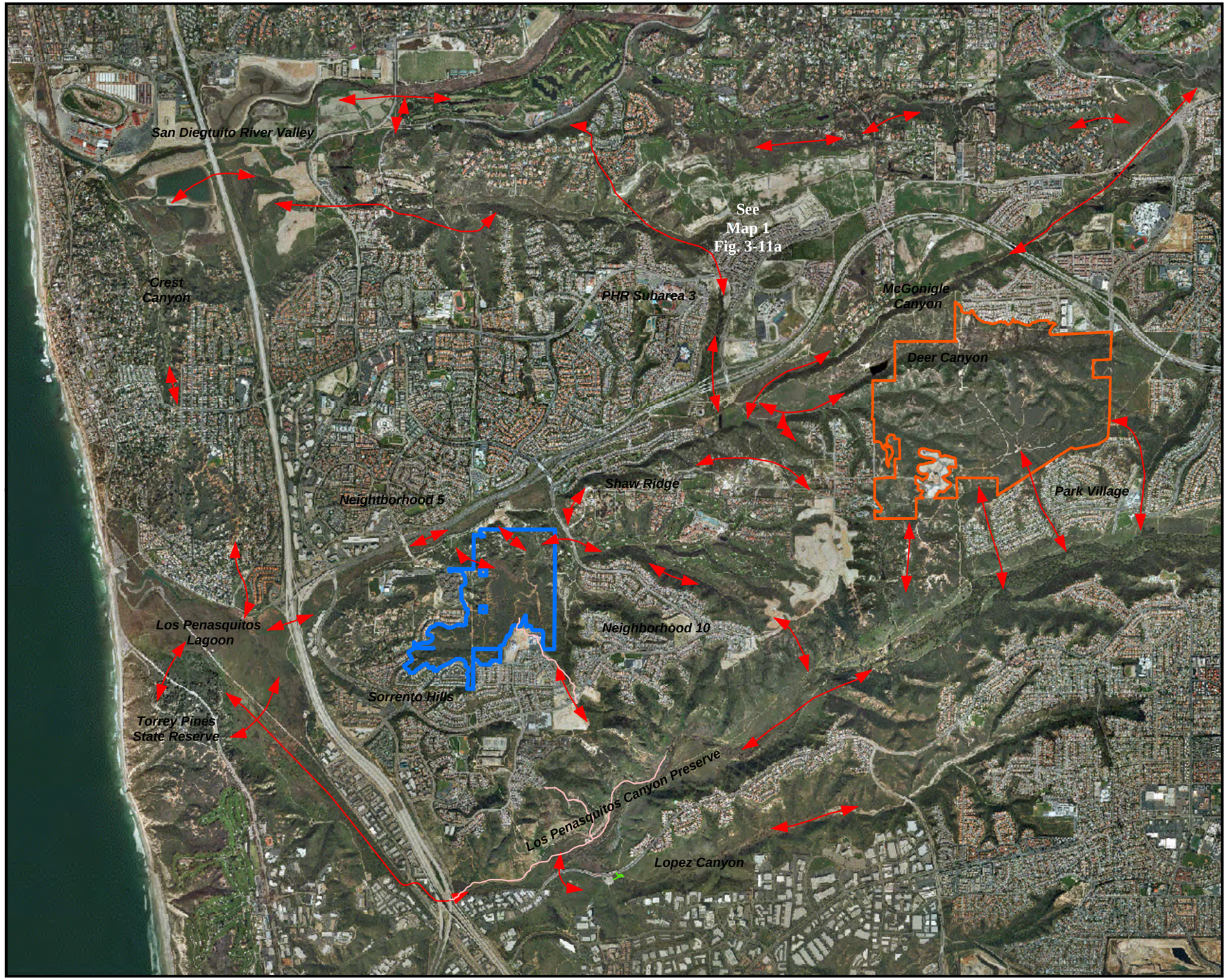

Legend

- Wildlife Corridor
- Del Mar Mesa Preserve
- Carmel Mountain Preserve

FIGURE 3-5
Wildlife Corridors

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Miles

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iv. Mammals

Mountain lion (*Felis concolor*). The mountain lion is a California fully protected species, and an MSCP-covered species (species management directives are in Section 7.3.1). The mountain lion has shown dramatic decline in southern California. Mountain lions are widespread but uncommon in California, ranging from sea level to alpine meadows. Mountain lions are most abundant in riparian and bushy habitats, as long as southern mule deer (their primary food source) are present. Home ranges for adult animals range from 8 to 40 square kilometers; males maintain larger ranges than do females. Population numbers appear to be on the increase in California (Zeiner et al. 1990), but the main threat is human development, which leads to fragmentation of the habitat. As the habitat is fragmented, the movement of the lions is restricted, which increases the association with humans (Zeiner et al. 1990). Mountain lions have been observed in the Preserve but its current status is not known.

Southern mule deer (*Odocoileus hemionus fuliginata*). The southern mule deer is an MSCP-covered species (species management directives are in Section 7.3.1). Southern mule deer inhabit a variety of vegetation communities, including coastal sage scrub, chaparral, grassland, woodland, and riparian systems. Distribution extends from Baja California, Mexico, into portions of San Diego, Orange, Imperial and West Riverside Counties. Mule deer primarily forage upon herbaceous plants, but will also eat various shrubs and trees (National Audubon Society 1996). Southern mule deer were observed on the Preserve during surveys and the population is presumed to be stable.

3.1.2.5 Wildlife Corridors

The Carmel Mountain area provides a link for the movement of animals between inland natural areas, such as the Los Peñasquitos Canyon Preserve, and the coastal natural area of Torrey Pines Reserve (Figure 3-5).

3.1.3 Cultural Resources

This section provides a background of the cultural resources within the Preserves, and defines requirements and provides procedures for compliance with federal and state laws that apply to the Carmel Mountain and Del Mar Mesa Preserves. This plan will be used by the Preserves' Habitat Manager in making decisions regarding the management of cultural resources and historic properties.

3.1.3.1 Cultural Setting

a. Prehistoric Period

The area of the county occupied by the Preserves has a long and rich history of archaeological investigation. Malcolm Rogers, an early pioneer of archaeological survey, site documentation, and testing, concentrated his work in the southern California deserts and coast. Rogers, from the San Diego Museum of Man, recorded numerous local sites during the 1920s. He subsequently presented a cultural scenario for prehistoric people who created these sites. Rogers suggested that these people were nomadic gatherers who subsisted mainly on shellfish collected from beaches and around lagoons, and made stone tools which might best be described as "crude" (Rogers 1929).

Based on the proximity of these sites to the community of La Jolla, Rogers named this the La Jolla complex, or tradition, and the name has remained. It is interesting to note that Rogers hypothesized that the La Jolla complex was the oldest archaeological tradition in the region, primarily because of what he interpreted to be simple stone artifacts. This is now known to be incorrect. The La Jolla complex, as identified by Rogers, has been reliably radiocarbon dated between 8,000–2,000 years before the present (B.P.). The cultural materials identified as belonging to this tradition have been found in sites with radiocarbon dates as much as 8,500 years B.P.

Since the early proposition by Rogers that the La Jolla tradition was the most ancient of the archaeological manifestations in the San Diego region, clarification has been provided by the discovery of older materials and the recognition that the "crude" quality of the La Jolla artifacts is not a sound basis for a basal chronological placement. Later in his life, Rogers made it quite clear that his original thinking on this matter was in error.

The earliest archaeological materials in the county are attributed to a tradition, or phase, that is known as the San Dieguito. This phase, which begins in the county by about 9,500 years B.P., is a southern California reflection of a more ancient Folsom/Clovis tradition of large game and aquatic resource use concentrated around what are now desert areas and the Great Basin pluvial lakes of the late Pleistocene epoch (Moratto 1984). Artifacts of this period are generally described as stone bifaces, lanceolate projectiles, crescentics, and a variety of scrapers and choppers. Late in the tradition, pressure flaking was introduced. The site assemblages tend to be found as surface scatters or shallow deposits on ridge tops and overlooking the Pacific

Ocean, leading to a characterization of these people as nomadic hunters. Pleistocene megafauna began a decline, ultimately resulting in their extinction during the same time period as the first evidence of prehistoric human occupation begins in southern California (circa 10,000 B.P.). Thus, an economy based on large game hunting may have been practiced here for no more than 1,000 years. This may explain the relative scarcity of San Dieguito artifacts in the county. On-going research suggests that these people supplemented hunted foods and raw materials with gathered or foraged materials to a greater extent than was once portrayed. Sites of this ancient time are relatively unusual and often appear to have been disturbed or "contaminated" by archaeological materials from the subsequent traditions, the La Jolla and Kumeyaay.

Radiocarbon dating of two sites in western San Diego County, the Harris site and Rancho Park West, indicates that beginning circa 8,000 years B.P., the San Dieguito tradition was replaced by the La Jolla tradition, which held sway for roughly 6,000 years. There is considerable debate as to whether the San Dieguito people continued to occupy the county, or if they abandoned this area when the La Jolla tradition people arrived (Moriarty 1967; Kaldenberg 1982; Gallegos and Carrico 1984; Wallace 1978). Extinction of large game and the conversion to an already incipient maritime and floral resource orientation seems the simplest explanation of in situ culture change.

Stone tools of the La Jolla period appear to be "crude" compared with the San Dieguito holdings in items. Stone artifacts dating to the La Jolla phase sites do not reflect the variety of types and quality of craftsmanship that is represented in the San Dieguito tradition. There appears to be more expedient selection of raw material. Rather than searching out basalts and fine-grained meta-volcanics, the La Jolla tradition people seemed content to use the more readily available river cobbles. This type of rock is not well suited to fine working, and many of the tools appear to have been created and used expediently as a need for a cutting or scraping edge arose. Fine craftsmanship is lacking in the lithic tools of this period, and there is little to suggest that stone working was anything but a means to an end. The La Jolla phase tools are often made from cobble-based core stones with unifacial and bifacial edge damage from scraping and battering. While there is obvious edge preparation, the removal of flakes from these tools is through hard hammer percussion, resulting in undulating and imprecise edges.

In contrast to San Dieguito sites, La Jolla phase sites tend to yield ground stone implements, predominantly manos, and slab or basin metates. The settlement pattern is also distinctive. Sites are found both inland and along the coastal margin, with concentrations in major drainages where plant resources could be processed and around the estuaries or lagoons. These sites often reflect a depth of cultural deposit that is not found at sites of the preceding phase, and at coastal locations, shellfish refuse accumulations are common. This is consistent with the economic adaptation of the La Jolla-era peoples. Exploitation of marine and seed resources requires a very different tool kit than that of hunting large game. Further, one would expect a very different social and cultural system to evolve out of these different adaptive strategies.

By circa 2,000 years B.P., Yuman-speaking people were present in the Gila/Colorado River drainage. Within a short time, some of these groups had migrated further west and entered Imperial and San Diego Counties, bringing changes in subsistence patterns, technology, and customs. The Yuman-speaking peoples are the ancestors of the ethno-historically known Kumeyaay (also referred to in earlier literature as Diegueño due to their association with the San Diego Mission). Archaeological findings identify a number of changes resulting from this contact. Artifacts associated with this tradition include ceramics; small, finely worked triangular projectile points; bedrock milling equipment, in particular pestles and mortars; and scrapers. One of the most distinctive markers of contact with desert groups is the introduction of ceramic technology. However, there is some evidence that the original Yuman speakers who entered the county 2,000 years B.P. did not use pottery and that the ceramic tradition was introduced as late as 1,000 years B.P. (Clevenger and Schultze 1995).

Yuman traditions of plant processing are also distinctive. These activities included grinding on bedrock surfaces, creating deep "conical" depressions on bedrock surfaces, and stone bowls. In addition to the mano and metate implements that were already present, the Yuman assemblage includes pestles and deeper and narrower mortars or bowls and the extensive use of bedrock outcroppings as processing areas. In this period, mortuary customs were also changed from flexed inhumation to cremation.

b. Historic Period

Spanish colonization of Alta California began in 1769 with the migration of Spanish and Mexican troops, religious personnel, and civilians into the San Diego region. The landing for the sea-going portion of this excursion was the San Diego Bay, with a landfall near the area that is identified as Old Town. This group was followed by an overland expedition and a settlement was established at the location that is now within Presidio Park. Within a few years, the sacred and military elements of the colonial forces were separated and the mission portion of this early settlement was moved to the east, in Mission Valley, where the settlement was named Mission San Diego de Alcala. The siting of this mission was on a large Native American village, which is known from ethnographic sources as Nipaguay.

Spanish colonial activities throughout Alta California affected all of the aboriginal groups from the coast, where initial contact took place, to the inland areas. The Mexican period (1822–1848) saw the continued displacement and disruption of traditional lifeways primarily through the expansion of the land grant program and development of extensive rancho holdings.

Granting of statehood and the gold rush brought many changes for California generally and for San Diego County specifically. By the late 1800s, development in the county was well under way with the beginnings of a recognizable downtown San Diego area and the gradual development of a number of outlying communities, many of which were established around previously defined ranchos and land grants.

The area directly around the two Preserves was not included in any of the rancho land grants in either the Spanish or Mexican periods. Carmel Valley to the north was the site of an open-range sheep ranch established in the 1770s by a retired soldier from the San Diego Presidio. This soldier, named Cordero, built an adobe dwelling in the valley, roughly located just east of I-5 and south of Carmel Valley Road. Cordero lived there until his death, and for a time both McGonigle Valley and Carmel Valley were referred to as "Cordero" (Northrup 1989).

Don Jose Antonio de Jesus Serrano built a second adobe in Carmel Valley (Northrup 1989). Although there are no structures dating to the Spanish or Mexican periods in the Preserve areas or immediate vicinity, it is likely that cattle and sheep, especially the Cordero flocks from the north, grazed the Carmel Mountain Preserve lands.

Rancho de los Peñasquitos, granted to Francisco Maria Ruiz in 1823, is located east of the Carmel Mountain Preserve and forms the southern border of the Del Mar Mesa Preserve. Los Peñasquitos was the first private land grant of the Mexican period in San Diego County. In 1836 Ruiz, who had no spouse or descendents, deeded the ranch to Francisco Maria Alvarado. George Alanzo Johnson, was given one-half interest in the rancho in 1862, when he married into the Alvarado family. Johnson moved in and made considerable improvements to the rancho in the next 20 years. J. S. Taylor acquired the rancho in the early 1880s, remodeling the ranch house and continuing to run cattle. The rancho's subsequent owners made some alterations and additions, using the ranch house as a bunkhouse. In 1974 the County of San Diego purchased 193.0 acres, including the Johnson Taylor ranch house complex, as part of a proposed Los Peñasquitos Regional Park.

Ranching was the main occupation of the residents in this part of the county from the late nineteenth through the early twentieth century. The largest ranch in the vicinity of the Carmel Mountain Preserve was owned by the George McGonigle family, for which McGonigle Canyon is named. In 1899, the McGonigles sold over 1,000 acres of land to the Sisters of Mercy, a Catholic order of nuns associated with Mercy Hospital. Structures were built and the sisters cultivated the surrounding land. The farm supplied vegetables and dairy products to Mercy Hospital (Mikesell 1988). The sisters named the property Mount Carmel Ranch, from which the valley took its modern name Carmel Valley.

Another family, the Knechtels, moved to the Carmel Mountain area from Nebraska in the 1890s. The original Knechtel homestead, now recorded and designated CA-SDI-11724H, is located in the northeast corner of the Carmel Mountain Preserve. Anton Knechtel occupied the homestead from 1889 to 1903. He was buried on his farm, the grave being located approximately 100 meters north of the farm site, on a ridge. Although no structures still stand at the farm site, foundations and piles of wood remain, and his grave remains in good condition. The Knechtel family continued to dry farm beans on various tracts of land in Carmel Valley through the late 1980s.

3.1.3.2 Cultural Resources Found on Carmel Mountain

Literature and site records for recorded cultural resources on the Preserve were reviewed in 2001 (Price and Cheever 2002). Archival information from the South Coastal Information Center and the San Diego Museum of Man show previously recorded prehistoric and historic sites.

Cultural resources work within the last 10 years in the Neighborhood 8A Specific Plan area resulted in comprehensive surveying for cultural resources, and significance testing of a number of sites (City of San Diego 1998). A total of 27 prehistoric and historic archaeological sites are recorded on the Carmel Mountain Preserve (Table 3-1).

These recorded sites are generally sparse stone artifact scatters and special activity sites extending along the entire north and east margin of Carmel Mountain. The majority of these sites are characterized by small amounts of stone flakes and chipping waste, which are a byproduct of testing cobbles for suitable tool production material. The cobbles originate from the La Jolla geologic formation, eroding out along the edges of Carmel Mountain and the adjacent mesas. The sites often have a small amount of ground stone and/or a few stone tools in addition to the flakes. Sites containing such artifacts are considered special activity sites, with short term or single episode use, and are difficult to ascribe to a specific prehistoric group.

Possible hearths made of cobbles are present in some of the sites in the Preserve. A number of these features have been excavated, and moderate amounts of ground stone tool fragments have been found in association. In other cases, these cobble features are not directly associated with other types of artifacts and may represent individual events or features for specialized activities. These possible activities are described in the Carmel Valley EIR, Section 5.9 (City of San Diego 1998).

Prehistoric sites with such cobble features and wider range of artifact tool types indicate a more intensive or longer-term usage than light artifact scatters. CA-SDI-4904 is a large site on the Preserve that contains several such cobble features and a variety of stone artifacts. Testing in 1992 found a subsurface deposit, and analysis of artifacts recovered led to a conclusion that the site was primarily used for bulk seed processing (Eighmey 1994). Buckwheat, lemonadeberry, sages, manzanita, and native grasses grew on Carmel Mountain, and Native Americans used their seeds.

Two historic sites are recorded on the Carmel Mountain Preserve, the homestead of Anton Knechtel, and the gravesite of Anton Knechtel. The homestead consists of the remains of a wood structure, concrete cisterns and pad, historic trash scatter, and a grove of eucalyptus trees planted to shade the structure. The gravesite consists of the headstone and a picket fence surrounding it.

TABLE 3-1
PREVIOUSLY RECORDED CULTURAL RESOURCES ON CARMEL MOUNTAIN PRESERVE

CA-SDI-	SDM-W-	Site Description	Site Recorded	Reference
	379	Listed as destroyed during a field survey in 1990 by SRS		Whitney-Desautels 1993
4904	2174	Lithics, milling, and cobble features, tested by Eighmey 1993, significant		Eighmey 1994a
11726		150+ debitage, 15 FLA*, tested by Eighmey in 1993, significant		Eighmey 1994b
11724H	4449	Historic homestead site, tested by Eighmey 1993, significant		Eighmey 1994b
11728		Lithic scatter, manos, determined not significant, Eighmey 1993		Eighmey 1994b
11729	4453	3 loci, debitage, fla, chipping sta., determined not significant by Eighmey 1993		Eighmey 1994b
11730		Flaking station, 15 debitage, 3 cores, not relocated in 1993		Eighmey 1994b
11731		Lithic quarry and reduction, tested by Eighmey in 1993, not significant		Eighmey 1994b
11732		Lithic quarry, tested by Eighmey in 1993, not significant		Eighmey 1994b
11733		Light lithic scatter, tested by Eighmey 1993, not significant		Eighmey 1994b
11734		Light lithic scatter, tested by Eighmey 1993, not significant		Eighmey 1994b
10218	3614	Artifact scatter, 2 loci. Locus A tested by Cheever in 1992, locus B tested in 1992, both not significant		Cheever 1992; Gallegos 1992
11700		Light lithic scatter, cobble hearth	Pignolo 3/90	
11701		Camp, 2 hearths, debitage, 2 cores	Pignolo 3/90	
11702		Light lithic scatter, 2 cores, 15+ debitage	Pignolo 3/90	
11725		Camp, flas, manos, cobble hearth, determined not significant, Eighmey 1993		Eighmey 1994b
11727		Flaking station, 25+ debitage, not relocated by Eighmey 1993		Eighmey 1994b
11696		Hearths, FLAs, ground stone, shell	Pignolo 3/90	
11697	4461	Light lithic scatter, 5+ core tools, 5+ debitage	Pignolo 3/90	
11698	4462	Light lithic scatter, 2 cores, 5+ debitage	Pignolo 3/90	
11699	4463	Historic grave and marker, picket fence	Pignolo 3/90	
9089	378/379	Small shell midden, mano fragments, fire -affected rock, inaccurate mapping, may be outside project, mitigated by SRS in 1993		Whitney-Desautels 1993
4905	2175	Series of isolates, mitigated in 1978 by Norwood		Norwood 1978
11695	4459	Cobble hearth, 1 core, 3 debitage	Pignolo 3/90	
14523		Lithic scatter, 3 loci, cores, debitage, 2 mano fragments, mitigated in 1997 by Wade		Wade 1997
12939		Light lithic scatter, mitigated in 1992 by Saunders		Saunders 1992

*FLA = Flaked lithic artifact

Of the 27 recorded sites on the Carmel Mountain Preserve, 14 prehistoric sites and the Knechtel homestead have been identified and evaluated for importance (under CEQA guidelines). Three of the 14 sites evaluated are considered important under CEQA criteria, and the remaining 11 sites were determined not to be important resources. Four previously identified sites (SDM-W-379, CA-SDI-11727, -11729, and -11730) were not relocated during surveys in 2001 (Price and Cheever 2002). This may be the result of incorrect mapping during recording, or incorrect identification of natural material as prehistoric artifacts or vise versa during a survey.

3.1.4 Land Use and Recreation

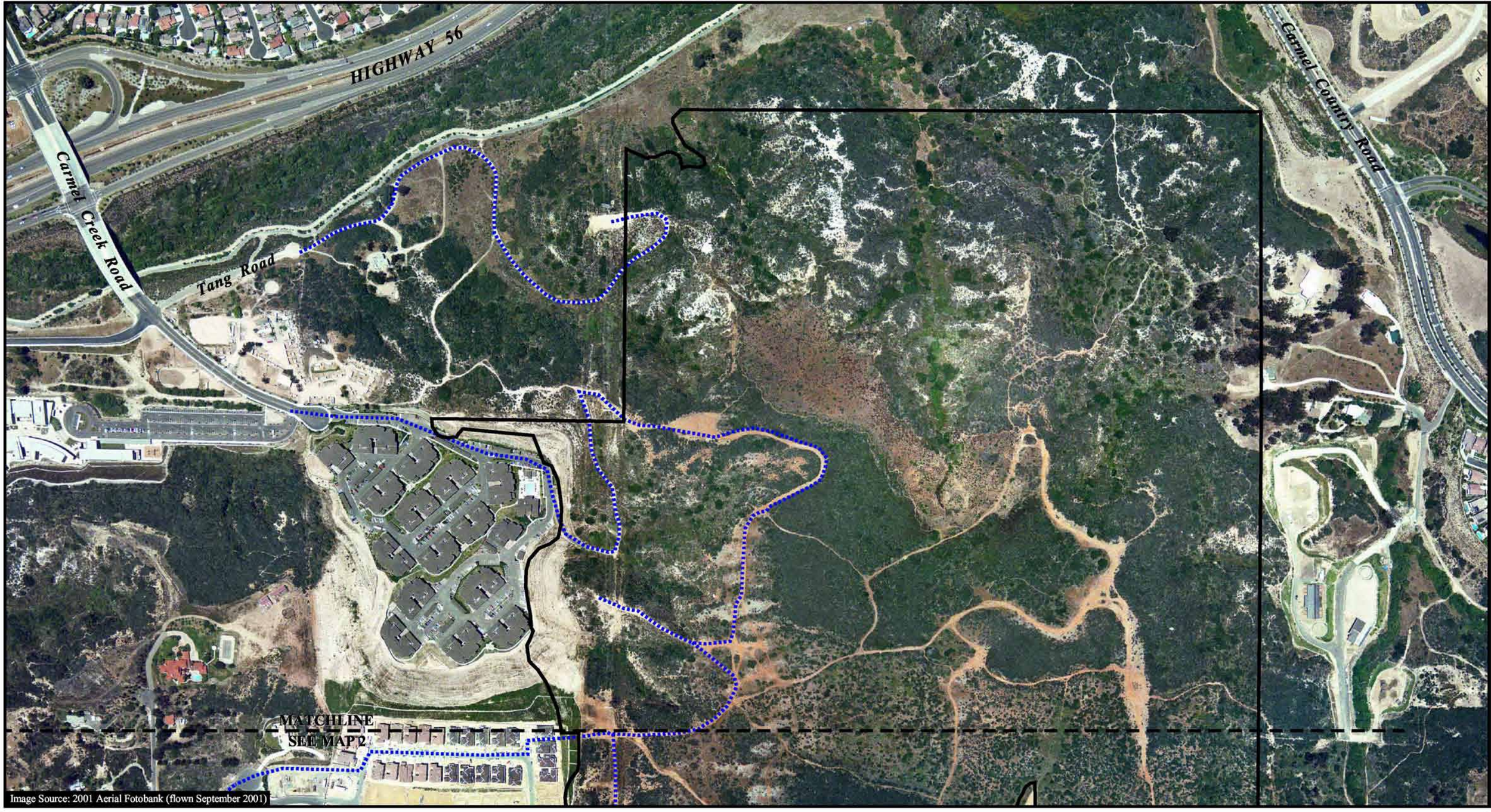
Land within the Carmel Mountain Preserve boundaries is owned by the City of San Diego except for two private inholdings (see Figure 2-1). The City lands and the private inholdings are undeveloped, so that all land within the Preserve boundaries functions a natural open space.

A 150-foot-wide SDG&E easement encompassing about eight acres runs north to south along the western side of the Carmel Mountain Preserve. The easement accommodates 138-kilovolt and 230-kilovolt high-tension overhead transmission lines, a 30-inch high-pressure gas line, 10- and 16-inch fuel lines, and associated access roads. SDG&E maintains the easement.

Other than SDG&E activities, the land within the Preserve boundaries is used for passive recreation, such as hiking, horseback riding, and mountain biking. Trails for these activities are narrow footpaths, SDG&E easement access roads, and wide trails historically used by vehicles and other visitors. Figures 3-6a and 3-6b show the existing trail system within the Preserve boundaries. Trails range in width from a few feet to approximately 15 feet, and the width can be highly variable on any one trail. The trails tend to widen into larger open areas where users cut corners at trail intersections. Many of these intersections are mostly bare ground, non-native grasses or carpets of *Selaginella* growth, with few or no shrubs. At some intersections, shortcut trails have impacted surrounding vegetation. In many locations vernal pool depressions are found alongside and within the roadways that function as trails.

SDG&E easement roads and single-track trails provide authorized vehicle and trail access to the Preserve. The SDG&E easement roads can be accessed at two locations. One is at the northwest corner of the Preserve from Carmel Creek Road, which ends within The Pinnacle at Carmel Creek apartment complex. The other existing vehicle access point for the SDG&E easement road is from the intersection of Longshore Way and Shorepoint Way. In addition to the SDG&E access points, single-track trail access points have been formed at various areas along the edges of the housing developments surrounding the Preserve.

The existing Carmel Mountain Preserve trail system is connected to the Los Peñasquitos Canyon Preserve trail system by the SDG&E service road that is a hiking, biking and horseback riding trail in Los Peñasquitos Canyon. A single-track trail for hiking and horseback riding, just west of the service road, also connects the trail systems between the two preserves.



Carmel Mountain Preserve

SDG&E access roads

0 Feet 400

FIGURE 3-6a

Existing SDG&E Access Roads on Carmel Mountain Preserve (Map 1)

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SEE MAP 1
MATCHLINE

Carmel Creek Road

Longshore Way

East Ocean Air Road

Way

Image Source: 2001 Aerial Fotobank (flown September 2001)

Carmel Mountain Preserve

SDG&E access roads

0 Feet 400

FIGURE 3-6b

Existing SDG&E Access Roads on Carmel Mountain Preserve (Map 2)

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3.2 Del Mar Mesa Preserve

Several biological resource studies have been conducted on Del Mar Mesa for various parcels that have been considered for potential development or mitigation (Dudek & Associates 1996; City of San Diego 1996; Zedler 1989; Greenwood and Abbott 1980). These studies contribute to the bank of knowledge about the biological resources on the Del Mar Mesa Preserve and are summarized in this chapter. Because the extent of vernal pools is extremely depleted in the San Diego region, they are an important resource to understand and protect on the Del Mar Mesa Preserve. The geology study by Greenwood and Abbott on Del Mar Mesa has also been summarized.

3.2.1 Physical Setting

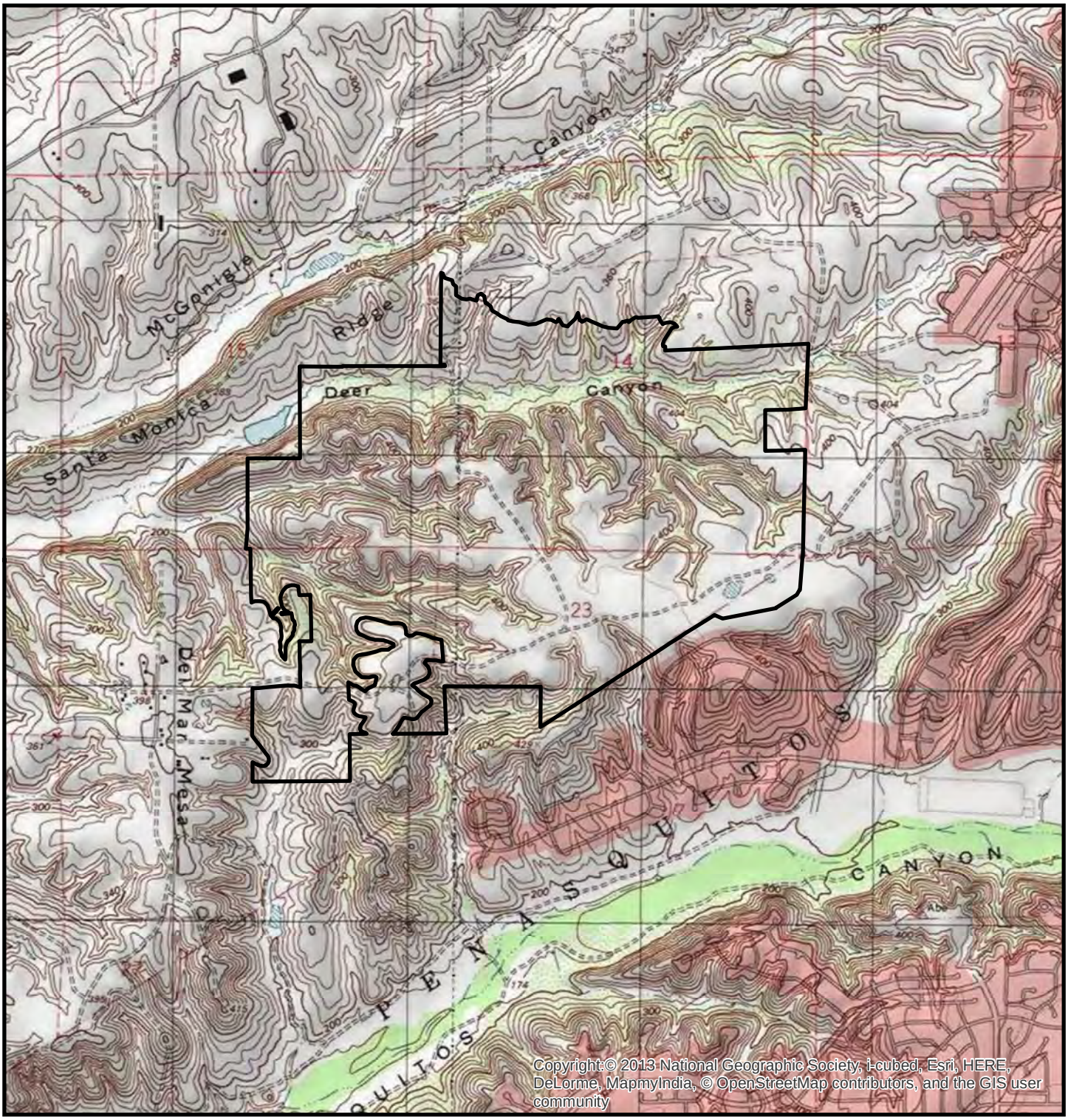
3.2.1.1 Topography

Del Mar Mesa is situated south of Highway 56 and north of Los Penasquitos Canyon, east of Carmel Country Road and north of Park Village Road. The topography (Figure 3-7) of the large Del Mar Mesa is diverse with level mesa tops, steep slopes, major drainages, and undulating mima mounds and intervening depressions (vernal pools). Elevations range from 420 feet above sea level on the mesa to 200 feet above sea level in the bottom of Deer Canyon, which runs along the northern edge of the Preserve.

3.2.1.2 Geology

The underlying rocks at the vernal pools on Del Mar Mesa Preserve are part of the Late Eocene epoch (45–40 million years ago) Poway Conglomerate that built out over the ancient coastal plain as a large cone of conglomeratic sediment from an apex just north of Lakeside. The Late Eocene epoch climate was semi-arid with 50–60 centimeters (cm) of annual rainfall that fell primarily during one season (Peterson and Abbott 1979). Eocene strata are dominated by rhyolite clasts brought from east of the modern Gulf of California by a large, long-distance, flood-type stream. The seasonality and lack of rainfall created soils under low moisture conditions that yielded caliches and clay in contrast to the dominant gravels and sands, and rare deposits of clay sediment on the high-energy, gravelly alluvial fan.

Most of the vernal pools in the San Diego area developed upon gently dipping terraces cut into the Eocene alluvial fan by a westward-retreating ocean from the Late Pliocene epoch (over one million years ago) to present. The vernal pools studied on Del Mar Mesa Preserve are toward the eastern (older) side of the Linda Vista Terrace. In brief, the vernal pool topography is largely developed within the B horizon of an ancient soil profile now being dissected under changed climatic conditions (refer to Page 3-41 for additional information).



Map Source: USGS 7.5 Minutes topographic map series
Del Mar Quadrangle

0 Feet 1,980

Del Mar Mesa Preserve

FIGURE 3-7
Topography on Del Mar Mesa Preserve

3.2.1.3 Soils

Soils, along with other physical characteristics, are important components that affect what vegetation type will grow at a particular location. Soils are derived from weathering of parent rock materials, with additional mineral and organic material contributed from the deposition and decay of plants, animals, and microbes. Soils throughout San Diego County have been mapped at a gross scale by the U.S. Department of Agriculture (USDA).

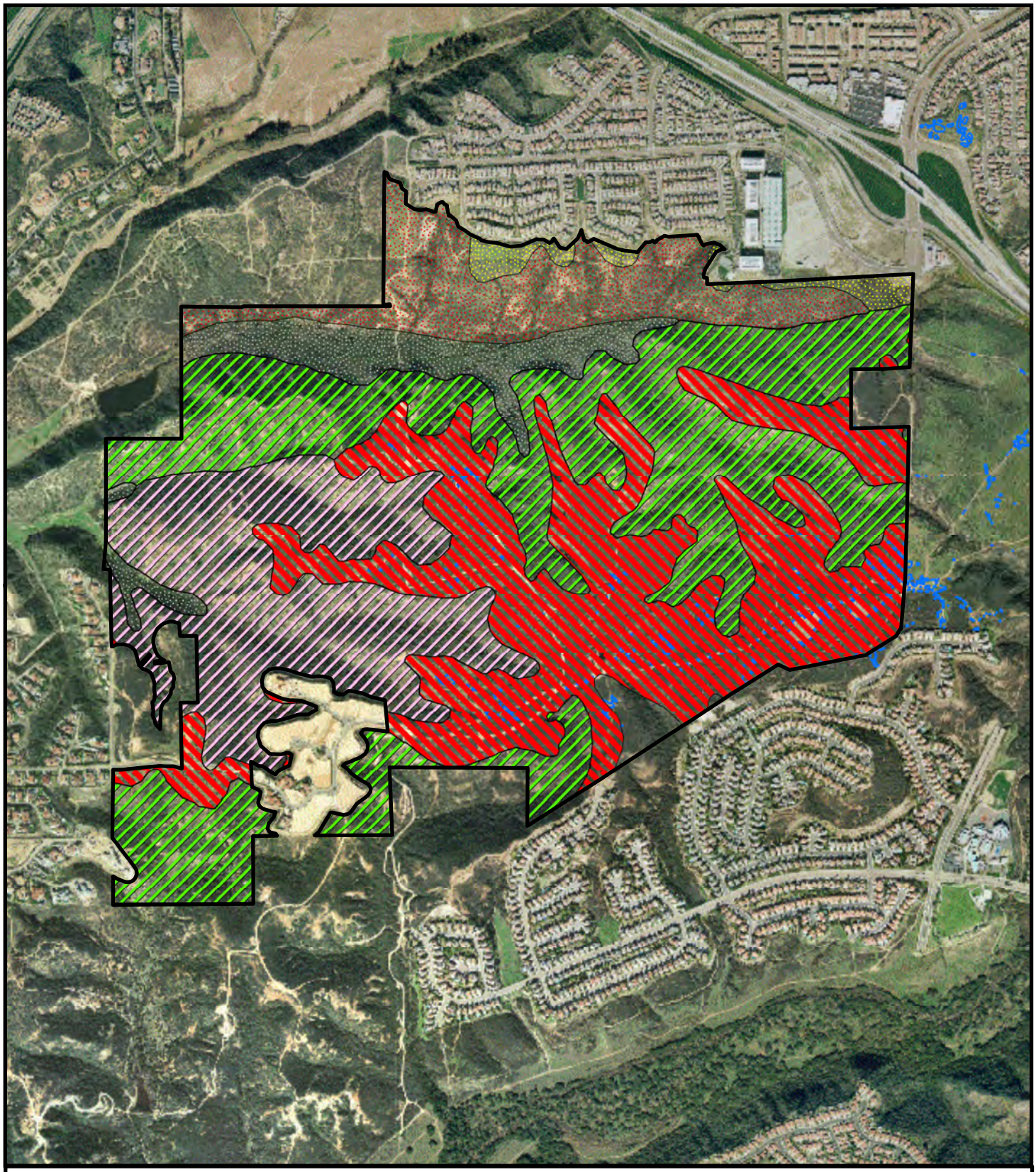
Soils on the Del Mar Mesa Preserve as mapped by the USDA (1973; Figure 3-8) are discussed below. Each soil type is generally associated with the topography as it changes over the Preserve. The Redding soils are located on the mesa tops. Salinas clay loam is the primary soil in the canyon bottoms such as in Deer Canyon. The Terrace Escarpments and Olivenhain cobbly loams are on the steep slopes.

Redding Series (Redding cobbly loam, dissected, 15 to 30 percent slopes; Redding gravelly loam 2 to 9 percents slopes). The Redding series consists of well-drained, undulating to steep gravelly loams that have a gravelly clay subsoil and a hardpan. These soils formed in old mixed cobbly and gravelly alluvium. Plant species typically associated with this soil series are chamise, California buckwheat, laurel sumac, scrub oak, and annual forbs and grasses. The surface layer is typically yellowish-brown and light-brown, with medium and strongly acidic gravelly loam about 15 inches thick. The subsoil is yellowish-red and red, of very strongly acid gravelly clay loam and gravelly clay.

The Redding Cobbly loam (15 to 30 percent slopes) formation on-site is found in the nearly level ground in the central and eastern portions of the mesa, which are typically characterized by steep slopes and narrow gullies. These soils on the mesa are 8–10 inches deep over a hardpan where the vernal pools are best developed. On the north and western portions of the mesa, Redding cobbly loam predominates on slopes of 15–30 percent. The soils are 10–20 inches deep over a hardpan.

The Redding gravelly loam (2 to 9 percent slopes), is an undulating to gently rolling soil, with an average slope of 3 percent. The topography consists of low, broad mounds, which are locally known as mima mounds.

Terrace Escarpments. Terrace escarpments consist of steep to very steep escarpments and escarpment-like landscapes, which occur on nearly even fronts of terraces or alluvial fans. In most places there are 4 to 10 inches of loamy or gravelly soil over soft marine sandstone, shale, or gravelly sediments. Vegetation may consist of sparse cover of brush and annual forbs and grasses on south-facing slopes while fairly dense cover may cover north-facing slopes.



Soil

Soil Types

- Olivenhain cobbly loam, 30 to 50 percent slopes (not visible at this scale)
- Olivenhain cobbly loam, 9 to 30 percent slopes
- Redding cobbly loam, dissected, 15 to 50 percent slopes
- Redding gravelly loam, 2 to 9 percent slopes
- Salinas clay loam, 2 to 9 percent slopes
- Terrace escarpments
- Del Mar Mesa Preserve

Del Mar Mesa Preserve

0 Feet 1,440

FIGURE 3-8

Soils on Del Mar Mesa Preserve

Steep to very steep terrace escarpments bound Del Mar Mesa Preserve to the south and line the north-facing slopes of Deer Canyon along the north side of the Preserve.

Olivenhain Series (Olivenhain cobbly loam, 9 to 30 percent slopes; 30 to 50 percent slopes). Olivenhain cobbly loam series consists of well-drained, moderate to deep cobbly loams that have a very cobbly clay subsoil. Plant species typically growing on soils of the Olivenhain series are chamise, scrub oak, California buckwheat, wild oats, sugar bush, smooth brome, and cactus. The steep slopes on the north side of Deer Canyon along the northern edge of the Preserve are Olivenhain cobbly loam that occurs on 9 to 50 percent slopes and has a very cobbly clay subsoil.

Salinas Series. Salinas clay loam, 2 to 9 percent slopes forms on floodplains and alluvial fans from sediments washed from other soil types, including Las Flores soils. The dark grayish brown surface layer grades from clay loam to heavy clay loam and may extend to 22 inches deep. Below this, the very dark gray brown heavy clay loam and clay loam subsoil extends up to 46 inches deep. The soil is moderately permeable, with slow to medium runoff and slight to moderate erosion hazard. The bottoms of the main drainages throughout the Del Mar Mesa Preserve are characterized by Salinas clay loam. No large rocks crop out on the mesa, but there are patches of rough, rocky soil and exposed erosion surfaces.

Vernal Pool Soils. In addition to the general soils information provided by USDA mapping, detailed studies of the soil underlying the H Series vernal pools at Del Mar Mesa Preserve were conducted for Caltrans (Greenwood and Abbott 1980) for the purposes of determining: (1) how much watershed is required to sustain a water level sufficient to maintain the topographic and biologic equilibrium of the pools, and (2) can the existing watershed area be modified without significant risk to the existing equilibrium? These questions were important at the time because Caltrans was intending to buy these pools to mitigate impacts caused by State Route 52 across Clairemont and Kearny Mesas and they did not know if additional vernal pool and watershed lands would be added to their incipient preserve. This parcel of land, sometimes called the "bowtie" parcel because of its shape, was the first parcel dedicated to preservation and around which other lands for preservation have been added.

The study focused on two major (referred to as the "large pool" and the "smaller pool") and several minor vernal pools (referred to as the "inter-pool area") within a large drainage basin atop the mesa. These pools are important because the large pools are the largest known in San Diego County, and they support the northernmost occurrence of the endangered San Diego mesa mint (*Pogogyne abramsii*).

The mesa top and the drainage basin are of such gentle slopes that precipitation gathers in isolated depressions as well as in the large pools. The total drainage basin area studied was 12.5 acres; the largest pool was 1.6 acres, the smaller pool 0.6 acre, and the inter-pool area 0.3 acre.

From test borings the investigators made estimates of layering depths and volumes of the various soil horizons within the drainage basin and under the vernal pools. The test boring locations were sited to provide the maximum information from the least amount of disturbance. The primary finding was the presence of two clay layers that contribute to the reservoir capacity of the vernal pool soils:

1. The upper loamy clay layer found throughout the basin ranges from 0.6 to 1.8 feet in thickness, with an average thickness of 1.06 feet.
2. The lower clay layer is highly compact, with a high content of expanding clays which serve to seal the bottom basin and it averages 2.15 feet thick.

The secondary finding based on the borings was the absence of a duripan (i.e., hardpan, a hardened layer of soil usually found in the B horizon caused by the penetration of soil particles by a substance such as silica, sesquioxides, calcium carbonate, or organic matter) layer throughout the drainage basin. They had assumed that because the soils at the top were Redding soils and that Redding soils and vernal pools generally are underlain by duripan layers that act as aquicludes, underground layers of impermeable materials which prevent the movement of ground water or soil moisture, to seal the overlying soils from percolation loss, a duripan would be found. However, in this case, the seal was dependent upon swelling clays.

The dominant minerals in the clay layers (Table 3-2) were smectite and vermiculite occurring in exceedingly fine (one micron), book-like packets that have a strong affinity to absorb water and expand. These fine clays were more abundant in the lower clay layer than the upper clay area. Coarser, less expansive illite and chlorite clays were more abundant in the upper layer than in the lower layer.

TABLE 3-2
CLAY TYPES ON DEL MAR MESA PRESERVE

Clay Type	Definition
Smectite	A type of clay more properly called montmorillonite, with an expanding crystal lattice. Sometimes refers to expandable clays other than montmorillonite.
Vermiculite	An expanding clay with greater expansion ratios than smectitic/monmorillonite clays.
Illite	A hydrous mica with a crystal structure similar to montmorillonite but lacking its expansive characteristics; water is permanently trapped in the fixed spaces between the lattice layers.
Chlorite	A hydrous mica clay with a very limited expandability.
Montmorillonite	A clay with an expanding crystal lattice which makes it highly expandable upon the addition of water.

The investigators surmised that this pattern probably occurred during an ancient soil-forming process wherein the finer expandable clays were more easily transported downward by

descending surface water to accumulate in a B horizon soil profile, which is a soil layer of maximum downward movement and deposition of silicate clay materials. They conclude that the vernal pools on Del Mar Mesa Preserve must hold water because of the low permeability caused by swelling of the fine, clay mineral sediments, rather than by the presence of a duripan or hardpan layer. These clay soils form desiccation cracks when they dry and contract.

The Redding soil is a relict soil or paleosol (ancient soil) and not a product of the present climate. This determination has been based on the weathering profiles on the Linda Vista Terrace, which are characterized by a pronounced reddish color due to precipitation and oxidation of iron-bearing minerals at depths ranging up to at least 15 meters, and pH readings of 4.3 to 6, and usually a discontinuous iron- and silica-cemented hardpan. Also in the associated sandy, back-beach ridges of the Carlsbad Series are opalized root tubes and a prominent layer of small pebble-sized, ironstone concretions. These characteristics do not represent our present climate. Coastal plain soils are thin and leeched only near the surface; they are low in organic matter and have some accumulation of calcium carbonate. The thick reddish zone indicates higher rainfall and deep moist surface condition not occurring at present. The incompatibility of the thick red soils and the modern climate let Carter (1957) to conclude they are relicts of an earlier humid climate.

3.2.2 Biological Resources

Del Mar Mesa Preserve has been the subject of biological study for many years, particularly the unique type of vernal pools that are found there. Unlike other vernal pools in San Diego County, those on Del Mar Mesa Preserve are almost exclusively found within chaparral habitats, versus other pools that may occur in coastal sage scrub or grasslands.

The information in this section is compiled from existing biology studies and recent field checks for verification. Most of the information describing the existing conditions on Del Mar Mesa Preserve is taken from the Biological Resources Report and Impact Analysis for Subarea V North City Future Urbanizing Area prepared by Dudek & Associates, Inc., (1996) for the City of San Diego, Development Services Department, as part of the subregional planning efforts. Other information has also been incorporated, as referenced.

3.2.2.1 Vegetation Communities

Nine vegetation communities have been identified on Del Mar Mesa Preserve, as classified by Holland (Figure 3-9).

- Diegan coastal sage scrub
- Southern willow scrub
- Southern mixed chaparral
- Southern maritime chaparral
- Chamise chaparral
- Scrub oak chaparral
- Non-native grassland
- Vernal pool
- Eucalyptus woodland

Photograph 3-7. Vegetation at the Northeast Corner of Del Mar Mesa Preserve

Areas of bare dirt are considered disturbed land.

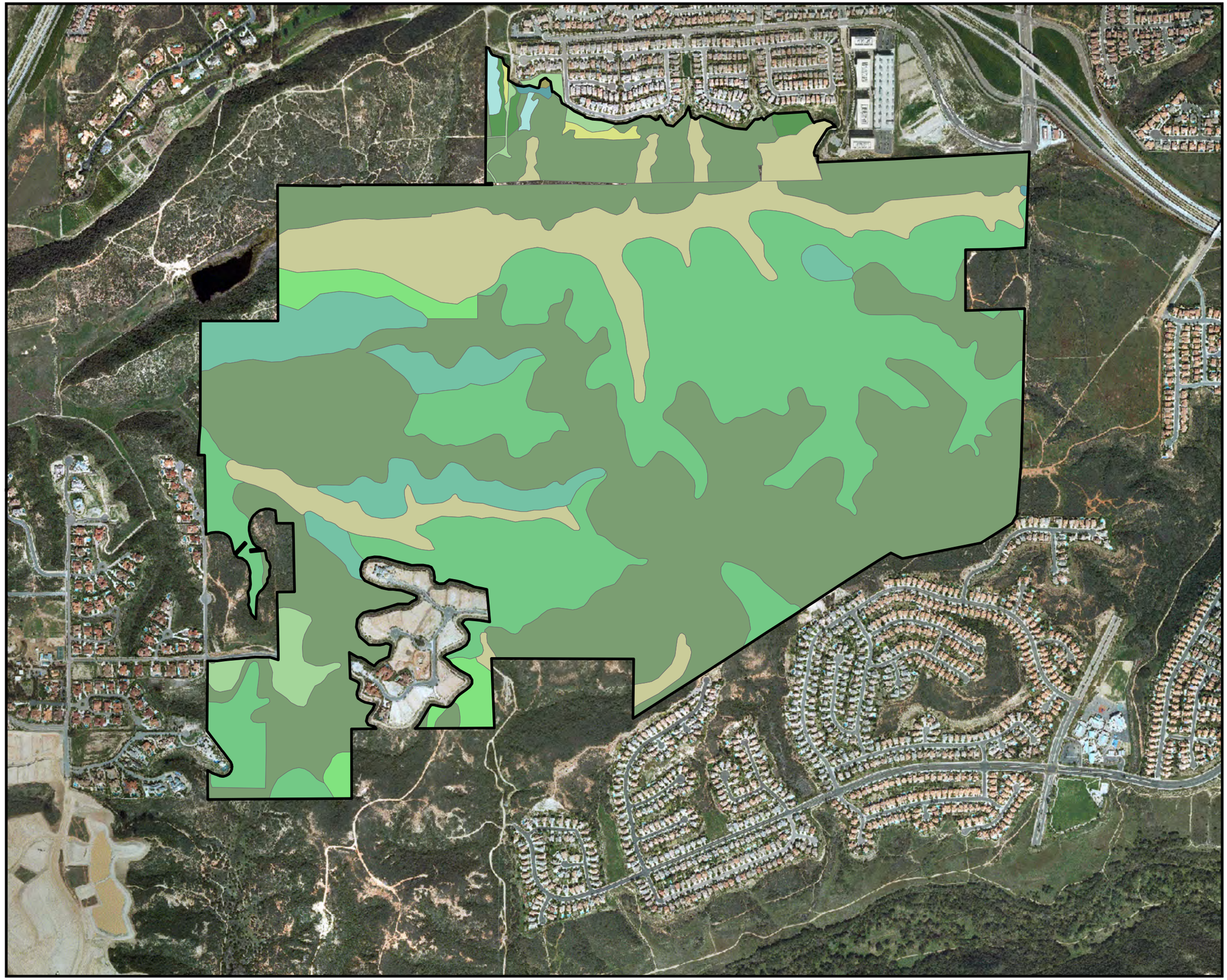
Plant species observed on Del Mar Mesa Preserve are listed in Appendix 3f.

Many of the native vegetation communities exist in disturbed as well as undisturbed conditions.

Diegan Coastal Sage Scrub. This community comprises 53.2 acres of the Preserve. Diegan coastal sage scrub, the southern form of coastal sage scrub, is comprised of low-growing, aromatic, drought-deciduous soft-woody shrubs that have an average height of approximately three to four feet. This community is typically dominated by facultatively (optionally) drought deciduous species such as California sagebrush, California buckwheat, laurel sumac, and white sage, and is typically found on low moisture-availability sites with steep, xeric slopes or clay rich soils that are slow to release stored water. These sites often include drier south- and west-facing slopes and occasionally north-facing slopes, where the community can act as a successional phase of chaparral development. Coastal sage scrub intergrades at higher elevations with several types of chaparrals, or in drier more inland areas with Riversidean sage scrub. This community is found in coastal areas from Los Angeles County south into Baja California, Mexico. Coastal sage scrub is considered sensitive by resource agencies and a Tier II (Uncommon Upland) by the City of San Diego's MSCP Subarea Plan.

On the western part of the Del Mar Preserve, this vegetation community is primarily dominated by California sagebrush or black sage, with most of it having been disturbed by agriculture, grazing, or fires. In the eastern part of the Preserve, coastal sage scrub grows on steep south-facing slopes in the context of the taller and denser chaparral communities. In these areas, black sage and common encelia with patches of California adolphia characterize the coastal sage scrub. A small amount of the coastal sage scrub at the east end of the mesa included notable amounts of native grasses (*Nassella pulchra, N. lepida*, and *Melica imperfecta*); these areas were mapped as coastal sage scrub/valley needlegrass grassland.

Southern Mixed Chaparral. There are 259.3 acres of southern mixed chaparral on the Preserve. Southern mixed chaparral is a vegetation community typically dominated by broad-leaved sclerophyllous (hard-leaved) shrubs or small trees that characteristically occupies protected north-facing and canyon slopes or ravines where more mesic conditions are present.



Del Mar Mesa Preserve

Vegetation Communities

- CSS/Chamise Chaparral
- Chamise Chaparral
- Diegan Coastal Sage Scrub
- Disturbed CSS
- Disturbed Chamise Chaparral
- Disturbed Habitat
- Non-Native Grassland
- Scrub Oak Chaparral
- Southern Maritime Chaparral
- Southern Mixed Chaparral
- Southern Willow Scrub

FIGURE 3-9
Vegetation on Del Mar Mesa Preserve

0 0.175 0.35

Miles

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Dominant shrubs in this community are typically 5 to 10 feet tall and may include manzanita (*Arctostaphylos* spp.), toyon (*Heteromeles arbutifolia*), ceanothus (*Ceanothus* spp.), mission manzanita, and sugar bush (*Rhus ovata*). Many species in this community are adapted to repeated fires by their ability to stump sprout. The vegetation is usually dense, with little or no understory cover, but may include patches of bare soil. This community is typically found in sites that are moister than those supporting chamise chaparral. Southern mixed chaparral typically occurs in coastal foothills of San Diego County and northern Baja California, Mexico, usually at elevations below 3,000 feet. This community is considered a Tier IIIA (Common Upland) by the City of San Diego's MSCP Subarea Plan.

Southern mixed chaparral is common in all but the southwestern portion of the Del Mar Preserve site. It is highly variable from patch to patch in stature, composition, and amount of disturbance present. The most common species in this community on-site is chamise and Nuttall's scrub oak (*Quercus dumosa*), laurel sumac, and black sage. There is a small area near the western edge of the property that consists of wart-stemmed ceanothus and summer holly in the shaded regions of the drainages that support the southern mixed chaparral.

Southern Maritime Chaparral. Southern maritime chaparral makes up 39.0 acres of the vegetation on the Preserve. Southern maritime chaparral is comprised of a low-growing, fairly open chaparral that grows along the coast and is influenced directly by the coastal climate. The vegetation community typically forms a mosaic of dense, impenetrable stands of vegetation intermixed with open areas. The plant species composition of southern maritime chaparral is similar to southern mixed chaparral. The presence of wart-stemmed ceanothus, Torrey pine and Del Mar sand aster in southern maritime chaparral distinguishes it from southern mixed chaparral. Southern maritime chaparral generally occurs at elevations below 3,000 feet and is restricted to sandy soils within the coastal fog belt and foothills in south Orange County, in San Diego County from Carlsbad to Point Loma, and in northern Baja California, Mexico (Hogan et al. 1996). This community is considered sensitive by state of California resource agencies and a Tier I (Rare Upland) by the City of San Diego Diego's MSCP Subarea Plan.

Southern maritime chaparral is restricted to the south-central portion of the Del Mar Mesa Preserve. Other sensitive species within this vegetation community included coast barrel cactus (*Ferocactus viridescens*), ashy spike-moss, and Del Mar Mesa sand aster.

Chamise Chaparral. Chamise chaparral is the most common type of chaparral community in southern California. Del Mar Mesa Preserve is dominated by this community, with 440.0 acres on the site. This vegetation community is dominated by chamise, a shrub that is three to ten feet in height. Associated species contribute little cover and mature stands are densely interwoven with very little herbaceous understory or litter. Chamise chaparral is often found on xeric slopes and ridges at low elevations. Granitic chamise chaparral is found in areas where the soil has a granitic base (Holland 1986). This habitat type is adapted to repeated fires by its ability to stump sprout. It is the predominant chaparral type in southern California, including areas such as Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties. This community is considered a Tier IIIA (Common Upland) by the City of San Diego Diego's MSCP Subarea Plan.

This vegetation community is found in several large patches mainly in the eastern half of the Preserve. In some of these areas, scrub oak and other species make up to 25 percent of the scrub cover.

Scrub Oak Chaparral. This community is the third largest on the site, totaling 103.0 acres. Scrub oak chaparral is dominated by a dense, evergreen chaparral that typically grows to 20 feet and is dominated by Nuttall's scrub oak with considerable Mountain mahogany (*Cercocarpus betuloides*). This chaparral community is somewhat more mesic than many chaparrals, and often occurs at slightly higher elevations of up to 5,000 feet. Substantial leaf litter accumulates in this habitat. Scrub oak chaparral occurs from the western Sierra foothills and North Coast range from Tehama County south through the southern California mountains and Baja California, Mexico.

Scrub oak chaparral occurs primarily on the bottom and lower slopes of drainages in the eastern half of the Preserve forming dense, nearly monotypic stands.

Non-Native Grassland. There are 5.9 acres of non-native grassland mapped on-site. Non-native grassland is characterized by a dense to sparse cover of annual grasses reaching to three feet high, which may include numerous native wildflowers, particularly in years of high rainfall. Non-native grasslands contain species including, but not limited to, bromes (*Bromus* spp.), wild oat (*Avena* spp.), ryegrass (*Lolium* spp.), and fescues (*Vulpia* spp.). Typically, non-native grassland includes at least 50 percent cover of the entire herbaceous layer attributable to annual non-native grass species, although other plant species (native and non-native) may be intermixed (City of San Diego 2012). These annuals germinate with the onset of the rainy season and set seeds in the late winter or spring. With a few exceptions, the plants are dead through the summer-fall dry season, persisting as seeds. Non-native grasslands are usually found on fine-textured, usually clay soils, that range from being moist or waterlogged in the winter to being very dry during the summer and fall. Typically, this vegetation community is found in valleys and foothills throughout most of California (except for the north coastal and desert regions) at elevations below 3,000 to 4,000 feet. Non-native grassland is considered a Tier IIIB (Common Upland) by the City of San Diego's MSCP Subarea Plan.

Mostly human disturbance via agriculture has degraded the quality of native habitats throughout a large area of the western half portion of the Preserve. Annual grasslands on-site are dominated by slender wild oat (*Avena barbata*), foxtail chess (*Bromus madritensis* ssp. *rubens*), and smooth brome (*Bromus hordaceus*). Some of these grasslands are punctuated by individual shrubs like California sagebrush, laurel sumac, and coast goldenbush (*Isocoma menziesii*). This habitat provides limited value for most typical sage scrub wildlife species, and is void of sensitive plant species. However, it may provide valuable foraging habitat for raptors.

Vernal Pools. Vernal pools fill with water in the spring, are dry during the summer, and stay dry until winter rains begins. They have a distinctive assemblage of plant species that may be aquatic or may germinate following the drying of the pool. Plant species that make up the vegetation that grows in the vernal pools and around their margins on Del Mar Mesa Preserve

Photograph 3-8. Vernal Pool on Property Owned by CDFG on Del Mar Mesa Preserve

include San Diego button celery (*Eryngium aristulatum* var. *parishii*), San Diego Mesa mint, water star-wort (*Callitriche marginata*), stone-crop (*Crassula aquatica*), short woolly marbles (*Psilocarphus brevissimus*), grass poly (*Lythrum hyssopifolium*), spikerush (*Eleocharis* sp.), California adder's tongue (*Ophioglossum californicum*), downingia (*Downingia cuspidata*), and little mousetail (*Myosurus minimus*).

Photograph 3-9. Eucalyptus Woodland at Del Mar Mesa Preserve

Eucalyptus Woodland. There is a small patch of eucalyptus woodland on the southwest portion of the site, occupying 2.15 acres. This is a fairly widespread tree in southern California, typically forming monotypic stands of introduced, Australian eucalyptus trees (*Eucalyptus* spp.). The understory is usually depauperate or lacking from either shade or the toxic properties of the leaf litter. Eucalyptus woodlands are typically limited in value, serving only as nesting and perching sites for raptors. Stands of eucalyptus are distributed throughout the Preserve.

Southern Willow Scrub. Southern willow scrub occupies 0.17 acre on the Del Mar Mesa Preserve, in the far northeast corner. Southern willow scrub is considered a sensitive wetland habitat by CDFG and U.S. Army Corps of Engineers (USACE). Southern willow scrub is a dense riparian community dominated by broad-leafed, winter-deciduous trees such as willows (*Salix* spp.), and often scattered with Fremont cottonwoods (*Populus fremontii*) and western sycamores (*Platanus racemosa*). This vegetation community is typically found along major drainages but also occurs in smaller drainages. The density of the willows typically prevents a dense understory of smaller plants from growing. The representative species typically grow in loose, sandy, or fine gravelly alluvium deposited near stream channels during flood flows. This community requires repeated flooding to prevent succession to community dominated by western sycamores and Fremont cottonwoods (Holland 1986).

Disturbed land. Disturbed habitat in this document refers to all dirt roads, graded areas, and other areas that lack vegetation. Approximately 15.7 acres in the southwest region of the Del Mar Mesa Preserve are considered disturbed.

3.2.2.2 Vernal Pools

Vernal pools are shallow, isolated, ephemeral wetlands. The microrelief surrounding vernal pools typically consists of small mima mounds or hummocks. Vernal pools fill with water during winter rains and the water evaporates after the rains cease. Plants in vernal pools may be

aquatic or may germinate following the drying of the pool. San Diego mesa hardpan vernal pools have a characteristic suite of plant and animal species. Hardpan vernal pools are primarily found north of Otay Mesa (Holland 1986). Vernal pools are considered to be sensitive habitat by local, state, and federal governments, and it is estimated that over 95 percent of the vernal pool habitat in San Diego County has been destroyed.

Photograph 3-10. Vernal Pool on Del Mar Mesa

Photograph 3-11. Vernal Pool on Del Mar Mesa Preserve

Sensitive plant species occurring in the vernal pools on Del Mar Mesa Preserve include San Diego button celery and San Diego mesa mint. Sensitive animal species within vernal pool habitat on the Preserve include the two-striped garter snake (*Thamnophis hammondii*), western spadefoot, and San Diego fairy shrimp. Other sensitive species typically associated with vernal pools include California adder's-tongue (*Ophioglossum californicum*), Orcutt's brodiaea (*Brodiaea orcuttii*), and San Diego goldenstar.

Numerous vernal pools are on Del Mar Mesa Preserve within areas mapped as chamise chaparral and southern mixed chaparral. Species dominating these pools are water star-wort, stone-crop, small woolly marbles, and grass poly. Some of the larger and deeper pools are distinguished by spikerush (*Eleocharis* sp.). Smaller populations of California adder's tongue are present in some pools, and San Diego button-celery is common in many of the pools. San Diego mesa mint is found in some of the pools as well. Downingia and little mousetail are present in the southeastern pool complex.

3.2.2.3 Wildlife

Del Mar Mesa Preserve supports a diversity of wildlife species. The diversity of animals observed and expected to occur in this area on the mesa is typical of relatively undisturbed native habitat in coastal San Diego County.

Wildlife species that have been observed at Del Mar Mesa Preserve are listed in Appendix 3g. Many other species than were observed during surveys are likely to occur on the Del Mar Mesa Preserve and may be encountered and documented during future monitoring and research studies.

3.2.2.4 Sensitive Biological Resources

Sensitive biological resources on Del Mar Mesa Preserve are shown on Figure 3-10. The locations of some sensitive species observations during past surveys were not mapped though the species was documented as being present. These species should be monitored when funding becomes available.

The City of San Diego has been monitoring some of the species discussed below (see Section 7.3.1), as required by the MSCP. When funding becomes available, it is recommended that future monitoring be done to determine the status of those sensitive species that are not being currently monitored.

a. Sensitive Plant Species on the Del Mar Mesa Preserve

Sensitive plant species observed on the Del Mar Mesa Preserve are listed in Appendix 3h. A complete list of species covered by the MSCP Subarea Plan is in Appendix 4. Those species that have been observed or detected on the Del Mar Mesa Preserve and that are covered by the MSCP Subarea Plan are described below and have specific management directives discussed in Section 7.3.1. They are:

Del Mar Manzanita
Arctostaphylos glandulosa var. *crassifolia*

Orcutt's brodiaea
Brodiaea orcuttii

Wart-stemmed ceanothus
Ceanothus verrucosus

Del Mar sand aster
Lessingia filaginifolia var. *filaginifolia* (=*Corethrogyne filaginifolia* var. *linifolia*)

San Diego goldenstar
Bloomeria clevelandii

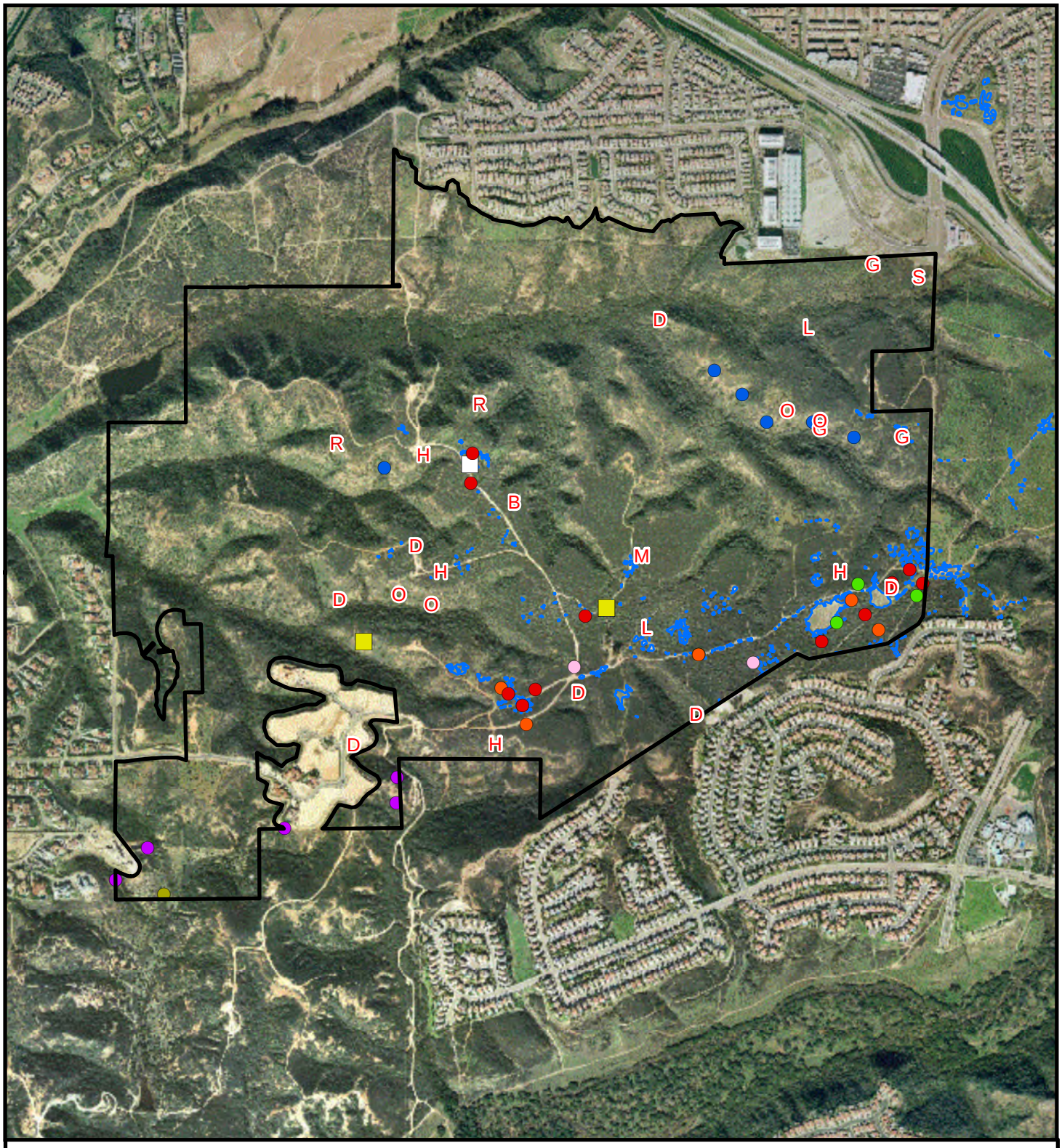
San Diego button celery
Eryngium aristulatum var. *parishii*

San Diego mesa mint
Pogogyne abramsii

Del Mar manzanita is federally listed as endangered. San Diego button celery and San Diego mesa mint are both federally and state listed as endangered.

Ten other species on the CNPS's List 1B and 2, considered eligible for state listing by CDFG and considered CEQA-significant, have been identified on-site. Those listed, but not described below, are described in Appendix 3i:

San Diego sagewort
Artemisia palmeri



Del Mar Mesa Preserve

Vernal Pools

Sensitive Plants
(Source: City of San Diego; NDDB)

- Arctostaphylos glandulosa var. crassif
- Brodiaea orcuttii
- Corethrogyne filaginifolia var. linifo
- Eryngium aristulatum var. parishii
- Ferocactus viridescens
- Muilla clevelandii
- Myosurus minimus ssp. apus
- Pogogyne abramsii

Sensitive Plants
(Source: RECON)

- *Adolphia californica*
- *Muilla clevelandii*

Sensitive Animals
(City of San Diego; NDDB)

- R CA rufous-crowned sparrow
- G California gnatcatcher
- S Grasshopper sparrow
- M Little mousetail
- L Mountain lion
- O Orange-throated whiptail
- H San Diego horned lizard
- D Southern mule deer
- B Western bluebird

0 Feet 1,480

FIGURE 3-10
Sensitive Species on Del Mar Mesa Preserve

Orcutt's brodiaea
Brodiaea orcuttii
Summer holly
Comarostaphylis diversifolia ssp.*diversifolia*
Del Mar sand aster
Lessingia filaginifolia var. *filaginifolia* (=*Corethrogyne filaginifolia* var. *linifolia*)
Coast barrel cactus
Ferocactus viridescens
Nuttall's scrub oak
Quercus dumosa
San Diego goldenstar
Bloomeria clevelandii
Wart-stemmed ceanothus
Ceanothus verrucosus
Palmer's grappling hook
Harpagonella palmeri var. *palmeri*
California adolphia
Adolphia californica

Three other plant species considered by CNPS to have limited distribution (List 4 and 3 species) are also found on-site:

Western dichondra
Dichondra occidentalis
California adder's-tongue fern
Ophioglossum californicum
Little mousetail
Myosurus minimus

The MSCP-covered plant species on the Del Mar Mesa Preserve are described below, with their status, as currently known, on the Preserve. Sensitive plant species that are not covered by the MSCP are described in Appendix 3i. Several other sensitive plant species that have not been seen on the Del Mar Mesa Preserve could occur there and may be found during future monitoring and research studies.

Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*). Del Mar manzanita is federally listed as an endangered species (USFWS 1996) and is a covered species under the MSCP Subarea Plan. This shrub is in the heath family (Ericaceae), and can be distinguished from the common Eastwood manzanita (*A. glandulosa* ssp. *glandulosa*) by its shorter stature (to four feet) and by leaf and bract characters. This subspecies occurs in southern maritime chaparral on sandstone terraces and bluffs in central coastal San Diego, and in northern coastal Baja California, Mexico. Urban expansion and clearing for agriculture have been responsible for

most of the loss of this species. Del Mar manzanita is a component of the chaparral vegetation communities in the southwestern corner of the Del Mar Mesa Preserve (see Figure 3-10).

Orcutt's brodiaea (*Brodiaea orcuttii*). Orcutt's brodiaea is a CNPS List 1B species Orcutt's brodiaea is considered sensitive by the City of San Diego. It is found only in San Diego, Riverside, and Orange Counties and in Baja California, Mexico (CNPS 2001). This herbaceous perennial in the lily family (Liliaceae) sprouts from corms. Its preferred habitat in San Diego County is vernally moist grasslands, mima mound topography, vernal pools edges, and occasionally along stream banks. It is known to occur in clay, and sometimes serpentine, soils including Stockpen gravelly loam on Otay Mesa and Redding gravelly loam on Mira Mesa (Reiser 2001). Orcutt's brodiaea has been documented on mesas in the central and southeastern portions of the Del Mar Mesa Preserve (see Figure 3-10).

Wart-stemmed ceanothus (*Ceanothus verrucosus*). Wart-stemmed ceanothus is in the buckthorn family (Rhamnaceae). It is a conditionally covered species under the MSCP Subarea Plan, and a CNPS List 2 species. This large evergreen shrub occurs along coastal San Diego County and northern Baja California, Mexico (Reiser 1996). Wart-stemmed ceanothus is typically found on north-facing slopes as a component of southern mixed chaparral or southern maritime chaparral vegetation communities (Holland 1986). This species produces clusters of small white lilac-like flowers that appear between January and April. The small thick leaves and corky "warts" on the stem are characteristic of the species (Munz 1974). This plant is threatened by loss of habitat to development (CNPS 2001). Wart-stemmed ceanothus is a component of the southern maritime chaparral on the Del Mar Mesa Preserve. The southern maritime chaparral grows on canyon slopes and bottoms in the western half of the Preserve, and on the north-facing slopes of Deer Canyon that runs across the north end of the Preserve.

San Diego button-celery (*Eryngium aristulatum* var. *parishii*). San Diego button-celery is a member of the Apiaceae family. This annual/perennial herb is federally listed as endangered, state listed as endangered, and a CNPS List 1B species. It was also a covered species under the MSCP Subarea Plan; however, the City relinquished federal coverage for vernal pool associated species following the Brewster lawsuit. A vernal pool HCP that includes coverage for San Diego button-celery has been drafted and would provide "take" coverage for this species if adopted. San Diego button-celery is an annual/perennial species restricted in distribution to Riverside County, San Diego County, and Baja California, Mexico, where it occurs within coastal sage scrub, valley foothill grasslands, and vernal pools. San Diego button-celery grows in vernal pool areas in the north and south central, and the southeastern portion of the Del Mar Mesa Preserve.

Coast barrel cactus (*Ferocactus viridescens*). Coast barrel cactus is a CNPS List 2 species and an MSCP-covered species. This perennial stem succulent in the cactus family (Cactaceae) ranges coastally from San Diego County southward into northern Baja California, Mexico. The preferred habitat for coast barrel cactus is on hillsides in Diegan coastal sage scrub, particularly around rock outcrops or in cobbles on warm dry slopes with a southerly exposure. It is also found near vernal pools on Otay Mesa. It is associated with Stockpen gravelly clay loam,

Miguel-Exchequer rocky silt loam, and Redding gravelly loam soils) (Reiser 2001). Coast barrel cactus is threatened by urbanization, vehicles, and horticultural collecting. Coast barrel cactuses have been found on west- and south-facing slopes in the north central and the northeastern portions of the Del Mar Mesa Preserve.

Del Mar sand aster (*Lessingia filaginifolia* var. *filaginifolia* [=*Corethrogyne filaginifolia* var. *linifolia*]). Del Mar sand aster is a CNPS List 1B species, with the highest rating for rarity, endangerment, and limited distribution (3-3-3) and is a covered species under the MSCP Subarea Plan. This perennial herb is a member of the sunflower family (Asteraceae) with gray-green leaves, violet ray flowers and yellow disk flowers that appear in summer. Del Mar sand aster is found in open coastal sage scrub and southern maritime chaparral on weathered sandstone-derived soils. It is endemic to San Diego County from Batiquitos Lagoon in Carlsbad, south to Del Mar Mesa, Carmel Mountain, and Torrey Pines State Park. Del Mar sand aster has been mapped as occurring in the southwestern corner of the Del Mar Mesa Preserve.

San Diego golden-star (*Bloomeria clevelandii*). San Diego golden-star is a member of the plant family Liliaceae. This herbaceous perennial is an MSCP-covered species and is on List 1B of the CNPS *Inventory* (CNPS 2001). San Diego golden-star is found only in southwestern San Diego County and northern Baja California, Mexico, where it occurs on clay soils in coastal sage scrub, chaparral, and grassland habitats (Munz 1974). It is a perennial bulb threatened by loss, degradation, and conversion of habitat. San Diego golden-star grows near vernal pools, though never within the inundation area of vernal pools. This species occurs in the south-central and southeastern portions of the Del Mar Mesa Preserve.

San Diego mesa mint (*Pogogyne abramsii*). This species is state and federally listed as endangered and is a CNPS List 1B species. San Diego mesa mint is a narrow endemic species and was covered by the MSCP; however, the City relinquished federal coverage for vernal pool associated species following the Brewster lawsuit. A vernal pool HCP that includes coverage for San Diego mesa mint has been drafted and would provide "take" coverage for this species if adopted.

San Diego mesa mint is a member of the Lamiaceae family. This annual herb flowers from April to June and is found only in vernal pools within San Diego County. San Diego mesa mint grows in the vernal pools where are located in the south-central and southeastern portion of the Del Mar Mesa Preserve.

b. Sensitive Animal Species

Sensitive wildlife species that have been observed during the various studies on the Del Mar Mesa Preserve are listed in Appendix 3j. The species described below are covered by the MSCP Subarea Plan, and management directives for them are in Section 7.3.1. Those not covered by the MSCP are described in Appendix 3i.

i. Invertebrates

San Diego fairy shrimp (*Branchinecta sandiegonensis*). The San Diego fairy shrimp is federally listed as endangered and was covered by the City of San Diego's MSCP Subarea Plan; however, the City relinquished federal coverage for vernal pool associated species following the Brewster lawsuit. A vernal pool HCP that includes coverage for San Diego fairy shrimp has been drafted and would provide "take" coverage for this species if adopted. This species is restricted to vernal pools in coastal southern California and south to northwestern Baja California, Mexico (USFWS 2000). The life cycle of fairy shrimp is relatively simple, with larvae hatching out of resting eggs after being covered with water for a prescribed period of time, developing into adults, and mating and laying eggs before the pool dries. The development time is influenced both by the water temperature and the species-specific responses to environmental cues. San Diego fairy shrimp are found in vernal pools that are generally less than 30 centimeters deep. This species takes between 3 and 8 days to hatch and development to the adult stage takes between 7 and 20 days. They are generally found in pools without other fairy shrimp but have been found with versatile fairy shrimp and Riverside fairy shrimp. During a 2001 survey, immature specimens were incidentally observed in vernal pools by RECON biologists.

ii. Amphibians

Western spadefoot toad (*Spea hammondii*). The western spadefoot toad is a CDFG species of special concern. This species is found from central northern California through the coast ranges from San Francisco south into Baja California, Mexico (Stebbins 1985). The western spadefoot toad is primarily a species of the lowlands, frequenting washes, floodplains of rivers, alluvial fans, alkali flats, temporary ponds, and vernal pools. This species is generally found in areas of open vegetation with sandy or gravelly soil (Stebbins 1985). The main threat to the western spadefoot toad is believed to be habitat loss and fragmentation, although pesticide uses have been implicated as well. This species has been detected on the Preserve, and its locations were mapped as part of the City's 2002-2003 Vernal Pool Inventory.

iii. Reptiles

San Diego horned lizard (*Phrynosoma coronatum blainvillii*). The San Diego horned lizard is a CDFG species of special concern and an MSCP-covered species. This lizard ranges from coastal southern California to the desert foothills and into Baja California, Mexico. In Riverside County, the San Diego horned lizard occurs in the western half of the county east to the desert passes. It is often associated with coastal sage scrub, especially areas of level to gently sloping ground with well-drained loose or sandy soil (Mills 1991). This animal usually avoids dense vegetation, preferring 20 to 40 percent bare ground in its habitat. Populations along the coast and inland have been severely reduced by loss of habitat. Where it can be found, the San Diego horned lizard can be locally abundant, with densities near 20 adults per acre. They are largely dependent on harvester ants for food, which contributes to about half their diet. Adults are active

from late March to late August; young are active from August to November or December. This species has been observed throughout the Preserve in chaparral habitat.

Belding's orange-throated whiptail (*Aspidoscelis hyperthyra beldingi*). The Belding's orange-throated whiptail is a CDFG species of special concern and an MSCP-covered species. This species ranges from southwestern San Bernardino County to the tip of Baja California, Mexico, in areas of low, scattered brush and grass with loose sandy loam soils. It can be found in open coastal sage scrub, chaparral, washes, streamsides, and other sandy areas with rocks, patches of brush, and rocky hillsides (Stebbins 1985). The orange-throated whiptail feeds primarily on subterranean termites. It is active during the spring and summer months and hibernates during the fall and winter. Adult orange-throated whiptails generally hibernate from late July or early August until late April. The immature whiptail has a shorter inactivity period, usually hibernating from December through March. Hibernation sites are on soft, well-drained slopes with southern exposure and little or no vegetation cover, and road cuts tend to be suitable. The orange-throated whiptail has declined within its range as a result of habitat loss and fragmentation (McGurty 1980). This species has been observed on the Preserve in chaparral habitat.

iv. Birds

Northern harrier (*Circus cyaneus*). Northern harriers are a CDFG species of special concern, and nesting sites are considered sensitive by CDFG. This raptor is also an MSCP-covered species. The species is a fairly common winter visitor and a formerly widespread breeder throughout California. The northern harrier hovers close to the ground while foraging in grasslands, agricultural fields, and coastal marshes. The northern harrier nests on the ground, with the nest concealed by marsh plants or other dense vegetation, in marshes and also on grasslands, in fields, or in areas of sparse shrubs (Unitt 2004; Zeiner et al. 1990). This species has been nearly eliminated as a nesting species in southern California because of disturbance and loss of suitable habitat (Small 1994). The local breeding population undoubtedly varies much with rainfall and the abundance of prey, and in San Diego County, was estimated in 2004 to be 25–75 pairs (Unitt 2004).

Cooper's hawk (*Accipiter cooperi*). The Cooper's hawk is an MSCP-covered species. Cooper's hawks range throughout most of the United States (National Geographic Society 1983).

In San Diego County, they are widespread over the coastal slope wherever there are stands of trees. They traditionally nest in oak woodlands and sometimes in riparian habitats, but also will use eucalyptus trees (Unitt 1984); during the bird atlas project (Unitt 2004) observers found twice as many nests in eucalyptus as in oaks. They nest high in trees but beneath the canopy. The Cooper's hawk is most numerous in lowland and foothill canyons and in the urban areas of the City of San Diego (Unitt 2004), where it forages primarily on songbirds but is also known to eat small mammals (National Geographic Society 1983). Although quantitative data is unavailable, Unitt (1984) speculates that breeding Cooper's hawks have declined in San Diego

County as a result of human disturbance related to urban and agricultural development. The breeding habitat on Del Mar Mesa Preserve is marginal for Cooper's hawks; however, there is a low to moderate potential for Cooper's hawk to forage within the Preserve.

Western bluebird (*Sialia mexicana*). The western bluebird is recognized as a locally rare species and is an MSCP-covered species. Western bluebirds occur throughout the year in foothills and mountains of San Diego County and are also residents of the more inland parts of the coastal lowland (Unitt 1984). The western bluebird breeds in open woodlands of oaks, riparian deciduous trees, or conifers with herbaceous understory and, in winter, uses more open habitats (Unitt 1984). Their breeding season is from May to July with egg dates from May 1 to June 12 (Unitt 1984). Western bluebirds generally require trees and shrubs for cover and will nest and roost in cavities of trees or snags. In the non-breeding season, western bluebirds will supplement their diet with berries of mistletoe, poison oak, and elderberry, among other species, and the presence of mistletoe berries may govern local occurrence in winter (Grinnell and Miller 1944). Competition for nesting cavities from non-native European starlings (*Sturnus vulgaris*) and house sparrows (*Passer domesticus*) threaten western bluebirds (Zeiner et al. 1990).

Coastal California gnatcatcher (*Polioptila californica californica*). The coastal California gnatcatcher is federally listed as threatened, a CDFG species of special concern, and an MSCP-covered species. This resident species occurs below the 2,400-foot elevation level, with 90 percent of the birds at locations below 1,000 feet. The San Diego County population exceeds 2,000 pairs, with fires in 1996 and 2003 temporarily reducing the carrying capacity of several of the habitat cores for this species (Unitt 2004). Wildfires of October 2003 affected 4 percent of the known coastal California gnatcatcher occurrences, 16 percent of its designated critical habitat, and 28 percent of the USFWS model for suitable habitat (Bond and Bradley 2004, as cited in Unitt 2004).

Coastal California gnatcatchers occur in the coastal slopes of southern California from Ventura County and the Los Angeles basin south to Baja California, Mexico (Atwood 1980; Jones and Ramirez 1995). It breeds only in coastal sage scrub vegetation preferring patches dominated by California sagebrush and flat-top buckwheat and avoiding those dominated by sage, laurel sumac, and lemonadeberry (Weaver 1998a, as cited in Unitt 2004). A breeding pair's territory ranges from less than one hectare along the coast to over 9 hectares farther inland, and is about 80 per cent larger during the non-breeding season (Unitt 2004). During dry months, the species will forage in adjacent riparian areas. The coastal California gnatcatcher population in southern California has been reduced through loss of habitat to urban and agricultural development of the coastal slopes. Nest predation by various animals and brood parasitism by brown-headed cowbirds is also reducing the population (Atwood 1980; Unitt 1984 and 2004). This species was documented in Diegan coastal sage scrub and southern maritime chaparral habitat on the Preserve during surveys in1994.

Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*). The southern California rufous-crowned sparrow is a CDFG species of special concern and an

MSCP-covered species. This resident bird ranges throughout coastal southern California, from Santa Barbara County south to San Diego County and into northwestern Baja California, Mexico (Grinnell and Miller 1944). Nests are most often made on the ground at the bases of bunchgrasses and low shrubs. Generally they begin nesting during the third week of March, with a few pairs starting earlier or later (Unitt 2004). Habitat affiliations are coastal sage scrub, chaparral, and adjacent grassy areas (Unitt 1984). The birds remain in their established territories for life, with juveniles probably dispersing only a few miles from where they were hatched (Unitt 2004). Habitat affiliations are coastal sage scrub, chaparral, and adjacent grassy areas (Unitt 1984). Insects are the primary food item of this species. Urbanization has decreased the amount of habitat suitable for southern California rufous-crowned sparrows.

v. Mammals

Mountain lion (*Felis concolor*). The mountain lion is a California fully protected species and is covered by the MSCP Subarea Plan. It has shown dramatic decline in southern California. Mountain lions are widespread but uncommon in California, ranging from sea level to alpine meadows. Mountain lions are most abundant in riparian and bushy habitats, as long as southern mule deer (their primary food source) are present. Home ranges for adult animals range from 8 to 40 square kilometers, which is larger for males and smaller for females. Numbers appear to be on the increase in California (Zeiner et al. 1990), but their main threat is human development, which leads to fragmentation of the habitat. As the habitat is fragmented, the movement of the lions is restricted which increases the associations with humans (Zeiner et al. 1990). Mountain lion has been observed on the Preserve; however, its current status is not known.

Southern mule deer (*Odocoileus hemionus fuliginata*). The southern mule deer is an MSCP-covered species. Mule deer inhabit a variety of vegetation communities, including coastal sage scrub, chaparral, grassland, woodland, and riparian systems. Distribution extends from Baja California into portions of San Diego, Orange, Imperial, and West Riverside Counties. Adults' antlers may reach a four-foot spread. Mule deer primarily forage upon herbaceous plants, but will also eat various shrubs and trees (National Audubon Society 1991). The population of mule deer that uses the Del Mar Mesa Preserve is presumed to be stable.

3.2.2.5 Wildlife Corridors

Corridor linkages existing between the Del Mar Mesa Preserve and surrounding areas include Deer Canyon to the northern border of the preserve that connects with the Santa Monica Ridge. Wildlife corridors in the Carmel Mountain/Del Mar Mesa vicinity are illustrated on Figure 3-5. The Santa Monica Ridge is bordered to the north by McGonigle Canyon. This corridor facilitates passage onto Black Mountain Park. Continuing eastward from Deer Canyon is the Carmel Valley. This corridor will be linked to the Gonzales Canyon in the future by a wildlife corridor that is currently being revegetated. Traveling south of Carmel Valley is a corridor that connects with the southwest corner of Del Mar Mesa Preserve, which feeds into Los Peñasquitos Canyon

Preserve. The Neighborhood 10 development impedes movement of wildlife from Los Peñasquitos Canyon into Carmel Mountain directly, but there are a couple of entrances via the southeast corner of Carmel Mountain Preserve, and from using the Carmel Country Road wildlife tunnels, which access Carmel Mountain on the northeast corner via Shaw Valley. The major connections between the Carmel Mountain Preserve to Torrey Pines State Reserve are restricted mainly to a few narrow routes along Sorrento Valley Road, Carmel Valley Road, and Carmel Mountain Road.

The Sorrento Valley corridor is outside of the Carmel Mountain and Del Mar Mesa Preserves; however, it is an important linkage between the coastal and inland areas of San Diego. The Sorrento Valley corridor was the only functional wildlife corridor to areas outside of the Torrey Pines Reserve in Crooks' 1997 study. A corridor previously labeled as functional by Ogden (1996), the Carmel Mountain corridor, no longer appears to be used, apparently due to construction and development over the last five years. No evidence of the use of the Sorrento Valley corridor by mule deer, bobcats (*Lynx rufus*), or mountain lions was found in 1992. The pressure of the development of Carmel Mountain Road has likely been the cause of their "switching" to the Sorrento Valley linkage.

At least two routes are used by predators and mesopredators through the Sorrento Valley corridor. The northern route starts at the west end of Los Peñasquitos Canyon, passes under Interstate 805 (I-805) and Interstate 5 (I-5), goes along the lawn south of the business complex on Sorrento Valley Road, passes under Sorrento Valley Road, and ends in Los Peñasquitos Lagoon. The southern route starts on the east side of Los Peñasquitos Canyon and passes under I-805 and I-5, goes under Sorrento Valley Road, and ends in Los Peñasquitos Lagoon. Both routes follow the natural riparian channel between Los Peñasquitos Lagoon and Los Peñasquitos Canyon.

Six species have been found to use the Sorrento Valley Wildlife corridor. All species use both routes within the corridor. Bobcats use the corridor several times a month, while evidence of the coyote, fox, and raccoon are found almost nightly. Opossums and skunks frequently use the wildlife corridor. No deer tracks were found, and this is likely due to the low underpass limiting the use of the corridor by deer. No mountain lion tracks were found either; however, this may be due to the fact that the duration of past surveys was too short to register a rare event.

As the only functional corridor between the Torrey Pines State Reserve and other core areas, Sorrento Valley corridor is vital, and requires restoration, protection and maintenance to continue to function. A number of management measures to ensure the functionality of the Sorrento Valley corridor, not only for the species currently using it, but for the mountain lion and mule deer as well, are outlined in Crooks (1997).

The Carmel Valley Corridor was functional for mountain lion, bobcat, coyote, and fox in 1992 (Ogden 1992). It was not thoroughly surveyed by Crooks in 1997 because the freeway was under construction. Crooks (1997) recommends that current construction plans be analyzed and construction be monitored to ensure a functional corridor is created. Two I-5 bridges have been

constructed over the Carmel Valley Creek channel. These parallel bridges measure approximately 8 feet high and 40 feet wide, and together they cover an over 200-foot stretch of the creek. It has not yet been determined if wildlife accepts this underpass as a viable route of travel, or if it is now or will remain accessible to wildlife.

The Carmel Mountain underpass was used by deer, mountain lions, bobcats, and coyotes in 1992 (Ogden 1992), but it is no longer functional. In 1992, wildlife could travel west from Del Mar Mesa, down Carmel Mountain Road, then across a small dirt road. West of the I-5 underpass, the corridor turned north and followed a narrow coastal sage scrub berm between I-5 to the east and an industrial park to the west. At the north end of the industrial park, the corridor turned west and followed a chaparral vegetated ravine to Sorrento Valley Road. Animals crossed the two-lane road and railroad tracks before entering Peñasquitos Lagoon and the main reserve. It is likely that this corridor has been permanently severed due to additional office development on the west side of I-5, widening and paving Carmel Mountain Road through the underpass, and current housing construction on the east side of I-5.

The existing Environmental Impact Report for Carmel Valley Neighborhood 10 (Neighborhood 10) (RECON 1994) displays an open space corridor from Los Peñasquitos Canyon running northeast to Carmel Mountain. This corridor is intended to provide a critical avenue for wildlife movement between Los Peñasquitos Canyon and McConigle Canyon/Carmel Valley to the north. Several sensitive reptile, mammal, and bird species currently use this corridor to meet their foraging and home range requirements. When development of Neighborhood 10 and Sorrento Hills planning area is completed, this will be one of the only remaining corridor linkages designated as open space. Without this connection, wildlife movement between Carmel Valley and Los Peñasquitos would decrease dramatically, resulting in increased fragmentation of many sensitive populations.

The Del Mar Mesa (Subarea V) Specific Plan EIR (City of San Diego 1996) states that the Del Mar Mesa Preserve area is considered to be a high value core habitat area. Adjacent to this area, south of the preserve, lays Los Peñasquitos Canyon Preserve. Los Peñasquitos Lagoon and Torrey Pines State Reserve lie a few miles to the west, via Carmel Valley. In addition, lands to the north currently provide habitat and wildlife movement capability, including the San Dieguito River valley and Black Mountain Park.

The City of San Diego, along with a number of wildlife conservation groups and agencies, recognize the Del Mar Mesa as an important area that allows wildlife movement between Los Peñasquitos Canyon and Deer Canyon, McGonigle Canyon, Carmel Valley, and open space areas to the north, west, and east. According to the Del Mar Mesa (Subarea V) Specific Plan EIR (City of San Diego 1996), the movement of animals is not confined to narrow corridors. Several large mammals use many of the dirt roads, such as mule deer, coyote, bob cat, mountain lions, as well as smaller animals. Birds are unrestricted, and have access to all portions of the site that suit them. Regions that funnel wildlife movement in Subarea V, include the north-south trending canyons and tributary drainages to Los Peñasquitos Canyon, Carmel

Valley, Deer Canyon, and Shaw Valley. Deer Canyon is considered a major corridor because of its relative isolation from disturbance and its water sources.

The City of San Diego MSCP Subarea Plan (1997) recognizes that this core resource area encompasses one of the few intact natural open space areas in coastal San Diego County that is still linked to larger expanses of habitat towards the east.

3.2.3 Cultural Resources

This section provides a background of the cultural resources on the Preserve.

3.2.3.1 Cultural Setting

a. Prehistoric Period

The area of the county occupied by the Preserves has a long and rich history of archaeological investigation. Malcolm Rogers, an early pioneer of archaeological survey, site documentation, and testing, concentrated his work in the southern California deserts and coast. Rogers, from the San Diego Museum of Man, recorded numerous local sites during the 1920s. He subsequently presented a cultural scenario for prehistoric people who created these sites. Rogers suggested that these people were nomadic gatherers who subsisted mainly on shellfish collected from beaches and around lagoons, and made stone tools which might best be described as "crude" (Rogers 1929).

Based on the proximity of these sites to the community of La Jolla, Rogers named this the La Jolla complex, or tradition, and the name has remained. It is interesting to note that Rogers hypothesized that the La Jolla complex was the oldest archaeological tradition in the region, primarily because of what he interpreted to be simple stone artifacts. This is now known to be incorrect. The La Jolla complex, as identified by Rogers, has been reliably radiocarbon dated between 8,000–2,000 years before the present (B.P.). The cultural materials identified as belonging to this tradition have been found in sites with radiocarbon dates as much as 8,500 years B.P.

Since the early proposition by Rogers that the La Jolla tradition was the most ancient of the archaeological manifestations in the San Diego region, clarification has been provided by the discovery of older materials and the recognition that the "crude" quality of the La Jolla artifacts is not a sound basis for a basal chronological placement. Later in his life, Rogers made it quite clear that his original thinking on this matter was in error.

The earliest archaeological materials in the county are attributed to a tradition, or phase, that is known as the San Dieguito. This phase, which begins in the county by about 9,500 years B.P., is a southern California reflection of a more ancient Folsom/Clovis tradition of large game and aquatic resource use concentrated around what are now desert areas and the Great Basin pluvial lakes of the late Pleistocene epoch (Moratto 1984). Artifacts of this period are generally

described as stone bifaces, lanceolate projectiles, crescentics, and a variety of scrapers and choppers. Late in the tradition, pressure flaking was introduced. The site assemblages tend to be found as surface scatters or shallow deposits on ridge tops and overlooking the Pacific Ocean, leading to a characterization of these people as nomadic hunters. Pleistocene megafauna began a decline, ultimately resulting in their extinction during the same time period as the first evidence of prehistoric human occupation begins in southern California (circa 10,000 B.P.). Thus, an economy based on large game hunting may have been practiced here for no more than 1,000 years. This may explain the relative scarcity of San Dieguito artifacts in the county. On-going research suggests that these people supplemented hunted foods and raw materials with gathered or foraged materials to a greater extent than was once portrayed. Sites of this ancient time are relatively unusual and often appear to have been disturbed or "contaminated" by archaeological materials from the subsequent traditions, the La Jolla and Kumeyaay.

Radiocarbon dating of two sites in western San Diego County, the Harris site and Rancho Park West, indicates that beginning circa 8,000 years B.P., the San Dieguito tradition was replaced by the La Jolla tradition, which held sway for roughly 6,000 years. There is considerable debate as to whether the San Dieguito people continued to occupy the county, or if they abandoned this area when the La Jolla tradition people arrived (Moriarty 1967; Kaldenberg 1982; Gallegos and Carrico 1984; Wallace 1978). Extinction of large game and the conversion to an already incipient maritime and floral resource orientation seems the simplest explanation of in situ culture change.

Stone tools of the La Jolla period appear to be "crude" compared with the San Dieguito holdings in items. Stone artifacts dating to the La Jolla phase sites do not reflect the variety of types and quality of craftsmanship that is represented in the San Dieguito tradition. There appears to be more expedient selection of raw material. Rather than searching out basalts and fine-grained meta-volcanics, the La Jolla tradition people seemed content to use the more readily available river cobbles. This type of rock is not well suited to fine working, and many of the tools appear to have been created and used expediently as a need for a cutting or scraping edge arose. Fine craftsmanship is lacking in the lithic tools of this period, and there is little to suggest that stone working was anything but a means to an end. The La Jolla phase tools are often made from cobble-based core stones with unifacial and bifacial edge damage from scraping and battering. While there is obvious edge preparation, the removal of flakes from these tools is through hard hammer percussion, resulting in undulating and imprecise edges.

In contrast to San Dieguito sites, La Jolla phase sites tend to yield ground stone implements, predominantly manos, and slab or basin metates. The settlement pattern is also distinctive. Sites are found both inland and along the coastal margin, with concentrations in major drainages where plant resources could be processed and around the estuaries or lagoons. These sites often reflect a depth of cultural deposit that is not found at sites of the preceding phase, and at coastal locations, shellfish refuse accumulations are common. This is consistent with the economic adaptation of the La Jolla-era peoples. Exploitation of marine and seed

resources requires a very different tool kit than that of hunting large game. Further, one would expect a very different social and cultural system to evolve out of these different adaptive strategies.

By circa 2,000 years B.P., Yuman-speaking people were present in the Gila/Colorado River drainage. Within a short time, some of these groups had migrated further west and entered Imperial and San Diego Counties, bringing changes in subsistence patterns, technology, and customs. The Yuman-speaking peoples are the ancestors of the ethno-historically known Kumeyaay (also referred to in earlier literature as Diegueño due to their association with the San Diego Mission). Archaeological findings identify a number of changes resulting from this contact. Artifacts associated with this tradition include ceramics; small, finely worked triangular projectile points; bedrock milling equipment, in particular pestles and mortars; and scrapers. One of the most distinctive markers of contact with desert groups is the introduction of ceramic technology. However, there is some evidence that the original Yuman speakers who entered the county 2,000 years B.P. did not use pottery and that the ceramic tradition was introduced as late as 1,000 years B.P. (Clevenger and Schultze 1995).

Yuman traditions of plant processing are also distinctive. These activities included grinding on bedrock surfaces, creating deep “conical” depressions on bedrock surfaces, and stone bowls. In addition to the mano and metate implements that were already present, the Yuman assemblage includes pestles and deeper and narrower mortars or bowls and the extensive use of bedrock outcroppings as processing areas. In this period, mortuary customs were also changed from flexed inhumation to cremation.

b. Historic Period

Spanish colonization of Alta California began in 1769 with the migration of Spanish and Mexican troops, religious personnel, and civilians into the San Diego region. The landing for the seagoing portion of this excursion was the San Diego Bay, with a landfall near the area that is identified as Old Town. This group was followed by an overland expedition and a settlement was established at the location that is now within Presidio Park. Within a few years, the sacred and military elements of the colonial forces were separated and the mission portion of this early settlement was moved to the east, in Mission Valley, where the settlement was named Mission San Diego de Alcala. The siting of this mission was on a large Native American village, which is known from ethnographic sources as Nipaguay.

Spanish colonial activities throughout Alta California affected all of the aboriginal groups from the coast, where initial contact took place, to the inland areas. The Mexican period (1822–1848) saw the continued displacement and disruption of traditional lifeways primarily through the expansion of the land grant program and development of extensive rancho holdings.

Granting of statehood and the gold rush brought many changes for California generally and for San Diego County specifically. By the late 1800s, development in the county was well under way with the beginnings of a recognizable downtown San Diego area and the gradual

development of a number of outlying communities, many of which were established around previously defined ranchos and land grants.

The area directly around the two Preserves was not included in any of the rancho land grants in either the Spanish or Mexican periods. Carmel Valley to the north was the site of an open-range sheep ranch established in the 1770s by a retired soldier from the San Diego Presidio. This soldier, named Cordero, built an adobe dwelling in the valley, roughly located just east of I-5 and south of Carmel Valley Road. Cordero lived there until his death, and for a time both McGonigle Valley and Carmel Valley were referred to as "Cordero" (Northrup 1989).

Don Jose Antonio de Jesus Serrano built a second adobe in Carmel Valley (Northrup 1989). Although there are no structures dating to the Spanish or Mexican periods in the Preserve areas or immediate vicinity, it is likely that cattle and sheep, especially the Cordero flocks from the north, grazed the Carmel Mountain Preserve lands.

Rancho los Peñasquitos, granted to Francisco Maria Ruiz in 1823, is located east of the Carmel Mountain Preserve and forms the southern border of the Del Mar Mesa Preserve. Los Peñasquitos was the first private land grant of the Mexican period in San Diego County. In 1836 Ruiz, who had no spouse or descendents, deeded the ranch to Francisco Maria Alvarado. George Alanzo Johnson, was given one-half interest in the rancho in 1862, when he married into the Alvarado family. Johnson moved in and made considerable improvements to the rancho in the next 20 years. J. S. Taylor acquired the rancho in the early 1880s, remodeling the ranch house and continuing to run cattle. The rancho's subsequent owners made some alterations and additions, using the ranch house as a bunkhouse. In 1974 the County of San Diego purchased 193 acres, including the Johnson Taylor ranch house complex, as part of a proposed Los Peñasquitos Regional Park.

Ranching was the main occupation of the residents in this part of the county from the late nineteenth through the early twentieth century. The largest ranch in the vicinity of the Carmel Mountain Preserve was owned by the George McGonigle family, for which McGonigle Canyon is named. In 1899, the McGonigles sold over 1,000 acres of land to the Sisters of Mercy, a Catholic order of nuns associated with Mercy Hospital. Structures were built and the sisters cultivated the surrounding land. The farm supplied vegetables and dairy products to Mercy Hospital (Mikesell 1988). The sisters named the property Mount Carmel Ranch, from which the valley took its modern name Carmel Valley.

Another family, the Knechtels, moved to the Carmel Mountain area from Nebraska in the 1890s. The original Knechtel homestead, now recorded and designated CA-SDI-11724H, is located in the northeast corner of the Carmel Mountain Preserve. Anton Knechtel occupied the homestead from 1889 to 1903. He was buried on his farm, the grave being located approximately 100 meters north of the farm site, on a ridge. Although no structures still stand at the farm site, foundations and piles of wood remain, and his grave remains in good condition. The Knechtel family continued to dry farm beans on various tracts of land in Carmel Valley through the late 1980s.

3.2.3.2 Cultural Resources Found on the Del Mar Mesa Preserve

Literature and site records for recorded cultural resources were reviewed in 2001 (Price and Cheever 2002). Archival information from the South Coastal Information Center and the San Diego Museum of Man show 65 previously recorded prehistoric and historic sites on the two Preserves.

All of Subarea V, which includes Del Mar Mesa, has been included in previous surveys (City of San Diego 1996). As a result of these surveys, 38 prehistoric and historic archaeological sites are recorded within the Del Mar Mesa Preserve boundaries (Table 3-3). Of these sites, 24 are prehistoric, two are historic, and 12 are prehistoric isolates. One prehistoric site (CA-SDI-11909), and one historic site (CA-SDI-13077H), were previously evaluated and the historic site was determined to be potentially significant (Schaeffer 1998).

The prehistoric sites are all listed as "lithic scatters," "chipping stations," or quarries. They are the result of testing the cobbles that eroded out of the ridge edges. The testing determined how suitable the material was. These sites have a limited variety of artifact types, usually consisting of flakes, shatter, cores, and possibly a few flaked stone tools. The potential for subsurface deposits is very low for such sites, due to the limited variety of tasks and small amount of time needed to test potential cobbles. No habitation sites that would have a wide range of artifact types or subsurface deposits were recorded. The 12 isolates consist of one or two flakes or cores and two stone tools.

The historic site, CA-SDI-13077H, has several cobble features, consisting of two small cobble circles, two large filled cobble circles, and a cobble rectangle with semicircular extensions. A low-density trash scatter surrounds the features. No determination of the age of the site has been proposed.

One of the prehistoric sites (CA-SDI-10138A-B) could not be relocated in recent surveys and is considered destroyed.

TABLE 3-3
RECORDED CULTURAL RESOURCES IN DEL MAR MESA PRESERVE

CA-SDI	SDM-W	P-37-	Site Description	Site Recorded	Report Reference
10137	3568		3 chipping stations, 11 cores, 36+ flakes	Oct. 1995	Gallegos & Assoc. 1995
10305	3687		Light lithic scatter, a few cores, updated in 2000	Oct. 1995	Gallegos & Assoc. 1995
14119	6596		Light lithic scatter, 4 cores, 5+ flakes, disturbed by grading	Oct. 1995	Gallegos & Assoc. 1995
14121	6598		Sparse lithic scatter (FLAs*, milling, a few flakes)	Oct. 1995	Gallegos & Assoc. 1995
14122	6599		Cobble quarry site, cores and flakes	Oct. 1995	Gallegos & Assoc. 1995
14123	6600		Chipping station, 3 cores, 12+ flakes	Oct. 1995	Gallegos & Assoc. 1995
14124	6601		Lithic scatter with chipping station, several cores, 24+ flakes	Oct. 1995	Gallegos & Assoc. 1995
14125	6602		Light lithic scatter, 3 cores and numerous flakes	Oct. 1995	Gallegos & Assoc. 1995
14126	6603		Sparse lithic scatter, cores, biface frag. flakes	Oct. 1995	Gallegos & Assoc. 1995
14127	6604		Chipping station, 5 cores, 12+ flakes	Oct. 1995	Gallegos & Assoc. 1995
14128	6605		Sparse lithic scatter, cores and flakes	Oct. 1995	Gallegos & Assoc. 1995
14129	6606		Sparse lithic scatter, cores and flakes	Oct. 1995	Gallegos & Assoc. 1995
14130	6607		Sparse lithic scatter, 3 cores, 6+ flakes	Oct. 1995	Gallegos & Assoc. 1995
14131	6608		Flaking station, 2 cores, 3+ flakes	Oct. 1995	Gallegos & Assoc. 1995
14132	6609		Sparse lithic scatter, 2 cores, 2 fla, 30+ flakes	Oct. 1995	Gallegos & Assoc. 1995
14133	6610		Sparse lithic scatter, 3 cores, 1 preform, 15+ debitage	Oct. 1995	Gallegos & Assoc. 1995
14134	6611		Sparse lithic scatter, 1 core, 2 tools, 1 flake	Oct. 1995	Gallegos & Assoc. 1995
14135	6612		Sparse lithic scatter, 2 cores, 2 flakes	Oct. 1995	Gallegos & Assoc. 1995
14136	6613		Chipping station, 1 core, 5 flakes	Oct. 1995	Gallegos & Assoc. 1995
14137	6614		Sparse lithic scatter, 2 flaked lithic artifacts	Oct. 1995	Gallegos & Assoc. 1995
14138	6615		Sparse lithic scatter, cores and flakes	Oct. 1995	Gallegos & Assoc. 1995
14139	6616		Sparse lithic scatter, cores, hammerstone, flakes	Oct. 1995	Gallegos & Assoc. 1995
11909	6721		Lithic scatter, collected and tested by B. Smith in 1990	1990	Smith 1990
10138A-B	3569A-B		Recorded as lithic scatter, destroyed by 1993		Gallegos & Assoc. 1993
13077H			3 cobble features (possible foundation), evaluated by Schaeffer 1998	Feb. 1993	Schaeffer 1998
14147H	6620		Trash deposit and possible foundation	Oct. 1995	Gallegos & Assoc. 1995

TABLE 3-3
RECORDED CULTURAL RESOURCES IN DEL MAR MESA PRESERVE
(continued)

CA-SDI	SDM-W	P-37-	Site Description	Site Recorded	Report Reference
	5424		Isolate, broken point	1992	Gallegos & Assoc. 1992
	6547	14177	Isolate, 2 flakes	July 1995	Gallegos & Assoc. 1995
	6636		Just outside west boundary, isolated flake	Oct. 1995	Gallegos & Assoc. 1995
	6637	14510	Isolated quartzite core	Oct. 1995	Gallegos & Assoc. 1995
	6638	14511	Isolated flake	Oct. 1995	Gallegos & Assoc. 1995
	6643	14516	Isolate, 2 flakes	Oct. 1995	Gallegos & Assoc. 1995
	6644	14517	Isolate, 1 core	Oct. 1995	Gallegos & Assoc. 1995
	6645	14518	Isolate, 2 quartzite cores	Oct. 1995	Gallegos & Assoc. 1995
	6646	14519	Isolate, 1 core, 1 core/scraper	Oct. 1995	Gallegos & Assoc. 1995
	6647	14520	Isolate, flake and scraper	Oct. 1995	Gallegos & Assoc. 1995
	6648	14521	Isolate, 1 quartzite core	Oct. 1995	Gallegos & Assoc. 1995
	6649	14522	Isolated core	Oct. 1995	Gallegos & Assoc. 1995

*FLA = Flaked lithic artifact

3.2.4 Land Use and Recreation

The Del Mar Mesa Preserve is owned by private land holders and four public land owners/managers (see Figure 2-2): City of San Diego, County of San Diego, CDFW, and USFWS. Each of these entities has mandates that direct their management of open space preserves. Eight parcels on Del Mar Mesa Preserve have been preserved as mitigation by 1) Metropolitan Wastewater Department, 2) The Environmental Trust (owned/managed by the City following the bankruptcy of The Environmental Trust), 3) Mira Mesa Market Center, 4) Environmental Services, 5) the Deer Canyon Mitigation Bank, 6) the SANDAG/CalTrans Environmental Mitigation Program, 7) the McCaw Property (PTS 174584), and 8) voter-approved Proposition C (Resolution 288960) (see Figure 2-2).

A network of roads and trails (Figure 3-11a through 3-11d) is located throughout the Del Mesa Preserve and are mainly SDG&E easement access roads, wide trails used by vehicles, horseback riders, bicyclists, and people on foot; and narrow footpaths or single-track trails. Trail widths vary from a few feet to 30 feet where easement road width has been expanded.

Most of the roads are maintained by SDG&E for access to their transmission line towers. The southeastern-most road accesses the Vernal Pool Reserve on CDFG property and ends at the southeastern corner of the Preserve. Many of the roads and trails bisect vernal pools within the chaparral. Vernal pools are located alongside and, in some cases, within the roads on the Preserve. Vehicles have made deep depressions and road ruts during the wet seasons and the depressions and ruts remain during the dry parts of the year. In addition to using the wider, easement roads people also use the more narrow trails, causing them to widen into the adjacent vegetation. The CDFW Vernal Pool Reserve fence has been illegally cut in several places to facilitate access between the preserves.

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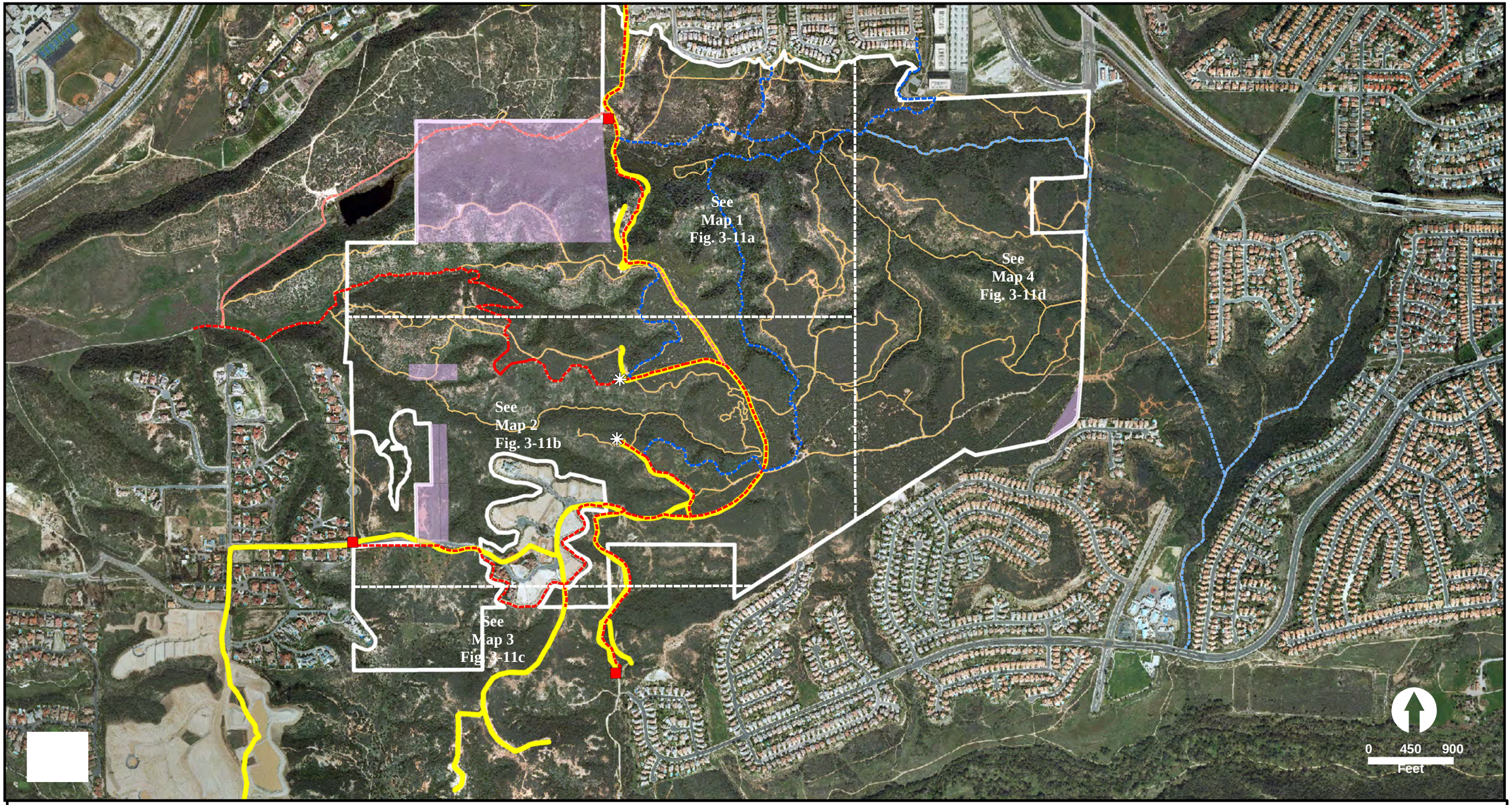

Proposed trail access
Existing unathorized paths
SDG&E access roads
Proposed view point
Proposed multi-use trail
Proposed hike/bike trail
Private property
Proposed future multi-use trail
Proposed future hike/bike trail

Note: Fencing and signage will be installed as necessary
Note: Public trails will not be located on private land (pending land acquisition, MOU and/or trail easement)
Note: Lands not shown as private, within the boundaries of Del Mar Mesa Preserve, are in public ownership or under easement to a public agency

FIGURE 3-11
Overview of Existing Roads, Paths, and Proposed Trail System on Del Mar Mesa Preserve

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Access for emergency and property owner vehicles

Existing unauthorized paths

Utility access roads

Existing trail per Del Mar Mesa Specific Plan

Private property

Note: Public trails will not be located on private land (pending land acquisition, MOU and/or trail easement)

FIGURE 3-11a
Existing Roads and Paths on Del Mar Mesa Preserve (Map 1)

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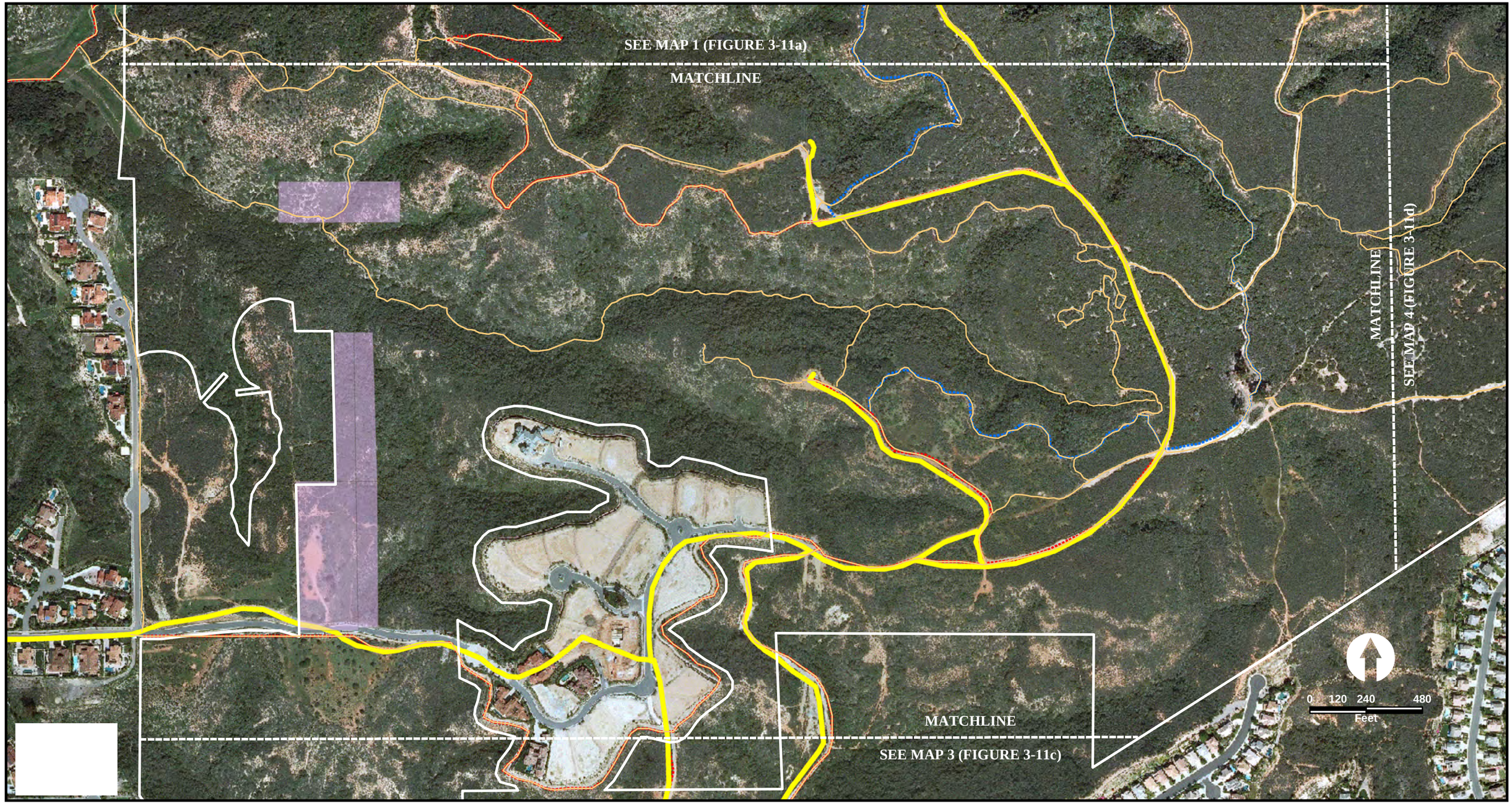

Access for city vehicles and private land owners within the preserve

Existing paths

SDG&E access roads

Private property

Proposed Multi-Use Trails

Proposed Hike and Bike Trails

Note: Public trails will not be located on private land (pending land acquisition, MOU and/or trail easement)

FIGURE 3-11b
Existing Roads and Paths on Del Mar Mesa Preserve (Map 2)

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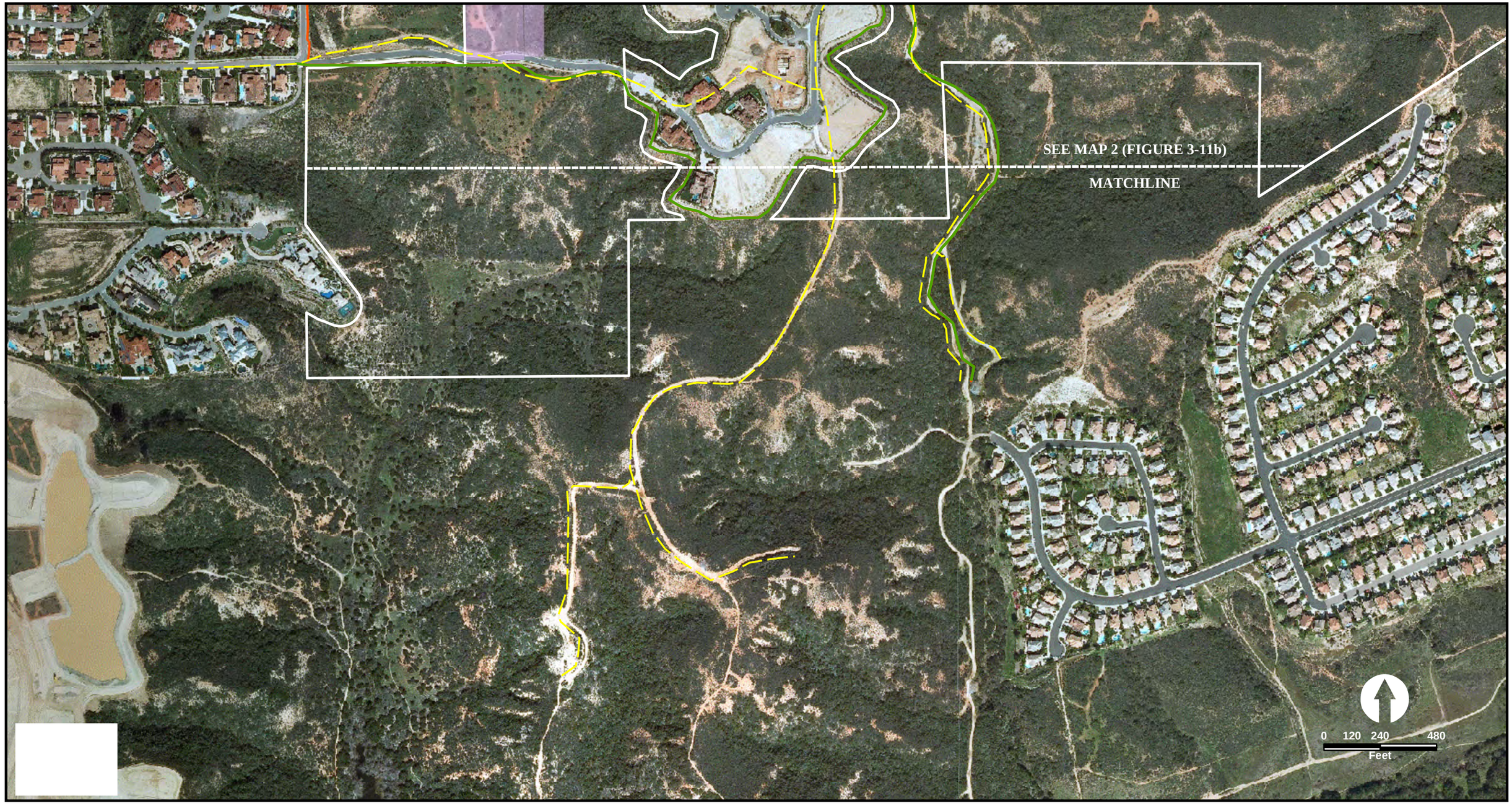


Access for emergency and property owner vehicles

Existing unauthorized paths

Existing trail per Del Mar Mesa Specific Plan

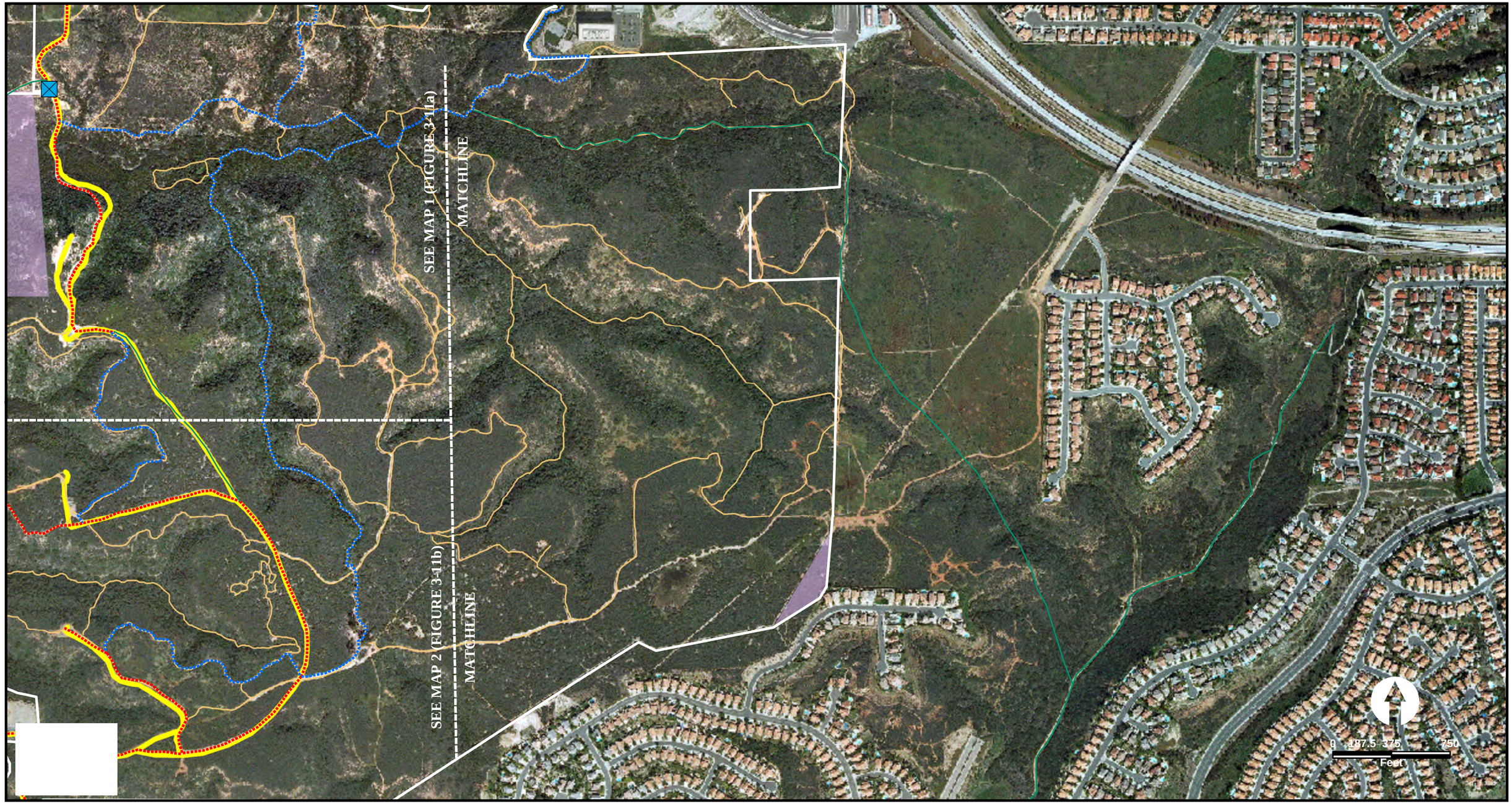
Utility access roads

Private property

Note: Public trails will not be located on private land (pending land acquisition, MOU and/or trail easement)

FIGURE 3-11c
Existing Roads and Paths on Del Mar Mesa Preserve (Map 3)

BLANK BACK OF FIGURE 3-11d



Access for city vehicles and private land owners within the preserve

Existing paths

SDG&E access roads

Private property

Proposed Multi-Use Trails

Proposed Hike and Bike Trails

Note: Public trails will not be located on private land (pending land acquisition, MOU and/or trail easement)

FIGURE 3-11d
Existing Roads and Paths on Del Mar Mesa Preserve (Map 4)

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4.0 Challenges to be Faced

4.1 Public Use

Challenges that may be encountered with public use of the Preserves include education of the visitors so they understand the purpose and values of the Preserves; accidents people may have while visiting the Preserves; and possibly crowd management since the Preserves are in the vicinity of many private residences. Public use of the Preserves may cause damage to trails, including visitors walking or riding off the trails; animal excrement from the pets that are walked on the trails; litter; and noise.

4.2 Urban Encroachment and Edge Effects

"Edge effects" is a general term for a variety of impacts to natural communities across a boundary between land uses and habitat.

Rotenberry and Kelly (1993) list several potential edge effects to habitat reserves in southern California, including:

- Introduction of alien predators, particularly domestic cats;
- Introduction of competitors (rats and mice);
- Disease transmission from domestic or commensal animals to wildlife;
- Trespass and associated habitat alteration;
- Increased levels of nighttime illumination; and
- Increases in sound and vibration levels.

The first three of these "edge effects" are biologically-mediated and have the potential to impact the entire area of the preserves, not just the edges. Replacement of native vegetation communities by exotic vegetation may be added to the list of these biological edge effects.

Habitat alteration by trespassers is a direct human impact. A variety of unauthorized uses of the preserves may be included in this group; however, in general these impacts will be concentrated in those areas that are most accessible to the general public.

The last two edge effects listed may be termed physical effects and, like physical changes to forest edges, are limited in impact to relatively limited, peripheral areas of the preserves.

The impact of these edge effects, and the ultimate value of these preserves as wildlife habitat, depends on the extent of human impacts to the surrounding landscape, their direct and indirect effects, and the proactive measures taken to ameliorate these effects.

In 1990, land use in the vicinity of the Preserves was primarily undeveloped lands and extensive agriculture. In the last decade residential development has begun to change the area (Figures 4-1 and 4-2), and this process will continue until Carmel Mountain and Del Mar Mesa become "habitat peninsulas," areas with development along most of their perimeters, but retaining a degree of connectivity with other habitat areas.

The Carmel Mountain Preserve is about 300 feet from the nearest residential development, near the southwest corner of the Preserve (San Diego Association of Governments [SANDAG], Land Use 1990 GIS coverage). Housing is adjacent to the southwest corner, and within 600 feet, of the preserve at points along the southern and eastern sides. Land use plans call for multi-family housing adjacent to the west and north sides of the Preserve, and single-family housing adjacent to the south side (SANDAG 1990). To the east, a mix of housing, golf courses, and wildlife corridors are in place that will produce less severe edge effects.

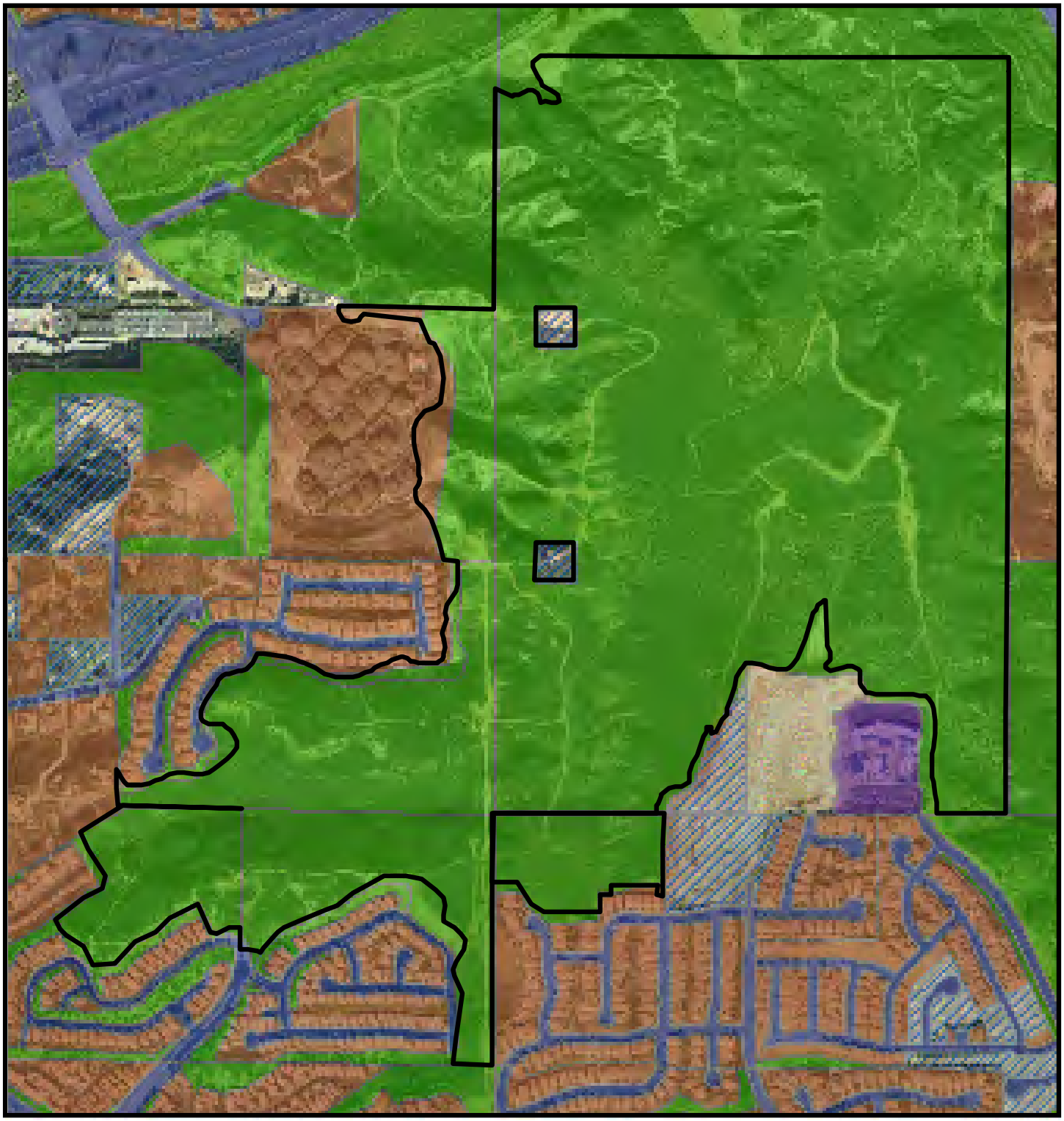
In 1990, the future Del Mar Preserve was about 2,000 feet from the nearest residential development to the east of the Preserve. By 2000, residential development along three-quarters of the Preserve's southern side and within 1,500 feet of its eastern side had been constructed. Planned land use for the area calls for retail and strip commercial development adjacent to the east side of the Preserve, and rural residential development to the west. The Del Mar Preserve will be linked to habitat corridors to the north and south.

4.2.1 Exotic Animals

Increases in available food resources in the surrounding area (e.g., household garbage) may lead to increased population levels of both native and non-native opportunistic species, such as opossums, skunks, coyotes, rats, and mice. Increased populations then expand into native habitat, competing with native wildlife for food resources within the Preserves. During times when food is limited, particularly during drought, these artificially sustained animals may outcompete native wildlife for naturally occurring food resources. Commensal animals may also serve as disease vectors, introducing native wildlife to novel diseases associated with humans and their domestic animals.

Domestic cats (*Felis cattus*) prey on wild animals for reasons other than hunger, so their introduction, even if they are well fed by the owners, can affect the populations of birds, reptiles and small mammals, if the cats are allowed to roam in the Preserves.

The Argentine ant (*Iridomyrmex humilis*) may occur on either of the Preserves. Argentine ants displace native ants, which are the main prey of the San Diego horned lizard. The



Carmel Mountain Preserve

Land Use

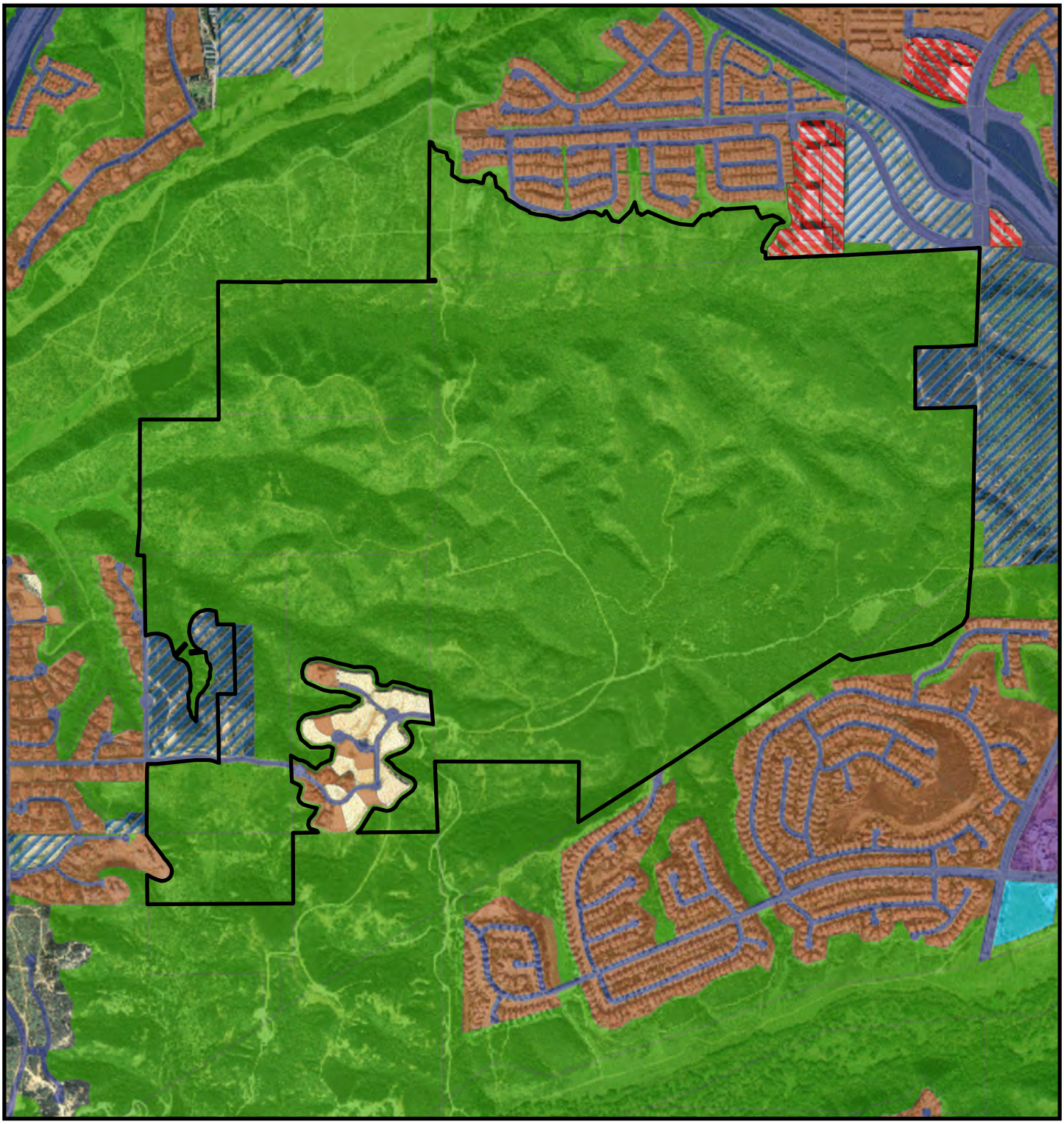
- Commercial
- School
- Field Crops
- Roads
- Open Space
- Residential
- Park - Active
- Vacant and Undeveloped Land

0 Feet 840

FIGURE 4-1

Land Use

Carmel Mountain Preserve



Del Mar Mesa Preserve

Land Use

- Commercial
- School
- Field Crops
- Roads
- Open Space
- Residential
- Park - Active
- Vacant and Undeveloped Land

0 Feet 1,480

FIGURE 4-2
Land Use
Del Mar Mesa Preserve

locations of Argentine ants and imported fire ants found during maintenance and monitoring activities on the Preserves should be noted and the ants destroyed as part of routine maintenance. Control measures that are based on methods prescribed by County and state agencies and approved by the Habitat Manager, should be implemented by City staff, dependent on staffing and budget availability. Food and moisture in trash can attract Argentine ants. Therefore, trash should be removed frequently and regularly. Water should not be supplemented in native vegetation communities on the Preserve, except where necessary for a limited time for habitat restoration.

The use of pesticides is discouraged on the Preserves. If the Habitat Manager determines that pesticides are needed to control invasive plants or animals, the Habitat Manager shall be responsible for any permits required by City, County, state and federal guidelines. Any pesticides used must be on the City Park and Recreation pre-approved pesticide list.

An unfortunate inclusion to the exotic species group is uncontrolled pets. Dogs and cats can be major predators on native species. Steps shall be taken to prevent the predation of native species by dogs, cats, and other non-native predators. Predator control should be initiated case-by-case and as funding allows. The following are guidelines for predator control:

- Trapping of non-native predators should be limited to strategic locations where determined useful to protect ground and shrub-nesting birds, lizards, and other sensitive species from excessive predation.
- Predator control should be considered a temporary, short-term activity.
- A predator control program should only be implemented to address a significant problem that has been identified and is needed to maintain balance of wildlife within the Preserves.
- Predator control methods shall be humane. Adequate shade and water should be provided and traps should be checked twice daily.
- If a predator control program becomes necessary, signs at access points should be installed to notify adjacent residents that trapping is scheduled and how to retrieve their trapped pets.
- Any domestic animal inadvertently trapped should be taken to the nearest animal shelter.
- Any predator control activities should be coordinated with MSCP staff to ensure that the activity complies with MSCP Subarea Plan regulations.
- The Habitat Manager shall promote education of the open space users to the potential impacts of uncontrolled pets, such as by posting signs at trailheads.
- Leash laws shall be enforced within the Preserves so that pets cannot impact the native habitat (e.g., by digging) or prey on native wildlife (e.g., eating small birds and reptiles).

- The Habitat Manager shall report persistent and chronic problems caused by uncontrolled pets in the open space to the County Animal Control Officers.

Eradication and control efforts shall be done at the most effective and efficient time of year, and these efforts shall reflect the latest information in the field on control of the target species.

Observations of non-native predators (i.e., brown-headed cowbirds, feral cats, etc.), within the Preserves should be reported as soon as possible to the Habitat Manager. A qualified biologist should verify any observations by unqualified staff or the public. If funding is available, the Habitat Manager ranger should begin predator control at that location in accordance with the guidelines given above.

Another significant variable contributing to the loss of chaparral-dependent bird species is the absence of coyotes and the presence of gray foxes in areas of isolated habitat. The loss of dominant predators, such as coyotes, is believed to lead to population explosions of smaller predators, such as foxes and domestic cats that prey on bird species, a phenomenon known as "mesopredator release" (Soule et al. 1988).

4.2.2 Invasive Plants

Intact native vegetation is generally resistant to invasion, providing few safe sites where non-native seeds can establish. Natural disturbances, such as fire or mammal burrowing, human-induced disturbances, and development adjacent to natural open space create opportunities for opportunistic non-native species to invade and become established.

Invasive plant species have the potential to displace native species and eventually dominate the habitat, hybridize with native plant species, provide food and habitat for non-native animal species, and effect ecosystem functions such as nutrient cycling, wetland hydrology, sedimentation, and erosion (Brossard et al. 2000).

Invasive species present on the Preserves and in surrounding wildlands include non-native grasses (*Avena* spp., *Bromus* spp., *Hordeum* spp., *Lolium* spp.), mustard (*Brassica nigra*), and thistles (*Carduus* spp., *Centaurea* spp., *Circium* spp.). Invasive species that may be introduced from residential developments include pampas grass (*Cortaderia selloana*), crown daisy (*Chrysanthemum coronarium*), and other landscape plants.

Most of these exotic species present threats to upland habitats, where they occupy the understory and are unlikely to result in major ecosystem changes in the absence of widespread disturbance. Perennial ryegrass (*Lolium multiflorum*), a non-native grass species, is adapted to moist soil conditions and has a high potential to invade the fringes of vernal pools and other ephemeral wetlands, even in the absence of additional habitat disturbance.

4.2.3 Direct Human Impacts

Unregulated human activities that may reduce habitat quality include trespass, encroachment by people building structures, creation of unauthorized trails, motorized vehicle use, building temporary habitations, and fire. Soil disturbance from these activities provides sites for exotic plant species to become established and increases soil erosion. Impacts that create new trails, particularly through chaparral and coastal sage scrub, can effectively increase the "edge" within the Preserves by expanding the foraging range of cats and other mesopredators, and creating dispersal corridors for commensal animals.

4.2.4 Physical Impacts

Increases in nighttime illumination and in sound and vibration levels from surrounding residential development and roadways may directly affect wildlife activity along the urban/wildland interface at the periphery of the Preserves. Increased light levels at night reduce habitat for nocturnal animals, which has been demonstrated in San Diego County by reduced nocturnal: diurnal snake capture ratios near developed areas (Fisher 2001). Noise levels above 60 A-weighted decibels are considered by regulatory agencies to interfere with nesting success of coastal California gnatcatcher and least Bell's vireo, and may affect other bird species.

These impacts are relatively minor in scale, impacting only the periphery of the Preserves with adjacent residential development or roads over a width on the order of 100 feet.

4.3 Easements

Easements on the Preserves can cause the encroachment of weeds from disturbance associated with maintaining access within the easements.

4.4 Brush Management

Brush management to protect homes and other development adjacent to the Preserves could cause impacts to vegetation and sensitive species.

4.5 Erosion

Trail erosion is the most likely challenge to be faced by public use of the Preserves. In addition, natural erosion of the sandstone bluffs, particularly in the vicinity of the short-leaved dudleya populations, will also be a challenge.

5.0 Constraints and Opportunities

5.1 Opportunities

Options for managing the Preserves vary in scale, cost, and effort to achieve. It is anticipated that numerous strategies will be employed in a multifaceted approach. Some examples of the varied conservation opportunities on Carmel Mountain and Del Mar Mesa Preserves are as follows:

5.1.1 Maintain and Manage the Existing Preserve System

A preserve system has been established that serves as the core upon which to expand.

5.1.2 Expand and Enhance the Existing Preserves

Opportunities exist to expand the boundaries of the existing Preserves by purchase of land, land swapping, and land donations. The Preserves may be enhanced through restoration projects, installation of public education features, and additional enforcement activities.

5.1.3 Custom Design Appropriate Management Strategies

This Resource Management Plan (RMP) provides specific management policies, direction, and actions for the two Preserves to improve conditions for existing sensitive species, establish conditions that will support the introduction or reintroduction of other native species, and address other issues such as those associated with non-native and invasive species. Management needs to be adaptive to changing conditions of ecosystems, species viability, level of stress, and many other factors. On-going examples are the changing, or evolving, policies of land and wildlife management agencies with regard to their stances on invasive versus native species and wildfire management, and potentially varying conflicting purposes, desires, and abilities.

5.2 Constraints

Constraints are equally as important as the opportunities and are an inherent and useful tool in identifying the various strategies for implementing this plan. Many of the constraints represent factors that we have no control over, yet have an influence on the Preserves. The following are examples of the many factors that should be considered and evaluated in the adaptive management of the Preserves.

5.2.1 Level of Species-Specific Information

This is critical to making informed decisions during the management process. Adequate knowledge about the status, life history, distribution, and habitat requirements of plants and animals is essential and oftentimes lacking.

5.2.2 Existing and Future Actions or Landscape Elements that may Pose Impacts to Sensitive Species

Land use, water use, transportation elements, and utility corridors all have implications as potential threats and stressors to sensitive, vulnerable species, and their habitats.

5.2.3 Land Use Conflicts within Biologically Significant Areas

Existing or future land uses may conflict with the needs of native species in some areas.

5.2.4 Conflicting Needs of Different, Equally Important Species

There may be areas where two or more sensitive species exist in the same ecosystem competing for food sources or with conflicting needs for other habitat elements.

5.2.5 Costs of Land, Expertise, and Improved Data

Cost is a significant determinant in the reserve implementation and management.

5.2.6 Funding of Land Management Policies and Practices

The methods with which the Preserves are managed, in part or as a whole, will be critical to their long-term survivability. The land management stakeholders—local, state, and federal agencies as well as private parties—will be challenged to define and refine management policies and practices to best meet their goals and the goals of the Management Plan. Realistic limitations must be considered while identifying new sources of funding in both the short term and the long term.

5.2.7 Current and Future Agency and Jurisdiction Staffing Levels and Budgets

Agency and jurisdiction staffing levels and budgets will need to be reviewed to determine their adequacy in light of the potential for increased management, maintenance, and monitoring responsibilities.

5.2.8 Changes over Time

The fact that landscapes are dynamic needs to be considered in the implementation of this plan to ensure appropriate adjustment of management and monitoring strategies.

Because of their inherent dichotomy, the conservation opportunities and constraints can be viewed as opposing and *at the same time* complementary elements of the preserve management process. Viewing the level of current conservation status of lands shows us at the same time the areas outside of protection. Conversely, identifying the ecosystems that are most threatened by current and future actions shows us the areas most in need of protective measures and conservation.

6.0 Maintenance and Use Guidelines

6.1 SDG&E Utility Maintenance

6.1.1 Utilities on Carmel Mountain Preserve

A 150-foot-wide SDG&E easement runs north to south along the western side of the Carmel Mountain Preserve (see Figures 3-6a and 3-6b) and encompasses approximately 8.0 acres. The easement accommodates 138-kilovolt and 230-kilovolt high-tension overhead transmission lines, a 30-inch high-pressure gas line, and 10- and 16-inch fuel lines. Facilities for 12-kilovolt electric distribution and 69-kilovolt electric transmission are also located within the Carmel Mountain Preserve.

6.1.2 Utilities on Del Mar Mesa Preserve

SDG&E access roads to their transmission towers are located on the Del Mar Mesa Preserve (see Figures 3-11a–d), including a 100-foot-wide easement that runs north to south and encompasses approximately 14.5 acres. SDG&E also maintains important access roads outside of the easements discussed above.

6.1.3 Utilities Operation and Maintenance at the Preserves

SDG&E has developed a Subregional NCCP (SDG&E 1995) designed to provide long-term conservation of habitats and species while allowing SDG&E to develop, install, maintain, operate, repair, and replace facilities on public and private land within the subregional plan area, including land set aside for the protection of plants and animals such as Carmel Mountain and Del Mar Mesa.

The Carmel Mountain and Del Mar Mesa Preserves are within the MHPA as designated by the MSCP Subarea Plan; however, implementation of SDG&E's Subregional NCCP is independent of the MSCP Subarea Plan and other plans. Therefore, SDG&E may conduct necessary operation, maintenance, repair, and replacement activities as listed below for all facilities that are or may be located within the preserve, provided the activities are conducted in accordance with the Subregional NCCP.

Overhead Facilities

- New overhead facility alignment
- Placement of structures
- Placement of electrical equipment on structures
- Insetting poles
- Equipment repair and replacement

- Pole anchors and stubs
- Insulator washing
- Tree trimming
- Use of helicopters

Underground Facilities

- New underground facility alignment
- Underground facility access
- Protection of underground facilities in waterways
- Trenching
- Line markers
- Use of helicopters and/or fixed wing aircraft for visual inspection

Other Ground Disturbance

- Access roads
- Access roads crossing waterways
- Slopes to create beds for structures or access roads
- Staging and other work areas
- Geotechnical remediation
- Geotechnical testing
- Pest control
- Fire control areas
- Vegetation control (mechanical and chemical)

Substations and Regulator Stations

- Substation and regulator siting
- Staging and other work areas
- Fire control areas
- Geotechnical failure protection and remediation

Even with the Subregional NCCP, many projects will require CEQA and NEPA review, such as projects that are subject to permits from the California Public Utilities Commission, Coastal Commission, Energy Commission, State Lands Commission, and several other state and federal agencies. However, without further authorization from USFWS or CDFG, SDG&E may conduct all necessary maintenance, repair, and replacement activities with respect to all existing facilities that are now or may hereafter be located within a preserve area of a Habitat Conservation Plan, if conducted in accordance with the provisions of the SDG&E Subregional Plan (SDG&E 1995).

Several species are adequately conserved by the Subregional Plan because impacts will be avoided unless deemed necessary for emergencies or repairs. Those species that occur on the Carmel Mountain and/ or Del Mar Mesa Preserve, and that are covered by the SDG&E Subregional Plan are (SDG&E 1995):

- Del Mar manzanita
- Orcutt's brodiaea
- Wart-stemmed ceanothus
- Short-leaved dudleya
- San Diego button celery
- San Diego barrel cactus
- Palmer's grappling hook
- Del Mar Mesa sand aster
- San Diego goldenstar
- Little mousetail
- California Orcutt grass
- Torrey pine

If impacts are unavoidable, state of the art conservation practices will be used to determine the best impact minimization and mitigation method consistent with SDG&E operational protocols. If repairs to existing facilities could result in an impact to short-leaved dudleya or other narrow endemic species, a biologist would be consulted. Pursuant to SDG&E's NCCP, narrow endemic species may not be impacted for non-emergency work without SDG&E conferring with the USFWS and CDFG. For new projects, kill or injury of narrow endemic animal species or destruction of such plants or their supporting habitat would not be covered by the Subregional Plan and the associated Implementing Agreement.

See Sections 7.1 and 7.2 of the SDG&E Subregional Plan for operational protocols and habitat enhancement measures.

6.1.4 Accidental Damage to Habitat

Any accidental damage to habitat on the Preserves outside the SDG&E right-of-way shall be mitigated per the "Subregional NCCP" (SDG&E 1995) as outlined in the SDG&E NCCP. The NCCP requires that projects go through a mitigation process for direct and indirect impacts. Forms of acceptable mitigation, in order of preference, include avoidance; on-site mitigation; fee-owned easements dedicated to the MHPA; and credits from pre-approved mitigation banks; and SDG&E shall conduct all operations within the Preserves according to "Operational Protocols" outlined in their NCCP. This NCCP serves as a 50-year permit with USFWS and CDFG and meets the requirements for the federal and state endangered species acts for 25 years, with an option for renewal up to 50 years.

6.2 Public Use

The following guidelines pertain to the use of the Preserves by the public:

1. All trail users should remain on designated trails for protection of adjacent sensitive resources and for their personal safety.

2. Signs will direct people to trails designated for horseback riding, hiking, and bicycling. Signs along each trail will identify its uses. All undesignated trails are closed to the public.
3. Domestic animals shall be on a leash at all times within the Carmel Mountain and Del Mar Mesa Preserves and will remain on designated trails.
4. All litter should be placed in trash receptacles placed at trail heads and other locations within the Preserves. Trash receptacles should be emptied regularly.
5. Park rangers will enforce state law, city codes and ordinances, and the policies of this RMP in conformance with current Department Instruction. In addition, CDFG policies govern enforcement and use of State of California lands, and USFWS Refuge policies govern enforcement and use of lands owned by USFWS.
6. Regular patrols to identify and control vandalism, off-road vehicle activity, poaching, and illegal encampments shall be conducted.
7. Subsequent to completion of a Notice to Vacate and in accordance with applicable codes, any encampments found shall be removed as soon as possible after consideration of biological concerns.
8. No unauthorized motorized vehicles shall be driven on any trails within the preserve. No off-trail use is allowed within the preserves. Authorized vehicles include emergency vehicles, preserve managers' vehicles, Park Rangers' vehicles, or maintenance personnel (including SDG&E) vehicles.
9. Graffiti and other effects of vandalism shall be removed or repaired as soon as possible, based on park staff schedules.
10. A reporting and enforcement procedure should be developed to prevent residential or landscape encroachment into the Preserves.
11. Areas where dumping occurs should be checked regularly and barricaded, if deemed necessary, to prohibit dumping.
12. Any identified hazardous waste shall be removed as soon as possible following appropriate hazardous waste material disposal guidelines. Areas should be signed within 24 hours of identification of the waste to indicate the presence of hazardous materials and should be designated as off-limits to public use.

Table 6-1 provides a possible schedule for maintenance.

TABLE 6-1
PRESERVE MAINTENANCE SCHEDULE

Task	Schedule
Restroom cleaning (if they are installed)	As needed, as determined by park staff.
Litter control	Twice per week in parking lots and picnic areas; annual cleanup in other areas; and special volunteer projects for litter and illegal encampment removal as needed.
Illegally dumped material removal	As soon as possible where needed.
Manure removal from equestrian trails and parking lots	As soon as possible where needed.
Graffiti removal	As soon as possible from preserve facilities.
Maintenance and installation of gates, chains, and locks	As needed to prevent illegal entrance (coordinate with SDG&E, agencies, private landowners, and other entities that may need access).
Sign replacement, repair, and cleaning	As needed.
Picnic areas vegetation maintenance if picnic areas are designated at the preserves – flail, mow, and weed to prevent fire and safety hazards	In the spring after native plants go to seed (April - June).
Safety hazard removal (such as fallen trees or hanging shrub limbs along the trails)	Remove and place as needed.
Improper or illegal public activity removal (such as transient encampments; private encroachments on public land; tree houses, swings, or ropes in trees)	As needed.
Exotic, nonnative plant removal	As and where needed, by City staff or volunteers trained or supervised by City staff. Coordination with other agencies conducting similar activities in the area is desirable for optimum effectiveness.
Brush removal and thinning within 100 feet from structures within preserves, per City of San Diego Municipal Code 142.0412 to address Category I fire hazards	As need based on an annual evaluation.
Trail maintenance	Major repairs once per year after the end of the rainy season; minor repairs throughout the year as needed.
Hazardous material removal	When identified, hazardous materials should be removed per approved procedures. Contact the City of San Diego Environmental Services Department hazardous materials team for details.
Parking lot maintenance	Parking areas maintained and repaired once per year after rainy season.
Sewer line and access road service (City of San Diego Metropolitan Wastewater Department), if they are installed at the preserves – service manholes, monitor and maintain sewer lines and access roads	Once per year or according to existing MWWD schedule. Emergency repairs should be conducted as soon as possible.
Power line and right-of-way maintenance (SDG&E)	General maintenance once per year. Emergency repairs as soon as possible.

6.3 Preserve Maintenance

The following guidelines address several issues that pertain to maintenance activities for both Preserves:

1. If required, all applicable city, state, and/or federal permits shall be obtained prior to conducting any maintenance activity. Additionally, proposed maintenance activity shall comply with guidelines in this management plan.
2. If a maintenance activity should result in direct or indirect impacts to surrounding habitat or sensitive resources, the maintenance area should be coned or flagged by a Park Ranger, Natural Resource Planner, or qualified biologist and/or archaeologist to aid the maintenance personnel in keeping the impact confined to the work area.
3. Prior to conducting any maintenance activity that disturbs existing soil from the ground to the subsoil in areas that have not previously been surveyed for archaeology; a site check for archaeological resources shall be conducted by a qualified archaeologist. Results shall be given to the City of San Diego (Contact: Park Ranger or Natural Resource Planner for review by Development Services archaeologist) and the land owner, if applicable, for review and evaluation. If the potential for indirect impacts exist, the site shall be flagged to keep work crews away. If direct impacts are found to be likely, the project should: (1) try to avoid the area; (2) minimize the impact; and (3) develop and implement a plan for recovery of resources subject to approval by the City contacts provided earlier. Native American consultation should be made, when appropriate, during impact analysis and mitigation design and implementation.

   A stewardship program for prehistoric and historic resources should be instituted for the Preserves in conjunction with the information outlined in the Cultural Resources section of this document. A designated steward would then be involved in consultations about projects and possible impacts to cultural sites.
4. Access should be maintained for emergency and maintenance vehicles (including utility access where required). Road maintenance should be limited to clearing or thinning brush and smoothing the road surface within the existing roadway.
5. All road repair and maintenance activity should be confined to the roads and easements themselves. Work should be planned and coordinated with appropriate personnel and agencies in advance to ensure no impacts occur to known sensitive biological and archaeological resources.
6. Whenever possible, maintenance and/or patrol vehicle activity should be minimized within the preserves when soils are wet to avoid degradation of trails.
7. All fences and gates will be kept in good repair and, when necessary, promptly replaced.
8. All maintenance activities should use best management practices for erosion control at the work site.

9. Trail (hiking, bicycling, and equestrian) maintenance will be initiated based on inspection by the Habitat Manager and coordinated with biologist and/or archaeologist, as necessary.
10. Trail closures should be instituted to: allow native vegetation to recover; facilitate wildlife movement; protect archaeological sites and biological sensitive species or areas; allow added protection for sensitive species during breeding season; provide erosion control; ensure public safety; and allow for trail maintenance. Such closures may be temporary or permanent depending on the need.

    Additionally, the City Park and Recreation Department, Open Space Division staff reserves the right to restrict the use of and/or close any public trail or access point on Carmel Mountain and Del Mar mesa to protect the public health, safety, and welfare. An example of such conditions would include, but is not limited to, restrictions/closure during inclement weather, trail overuse, landform deterioration, or other adverse conditions.
11. Existing and proposed trails will be regularly evaluated by a qualified biologist and/or Habitat Manager for impacts with consideration given to erodibility of soils and to sensitive species/habitat in the vicinity.
12. Fencing may be needed to keep people on the trails and out of sensitive areas. All fencing shall be placed in a manner that avoids impacts to native vegetation.
13. Refurbish existing trails and relocate, if necessary, to avoid environmentally sensitive areas.
14. Poison oak, stinging nettle, and other native human nuisance plant species should be controlled only around highly used public areas, such as trails, parking lots, historic points of interest, and interpretive displays. In other areas they should be allowed to remain as part of the natural system.
15. Equestrian trails need to be cleaned as necessary using manual, not mechanical, methods.
16. Brush management activities (fire breaks, brush thinning) should be done in accordance with City of San Diego Land Development Code. Brush management actions conducted in accordance with the Land Development Code are exempt from mitigation requirements in this document. Further information with regard to fire management activities is provided in Section 8.0 of this document, which includes the Fire Management Plan for the Preserves.
17. Wildlife corridors shall be kept free of debris, trash, homeless encampments, and other obstructions to wildlife movement.
18. Any wildlife crossing should be screened on both sides of the crossing between the crossing and adjacent land uses.
19. The potential release of toxic or extraneous materials should be monitored and enforcement action taken as necessary.

20. Affected land owners within the preserves should be contacted prior to any maintenance activities. Any additional regulatory requirements should be implemented as required by the affected land owners (e.g. USFWS Refuge requirements).
21. Maintenance activities should avoid being conducted during the rainy season when soils are wet.
22. Kiosks and educational panels shall be located in a manner that does not impact native vegetation.
23. Except where previously approved by the landowner, all vehicles, personnel, and equipment shall remain within the existing right-of-way.

Table 6-1 provides a possible schedule for maintenance.

6.3.1 Public Awareness

The long-term success of the Preserves and the concept of habitat protection are dependent on the Preserve's acceptance by local community residents as valuable amenities and resources. A belief in open space as a part of their community causes residents and local schools to become interested and protective of the resource. Consequently, residents and local schools should not only refrain from disturbing the resource but also inform others of its importance, to prevent vandalism and unauthorized activities from occurring within the open space. In this manner, by becoming stewards of the open space preserve areas, community members provide a valuable service to the Habitat Manager and the preserve, as their vigilance affords protection to the area when the Habitat Manager is not present (Affinis 1998; Helix 2000).

It is the Habitat Manager's responsibility to work with the community as much as possible and take steps to maintain a positive working relationship between the community and the habitat management program.

Volunteer services are both a method of and a result of public awareness. The Habitat Manager shall participate in subregional or regional programs that encourage and feasibly use volunteer services. Continual volunteer programs may be established, allowing students the opportunity to volunteer and aid the Habitat Manager in the maintenance of the open space.

6.3.2 Trash Disposal

Trash and recycling bins may be placed at selected trail entrances as needed. Park staff shall be responsible for the general cleanliness of the Preserves by removing trash and litter. Park staff shall coordinate with the biologist if trash needs to be removed from habitat. Due to the presence of both historic and prehistoric archaeological artifacts within the open space, coordination with the Preserve's Habitat Manager will be required prior to any trash removal within non-trail/road areas.

The handling, transport, and disposal of any hazardous materials or hazardous wastes found in the open space will be subject to all applicable local, state, and federal regulations. The regulations dictate the qualifications of the personnel and the type of methods and equipment used. Notification of any toxic spills or unlawful dumping of hazardous wastes in the plan area will be reported to the Habitat Manager.

6.3.3 Transient Encampments

Transient encampments are prevalent throughout the undeveloped open space areas of San Diego County. The Habitat Manager shall regularly survey for and report any permanent encampments to the Police Department. All transient encampments should be removed.

6.3.4 Shooting/Hunting

The preservation of habitat is the primary function of the open space Preserve. Shooting and hunting are generally prohibited within the City limits. No shooting or hunting of any kind shall be permitted in the Preserves, and potential hunters shall be advised by signage warning them of the legal consequences of such activity. The Habitat Manager will post this signage as well as inform, in a non-confrontational manner, anyone shooting or hunting within the open space that these activities are illegal or report the activity to the Police Department, CDFG, or USFWS. The Habitat Manager shall report any confrontational situations and any chronic offenders to the aforementioned agencies.

6.3.5 Problem Species

Many exotic animal species can interfere with the life cycles of native animals. Brown-headed cowbirds lay their eggs in other, smaller birds' nests. The large cowbird hatchlings take food intended for the smaller native hatchlings, and the native hatchlings die. European starlings, which form large flocks, displace native species by consuming food and nesting in tree and large shrub cavities that would otherwise be used by native species. Problem species such as these that are persistently present on the Preserves shall be removed, dependent on budget availability. Feral and unleashed domestic dogs and cats shall also be removed, dependent on budget availability. It is the Habitat Manager's responsibility to ensure necessary approvals and permits are obtained from the City, CDFG, and USFWS before the removal operations begin.

The public should be educated to promote top predators as "keystone species" of the natural world, rather than as "varmints" degrading the quality of suburban life. This education could be implemented through signage and field trips within the Preserves, and educational packets for schools and community groups.

Educating the public on the adverse impact of invasive exotic species, particularly pampas grass and other ornamental plants, should also be part of community education. Volunteer efforts to control exotics within the Preserves should be encouraged, with the recognition that

these efforts will be of primary benefit to long-term habitat quality by increasing the level of community appreciation of native species and natural ecological processes. Eradication of exotic plant species should be regarded as a secondary outcome of volunteer activities, and will most likely depend upon efforts of Preserve staff for effective, coordinated implementation.

Public outreach efforts should include signs within the preserve illustrating the destructive effects (erosion, exotic invasive plants) of unauthorized activities; outreach to community groups, including mountain bicycle outlets and associations; and outdoor classroom programs.

6.3.6 Poaching/Collecting

Removal of any natural resource from the open space—e.g., plants, animals, rocks, minerals—is prohibited. Anyone attempting to take such things shall be informed of the policy by the Habitat Manager, in a non-confrontational manner. Signage will also include language warning of the legal consequences of removing any natural resources. The Habitat Manager shall report any confrontational situations and any chronic offenders to the appropriate Sheriff's Office.

The Habitat Manager, at his/her discretion, may allow cuttings only for revegetation of areas within the Preserves. Any such cuttings shall be taken only by the Habitat Manager, under his/her supervision, or under a written agreement specifying amounts and localities of collectible materials. These cuttings will be limited to only what is necessary to the revegetation effort and will not seriously deplete the existing vegetation.

6.3.7 Lighting

No lighting shall be directed towards the open space areas. Lighting from adjacent developments shall be shielded and directed downward and away from open space.

6.3.8 Fencing/Barriers

Permanent fencing preventing human traffic may be placed at appropriate locations on the Preserves to limit the amount of human disturbance to the habitat, and control access as needed. The fencing shall be routinely patrolled to monitor for signs of trespassing, specifically around the vernal pools.

Permanent or temporary fencing that does not inhibit the movement of wildlife may be installed along or adjacent to power transmission line access roads within the open space.

Barrier posts will be placed at trailheads to prevent motorized vehicles from entering the trail while allowing authorized users to pass through. The Habitat Manager shall also coordinate with SDG&E to have a gate placed at each entrance to the SDG&E access roads.

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7.0 Resource Management, Enhancement and Restoration Guidelines

7.1 Mitigation

Pardee Homes (Pardee), through an agreement with the City of San Diego as part of the dedication of lands from Pardee to the City, has the right to sell 24.0 acres of habitat at the Carmel Mountain Preserve to another party as mitigation for development impacts as described in the Pacific Highlands Ranch Development Agreement (Section 5.2.5, Doc. #00-18571, September 9, 1998). The 24.0 acres is not specific to any location on the ground, but is a means for Pardee to recoup some of the cost of dedicating the land. The acres can be sold in part or as a whole, at a per-acre cost agreed upon between the City and Pardee.

7.2 Preserve Enhancement and Restoration Opportunities

This chapter summarizes potential enhancement and restoration programs for native habitats on Carmel Mountain and Del Mar Mesa, excluding privately owned lands, until the land is conserved in perpetuity by the landowner or acquired by a public or non-profit agency for the purposes of conservation or until written permission is obtained from the landowner. Enhancement or restoration of sensitive resources in the SDG&E access roads would only be done if these roads are no longer needed by SDG&E or private landowners.

7.3 Natural Resources Management

7.3.1 Species Monitoring and Management

7.3.1.1 MSCP Monitoring and Management Requirements

The City of San Diego adopted revised rare plant monitoring protocols based on input from a scientific advisory review, led by Dr. Kathryn McEachern, a rare plant specialist with the U.S. Geological Survey Biological Research Division. The project was funded through a grant from the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife.

The following plant and animal species, known to occur on either the Carmel Mountain Preserve or the Del Mar Mesa Preserve, are covered by the MSCP Subarea Plan. Each species has specific directives for their management within the MSCP preserve system. Management

directives for each species are from Table 3-5 of the MSCP (City of San Diego 1997; see Appendix 4).

a. Plants

Del Mar Manzanita. Del Mar manzanita is a federally endangered species that is restricted to sandstone bluffs. Within the City of San Diego MSCP area, 67 percent of the known habitat (southern maritime chaparral) and 91 percent of the major populations are covered. Area-specific management directives must include specific management measures to address the autecoloty (the study of individuals or populations of a single species and their relationship to their environment) and natural history of the species and to reduce the risk of catastrophic fire.

This species is confined to the coastal areas of San Diego and open spaces within the Metro–Lakeside–Jamul segment of the County of San Diego's MSCP Subarea Plan. Development is the primary risk to this species.

Management of this plant should include the mapping of any newly discovered locations, protection of the species, and expansion of the range. A weeding regime, where necessary based on MSCP or other monitoring, would have the dual effect of removing competition allowing the species to expand and to remove the fuel source near the ground, which if ignited could cause damage to the seeds and crowns. Other threats include invasive weeds, trampling, and brush management activities.

Orcutt's Brodiaea. This is a CNPS List 1B species that is most commonly associated with vernal pools. All of the major populations are located within the City's Multi-Habitat Planning Area (MHPA). All of the population will be conserved under the MSCP Subarea Plan. Area-specific management directives must include specific measures to protect against detrimental edge effects.

Orcutt's brodiaea is found within the preserve near vernal pools. The major threat to this species is competition by invasive weeds and vehicular and recreational activity. When this plant is located in undisturbed habitat, the native cover of the chaparral and other native plants suppresses the expression of the invasive weeds. Areas that have been disturbed or are exposed to an edge, such as a road or trail, allow weeds to gain a foothold and eventually blanket the habitat.

By minimizing edge effects along trails and roads and implementing a weed control program where necessary, the functional values of the habitat can be restored to a functional state. Vehicular and recreational traffic on the Preserves should also be monitored to reduce disturbance to this species.

Wart-stemmed Ceanothus. This is a CNPS List 2 species. Wart-stemmed ceanothus is a rounded evergreen shrub associated with chaparral on dry hills and mesas within San Diego.

Sixty-seven percent of the major populations will be conserved in the City's MSCP Subarea Plan.

Within the appropriate habitats, restoration of this species is required by the MSCP. Area-specific management directives for the protected populations must include specific measures to increase populations. Area-specific management directives must include specific management measures to address the autecoloty and natural history of the species and to reduce the risk of catastrophic fire. Any newly found populations should be evaluated for inclusion in the preserve strategy through acquisition.

Within the preserve, this species is found in southern mixed chaparral on Carmel Mountain. Measures should be taken to remove invasive weeds that may compete with this species as determined by MSCP or other monitoring. This will have the dual action of expanding the habitat, and removing the ground level fuel source that would damage crowns and bulbs as the fire moved through the vegetation. Currently, wart-stemmed ceanothus is common on Carmel Mountain and efforts to increase population size are not recommended at this time. Implementation of weeding programs as necessary and continued restriction of access to authorized trails will likely maintain the status of this species on the Preserve.

Del Mar Sand Aster. Del Mar sand aster is a CNPS List 1B species. This species is limited to the sandstone soils that are found within the preserve. Area-specific management directives for the protected populations must include specific measures to protect against detrimental edge effects to this species, including specific management measures to address the autecoloty and natural history of the species and to reduce the risk of catastrophic fire. Management measures to accomplish this may include prescribed fire.

Threats to existing populations on the Preserves include vehicular and recreational traffic, weed invasion and road grading. Information gathered from surveys conducted by the City of San Diego should be used to develop management strategies.

Expansion of the populations would be possible through a plant propagation program. Confining recreational activities to the designated trail system will minimize edge effects. Habitat for this species can be enhanced through the removal of exotic plants. Exotic plant control would reduce the effect that a fire would have upon the plants.

Short-leaved Dudleya. This species is listed as state endangered and was proposed as federally endangered until 1996. The threats to short-leaved dudleya decreased after the proposal was published. Short-leaved dudleya is a narrow endemic species under the City's MSCP Subarea Plan. Under the MSCP, 98 percent of major short-leaved dudleya populations will be conserved. Management directives for this species require specific measures for maintaining and increasing populations, reducing risk of catastrophic fire, and addressing autecoloty and natural history.

The short-leaved dudleya is a focal species for conservation on Carmel Mountain. This species' protection, along with the preservation of vernal pools and southern maritime chaparral habitats and their associated sensitive species, is the reason that Carmel Mountain was conserved. Appendix 5 provides recommendations for the enhancement and restoration of short-leaved dudleya on the Carmel Mountain Preserve.

San Diego Button Celery. San Diego button celery is a federally and state listed endangered species. It is on the MSCP's list of narrow endemics, and is a state MSCP covered species; the City relinquished federal coverage for vernal pool associated species following the Brewster lawsuit. Eighty-two percent of the major populations are covered under the MSCP. This species is limited to salt marshes and vernal pools. There are also important populations that are found on military installations throughout the county. Area specific management directives must include specific measures to protect against detrimental edge effects.

The population on Del Mar Mesa is likely subject to edge effects such as; vehicular and recreational activity, road grading and weed invasion. Restoration efforts, where applicable and as funding become available, will improve the quality of the habitat by protecting and enhancing the vernal pool habitat for San Diego button celery. Protection will include directing all activities to less sensitive areas when possible. Enhancement would involve restoring the natural hydrology to disturbed pools, removal of exotic plants and the reintroduction of plant propagules.

Coast Barrel Cactus. Coast barrel cactus is a CNPS List 2 species. It is usually found on dry hills with open coastal sage scrub. The MSCP conserves 81 percent of the major populations. Area-specific management directives must include measures to protect this species from edge effects, unauthorized collection, and include appropriate fire management and control. This species is currently threatened by vehicular and recreational activity on the Preserves. The populations within the Preserves should be protected and enhanced by redirecting activities to less sensitive areas when possible and by implementing an aggressive weed control program, as outlined in Chapter 7.0. Exotic plant control would reduce the effect that a fire would have upon the plants.

San Diego Goldenstar. The San Diego goldenstar is a CNPS List 1B species. It is associated with chaparral and coastal sage scrub on dry hills and mesa tops. Area-specific management directives must include monitoring of the transplanted populations and specific measures to protect against detrimental edge effects to this species. Vehicular and recreational activity pose the major threat to the current populations on the Preserves. Redirecting activity to less sensitive areas when possible is recommended. Invasive weeds should also be managed by the implementation of a weeding program, to maintain the status of this species on the Preserves.

Torrey Pine. The Torrey pine is a CNPS List 1B species. This distinctive pine is limited to microhabitats located only in Del Mar and Santa Rosa Island off of the coast of Ventura. The main population is located at Torrey Pines State Reserve and is under management.

Infestation by the bark beetle (*Ips paraconfusus*), and human-induced fires have been contributing to this species decline in San Diego County (Reiser 2001). This species should be monitored regularly for the presence of beetle activity. Exotic plant control would reduce the effect that a fire would have upon this species.

A small number of pines are located in two areas on the Carmel Mountain Preserve. It is not known if these individuals are native or the result of cultivation. They should be incorporated into the overall enhancement plan of the preserve.

San Diego Mesa Mint. San Diego mesa mint is a federal and state listed endangered species. It is associated with vernal pools and surrounding complexes. Many of the populations occur on military installations and are protected by federal agencies. Area specific management directives must include measures to protect against detrimental effects, maintain surrounding habitat for pollinators, and maintain pool watersheds.

The population on Del Mar Mesa is subject to direct vehicular and recreational activity, as it is associated with the vernal pool complex along the existing trails and roads. To ensure the survival of the species on Del Mar Mesa, redirection of activity around this habitat is recommended. The implementation of an aggressive restoration effort should be undertaken to improve the quality of the habitat by protecting and enhancing the pools that the species is associated with. Enhancement of this habitat would involve restoring the correct hydrology, removal of exotic plants and the reintroduction propagules.

b. Invertebrates

San Diego Fairy Shrimp. The San Diego fairy shrimp is a federally endangered species. This species spends its entire lifecycle in vernal pools. Vernal pools are not independent systems, but are a part of a vernal pool complex in which individual pools are a subpopulation. The primary goal in the recovery of the fairy shrimp is to secure existing vernal pools and their watersheds from further loss and degradation in a configuration that maintains habitat function and species viability (USFWS 1998). Approximately 83 per cent of vernal pool habitat is preserved in the MSCP preserve system (City of San Diego 1997). MSCP management directives require that area specific management directives for preserves protect vernal pools against edge effects that may harm the species.

Numerous vernal pools and depressions that pond water are present within the existing roads, SDG&E access roads and trails on Carmel Mountain and Del Mar Mesa Preserves. Direct vehicular and recreational activity is the major threat to this species.

Individual vernal pool and habitat restoration recommendations are discussed in Appendix 6 in detail. Management recommendations include performing surveys, to determine their distribution. Monitoring for the San Diego fairy shrimp and management of the existing habitat and restoration of disturbed vernal pools is also recommended. The future closure of roads and trails through the vernal pool complex on the Preserves is recommended to avoid the

degradation of the watershed and protect listed species. Fencing around sensitive areas and signage encouraging visitors to stay on paths is also recommended. Placing language on signs throughout the preserves stating that damaging the habitat of a federally listed species is illegal may also be a deterrent. Routine patrolling of all fenced off sensitive areas, especially the vernal pool preserve on Del Mar Mesa, is essential in maintaining the integrity of the fencing and landscape.

c. Reptiles

Belding's orange-throated whiptail. Belding's orange-throated whiptail is a federal and state species of concern. There is insufficient information on this species' breeding and egg-laying habitat requirements, but it is known to inhabit coastal sage scrub, chaparral, mixed chaparral and woodland habitats (County of Riverside 2000). Approximately 59 per cent of the potential habitat and 62 percent of all known point occurrences will be conserved in the MSCP preserve system (City of San Diego 1997). The Plan requires monitoring of populations, habitat linkages to other protected areas, adaptive management practices and edge effect management directives to be instituted on preserves that support orangethroat whiptails.

Belding's orange-throated whiptails are known from two locations on Carmel Mountain Preserve and two locations on Del Mar Mesa Preserve. Suitable habitat is present on both Preserves to support the species. Pitfall traps have been installed on the Carmel Mountain and Del Mar Mesa Preserves as part of the MSCP Herpetofaunal Monitoring Program.

Management for orange-throated whiptail on the preserves will consist of continued monitoring efforts, maintaining existing potential habitat, encouraging habitat inhabited by prey species, and maintaining linkages to off-site habitat. Belding's orange-throated whiptail's preferred prey species is termites, and areas where this prey would be present such as in woodpiles and litter must be maintained and encouraged. Populations near development should be monitored for trends that might change due to edge effects such as domestic pets, exotic plants, and invasive ants (USGS and San Diego State University [SDSU] 2001).

San Diego Horned Lizard. San Diego horned lizard is a CDFG species of concern. The San Diego horned lizard occurs primarily in coastal sage scrub habitat. Under the MSCP Subarea Plan, approximately 60 percent of potential habitat and 63 percent of point occurrences for this species will be conserved. The Plan requires area-specific management directives to maintain native ant species, discourage the Argentine ant and protect the species against detrimental edge effects (City of San Diego 1997).

Nine occurrences of San Diego horned lizard have been documented within the southern mixed chaparral and coastal sage scrub on Carmel Mountain and five within the chaparral on Del Mar Mesa Preserve. Suitable habitat exists on both Preserves to support this species. Pitfall traps have been installed on the Carmel Mountain and Del Mar Mesa preserves as part of the MSCP Herpetofaunal Monitoring Program.

Management for this species will include maintaining the existing suitable habitat and maintaining linkages to off-site habitat. Monitoring efforts to detect the species should continue. Irrigation and trash within the preserve should be controlled in order to discourage Argentine ants, which displace native ant populations. In addition, restoration of non-native grassland areas should be undertaken in areas that may support the species. The Center for the Reproduction of Endangered Species (CRES) has been monitoring the San Diego horned lizard for the past six years and has identified biological differences in horned lizards that inhabit disturbed habitat types. Horned lizards that inhabit disturbed habitats have a smaller body size and larger home range with lower plant diversity than those lizards found in pristine coastal sage scrub habitats (Zoological Society of San Diego 2001). This species tends to occur along roadsides, near thick vegetation. It is recommended that new trails and roads should not be created where the species is known to occur (USGS and SDSU 2001). In addition, educational signage should be placed throughout the preserve indicating the sensitivity of the animal and discouraging its removal as a pet.

d. Birds

Coastal California Gnatcatcher. The coastal California gnatcatcher is federally listed as threatened and is a CDFG species of special concern. The coastal California gnatcatcher typically occurs in or near sage scrub and prefers habitat dominated by California sagebrush. The bird also uses chaparral, grassland, and riparian woodland habitats where they occur adjacent to sage scrub.

Approximately 73, 300 acres of existing and potential habitat for the coastal California gnatcatcher will be conserved and linked together within the MSCP preserve (City of San Diego 1997). MSCP management directives for this species include; measures to reduce and minimize disturbance to habitat during the nesting period from mid-February to August, and fire protection measures to reduce the potential of habitat degradation and conversion due to unplanned fires. Areas containing high value gnatcatcher coastal sage scrub habitat are priority conservation areas. Management measures to maintain or improve habitat quality of high value conserved habitat are also required by the management directives for this species (City of San Diego 1997). No clearing of occupied habitat within the City's MHPAs is allowed during the breeding season from March 1 to August 15.

Coastal California gnatcatchers have been observed on Carmel Mountain and Del Mar Mesa Preserves within coastal sage scrub and chaparral habitat (see Figures 3-4 and 3-10). It is recommended that suitable habitat on the Preserves be monitored for coastal California gnatcatcher to determine presence of the species, and the appropriate areas of habitat to be maintained or restored if necessary. Habitat around known nesting areas should be enhanced, and protected to discourage humans or domestic animals from disturbing the habitat. Occupied gnatcatcher areas should be monitored for the presence of brown-headed cowbirds (*Molothrus ater)*, to prevent brood-parasitism.

Cooper's Hawk. The Cooper's hawk is an MSCP covered species. This hawk mainly breeds in oak riparian woodlands and only occasionally may also use eucalyptus trees (Unitt 1984). Under the MSCP approximately 59 percent of potential oak woodland, chaparral, and sage scrub foraging habitat and 52 percent of potential oak riparian and woodland nesting habitat for this species is conserved. MSCP management directives for this species include 300-foot impact avoidance areas around active nests and minimization of disturbance in oak woodlands and oak riparian forests.

The eucalyptus woodlands and individual eucalyptus on Del Mar Mesa Preserve should be monitored for potential nesting activity during the breeding season. If active nests are located, signage should be placed at the appropriate intervals around the area restricting access during breeding season.

Northern Harrier. The northern harrier is a CDFG species of special concern. Northern harrier nesting sites are considered sensitive. The northern harrier most commonly nests on the ground at the edge of marshes, but will also nest on grasslands, fields, or in areas of sparse shrubs. Northern harriers have nested in San Diego County at the Tijuana River, Otay Mesa, Lake Hodges, and Camp Pendleton and active nesting is known to occur in the Tijuana River Valley, South San Diego Bay, Sweetwater Marsh and in Proctor Valley (Unitt 1984; City of San Diego 1997). Harriers exhibit nest area fidelity and will forage up to four miles from their nest sites (City of San Diego 1997). Under the MSCP, 42 percent of potential northern harrier nesting habitat and approximately 85,000 acres of potential northern harrier foraging habitat will be conserved. MSCP Management directives for this species include: (1) managing agricultural and disturbed lands within four miles of nest sites that are to become part of the MSCP preserve system to provide foraging habitat, (2) prioritizing grassland and wetland habitats for conservation within the preserve system, (3) impact avoidance areas of 900 feet or to the maximum extent possible within a preserve around active nest sites, and (4) maintaining wintering habitats within key wintering areas in San Diego County.

Northern harriers are not expected to nest on either preserve; however, the preserves support ample foraging habitat to support the species. Management for northern harrier should be directed at maintaining foraging habitat on both Carmel Mountain and Del Mar Mesa Preserves.

Southern California Rufous-crowned Sparrow. The southern California rufous-crowned sparrow is a CDFG species of special concern. Southern California rufous-crowned sparrows are year-round residents that can be found in coastal sage scrub that is generally steep and rocky and in grassy areas of coastal sage scrub (Unitt 1984). Southern California rufous-crowned sparrows are also known to inhabit grassland areas that have been created by fire and human disturbance when the grasslands are adjacent to coastal sage scrub (Unitt 1984). Under the MSCP, approximately 61 per cent of potential southern California rufous-crowned sparrow habitat, in addition to 71 percent of mapped localities for the species, is conserved. MSCP specific management directives for this species include maintenance of fire processes to perpetuate herbaceous components in open phases of coastal sage scrub.

The southern California rufous-crowned sparrow is intolerant of edge effects, small habitat patches, low shrub volume and short-term habitat disturbance. According to Unitt (1984), favorable southern California rufous-crowned sparrow habitat occurs within Los Peñasquitos Canyon to the south of Del Mar Mesa Preserve. Management for the southern California rufous-crowned sparrow should be directed at maintaining the native herbaceous component within the sparrow's habitat, either by prescribed burns or manual methods.

Western Bluebird. The western bluebird is an MSCP covered species. During the spring this bird breeds in open woodlands of oaks, riparian deciduous trees, or conifers with herbaceous understory and in winter, uses more open habitats as well. Western bluebirds generally require trees and shrubs for cover and will nest and roost in cavities of trees or snags. Under the MSCP, 59 percent (15,000 acres) of potential western bluebird habitat will be conserved. The persistence of this species largely depends on the conservation of existing large populations of western bluebird on public lands east of the MSCP plan area (City of San Diego 1997).

Competition from European starlings and house sparrows has reduced eastern bluebird populations in parts of the eastern U.S., and threatens western bluebirds (Zeiner et al. 1990). Proximity to development increases the likelihood of starling and house sparrow presence (Marzluff and Ewing 2001). Management for the western bluebird should be directed at enhancing habitat around occupied habitat or nesting areas to discourage humans, domestic animals and pest species from entering the area.

Western Burrowing Owl. The western burrowing owl is a CDFG species of special concern. This species was observed during surveys on-site by RECON (1994), however, the location was not mapped.

It is believed that western burrowing owls may occur wherever there are ground squirrel colonies as squirrels are the primary excavators of western burrowing owl burrows. These animals exhibit high site fidelity, reusing the same burrow year after year (Rich 1984). Under the MSCP, approximately 4,000 acres of known suitable habitat and 5,770 acres of potential habitat within grassland vegetation communities will be conserved. Specific survey protocol and mitigation guidelines have been formulated for this species (California Burrowing Owl Consortium 1993) but are not legally required. MSCP management directives for western burrowing owl include the enhancement of known, historical, and potential western burrowing owl habitat, and the management of ground squirrels. Management measures will include the construction of artificial burrows and vegetation enhancement to enhance foraging habitat (City of San Diego 1997). Within preserve areas, western burrowing owl nests should be monitored to determine use and nesting success, predator control measures must be employed and a 300-foot impact avoidance area around occupied burrows must be established.

e. Mammals

Mountain Lion. The mountain lion is not a sensitive species but is covered under the MSCP and protected for its aesthetic and intrinsic value, as the largest native carnivore in the plan area

(City of San Diego 1997). The mountain lion requires large continuous tracts of land as their home ranges can vary from 13–800 square kilometers (Hansen 1992). Approximately 105,000 acres of mountain lion habitat is conserved with the MSCP preserve system (City of San Diego 1997). Under the plan, core and linkage areas were designed to maintain ecosystem function including large animal movement throughout different areas of the preserve system. Wildlife agencies are required to monitor the MSCP preserve area for changes in ecosystem function and develop adaptive management strategies should the need arise. In each subarea plan of the MSCP, linkages and road crossing/under crossings in wildlife movement areas are design requirements.

This species is constrained in the western areas of the MSCP preserve system by expanding residential development and loss of protective habitat. The mountain lion is known from historic sightings at Carmel Mountain and Del Mar Mesa Preserves (see Figures 3-4 and 3-8). The Los Peñasquitos and Del Mar Mesa Preserves are directly connected at the western end of the Del Mar Mesa Preserve and at three crossings along Park Village Road. Should mountain lions move into Los Peñasquitos Canyon, they could access the Del Mar Mesa Preserve from either of the four connection points. Access to the Carmel Mountain Preserve is constrained by the high density of residential development on all sides. Given the small size of this Preserve, it is unlikely to support this species.

Wildlife movement in Los Peñasquitos Canyon Open Space Preserve is monitored by the San Diego Tracking Team. In addition to monitoring conducted by the San Diego Tracking Team, several sites in Del Mar Mesa and Los Peñasquitos Canyon have been monitored as part of a wildlife corridor study by the Conservation Biology Institute as part of the MSCP. No mountain lion tracks were identified at any of the study sites in the vicinity of Del Mar Mesa or Los Peñasquitos Canyon (Hayden 2001).

Southern Mule Deer. The southern mule deer is not a sensitive species, but is covered under the MSCP for its aesthetic and intrinsic value, as the largest native herbivore in the plan area (City of San Diego 1997). The mule deer is the principal food source of the mountain lion. Mule deer utilize and modify several different vegetation communities: coastal sage scrub, chaparral and oak woodlands. Approximately 105,000 acres of mule deer habitat is conserved within the MSCP preserve system (City of San Diego 1997). Under the plan, core and linkage areas were designed to maintain ecosystem function including large animal movement throughout different areas of the preserve system. Wildlife agencies are required to monitor the MSCP preserve area for changes in ecosystem function and develop adaptive management strategies should the need arise. In each subarea plan of the MSCP, linkages and road crossing/under crossings in wildlife movement areas are design requirements.

In contrast to the mountain lion, mule deer are not as constrained within the MSCP Preserve system, as they are able to adapt to development in low densities and can move throughout urban canyons. Mule deer are known from historic sightings at Carmel Mountain and Del Mar Mesa and have been actively monitored by the San Diego Tracking Team since 1997 (Friends of Los Peñasquitos [Friends] 2002). Mule deer are routinely sighted in Los Peñasquitos and use

the canyons in and around Del Mar Mesa for movement and day bedding (Friends 2002, Hayden 2001). Mule deer and other mammals use the SDG&E access roads to the west of Park Village Road to move between Del Mar Mesa and Los Peñasquitos in addition to other areas (Hayden 2001).

7.3.1.2 Management of Sensitive Species Not Covered by the MSCP

Several plant and animal species on the Preserves are considered sensitive, but are not covered by the MSCP. Management recommendations for these species are provided below. Future surveying and monitoring of all plant and wildlife species discussed below is recommended as funds become available.

a. Plants

For most of the sensitive plants present on the Preserves, invasive weeds and recreational activity are the primary threats to the existing populations. Trampling and destroying the vegetation allows for the exotic weeds to become opportunistic. Redirecting activity to less sensitive areas when possible is recommended, as is implementing a weed management program in areas impacted by invasive species as funding becomes available. These guidelines should be considered when managing the following sensitive resources on the Preserves:

- California adolphia (*Adolphia californica*)
- South coast saltbush (*Atriplex pacifica*)
- San Diego sagewort (*Artemisia palmeri*)
- Seaside calandrinia (*Calandrinia maritima*)
- Summer holly (*Comarostaphylis diversifolia* ssp.*diversifolia*)
- Sea dahlia (*Coreopsis maritima*)
- Western dichondra (*Dichondra occidentalis*)
- Palmer's grappling hook (*Harpagonella palmeri*)
- Little mousetail (*Myosurus minimus* ssp.*apus*)
- California adder's-tongue fern (*Ophioglossum californicum*)
- Nuttall's scrub oak (*Quercus dumosa*)
- Ashy spike-moss (*Selaginella cinerascens*).

b. Reptiles and Amphibians

The current herpetofaunal monitoring being conducted on both of the Preserves, as required by the MSCP, will contribute to the knowledge of species diversity present and how to better manage them.

The major threats to amphibian and reptile species on the Preserves include unauthorized vehicular and recreational traffic. Vernal pools provide habitat and important resources for amphibians and reptiles alike. Because many of the pools are located in roads and trails, redirecting recreational activity to less sensitive areas on the Preserves is recommended.

Educating the public of the benefit of these resources is also important, to eliminate destruction and entrapment of species. Signage is also recommended in habitat occupied by the species mentioned below.

Those sensitive amphibian/reptile species not covered by the MSCP include: Western spadefoot toad (*Spea hammondii*), two-striped garter snake (*Thamophis hammondii*) and the northern red diamond rattlesnake (*Crotalus ruber*).

c. Birds

Habitat degradation is the major threat to avian species on the Preserves. Guidelines suggested below should be considered when managing the following sensitive resources not covered by the MSCP on the Preserves:

White-tailed kite (*Elanus leucurus*). These birds prefer to nest in riparian woodland, live oaks, or groves of sycamores, and forage in any open, grassy area. It is recommended that the Eucalyptus groves be monitored for nesting, and that their preferred foraging habitat be enhanced. Open spaces occur on both preserves, and should be enhanced by implementing a weed control program, and by confining activity to the designated trail system. Future surveying and monitoring of all species discussed below is recommended as funds become available.

California horned lark. These birds typically inhabit grasslands, mesas, and areas with sparse vegetation. It is recommended that these open spaces be enhanced by implementing a weed control program, and by confining activity to the designated trail system.

Blue-gray gnatcatcher. This bird will winter in chaparral occasionally, and breeds in foothill chaparral, and riparian woodland. Brood-parasitism by brown-headed cowbirds is a threat to this bird. Recommendations for managing this bird include confining activity to designated trail system, and regular monitoring for brown-headed cowbirds in known locations of gnatcatchers.

Loggerhead shrike. This bird inhabits grasslands and chaparral, and prefers open areas with perches for hunting and fairly dense shrubs for nesting. It is recommended that these open spaces be enhanced by implementing a weed control program, and by confining activity to the designated trail system.

Bell's sage sparrow. This bird prefers interior chaparral, and coastal sage scrub habitats, including dense stands of chamise chaparral. It is recommended that activity be confined to the designated trail system, and that coastal sage scrub habitat be enhanced when necessary, and confining activity to the designated trail system.

Grasshopper sparrow. This bird prefers areas of tall grass, often when mixed with coastal sage scrub. It is recommended that activity be confined to the designated trail system, and that coastal sage scrub habitat be enhanced when necessary, and confining activity to the designated trail system.

d. Mammals

One sensitive mammal species not covered by the MSCP is present on the Preserves, the San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). This species prefers open or semi-open country. Maintaining the integrity of the natural open spaces on the Preserves is recommended.

7.3.1.3 Native Species Introduction

A native species that has been extirpated from the Carmel Mountain or Del Mar Preserve areas may be reintroduced into the Preserves. Any introductions are subject to the prior consensus of the City of San Diego, the Habitat Manager, the agency(ies) with jurisdiction over that species, and any private landowners that may be affected. Introductions must be evaluated with respect to feasibility and the availability of suitable habitat. Only native species whose historic range included the preserve site may be introduced.

7.3.2 Habitat Management

7.3.2.1 Maintaining High Quality Habitat

To maintain high quality habitats on the Preserves, the following activities shall be prohibited:

1. Grading, except for habitat or species restoration, facilities such as nature/interpretive center or comfort station, or if trails need to be redirected around sensitive habitat or species.
2. Excavation, except for vernal pool restoration.
3. Placement of soil, sand, rock, gravel, or any other material, except for habitat or species restoration.
4. Clearing of vegetation, except for removal of exotic plant species, brush management activities, and rerouting of trails.
5. Minimizing the number of buildings or structures to be built.
6. Driving unauthorized vehicles.
7. Dumping trash or hazardous waste.
8. Allowing pets to run free in the habitat.

To limit impacts to the preserves, activities in the habitat are restricted to:

1. Natural resource surveys, including MSCP monitoring activities.
2. Emergency response by the Habitat Manager and the appropriate agencies in case of fires, floods, earthquakes, or other natural disasters.

3. Vehicle access for preserve patrols, restoration implementation, and utility maintenance.
4. Hiking, biking, and equestrian activities on the designated hiking/biking/equestrian trails.

All activities on the Preserves must avoid or minimize impacts to the native habitats and avoid take of listed species. If take cannot be avoided, the take must be authorized by a take permit from USFWS.

7.3.2.2 Invasive Exotic Plant Control Program

This section discusses a variety of methods involved in, and issues related to, restoration, including restoring occupied habitat; removing and controlling non-native plant species; preparing the site; selecting native plant species; collecting native plant seed; restoring microbiotic crusts; using salvaged materials; monitoring and maintaining the restored habitat, and implementing adaptive management techniques.

Non-native plant removal strategies should be site-specific to take advantage of habitat breaks such as those created by large shrub patches, canyon edges, rock outcrops, or roads so that patches of weeds can be effectively controlled. Taking advantage of existing breaks will enable managers to use non-native plant removal funds most efficiently. Initially, efforts should be concentrated habitat patches that support sensitive species such as the short-leaved dudleya and vernal pools and this will improve the habitat quality in these most critical sites until resources are available to weed and restore larger areas. After non-native plant removal, populations of native species may be enhanced or re-established by hand seeding, or propagation off-site and outplanting.

The weed management program described below can be implemented over a five-year period. After weeds have been successfully controlled, a reduced level of effort will be required over the long-term to keep weeds under control. The long-term weeding program would focus on spot control of weed populations and finding and eradicating new infestations.

7.3.2.3 Restoring Areas Dominated by Non-native Plants when Native Species are Still Present

Native vegetation communities invaded by non-native species can be weeded using different methods, depending on the site conditions and the presence of sensitive resources. Some habitat patches will require only spot herbicide spraying, and possibly hand removal of individual non-native plants. Other methods can also be used, although not all non-native plant control methods may be appropriate in sensitive habitat, such as the use of pre-emergent or other herbicides. Site-specific non-native plant control strategies will be needed, and will be implemented as funding becomes available. Timing of non-native plant control efforts is critical to success. If non-native plants are not killed prior to seed set, then removal effort and cost will remain high over time. Another critical component of the non-native plant removal method

described below is that workers must be trained to distinguish between native and non-native plants for restoration to be successful.

This method of restoring native vegetation communities, which is described below, involves removal of dead plant thatch using hand tools and "weed whippers," and return visits for spraying with glyphosate herbicide, appears to be successful on sites in central and southern San Diego County. Thick thatch can prevent native species from germinating and or competing successfully for light and space with non-natives.

If non-native plants are present at moderate to high levels in areas that still have significant numbers of native species present, the following de-thatching technique can be used to restore or enhance these sites. De-thatching should be used in areas that have a buildup of organic matter on the soil surface, such as annual grasses or mustard.

De-thatch and Repeat Spray/or Hand Pull Method (in order):

- Cut thatch/dead non-native plants with "weed whippers." This can be done during the summer or early fall.
- Rake up and collect non-native plant thatch.
- Remove thatch from site and dispose of it in dumpsters, a landfill, or an area where it can be composted nearby to reduce disposal costs.
- Return to site and spray Roundup (or more selective herbicide) on non-native plant seedlings after sufficient rains have fallen in winter and spring. In sensitive plant habitat hand pulling of weeds or weed whipping will be required in the immediate vicinity of rare plants to prevent them being killed by herbicide. Hand removal should be done in a manner that minimizes disturbance to the soil surface. Careful pulling or cutting of weeds is necessary so that the control methods do not create conditions favorable for further weed invasion.
- Repeat spraying/hand pulling as necessary to prevent seed set. Other options include the use of pre-emergent herbicide prior to the first significant rain. Pre-emergent herbicides kill seeds prior to seed germination. Pre-emergent herbicides should only be used in areas that are not intended for seeding with natives.
- Repeat spraying as necessary to maintain non-native plant density to a low level. If non-native plants are controlled each season prior to flowering and setting seed, the level of effort required should decrease over the five-year period.

The non-native plant removal process must be carefully monitored because as the dominant non-native plant species are removed, other non-native plant species can multiply rapidly and replace the formerly dominant non-native species particularly in more disturbed sites.

Adaptive management strategies must quickly address control of newly dominant non-native species. Frequent site visits are necessary during the growing season to assess non-native

plant removal efforts and to determine whether changes are needed in the strategy being used or the intensity of non-native plant removal efforts. This type of non-native plant removal effort requires control of weeds prior to flowering and seed development. As non-native plants are controlled over the first few years, natives will return to dominance. Removal of non-native plants by hand may be required around sensitive species and small populations of herbaceous natives. Herbaceous annuals, which may be locally rare because of non-native plant competition, may need population augmentation and careful hand removal of non-natives to ensure expansion of native plant species.

7.3.2.4 Exotic Plant Species

The introduction of exotic plant species is the chief cause of habitat degradation near developed areas. Control of exotic plant species will include:

- Monitoring of habitat within the open space for occurrence of exotic plant species.
- Removal of existing exotic species using manual methods as needed.
- Prevention or minimization of the introduction of exotic plants. The plants identified by the California Invasive Plant Council (Cal-IPC) should be prohibited from being planted or introduced in any way to the Preserves and should be removed if found (Appendix 7). The Habitat Manager should supply the table to the Habitat Management District and the local project developers and homeowners associations. The Habitat Manager should add plants to this list of exotics if it can be shown the species is having a negative impact on the Preserves.
- Removal of all new infestations promptly following their discovery. This is the responsibility of the Habitat Manager.

Perennial and biennial exotic plant species removal and control will consist of cutting weed stems off below ground level or pulling weeds manually. Annual weeds will be manually or mechanically (i.e., mowed) cut prior to producing ripe seed. Cut or pulled weeds will be disposed of properly. Use of herbicides for weed control will be allowed at the discretion of the Habitat Manager. Any herbicide used on Park and Recreation managed lands must be on the "Approved for Park and Recreation Use" herbicide list.

With the use of herbicides:

- The herbicides should be biodegradable.
- The minimum amount required to be effective will be used.
- Applications need to be done at the appropriate time of year to maximize efficiency.
- Applications must be focused on the target species, avoiding impacts to native vegetation.
- Areas treated shall be posted with signs warning of the presence of herbicides.

Pesticide application would be consistent with City, County, state, and federal guidelines. All applications must avoid take of listed species. The Habitat Manager is responsible for all the necessary permitting required for exotic plant species removal.

Each year, the Habitat Manager will assess the occurrence of perennial and biennial weeds in the open space. The Habitat Manager will identify problem areas, prescribe the measures to remove the weeds, prioritize the weed removal tasks, and set a schedule for the recommended actions, dependent on staffing and budget. Only herbicides on the Park and Recreation Department's pre-approved herbicide list will be used.

a. Focused Weeding Areas on Carmel Mountain

Areas proposed for de-thatching and intensive weeding on Carmel Mountain are depicted in Figures 7-1a and 7-1b. Known invasive species such as pampas grass and sweet fennel have also been mapped. In addition to the focused weeding areas depicted in the figures, all roads and trails in the Preserve should be surveyed for weeds each spring and a control program of spot spraying, hand pulling and timely weed whipping should be implemented. Most of the Preserve is relatively weed free at this time. The greatest concentrations of weeds occur in areas formerly disturbed by grading and clearing activities. In addition, any areas of recent burns should be checked frequently during the growing season to check for new weed patches and these weeds should be aggressively controlled to prevent further invasion of non-natives into burn sites. Although extensive weed invasion of most of the Preserve has yet to occur, the likelihood of future weed invasions will increase with time as development surrounds the Preserve.

b. Focused Weeding Areas on Del Mar Mesa

Areas proposed for de-thatching and intensive weeding on Del Mar Mesa are depicted in Figures 7-2a–d. In addition to the focused weeding areas depicted in the figures, all roads and trails in the Preserve should be surveyed for weeds each spring and a control program of spot spraying, hand pulling and timely weed whipping should be implemented. Most of the Preserve is relatively weed free at this time. The greatest concentrations of weeds occur in areas formerly disturbed by grading and clearing activities. In addition, any areas of recent burns on Del Mar Mesa should be checked frequently during the growing season to check for new weed patches and these weeds should be aggressively controlled to prevent further invasion of non-natives into burn sites. Although extensive weed invasion of most of the Preserve has yet to occur, the likelihood of future weed invasions will increase with time as development surrounds the Preserve. There are large populations of invasive weeds including artichoke thistle.

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MATCHLINE
SEE MAP 2

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Carmel Mountain Preserve

Potential Weeding and Enhancement Areas
- Weeding
- Weeding and enhancement
- Weeding/enhancement areas on private land (pending land acquisition)

- *Foeniculum vulgare* (Sweet fennel)
- *Cortaderia jubata* (Pampas grass)
- *Nicotiana glauca* (Tree tabacco)
- Trash

0 Feet 400

FIGURE 7-1a
Potential Weeding and Enhancement Areas on Carmel Mountain Preserve (Map 1)

M:\jobs\3493\gis\mgm_updates05.apr\fig7-1a (weeding/enhance-cmm_1) 08/25/06

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MATCHLINE
SEE MAP 2

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Carmel Mountain Preserve

Potential Weeding and Enhancement Areas
- Weeding
- Weeding and enhancement
- Weeding/enhancement areas on private land (pending land acquisition)

- *Foeniculum vulgare* (Sweet fennel)
- *Cortaderia jubata* (Pampas grass)

0 Feet 400

FIGURE 7-1b
Potential Weeding and Enhancement Areas on Carmel Mountain Preserve (Map 2)

M:\jobs\3493\gis\mgm_updates05.apr\fig7-1b (weeding/enhance-cmm_2) 08/25/06

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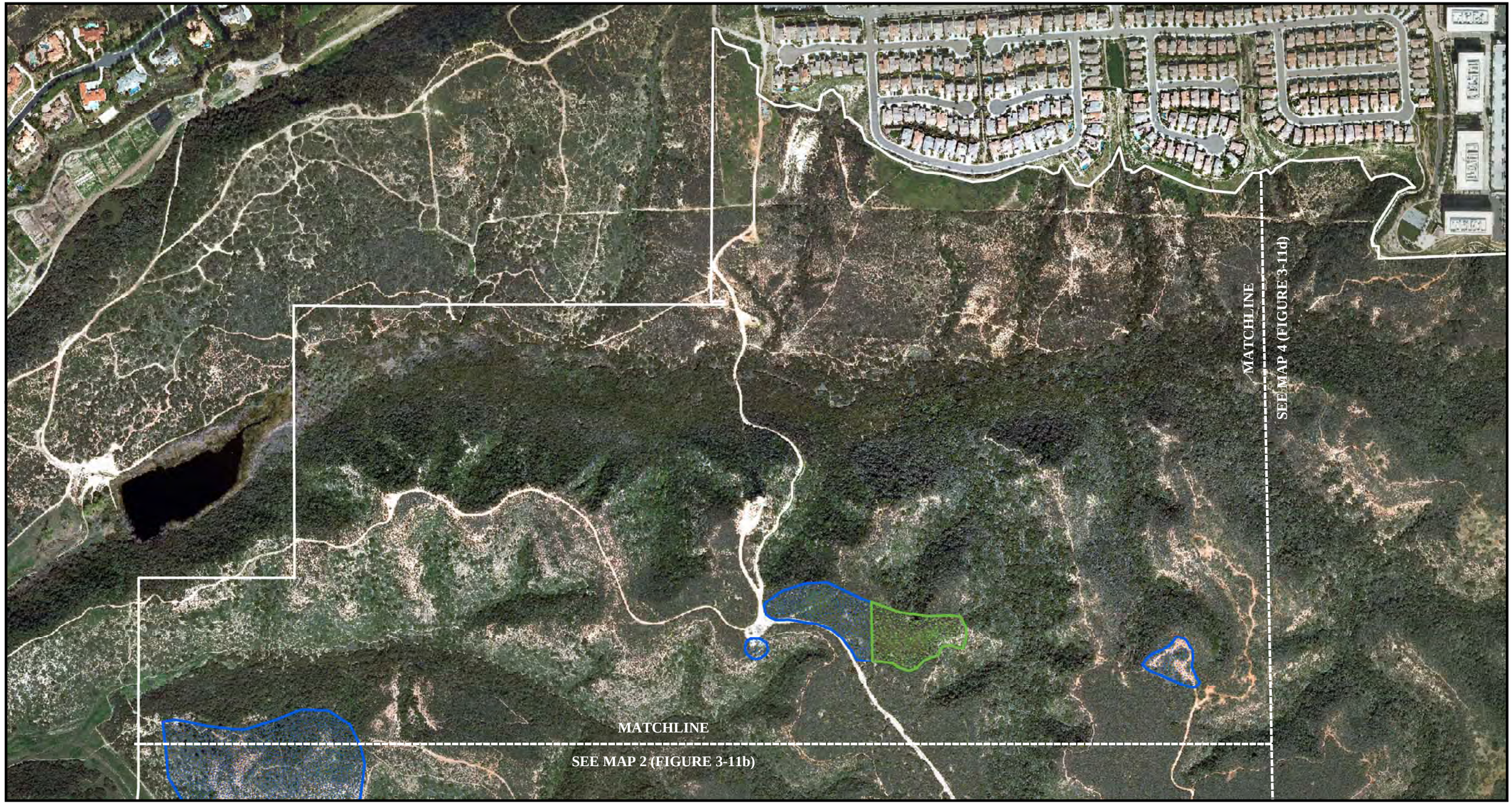

0 145 290 580
Feet

Potential weeding and enhancement areas on private land (pending land acquisition)
Weeding and enhancement
Carpobrutus edulis (Hottentot fig)
Trash

FIGURE 7-2a

Potential Weeding and Enhancement Areas on Del Mar Mesa Preserve (Map 1)

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0 120 240 480
Feet

Potential weeding and enhancement areas on private land (pending land acquisition)
Weeding and enhancement
Carpobrutus edulis (Hottentot fig)
Trash

FIGURE 7-2b

Potential Weeding and Enhancement Areas on Del Mar Mesa Preserve (Map 2)

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SEE MAP 2 (FIGURE 3-11b)

MATCHLINE

0 100 200 400
Feet

Potential weeding and enhancement areas on private land (pending land acquisition)

Weeding and enhancement

Carpobrutus edulis (Hottentot fig)

Trash

FIGURE 7-2c

Potential Weeding and Enhancement Areas on Del Mar Mesa Preserve (Map 3)

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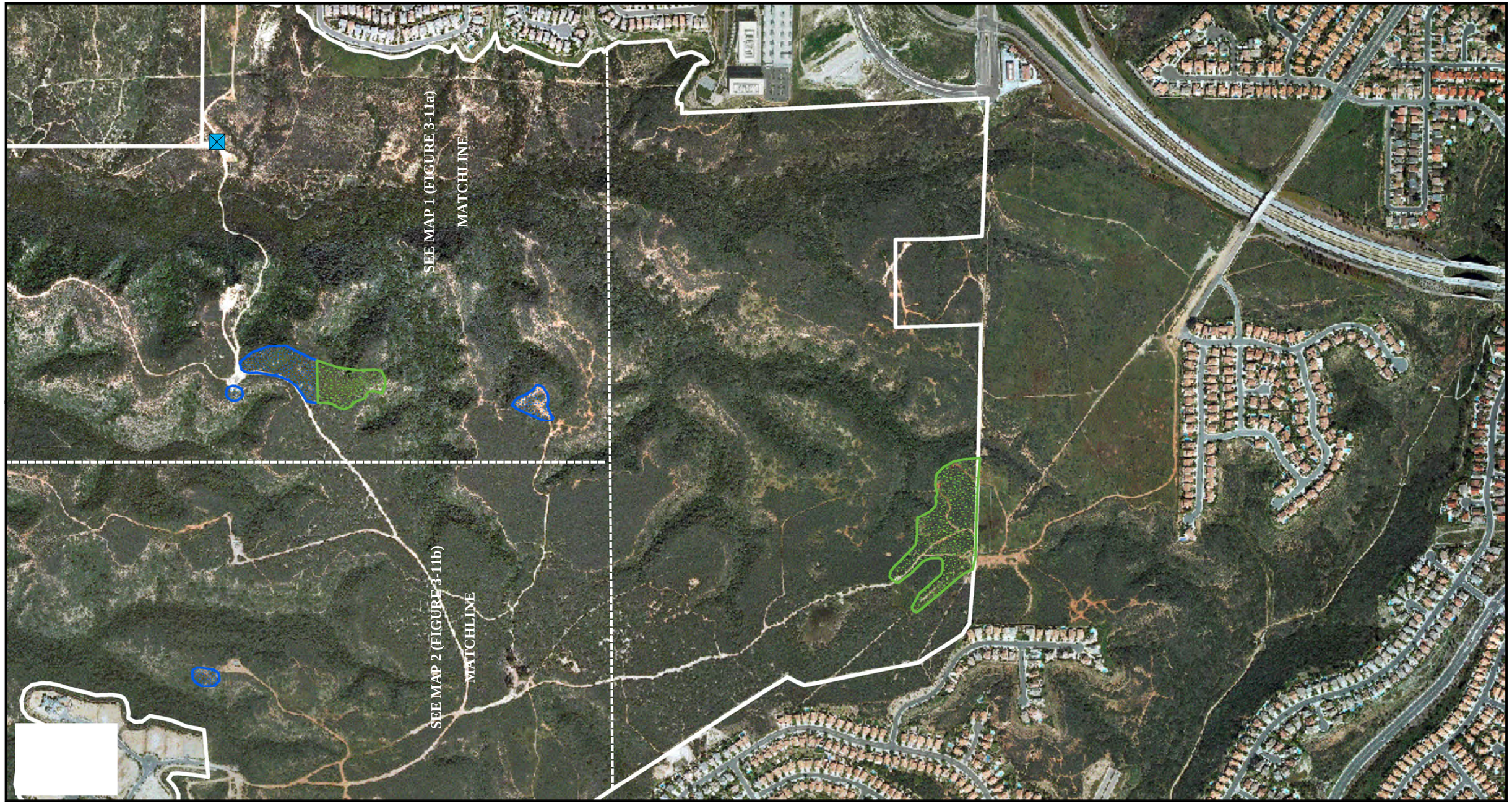

0 200 400 800
Feet

Potential weeding and enhancement areas on private land (pending land acquisition)

Weeding and enhancement

Del Mar Mesa Boundary

Carpobrutus edulis (Hottentot fig)

Trash

FIGURE 7-2d

Potential Weeding and Enhancement Areas on Del Mar Mesa Preserve (Map 4)

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7.3.2.5 Exotic Animal Species

Exotic animals typically present a much more difficult control problem than do exotic plants. There is a potential for the Argentine ant to occur within the proposed open space. Cats and dogs from adjacent developments are expected to enter the Preserve. These activities may be subject to CEQA and therefore require additional environmental review.

1. The Habitat Manager should make note of the occurrence of Argentine ants and imported fire ants during other scheduled maintenance and monitoring visits. As funding becomes available, control measures should be implemented based on methods prescribed by County and state agencies with approval by the Habitat Manager.
2. Removal of trash, an unwanted food source, and control of irrigation runoff from outside the Preserves and excess water inside the Preserves, will help discourage establishment of Argentine ants, which displace native ants, the main prey of the San Diego horned lizard. To minimize irrigation runoff into the Preserves, irrigation and runoff control plans for adjacent development projects should be reviewed by appropriate City staff to ensure designs direct runoff into storm drains and away from the Preserves.
3. The use of pesticides is discouraged on the Preserves. If deemed necessary by the Habitat Manager, pesticides are to be used at the discretion of the Habitat Manager, who shall be responsible for any permits per City, county, state and federal guidelines.

An inclusion to the exotic species group is uncontrolled pets. Dogs and cats can be major predators on native species. Steps shall be taken to prevent the predation of native species by dogs, cats, and other non-native predators. Predator control should be initiated as necessary on a case-by-case basis and as funding permits. The following are specific guidelines for controlling predators:

1. Trapping of non-native predators should be limited to strategic locations where determined feasible to protect ground and shrub-nesting birds, lizards, and other sensitive species from excessive predation.
2. Predator control should be considered to be a temporary, short-term activity.
3. A predator control program should only be implemented to address a significant problem that has been identified and is needed to maintain balance of wildlife within the preserves.
4. Predator control methods shall be humane. Adequate shade and water should be provided and traps should be checked twice daily.
5. If a predator control program becomes necessary, signs at access points should be installed to notify adjacent residents that trapping will occur and how to retrieve their pets.

6. Any domestic animal inadvertently trapped should be taken to the nearest animal shelter.
7. Any predator control activities should be coordinated with MSCP staff to ensure that the activity is in compliance with MSCP regulations.
8. The Habitat Manager shall promote education of the open space users (those using the hiking/biking/equestrian trails) to the potential impacts of uncontrolled pets, using signs posted at the trailhead locations.
9. Leash laws shall be enforced within the preserves in order to control pets.
10. The Habitat Manager shall report to the County Animal Control Officers if persistent and chronic problems in the open space from particular uncontrolled pets occur.
11. Eradication and control efforts shall be done at the most effective and efficient time of year; these efforts shall reflect the latest information in the field on control of the target species.
12. If any non-native predators are observed within the preserve area (i.e., brown-headed cowbirds, feral cats, etc.), it should be reported as soon as possible to senior park staff and MSCP staff. A qualified biologist should verify any observations by unqualified staff or the public. If funding is available, the ranger should begin predator control at that location in accordance with the guidelines given above.

7.3.3 Native Pollinator Population Enhancement

Providing adequate habitat for pollinator assemblages is critical to the success of any restoration project. Fortunately the Carmel Mountain and Del Mar Mesa areas have significant areas where weeds have not yet invaded and these areas probably support viable populations of native pollinators. Pollinators are required to ensure that plants have high seed set and persist long term. In arid environments, many potential pollinators, including native bee species, require open ground for nesting (Buchmann and Nabhan 1996). Extensive non-native plant cover continues to invade and dominate many habitats in Southern California, resulting in a loss of open ground suitable for ground nesting pollinators. By reducing available nesting sites, the non-native plant growth is causing a decline in pollinator numbers and diversity, with negative implications for entire ecosystems.

In addition to the rapid reduction in the extent of open areas required for ground nesting pollinators, competitive interactions between non-native and native plant species are causing declines in the biological diversity of natural communities in southern California. In order to support a diverse assemblage of potential pollinators and native plant species, areas of open ground within associated native vegetation communities should be restored to support ground nesting bees and other invertebrates. The goal of having open ground for pollinators is compatible with rare herbaceous plant restoration efforts for the short-leaved dudleya and bulb

species that tend to occur in openings within the matrix of surrounding maritime chaparral vegetation.

Restoration plantings should include nectar-producing plant species with overlapping flowering periods that extend throughout the typical Southern California growing season. Although there are exceptions, in general many of the nectar producing plants of arid Southwest environments (including chaparral, coastal sage, grasslands and vernal pools habitats in southern California) are visited by generalist pollinating insects (Buchmann and Nabhan 1996). Generalist pollinators visit more than one plant species for their nectar and pollen. To support pollinator assemblages throughout the flowering season, reestablishment and enhancement of nectar-producing plant populations should be one of the goals of restoration efforts. Generalist pollinators may require temporally overlapping nectar resources to support their populations throughout the year. At a minimum, several nectar-producing plant species should be included in restoration plantings, which in combination flower from early spring through late summer, as seen in relatively undisturbed natural ecosystems in southern California.

For example, species that provide good nectar resources include goldfields (*Lasthenia* sp.) and tidy tips (*Layia* sp.), which flowers in early spring; gumplant (*Grindelia* sp.), which flowers later but overlaps with goldfields; and other herbs such as tarplants (*Hemizonia*) and shrubby species such as goldenbush (*Isocoma* sp.), which flower in late spring and during the summer. The re-establishment of these or other appropriate species on a restoration project site will provide a continuous nectar source to keep local pollinator assemblages supplied with resources until the fall, when many pollinating insects become dormant or enter another phase of their life cycle. Each region has its own set of nectar-producing plants, and restoration programs should be designed on a site-specific basis with the goal of supporting viable populations of potential pollinators.

7.3.4 Microbiotic Crust Enhancement and Restoration

Although the science of restoring microbiotic crusts is still in its infancy and the regeneration process requires a long time for full development, there are known techniques to promote conditions that are appropriate for the growth of these microbiotic crusts. Observations of older disturbed habitat in San Diego County and elsewhere indicate that microbiotic and other soil crusts can recover following a disturbance. The process takes many years and proceeds more slowly in xeric environments than in more mesic sites. Microbiotic crust redevelopment on disturbed sites is likely to be more species diverse when intact crusts exist adjacent to the disturbed area. Moisture and soil conditions along with levels of disturbance are the most important factors to consider when promoting crust growth.

Belnap et al. (1999) listed these five factors that increase moisture on the soil surface and therefore promote crust development: (1) closely spaced plants; (2) flat areas (depositional surfaces rather than erosional surfaces); (3) limited surface rocks, roots, or light plant litter to slow water and wind; (4) soils with inherently high stability (silt/clay>sandy>shrink-swell clay);

and (5) stable microhabitats (under shrubs, away from small drainages). As soil stability increases and human-related disturbances decrease, rich communities of cyanobacteria, mosses, and lichens become more widespread, covering all surfaces not occupied by vascular plants and rocks.

Recent attempts have been made to reintroduce crust organisms to restoration sites on Otay Mesa, in San Diego County. Crust organisms such as ashy spike-moss and other associated crust flora such as liverworts, mosses, fungi, and lichens have been salvaged from recently developed areas and planted into restoration sites (RECON 1999). One way to translocate crust organisms such as ashy spike-moss from development impact areas is to cut squares of spike-moss about the size of a greenhouse flat using hand tools and place the squares into the flats for transport or temporary storage. When soils at the restoration site are moist, the spike-moss can be planted into shallow holes excavated in the shape of the flat. The spike-moss is planted in the hole so that it is flush with or slightly below the surrounding soil surface. This placement reduces the chance that erosion will break apart the crust. New crust organisms have been grown on a small scale by placing salvaged native topsoil in greenhouse flats and then keeping them continually moist in a shaded growing structure.

These small-scale microbiotic crust restoration trials have produced actively growing liverworts, mosses, and ashy spike-moss. Large-scale production could be used to grow many units of crust, which can be planted at the restoration sites after non-native plants are removed or under control. Salvaged brush is also being used to promote the growth of crusts by placing branches on open ground after weeds have been controlled. The branches alter the soil moisture conditions by reducing evaporation. Mosses and algae have been observed growing under the branches within one year after the branches have been put in place. Future efforts to promote crust development will include crust salvage from development impact sites during the summer dry season and then using the powdered dry soils to sprinkle over stable soil areas that are lightly covered with branches.

7.3.5 Seed Collection Guidelines

Seeds of native plant species used in each restoration project should be locally collected whenever possible. If a plant species was historically present in an area but can no longer be found, it should be reintroduced from the locality nearest the restoration site. It has been shown that locally adapted plants are better competitors than plants introduced from a different climate zone (Knapp and Rice 1998). Seed collection should generally occur within five miles of a proposed restoration or enhancement site. If collecting within the five mile of the site is not possible, research has demonstrated that it is best to collect seeds as close as possible within the same general climate zone. General climate zones outlined in the Sunset Western Garden Book (Sunset Publishing Corporation 1995) can be used as a guide. Reciprocal transplant experiments have shown that plants of genotypes that are not locally adapted are inferior competitors when they are moved to a different climate zone. In addition, introducing plants that are not locally adapted can be detrimental to local herbivorous insects.

Some species, particularly annuals, will be difficult to collect from the wild in sufficient quantity to seed the restored areas. Collecting from the wild must be limited such that it will not adversely affect source plant populations. To ensure that adequate seed is available, seed bulking (growing seed in cultivation to increase the amount of seeds) of annuals may be necessary. This seed bulking should be done at growing areas that can provide reproductive isolation from related plants from different regions. Plants from different source regions should not be allowed to hybridize at a common growing facility. Locally adapted genotypes for plants should be maintained as much as possible. It can take three years to grow native bulbs from seed to a size large enough to plant and still have high survivorship when they are planted out. Therefore, restoration of diverse grassland sites, for instance, can require several years of planting and preparation.

7.3.6 Plant and Soil Salvage and Use Guidelines

7.3.6.1 Topsoil

Salvaged topsoil can also be used from nearby construction sites to enhance the restoration areas, including bringing in native plant propagules and soil fauna. Opportunities for topsoil translocation include areas where existing roads or trails would be closed and the sites do not already have native plants present. The most likely location for topsoil should only be salvaged from areas that are not infested with non-native plants. Salvaged topsoil must be placed at the recipient site as soon as possible to maintain the maximum diversity of seeds and other soil organisms. The greatest chance of success in using salvaged topsoil is to collect soil in the summer or early fall dry period. If soils are wet when moved and spread greater damage to the native seed bank and soil organisms will occur than if the soil is dry and organisms are dormant. Soil should be stockpiled only if absolutely necessary because the longer the soil is stored the greater the loss of seeds and soil fauna. If soil must be stockpiled, it should be kept dry. The depth of piles in storage should not exceed three feet to avoid composting effects, and a depth of one to two feet is preferable for maintaining seed banks. Any topsoil recipient sites should be prepared prior to topsoil delivery.

7.3.6.2 Brush and Rocks

The following techniques can be used to increase the structural diversity of the restoration area to provide cover sites for wildlife and to promote microbiotic crust redevelopment. Brush piles, scattered sticks, branches, and rock cobbles can be brought to the restoration site to increase the available cover for many animals. Brush can be obtained from nearby construction sites, either from brushed habitat impacted by development or from brush management activities adjacent to structures. Because brush material is considered a waste product and has to be chipped and removed to a landfill, most construction supervisors will truck the material to a restoration site if it is nearby the construction area. This can save the developer on costs

associated with trucking the material to a landfill. Creative partnerships with developers can result in increased structural diversity of restoration sites.

Placement of decaying wood and brush in the restoration site can provide immediate cover for many animals. By bringing in brush and rocks (if appropriate to the specific site) you can "jump start" restoration by providing cover that would take many years to develop or accumulate otherwise. The use of one or two restoration enhancement techniques, such as placement of brush and rocks, can benefit multiple species when done using an integrated ecosystem approach. For example, brush piles and sticks that provide nest sites for native woodrats and other wildlife can also provide food for termites that are the primary food source for orange-throated whiptails, a covered MSCP species.

7.4 Cultural Resources Management

This section is intended to provide technical information specific to the laws pertaining to preservation and protection of prehistoric and historic properties and the appropriate methods to avoid, reduce, or otherwise mitigate adverse impacts resulting from programs and activities relating to the management of the Preserves.

Current and future activities at the Carmel Mountain and Del Mar Mesa Preserves may have the potential to damage or alter historic properties (historic or prehistoric cultural resource sites) eligible for the National Register of Historic Places or resources considered significant under CEQA and/or City of San Diego Historical Resource Guidelines. These activities are considered an undertaking under the National Historic Preservation Act (NHPA). An undertaking is defined as:

> A project, activity, or program funded in whole or part under the direct jurisdiction of a federal agency (NHPA section 301[7]). This includes projects:
>
> - Carried out by or for the agency;
> - Carried out with Federal financial assistance;
> - Requiring Federal permits, licenses, or approval;
> - Subject to State or local regulations administered pursuant to a delegation or approval by a state or Federal agency.

All procedures in an undertaking must be in compliance with the City's historic resource regulations and guidelines as well as 36 CFR 800 guidelines. The area of potential effect (APE) and any areas associated with the undertaking must be developed in consultation with the State Historic Preservation Officer (SHPO) and other consulting parties, including Native Americans, public agencies, and private property owners.

An undertaking is determined to have an effect when it:

1. May alter characteristics of the property, including relevant features of its environment or use, which qualify the property for inclusion in the National Register of Historic Places (NRHP) and/ or i s considered si gnificant und er C EQA or t he C ity of S an D iego Guidelines; and
2. May di minish t he i ntegrity o f the p roperty's location, de sign, se tting, materials, workmanship, feeling, or association.

Effects can be determined as beneficial or adverse. For example, beneficial effects of an undertaking can include restoration of an historic building or features, or enhancement or protection of an archaeological site. Adverse effects can include but are not limited to:

- Physical destruction, damage, or alteration of all or part of the property;
- Alteration o f the ch aracter o f t he p roperty's surrounding env ironment w here t hat character contributes to the property's eligibility;
- Neglect of a property resulting in its deterioration or destruction;
- Alteration of a drainage or erosion pattern;
- Creation of access into previously inaccessible areas;
- Unauthorized collection; and
- Off-road vehicle use.

7.4.1 Process

The c ultural r esource management p rocess consists of t wo par ts: (1) i dentification an d evaluation and (2) treatment.

7.4.1.1 Identification and Evaluation

The first step is identification and evaluation of cultural properties subject to potential impacts. Resource identification and evaluation are conducted within research contexts that provide the criteria by which individual cultural properties can be assigned scientific or social significance. Those resources not meeting significance criteria receive no further management treatment, except for possible construction monitoring. Resources that are determined to be significant are provided protection under existing statutory and regulatory authorities.

7.4.1.2 Treatment

Mitigation of Significant Sites. If a resource is significant or NRHP eligible, the nature and extent of impacts are determined and a pl an is developed for mitigating the adverse effects. Often impact avoidance, through project redesign, is not possible or practical and al ternative mitigation measures (rehabilitation, data recovery, and analysis) must be instituted. All alternatives to preservation in place cause some loss of resource integrity. Therefore, the nature of this loss and any data recovered through mitigation activities must be documented.

Monitoring of Potentially Significant Sites. On-site monitoring is undertaken during any ground-disturbing activity if potential for subsurface deposits exists. Monitoring conducted as part of construction verifies that mitigation measures are effective and ensures against loss of any previously undiscovered significant resource(s) uncovered during construction activities. Long-term operational monitoring may be required to identify any changes in the physical status of a resource that results in the loss of integrity.

7.4.1.3 Priorities

Long-term priorities are in effect for more than four years or extend into more than one funding cycle. Long-term priority goals relate to the consistent implementation of the procedures for accomplishing the cultural resource management objectives of the two Preserves. Resource Management Goals are to:

1. Protect and Manage Identified Cultural Resources. Maintain cultural resource protection measures through proper planning for avoidance of adverse effects, maintain site markings as appropriate, enforce historic preservation regulations for all Preserve users, and develop and maintain an archaeological site monitoring program.
2. Encourage Public Involvement. Cooperate with interested local historical and archaeological groups, local Native American tribes, and educational institutions in developing a plan to promote public participation in historic preservation and enjoyment of cultural resources at the two preserves.

7.4.2 Management Guidelines

7.4.2.1 Evaluating Significance

Establishing historic contexts is the first standard outlined in the *Secretary of the Interior's Standards for Preservation Planning* section of the NHPA (Section 110). The historic context of a cultural resource is used to determine the significance of a resource under Section 106 of the NHPA. A cultural resource's historic context is a combination of the geographic location and surrounding area, time period of resource significance, historical themes or research questions the resource can address, and potential Native American significance. Historic contexts are derived from recorded site information and from prehistoric and historic background information.

The historic context organizes information based on cultural themes and their geographical and chronological limits, describing significant broad patterns of development that may be represented by individual archaeological sites.

Significance assessments are designed to systematically quantify those values that make archaeological resources important to historic preservation, to scientific research, to Native Americans, and to the public. Assigning significance levels for individual cultural resources and

in some cases, classes of site types (e.g., prehistoric trails, hearths, lithic workshops, sparse lithic scatters) is also a useful step towards organizing.

Site-specific contexts should include time period of occupation, identification of occupants, and site function. Additional context can be established by assessing how the site fits into broad regional themes. These can include Native American, transportation, ranching, exploration, and military. The historical context is used to generate research questions needed to evaluate individual sites.

Section 106 of the National Historic Preservation Act significance criteria states that:

> The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association, and:
>
> Criterion A – That are associated with events that have made a significant contribution to the broad patterns or our history; or
>
> Criterion B – That are associated with the lives of persons significant in our past; or
>
> Criterion C – That embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> Criterion D – That have yielded, or may be likely to yield, information important in prehistory or history (36 CFR 60.4).

A National Register eligible site must meet one or more of the above criteria. Each criterion must be justified. In most cases, prehistoric sites are justified under Criterion D; historic era properties may also qualify for listing under Criteria A, B, or C. Suggested procedures for evaluating resources under NRHP guidelines are listed in Appendix 8.

Under special conditions, religious properties, moved properties, birthplaces and graves, cemeteries, reconstructed properties, commemorative properties, and properties less than 50 years old are eligible for listing in the National Register. These conditions/criteria include:

- Religious property may be eligible if it derives its primary significance from architectural or artistic distinction or historical importance;
- Property removed from its original or historically significant location can be eligible if it is significant primarily for architectural value or it is the surviving property most importantly associated with a historic person or event;
- Birthplace or grave of a historical figure may be eligible if the person is of outstanding importance and if there is no other appropriate site or building directly associated with his or her productive life;

- Cemetery may be eligible if it derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from associations with historic events;
- Reconstructed property may be eligible when it is accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan and when no other building or structure with the same associations has survived;
- Property primarily commemorative in intent can be eligible if design, age, tradition, or symbolic value has invested it with its own historic significance; and
- Property achieving significance within the last 50 years may be eligible if it is of exceptional importance.

Traditional Cultural Properties (TCP) are often associated with Native American resources and properties that are associated with cultural practices or beliefs of a living community. However, a TCP may also include traditions, beliefs, practices, lifeways, arts, crafts, and social institutions of any community. Examples of TCPs include:

- A location associated with the traditional beliefs of a Native American group about its origins, cultural history, or the nature of the world;
- A rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents;
- An urban neighborhood that is the traditional home of a particular cultural group, and that reflects its beliefs and practices;
- A location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; and
- A location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historical identity (National Register Bulletin #38).

Significant prehistoric and historic sites or resources are defined by the Historical Resources Regulations in the City's Land Development Code.

The significance of the resource is based on the potential for the resource to address important research questions documented in a site-specific technical report prepared as part of the environmental review process. An archaeological site must consist of at least three associated artifacts/ecofacts (within 50-square-meter area) or a single feature and must be at least 45 years of age. Archaeological sites containing only a surface component are generally considered not significant, unless demonstrated otherwise. Such site types may include isolated finds, bedrock milling stations, sparse lithic scatters, and shell processing stations. All other archaeological sites are considered potentially significant.

The evaluation program for prehistoric sites includes surface collection (diagnostic artifacts) and subsurface testing (e.g., shovel test pits [STPs], excavation units, remote sensing). Evaluation of historic archaeological sites requires research as well as some form of subsurface testing. If a site is determined to be significant and if a proposed undertaking will have an adverse effect on the site, a treatment plan will be required.

The treatment plan will detail the undertaking, significance of the site(s), and level of impact to the site. The habitat manager will consult with SHPO or the Tribal Historic Preservation Officer (THPO) and other consulting parties to seek ways to avoid, minimize, or mitigate any adverse effects.

Assessment of significance can be determined in two ways depending on the depth and detail of site-specific data. Significance values must be scored by a professional archaeologist prior to initiating any action other than site avoidance. Four categories of significance (Levels 1 through 4) have been developed as a management tool. They are not part of a federal or state law. For administrative purposes, four levels of site significance are given below:

Significance Level 1: Very complex archaeological sites with substantial buried deposits (e.g., midden); known or high potential for Native American cremations; potential for stratigraphic integrity and preserved subsurface features; high potential to yield information to address numerous research questions from many research domains; for historic sites, archaeological research potential is greater when corresponding archival documentation is poor or lacking.

Significance Level 2: Archaeological sites with the potential for buried deposits; potential to address several research questions; potential for stratigraphic integrity and preserved subsurface features.

Significance Level 3: Surface or relatively shallow archaeological deposits; probable absence of stratigraphic integrity and chronological indicators; limited potential to address research questions.

Significance Level 4: Surface or relatively shallow archaeological deposits or scatters; limited data potential to address a few narrowly defined research questions, and where questions are resolved mostly or entirely through documentation.

Resources that are determined not significant do not require data recovery or additional documentation.

7.4.2.2 Monitoring

An important part of the management plan is development of a monitoring program for use during undertakings, and a treatment plan for unanticipated discoveries, to ensure that trails, land use, and other elements of the Preserve will not have an adverse effect on cultural resources. If there is an undertaking, s, the boundaries of cultural resources determined to be

significant should be clearly flagged and possibly fenced to avoid any inadvertent impacts to the site. If avoidance is not possible, a treatment plan will be developed.

The objective of a cultural resource monitoring program is to provide an immediate, educated on-site archaeological response and evaluation for any resources that are revealed during any ground disturbing activity in areas that have the potential for significant cultural resources. Monitoring also provides a means of maintaining protective buffers around previously identified cultural resources that have been determined to be important.

Archaeological monitors record archaeological remains exposed during ground disturbing activities and document and ensure proper treatment of any "new" finds discovered during any ground disturbance. The role of the in-field cultural resource monitor is diagnostic and advisory. The monitor(s) will be prepared to evaluate discoveries and to advise the agency of their needs. The definition of a qualified cultural resource monitor is an individual with a bachelor's degree in anthropology or archaeology and one year of field experience in southern California. The Principal Investigator will satisfy the requirements for enrollment on the Register of Professional Archaeologists and must meet the Secretary of the Interior's professional standards.

7.4.2.3 Unanticipated Discoveries

In the event that a "new" or unanticipated archaeological site is discovered or a previously unknown locus or buried component is found at a recorded site, the archaeological monitor will immediately report the discovery so that appropriate treatment measures can be implemented. Unanticipated discoveries are defined as:

- Previously unidentified archaeological sites, as defined by CEQA and professional guidelines; or
- Artifacts or cultural materials within archaeological sites previously determined to be ineligible for further treatment that are qualitatively distinct from artifacts and cultural materials previously identified at the site and that indicate that the site has the potential to qualify as eligible for further treatment based on its potential to provide data; or
- Artifacts or cultural materials within archaeological sites previously determined to be eligible for further treatment that are qualitatively different from artifacts and cultural materials previously identified and/or investigated in the impacted portion of the site and that indicate that the impacted portion of the site has the potential to contribute to the eligibility of the site based on its potential to provide data relevant to the sorts of research issues defined in the project research design; or
- Any evidence of human remains regardless of context of discovery. All discoveries of bone will be treated as potential human remains until a determination can be made by the field archaeologist and/or project manager.

Discoveries that do not qualify as unanticipated discoveries include prehistoric and historic era isolates:

- Isolated prehistoric flaked stone and groundstone artifacts, burned rock, or non-human bone outside the boundaries of previously defined archaeological sites. The field archaeologist may be able to determine if any discovered bone is non-human; in this event, the find does not qualify as a discovery unless accompanied by other materials justifying its identification as an unanticipated discovery. If there is any question that the bone may be human, it must be treated as an unanticipated discovery.
- Isolated historic artifacts outside the boundaries of a previously defined archaeological site.
- Artifacts or materials within an archaeological site previously evaluated as ineligible for either the California Register or the National Register, which are qualitatively consistent with materials previously identified at the site.

Not all archaeological deposits (historic properties) are possessed of the same data potential. Some sites, such as stratified midden deposits, can yield a diverse and rich assemblage of artifacts, ecofacts, and possibly features. Data sets of this type can be used to address research questions regarding cultural chronology, paleoenvironmental reconstruction, site formation processes, and past lifeways. An appraisal is made of recovered archaeological materials from these sites to determine their potential in this regard. Other sites, such as sparse lithic scatters, are anticipated to contain a narrow variety of archaeological data with the result being limited research applications. A critical element of evaluation by the archaeological consultant is the research potential, or, in legal terminology, the significance of newly discovered sites.

Following the discovery of unanticipated archaeological deposits, construction activities will be redirected to other work areas, with an assigned monitor, while the horizontal limits of the discovery are determined.

Determination of the horizontal limits will be assessed as precisely as possible through completion of both surface and subsurface examination. A temporary exclusion zone will be marked around the assessed deposit limits using posts and survey ribbon of a predetermined color. Signs will also be placed to identify the exclusion zone. Subsurface probes will be used to aid in determining the horizontal and the vertical extent of the deposit. The subsurface probes may be excavated by hand or by mechanical means.

The proposed approaches for unanticipated resource deposits will vary according to the types of sites found. At sites with limited data potential (e.g., low-density/low-diversity artifact or ecofact scatters), the management will focus on recording the attributes of the deposit and its stratigraphic context. In addition, sampling may be reduced to judgmental removal of trench sidewall materials for descriptive information or for radiocarbon samples. More complex deposits will be treated through a data recovery program in a manner consistent with their

perceived potential and by using a sampling design that maximizes the recovery of meaningful data.

7.4.2.4 Protecting Cultural Resources During Restoration

Although no specific plans for management or improvement have been developed, basic rules for procedures are proposed to cover potential situations. As specific plans for restoration are proposed, a literature search should be conducted through the South Coastal Information Center and the San Diego Museum of Man to inventory recorded prehistoric and historic cultural resources in the area of work if the area has not already been surveyed. In addition to this archival research, a field survey should be conducted by a qualified archaeologist to determine if unrecorded cultural resources are present. Since initial site mapping can be inaccurate, a field survey will also confirm or adjust recorded site boundaries to conform to current conditions. In the event cultural resources are found on the proposed area of impact, plans can be modified to reduce or remove potential impacts. If restoration designs cannot feasibly be modified to remove impacts, an evaluation plan should be proposed and implemented by a qualified consultant.

7.4.2.5 Siting Trails and Facilities Away from Significant Cultural Resources

Roads such as SDG&E access roads will be kept open for necessary utility maintenance. In addition to protecting and enhancing biological resources, the proposed trail system has been designed to avoid sensitive cultural resources. This is especially true of CA-SDI-4904, which presently has a dirt road running through its western edge. Work to restore native vegetation on abandoned trails and roads near archaeological sites should be planned to limit impacts to within the disturbed areas only. Erosion control measures on retained trails should also be planned and carried out without impacting cultural resources. These measures are compatible with the goal of preserving the native vegetation on the Preserves.

Any proposed buildings or other visitor-related facilities should be sited with cultural resources in mind. Facilities should be planned to avoid existing site locations and their immediate vicinity. Locating facilities near sites increases the potential for impacts from foot traffic and vandalism. Locating facilities in areas that have already been disturbed will avoid new impacts to cultural resources. If there is an undertaking, such as trail improvement or new facility construction, the boundaries of adjacent significant cultural resources should be clearly flagged and fenced, if possible, to avoid any impacts to the site. If avoidance is not possible, a treatment plan should be developed to address impacts.

7.4.2.6 Maintain a Database of Cultural Resources

An important aspect of Preserve management will be the development and implementation of a geographic information system (GIS)–based resource information program for the floral, faunal,

and cultural resources of the Preserves. An initial program of field surveys to relocate and refine site boundaries should be conducted to add up-to-date information on site sizes and conditions. A comprehensive database will provide information for evaluating known contents and locations of culturally sensitive areas. With such information available to Habitat Managers, it will be easier to protect cultural resources.

7.4.2.7 Establishing a Cultural Resources Educational and/or Interpretive Program

Cultural resources should be included in any educational/interpretive program implemented for the Preserves. Interpretive signs or displays can be used to explain prehistoric uses of the Preserves' natural resources. This information could be installed either in a central visitors' center, if one is proposed, or as signs along the trails. A visitors' center display should contain photographs of the cultural resources on the Preserve shown in such a way that their specific location cannot be discerned. A visitor's center could also exhibit artifacts used to procure resources from the area. Trail signage could be used to identify specific plants used by Native Americans. Signs with information about the cobble and other geologic resources can also be informative, but should not be placed near actual quarries or flaking stations.

Local Native American input should be solicited at the development stage of the educational/interpretive program.

8.0 Fire Management

This section of the RMP is the Fire Management Plan for the Preserves.

8.1 Preserve Setting for Fire Management

8.1.1 The Wildland/Urban Interface

Much of the land surrounding the Preserves has been developed into residential communities and commercial establishments. This interface between the wildlands of the Preserves and the urban development creates several management issues regarding fire, sensitive species and habitats, and conflicts between those who want to preserve San Diego's wildlands and those who buy homes adjacent to the wildlands.

The need to control and manage wildfire is caused by the encroachment of development into wildlands. A vegetation management program, strong prevention effort, fire suppression, and fire-resistant building practices are needed to protect development.

San Diego County suffered intense and widespread fires in October 2003 that have caused fire managers to reassess their approach to fire management. Fire has always played a major role in southern California. Fire suppression forces have a good record of controlling brush fires under normal weather conditions; however, the fires of 2003 and 2007 illustrated that the suppression strategies used were ineffective on the wind driven fires under Santa Ana weather conditions.

The other alternative in the reduction of the fuel load may be accomplished by thinning or removal of vegetation near and adjacent to development, though prescribed burning as a method of controlling wildfires is not permitted within City limits. Fire management tasks for the preserves, including brush management, are discussed in this section and are in accordance with the MSCP and adopted City regulations.

The 2003 fires instigated updates of fire management plans and a new awareness of fire conditions. The Department of Homeland Security's Federal Emergency Management Agency (FEMA) began a new "2004 Wildland Update" web page (www.usfa.fema.gov/fire-service/wildfire/update_2004.shtm) to help firefighters and community leaders locate important and up-to-date wildland fire information. The web page features a collection of links to critical wildland web sites as well as weather predictions, current aviations strategy, community programs, and a daily "Six Minute Safety Briefing" (U.S. Fire Administration 2004).

Recent research indicates that fuel load is not the main ingredient for catastrophic fires. Climate, weather, and wind conditions affect wildfires much more than the fuel load

does. Those variables cannot be controlled at a local level, but the effects of wildfires can be minimized. Climate change, greenhouse effect, changing local conditions (such as irrigation that can increase humidity), long-term human effects of burning, and fire suppression have all affected the current condition of the wildlands in southern California.

8.1.2 Wildland Fire Management Condition

Vegetation on the Carmel Mountain Preserve is dense southern maritime chaparral and Diegan coastal sage scrub, with small patches of grasslands interspersed within the chaparral on the flattest portions of the mesa top. The grassland areas are generally along dirt roads. On the Del Mar Mesa Preserve, the vegetation is Diegan coastal sage scrub, scrub oak chaparral, southern maritime chaparral, and southern mixed chaparral, with a small eucalyptus woodland sided by non-native grassland.

These vegetation types represent the fuel on the Preserves. The coastal sage scrub and chaparral shrubs are adapted to the Mediterranean climate of southern California. The shrubs survive in the summer dry conditions by being either drought-deciduous (drop their leaves during the dry season), or sclerophyllous (having thick leaves that resist desiccation). Other plants survive by being annuals that germinate, mature, and set seed before the dry season, or by having succulent, thick-skinned stems, such as cacti.

Wildfires generally burn in these vegetation types during the late summer and fall when the plants are extremely dry. Non-native annual grasses that often compose the understory can help spread fire along the ground. The fires may be excessively fanned and spread by Santa Ana winds. These extreme winds sustain ignition and can cause wildfires to spread by spotting, or dropping hot embers into the dry vegetation. The high winds also allow the wildfire to spread so rapidly that the fires are beyond control or suppression.

The following information about Santa Anas is from the Meteorology Department of the University of California San Diego (2005). The Santa Ana is a dry, sometimes hot and dusty, wind in southwestern California that blows westward through the canyons toward the coastal areas. Santa Anas are seasonal phenomena, occurring mostly during fall, winter and spring. Many associate Santa Anas with autumn because at that time the winds often spread wildfires across areas that have gone months with little or no rain.

The wind usually has its origin when cold air spills southward into the Great Basin, trapped between the Rockies to the east and the Sierras and Southern California coastal range to the west (Figure 8-1). This cold air mass is characterized by unusually high pressure near the land surface. Winds are driven into Southern California when the pressure of this interior air mass exceeds the pressure along the California coast. Winds are often strongest in mountain passes, which are ducts for the continental air flow. Because the air over the higher elevations of the Great Basin sinks as it flows into

coastal California, it is heated adiabatically, and temperatures are often quite warm. This continental air mass is invariably dry, so humidity in Santa Anas is low, often less than 25 percent relative humidity.

Figure 8-1. Santa Ana Winds.
Source: www. meteora.ucsd.edu/cap/santa_ana.html

Santa Ana's have occurred irregularly over the time period since about 1950 when we have collected detailed wind and humidity observations, with some months experiencing Santa Ana conditions 30 percent the time, and other months less than 5 percent of the time.

8.2 Historic Role of Fire

Fire is a natural part of the earth's ecosystems and almost every landscape has a history of fire. Some prehistoric fires were caused by lightening strikes, but ancient cultures also used fire to manipulate the plant and animal life around them. Several tribes of Prehistoric Californians used fire to drive rabbits for hunting, to improve forage for game animals, and to increase the availability of certain plants for human use. No one knows what southern California would look like if humans had not affected the region. Some say that San Diego County would look like Baja California, Mexico; however, we can assume that aboriginal fires also affected the vegetation there.

In southern California, Friar Crespi, a member of Portola's expedition, in 1770 documented that the prehistoric peoples burned the vegetation. Friar Crespi described vast expanses of grasslands and wildflowers with little sage scrub or chaparral and oak savannas without shrubs. The first fire control regulation in Alta California was proclaimed by Governor Jose Joaquin de Arrillaga in 1793 when he prohibited intentional burning "…not only in the vicinity of the towns, but even at the most remote distances…to uproot this very harmful practice of setting fire to pasture lands…", from the Santa Barbara area southward along the coast.

Vegetation burning, as well as other aspects of prehistoric culture, was lost underneath the missions. Suppression of fires by the Spaniards and their successors contributed to the decline in productivity of the native grassland and to the encroachment of coastal

sage scrub, and perhaps of chaparral, into grassland and savanna habitats (Aschmann 1976 in Timbrook 1982) and to the invasion of European grasses, broadleaved weeds, and large herbivores, and the practice of agricultural cultivation, completed the destruction of the native grassland in coastal southern California (Burcham 1957 in Timbrook 1982). This drastic alteration probably contributed to a gradual abandonment of traditional seed foods by the native people (Cook 1941 in Timbrook 1982). Native southern Californians interviewed in the 1910s and 1920s spoke of wild seeds and greens as things the old people used to eat, but which were no longer in common use. By then, burning as a food procurement technique was apparently unknown (Timbrook 1982).

Fire suppression was the preferred management tool in the early part of the twentieth century. Eventually, research showed that fire suppression increased fuel loads and, by the 1970s fire management had taken another direction, where land managers worked to minimize the risks associated with fire while allowing fire to play a more natural role in maintaining ecological processes and communities. Burns were "prescribed" to reduce the fuel loads and prevent unexpected and intense fires by developing age class mosaics within native vegetation. The different age classes of vegetation within the mosaic would significantly reduce suppression costs, wildfire damage, related flood damage, and sediment reduction while providing optimum benefits to wildlife, water, timber, range, and recreation by reducing the extent of old vegetation with high fuel load (Rogers 1982).

Prescribed burns adjacent to the wildland/urban interface presented problems, such as the potential health effects of the smoke, reduced visibility, potential danger of the controlled fire escaping and endangering residences, and compliance with air quality regulations. With these constraints, wildland/urban prescribed burnings were limited, and escaped controlled burns in Los Alamos, New Mexico, in 2000 convinced many people that prescribed burning is not a responsible way to control wildfire.

Prescribed burning is not feasible at the Preserves, where the vegetation is near and adjacent to homes and businesses.

8.3 Fire Management Objectives

This chapter describes fire and fuel management strategies and tactics that support land and resource management goals, one of which is to manage wildfires. The plan takes into account fire management as directed by agency (USFWS, CDFG, County of San Diego, and City of San Diego) landowners of the Preserves, and by the City of San Diego, which has jurisdiction over the private inholdings.

The Carmel Mountain and Del Mar Mesa Preserves both consist primarily of southern mixed chaparral, and chamise chaparral vegetation communities. The chaparral-covered hills combined with the long, dry summers make wildfires inevitable.

The objectives for managing wildfire at the Preserves are:

1. The highest priority of fire management is to firefighter and public safety.
2. Providing access to fight fires.
3. Appropriate management responses for wildland fires will be rapid containment and suppression to protect the public, avoid fire spreading onto adjacent lands, and protect the natural and cultural resources of the Preserves.
4. Interaction with adjacent land managers through participation in prevention programs will be encouraged.
5. Employ minimum impact suppression tactics.
6. No off road vehicle use unless approved by the Habitat Manager, unless an emergency situation exits and waiting for approval would risk life or serious injury.
7. No dozer or grader use unless approved by the Habitat Manager, unless an emergency situation exits and waiting for approval would risk life or serious injury.
8. Fires should be extinguished using water, unless the Fire Marshal deems retardant as necessary to protect human life and developed property. Fire fighters should avoid using fire retardant on the vernal pools and dudleya populations, unless such avoidance would endanger human lives.
9. The Preserves will be closed at the discretion of the Habitat Manager, unless an emergency situation exits and waiting for approval would risk life or serious injury.
10. Fire management operations will be carried out by qualified individuals who will promote the safe and skillful application of fire management strategies and techniques.
11. Fire management operations will support land and resource management plans and their implementation.
12. Fire management tactics that are economically viable, based upon values to be protected, costs, and land and resource management objectives, will be employed.
13. Fire management tactics will be based on the best available science.
14. The methods of fire suppression and management that are the least damaging to resources and the environment, after considering safety, will be used.

The Fire Management Plan provides the following items to local Fire Department authorities:

1. Maps of sensitive resources to be avoided as much as possible on Carmel Mountain and Del Mar Mesa Preserves, such as listed and otherwise sensitive plant and animal species, vernal pools, sandstone cliffs, steep slopes, and cultural resources.
2. Maps indicate preferable staging areas, access routes, and the most important fire suppression areas.
3. Basic guidance for minimizing impacts to biological resources when fighting a fire on Carmel Mountain and/or Del Mar Mesa Preserves, including preferred access routes and natural and cultural resource priorities (i.e., Is it better to allow an area to burn than to risk soil disturbance adjacent to an archaeological site or a federally listed endangered plant species?).
4. Contact information in the event fire management activities may affect natural and cultural resources.

8.4 Post-fire BMPs and Revegetation Efforts

To minimize excessive runoff and siltation into sensitive habitat or to prevent erosion of trails, areas affected by fire should be monitored for erosion during the subsequent rainy season. If erosion problems occur, Best Management Practices (BMPs) such as fiber roles should be installed, as needed, to slow the flow of water.

Post-fire weed control may also be necessary in areas that are subject to invasion by non-natives. Non-native species should be controlled to prevent annual grasses and other weeds from invading burn areas. When uncontrolled, non-native grasses and other weedy annuals provide flash fuels that increase the probability of repeat fires. Increased fire frequency due to type conversion to non-native grassland has the potential to significantly reduce the biological diversity of the Preserves over time.

In cases where all native vegetation has been removed by fire, revegetation with native species may be recommended by the Habitat Manager. If post-fire seeding is necessary, all seeds used for erosion control or revegetation should be native and collected from adjacent open space to maintain the local population genetics. Under no circumstances should non-native grasses be used in erosion control seed mixes for the Preserves.

8.5 Fire Management Units

The two Preserves represent two fire management units (FMUs): the Carmel Mountain Preserve is Unit 1 and the Del Mar Mesa Preserve is Unit 2.

8.5.1 Carmel Mountain Preserve, FMU 1

8.5.1.1 Fire Suppression

All fires on the Preserve will be suppressed, controlled, and put out.

8.5.1.2 Vegetation

Vegetation on the Carmel Mountain Preserve is dense southern maritime chaparral and Diegan coastal sage scrub, with small patches of grasslands interspersed within the chaparral on the flattest portions of the mesa top. The grassland areas are generally along dirt roads.

8.5.1.3 Access

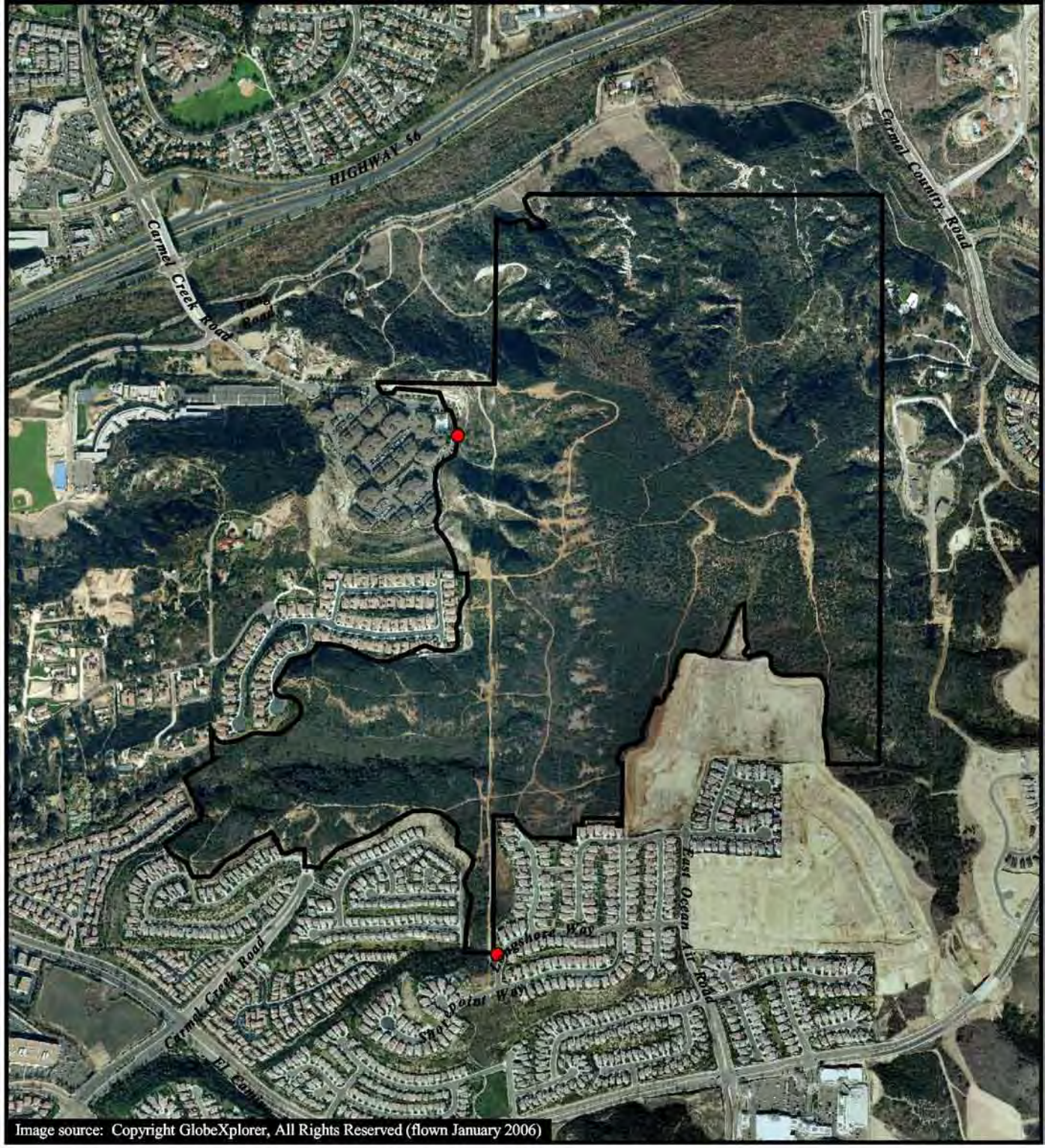
SDG&E easement roads are wide enough to allow access to Fire Department trucks. The SDG&E easement, which will have an SDG&E standard lock, can be accessed at two locations (Figure 8-2). One is at the northwest corner of the Preserve where the easement road can be accessed from Carmel Creek Road, which ends within The Pinnacle at Carmel Creek apartment complex. The other existing access site for the SDG&E easement road is from the intersection of Longshore Way and Shorepoint Way. Other access sites are single-track trails that are too narrow for trucks. Once on the Preserve via the SDG&E easement access road, various dirt roads are available for accessing fire locations.

As part of the development review process, any development proposed adjacent to the Preserves would undergo review to ensure that adequate fire fighting access to the Preserves is incorporated into the project design.

8.5.2 Del Mar Mesa Preserve, FMU 2

8.5.2.1 Fire Suppression

All fires on the Preserve will be suppressed.



Carmel Mountain Preserve

Fire Truck Access Points

0 Feet 1000

FIGURE 8-2

Fire Truck Access Points for the Carmel Mountain Preserve

M:\jobs\3493\gis\mgm_updates05.apr\fig8-2 (cmmFire) 08/25/06

8.5.2.2 Vegetation

Vegetation on the Del Mar Mesa Preserve includes Diegan coastal sage scrub, scrub oak chaparral, southern maritime chaparral, and southern mixed chaparral, with a small eucalyptus woodland sided by non-native grassland.

8.5.2.3 Access

SDG&E easement roads, which will have an SDG&E standard lock, provide access to the Del Mar Mesa Preserve (Figure 8-3). The west side of the Preserve can be accessed from Rancho Toyon Place. The south side of the Preserve can be accessed from the west end of Park Village Road.

8.6 Reporting a Fire

To report a fire on either of the Preserves, or the areas surrounding the Preserves:

DIAL 911

Your call will be reported to the appropriate department.

8.7 Fire Management Responsibilities

8.7.1 San Diego Fire-Rescue Department Fire Suppression Roles and Responsibilities

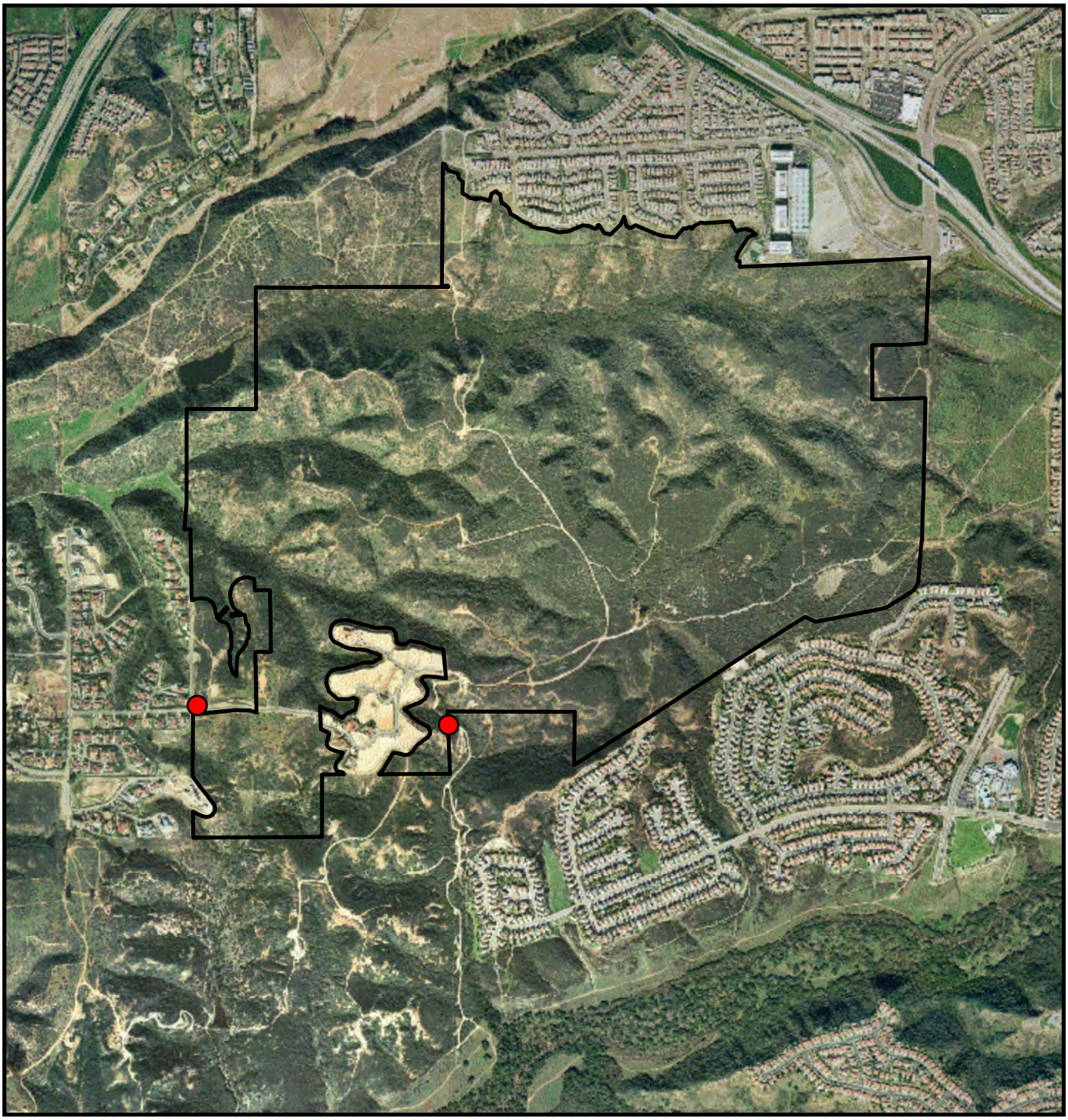
The San Diego Fire-Rescue Department is a paramilitary organization operating under a "Chain Of Command". The source of the following information is www.sandiego.gov/fireandems/about/suppressroles.shtml.

8.7.1.1 Senior Staff

The Fire Chief and Deputy Chief positions are "Straight Day", meaning the men and women who fill those positions work normal business hours and are on 24-hour call for any incidents that demand their attention.

Fire Chief. The Fire Chief is the Administrative Officer of the entire Fire-Rescue Organization. The Fire Chief reports to the Mayor.

Deputy Chief. A Deputy Chief is a Chief Officer who assists in the administration of the San Diego Fire-Rescue Department and directs the operation of a division within the organization. The San Diego Fire-Rescue Department has assistant Chiefs and Deputy Chiefs overseeing such divisions as Communications, Emergency Medical Services, Field Operations, Fire & Hazard Prevention Services, Employees Services, Emergency Management, Maintenance and Materiel Services, and Lifeguard Services.



Map Source: USGS 7.5 Minutes topographic map series
Del Mar Quadrangle

Del Mar Mesa Preserve

Fire Truck Access Points

0 Feet 1,640

FIGURE 8-3

Fire Truck Access Points for the Del Mar Mesa Preserve

8.7.1.2 Field Operations

The following positions are "Shift" positions; employees work a 24-hour shift with one to six days off between shifts. Employees work a 56-hour week, insuring City residents have protection 24-hours a day 365 days a year.

Battalion Chief. A Battalion Chief supervises a Battalion of approximately 6–7 stations, 35–40 firefighters, and coordinates fire suppression activities within a designated geographical area. A Battalion Chief acts as incident commander at large scale incidents. The Battalion Chiefs reports to the Deputy Chiefs of Field Operations.

Captain. Under the direction of a Battalion Chief, the Captain is in command of a Station and/or a single Fire Company (a Fire Company is an individual piece of equipment such as a fire engine or a fire truck.) The Captain is in charge of day-to-day activities at his or her station, which may include inspections, in-service training or community education events. At a fire, medical or other disaster the Captain directs the operations of his/her crew.

Engineer. Under the direction of the Captain, a Fire Engineer operates and maintains fire apparatus and associated equipment. Engineers are responsible for the safe delivery of fire crews to and from emergencies.

Firefighter. Under the direction of a Captain, a firefighter performs routine station maintenance. At the scene of a fire, firefighters are directly responsible for rescue and extinguishment of the fire. At medical calls, which make up 80 per cent of total responses, firefighters are directly involved in patient care.

Fire Recruit. Fire Recruits attend a fire academy lasting approximately three months. During the academy, recruits learn fire, rescue and medical techniques. Upon completion of the academy, recruits are assigned to a fire station as probationary firefighters.

8.8 Fire Management Plans, Programs, and Policies Pertaining to the Preserves

8.8.1 MSCP Guidelines for Fire Management

Fire management on the Preserves incorporates the MSCP (City of San Diego 1997) fire management guidelines, which affect MHPA lands. Fire management in the City of San Diego primarily focuses on fuel or brush management, and is regulated by the San Diego Municipal Code and the Fire Department. The typical mesa-canyon topography and fire-adapted native vegetation of the Preserves has led to development on mesa tops that are surrounded by canyon slopes of highly flammable chaparral and other natural open space. The formation of an open space system to protect biological

resources and to preserve long-term viability introduces additional issues regarding fire management that need to be addressed in conjunction with public safety factors.

Major issues related to fire management in the MHPA include the following:

- Fire hazard reduction methods, including brush management, for public safety purposes may impact sensitive species.
- Fire hazard reduction may involve methods that increase other management concerns (e.g., exotic species invasion, erosion).
- Senescent native vegetation no longer supports the diversity of species of areas allowed to rejuvenate through periodic non-catastrophic fire.
- Catastrophic fires can destroy soil structure, seed banks, root burls and other natural regeneration components, and act to convert native vegetation communities to non-native landscapes.
- Fire management needs for particular fire-adapted species such as Del Mar manzanita.
- Fire management for human safety, protection of property, and hazard reduction.
- Fire management for biological resources.

The Fire Management Plan would maintain human safety, yet be compatible with the conservation needs of the biological resources at the Preserves. Brush must be managed to reduce fuel and protect urban uses when development is adjacent to one of the Preserves.

8.9 Fire Effects on Resources

8.9.1 Vegetation and Plant Species

Fire is a disturbance process that affects the composition, structure, and pattern of vegetation on the landscape. Disturbance is necessary to maintain a diversity of living things and processes. The old idea of vegetation communities and their broader ecological systems reaching an equilibrium or a climax community is being rejected by modern ecologists and resource managers (Botkin 1990; Morgan et al. 1994, in Brown 2000) because the communities are constantly changing from the effects of environmental conditions, whether by fire, drought, or any other change-inducing agent.

In Mediterranean vegetation communities, such as chaparral and coastal sage scrub, fire and decomposition are the two ways of recycling carbon and nutrients. Since microbes that decompose plant material generally require moist conditions, in dry summer areas, decomposition is minimized; decay is constrained by the elements and

fire plays a dominant role in recycling plant debris (Harvey 1994). The primary effects of fire on vegetation are plant mortality and removal of organic matter.

The fire regime at the Preserves is considered a "stand-replacement" fire regime. Fires kill aboveground parts of the dominant vegetation and change the aboveground vegetative structure, which then re-grows from underground plant parts or from seed. In a normal fire, approximately 80 percent or more of aboveground dominant vegetation is either consumed or dies as a result of fires. The dominant shrub layer is usually killed back to growing points in or near the ground.

Fire behavior, fire duration, the pattern of fuel consumption, and the amount of subsurface heating all influence injury and mortality of plants and their recovery. Post-fire responses also depend on the characteristics of the plant species, their susceptibility to fire, and the means by which they recover after fire. For example, *Ceanothus* species can resprout from their underground burls after fire, and fire stimulates the germination of their seeds.

Most plant cells die if heated to temperatures between about 122 –131 degrees Fahrenheit (50–55 degrees Celsius) (Wright and Bailey 1982). Plants can die if exposed to high temperatures for short amounts of time (Martin 1963), or low temperatures for longer exposures (Ursic 1961).

Some plant tissues, especially the growing points (meristems or buds) tend to be much more sensitive to heat when they are actively growing and their tissue moisture is high, than when their moisture content is low (Wright and Bailey 1982). Plant mortality depends on the amount of meristematic tissues killed. Susceptible tissue may not be exposed to heating by fire because it is protected by structures such as bark or bud scales, or is buried in duff or soil. Plant mortality is often the result of injury to several different parts of the plant, such as crown damage coupled with high cambial mortality. Death may not occur for several years and may be associated with the secondary agents of disease, fungus, or insects. A plant weakened by drought, either before a fire or after wounding, is more likely to die.

8.9.2 Soil Surface and Microbiotic Soil Crusts

Much of the ground on the Preserves is covered with microbiotic crusts, which are biologically active, living layers of organisms in an intimate association between soil particles and cyanobacteria, algae, lichens, fungi, and bryophytes (Hawk 2003). They can be pioneer organisms, nitrogen fixers, and contributors to soil stabilization and erosion control. Lichens on bark, rock, and soil are important biological indicators of air quality, soil quality and ecosystem health. They can provide food and nesting material for some birds and invertebrates. Soil lichens have soil-anchoring structures call rhizines that penetrate the uppermost soil layers and bind them together into a stable matrix, and

some fix nitrogen. Crusts may compose as much as 40 to 70 percent of soil cover in some parts of the west.

Fire can have a devastating impact on soil crusts but wildfires of uneven intensity and duration often leave behind a mosaic of biological soil crust patches, some of which survive unharmed (Johansen 1993). Wildfires fanned by hot Santa Ana winds can race quickly through vegetation, leaving the soil unscathed.

In extremely hot or slow fires, the soil fabric can be altered. Not only can the microbiotic soil crust be changed, but the chemical composition of the soil itself can be affected. In an experiment of fire effects on soils, the upper 3–5 cm of a burned sagebrush subcanopy soil was completely charred. The formerly open fabric collapsed due to destruction of plant litter. Immediately below charred zone some mineral grains became thickly coated by dark material and the plant litter became darkened. Researchers suggested that the coatings were formed by condensation of organic vapors on the cooler soil mineral particles at depth; these are the hydrophobic compounds so often found after wildfires (DeBano et al. 1998). Another consequence of wildfires is the cleavage of biotite flakes (potassium iron magnesium aluminum silicate hydroxide fluoride), which enhances post-wildfire potassium fertility. This increased fertility, combined with the opening of the shrub canopy, allowing light to penetrate to the soil, can increase and enhance the germination of seeds.

8.9.3 Wildlife

Effects to wildlife are influenced by fire season, intensity, severity, rate of spread, uniformity, and size. Responses of wildlife to fire may include injury, mortality, immigration, or emigration. Animals with limited mobility, such as young, are more vulnerable to injury and mortality than mature animals. Changes are at the individual, population, community, and landscape levels. Fires generally kill or injure a relatively small proportion of animal populations, except for major conflagrations such as in San Diego County in October 2003 where an unusual number of animals were killed.

Habitat changes from fire affect wildlife more drastically than the fire itself (except for those individuals that are killed by fire). For animals, the vegetation structure spatially arranges the resources needed to live and reproduce, including food, shelter and hiding cover. Some fires alter the vegetation structure in relatively subtle ways, for example, reducing litter and dead herbs in variously sized patches. Other fires change nearly every aspect of vegetation structure: woody plants may be stripped of foliage and killed; litter and duff may be consumed, exposing mineral soil; and underground structures such as roots and rhizomes, may be killed or rejuvenated.

These changes affect feeding, movement, reproduction, and availability of shelter. Fires often cause a short-term increase in productivity, availability, or nutrient content of forage and browse, which can contribute to substantial increases in herbivore

populations, but potential increases are moderated by animals' ability to thrive in the altered, often simplified, structure of the post-fire environment. Fires generally favor raptors by reducing hiding cover and exposing prey. Small carnivores respond to fire effects on small mammal populations, either positive or negative. Large carnivores and omnivores are opportunistic species with large home ranges. Their populations change little in response to fire, but they tend to thrive in areas where their preferred prey is most plentiful—often in recent burns. Stand-replacing fires, such as in chaparral and coastal sage scrub, reduce habitat quality for species that require dense cover and improve it for species that prefer open sites. Often, wood-boring insects may increase after fire, leading to an increase of insect-eating birds and other insect predators.

Many animal-fire studies depict a reorganization of animal communities in response to fire, with increases in some species and decreases in others. Fire effects to ecological communities are related to the amount of structural change in vegetation. In vegetation types that come back quickly, like grasslands, the fire effects may only last one to two years, whereas in shrublands the effects last much longer. Fires in shrublands and forests can cause initial positive effects for insect-eating birds, but negative for species that require dense, closed canopy habitats. Bird abundance and diversity are likely to be greatest early in succession. When the shrub or tree canopy closes, species that prefer open sites and habitat edges decline, and species that prefer mature structures increase.

Major changes to fire regimes, such as when fires are suppressed or prescribed too frequently or not often enough, can alter landscape patterns, processes, and the function of habitat linkages. These changes can affect animal habitat and often produce major changes in the composition of faunal communities. In many western ecosystems, landscape changes due to fire exclusion have changed fuel quantities and arrangement, increasing the likelihood of large or severe fires, or both. Where fire exclusion has changed species composition and fuel arrays over large areas, subsequent fires without prior fuel modification are unlikely to restore pre-settlement vegetation and habitat. In many desert and semi-desert habitats, where fire historically burned infrequently because of sparse fuels, invasion of weedy species has changed the vegetation so that burns occur much more frequently. Many animals in these ecosystems are poorly adapted to avoid fire or to use resources in post fire communities.

Grasslands recover quickly. New stands of grass can shoot up from surviving root systems. Forbs increase during the first or second year after a fire. The grassland structure is reestablished in about three years (Bock and Bock 1990) and wildlife populations are usually reestablished to pre-burn conditions. Repeated fires can turn shrublands into grasslands and lack of fire can allow shrub seedlings to establish in grasslands, eventually converting grassland to shrubland.

In chaparral and sage scrub vegetation communities, fires (stand-replacing fires) kill aboveground vegetation, reducing the canopy cover. Initial regrowth is grasses and

forbs. Dead wood remains standing and the burned shrubs become perch sites for songbirds, raptors, and lizards. Burning often increases seed visibility and availability for small mammals, but increases the mammals' visibility to predators. Though forage is abundant, deer often do not use it because their cover is so reduced. Shrubs regenerate from underground parts and seed, as described above for *Ceanothus* species. Reestablishment of chaparral and sage scrub communities generally takes from 10 to 60 years.

Broad thick-leaved shrubs of the chaparral are well adapted to fire. In southern California, the chaparral is notorious for frequent, fast-spreading, stand-replacing fires. Many chaparral species resprout and also establish vigorously from seed. Many species have seed that germinates best after being heated by fire. Stand-replacing chaparral fires have occurred every 20 to 40 years for hundreds of years (Kilgore 1981). Annual and perennial herbs flourish after fire in chaparral, along with seedling and resprouting shrubs. Browse productivity for herbivores increases dramatically during first four to six years after burning, but declines after that. Snags and dead wood remaining after fire are important to birds and small mammals. Dead wood on the ground is essential habitat component for many birds and small mammals. Shrubland fire both destroys and creates woody debris. Herbs are eliminated as the dense overstory of large shrubs matures.

Scrub oaks, an important source of wildlife food, usually resprout vigorously after fire. Acorns are eaten by 100 species of animals in California, including California quail and deer. For a decade or two after a fire, the chaparral is quite fire resistant (Wright 1986). Chaparral's burning at every 20–30 years maintains a diverse mix of species. If fires do not occur every 10–30 years, mature shrubs will dominate and plant diversity will decrease.

8.9.4 Cultural Resources

Understanding the potential impacts of wildland fire on cultural resources is imperative to a comprehensive management plan. Damage can be from fire or actions of fighting or managing the wildfire.

As with vegetation and soils, the effects vary depending on the fire's intensity, duration, and depth of the heat's penetration into the soil. A fire's intensity, the measure of the severity of a fire, is often expressed for archaeological purposes as either low, moderate, or heavy (Lentz et al. 1996). Abundant accumulation of dry fuel, or duff, on the ground will allow the fire to burn longer and hotter. Below ground heating depends on factors such as soil moisture, soil type and coarseness, weather conditions, the accumulation of duff, organic litter, or fuel above ground.

Recent large fires in New Mexico, Mesa Verde, southern California, and even Australia, have allowed the study of fire impacts on cultural resources (Buenger 2004, Lentz 1996; Lentz et al. 1996; Traylor 1990).

Types of effects of fire on cultural resources are (Connor et al. 1989; Connor and Canon 1991; Lentz et al. 1996; Taylor et al. 1990):

- Oxidation at low, moderate and heavy severities
- Thermal spalling, leading to exfoliation of spalls (a spall is a chip, fragment, or flake from a piece of stone; usually concave on medial face), induced by expansion of the heated stone and steam pressure (Hettema 1998 in Buenger 2004)
- Potlid fracturing (Potlid: A roundish fragment of stone, the exfoliated portion usually convex on the medial face)
- Spall scaring
- Combustive blackening
- Crazing, or cracking of glass into irregular fragments
- Soil oxidation
- Stump and root combustion
- Bone, shell, glass and wood burning

These effects can change the dendrochronology results, thermoluminescence, archaeological dating, and the interpretation of the site.

The severity of effects are influenced by the fuel load, fire behavior, peak temperature and duration of heating, proximity of artifacts to fuels, and the type of artifact. Cool fires have less effect, while hot fires have more effect on cultural resources. Fine fuel (grass) fires are cooler, as the grasses are not able to maintain high levels of radiant heat energy during combustion.

The most common thermal alteration is oxidation where the heat induces color changes by altering the mineralogy of rocks, particularly chert. Cherts are more prone to thermal fracturing, oxidative staining, and combustive blackening compared to other lithic types (Buenger 2004).

Experiments and observations indicate that cultural resources below the surface, unless directly exposed to a burning duff layer or burning underground roots, normally do not sustain significant damage, if any at all.

Fire fighting can cause damage to the artifacts themselves, either by moving or removing them. Removing or damaging an artifact's setting in space (its context) can be more detrimental than the fire damage itself because artifacts lose their meaning when removed from the clues that place them within a historical context. It is important that those on the front lines of fire suppression and prescriptive burning understand the

consequences of using heavy equipment such as bulldozers to fight fires or construct firelines. Care during post-fire mop-up and rehabilitation, and the potential corrosive properties of retardants must be considered.

Knowing where culturally sensitive areas lie within the Preserves, and which practices can damage those areas, will help to minimize damage on the part of the firefighters.

Artifacts on the ground are most vulnerable, and those progressively deeper below ground are less prone to damage. Temperatures over 300 degrees Celsius can damage many inorganic materials; however, ceramics, having already been fired, are not critically affected until temperatures reach 600 degrees Celsius. In addition to causing deterioration of the artifacts, such as cracking, chipping, and charring, heat can destroy artifacts made from wood or plant materials. Other culturally significant information in the form of pollen grains used to assess diet and environmental conditions of the past can be destroyed, and dating techniques can be rendered inaccurate when heat damages some artifacts.

8.9.5 Wildfire Response

The following San Diego Fire-Rescue Department Stations are within the vicinity of the Carmel Mountain and Del Mar Mesa Preserves (Table 8-1 and Figure 8-4):

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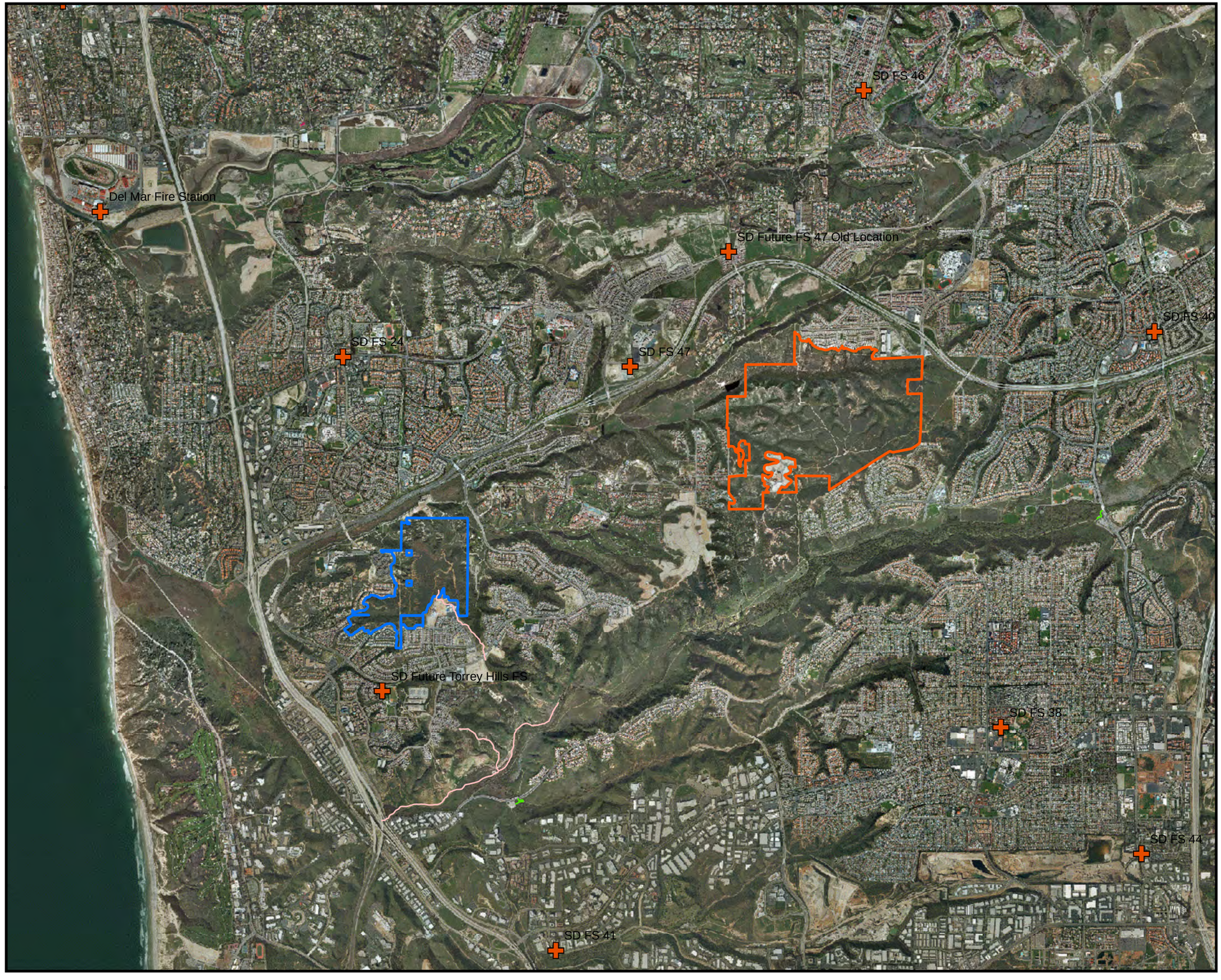

Legend

- Fire Station
- Del Mar Mesa Preserve
- Carmel Mountain Preserve

FIGURE 8-4
Fire Stations in the Vicinity of the Preserves

0 0.375 0.75
Miles

Figure 8-4; color/oversize

TABLE 8-1
LOCATION OF SAN DIEGO FIRE-RESCUE DEPARTMENT STATIONS

Station Number	Service Area	Address	Apparatus Available
24	Del Mar Heights and Surrounding Areas	13077 Hartfield Ave. San Diego, CA 92130	Engine 24, Brush* 24, Medic/Rescue 24
38	Mira Mesa and Surrounding Areas	8441 New Salem St. San Diego, CA 92126 (Cross Street – Camino Ruiz)	Engine 38, Brush* 38
40	Rancho Pensaquitos & Surrounding Areas	13393 Salmon River Rd., San Diego, CA 92129 (Cross Street – Camino Montalban)	Engine 40, Truck 40, Brush* 40, Brush* 140, Water Tender 40, Utility 40, Medic 40
41	Sorrento Valley and Surrounding Areas	4914 Carroll Canyon Rd. San Diego, CA 92121 (Cross Street – Mira Mesa Boulevard)	Engine 41, Truck 41, Medic 41

Photograph 8-1. Brush Rig
(Source: www.sandiego.gov/fireandems/about/suppressroles.shtml)

Brush Rig. Brush Rigs are pumper units used on grass fires and are specially adapted to fire fighting in rough (wildland) terrain where access is a problem and fire hydrants are few or non-existent. Brush Rigs carry from 600-1,500 gallons of water and are designed for off-road areas and brush fire fighting. Some of the brush rigs are four-wheel drive and carry light water or foam (light water is water that has been thinned or treated with material that allows the liquid to deeply penetrate brush.)

8.10 Fire Plan Review

This Fire Management Plan has been reviewed and approved by the City's Fire Chief.

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9.0 Interpretive and Research Guidelines

The Preserves have been set aside to protect all the natural resources within them, in particular, the vernal pools and the short-leaved dudleya, both of which are in extreme peril of extinction. Local residents and visitors are allowed to use the Preserves for pleasure or research provided the resources are not abused.

9.1 Public Use of the Preserves

The resources at the two Preserves must be protected. This management plan has presented many avenues of managing and monitoring the Preserves for the benefit of the public. However, members of the public sometimes harm resources. All recreation activities within the Preserves should be permitted only during daylight hours.

Everyone who visits the Preserves and who lives in the neighboring communities should be informed on actions to be taken if they see harm being done to or at the Preserves. Following are some actions the Habitat Management and the oversight committee could take to enforce rules, regulations, and laws at the Preserves:

- One phone number, probably that of the Habitat Manager, should be identified prominently on signs, in newsletters if they are written for the Preserves, in brochures, and on the website that someone can call if they see harmful or illegal actions.
- Criminal activities should be reported immediately to the San Diego Police Department.
- The Habitat Manager should have a ready reference of other numbers to call, such as the police department, fire department, and wildlife agencies.

Park Rangers, Wardens, or other appropriate interpretive and enforcement staff should be assigned to the Preserves and should patrol on weekdays and/or weekends, based on public use patterns. They should be empowered to issue citations for violations such as riding motorcycles on the Preserves, allowing dogs to run off leashes, and collecting plant or animal species.

9.2 Interpretive and Information Displays and Programs

Interpretation and education has become a widespread management tool of natural resources as it has the capacity to reduce inappropriate behavior voluntarily through education (Black 2002). Until the benefits of education and interpretation were recognized, management

strategies generally were focused on physical controls such as barriers, boardwalks, and the location of facilities, as well as regulatory controls (Orams 1996; Hall and McArthur 1996).

The level and type of education and interpretation will depend on the needs, interests, and expectations of the visitor and may include a wide range of interpretive media. Like the management of the Preserves, the interpretation and educational tasks need to adapt to changes and must respond to the needs of the Preserves.

The long-term success of the Preserves and the concept of habitat protection are dependent on acceptance by local community residents of the Preserves as valuable amenities and resources. A belief in open space as a part of their community may cause residents and local school children to become interested and protective of the resource. Consequently, residents and local school children not only refrain from disturbing the resource but also inform others of its importance, to prevent vandalism and unauthorized activities from occurring within the open space. In this manner, by becoming stewards of the open space preserve areas, community members provide a valuable service to the Habitat Manager and the preserve, as their vigilance affords protection to the area when the Habitat Manager is not present (Affinis 1998; Helix 2000).

It is the Habitat Manager's responsibility to work with the community as much as possible and take steps to maintain a positive working relationship between the community and the habitat management program.

9.2.1 Signs

9.2.1.1 Educational Signs

Information regarding the general ecological, faunal, and floral resources, especially those resources that are endemic, endangered, or threatened on both preserves should be adequately provided via signage, pamphlets, and at informational kiosks at major trail entrance designations. Signage is recommended at particularly sensitive habitat areas, such as at the vernal pool and the short-leaved dudleya habitat areas.

Education signs should be placed at trailheads and at other opportune locations where they will be frequently encountered. Signs should be interpretive of the open space, and cover such topics as purpose, ecological descriptions, common species, and importance of the open space in and of itself and as a part of a subregional system.

The educational signs should include space to post notices on such topics as herbicide use dates, rattlesnake warnings, scheduled trail repair or maintenance, and other items of concern.

9.2.1.2 Advisory Signs

Signs informing the public about restrictions to protect the Preserves should be posted at trailheads. Restrictions include activities such as poaching, allowing dogs to be off leashes, harassing or killing endangered or other animals, removing reptiles as pets, fires, littering, and removal of plant material.

Other advisory signs could encourage visitors to pick up trash and to notify the Habitat Manager of violation.

9.2.1.3 Trail Signs

Signage should be placed at all trailheads and throughout the Preserves showing the location of the sign in regards to the trail system and itemizing the uses allowed on each type of trail. Signs at the beginning of trails will indicate what type of trail is being accessed. View points and other points of interest will be marked on the trails with signs that point in the direction of the point of interest. Figures 9-1a and 9-1b show the trail uses, signs, fences and lookouts.

9.2.1.4 Interpretive Trail Signs

One trail at each of the Preserves should be designated for interpretation. Signs should be placed at locations along the trail briefly describing the resources (see Figures 9-1a and 9-1b). An interpretive trail brochure should be designed to provide additional information regarding the resources.

9.2.2 Public Education

The following steps should be taken to facilitate both public awareness of the open space and coordination between the Habitat Managers of other properties.

9.2.2.1 Communication

The Habitat Manager will answer questions and explain the open space to local residents and students initiating inquiries.

9.2.2.2 Volunteer Services

Volunteer services are both a method of and a result of public awareness. The Habitat Manager should participate in subregional or regional programs that encourage and feasibly use volunteer services. Continual volunteer programs may be established, allowing students the opportunity to volunteer and aid the Habitat Manager in the maintenance of the open space.

9.2.2.3 Newsletter

A newsletter should be considered as a way of informing the public about the Preserves and to engage them into supporting and protecting the Preserves. The newsletter could be distributed to local schools, residents of the adjacent properties, stakeholders, and wildlife agencies. The newsletter will serve to remind the community of the open space, its protected status, reasons for its establishment and ongoing existence, information on regional open space happenings, and any other information deemed pertinent by the Habitat Manager.

9.2.2.4 Trail Guide

A trail guide should be prepared and provided at the information kiosks at the Preserves.

9.2.2.5 Website

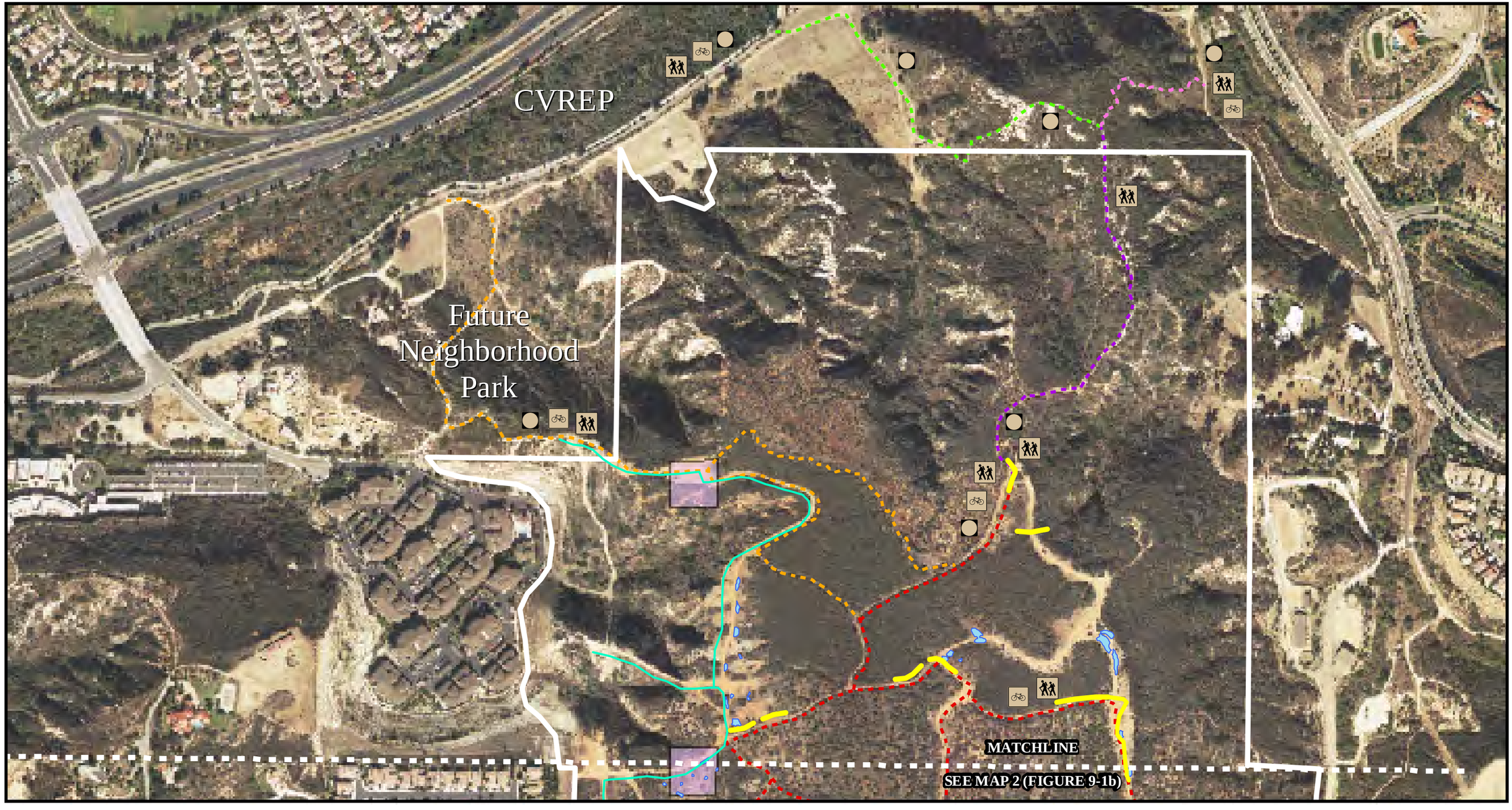
A website with a map to the Preserves and with trails maps of the Preserves should be established, and linked to websites of public landowners of the Preserves.

9.2.2.6 Docent Program

A docent program should be established, possibly in conjunction with the existing City of San Diego Park and Recreation Department volunteer program. Similar to current volunteers, docents could lead field trips, participate in presentations at the Preserves, monitor the trails, and generally watch over the Preserves. Docents and other volunteers provide outreach into all parts of the community through their help at the Preserves.

9.2.2.7 Adopt-a-School Program

Each Preserve could adopt a local school. Programs could be developed to teach the children about natural resources through presentations and walks, and provide hands-on experience in small habitat restoration, exotic species control, and maintenance activities.



0 205 410
Feet

Proposed Multi-Use Trails
Proposed Hike and Bike Trails
Proposed Hiking and Equestrian Trails
Proposed Hiking Only Trails
Proposed Equestrian Only Trails
Proposed Future Multi-Use Trails
Proposed Trail Access
Proposed Hiking Signage
Proposed Biking Signage
Proposed Signage
Utility Access Road
Proposed Fencing
Vernal Pools (Source: City of San Diego revised in part by RECON 2001/2002)
Seeps (Source: City of San Diego, Helix Environmental Inc. revised in part by RECON 2002)
Private Property
Proposed Viewpoint

Note: Public trails will not be located on private land (pending land acquisition, MOU and/or trail easement)

FIGURE 9-1a
Proposed Trail System
on Carmel Mountain Preserve
(Map 1)

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0 200 400
Feet

Proposed Multi-Use Trails
Proposed Hike and Bike Trails
Proposed Hiking and Equestrian Trails
Proposed Hiking Only Trails
Proposed Equestrian Only Trails

Proposed Future Multi-Use Trails
Proposed Trail Access
Proposed Hiking Signage
Proposed Biking Signage
Proposed Signage

Utility Access Road
Proposed Fencing
Vernal Pools (Source: City of San Diego Vernal Pool Inventory 2004)
Seeps (Source: City of San Diego, Helix Environmental Inc. revised in part by RECON 2002)
Private Property

Proposed Viewpoint

Note: Public trails will not be located on private land (pending land acquisition, MOU and/or trail easement)

FIGURE 9-1b
Proposed Trail System
on Carmel Mountain Preserve
(Map 2)

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9.3 Nature Trails

A network of utility access roads and authorized and unauthorized paths exists within and adjacent to both the Carmel Mountain and Del Mar Mesa Preserves. Under this management plan, a multi-use trail system will be established for both Preserves to 1) accommodate a variety of recreational uses, 2) provide connections to the local and regional trail system, and 3) offer a unique natural recreation experience while protecting sensitive biological areas. The proposed Carmel Mountain/Del Mar Mesa trail plan would satisfy this area of the City-Wide Trails Master Plan.

The proposed trail system is based on existing paths and use patterns. However, many of the existing, unauthorized paths are located within sensitive habitat areas that have the potential of being adversely impacted by all recreational users. All existing, unauthorized trails will be targeted for active or passive restoration, as appropriate (Figure 3-11). The identified trail system will connect to other open space areas and parks via existing roads and paths, new trails and surface streets. This Plan proposes no impacts associated with trail use (e.g. grading or cutting); any future impacts require additional review and separate permitting.

The trail plan proposes specific enforcement of the adopted trails plan within Del Mar Mesa. A significant portion of the existing paths are within biologically sensitive areas, or have been determined to be redundant, unsustainable and/or unsafe. The goal of the enforcement of the approved trail system is a reduction of human activity in critical natural resource areas (e.g. deer day-bed sites).

Trails proposed on lands not owned by the City of San Diego will not be opened for access until the land is conserved or written permission is obtained from the landowner(s). Trails on USFWS lands may require review a Compatibility Determination as part of a Comprehensive Conservation Plan approval while trails on State of California lands will require review and approval by the managing Department; if approved by the appropriate landowner, the City Manager is authorized to amend this plan to incorporate the trail(s), including Figure 9-2 of this document, without further City Council approval.

9.3.1 Carmel Mountain Preserve

9.3.1.1 Existing Conditions and Access

A network of paths and utility access easement roads exists throughout the footprint of Carmel Mountain Preserve. These areas have a long and varied history of uses, including authorized and unauthorized motor vehicle access and multi-use recreation. The paths and roads are highly variable in width, from a few feet up to fifteen feet, and often vary within a single reach.

The paths tend to widen into larger open areas where users cut corners at intersections. Many of these intersections are bare ground, non-native grasses or carpets of *Selaginella* growth, with

few or no shrubs. At some intersections, shortcuts have impacted surrounding shrub vegetation, as well. In many locations vernal pool depressions are found alongside and within the roadway. Roadside vernal pools have been previously impacted by utility maintenance and recreational use in several locations. Vehicles have made deep depressions and road ruts during the wet season and these depressions and ruts remain during the dry part of the year. These areas are now fenced as appropriate to minimize impacts.

SDG&E employees and private landowners may access the Preserve from three existing roads—two from the south and one from the northwest—through locked gates. A key to the appropriate gate will be provided to private property owners. The majority of the roads are maintained by SDG&E for access to their transmission line towers.

As stated in the Carmel Valley Neighborhood 8A Specific Plan/Precise Plan and the City of San Diego MSCP Subarea Plan, trails are a conditionally compatible use in MHPA open space when developed and operated in a manner consistent with the applicable management directives. For example, authorized trails should follow existing dirt paths and roads as much as possible, should not bisect sensitive habitat, and must be directed away from sensitive areas through signage and/or fencing, where necessary. If trails are provided through MHPA open space, the following directives shall apply.

1) Provide sufficient signage to clearly identify public access to the MHPA.

2) Locate trails, view overlooks and staging areas in public owned areas and in the least sensitive areas of the MHPA. Locate trails along the edges of urban development and follow existing dirt roads/trails and utility easements as much as possible.

3) Trails should not be paved, and trail widths should be minimized.

In addition, the MSCP General Management Directives (City of San Diego Subarea Plan Section 1.5.2) for trail design and maintenance are applicable.

9.3.1.2 Trail, Access Point, and View Point Plan

The proposed trail system for Carmel Mountain Preserve makes use of some of the existing roads and narrow paths to accommodate compatible recreational use, creating reasonable trail loops and connectivity to adjacent trail systems; please refer to Figure 9-1b for details of the trail plan.

Authorized trails within the Carmel Mountain Preserve were planned and are maintained consistent with the MSCP and the Carmel Valley Neighborhood 8A Specific Plan/Precise Plan. For example, fencing and signage have been used to direct human access away from vernal pools and state-endangered short-leaved dudleya populations. In addition to protective fencing and interpretive signage, regular patrols by volunteers and staff also limit human impacts, educate users and monitor sensitive habitat. In some cases, trail use is restricted to specific

user types, such as equestrians or cyclists, based on trail configuration (e.g. historic use and/or connectivity), user group input and/or sensitive natural resources. Authorized trails on Carmel Mountain are located within existing road beds or established use patterns. Trails are maintained at minimal widths where possible, and closed areas previously impacted by roads or paths are protected to allow passive restoration. The designated trail system for all use types avoids wetlands, including vernal pools; therefore this trail system fulfills the MSCP requirement to develop an equestrian use plan.

Proposed trails on Carmel Mountain are within existing use patterns and were selected to avoid identified vernal pools, and sensitive natural resources and habitat. Additionally, trail selection was based on one or more of the following trail criteria: 1) Connectivity, 2) Destination or 3) Loop trails. Trail-use designation was based on historical use, and community input (including representatives of all user groups). Trails not considered for inclusion were based on:

- Redundant trails
- Unauthorized trails, including shortcuts
- Trails not accessible to the public
- Unsafe or unsustainable trails
- Impacts of trails on MSCP covered species

Proposed trail selection was reviewed for consistency to MSCP requirements and directives, and with direction from MSCP staff on fencing and signage to direct use away from or close sensitive areas.

Vehicle access points and trail heads are provided at strategic locations for reasonable access. Vehicle access is provided at three existing locations: 1) the southwest access is located at the corner of Shorepointe Way and Longshore Way; 2) the central access is located at the corner of Fairport Way and Shorepointe Way west of Ocean Air Community Park; and 3) the northwest access point is located within the Pinnacle at Carmel Creek apartment complex at the end of Carmel Creek Road. Additional trail heads are located on the north of the Preserve, along the Carmel Valley Riparian Enhancement Project (CVREP) Trail for equestrian users, and on the southeast edge of the Preserve, east of Ocean Air Elementary School for pedestrian and equestrian users.

There are three scenic viewpoints proposed on Carmel Mountain Preserve. One is located at the northeast corner of the mesa overlooking Shaw Valley and Black Mountain Open Space Park. Two view points are proposed on the western edge of the Preserve where the land slopes downward toward a panoramic view of Torrey Pines State Park, Del Mar and the Pacific Ocean.

Several paths on the eastern side of the Preserve will be closed to protect a large population of state endangered short-leaved dudleya and several vernal pools. Additional paths will be closed throughout the Preserve to ensure the long-term viability and sustainability of native ecosystem function and natural processes and to protect the existing and restored biological

resources from disturbance. Trails may be closed at the discretion of the Park and Recreation Department due to the following reasons:

- Unsafe or unsustainable trails
- Trails initiating opportunities for illegal activity
- Trails contributing to resource impacts (i.e. erosion, biological, etc.)
- New environmental concerns
- Other issues under which closure is warranted based on professional staff opinion

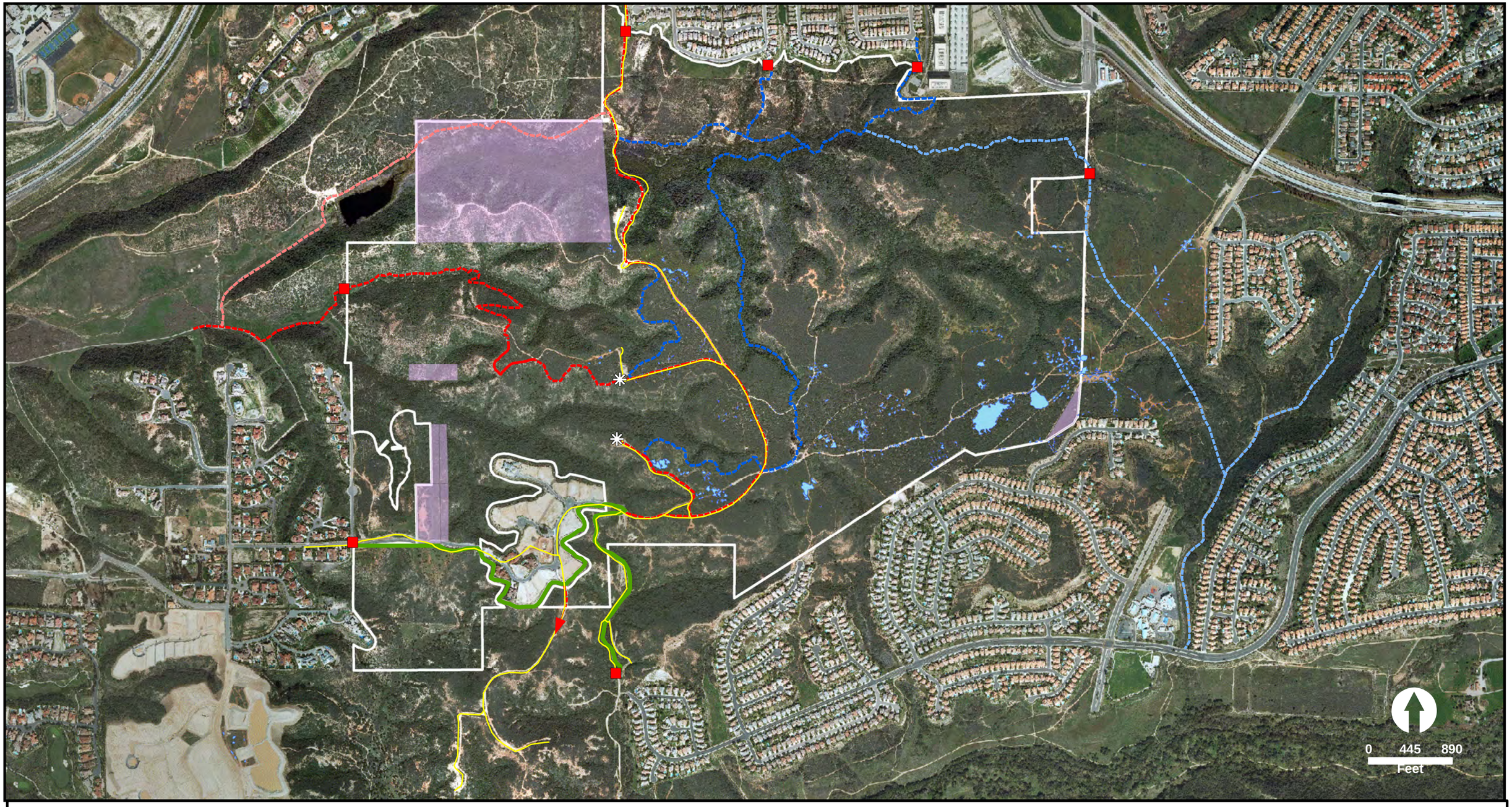
Proposed changes or additions to the trail alignments included in this document will be evaluated based on the MSCP and additional applicable regulations, if any, and the acquisition of appropriate permits. All changes must be authorized through an amendment to this plan or through concurrence of City, CDFW and USFWS staff.

9.3.2 Del Mar Mesa Preserve

9.3.2.1 Existing Conditions and Access

In addition to authorized utility access roads, a large network of unauthorized paths exist throughout the Del Mar Mesa Preserve (Figure 3-11) on both public and private lands. This network has a long and varied history of uses including authorized and unauthorized motor vehicle access, illegal encampments and multi-use recreation, with paths/roads that vary in width from a few feet up to thirty feet. A major component of this network is referred to as the "tunnels", a connective system of over 10 miles of narrow unauthorized paths, many of which are under the canopy of chaparral vegetation.

The main utility access road runs north/south through the center of the Preserve with spurs to SDG&E transmission towers. An unauthorized road bisects the CDFW Vernal Pool Reserve and ends at the southeast corner of the Preserve. Many of the existing roads and paths bisect vernal pool habitat (see Figures 9-3a and 9-3b). Ninety-three vernal pools and depressions were mapped within the SDG&E access roads and the unauthorized east-west road on the CDFW Vernal Pool Preserve. Roadside vernal pools have been previously impacted by utility maintenance and recreational use in several locations; however, impacts associated with SDGE activities within the SDGE right-of-way are covered by the SDGE NCCP. Vehicles have made deep depressions and road ruts during the wet season (Photograph 9-1) and these depressions and ruts remain during the dry part of the year (see Appendix A6).



Proposed trail access
SDG&E access roads
Private property
Proposed view point
Proposed multi-use trail
Proposed hike/bike trail
Proposed future multi-use trail
Proposed future hike/bike trail
Existing trail per Del Mar Mesa Specific Plan
Vernal pools (Source: City of San Diego Vernal Pool Inventory 2004)

Notes:
1 - Fencing and signage will be installed as necessary
2 - Public trails will not be located on private land (pending land acquisition, MOU and/or trail easement)
3 - Lands not shown as private, within the boundaries of Del Mar Mesa Preserve, are in public ownership or under easement to a public agency

FIGURE 9-2
Proposed Trail System
on Del Mar Mesa Preserve

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Use and creation of unauthorized paths and roads for recreation has resulted in impact/loss of adjacent vegetation (i.e. trail widening). The CDFW Vernal Pool Reserve fence has been cut in several places to facilitate unauthorized access throughout the Preserve. The chaparral habitat has also been cut for unauthorized access, in particular within the canyon areas of the Preserve.

Photograph 9-1.
Vernal pool impacted by vehicles.

SDG&E employees and public and private landowners can access the Preserve from the existing north, south and west roads through locked gates. A key to the appropriate gate will be provided to private property owners. The majority of the authorized roads are maintained by SDG&E for access to their transmissions line towers.

The regulatory land use document for this area is the Del Mar Mesa Specific Plan which currently identifies the west and north/south SDG&E access road as the approved trail alignment. The Del Mar Mesa Specific Plan will be amended as part of the approval process for this Plan to reflect the included trail system.

9.3.2.2 Trail, Access Point and View Point Plan

The proposed trail system makes use of authorized existing utility access roads and select single-track paths to accommodate recreational use by creating reasonable trail patterns (e.g. loops) and connectivity to adjacent trail systems as approved by regulatory agencies, public input, and City policy. Figures 9-3A through 9-3D show, in detail, the proposed trail system for Del Mar Mesa Preserve. Use of the CDFW Vernal Pool Reserve is governed by CDFW policies. These unauthorized trails may be re-vegetated based on State statues and management policy (see Chapter 3.0 for individual vernal pool locations).

Much of the land on Del Mar Mesa has been historically impacted by many uses over the past decade and beyond. Lands acquired as mitigation are to be maintained at mitigation levels. Some of the areas previously impacted by illegal encampment, migrants, and unauthorized paths have been recently reopened by unauthorized trail use. If the new impacts are on previously mitigated lands, all necessary steps must be taken to restore to past mitigation conditions. Restoration of impacted areas will be both active (planting, native seed broadcasting), and passive (allowing native vegetation to recover from human impacts).

Proposed trails have been located in the least sensitive areas, and will include appropriate signage and fencing to direct users away from important natural resources. Proposed trails will be maintained and repaired as needed, including measures to minimize erosion. Due to its importance as biological habitat, Del Mar Mesa is not a planned destination for recreational users, but rather provides an important connection to the local and regional trail system. No new

trails will be developed, and areas currently impacted by unauthorized activity will be closed with native materials (brushing) and/or fencing and/or signage as needed. Authorized trail use in specified areas will be limited by user group. Proposed trail alignments were selected to avoid vernal pools and vernal pool watersheds, as well as other identified sensitive resources, and were reviewed by the U.S. Fish and Wildlife Service and California Department of Fish and Game for consistency with the MSCP. In order to fulfill the MSCP requirement for an equestrian use plan, equestrian trail use will be in areas away from vernal pools and vernal pool watersheds.

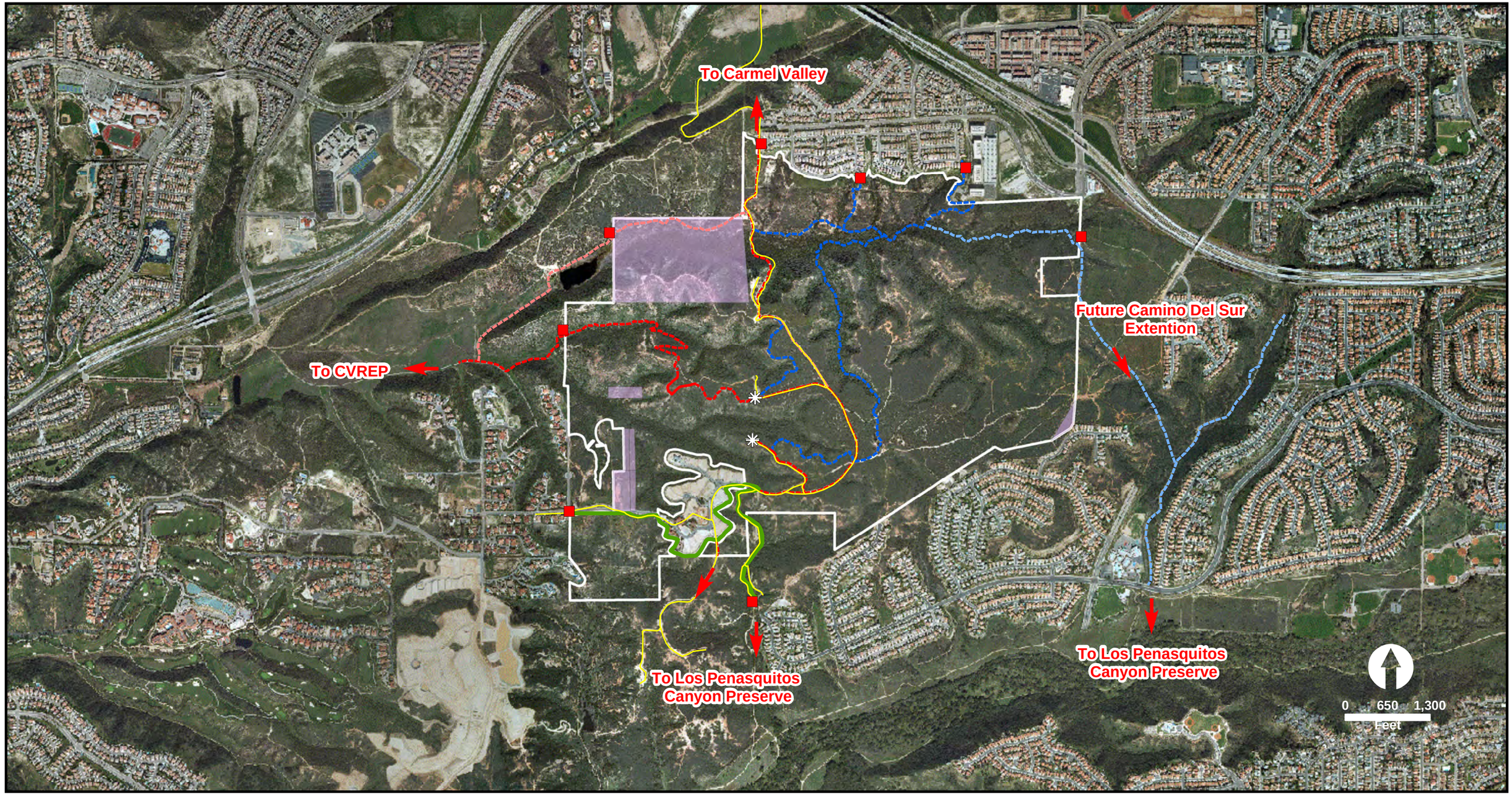
Proposed trails on Del Mar Mesa were selected to utilize existing utility access roads and old unauthorized use patterns (e.g. historic itinerant activity, illegal trespass, etc.), and to avoid any new impacts to habitat. As the Del Mar Mesa area is critical for connection to both the local and regional trail system, trails proposed were primarily based on connectivity, with the incorporation of limited large loops. There are no specific destinations within the proposed trails of Del Mar Mesa. The proposed trails were selected to both preserve and protect vernal pools and sensitive natural habitat, while allowing recreational trails in densities appropriate for the preserve. Trail use designation is based on physical constraints such as low brush canopy, natural cover and sanctuary for wildlife, and avoidance of sensitive flora. Selected trails were based on input from the community and user groups, City staff, and direction from CDFW and USFWS. Trails not considered for inclusion were based on:

- Redundant trails
- Unauthorized trails, including shortcuts
- Trails not accessible to the public
- Unsafe or unsustainable trails
- Impacts of trails on MSCP covered species

Proposed trail selection was reviewed and approved by City staff, CDFW and USFWS. Effective closure of unauthorized routes, active and passive restoration of impacted areas, and fencing and signage to close sensitive areas to public use or direct use away from sensitive areas will be implemented and maintained.

Vehicle access points and trail heads are provided at strategic locations for reasonable access. Vehicle access points are located at three existing locations: 1) the western access is located at the end of the Preserve Terrace through “The Preserve” housing development; 2) the northern access at the end of Santa Fe Canyon Place; 3) the southern access via the road from Los Peñasquitos Canyon Preserve at the end of Park Village Road. Access to private property on Del Mar Mesa will continue to be provided through existing roads. Additional trail heads will be located 1) from the west at the end of Rancho Toyon Place bordering “The Preserve” housing development, and 2) from the north at the corner of Arroyo Grande Road and Sierra Mesa Court.

There are two scenic viewpoints proposed on Del Mar Mesa Preserve (see Figure 9-3a). The southernmost view point overlooks Los Peñasquitos Canyon Preserve to the south.



Proposed trail access
Utility access roads
Proposed view point
Proposed multi-use trail
Proposed hike/bike trail
Private property
Proposed future multi-use trail
Proposed future hike/bike trail
Existing trails per Del Mar Mesa Specific Plan

Notes:
1 - Fencing and signage will be installed as necessary
2 - Public trails will not be located on private land (pending land acquisition, MOU and/or trail easement)
3 - Lands not shown as private, within the boundaries of Del Mar Mesa Preserve, are in public ownership or under easement to a public agency

FIGURE 9-3
Off-site Trail Connections for the Proposed Trail System on Del Mar Mesa Preserve

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The second viewpoint is located northeast of "The Preserve" housing development on the southern most spur off the main road.

Many of the existing unauthorized paths within the Preserve will remain closed and will be re-vegetated with passive and/or active methods to restore natural processes interrupted and/or damaged by unauthorized use. In addition, restrictions based on the land purchase requirements will be enforced, e.g. lands purchased as mitigation or with restricted state bond funds. Trails may be closed at the discretion of the Park and Recreation Department due to the following reasons:

- Unsafe or unsustainable trails
- Trails initiating opportunities for illegal activity
- Trails contributing to resource impacts (i.e. erosion, biological, etc.)
- New environmental concerns
- Other issues under which closure is warranted based on professional staff opinion

Proposed changes or additions to the trail alignments included in this document will be evaluated based on the MSCP, additional applicable regulations, if any, and the acquisition of appropriate permits. All changes must be authorized through an amendment to this plan and the Del Mar Mesa Specific Plan, or through concurrence of City, CDFW and USFWS staff.

9.3.3 Connections to Other Trail Systems

The proposed trail systems on Carmel Mountain Preserve and Del Mar Mesa Preserve were designed to be part of the regional trail system, connecting to other open space trails, specifically, Los Peñasquitos Canyon Preserve (LPCP), Torrey Pines State Reserve, Black Mountain Open Space Park and the San Diego Trans-County Trail (see Figure 9-2a).

The two Preserves are connected via trails along the following surface streets: Rancho Toyon Place, Little McGonigle Ranch Road and Del Mar Mesa Road.

9.3.3.1 Carmel Mountain

Connection to Torrey Pines State Reserve is made via the CVREP trail on the north. Los Peñasquitos Canyon Preserve can be reached from the southeast corner of the Preserve past Ocean Air Elementary via Carmel Mountain Road and Wagon Wheel Crossing within LPCP. Connection to the San Diego Trans-County Trail is made by taking the trail along the surface streets mentioned above and entering Del Mar Mesa at the existing south access road toward Park Village Road to Kit Carson's Crossing within LPCP.

9.3.3.2 Del Mar Mesa

Future connection to Torrey Pines State Reserve will be made from the northwest corner of Del Mar Mesa through Carmel Valley via the CVREP trail. The connection to Black Mountain Open Space Park will be made from the north through McGonigle Canyon and Carmel Valley. The existing connection to LPCP from the south is via the existing access road. There is an additional connection to LPCP by way of the Shaw-Lorenz development down the "Side Hill Trail" just west of Sycamore Crossing. There are two proposed connections to LPCP 1) from the eastern side of Del Mar Mesa through Darkwood Canyon and 2) from the southwest corner of Del Mar Mesa connecting to "Cobbles/Queens" trail north of the waterfall.

9.3.3.3 San Diego Trans County Trail

The San Diego Trans County Trail is a 114-mile route that stretches from Torrey Pines to the Anza Borrego desert (Figure 9-4). The trail corridor extends through several administrative jurisdictions and consists of existing and proposed trails on public lands and within the public right-of-way. Nearly 70 per cent of the route exists on federal, state, county and city lands. In 1998, the expedition known as the "Spines to Pines" expedition traversed the route from the desert to the coast (San Diego Natural History Museum 2001).

The San Diego Trans County Trail is a branch of the 7,700-mile Sea-to-Sea Trail, a system of interconnected trails crisscrossing the lower 48 states. On this trail system a person will be able to ride a bicycle, ride a horse, or walk to every large or medium size town in the country. Trails will lead directly or indirectly to the nation's major trails, including the Pacific Crest Trail that extends from Mexico to Canada. The Pacific Crest Trail runs north-south through the mountains of eastern San Diego County.

The San Diego Trans County Trail is sometimes called the San Diego Sea-to-Sea Trail, connecting the Pacific Ocean to the Salton Sea, a distance of 140 miles.

9.3.4 Trail Uses

A variety of non-motorized uses will be allowed on the trails of the Carmel Mountain and Del Mar Mesa Preserves. The primary uses are on-foot (hiking, walking, jogging, and running), mountain biking, and horseback riding. Figure 9-1a shows the difference trail uses, signage, fencing and lookouts.

Fencing will protect and prevent degradation of sensitive resources where trails encounter them. When brought on the Preserves, domestic animals will be leashed or otherwise constrained at all times and will be cleaned-up after by the owner or animal walker.

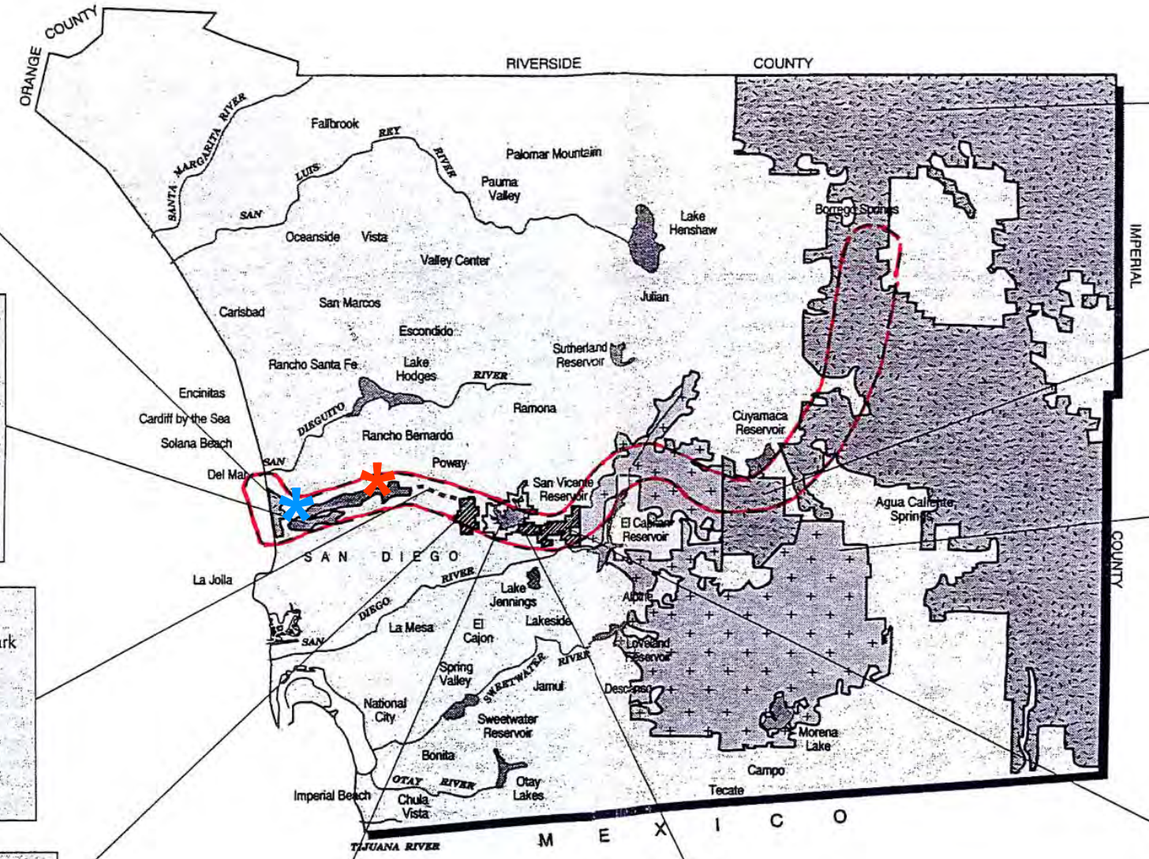
Encouraging multi-use activities on designated trails, rather than creating different trails for different activities, is important to maintain the biological integrity of the habitats. Trails in natural areas can significantly alter the habitat surrounding them. The opening of canopies by

TORREY PINES STATE PARK - 1,750 ACRES
State of California, Parks and Recreation Department
- Habitat: beach, lagoon, salt marsh estuary, coastal sage scrub, maritime chaparral, pine woodland
- Staging area and beach access at McGonigle Road parking lot
- Nearly 14 miles of existing trails
- Connected to Peñasquitos via public road right-of-way
- Some right-of-way trail construction is needed to connect Torrey Pines to Peñasquitos

LOS PEÑASQUITOS CANYON PRESERVE - 3,720 ACRES
City of San Diego, Parks and Recreation Department
- Habitat: freshwater marsh, grassland, riparian, oak woodland, coastal sage scrub, chaparral
- Staging area and west end trail access off Sorrento Valley Road
- Staging area and east end trail access off Black Mountain Road
- Nearly 18 miles of trails. The main trial stretches from staging area to staging area
- Abuts an open space corridor and the City of Poway
- Some trail construction is needed within Peñasquitos

CITY OF POWAY - 25,088 ACRES
- Habitat: coastal sage scrub, chaparral, neighborhood park, business park
- An existing trail connects Peñasquitos to a vast network of multi-use, non-motorized, public pathways
- Over 60 miles of a 75-mile trail master plan have been completed
- In Poway, the Trans-County Trail will run through the City and skirts a business park
- Some trail construction is needed within Poway to connect the City to Sycamore Canyon

SYCAMORE CANYON OPEN SPACE PRESERVE - 1,819 ACRES
County of San Diego, Parks and Recreation Department
- Habitat: oak woodland, coastal sage scrub, chaparral
- Staging area and north side trail access, from the City of Poway, via Sycamore Canyon Road
- Staging area and east side trail access off Highway 67
- 10 miles of trails, including several loop routes
- No more than one mile from the public property that surrounds San Vicente Reservoir



ANZA-BORREGO DESERT STATE PARK - 640,000 ACRES (not all shown)
State of California, Parks and Recreation Department
- Habitat: badlands, desert floor, riparian, palm oasis, piñon pine, desert transition, chaparral, montane
- The largest state park in the contiguous United States
- Over 500 miles of trails, including dirt roads

CUYAMACA RANCHO STATE PARK - 25,000 ACRES
State of California, Parks and Recreation Department
- Habitat: meadow, chaparral, oak woodland, mixed conifer forest
- 120 miles of existing trails
- Connected to Anza-Borrego by the California Riding and Hiking Trail and by the Pacific Crest Trail

CLEVELAND NATIONAL FOREST - 421,000 ACRES (not all shown)
United States of America, Department of Agriculture
- Habitat: coastal sage scrub, chamise chaparral, mixed chaparral, oak woodland, mixed conifer forest
- Nearly 358 miles of existing trails
- Adjacent to Cuyamaca Rancho
- Some trail construction is needed to connect El Capitan to Cuyamaca Rancho

EL CAPITAN OPEN SPACE PRESERVE - 2,839 ACRES
County of San Diego, Parks and Recreation Department
- Habitat: oak woodland, coastal sage scrub, mixed chaparral
- Staging area and trail access off Wildcat Canyon Road
- 8 miles of trail over rugged terrain
- Some of the most scenic vistas in San Diego County
- Abuts the Cleveland National Forest

SAN VICENTE RESERVOIR - 3,405 ACRES
City of San Diego, Department of Water Utilities
- Habitat: open water, oak woodland, coastal sage scrub, chaparral
- No trails at this time
- Adjacent to Oak Oasis
- Trail construction is needed to connect Sycamore Canyon to Oak Oasis

OAK OASIS OPEN SPACE PRESERVE - 397 ACRES
County of San Diego, Parks and Recreation Department
- Habitat: oak woodland, mixed chaparral
- Staging area and trail access off Wildcat Canyon Road
- 3 miles of existing trails
- Connected to El Capitan by public trail right-of-way

LEGEND

NATIONAL FOREST	S.D. WATER UTILITIES
STATE PARKS	
COUNTY PARKS	POWAY TRAIL CORRIDOR
S.D. CITY PARKS	

FOR MORE INFORMATION CONTACT COUNTY PARKS AT (619) 694-3042

* Carmel Mountain Preserve

* Del Mar Mesa Preserve

FIGURE 9-4
Trans-County Trail System

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vegetation removal, soil compaction, and the modification of existing drainage patterns by removal of upper soil horizons result in the modification of micro-topography that directly influences micro-climate and are direct consequences of trail construction (Cole as cited in Dehring and Mazotti 1997). In addition, off-trail use adjacent to marked trails results in increased instances of vegetation trampling and creation of unauthorized volunteer trails. Trampling causes structural damage to plants, which can lead to modified species composition and reduced cover and height. Trampling also affects trailside vegetation by changing soil conditions through compaction of soil particles and disruption of soil surface horizons. These changes in soil conditions often result in decreased nutrient, oxygen, and moisture levels, and increase the soils' resistance to root penetration (Dehring and Mazotti 1997). Short-cut trails that link two main trails opens up a wider area of habitat to disturbance, increases habitat fragmentation within the landscape, and deteriorates natural vegetation communities by creating favorable conditions for exotic species.

9.3.4.1 Hiking, Walking, and Running

The Carmel Mountain and Del Mar Mesa Preserves are both in the vicinity of housing developments. Once the development projects are completed, the Carmel Mountain Preserve will have residential housing on three sides. The southern boundary of the Del Mar Mesa Preserve links with the Los Peñasquitos Open Space Preserve and will attract hikers coming from that Preserve. Both the Carmel Mountain and the Del Mar Mesa Preserves are already being used by people hiking and walking their pets.

9.3.4.2 Horseback Riding

To protect sensitive biological resources while maintaining equestrian use within the Preserves, sensitive resources will be fenced, and the trails modified to allow the co-existence of sensitive resources and equestrian use. Sections 1.5.8 of the MSCP requires that the placement of equestrian use areas for both the Del Mar Mesa and Carmel Mountain Preserves minimize equestrian contact with wetland areas, including the vernal pool areas, and other highly sensitive biological areas (City of San Diego 1997).

Equestrian use on trails can contribute to the deterioration trails by loosening the soil, trampling the vegetation, and encouraging avoidance behavior in native animals (Dehring and Mazotti 1997). By remaining on designated trails, the horseback riding impacts in the surrounding habitat will be avoided. In addition, the City may pursue agreements with local commercial stables to conduct manure removal within the Preserves, and licensing of horses to fund management activities.

9.3.4.3 Mountain Biking

Those sensitive resources located near potentially impactive activities, such as mountain biking and other uses, will be protected by fencing. The City may pursue licensing of non-motorized vehicles, such as bikes, used within the Preserves to fund management activities.

9.3.4.4 Access for Private Landowners

Access to private property on Del Mar Mesa can be obtained through existing SDG&E access roads. Additional environmental review will be required for access and development of private lands.

9.3.5 Trail Management

9.3.5.1 Trail Implementation

a. City of San Diego MSCP Subarea Plan Guidelines

The following requirements are taken from the City of San Diego's MSCP Subarea Plan (Section 1.5.2, 1997) in regards to general management directives for trails:

- Provide sufficient signage to clearly identify public access to the MHPA. Barriers such as vegetation, rocks/boulders or fencing may be necessary to protect highly sensitive areas. Use appropriate type of barrier based on location, setting and use. For example, use chain link or cattle wire to direct wildlife movement, and natural rocks/boulders or split rail fencing to direct public access away from sensitive areas. Lands acquired through mitigation may preclude public access in order to satisfy mitigation requirements.
- Locate trails, view overlook, and staging areas in the least sensitive areas of the MHPA. Locate trails along the edges of urban land uses adjacent to the MHPA, or the seam between land uses (e.g. agriculture/habitat), and follow existing dirt roads as much as possible rather than entering habitat or wildlife movement areas. Avoid locating trails between two different habitat types (ecotones) for longer than necessary due to the typically heightened resource sensitivity in those locations.
- In general, avoid paving trails unless management and monitoring evidence shows otherwise. Clearly demarcated and monitor trails for degradation and off-trail access and use. Provide trail repair/maintenance as needed. Undertake measures to counter the effects of trail erosion including the use of stone or wood crossjoints, edge plantings of native grasses, and mulching of the trail.
- Minimize trail widths to reduce impacts to critical resources. For the most part, do not locate trails wider than four feet in core areas or wildlife corridors. Exceptions are made when appropriate and necessary, to safely accommodate multiple uses or disabled access. Provide trail fences or other barriers at strategic locations when protection of sensitive resources is required. The existing fence design is shown in Photograph 9-2, a fence on the Carmel Mountain Preserve.
- Limit the extent and location of equestrian trails to the less sensitive areas of the MHPA. Locate staging areas for equestrian uses at a sufficient distance (e.g. 300–500 feet) from

areas with riparian and coastal sage scrub habitats to ensure that the biological values are not impaired.

- Off-road or cross country vehicle activity is an incompatible use in the MHPA, except for law enforcement, preserve management or emergency purposes. Restore disturbed areas to native habitat where possible or critical, or allow to regenerate.

Photograph 9-2. Fence design.

- Limit recreational uses to passive uses such as bird watching, photography and trail use. Locate developed picnic areas near MHPA edges or specific areas within the MHPA, in order to minimize littering, feeding of wildlife, and attracting or increasing populations of exotic or nuisance wildlife (opossums, raccoons, skunks). Where permitted restrain pets on leashes.
- Remove homeless and itinerant worker camps in habitat areas as soon as found pursuant to existing enforcement procedures.
- Maintain equestrian trails on a regular basis to remove manure (and other pet feces) from the trails and preserve system in order to control cowbird invasion and predation. Design and maintain trails where possible to drain into a gravel bottom or vegetated (e.g. grass-lined) swale or basin to detain runoff and remove pollutants.

b. Specific Management Policies and Directives

The City of San Diego Subarea Plan (Section 1.5.8) also provides specific management directives for the Northern areas. Both the Carmel Mountain Preserve and Del Mar Mesa Preserve are subject to the specific guidelines as stated in the Carmel Valley Neighborhood 8A, and North City Future Urbanizing Area (NCFUA) Subarea 5 Plan. The following guidelines are taken directly from City of San Diego Subarea Plan Section 1.5.8.

The goals and objectives of the MHPA in the Northern area consists primarily of regional wildlife corridors providing linkages to the core areas of Del Mar Mesa, Los Peñasquitos Canyon Preserve, Los Peñasquitos lagoon, Torrey Pines State Park, the proposed San Dieguito River Valley Regional Park and the Black Mountain area. These linkages and core areas provide an important network of viable native habitats and plant communities, support the full range of native species, and provide functional wildlife connections over the long-term.

Table 9-1 is a complete list of covered species in the Northern Area.

TABLE 9-1
COMPLETE LIST OF COVERED SPECIES IN THE NORTHERN AREA

Plants Covered	Animals Covered
Del Mar Manzanita	Belding's savannah sparrow
Encinitas baccharis	Burrowing owl
Orcutt's brodiaea	California brown pelican
San Diego barrel cactus	California gnatcatcher
San Diego button-celery	California least tern
San Diego goldenstar	California rufous-crowned sparrow
San Diego mesa mint*	Canada goose
San Diego thorn-mint	Coastal cactus wren
Shaw's agave	Coopers hawk
Short-leaved dudleya	Golden eagle
Variegated dudleya	Mountain lion
Wart-stemmed ceanothus	Southern mule deer
Willowy monardella	Northern harrier
	Belding's orange-throated whiptail
	Riverside fairy shrimp
	San Diego horned lizard
	Southwestern pond turtle
	Western snowy plover
	White-faced ibis

*The City relinquished federal coverage for this species.

NCFUA Subarea 5 provides for the following specific management directives, as described in Section 1.5.8:

- All trails through the Del Mar Mesa area shall be clearly demarcated and provide split rail fencing or barriers and signage along sensitive portions to discourage off-trail use. Trails through this area should use the existing disturbed roads as much as possible. No new trails should be cut through the existing habitat. Over the long-term, evaluate existing dirt and disturbed roads and trails for restoration.
- Establish an equestrian use plan for the Del Mar mesa area that avoids vernal pool habitat and associated watershed areas. If possible, this area should be managed as a single unit, avoiding being split into separate entities according to ownership.
- Sensitive areas of Del Mar Mesa should be protected from impacts via adjacent development. Signage should be used to inform people of sensitive resources such as vernal pools, and restriction of off-road vehicle use in the area.
- Occasionally monitor the corridor from Shaw Valley through the Bougainvillea golf course development to the Walden Pond area for wildlife usage (to include mesopredators like opossums, skunks, and raccoons), and feral animals and invasive plant species.

c. Coastal Zone Guidelines for Subarea 5

Carmel Valley Neighborhood 8A area should adhere to the following specific management directives, as described in Section 1.5.8 of the MSCP (1997), which is applicable to Carmel Mountain Preserve:

- Use signage and fencing to delineate and protect sensitive species, and to redirect human access from vernal pools and dudleya populations.
- Develop an equestrian use plan to include a trail system that will avoid wetlands and other highly sensitive areas as much as possible.
- Monitor sensitive areas for off-road/off-trail use. Take necessary measures to prevent such use, and repair damage (at minimum, closure of areas) as soon as feasible, including invasive plant removal.
- Use some of the existing dirt roads for trails. Avoid cutting new trails through habitat areas. Restore/revegetate dirt roads (not used as trails) and other disturbed areas to the appropriate habitat (maritime chaparral, vernal pool, grassland, coastal sage scrub), as determined by biologists.

9.3.6 Trail Features Requiring Maintenance

The following features indicate that the trail has degraded and needs maintenance:

- **Deep Trenching.** A trail that has sunken, causing hikers to feel as though they are walking in a trough. Deep trenching may cause users to walk/ride on level ground to the left or right of the trail, thus widening the trail and causing impacts to adjacent vegetation and soil crusts.
- **Widening.** The trail has become widened from a single or double track to an unattractive wilderness “freeway” of several parallel tracks, each trenched to a varying degree.
- **Short Cuts.** Trail users sometimes travel the shortest distance between two points (a straight line), disregarding the designated trails and creating a web of steep erosive trails.
- **Steepness.** When a trail exceeds a comfortable level of steepness over a long distance, users will either discontinue using the trail or they will not enjoy their excursion.
- **Impacts to Natural and Cultural Resources.** Sensitive plant and animal species, and archaeological sites can be impacted by erosive trails.

9.3.6.1 Designing the Trail System to Minimize Maintenance

The original trail design and its alignments are the most integral component of trail maintenance. A well-designed trail will be easier to maintain, will deteriorate less rapidly, and

will provide a more pleasant recreational experience. On the other hand, a poorly designed trail is difficult to maintain, deteriorates quickly and, once you lose it, there is not much that can be done to restore it. In addition, a poorly designed trail will always be less pleasant to hike or ride.

a. Gradient

The Preserves sit atop erosive sandstone strata; therefore, gradients should be low. Trails along the steep slopes require switchbacks to keep gradients low and to minimize erosion. Generally, the linear gradient of a trail in either Preserve should be less than 2–5 per cent. Since the sandstone soils are highly erosive, a 5 percent slope may be excessive.

b. Relationship to Existing Contours

On a map, a contour is a line of points that are at the same elevation. If you walk precisely parallel to a contour, you are walking at a level (0 percent) grade. If you walk perpendicular to a contour, you are walking either straight uphill or straight downhill. A well-designed trail is laid out to traverse a hillside, closer to parallel than perpendicular to the contours.

When a trail runs perpendicular to the contours, water runs down the middle of the trail, causing trenching, even at a 10 percent gradient. The only way to get water off the trail is for the route to traverse the natural slope, because then there is always a lower side of the trail. When there is a lower side of the trail, it becomes a simple matter to redirect water across and off the trail, rather than allowing it to cut a channel down the trail's centerline.

c. Outslope

A well-designed trail should be constructed to have a 3 to 4 percent cross-slope grade, tilting toward the outside (downhill side) of the trail to get the water off the trail as soon as possible. Outsloped trails are the easiest to construct if the original trail alignment traverses the natural slope.

d. Switchbacks

A "switchback" is any place where the alignment of a trail traverses a slope in one direction and then abruptly "switches back" toward the opposite direction. Switchbacks are often used to run a trail up a steep slope in a constrained location. Although switchbacks are often the only solution to the problems of rock outcrops and steep slopes, they should be avoided where possible. Unless they are perfectly designed and constructed, switchbacks present an irresistible temptation to people to shortcut the trail and cause erosion over a web of indiscriminately created volunteer routes.

9.3.7 Trail Maintenance

The following maintenance guidelines are summarized from the Park and Recreation Department Open Space Division Trail Policies and Standards (City of San Diego 2010).

Inspection of the trail is the first step in trail maintenance. When erosion problems are evident, water may be the cause, and where to divert it is an important issue. The following elements represent the primary mechanisms to be used in the maintenance of trails. They are generally listed in priority order, but each has its own special application and purpose. Maintaining the outslope and the drainage dips represent the most important issues of trail maintenance.

9.3.7.1 Outslope

This is the first order of business in trail maintenance. It is the simplest, but most labor intensive trail maintenance tool.

Normal trail use will build up a berm along the outside (downhill) edge of the trail. If allowed to continue, the berm will grow and prevent water from flowing off the trail, causing the centerline of the trail to become entrenched. If this centerline trench is allowed to continue unchecked, the trail will trench deeper and deeper. Entrenching can be repaired using rolling slopes, which are alternating, multiple, cross-slopes that slow water and reduce erosion.

The outslope is maintained by simply pulling the berm back into the trail tread. This must be done consistently by trail crews. In many cases, if the outslope is restored on a regular basis, little or no maintenance is needed of any other kind. However, some use patterns (extensive equestrian use), soil conditions (sandy), and climate conditions (high precipitation) combine to minimize the effectiveness of this maintenance tool.

9.3.7.2 Drainage Dips

A drainage dip is built into the original trail alignment and is a change in gradient (a "dip" in the trail) that dissipates and diverts water flow. It only remains effective at preventing erosion as long as regular maintenance keeps it unplugged.

9.3.7.3 Pruning Overhanging Vegetation

Pruning vegetation may be necessary as part of regular trail maintenance. Multi-use trails should have 10-foot vertical clearance. There may be specific considerations for trail dimensions depending on the location of the trail, to comply with the proper jurisdictions of the region.

Too often, trail pruning is accomplished in the most expeditious manner possible—a branch intrudes within the walking/riding space of the trail and is quickly lopped-off so that it does not intrude and the debris is indiscriminately tossed aside. However, our goal in trail maintenance is

to maintain a trail in as natural appearance as possible. A quick pruning job deals only with the function of trail maintenance, not the aesthetics.

These elements of pruning are utilized by California State Parks and may be useful to incorporate into maintenance activities. Each of these elements makes pruning a more tedious maintenance task, but results with a trail that is compatible with the natural environment.

- **Do not toss debris**: Branches that are randomly discarded usually end up hanging in adjacent shrubs or trees. These dead branches are both unsightly and create a fire hazard.
- **Place debris out of view.** This element requires the extra effort of dragging branches under and around shrubs.
- **Place the butt (cut) end away from the trail.** This will help disguise the debris.
- **Each cut branch should be touching the ground to promote decomposition.** This means that brush piles are not appropriate.
- **Pruning should be done sensitively so that the trail appears natural** and not as if a chain saw was used without regard. Ideally, trail users should not be aware that maintenance work has recently been done.
- **Prune to the collar of any branch stem** for the health of the shrub and a more natural looking result. At the base of any branch there is a wide section that contains a plant's natural healing agents. Any pruning performed away from this collar will expose the plant to a greater risk of infection. A cut at the collar will naturally heal. For large branches over two inches in diameter, cut from the bottom, then cut down from the top. This prevents tearing of the bark, reducing infection.

9.3.7.4 Signing/Mapping

Adequate signing and mapping keeps trail users on the trail. Uncertainty about which trail to use may lead to new trails being created by trail users. These new trails will become maintenance problems and will ultimately need to be abolished.

9.3.7.5 Rolling Slopes

Rolling slopes are alternating, multiple, cross-slopes that can be used to divert water from the trail. At each change in slope, the water is slowed, allowing it to drop sediment. By reducing erosion and allowing sediment to drop on to the trail, an entrenched trail can be repaired. Depending on conditions, this method may effectively rebuild the trail over time.

9.3.7.6 Imported Fill Material

A deeply trenched trail can be restored by importing dirt or decomposed granite, compacting it, and recreating a well-drained outsloped trail. However, in most situations, this approach is usually both cost prohibitive and far too labor intensive.

9.3.7.7 Rerouting Trails

Trail rerouting is beyond the responsibilities of a trail maintenance crew. New trail alignments must be flagged by experienced park staff and then reviewed by resource specialists for compliance with applicable regulations (e.g.California Environmental Quality Act). Trail maintenance crews can provide valuable assistance by alerting park staff to those trail routes that may need to be rerouted.

9.3.8 Trail Monitoring

Trail monitoring is extremely important in evaluating environmental impacts resulting from a variety of uses on the trails. Some activities will impact the integrity of the trails more so than others, and will need to be actively monitored more closely. It is therefore beneficial to track when activities occur more frequently than others (there may be seasonal differences).

The following guidelines may contribute to keeping track of how many people are actively using the trails, and for what kinds of recreation.

- Identify the impacts being monitored, including impacts to water quality, soils, wildlife, flora, and other users (accidents, injuries, enjoyment of the trail).
- Establish quantitative and qualitative measurement scales for impacts.
- Establish impact thresholds that, if reached, trigger correction or closure of the trail to bicycles, equestrian, or other activity.
- Establish a schedule for monitoring activities.
- Establish a written reporting system.
- Train personnel to follow the monitoring program.
- Reliable trained persons from user groups may be used to supplement monitoring by staff.
- Specify baseline inventories to allow for monitoring of trends.
- Secure the resources to carry out the monitoring plan.

The best enforcement of regulations will come from regular patrolling combined with effective education and an active monitoring program.

Trail monitoring provides organizations and individuals a sense of what is occurring within the Preserves and a method to document degradation and damage to public lands. Trails receive impact from all authorized user groups and unauthorized use such as motorized trespass.

The City Park and Recreation Department, Open Space Division staff reserves the right to restrict the use of and/or close any public trail or access point on Carmel Mountain or Del Mar Mesa to protect public health, safety and welfare. An example of such conditions would include, but is not limited to, restrictions/closures during inclement weather, trail overuse, landform deterioration, and other adverse conditions.

9.4 Research

Research that would require going off the official trails and roads or would require collection of resources from either of the Preserves requires approval from City staff. Research must avoid adverse environmental effects by the researchers' presence and activities. Researchers who apply to conduct their research in the Preserves must present a research design and evidence of their qualifications to conduct such research, including professional training, publications, and experience.

Research on federally listed species must also be approved in writing by the USFWS Carlsbad Field Office. Results of research on federally listed species will be provided to the Carlsbad Field Office and the City of San Diego, MSCP program.

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