ATTACHMENTS

ATTACHMENT A

FINAL
NAVAL MEDICAL CENTER SAN DIEGO
NATURAL RESOURCES INVENTORY AND IMPLEMENTATION GUIDE

Contract Number N68711-00-D-4414; Delivery Order 0010

Prepared for

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Executive Summary

This document summarizes the results of the baseline natural resources surveys on the Naval Medical Center San Diego (NMCSD). These surveys were conducted in 2002 and 2003 in support of the management strategies detailed in the Integrated Natural Resources Management Plan (INRMP) for NMCSD.

NMCSD occupies approximately 75 acres in the southern portion of Balboa Park in the City of San Diego. The site is bordered by Florida Drive and Pershing Drive to the east, Park Boulevard to the west, and Interstate 5 to the south and southwest.

RECON biologists conducted surveys in 2002 and 2003 to locate and map the following biological resources: rare plants (including narrow endemics), vegetation communities, and federal jurisdictional waters of the U.S. In addition, RECON biologists conducted mammalian, herpetological, ornithological, and invertebrate focused surveys. An exotic invasive plant control plan and an erosion control plan have also been prepared. The natural resource surveys were based on currently accepted methods and specifications provided in delivery order 0010 of the Indefinite Delivery/Indefinite Quantity Contract N68711-00-D-4414.

There are five land cover types on-site as mapped using the Holland classification system: Diegan coastal sage scrub, southern willow scrub, ornamental vegetation, disturbed habitat, and urban/developed lands. The majority of vegetation on-site is non-native ornamental landscaping. The west-facing slope above Florida Canyon contains Diegan coastal sage scrub with varying dominant and co-dominant species. The urban drainage on the east side of the property includes southern willow scrub with patches of invasive exotic species. Ninety-eight vegetation classifications were defined using the comprehensive Sawyer and Keeler-Wolf method, which maps a vegetation polygon based on visual changes in vegetation and then determines the dominant and co-dominant species in each polygon. These associations become the vegetation classification.

A total of 202 plant species were identified within the NMCSD boundary. Of this total, 64 (32 percent) are species native to southern California. Four species of reptiles were detected on-site during general surveys and cover board checks. 29 species of birds were detected. Nine mammal species were identified. A total of 344 invertebrates were collected representing twelve different orders.

No rare plants, amphibians, reptiles, invertebrate, or mammal species were observed during the focused and general surveys. One federally listed threatened species, coastal California gnatcatcher, was detected on the western slopes that support native Diegan coastal sage scrub.

A total of 0.48 acre of jurisdictional wetlands was delineated in the urban drainage adjacent to Florida Drive.

Both short-term and long-term erosion control issues were identified. A total of nine areas were defined as short-term erosion control areas, which require immediate installation of erosion and sediment control devices in order to control current erosion problems. All of these items should be considered a high priority, because, if left unchecked, they could pose significant erosion problems on the site. Several sites have been identified for long-term sediment and erosion management, and should be regularly monitored for signs of erosion or sedimentation.

A total of 38 invasive exotic species were identified on-site. Removal and control methods are described for 20 of these species that are considered to provide the greatest threat to the native habitat on-site.

Introduction

The purpose of this document is to provide a baseline inventory of natural resources that will support the management strategies detailed in the Integrated Natural Resources Management Plan (INRMP) for Naval Medical Center San Diego (Tierra Data Systems 2001).

The Naval Medical Center San Diego (NMCSD) occupies approximately 75 acres within the southern portion of Balboa Park in the City of San Diego (Figures 1 and 2). NMCSD is bordered by open space that contains large tracts of coastal sage scrub, which is part of the city of San Diego's Multiple Habitat Planning Area. The site is bordered by Florida Drive and Pershing Drive to the east, Park Boulevard to the west, and Interstate 5 to the south and southwest (see Figure 2).

A variety of surveys were conducted by RECON biologists in 2002 and 2003 to locate and map the following biological resources: rare plants (including narrow endemics), vegetation communities, and jurisdictional waters of the U.S. under federal regulation. In addition, RECON biologists conducted mammalian, herpetological, and invertebrate focused surveys. An exotic invasive plant control plan and an erosion control plan have also been prepared. The natural resource surveys were based on currently accepted methods and specifications provided in delivery order 0010 of the Indefinite Delivery/Indefinite Quantity contract N68711-00-D-4414.

Survey Methods

A. Literature Review

A review of existing literature relevant to the existing biological resources and management concerns on the NMCSD site was conducted. Literature reviewed included, but was not limited to the following documents:

- Integrated Natural Resource Management Plan for Naval Medical Center San Diego (Tierra Data Systems 2001)

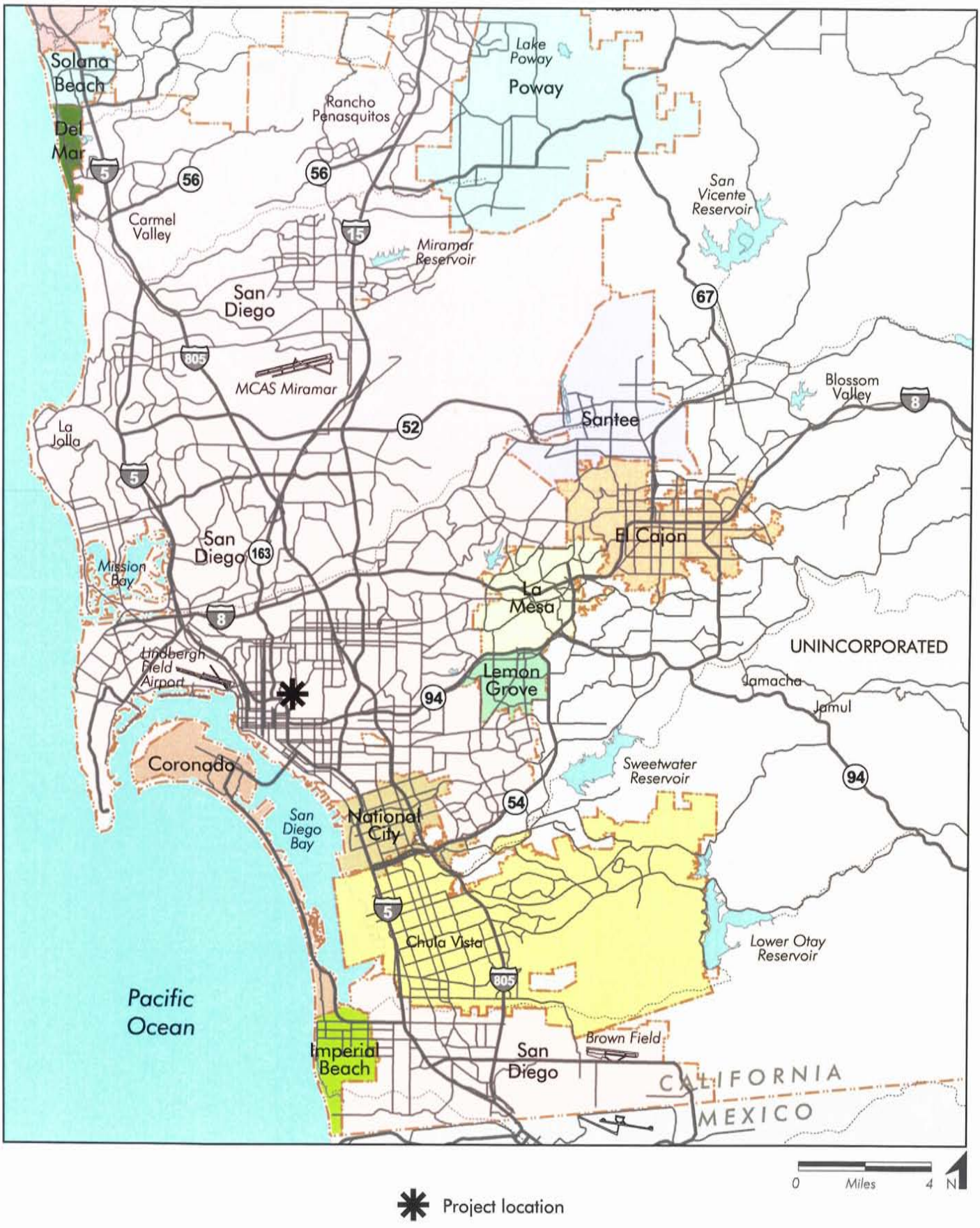

FIGURE 1
Regional Location

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fig1 (regl) 11/03/03

Map Source: USGS 7.5 minute topographic map series, Point Loma quadrangle

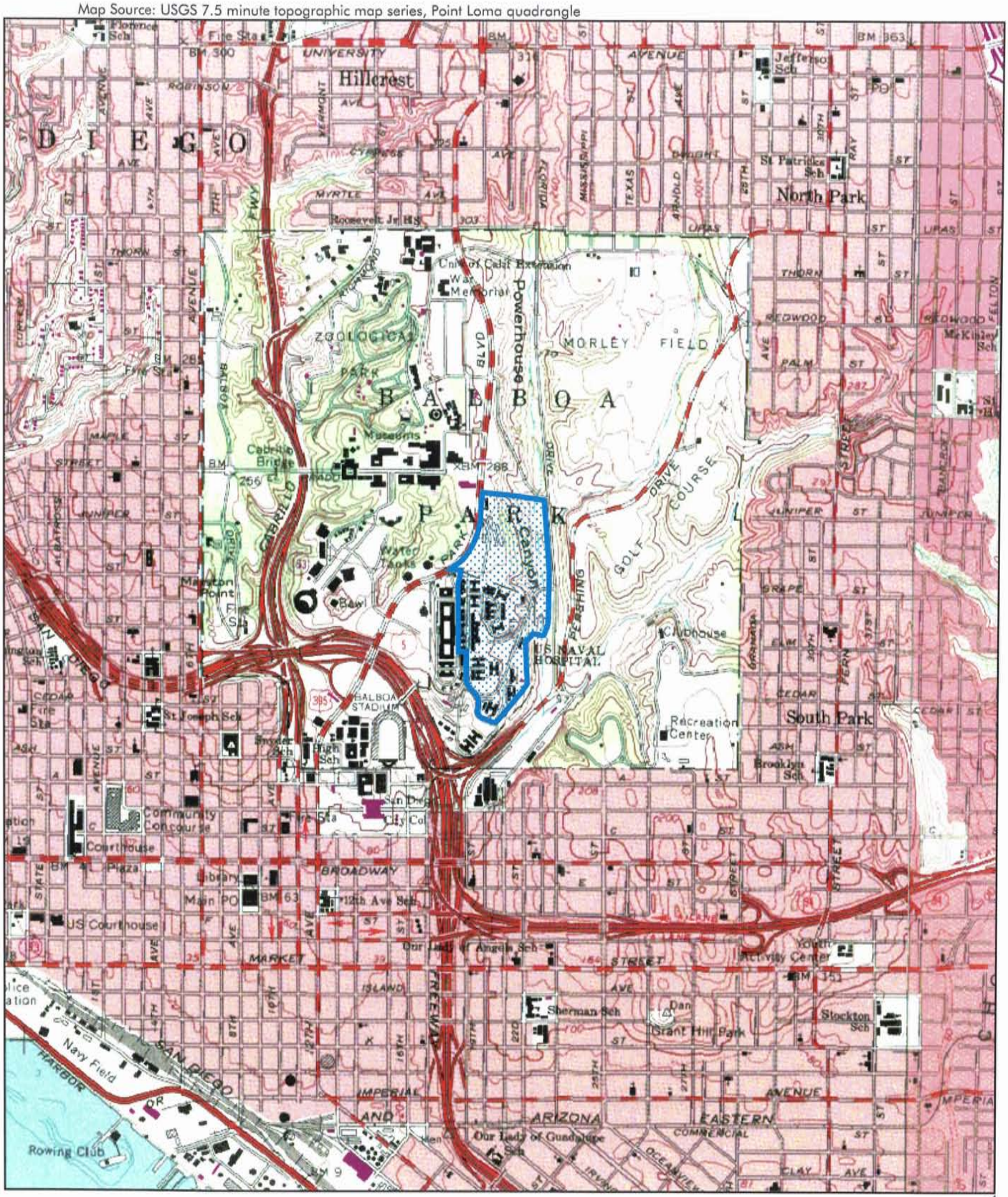

FIGURE 2
Project Location on United States Geological Survey Map

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fig2 (usgs) 11/03/03

- California gnatcatcher surveys on NMCSD (Appendix C of the INRMP)
- Naval Medical Center Final Natural Resources Management Plan (RECON 1996)
- California Natural Diversity Data Base (State of California 2002e) (electronic database)

B. Botanical Resources

Table 1 provides the dates and times all botanical surveys were conducted and the personnel involved. Survey dates were modified from those presented in the Final Work Plan (RECON 2003) when weather conditions were inclement.

The property has been divided into 10 management units to better coordinate survey efforts and for future management of the site. Figure 3 shows the management units. The boundaries of the management units were chosen based on topography, current land use, location, and preliminary information regarding the natural resources present. All data collected was inventoried and recorded by management units.

1. Vegetation Communities and General Plant Surveys

Vegetation communities were mapped on November 27 and December 12, 2002 and January 12, September 26, and October 17, 2003 by RECON biologists Wendy Loeffler, Jennifer Hodge MacAller, and Brant Primrose on a 1 inch = 150 feet aerial photograph (see Table 1). Vegetation communities were assessed and mapped within each management unit according to the classification system outlined in Sawyer and Keeler-Wolf (1995). Native plant groupings equal to or greater than 10-foot-square were mapped as individual plant community polygons. Horticultural or landscaped areas equal to or greater than 20-foot-square were also mapped individually.

Floral nomenclature follows Hickman (1993) for common plants and the California Native Plant Society (CNPS; 2001) for sensitive species. Nomenclature for ornamental plant species follows Bailey (1976). Species that could not be readily identified in the field were collected and later identified using a taxonomic key.

Twenty-eight photo-documentation points were established to document the vegetation on the NMCSD site. The photo-documentation points were marked using a Trimble Global Positioning System (GPS). The photographer, time and date, compass direction, height from ground level and magnification were recorded for each photograph. All photographs were taken with a digital camera with 3.3-mega pixel resolution. The photographs, map of photograph locations, and data log are provided in Appendix A.

2. Rare Plant Surveys

Three focused surveys for rare plants were conducted over the entire NMCSD, two in spring and one in summer. Brant Primrose conducted rare plant surveys on March 3, May 12, and July 14, 2003. Jennifer Hodge MacAller assisted during the initial survey. Survey routes are depicted in Figure 4.

TABLE 1
SURVEY SCHEDULE AND PERSONNEL

Date	Task	RECON Personnel
Vegetation Survey		
November 27 and December 12, 2002; January 12 and September 26, 2003	Conduct vegetation survey.	J. Hodge MacAller W. Loeffler
September 26, 2003	Establish photograph points and map locations using GPS.	W. Loeffler J. Hodge MacAller
Rare Plant Survey		
March 3, 2003	First rare plant survey.	J. Hodge MacAller B. Primrose
May 12, 2003	Second rare plant survey.	B. Primrose
July 14, 2003	Third rare plant survey.	B. Primrose
Herpetological Survey		
December 9, 2002	Place cover boards for herpetological surveys. Map locations of cover boards using GPS.	V. Novik B. Primrose
February 21, 2003	Check under cover boards.	W. Loeffler B. Primrose
March 18, 2003	Check under cover boards.	A. Hamel B. Primrose
April 15, 2003	Check under cover boards.	B. Primrose A. Hamel
May 21, 2003	Check under cover boards.	W. Loeffler B. Primrose
June 6, 2003	Herpetological ocular surveys.	J. Seed
October 29, 2003	Check and pick up cover boards.	B. Primrose
Invertebrate Survey		
May 27, 2003	First daytime invertebrate survey. Check under cover boards.	J. Radtkey W. Loeffler B. Primrose
July 7 and 10, 2003	First nighttime invertebrate survey using black light.	J. Radtkey W. Loeffler J. Hodge MacAller
July 17 and 21, 2003	Second nighttime invertebrate survey using black light.	J. Radtkey W. Loeffler P. Tomsovic
July 29, 2003	Second daytime invertebrate survey.	J. Radtkey
July 24 and 31, 2003	Third nighttime invertebrate survey using black light.	W. Loeffler P. Tomsovic R. MacAller

TABLE 1
SURVEY SCHEDULE AND PERSONNEL
(continued)

Date	Task	RECON Personnel
August 5, 2003	Third daytime invertebrate survey.	J. Radtkey J. Hodge MacAller
Ornithological Survey		
January 17, 2003	First winter ornithological survey.	J. Hodge MacAller
February 18, 2002	Second winter ornithological survey.	A. Hamel V. Novik
April 15, 2003	Spring ornithological survey.	A. Hamel B. Primrose
May 27,2003	Second spring ornithological survey.	W. Loeffler
Mammal Survey		
May 28-31, 2003	First mammal trapping period.	J. Hodge MacAller J. Seed B. Primrose W. Loeffler
June 6, 2003	Ocular mammal surveys and survey for feral cat feeding stations.	J. Seed
June 30-July 3, 2003	Second mammal trapping period	W. Loeffler J. Hodge MacAller P. Tomsovic B. Primrose R. MacAller
July 28-31, 2003	Third mammal trapping period	W. Loeffler J. Hodge P. Tomsovic B. Primrose R. MacAller
Wetland Delineation		
December 10, 2002	Wetland delineation.	J. Hodge MacAller V. Novik
August 27, 2003	Wetland delineation.	J. Hodge MacAller P. Tomsovic
Erosion Control Visit		
February 25 and March 31, 2003	Assess erosion control issues.	P. Tomsovic W. Loeffler R. MacAller
Exotic Plant Survey		
January 21, 2003	Map exotic plants using GPS.	B. Primrose V. Novik
September 25, 2003	Map exotic plants using GPS.	B. Primrose

Image Source: Photo Geodetic Corporation (flown April 2002)

Project boundary

10 Management units

FIGURE 3
Management Units

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fig3 (mgmt units) 11/03/03

Image Source: Photo Geodetic Corporation (flown April 2002)

FIGURE 4
Rare Plant Survey Route

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C. Wildlife Resources

Zoological nomenclature for birds is in accordance with the American Ornithologists' Union Checklist (1998); for mammals, Jones et al. (1997); and for amphibians and reptiles, Crother (2001). Assessments of the sensitivity of species and habitats are based primarily on California Native Plant Society (CNPS 2001), State of California (2002a, 2002b, 2002c, 2002d, 2002e), U.S. Fish and Wildlife Service (USFWS; 2002), and Holland (1986).

1. Herpetological Surveys

General herpetological surveys were conducted over the entire NMCSD site. Surveys were conducted at various times to ensure optimal detection of the reptile and amphibian species potentially present on-site. Surveys were conducted by walking meandering routes through the appropriate habitats to look for any sign of amphibian and reptile species. Survey routes are depicted in Figure 5. All habitat types were given equal survey effort. All reptile and amphibian species observed were recorded.

A total of 18 cover boards were placed throughout the various habitats on NMCSD. Each cover board was laid flat on the surface of the soil. The boards were placed on-site on December 9, 2002 and allowed to weather for several months to allow the various species to become acclimated to the boards. The cover boards were checked by carefully lifting the board up and documenting the species observed. RECON biologists Wendy Loeffler, Brant Primrose, and Angelique Hamel checked the cover boards on February 21, March 18, April 15, May 27, and October 9, 2003, as detailed in Table 1. The locations of the cover boards, which are shown on Figure 6, were mapped using a Trimble GPS unit with sub-meter accuracy.

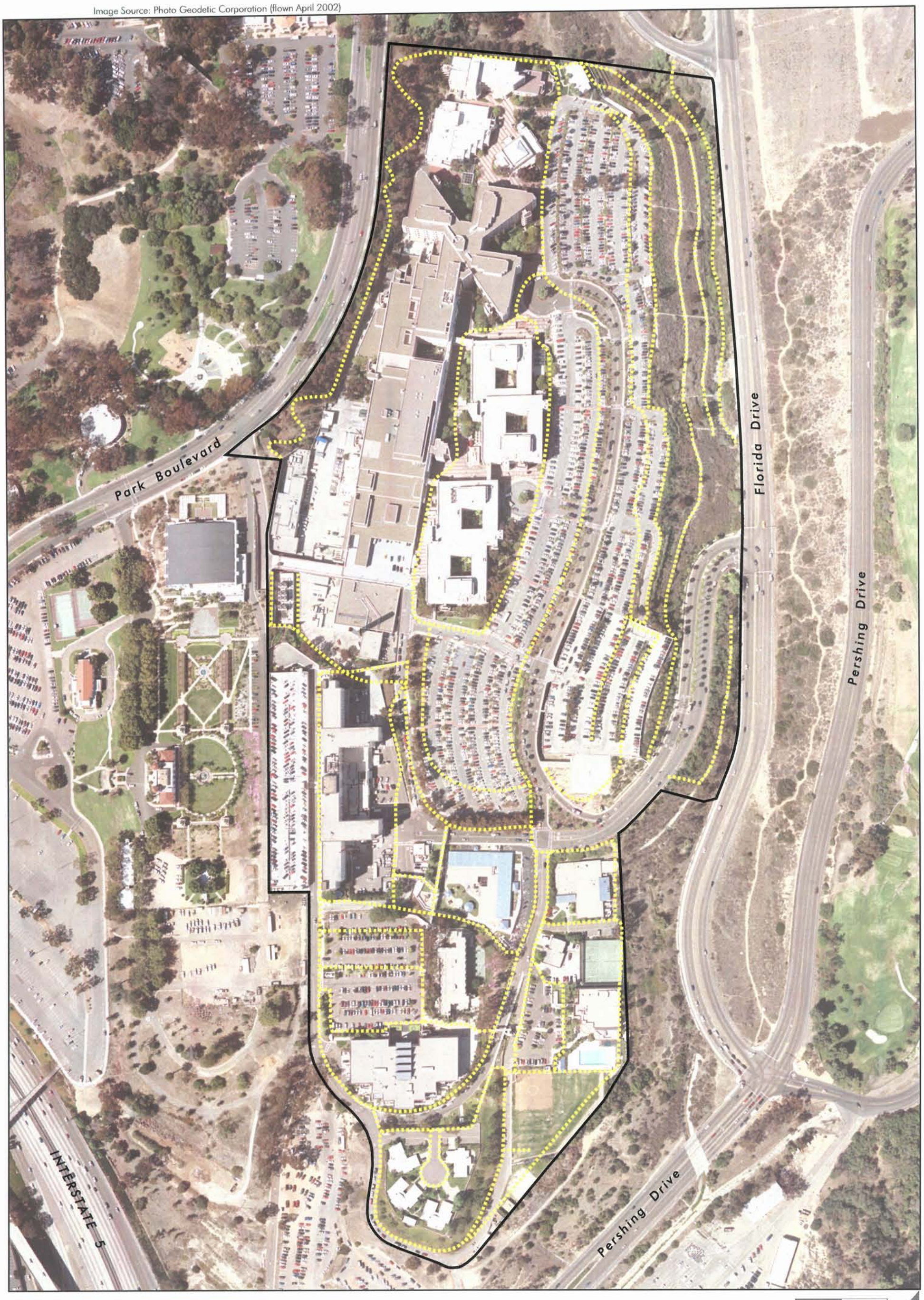
2. Invertebrate Surveys

General surveys for invertebrate species (excluding fairy shrimp) were conducted throughout the entire NMCSD site. These general surveys consisted of visual detection in the vegetation, air, or under cover boards; bush beating; and capture by canvas or mesh nets. The invertebrates found beneath the cover boards were recorded during the herpetological surveys. Survey routes for the visual surveys are shown in Figure 5.

Three daytime surveys were conducted, one during the spring and two in the summer. RECON biologists Jennifer Radtkey, Wendy Loeffler, Jennifer Hodge MacAller, and Brant Primrose conducted daytime invertebrate surveys on May 27, July 29, and August 5, 2003 (see Table 1). These daytime surveys included bush beating, net and air sweeps, and visual detection. Bush beating includes the placement of a sheet or tray below selected shrubs, which is then disturbed by shaking or beating, thus dislodging invertebrates inhabiting the vegetation. Canvas and mesh nets were used to capture insects in bushes and in the air. Locations of these surveys are illustrated on Figure 6.

In July 2003, Jennifer Radtkey, Wendy Loeffler, Pete Tomsovic, Jennifer Hodge MacAller, and Robert MacAller conducted nighttime invertebrate surveys at six locations, once a week for three weeks (see Table 1). Surveys were conducted using a black light projected on a white sheet. The invertebrates

Image Source: Photo Geodetic Corporation (flown April 2002)



Project boundary

Survey route

FIGURE 5
Survey Routes for Herpetological, Ornithological, and Mammal Ocular Surveys

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fig5 (survey routes) 11/03/03

Image Source: Photo Geodetic Corporation (flown April 2002)

Park Boulevard

Florida Drive

Pershing Drive

INTERSTATE 5

Pershing Drive

0 Feet 250 N

Project boundary

Cover board

Invertebrate survey locations

- Blacklight station (surveyed each visit)
- Blacklight station (surveyed once)
- Bush beating and net/air survey
- Net/air survey only

FIGURE 6
Herpetological and Invertebrate Survey Locations

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fig6 (herps events) 01/27/05

attracted to or near the sheet were collected. Biologists remained at each location for approximately one hour during each survey. Only three locations could be surveyed during each visit; therefore, two survey nights were required each week to complete surveys at all six stations. The survey locations using black lighting were mapped using a Trimble GPS with sub-meter accuracy and are provided on Figure 6. Five of the stations were fixed locations and surveyed each week. The sixth station location was rotated each week to increase the coverage of different areas on the base.

All invertebrates collected are currently being identified to family and genus, when possible. All specimens will be curated with the name and location collected clearly labeled. This invertebrate collection will be included with the final submittal to NMCSD at the completion of the contract.

3. Ornithological Survey

General ornithological surveys were conducted by Wendy Loeffler, Jennifer Hodge MacAller, Angelique Hamel, Victor Novik, and Brant Primrose in January, February, April, and May, 2003 to detect resident, winter, breeding, and spring migrant bird species (see Table 1). Bird species were identified visually or by vocalizations. Surveys were conducted by walking meandering survey routes through each of the habitat types within the management units on the NMCSD. Survey routes are shown on Figure 5.

4. Mammal Surveys

General daytime mammal surveys were conducted by Jill Seed on June 6, 2003 (see Table 1). Ms. Seed walked meandering survey routes in appropriate habitat areas. In shrub-dominated habitats, surveys were conducted on all accessible lanes and around the habitat periphery to detect any evidence of mammals. All mammals detected visually or by sign, such as track, scat, or burrow, were noted. The survey routes for mammal surveys are depicted on Figure 5. Ms Seed also conducted a focused survey for feral cat populations and feeding locations. In addition, biologists kept a record during all general surveys if feral cats were noted.

Surveys also included small mammal trapping using Sherman live traps. The trap lines are shown on Figure 7. Trapping was conducted for three consecutive nights, on or near the new moon, once in early spring and twice in the summer. As shown in Table 1, biologists conducted small mammal trapping May 28 to 31, June 30 to July 3, and July 28 to 31, 2003. Each trap is modified to reduce the risk of injury to small mammals. Traps were baited with oatmeal and set near dusk and checked soon after sunrise to limit the time that the mammals spent in the traps. An attempt was made to place the traps in areas that did not support Argentine ant activity. Initially 54 traps were placed along three trap lines. This was increased to 86 traps along four trap lines for the remaining two nights of the spring survey. The traps were added to provide greater coverage of the entire site. Six traps were subsequently removed during the first summer survey because of their proximity to an active wasp nest. Eighty-four traps were set during the three nights of the second summer survey. A total of 724 trap nights was conducted over all three live trap surveys. Hall and Kelson (1959) and Tremor (1999) were used for nomenclature and for species identification.

Image Source: Photo Geodetic Corporation (flown April 2002)

Project boundary

Trapline

Mammal trap

* Traps 1-10, 1-11 and 1-12 were removed due to presence of wasp nest. Trap 1-1a was subsequently added.

FIGURE 7
Mammal Trap and Trapline Locations

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bg7 (mcginnis) 11/03/03

D. Wetland Delineation

A routine wetland delineation, following the guidelines set forth by U.S. Army Corps of Engineers (USACE 1987), was performed to gather field data at potential wetland sites the NMCSD boundary. RECON biologists Jennifer Hodge MacAller and Victor Novik began the delineation on December 10, 2002. Jennifer Hodge MacAller and Pete Tomsovic completed the delineation on August 27, 2003 (see Table 1). All jurisdictional waters and soil test pit locations were mapped. Wetland data sheets are provided in Appendix B.

1. Regulatory Definition

In accordance with Section 404 of the Clean Water Act (CWA), the USACE regulates the discharge of dredged or fill material into waters of the U.S. The term "waters of the United States" is defined as:

- All waters currently used, or used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide;
- All interstate waters including interstate wetlands;
- All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds; the use, degradation or destruction of which could affect foreign commerce including any such waters: (1) which could be used by interstate or foreign travelers for recreational or other purposes; or (2) from which fish or shellfish are, or could be taken and sold in interstate or foreign commerce; or (3) which are used or could be used for industries in interstate commerce.
- All other impoundments of waters otherwise defined as waters of the United States under the USACE definition;
- Tributaries of waters identified above;
- The territorial seas; and
- Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in the paragraphs above [33 CFR Part 328.3(a)].

2. Wetland Parameters

According to the 1987 USACE manual, wetlands are defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands are delineated using three parameters: hydrophytic vegetation, wetland hydrology, and hydric soils.

According to USACE, indicators for all three parameters must be present to qualify as a wetland. The definition of a wetland includes the phrase "under normal circumstances," because there are situations in which the vegetation of a wetland has been removed or altered as a result of recent natural events or human activities (USACE 1987).

To describe these conditions, USACE uses definitions for atypical situations and problem areas. They are as follows:

> Atypical situation: . . . refers to areas in which one or more parameters (vegetation, soil, and/or hydrology) have been sufficiently altered by recent human activities or natural events to preclude the presence of wetland indicators of the parameter (USACE 1987).
>
> Problem areas: . . . wetland types in which wetland indicators of one or more parameters may be periodically lacking due to normal seasonal or annual variations in environmental conditions that result from causes other than human activities or catastrophic natural events. Representative examples of problem areas include seasonal wetlands, wetlands on drumlins, prairie potholes, and vegetated flats (USACE 1987).

Atypical situations and problem areas may lack one or more of the three criteria and may still be considered wetlands, if background information on the previous condition of the area and field observations indicate that the missing wetland criteria were present before the disturbance and would occur at the site under normal circumstances. Additional delineation procedures would be employed if normal circumstances did not occur on a site.

a. Hydrophytic Vegetation

Hydrophytic vegetation is defined as "the sum total of macrophytic plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content" (USACE 1987). The potential wetland areas were surveyed by walking the project site and making observations of those areas exhibiting characteristics of jurisdictional waters or wetlands. Vegetation within the potential jurisdictional areas was examined. The relative canopy cover of each species present was visually estimated.

The dominant species were then recorded on a summary datasheet along with the associated wetland indicator status of those species. The wetland indicator status of each dominant species was determined by using the list of wetland plants for California provided by the U.S. Fish and Wildlife Service (1997).

The hydrophytic vegetation criterion is considered fulfilled at a location if greater than 50 percent of all the dominant species present within the vegetation unit have a wetland indicator status of obligate (OBL), facultative-wet (FACW), or facultative (FAC) (USACE 1987). An OBL indicator status refers to plants that have a 99 percent probability of occurring in wetlands under natural conditions. A FACW indicator status refers to plants that occur in wetlands (67 to 99 percent probability) but are occasionally

found in non-wetlands. A FAC indicator status refers to plants that are equally likely to occur in wetlands or non-wetlands (estimated probability 34 to 66 percent).

b. Wetland Hydrology

Hydrologic information for the site was obtained by reviewing U.S. Geologic Survey (USGS) topographic maps and by directly observing hydrology indicators in the field. Examples of wetland hydrology indicators may include, but are not limited to, inundation, watermarks, drift lines, sediment deposits, and drainage patterns. Evidence of flows, flooding, and ponding was recorded and the frequency and duration of these events were inferred.

The wetland hydrology criterion is considered fulfilled at a location if, based upon the conclusions inferred from the field observations, an area has a high probability of being periodically inundated or has soils saturated to the surface at some time during the growing season to develop anaerobic conditions in the surface soil environment, especially the root zone (USACE 1987).

c. Hydric Soils

A hydric soil is a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation (USACE 1987). The hydric soil criterion is considered fulfilled at a location if soils in the area can be inferred to have a high groundwater table, there is evidence of prolonged soil saturation, or there are any indicators suggesting a long-term reducing environment in the upper 18 inches of the soil profile.

Sample points were selected within potential wetland areas and where the apparent boundary between wetland and upland was inferred based on changes in the composition of the vegetation. Soil pits were dug to a depth of at least 18 inches or to a depth necessary to determine soil color, evidence of soil saturation, depth to groundwater, and indicators of a reducing soil environment (e.g., mottling, gleying, and sulfidic odor). Sandy soils, when present, may mask the presence of hydric soil indicators. Additional wetland indicators used to identify hydric sandy soils include high organic matter content in the surface horizon or at the depth of the water table and organic streaking.

3. Non-wetland Jurisdictional Waters

The USACE also requires the delineation of non-wetland jurisdictional waters. These waters must have strong hydrology indicators such as the presence of seasonal flows and an ordinary high watermark. An ordinary high watermark is defined as:

> . . . that line on the shore established by the fluctuations of water and indicated by physical characteristics such as [a] clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas (33 CFR Part 328.3).

Areas delineated as non-wetland jurisdictional waters may lack wetland vegetation or hydric soil characteristics. Hydric soil indicators may be missing because topographic position precludes ponding and subsequent development of hydric soils. Absence of wetland vegetation can result from frequent scouring due to rapid water flow. These types of jurisdictional waters are delineated by the lateral and upstream/downstream extent of the ordinary high watermark of the particular drainage or depression.

E. Erosion Evaluation and Control Plan

The purpose of the Erosion Evaluation and Control Plan is to assist the medical center in complying with federal regulations dealing with the control of nonpoint source pollution. RECON biologists Peter Tomsovic, Robert MacAller, and Wendy Loeffler assessed the site for erosion control issues on February 25 and March 31, 2003. The plan, which is provided in Appendix C, includes a list of best management practices (BMPs) to minimize pollution from storm water runoff. The plan addresses the topography, soils, land cover, adjacent properties, and principle drainages. A map that shows the location of BMPs with an associated description of BMP installation, maintenance, inspection, and removal schedules was also prepared. Drawings and specifications for the recommended BMPs are also provided in the plan. The plan includes ways to minimize erosion and vegetation removal.

RECON staff initiated a landscape audit to be conducted by the City of San Diego. A landscape audit provides information regarding the amount of water usage on the landscaped areas of the site. Peter Tomsovic contacted Richard Nambo (619-533-4290), the City of San Diego Commercial Landscape Auditor in October of 2003 and learned that landscape audits can only be scheduled with direct contact between either the person responsible for paying the water bill or the landscape maintenance personnel responsible for maintaining the irrigation clocks and system. It is the policy of the Landscape Auditor that subcontractors cannot schedule audits. City staff are currently working on the landscape audit (Richard Nambo, pers. comm. of November 27, 2004). Jim Kirkpatrick, Environmental Protection Specialist at NMCSD is working with city staff as part of an overall water usage/conservation assessment for the Naval Medical Center (pers. comm. November 27, 2004).

F. Exotic Invasive Plant Removal Plan

Brant Primrose conducted focused surveys for exotic invasive plants on January 21 and September 25, 2003. Populations and individuals of invasive exotics were mapped using a GPS unit with sub-meter accuracy. The exotic invasive plant removal plan, which is provided in Appendix D, includes a list of the invasive exotic plants on the property and their affect on the ecosystem. Recommendations for control or removal, and the best time of the year to implement control are also provided.

Existing Resources and Survey Results

A. Site Description

1. Topography

NMCSD lies on a bluff called Inspiration Point, approximately four miles inland of San Diego Bay (Tierra Data Systems 2001). Elevation on-site ranges from 100 feet to 280 feet mean sea level (USGS 1967) (see Figure 2).

2. Soils

A map of the existing soil types is provided in Figure 8. Three soil types occur on-site, including Redding cobbly loam—9 to 30 percent slopes, Redding gravelly loam—2 to 9 percent slopes and Urban land (USDA 1973). These soil types are summarized below.

Redding cobbly loam—9 to 30 percent slopes (ReE): Redding cobbly loam is a well-drained soil with a gravelly clay subsoil. This is a strongly sloping to moderately steep soil that is 10 to 20 inches deep over a hardpan. Cobbles make up 20 to 30 percent of the surface layer and 25 to 35 percent of the subsoil. Runoff is medium to rapid and the erosion hazard moderate to high.

Redding gravelly loam—2 to 9 percent slopes (RdC): This soil type is also well-drained with a gravelly clay subsoil. Redding gravelly loam is found on gently rolling slopes, averaging three percent.

Urban land (Ur): Urban land is developed to the point where the soil type is no longer identifiable. This classification is reserved for buildings, streets, and other developed areas.

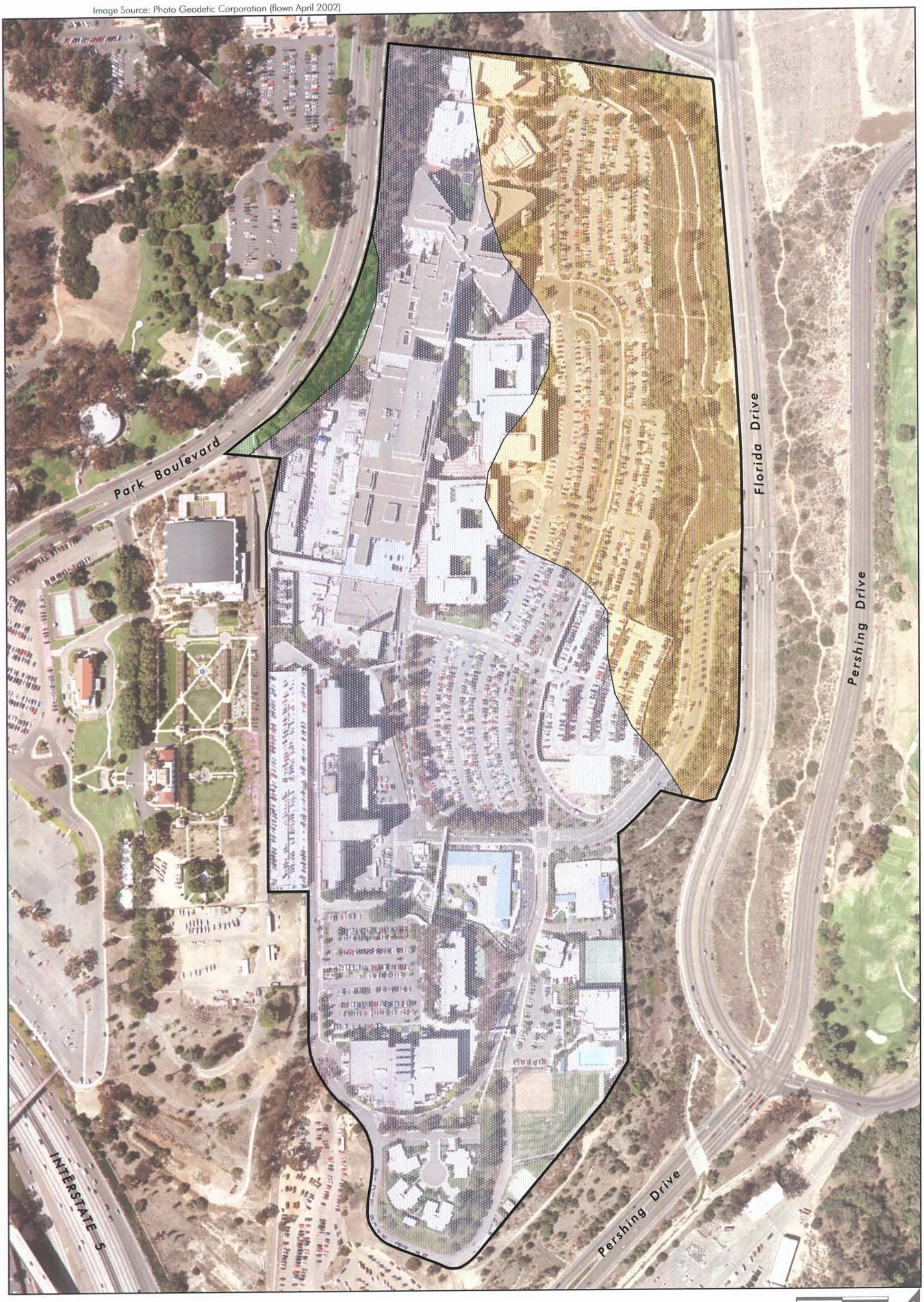
Soil types identified by U.S. Department of Agriculture (USDA) are general categories mapped at a large scale and represent the site condition prior to current development. The wetland delineation performed on-site identified the presence of loamy sands within the drainage, which were likely deposited through the general course of water flow.

B. Botanical Resources

1. Vegetation Communities

The Sawyer and Keeler-Wolf classification system, which was applied to native and non-native vegetation communities, allows for a comprehensive breakdown of vegetation types (Sawyer and Keeler-Wolf, 1995). The Holland classification system provides a broader view of the native and non-native vegetation communities (Holland 1997). Both of these classification systems were used in the mapping of NMCSD. Figures 9 and 10 provide the results of vegetation mapping according to each classification system. Figure 9 is a broad overview of the site using the Holland Classification system; Figure 10

Image Source: Photo Geodetic Corporation (flown April 2002)



Project boundary

Soils
- Redding cobbly loam, 9 to 30 percent slopes
- Redding gravelly loam, 2 to 9 percent slopes
- Urban land

FIGURE 8
Soils

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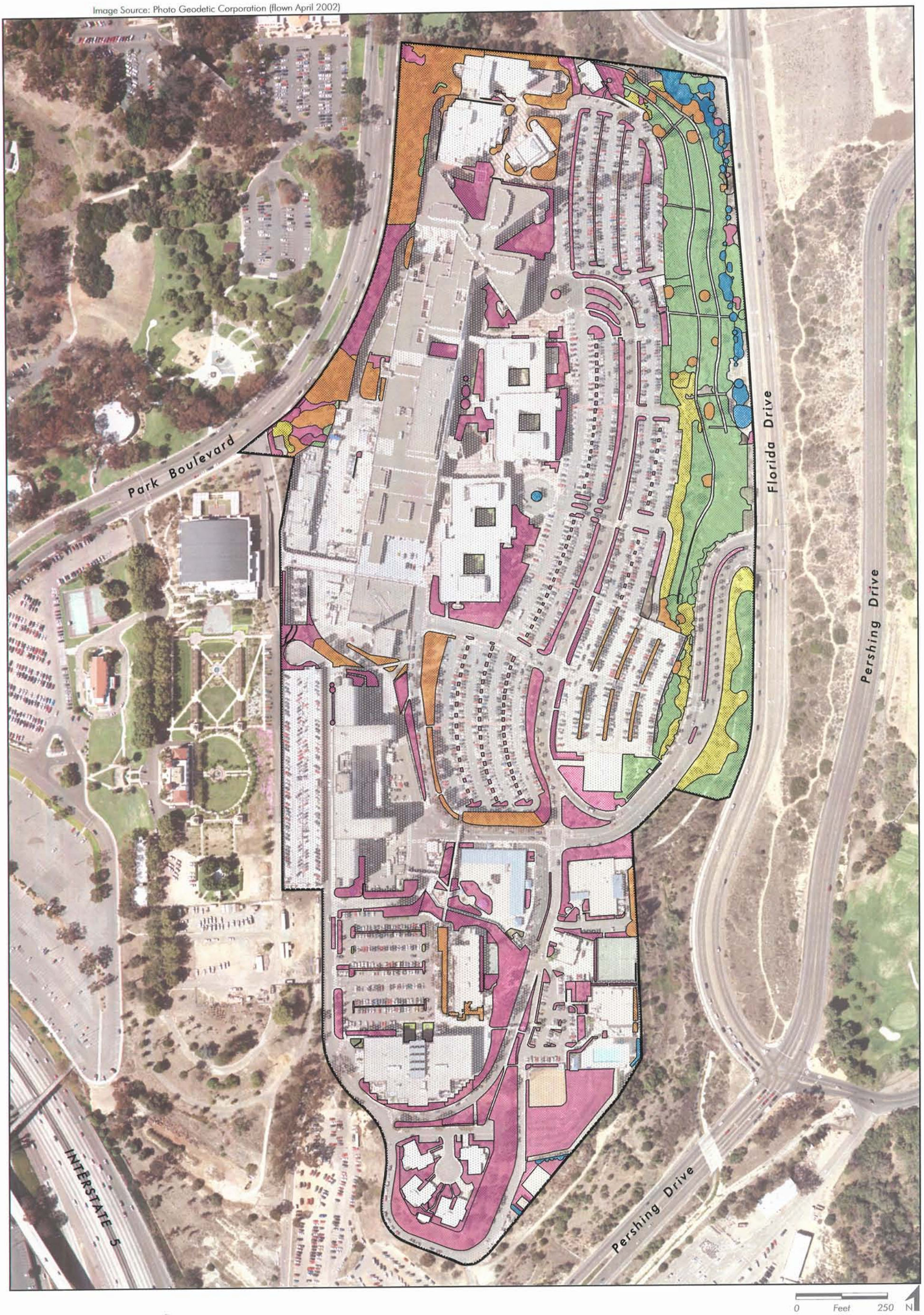
fig8 (soils) 11/03/03

Image Source: Photo Geodetic Corporation (flown April 2002)



Project boundary

Vegetation communities
- Diegan coastal sage scrub
- Southern willow scrub
- Ornamental landscape
- Acacia-dominated ornamental landscape
- Eucalyptus-dominated ornamental landscape
- Urban/Developed
- Not mapped

FIGURE 9
Vegetation Map
(Holland Classification System)

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hol9 biog_holland1 11/03/03

Image Source: Photo Geodetic Corporation (flown April 2002)

Project boundary

Vegetation communities - see next page for legend

FIGURE 10
Vegetation Map (Sawyer and Keeler-Wolf Classification System)

M:\jobs\7\3743\doc\gis\boles.mpr\
bg10 (bg-sky) 01/27/05

1 Acacia
2 Acacia, Cape leadwort
3 Acacia, Eucalyptus
4 Acacia, Lemonadeberry, Eucalyptus
5 African daisy, Ice plant
6 African iris
7 Arroyo willow
8 Arroyo willow, Black willow, Wild grape, Mule fat
9 Bare ground
10 Bare ground, Carob tree
11 Bare ground, Queen palm
12 Black sage, California sagebrush
13 Bougainvillea
14 Brazilian pepper tree
15 Brazilian pepper tree, Common encelia, Mule fat
16 Brazilian pepper tree, Mule fat
17 Brow ditch
18 California fan palm, Indian hawthorn
19 California sagebrush
20 California sagebrush, California buckwheat
21 California sagebrush, Common encelia
22 California sagebrush, Eucalyptus
23 California sagebrush, Lemonadeberry
24 Cape honeysuckle
25 Cape leadwort
26 Carrot wood, Indian hawthorn, Daylily
27 Common encelia
28 Common encelia, Broom baccharis, Mule fat, Fourwing saltbush
29 Common encelia, California sagebrush
30 Common encelia, Fourwing saltbush
31 Crown of gold
32 Crown of gold, Indian hawthorn
33 Daylily
34 Developed
35 Disturbed habitat
36 English ivy
37 English ivy, Indian hawthorn
38 Eucalyptus
39 Eucalyptus, Acacia
40 Eucalyptus, California sagebrush, Common encelia
41 Eucalyptus, English ivy
42 Eucalyptus, Ice plant
43 Eucalyptus, Lemonadeberry
44 Eucalyptus, Pittosporum
45 Fourwing saltbush
46 Fourwing saltbush, California buckwheat, California sagebrush, Broom baccharis
47 Fourwing saltbush, California sagebrush
48 Fourwing saltbush, California sagebrush, Common encelia
49 Giant reed
50 Grass lawn
51 Grass lawn, Crown of gold, Eucalyptus
52 Grass lawn, Sweet gum
53 Hong Kong orchid tree, Daylily, Indian hawthorn
54 Hottentot fig
55 Ice plant, Eucalyptus, Brazilian pepper tree
56 Indian hawthorn, Prune tree
57 Jacaranda
58 Japanese black pine
59 Japanese photinia
60 Laurel sumac
61 Laurel sumac, Myoporum
62 Lemonadeberry, Acacia
63 Lemonadeberry, California sagebrush, Laurel sumac, Eucalyptus
64 Lemonadeberry, Laurel sumac
65 Mirror plant
66 Mule fat
67 Myoporum, grass lawn, Crown of gold
68 Myoporum, Washington palm
69 Natal plum
70 New Zealand Christmas tree
71 New Zealand Christmas tree, Sydney golden
72 New Zealand flax, African iris
73 Ornamental ash
74 Ornamental ash, Firethorn
75 Peruvian pepper tree
76 Peruvian pepper tree, Hottentot fig, Ice plant
77 Pink escallonia
78 Pink escallonia, Crown of gold
79 Pittosporum
80 Prune tree, Indian hawthorn, Star jasmine
81 Queen palm, English ivy
82 Rosea ice plant
83 Rush
84 Star jasmine, Japanese black pine, Washington palm
85 Sweet bay
86 Sweet gum, Indian hawthorn, grass lawn
87 Sydney golden
88 Toyon, Lemonadeberry
89 Trailing lantana
90 Trailing lantana, Sweet gum
91 Trumpet vine
92 Washington palm
93 Washington palm, Pittosporum
94 Western sycamore, grass lawn, bare ground
95 Yew pine, African daisy
96 Yew pine, bare ground
97 Yew pine, Japanese black pine
98 Yew pine, Natal plum

Legend
FIGURE 10
Vegetation Map
(Sawyer and Keeler-Wolf Classification System)

depicts the comprehensive mapping effort according to the Sawyer and Keeler-Wolf classification system.

a. Holland Classification System (General Vegetation Mapping)

According to the Holland classification system, there are five land cover types on-site: Diegan coastal sage scrub, southern willow scrub, ornamental vegetation, disturbed habitat, and urban/developed lands. The majority of vegetation on-site is non-native ornamental landscaping. The west-facing slope above Florida Canyon contains Diegan coastal sage scrub with varying dominant and co-dominant species. The urban drainage on the east side of the property includes southern willow scrub with patches of invasive exotic species. A few small patches of native shrubs occur within the ornamental vegetation on the steep west-facing slope in the northwest portion of the property. Table 2 provides the acreage of each land cover type. A brief description of each of the Holland vegetation communities follows.

TABLE 2
HOLLAND VEGETATION COMMUNITIES AND LAND COVER TYPES

Holland Vegetation Classification	Acreage
Diegan coastal sage scrub	5.34
Southern willow scrub	0.62
Ornamental landscape	10.18
Ornamental landscape- eucalyptus-dominated	3.73
Ornamental landscape-acacia-dominated	1.50
Disturbed habitat	0.54
Urban/Developed	53.26
TOTAL	75.17

Diegan Coastal Sage Scrub (Holland Code 32500)

Coastal sage scrub is a plant community comprised of low-growing, aromatic, drought-deciduous soft-woody shrubs that have an average height of approximately three to four feet. The plant community is typically dominated by facultatively drought deciduous shrubs. The community typically is 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. Diegan coastal sage scrub is found in coastal areas from Los Angeles County south into Baja California, Mexico (Holland 1986). This plant community is dominated by species such as California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), broom baccharis (*Baccharis sarothroides*), and fourwing saltbush (*Atriplex canescens*).

Southern Willow Scrub (Holland Code 63320)

Southern willow scrub is a dense riparian community dominated by broad-leaved, winter-deciduous trees. Goodding's black willow (*Salix gooddingii*), arroyo willow (*Salix lasiolepis*), and mule fat (*Baccharis salicifolia*) dominate the southern willow scrub in the on-site urban drainage. The community contains a variety of invasive non-native species including palm trees (*Washingtonia robusta* and *Phoenix canariensis*), giant reed (*Arundo donax*), Peruvian pepper tree (*Schinus molle*), and pampas grass (*Cortaderia* sp.).

Ornamental Vegetation (Holland Code 11000)

Ornamental vegetation dominates the site and consists of a wide variety of non-native species that were planted for landscape purposes. Two additional subcategories have been identified: eucalyptus-dominated and acacia-dominated ornamental landscaping. These are areas that are dominated by either eucalyptus trees (*Eucalyptus* spp.) or acacia trees (*Acacia* spp.) and are generally located within or adjacent to the native slopes around the perimeter of the site.

Disturbed Habitat (Holland Code 11300)

Disturbed habitat on-site includes areas of disturbance that are mainly vegetated with invasive annual species, such as crown daisy (*Chrysanthemum coronarium*), mustard (*Brassica* spp.), and tocolote (*Centaurea melitensis*). The majority of disturbed habitat occurs in the northeast corner of the property adjacent to the intersection of Morley Field Drive and Florida Drive.

Urban/Developed (Holland Code 12000)

Urban/Developed lands on-site include the interior developed portion of the facility. This classification includes all buildings, parking lots and other unvegetated areas.

b. Sawyer and Keeler-Wolf Classification System

Ninety-eight vegetation classifications were defined using the comprehensive Sawyer and Keeler-Wolf method. The basic principle in mapping at this level is to define the polygon based on visual changes in vegetation and then determine the dominant and co-dominant species in each polygon. These associations become the vegetation classification. A complete list of the classifications is provided in Table 3.

2. General Plant Surveys

A total of 202 plant species were identified within the NMCSD boundary. Of this total, 64 (32 percent) are species native to southern California. Table 4 provides a list of all plant species observed on the property.

TABLE 3
SAWYER AND KEELER-WOLF VEGETATION CLASSIFICATION

Sawyer and Keeler-Wolf Vegetation Classification	Acreage
Acacia	0.082
Acacia, cape leadwort	0.03
Acacia, eucalyptus	0.11
Acacia, lemonadeberry, eucalyptus	0.47
African daisy, ice plant	0.15
African iris	0.07
Arroyo willow	0.16
Arroyo willow, black willow, wild grape, mule fat	0.12
Bare ground	0.13
Bare ground, carob tree	0.03
Bare ground, queen palm	0.06
Black sage, California sagebrush	0.01
Bougainvillea	0.03
Brazilian pepper tree	0.03
Brazilian pepper tree, common encelia, mule fat	0.01
Brazilian pepper tree, mule fat	0.03
Brow ditch	0.49
California fan palm, Indian hawthorn	0.01
California sagebrush	0.02
California sagebrush, California buckwheat	0.01
California sagebrush, common encelia	2.79
California sagebrush, eucalyptus	0.05
California sagebrush, lemonadeberry	0.43
Cape honeysuckle	0.01
Cape leadwort	0.04
Carrot wood, Indian hawthorn, daylily	0.28
Common encelia	0.04
Common encelia, broom baccharis, mule fat, fourwing saltbush	0.39
Common encelia, California sagebrush	0.01
Common encelia, fourwing saltbush	0.15
Crown of gold	0.98
Crown of gold, Indian hawthorn	0.63
Daylily	0.02
Developed	52.77
Disturbed habitat	0.54
English ivy	0.23
English ivy, Indian hawthorn	0.03
Eucalyptus	2.52
Eucalyptus, acacia	0.18
Eucalyptus, California sagebrush, common encelia	0.05
Eucalyptus, English ivy	0.82
Eucalyptus, ice plant	0.13
Eucalyptus, Lemonadeberry	0.02
Eucalyptus, pittosporum	0.03
Fourwing saltbush	0.09
Fourwing saltbush, California buckwheat, California sagebrush, broom baccharis	0.16
Fourwing saltbush, California sagebrush	0.04
Fourwing saltbush, California sagebrush, common encelia	0.01
Giant reed	0.07
Grass lawn	1.56
Grass lawn, crown of gold, eucalyptus	0.12
Grass lawn, sweet gum	0.01

TABLE 3
SAWYER AND KEELER-WOLF VEGETATION CLASSIFICATION (continued)

Sawyer and Keeler-Wolf Vegetation Classification	Acreage
Hong Kong orchid tree, daylily, Indian hawthorn	0.01
Hottentot fig	0.01
Ice plant, eucalyptus, Brazilian pepper	0.51
Indian hawthorn, prune tree	0.01
Jacaranda	0.04
Japanese black pine	0.13
Japanese photinia	0.01
Laurel sumac	0.02
Laurel sumac, myoporum	0.03
Lemonadeberry, acacia	0.19
Lemonadeberry, California sagebrush, laurel sumac, eucalyptus	0.68
Lemonadeberry, laurel sumac	0.16
Mirror plant	0.02
Mule fat	0.17
Myoporum, grass lawn, crown of gold	0.04
Myoporum, Washington palm	0.27
Natal plum	0.18
New Zealand christmas tree	0.02
New Zealand christmas tree, Sydney golden	0.03
New Zealand flax, African iris	0.02
Ornamental ash	0.01
Ornamental ash, firethorn	0.17
Peruvian pepper tree	0.02
Peruvian pepper tree, hottentot fig, ice plant	1.05
Pink escallonia	0.45
Pink escallonia, crown of gold	0.15
Pittosporum	0.06
Prune tree, Indian hawthorn, star jasmine	0.04
Queen palm, English ivy	0.07
Rosea ice plant	0.85
Rush	0.01
Star jasmine, Japanese black pine, Washington palm	0.08
Sweet bay	0.04
Sweet gum, Indian hawthorn, grass lawn	0.03
Sydney golden	0.06
Toyon, lemonadeberry	0.06
Trailing lantana	0.82
Trailing lantana, sweet gum	0.02
Trumpet vine	0.01
Washington palm	0.19
Washington palm, pittosporum	0.12
Western sycamore, grass lawn, bare ground	0.04
Yew pine, African daisy	0.05
Yew pine, bare ground	0.01
Yew pine, Japanese black pine	0.17
Yew pine, Natal plum	0.05
TOTAL	75.16

TABLE 4
PLANT SPECIES OBSERVED

Scientific Name	Common Name	Habitat	Origin
Acacia longifolia (Andr.) Willd.	Sydney golden	ORN	I
Acacia redolens Maslin.	Acacia	ORN	I
Acer macrophyllum Pursh	Big-leaf maple	ORN	N
Achillea millefolium L.	Yarrow, milfoil	CSS	N
Agapanthus africanus (L.)	Lily of the Nile	ORN	I
Agave americana L.	Century plant	ORN	I
Agrostis exarata Trin.	Spike redtop	CSS	N
Allium sp.	Onion	ORN	N
Alnus rhombifolia Nutt.	White alder	ORN	N
Ambrosia psilostachya DC.	Western ragweed	SWS	N
Amorpha fruticosa L.	False indigo	CSS	N
Anagallis arvensis L.	Scarlet pimpernel, poor-man's weatherglass	CSS	I
Anemopsis californica (Nutt.) Hook. & Arn.	Yerba mansa	SWS	N
Apium graveolens L.	Celery	SWS	I
Aptenia cordifolia (L.F.) N.E.Br.	Baby sun rose	ORN	I
Archontophoenix cunninghamiana (H. Wendl.)	King palm	ORN	I
Arctotis sp.	African daisy	ORN	I
Arecastrum romanzoffianum (Chanı.) Becc.	Queen palm	ORN	I
Artemisia californica Less.	California sagebrush	CSS	N
Arundo donax L.	Giant reed	SWS	I
Asparagus densiflorus (Kunth) Jessop	Asparagus fern	ORN	I
Asparagus officinalis L. ssp. *officinalis*	Garden asparagus	ORN	I
Asphodelus fistulosus L.	Hollow-stem asphodel	ORN	I
Aspidistra elatior Blume	Cast iron plant	ORN	I
Atriplex canescens (Parsh) Nutt.	Fourwing saltbush, shad-scale	CSS	N
Atriplex lentiformis (Torrey) S. Watson ssp. *lentiformis*	Big saltbush	CSS	N
Atriplex semibaccata R.Br.	Australian saltbush	CSS	I
Avena sp.	Wild oats	CSS	N
Azalea sp.	Azalea	ORN	I
Baccharis salicifolia (Ruiz Lopez & Pavón) Pers.	Mule fat, seep-willow	SWS	N
Baccharis sarothroides A. Gray	Broom baccharis	CSS	N
Bauhinia blakeana S.T.Dunn	Hong Kong orchid tree	ORN	I

TABLE 4
PLANT SPECIES OBSERVED
(continued)

Scientific Name	Common Name	Habitat	Origin
Bougainvillea sp.	Bougainvillea	ORN	I
Brachychiton acerifolius (A. Cunn.) F.J. Muell	Flame tree	ORN	I
Brachychiton populneus (Schott & Endl.) R. Br.	Kurrajong	ORN	I
Brassica nigra (L.) Koch.	Black mustard	CSS, DIS	I
Brassica rapa L.	Field mustard	CSS, DIS	I
Bromus madritensis L. ssp. *rubens* (L.) Husnot	Foxtail chess	CSS	I
Callistemon citrinus (Curtis) Stapf	Bottlebrush	ORN	I
Calystegia macrostegia ssp. *intermedia* (Abrams) Brum	Chaparral morning-glory	CSS	N
Camellia japonica L.	Common camellia	ORN	I
Camissonia sp.	Sun cup	CSS	N
Carpobrotus chilensis (Molina) N.E. Brown	Sea fig	ORN	N
Carpobrotus edulis (L.) Bolus.	Hottentot fig	ORN	I
Carissa grandiflora A. DC.	Natal plum	ORN	I
Cassia excelsa Schrad.	Crown of gold	ORN	I
Ceanothus sp.	Ceanothus	ORN	I
Centaurea melitensis L.	Tocolote, star-thistle	CSS, DIS	I
Ceratonia silique L.	Carob tree	ORN	I
Chamaesyce sp.	Prostrate spurge	CSS	I
*Chamomilla suaveolens (*Pursh.) Rydb.	Pineapple weed, rayless chamomile	DIS, ORN	N
Chenopodium sp.	Goosefoot	SWS, DIS	I
Chenopodium album L.	Lamb's quarters, pigweed	CSS, DIS	I
Chrysanthemum coronarium L.	Garland, crown daisy	CSS, DIS	I
Cistis creticus L.	Rock-rose	ORN	I
Citrus sp.	Citrus	ORN	I
Conyza canadensis (L.) Cronq.	Horseweed	CSS	N
Coprosma repens A. Rich.	Mirror plant	ORN	I
Cortaderia jubata (Lemoine) Stapf	Pampas grass	CSS, SWS	I
Cotoneaster sp.	Cotoneaster	ORN	I
Crassula argentea Thunb.	Jade plant	ORN	I
Cupaniopsis anacardioides Radlk.	Carrot wood	ORN	I
Cuphea hyssopifolia HBK.	False heather	ORN	I

TABLE 4
PLANT SPECIES OBSERVED
(continued)

Scientific Name	Common Name	Habitat	Origin
Cycas revoluta Thunb.	Sago palm	ORN	I
Cynara cardunculus L.	Cardoon	CSS, DIS	I
Cynodon dactylon (L.) Pers.	Bermuda grass	ORN, SWS	I
Cyperus sp.	Nutsedge	SWS	N
Cyperus alternifolius L.	Umbrella-plant	SWS	I
Delosperma alba L.	Ice plant	ORN	I
Dietes vegeta (L.) N.E.Br.	African iris	ORN	I
Distichlis spicata (L.) E. Greene	Saltgrass	SWS	N
Distictis sp.	Trumpet vine	ORN	I
Dracaena draco L.	Dragon tree	ORN	I
Drosanthemum floribundum L.	Rosea ice plant	ORN	I
Echium plantagineum L.	Viper's bugloss	ORN	I
Eleocharis macrostachya Britton	Pale spikerush	SWS	N
Encelia californica Nutt.	Common encelia	CSS	N
Eriobotrya japonica (Thunb.) Lindl.	Loquat	ORN	I
Eriogonum fasciculatum Benth. var *foliolosum*	California buckwheat	CSS	N
Eriophyllum confertiflorum (DC.) A. Gray var. *confertiflorum*	Golden-yarrow	CSS	N
Erodium sp.	Filaree, storksbill	CSS	I
Erythrina sp.	Coral tree	ORN	I
Escallonia laevis Vell.	Pink escallonia	ORN	I
Eschscholzia californica Cham.	California poppy	ORN, CSS	N
Eucalyptus globulus Labill.	Eucalyptus	ORN	I
Eucalyptus spp.	Eucalyptus	CSS, ORN	I
Euphorbia peplus L.	Petty spurge	ORN	I
Ficus carica L.	Edible fig	ORN	I
Ficus pumila L.	Creeping fig	ORN	I
Filago sp.	Herba impia	CSS, ORN	N
Foeniculum vulgare Mill.	Fennel	CSS, SWS	I
Fraxinus sp.	Ash	SWS	I
Gardenia sp.	Gardenia	ORN	I
Gazania sp.	African daisy	ORN	I

TABLE 4
PLANT SPECIES OBSERVED
(continued)

Scientific Name	Common Name	Habitat	Origin
Gelsemium sempervirens (L.) Ait.	Carolina jessamine	ORN	I
Gnaphalium sp.	Cudweed, everlasting	CSS, SWS	N
Hebe buxifolia (Benth.)	Boxleaf hebe	ORN	I
Hedera helix L.	English ivy	ORN	I
Heliotropium curassavicum L.	Chinese pusley	SWS	N
Hemizonia fasciculata (DC.) Torrey & A. Gray	Golden tarplant	CSS	N
Hemerocallis sp. L.	Daylily	ORN	I
Heteromeles arbutifolia (Lindley) Roemer	Toyon, christmas berry	ORN, CSS	N
Heterotheca grandiflora Nutt.	Telegraph weed	CSS, DIS	N
Hibiscus sp.	Hibiscus	ORN	I
Hordeum jubatum L.	Foxtail barley	CSS	N
Impatiens balsamina L.	Impatiens	ORN	I
Ipomoea purpurea (L.) Roth.	Common morning-glory	ORN	I
Isocoma menziesii (Hook. & Arn.) G. Nesom	Coast goldenbush	CSS	N
Jacaranda mimosifolia D. Don	Jacaranda	ORN	I
Juniperus sp.	Juniper	ORN	I
Lactuca serriola L.	Prickly lettuce	CSS	I
Lamarckia aurea (L.) Moench.	Goldentop	CSS	I
Lantana montevidensis (K. Spreng.) Briq	Trailing lantana	ORN	I
Lathyrus splendens Kell.	Pride of California, campo pea	ORN	N
Laurus nobilis L.	Sweet bay	ORN	I
Lepidium nitidum Torrey & A. Gray var. *nitidum*	Shining peppergrass	ORN, CSS	N
Lessingia filaginifolia (Hook. & Arn.) M.A. Lane var. *filaginifolia*	California-aster	CSS	N
Ligustrum japonicum Thunb.	Wax-leaf privet	ORN	I
Limonium perezii (Stapf) Hubb.	Perez rosemary	ORN	I
Liquidambar styraciflua L.	Sweet gum	ORN	I
Liriope muscari (Decne.) L.	Big Blue lily turf	ORN	I
Lonicera japonica Thumb.	Japanese honeysuckle	ORN	I
Lotus sp.	Trefoil	CSS	N

TABLE 4
PLANT SPECIES OBSERVED
(continued)

Scientific Name	Common Name	Habitat	Origin
Lotus scoparius (Nutt. in Torrey & A. Gray) Ottley var. *scoparius*	California broom	CSS	N
Malephora crocea (Jacq.) Schwantes	Croceum ice plant	ORN	I
Malosma laurina (Nutt.) Abrams	Laurel sumac	ORN	N
Malva parviflora L.	Cheeseweed, little mallow	CSS, ORN	I
Marah macrocarpus (E. Greene) E. Greene	Wild cucumber	SWS	N
Marrubium vulgare L.	Horehound	CSS, DIS	I
Medicago polymorpha L.	California bur clover	CSS, DIS	I
Melaleuca nesophylla F.J.Muell.	Western tea myrtle	ORN	I
Melilotus alba Medikus	White sweet clover	CSS	I
Melilotus indica (L.) All.	Sourclover	CSS, SWS	I
Mesembryanthemum crystallinum L.	Crystalline ice plant	ORN	I
Mesembryanthemum nodiflorum L.	Slender-leaved ice plant	ORN	I
Metrosideros excelsus Soland. ex Gaertn.	New Zealand christmas tree	ORN	I
Mimulus aurantiacus Curtis	Bush monkeyflower	CSS	N
Mirabilis californica A. Gray	Wishbone bush	CSS	N
Myoporum laetum G. Forst.	Ngaio	ORN	I
Myoporum parvifolium L.	Myoporum ground cover	ORN, SWS	I
Nandina domestica Thunb.	Heavenly bamboo	ORN	I
Nassella sp.	Needlegrass	CSS	N
Nephrolepis exaltata (L.) Schott.	Sword fern	ORN	I
Nerium oleander L.	Oleander	ORN	I
Nicotiana glauca Grah.	Tree tobacco	CSS, SWS	I
Olea europeae L.	Common olive	ORN	I
Opuntia ficus-indica (L.) Miller	Indian fig	ORN	I
Opuntia littoralis (Engelm.) Cockerell.	Shore cactus	CSS	N
Opuntia prolifera Engelm.	Cholla	CSS	N
Oxalis sp.	Wood-sorrel	ORN	N
Paspalum dilatatum Poiret	Dallis grass	ORN, SWS	I
Pennisetum setaceum Forsskal	Fountain grass	ORN, CSS	I
Phoenix canariensis Chabaud.	Canary Island date palm	SWS, ORN	I

TABLE 4
PLANT SPECIES OBSERVED
(continued)

Scientific Name	Common Name	Habitat	Origin
Phoenix roebelenii O'Brien.	Date palm	ORN	I
Phormium tenax J. R. Forst. & G. Forst.	New Zealand flax	ORN	I
*Photinia glabra (*Thunb.*)* Maxim.	Japanese photinia	ORN	I
Picris echioides L.	Bristly ox-tongue	SWS	I
Pinus sp.	Pine	ORN	I
Pinus thunbergiana Franco	Japanese black pine	ORN	I
Piptatherum miliaceum (L.) *Ciosson*	Smilo grass	ORN, SWS	I
Pittosporum tobira L.	Pittosporum	ORN	I
Plantago sp.	Plantain	ORN	N
Platanus racemosa Nutt.	Western sycamore	ORN	N
Plumbago auriculata Lam.	Cape leadwort	ORN	I
Plumeria sp.	Plumeria	ORN	I
Podocarpus sp.	Yew pine	ORN	I
Prunus sp.	Prune tree	ORN	I
Pyracantha sp.	Firethorn	ORN	I
Pyrus kawakamii Hayata.	Evergreen pear	ORN	I
Quercus agrifolia Nee	Coast live oak, encina	ORN	N
Raphanus sativus L.	Radish	CSS, SWS	I
Raphiolepis indica (L.) Lindl.	Indian hawthorn	ORN	I
Rhus integrifolia (Nutt.) Brewer & Watson	Lemonadeberry	CSS	N
Ricinus communis L.	Castor bean	SWS, CSS	I
Rorippa nasturtium-aquaticum (L.) Hayek	Water cress	SWS	I
Rumex crispus L.	Curly dock	SWS	I
Salix gooddingii C. Ball.	Goodding's black willow	SWS	N
Salix lasiolepis Benth.	Arroyo willow	SWS	N
Salsola tragus L.	Russian thistle, tumbleweed	CSS, DIS	I
Salvia mellifera E. Greene	Black sage	CSS	N
Sambucus mexicana C. Presl	Blue elderberry	SWS	N
Schinus molle L.	Peruvian pepper tree	ORN, SWS	I
Schinus terebinthifolius Raddi	Brazilian pepper tree	ORN, SWS	I
Senna covesii (A. Gray) H. Irwin & Barneby	Coue's cassia	CSS	N

TABLE 4
PLANT SPECIES OBSERVED
(continued)

Scientific Name	Common Name	Habitat	Origin
Sisymbrium irio L.	London rocket	CSS, DIS	I
Solanum douglasii Dunal	Douglas nightshade	CSS	N
Sonchus oleraceus L.	Common sow thistle	SWS	I
Spergularia macrotheca (Hornem.) Heynh.	Large-flowered sand spurrey	CSS	N
Stephanomeria virgata (Benth.) ssp. *virgata*	Slender stephanomeria	CSS	N
Sterlitzia nicolai Regel & Korn.	Large Bird of paradise	ORN	I
Tamarix sp.	Tamarisk	SWS, CSS	I
Tecomaria capensis (Thunb.) Spach	Cape honeysuckle	ORN	I
Trachelospermum jasminoides (Lindl.) Lem.	Star jasmine	ORN	I
Trifolium sp.	Clover	CSS	N
Typha latifolia L.	Broad-leaved cattail	SWS	N
Ulmus parvifolia Jacq.	Chinese elm	ORN	I
Urtica dioica L. ssp. *holosericea* (Nutt.) Thorne	Hoary nettle	SWS	N
Vinca major L.	Greater periwinkle	ORN	I
Vitis girdiana Munson	Desert wild grape	SWS	N
Washingtonia robusta Wendl.	Washington palm	SWS, ORN	I
Xanthium strumarium L.	Cocklebur	SWS, CSS, DIS	N
Zantedeschia aethiopica L.	Common calla lily	ORN	I

HABITATS

CSS = Coastal sage scrub
DIS = Disturbed habitat
SWS = Southern willow scrub
ORN = Ornamental vegetation

OTHER TERMS

N = Native to locality
I = Introduced species from outside locality

3. Rare Plant Surveys

No rare plant species were observed during the three focused surveys. A list of rare plants with the potential to occur on-site is presented in Table 5.

C. Zoological Resources

1. Herpetological Resources

No amphibians have been detected on NMCSD. There is a potential for Pacific treefrogs (*Hyla regilla*) to occur in the drainage on the east side of the property.

Four species of reptiles were detected on-site during general surveys and cover board checks. Table 6 provides a list of each species observed.

2. Invertebrate Resources

A complete list of the invertebrate species observed and/or collected is provided in Table 7. Nomenclature and identifications were determined using the following references: Arnett and Jacques (1981), Arnett (2000), Borror and White (1970), Borror et al. (1976), Glassberg (2001 and 2002), Knopf (1980), Mattoni (1990), Opler and Wright (1999), and Powell and Hogue (1979).

3. Ornithological Resources

Bird species commonly observed in the upland sage scrub habitats include wrentit (*Chamaea fasciata henshawi*), California towhee (*Pipilo crissalis*), western scrub-jay (*Aphelocoma californica*), Bewick's wren (*Thyromanes bewickii*), song sparrow (*Melospiza melodia*), and lesser goldfinch (*Carduelis psaltria hesperophilus*). A male Wilson's warbler (*Wilsonia pusilla*) was observed briefly on the east-facing slope adjacent to Florida Canyon in September 2003. This individual was likely migrating through the area.

Riparian vegetation communities provide habitat for many resident and migratory bird species. Species observed within the southern willow scrub include yellow-rumped warbler (*Dendroica coronata*), and song sparrow.

Birds found on-site, which are typical of urban areas, include black phoebe (*Sayornis nigricans semiatra*), mourning dove (*Zenaida macroura*), northern mockingbird (*Mimus polyglottos polyglottos*), and European starling (*Sturnus vulgaris*). A complete list of birds species observed is provided in Table 8.

The coastal California gnatcatcher (*Polioptila californica californica*), a federally threatened species, was observed foraging along the native slopes above Florida Canyon during many of the surveys. At least two birds were observed during surveys conducted during the fall of 2003. The general use area that encompasses all of the observations made during all surveys on-site is shown on Figure 11.

TABLE 5
RARE PLANT SPECIES WITH THE POTENTIAL FOR OCCURRENCE

Species	State/Federal Status	CNPS List	Typical Habitat/Comments
Acanthomintha ilicifolia San Diego thornmint	CE/FT	1B	Chaparral, coastal sage scrub, valley and foothill grassland/clay soils.
Achnatherum diegoensis (=*Stipa diegoensis*) San Diego County needle grass	–/–	4	Rocky soils; chaparral, coastal sage scrub; often near streams.
Adolphia californica California adolphia	–/–	2	Chaparral, coastal sage scrub.
Ambrosia pumila San Diego ambrosia	–/–	1B	Coastal sage scrub, valley and foothill grassland.
Artemisia palmeri San Diego sagewort	–/–	2	Coastal sage scrub, chaparral, riparian.
Astragalus pachypus var. *jaegeri* Jaeger's milk vetch	–/–	1B	Rocky or sandy areas in grassland or shrubland.
Bergerocactus emoryi Golden-spined cereus	–/–	2	Coastal sage scrub.
Dichondra occidentalis Western dichondra	–/–	4	Chaparral, cismontane woodland, coastal sage scrub, valley and foothill grassland.
Dudleya attenuata ssp. *orcuttii* Orcutt's dudleya	–/–	2	Coastal sage scrub.
Dudleya blochmaniae ssp. *blochmaniae* Blochman's dudleya	–/–	1B	Coastal sage scrub.
Dudleya variegata Variegated dudleya	–/–	1B	Chaparral, coastal sage scrub.
Ericameria palmeri var. *palmeri* (=*Haplopappus palmeri* ssp. *palmeri*) Palmer's ericameria	–/–	2	Coastal sage scrub.
Euphorbia misera Cliff spurge	–/–	2	Coastal sage scrub.
Ferocactus viridescens Coast barrel cactus	–/–	2	Chaparral, coastal sage scrub, valley and foothill grassland.

TABLE 5
RARE PLANT SPECIES WITH THE POTENTIAL FOR OCCURRENCE (CONT.)

Species	State/Federal Status	CNPS List	Typical Habitat/Comments
Harpagonella palmeri var. *palmeri* Palmer's grappling hook	–/–	2	Chaparral, coastal sage scrub, valley and foothill grassland.
Iva hayesiana San Diego marsh elder	–/–	2	Riparian, playas.
Monardella linoides ssp. *viminea* Willowy monardella	CE/FE	1B	Riparian scrub.
Muilla clevelandii San Diego goldenstar	–/–	1B	Chaparral, coastal sage scrub, valley and foothill grassland, vernal pools.
Viguiera laciniata San Diego County viguiera	–/–	4	Chaparral, coastal sage scrub.

TABLE 6
HERPETOLOGICAL SURVEY RESULTS

Scientific Name	Common Name	Habitat	Survey Type
Western fence lizard	*Sceloporus occidentalis*	U/D, CSS	CB, O
Side-blotched lizard	*Uta stansburiana*	CSS	CB, O
San Diego alligator lizard	*Elgaria multicarinata webbi*	CSS	CB
San Diego gopher snake	*Pituophis catenifer annectens*	CSS	O

U/D = Urban/Developed lands; CSS = Diegan coastal sage scrub
CB = Cover board; O = Observed during general survey

TABLE 7
INVERTEBRATE SURVEY RESULTS

Scientific Name	Common Name	Habitat	Survey Type	Number of Individuals
Class Arachnida	**Arachnids**			
Or. Acari	Mites (Vial #1,2)	CSS; SWS	BB	3
Subtotal				**3**
Or. Araneida				
F. Thomisidae	Crab Spider (Vial #15)	ORN	BB	1
F. Salticidae	Jumping Spiders (Vial #15-21)	CSS; ORN	BB	8
F. Oxyopidae	Lynx Spider (Vial #22)	ORN	BB	1
F. Araneidae	Orb-weavers (Vial #19,23)	CSS	BB	2
F. Tetragnathidae	Four-jawed Spider (Vial #24)	SWS	BB	1
Identified to Order only	(Vial #2-14,17,19)	CSS; ORN; SWS	BB; BL	22
Subtotal				**35**
Class Arachnida total				**38**
Class Crustacea Subclass Malacostraca	**Crustaceans**			
Or. Amphipoda	Amphipod (Vial #25)	ORN	BL	1
Subtotal				**1**
Or. Isopoda	Isopods (Vial #25-26)	ORN	BB; BL	2
Subtotal				**2**
Class Crustacea total				**3**
Class Insecta	**Insects**			
Or. Thysanura	**Bristletails**			
Lepisma sp.	Silverfish	ORN	BB	1
Subtotal				**1**
Or. Orthoptera	**Grasshoppers and Crickets**			
F. Gryllidae	Cricket	ORN	BB	1
F. Blattidae	Cockroach	ORN	BB	1
F. Polyphagidae	Cockroach	ORN	BL	2
Subtotal				**4**
Or. Psocoptera	**Psocids**			
F. Pseudocaeciliidae	Psocid	SWS	BL	1
Identified to Order Only		CSS	BB	4
Subtotal				**5**

TABLE 7
INVERTEBRATE SURVEY RESULTS (CONT.)

Scientific Name	Common Name	Habitat	Survey Type	Number of Individuals
Or. Hemiptera	**True Bugs**			
F. Miridae	Plant Bugs	CSS; ORN; SWS	BB; BL	14
Lopidea sp.	Scarlet Plant Bug	SWS	BB	1
Clostercoris ornatus	Ornate Plant Bug	SWS	BB	1
F. Reduviidae Subf. Emisenae	Assassin Bugs	CSS; ORN; SWS	BL	8
F. Tingidae	Lace Bug	SWS	BB	1
Identified to Order Only	True Bug	CSS	BL	5
Subtotal				**30**
Or. Homoptera	**Cicadas and Hoppers**			
F. Cercopidae	Froghopper	CSS	BL	1
F. Cicadellidae	Leafhoppers	CSS; ORN; SWS	BB; BL	18
Hordnia sp.		SWS	BB	3
F. Fulgoridae	Fulgorid Planthoppers (Vial #27)	SWS	BB	4
F. Achilidae	Achilid Planthoppers	ORN	BB	2
F. Flatidae	Flatid Planthopper	ORN	BL	1
F. Aphididae	Aphids (Vial #2,27)	CSS; SWS	BB	2
Identified to Order Only	Hoppers	SWS	BB	4
Subtotal				**35**
Or. Neuroptera	**Lacewings**			
F. Hemerobiidae *Megalomus* sp.	Brown Lacewings	CSS; ORN	BB; BL	2
F. Chrysopidae	Aphidlion	SWS	BB	1
T. Chrysopini	Green Lacewing	SWS	BB	2
Subtotal				**5**
Or. Coleoptera	**Beetles**			
F. Cupedidae	Reticulated Beetle	U	U	1
F. Carabidae	Ground Beetle	ORN	BL	1
F. Staphylinidae		ORN	BL	1
Sepedophilus sp.	Rove Beetle	ORN	BB	1
F. Scarabaeidae				
Phyllophaga sp.	June Beetles	CSS; ORN	BL	8
Subf. Aphodiinae	Scarab Beetles	CSS; ORN	BL	3
F. Elateridae				
Athous sp.	Click Beetles	CSS; ORN	BB; BL	5
Subf. Oestodinae	Click Beetles	CSS; ORN	BL	1
F. Dermestidae *Anthrenus* sp.	Carpet Beetles	CSS; ORN	BB	6
F. Anobiidae	Drug Store Beetles	CSS	BB; BL	4
F. Melyridae	Soft-winged Flower Beetle	U	BL	1

TABLE 7
INVERTEBRATE SURVEY RESULTS (CONT.)

Scientific Name	Common Name	Habitat	Survey Type	Number of Individuals
Or. Coleoptera (Cont.)	**Beetles (Cont.)**			
F. Coccinellidae		SWS	BB	1
T. Coccinellini	Ladybird Beetle	ORN	BB	1
F. Alleculidae	Comb-clawed Beetle	CSS	BL	1
F. Mordellidae	Tumbling Flower Beetles	CSS; ORN	BL	2
F. Chrysomelidae Subf. Galerucinae	Leaf Beetle	CSS	BB	1
F. Anthribidae	Fungus Weevil	U	BL	1
F. Curculionidae	Snout Beetles	CSS; SWS	BB; BL	4
Pantomorous sp.	Rose Weevil	CSS; SWS	BL	5
Identified to Order Only	Beetles	CSS; ORN	BB; BL	12
Subtotal				**60**
Or. Lepidoptera	**Moths and Butterflies**			
F. Pterophoridae	Plume Moths	CSS; ORN	BB; BL	4
F. Tortricidae	Tortricid Moth	U	BL	1
F. Cosmopterygidae	Cosmopterygid Moths	CSS	BL	3
F. Opostegidae	Opostegid Moths	CSS: ORN	BL	5
F. Geometridae Subt. Synchlorina	Geometer Moths	CSS	BL	4
F. Arctiidae *Apantesis proxima*	Mexican Tiger Moth	ORN	BL	1
F. Noctuidae	Noctuid Moths	CSS	BL	11
F. Hesperiidae	Skipper	SWS	BB	1
Hylephila phyleus	Fiery Skipper	CSS; ORN	O	1
F. Lycaenidae				
Brephidium exile	Western Pygmy Blue	SWS	BB	1
Leptotes marina	Marine Blue	CSS; SWS	BB; O	2
F. Pieridae				
Pieris protodice	Common White Butterfly	CSS; SWS	BB; O	2
Pieris rapae	Cabbage White Butterfly	CSS; SWS	O	3
F. Papilionidae *Papilio zelicaon zelicaon*	Anise Swallowtail Butterfly	SWS	O	1
F. Nymphalidae				
Agraulis vanillae	Gulf Fritillary	U	BB	1
Nymphalis antiopa a.	Mourning Cloak	SWS	O	2
Identified to Order Only	Moths	CSS; ORN	BB; BL	20
Subtotal				**63**

TABLE 7
INVERTEBRATE SURVEY RESULTS (CONT.)

Scientific Name	Common Name	Habitat	Survey Type	Number of Individuals
Or. Diptera	**Flies**			
F. Tipulidae	Crane Flies	U	BL	2
F. Culicidae	Mosquitoes	CSS	BL	2
Anopheles sp.		CSS	BL	1
T. Culicini		CSS	BL	1
F. Cecidomyiidae T. Oligotrophini	Gall Midge	CSS	BL	1
F. Tabanidae	Deer Fly	CSS	BL	1
F. Asilidae *Efferia* sp.	Robber Flies	CSS	BL	2
F. Empididae	Dance Flies	SWS	BB; BL	2
F. Dolichopodidae	Longlegged Fly	ORN	BL	2
F. Phoridae	Humpbacked Fly	SWS	BB	1
F. Pipunculidae	Big-headed Fly	ORN	BB	1
F. Syrphidae				
T. Milesiini	Wasp Mimic Flower Fly	SWS	BB	1
F. Otitidae *Delphinia* sp.	Picture-winged Flies	CSS	BB	2
F. Sepsidae	Black Scavenger Fly	CSS	BL	1
F. Drosophilidae	Pomace Flies	CSS; ORN	BL	4
F. Chloropidae	Frit Fly	ORN; SWS	BB	8
F. Heleomyzidae	Heleomyzid Fly	ORN	BL	6
F. Muscidae	House Flies	CSS; ORN, U	BL	5
Identified to Order Only	Flies	CSS; ORN	BL	8
Subtotal				**51**
Or. Hymenoptera	**Ants, Bees, and Wasps**			
F. Braconidae	Braconid Wasp	U	BL	1
F. Encyrtidae	Encyrtid Wasp	CSS; ORN	BB	2
F. Pteromalidae	Pteromalid Wasps	CSS; ORN	BB	4
F. Platygastridae	Platygastrid Wasp	ORN	BL	1
F. Bethylidae	Bethylid Wasp	SWS	BB	1
F. Formicidae	Ants	ORN; SWS	BB; BL	2
Iridomyrmex humilis	Argentine Ants	ORN; SWS	BB	6
F. Vespidae	True Wasps	ORN	O	Colony
F. Masaridae Subf. Euparagiinae	Masarid Wasps	CSS; SWS	BB	2
F. Specidae Subf. Specinae	Sphecid Wasp	ORN	BB	1
F. Halictidae	Sweat Bees	SWS	BB	2
Subf. Halictinae		ORN	BB	4
F. Apidae	Bees	ORN	BB	4
Apis mellifera	Honey Bees	ORN	BB; BL	2

TABLE 7
INVERTEBRATE SURVEY RESULTS (CONT.)

Scientific Name	Common Name	Habitat	Survey Type	Number of Individuals
Or. Hymenoptera (cont.)	**Ants, Bees, and Wasps (cont.)**			
Superfamily Chalcidoidea	Chalcid Wasp	CSS; SWS	BB	1
Identified to Order Only	Wasps	CSS; ORN	BB; BL	16
Subtotal				**49**
Class Insecta total				**303**
GrandTotal				**344**

F. = Family; G. = Genus; Or. = Order; Sp. = Species; Subf. = Subfamily; Subt. = Subtribe; T. = Tribe
CSS = Diegan coastal sage scrub; ORN = Ornamental landscaping; SWS = Southern willow scrub
BB = Bush-beating/Net Sweep (Daytime Survey); BL = Blacklighting (Nighttime Survey); O = Ocular survey; U = Unknown

TABLE 8
ORNITHOLOGICAL SURVEY RESULTS

Scientific Name	Common Name	Status	Habitat
Cooper's hawk	*Accipiter cooperii*	CSC,MSCP	SWS
Red-tailed hawk	*Buteo jamaicensis*		CSS, F
American kestrel	*Falco sparverius*		F
California quail	*Callipepla californica californica*		CSS
Western gull	*Larus occidentalis*		F
Mourning dove	*Zenaida macroura marginella*		CSS, U/D
Rock dove	*Columbina livia*		U/D
Anna's hummingbird	*Calypte anna*		CSS, ORN
Belted kingfisher	*Ceryle alcyon*		SWS
Black phoebe	*Sayornis nigricans semiatra*		CSS, U/D
Cassin's kingbird	*Tyrannus vociferans vociferans*		CSS, ORN
Northern rough-winged swallow	*Stelgidopteryx serripennis*		F
Cliff swallow	*Hirundo pyrrhonota tachina*		F
Western scrub-jay	*Aphelocoma californica*		CSS
Common raven	*Corvus corax clarionensis*		CSS, U/D
Bushtit	*Psaltriparus minimus minimus*		CSS
Bewick's wren	*Thyromanes bewickii*		CSS
Northern mockingbird	*Mimus polyglottos polyglottos*		CSS, U/D
Wrentit	*Chamaea fasciata henshawi*		CSS
Coastal California gnatcatcher	*Polioptila californica californica*	FT,CSC, MSCP	CSS
Lesser goldfinch	*Carduelis psaltria hesperophilus*		CSS, SWS, ORN
House finch	*Carpodacus mexicanus frontalis*		CSS, SWS, ORN
Wilson's warbler	*Wilsonia pusilla*		CSS
California towhee	*Pipilo crissalis*		CSS
Song sparrow	*Melospiza melodia*		CSS, SWS
House sparrow	*Passer domesticus*		CSS, ORN
White-crowned sparrow	*Zonotrichia leucophrys*		CSS
Red-winged blackbird	*Agelaius phoeniceus*		SWS
European starling	*Sturnus vulgaris*		U/D, ORN

CSC = California species of special concern; FT = Federally threatened; MSCP = City of San Diego Multiple Species Conservation Plan
CSS = Diegan coastal sage scrub; ORN = Ornamental landscaping; SWS = Southern willow scrub; U/D = Urban/Developed lands

Image Source: Photo Geodetic Corporation (flown April 2002)

Project location

Coastal California gnatcatcher general observed use area

Feral cat feeding station

FIGURE 11
Wildlife Survey Results

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4. Mammalian Resources

Naturally vegetated areas provide cover and foraging opportunities for a variety of mammal species. Many mammal species are nocturnal and are detected during daytime surveys by sign such as scat, tracks, and burrows.

The rodents observed were detected in the Sherman live traps, primarily on the native slopes. Trap success was generally low for all three small mammal trap sessions. An individual dusky-footed woodrat (*Neotoma fuscipes*) was caught on the steep slope in the northwest portion of the project. All other individuals observed were found on the west-facing slopes adjacent to Florida Canyon. Survey conditions and results are summarized in Table 9 below. Table 10 provides a list of mammal species observed on-site during trapping and general surveys.

D. Jurisdictional Resources

Figure 12 illustrates the locations of the soil test pits and the results of the delineation. A total of 0.48 acre of jurisdictional wetlands was delineated in the urban drainage adjacent to Florida Drive. A three-parameter approach was used to determine jurisdictional resources on-site. Strong indicators of hydrophytic vegetation and wetland hydrology were evident. The third parameter, hydrophytic soils, was more difficult to determine because soils within the drainage include loamy sands that are depositional in nature. Urban runoff and sedimentation contribute greatly to this creek; therefore, the site may be considered an atypical situation. Small pockets of hydric soils were observed; these pockets exhibited low chroma soils and mottles. The presence of strong indicators of hydrophytic vegetation and wetland hydrology and the evidence of pockets of hydric soil indicators were used to determine the wetland boundary.

TABLE 9
SMALL MAMMAL SURVEY CONDITIONS AND TRAP SUCCESS

Date	Trap Set Time and Conditions	Trap Check Time and Conditions	Trap Success
May 28–29	5:45–7:45 P.M.; 65°F; W 1–3; Overcast	6:00–7:20 A.M.; 60–62°F; W 0–1; A.M. fog	7/54 = 13 percent
May 29–30	6:00–7:15 P.M.; 64°F; W 1–3; Overcast	6:00–7:30 A.M.; 60–62°F; W 0-1; A.M. fog	9/86 = 10 percent
May 30–31	6:15–7:30 P.M.; 65°F; W 0–1; Overcast	6:10–7:45 A.M.; 60–63°F; W 0–1; A.M. fog	7/86 = 8 percent
June 30–July 1	6:15–7:30 P.M.; 65°F; W 0–1; Overcast	5:40–7:00 A.M.; 59–62°F; W 0–1; A.M. fog	10/86 = 12 percent
July 1–July 2	6:15–7:30 P.M.; 65°F; W 0–1; Overcast	5:50–7:15 A.M.; 63–65°F; W 0–1; Clear	13/80 = 16 percent

TABLE 9
SMALL MAMMAL SURVEY CONDITIONS AND TRAP SUCCESS (CONT.)

Date	Trap Set Time and Conditions	Trap Check Time and Conditions	Trap Success
July 2–July 3	6:15–7:30 P.M.; 65°F; W 0–1; Overcast	6:10–7:45 A.M.; 64–68°F; W 0–1; A.M. fog	12/80 = 15 percent
August 25–26	6:15–7:30 P.M.; 68°F; W 0–1; Clear to Overcast	5:30–7:25 A.M.; 66–68°F; W 0–1; A.M. fog	15/84 = 18 percent
August 26–27	6:15–7:30 P.M.; 67°F; W 1–3; Clear to Overcast	5:50–7:30 A.M.; 66–68°F; W 1–3; A.M. fog	17/84 = 20 percent
August 27–28	6:15–7:30 P.M.; 68°F; W 1–3; Clear to Overcast	5:50–7:45 A.M.; 66–70°F; W 1–3; A.M. fog	16/84 = 19 percent

°F = Degrees Fahrenheit; W = Wind speed in miles per hour

TABLE 10
SMALL MAMMAL SURVEY RESULTS

Common Name	Scientific Name	Status	Habitat	Survey Type
Opossum	*Didelphis virginiana*		SWS	O
California ground squirrel	*Spermophilus beecheyi*		CSS	O
Brush mouse	*Peromyscus boylii rowleyi*		CSS	T
Cactus mouse	*Peromyscus eremicus*		CSS	T
Deer mouse	*Peromyscus maniculatus*		CSS	T
San Diego desert woodrat	*Neotoma lepida intermedia*	CSC	CSS	T
Dusky-footed woodrat	*Neotoma fuscipes*		CSS	T
Cottontail rabbit	*Sylvilagus audubonii*		CSS	O
Coyote	*Canis latrans*		CSS, SWS	O

CSC = California species of special concern
CSS = Diegan coastal sage scrub; SWS = Southern willow scrub
O = Ocular survey; T = Sherman live trap

Image Source: Photo Geodetic Corporation (flown April 2002)

Project boundary

Jurisdictional wetlands

Test pits

Culverts

FIGURE 12
Jurisdictional Wetlands

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The drainage has been channelized and is well defined with riprap throughout much of its length. The southern extent of the creek has been stabilized with concrete banks. The ordinary high water mark averages 15 feet wide. The creek enters the site through a box culvert beneath Zoo Drive and exits to the south via a large pipe. Additional water enters the drainage via runoff from the adjacent east-facing slope. Culverts drain the hillside into the creek.

E. Erosion Evaluation and Control Plan

Appendix C provides a detailed erosion analysis and includes a list of best management practices (BMPs) to control and minimize pollution from storm water runoff. A summary of the results of the analysis is presented in this section.

Both short-term and long-term erosion control issues were identified. Areas requiring short-term erosion control are those areas that require immediate installation of erosion and sediment control devices in order to control current erosion problems. Areas requiring long-term erosion control are those sites that should be regularly monitored for signs of erosion or sedimentation buildup that will lead to erosion problems in the future. Please refer to Appendix C for maps of all erosion locations and a detailed description of the erosion control issues and the proposed BMPs to repair existing and prevent further erosion.

1. Short-term Erosion Control

A total of nine areas currently require immediate erosion and sediment control. These areas should be considered a high priority. If left unchecked, they could pose significant erosion problems. Following any short-term corrective action, the site should be closely monitored for effectiveness and maintained as necessary until the site has become stabilized.

Short-term Erosion Control Site 1 (S1): Two sites are located in areas dominated by bare ground or sparsely distributed shrubs and herbs, on highly erodible slopes. Recommended erosion control includes installation of native shrubs and annual herbs. The establishment of plants and their root systems will greatly reduce the amount of erosion on these areas. Some maintenance will likely be necessary over the first two to three years until the plants have become established, but ultimately this solution is cost-effective and maintenance-free in the long term.

S2: Four locations have been identified immediately off-site where runoff from the NMCSD has created erosion gullies that are several feet deep. These erosion gullies are caused by drainpipes or concrete V-ditches that release concentrated flow onto unprotected slopes. These gullies will continue to erode and may eventually undercut walkways and other infrastructure associated with the NMCSD. The gullies can be packed with clean fill material and cobble, and then planted with native shrubs. The shrubs and their root systems will anchor the soil. To prevent further erosion, point sources of runoff such as drain pipes and concrete culverts should be redirected so that the accumulation of runoff does not drain off-site in concentrated flows. A drainpipe to the bottom of the slope may be necessary to avoid future erosion

problems if redirection of runoff is not possible. A redesign of the current drainage of water from adjacent impervious surfaces may identify a more permanent solution for gully erosion in these areas. An engineer should be consulted for design options.

S3: A catch basin inlet filter should be placed within the drain that receives runoff from the vegetated hillside. Currently, runoff from the hillside drains directly into the storm drain system with no sediment traps in place. A catch basin inlet filter will trap sediment as it enters the drain. The sediment bag should be cleaned out regularly and drain grates should be kept free of the vegetative debris.

S4: Soil is slowly being eroded from behind the retaining wall. While this erosion does not provide any immediate threat, long-term consequences could cause the wall to collapse. To eliminate the threat of erosion, a small berm or ditch should be constructed that will divert runoff toward the storm drain listed in item S3. Currently, runoff is not directed toward the drain, and water flows toward the retaining wall.

S5: Sediment erosion is occurring behind the corner of the large retaining wall below the parking structure causing a large cavity that could compromise the integrity of the retaining wall and the parking structure that it supports. It appears that there may be a low point in the concrete culvert that lies at the top of this wall that causes runoff to spill over the ditch and behind the wall. An engineer should be consulted to develop plans to correct both the retaining wall and concrete ditch.

2. Long-term Erosion and Sediment Control

Several sites have been identified for long-term sediment and erosion management and should be regularly monitored for signs of erosion or sedimentation. Proper management of these areas will be critical. If problems are identified and corrected for minimal costs and effort in their early stages of development, larger more costly problems may be avoided.

Long-term Erosion and Sediment Control Site 1 (L1): Drains and culverts located on the steep hillsides of NMCSD may become obstructed by debris from surrounding vegetation, which can result in erosion hazards on the slopes. All drains and culverts should be inspected before and after a significant rainfall event. All sediment and debris that is obstructing flow should be properly removed and disposed of in an area that is not subject to erosion. Special attention should be given to outlets and other points where concentrated flow is released. These areas should be inspected for scour holes and undermining. All sites containing visible signs of erosion should be repaired immediately by backfilling, gravel bags, or other means of erosion control.

L2: One of the components of an erosion control plan is to minimize pollution of watercourses or drainage systems from sediment- or debris-laden storm water. The drainage outlets for the parking lots include three points where flow into the concrete drainage ditches is unrestricted. The accumulation of sediment and debris can clog these ditches and cause erosion problems.

Sediment and debris traps should be placed at the point where runoff from the parking lot enters the concrete drains on the west end of the parking lot. Keeping these drains free of debris will allow them to

function as designed. A simple grate with filter fabric placed across the opening of the concrete ditch should eliminate sediment and debris from entering the ditch. Regular maintenance of these structures is necessary for proper operation.

L3: Debris and sediment has become trapped at the bottom of the concrete ditches where they pass beneath the perimeter fence on the western edge of NMCSD. An obstruction within these ditches ultimately compromises them. Water flow that is obstructed eventually flows around the obstruction and will erode adjacent areas. The drainages should be regularly swept free of accumulated sediment and debris following significant storm events.

3. Monitoring, Inspection, and Maintenance

The Erosion Control Manager should inspect all sediment and erosion management sites within 24 hours of a significant storm event. For NMCSD, a storm is significant, if precipitation reaches 0.25 inch or more in depth over the course of a 24-hour period. The Erosion Control Manager should record any damages or deficiencies.

Erosion or sediment control damages or deficiencies recorded by the Erosion Control Manager should be repaired or replaced as soon as feasible and preferably before a subsequent storm event. A supply of erosion and sediment control materials such as sand or gravel bags, mulch, storm drain inlet protectors, and catch basin inlet filters should be stored in a maintenance facility on-site for repairs or emergencies. All temporary sediment control devices should be inspected and maintained more frequently and removed when the erosion/sedimentation problem is eliminated.

4. Best Management Practices Fact Sheets

Attachment 2 in Appendix C presents a range of permanent best management practices (BMPs) for continued control of stormwater pollution. The categories of BMPs addressed in this attachment include topsoiling, seeding, planting, and catch basin inserts. Each BMP fact sheet presents a description, application, and limitation information, as well as design parameters, implementation guidelines, and operation and maintenance tips. The most important factors for successful performance of these BMPs are adhering to the manufacturer's application specifications and regular inspection and maintenance following installation. The BMP fact sheets have been acquired through the Idaho Department of Environmental Quality Catalog of Stormwater Best Management Practices and modified for use at NMCSD (IDEQ 2001).

F. Exotic Invasive Plant Removal Plan

Many exotic, or non-native, plant species are considered to be invasive species due to their ability to colonize new areas easily and potentially out-compete native plant species. Exotic species such as tamarisk and pampas grass have wind-dispersed seeds that can spread to areas a great distance away from the originating plant. The California Exotic Pest Plant Council (CalEPPC) has published a list of "exotic pest plants of greatest ecological concern" (List) (CalEPPC 1999). Several exotic ornamental plants on

NMCSD that have either been planted in landscaping beds or have colonized the area are considered invasive weeds, especially where they are adjacent to or have become established in the native open areas. For this reason, different control and monitoring programs are planned for different areas within NMCSD. In general, CalEPPC listed plants that occur in native areas will be monitored and controlled. CalEPPC listed plants that occur in landscaped areas should be monitored and managed on a case-by-case basis. Ornamental plants that have recruited outside of their designated planting area or that were planted immediately adjacent to native areas should be considered for removal. Appendix D provides the Exotic Invasive Removal Plan (EIRP), which includes a detailed description of exotic invasive plants located on NMCSD and methods for control and removal of these species. The section below provides a summary of this plan.

1. Definition of Exotic Invasive Plant Species

The California Exotic Pest Plant Council (CalEPPC) has published a list of "exotic pest plants of greatest ecological concern" (List) (CalEPPC 1999). The CalEPPC-listed plants that occur within NMCSD and their category are listed in Table 11. The CalEPPC List of exotic pest plants is categorized by ecological threat. The categories break down as follows:

List A: Most Invasive Wildland Pest Plants; documented as aggressive invaders that displace natives and disrupt natural habitats. It includes two sub-lists:

List A-1: Widespread pests that are invasive in more than three Jepson regions[1]

List A-2: Regional pests that are invasive in three or fewer Jepson regions.

List B: Wildland Pest Plants of Lesser Invasiveness; invasive pest plants that spread less rapidly and cause a lesser degree of habitat disruption; may be widespread or regional.

Red Alert: Pest plants with potential to spread explosively; infestations currently small or localized. If found, alert the California Invasive Plant Council (Cal-IPC), the County Agricultural Commissioner, or the California Department of Food and Agriculture.

Need More Information: Plants for which current information does not adequately describe nature of threat to wildlands, distribution, or invasiveness. Further information is requested from knowledgeable observers.

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[1] The Jepson Manual has described the function of providing geographic ranges in a botanical context to help the user of the manual predict where plant taxa can be expected to grow. There are 10 regions which cover the State of California.

TABLE 11
EXOTIC INVASIVE PLANT SPECIES OBSERVED

Scientific Name	Common Name	CalEPPC Status
Acacia redolens	Acacia	none
Aptenia cordifolia (L.F.) N.E.Br.	Baby sun rose	Need more information
Arundo donax L.	Giant reed	A-1
Asphodelus fistulosus L.	Hollow-stem asphodel	Need more information
Atriplex semibaccata R.Br.	Australian saltbush	A-2
Brassica nigra (L.) Koch.	Black mustard	B
Bromus madritensis L. ssp. *rubens* (L.) Husnot	Foxtail chess	A-2
Carpobrotus chilensis (Molina) N.E. Brown	Sea fig	Considered
Carpobrotus edulis (L.) Bolus.	Hottentot fig	A-1
Centaurea melitensis L.	Tocolote, star-thistle	B
Coprosma repens A. Rich.	Mirror Plant	Considered
Cortaderia jubata (Lemoine) Stapf	Pampas grass	A-1
Cotoneaster sp.	Cotoneaster	Need more information
Cynara cardunculus L.	Cardoon	A-1
Echium plantagineum L.	Viper's bugloss	Need more information
Eucalyptus globulus	Eucalyptus	A-1
Ficus carica L.	Edible fig	A-2
Foeniculum vulgare Mill.	Fennel	A-1
Hedera helix L.	English ivy	B
Malephora crocea (Jacq.) Schwantes	Croceum iceplant	Need more information
Medicago polymorpha L.	California bur clover	Considered
Mesembryanthemum crystallinum L.	Crystalline ice plant	B
Mesembryanthemum nodiflorum L.	Slender-leaved ice plant	Need more information
Myoporum parvifolium L.	Myoporum	A-2
Nerium oleander L.	Oleander	Considered
Nicotiana glauca Grah.	Tree tobacco	Need more information
Olea europeae L.	Common olive	B
Oxalis sp.	Wood-sorrel	Need more information
Pennisetum setaceum Forsskal	Fountain grass	A-1
Picris echioides L.	Bristly ox-tongue	Considered
Oryzopsis miliaceae (L.) Benth.	Smilo grass	Need more information
Ricinus communis L.	Castor bean	B
Salsola tragus L.	Russian thistle, tumbleweed	Need more information
Schinus molle L.	Peruvian pepper tree	B
Schinus terebinthifolius Raddi	Brazilian pepper tree	B
Tamarix sp.	Tamarisk	A-1
Vinca major L.	Greater periwinkle	B
Zantedeschia aethiopica L.	Common calla lily	Considered

Key to CalEPPC List Categories:

A-1 = Widespread pests that are invasive in more than three Jepson regions.

A-2 = Regional pests invasive in three or fewer Jepson regions.

B = Wildland Pest Plants of Lesser Invasiveness; invasive pest plants that spread less rapidly and cause a lesser degree of habitat disruption; may be widespread or regional.

Considered = Plants that, after review of status, do not appear to pose a significant threat to wildlands.

Need more information = Plants for which current information does not adequately describe the nature of threat to wildlands, distribution, or invasiveness. Further information is requested from knowledgeable observers.

Considered But Not Listed: Plants that, after review of status, do not appear to pose a significant threat to wildlands. Plants that fall into the following categories are not included in the list:

- Plants found mainly or solely in disturbed areas, such as roadsides and agricultural fields.
- Plants that are established only sparingly, with minimal impact on natural habitats.

2. Weed Management Target Areas

Highest priorities should be given to CalEPPC List A weed species that occur in either native upland habitat or riparian habitats on-site. Higher priority within this list is given to plants that interfere with the most important management goals and whose populations are small and easiest to control in the short-term. All listed species should be monitored at least every three years and mapped, if possible. Schedules for weed control are dependent on the type of weed species being controlled. As certain species are removed, new exotic species may move into these areas. Therefore, these areas must be monitored and controlled as needed. Appendix D provides a detailed description of each of the invasive plant species observed on-site.

a. Native Upland Habitat

Native upland habitat is confined to the western slopes of NMCSD. The most widespread weed over this habitat is salt cedar (*Tamarisk* sp.). Other problematic species in this area include artichoke thistle (*Cynara cardunculus*), Pampas grass (*Cortaderia jubata*), tocolote (*Centaurea melitensis*), yellow star thistle (*C. solstitialis*), fountain grass (*Pennisetum setaceum*), and other potentially invasive herbaceous species. These species out-compete native species for light, nutrients, and water, and these species can form dense uniform stands. Many of these species are prolific seed producers that may build up the seed bank quickly once established.

Control of the problematic species for native upland habitat is high priority. All of the high-priority native upland habitat weed species should be removed when detected by a method appropriate for each situation. Other, less invasive species, such as iceplant (*Carpobrotus edulis*) and crystalline ice plant (*Mesembryanthemum crystallinum*), blue gum (*Eucalyptus globules*), and acacia (*Acacia redolens*), may commonly occur in these areas and have a medium to low priority for removal, unless evidence suggests that the populations are becoming detrimental to native habitats.

b. Riparian Areas

Riparian areas are vegetated zones surrounding watercourses and are highly susceptible to weed infestations. Weeds occurring within NMCSD riparian areas include giant reed (*Arundo donax*), sweet fennel (*Foeniculum vulgare*), castor bean (*Ricinus communis*), blue gum, iceplant, and salt cedar. These six species can alter riparian community composition and structure if allowed to spread. These changes would result in a significant decline in habitat quality.

Invasive weed monitoring and elimination from riparian areas is a high priority. All six of the high-priority riparian weed species should be removed when detected by a method appropriate for each situation. Other, less invasive species that may commonly occur in these areas have a low priority, unless evidence suggests that the populations are becoming detrimental to native habitats.

c. Ornamental Areas

Several ornamental landscape areas within NMCSD contain tree and shrub species that are considered invasive weeds when they are introduced to native landscapes. These species include Brazilian pepper tree (*Schinus molle*), iceplant (*Carpobrotus chilensis* and *C. edulis*), fountain grass, and eucalyptus. Unless the species in question is a CalEPPC List A plant, this EIRP will not require the removal of these ornamental species (see Table 11). Instead, it is recommended that precautions be taken to reduce the threat of these plants from recruiting into native areas. Precautions may include:

- Cut seed heads off selected plants.
- Sweep or rake seeds off the ground when they fall from trees.
- Trim ornamental plants to ensure they don't overgrow their planters or designated planting area.

3. Monitoring and Education Plan

Management and monitoring of the EIRP should be coordinated with other land management practices on NMCSD. All landscaping personnel working on NMCSD should become educated in identifying problem weeds so that the weed locations can be mapped as they conduct other work. This will serve both to monitor known weed populations and act as an early warning system for new invasions of target pest species.

It is important to know the distribution of the weed species on NMCSD. It will allow the land manager to track the spread of each species and the efficacy of weed control tactics used. Blank survey maps should be made available to landscaping personnel working on the site. Workers can make notes on these maps when invasive weeds are encountered during routine maintenance activities. These maps should be compiled at the end of each year and will be used to assist in focused surveys.

Focused surveys should be conducted every three years. Focused surveys will include tracking the density and distribution of invasive weeds within and adjacent to NMCSD. Surveys should be conducted by walking along concrete drainages, roads, and slopes. Invasive weeds can often be spotted from far distances by color or growth habit. Specific attention should be given to riparian areas and drainages, as they serve as corridors for seed dispersal. Detailed aerial photographs should be used with focused surveys to pinpoint exact locations of new weed populations.

References Cited

American Ornithologists' Union

1998 *Check-list of North American Birds: The Species of Birds of North America from the Arctic through Panama, Including the West Indies and Hawaiian Islands.* 7th ed. Committee on Classification and Nomenclature.

Arnett, Dr. Ross H., Jr. and Dr. Richard L. Jacques, Jr.

1981 Simon and Schuster's Guide to Insects. Simon and Schuster Inc. New York.

Arnett, Ross H., Jr. Ph.D.

2000 American Insects: A Handbook of the Insects of America North of Mexico. CRC Press. Boca Raton.

Bailey, L. H. and E. Z. Bailey (editors)

1976 Hortus Third. *A Concise Dictionary of Plants Cultivated in the United States and Canada.* MacMillan Publishing Company.

Borror, D. J. and White, R. E.

1970 Insects, Peterson Field Guide. Houghton Mifflin Company. Boston.

Borror, Donald J. and *et. al.*

1976 An Introduction to the Study of Insects 5th Edition. Holt, Rinehart, and Winston. New York.

California Exotic Pest Plan Council (CalEPPC)

1999 California Exotic Pest Plant Council. The CalEPPC List: Exotic Pest Plants of Greatest Ecological Concern in California. October.

California Native Plant Society (CNPS)

2001 *Inventory of Rare and Endangered Plants of California.* 6th ed. Rare Plant Scientific Advisory Committee, D. P. Tibor, convening editor.

California, State of

2002a State and Federally Listed Endangered, Threatened, and Rare Plants of California. Natural Diversity Data Base. Department of Fish and Game. July.

2002b Special Vascular Plants, Bryophytes, and Lichens List. January.

2002c State and Federally Listed Endangered and Threatened Animals of California. Natural Diversity Data Base. Department of Fish and Game. July.

2002d Special Animals. Natural Diversity Database. Department of Fish and Game. July.

2002e California Natural Diversity Data Base. Nongame-Heritage Program, Department of Fish and Game, Sacramento.

Crother, B. I., ed.
2001 Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in Our Understanding. Society for the Study of Amphibians and Reptiles *Herpetological Circular* 29. iii + 82 pp.

Glassberg, Jeffrey
2001 Butterflies through Binoculars: The West. Oxford University Press, Inc. New York.

Glassberg, Jeffrey
2002 Butterflies of North America. Michael Friedman Publishing Group, Inc. New York.

Hall, E. R., and K. R. Kelson
1959 *The Mammals of North America.* Ronald Press, New York.

Hickman, J. C., ed.
1993 *The Jepson Manual: Higher Plants of California.* University of California Press, Berkeley and Los Angeles.

Holland, R. F.
1986 Preliminary Descriptions of the Terrestrial Natural Communities of California. Nongame-Heritage Program, California Department of Fish and Game. October.

Idaho Department of Environmental Quality (IDEQ)
2001 Idaho Department of Environmental Quality in partnership with Brown and Caldwell, Environmental Engineering and Consulting, Catalog of Stormwater BMPs for Idaho Cities and Counties. August on-line edition. http://www.deq.state.id.us/water/stormwater_catalog /chapter1_1.asp

Jones, C., R. S. Hoffman, D. W. Rice, R. J. Baker, M. D. Engstrom, R. D. Bradley, D. J. Schmidly, and C. A. Jones
1997 Revised Checklist of North American Mammals North of Mexico. *Occasional Papers, Museum of Texas Tech University* No. 173. December.

Knopf, Alfred A.
1980 The Audubon Society Field Guide to North American Insects and Spiders. Chanticleer Press, Inc. New York.

Mattoni, R.
1990 Butterflies of Greater Los Angeles. The Center for the Conservation of Biodiversity/Lepidoptera Research Foundation, Inc. Beverly Hills, CA.

Opler, P. A., and A. B. Wright
1999 *A Field Guide to Western Butterflies.* Peterson Field Guide Series. Houghton Mifflin, Boston.

Powell and Hogue
1979 California Insects. University of California Press, Berkeley.

RECON
1996 Naval Medical Center Final Natural Resources Management Plan.

2003 Final Work Plan for Naval Medical Center San Diego Natural Resources Inventory and Implementation Guide. July 9.

Sawyer, J. O., and T. Keeler-Wolf
1995 *A Manual of California Vegetation.* California Native Plant Society, Sacramento.

Tierra Data Systems
2001 Integrated Natural Resource Management Plan for Naval Medical Center San Diego. November.

Tremor, S.
1999 Mammals of San Diego County. Identification pamphlet from a San Diego Natural History Museum Workshop.

U.S. Army Corps of Engineers (USACE)
1987 Corps of Engineers Wetlands Delineation Manual. Wetlands Research Program, Technical Report Y-87-1. Department of the Army, Washington, D.C.

U.S. Department of Agriculture (USDA)
1973 *Soil Survey, San Diego Area, California.* Edited by Roy H. Bowman. Soil Conservation Service and Forest Service. December.

U.S. Fish and Wildlife Service (USFWS)
1997 National List of Vascular Plant Species that Occur in Wetlands: 1996 National Summary. Ecology Section–National Wetlands Inventory. March 3, 1997.

2002 Review of Species that are Candidates or Proposed for Listing as Endangered or Threatened: Annual Notice of Findings on Recycled Petitions; Annual Description of Progress of Listings. *Federal Register* 67(114). June 13. 50 CFR 17.

U.S. Geological Survey (USGS)
1967 Point Loma, California. 7.5 minute series topographic quadrangle map. Photorevised 1975.

APPENDIXES

APPENDIX A

APPENDIX A
LOG OF PHOTO-DOCUMENTATION POINTS

Photopoint Number	Time	Compass direction[1]	Height from ground level[2]	Coordinates (State Plane NAD 83 Feet)	Management Unit Viewed
1	9:41 A.M.	306	5'4"	6285947; 1845701	1
2	9:46 A.M.	10	5'4"	6285947; 1845701	1
3	9:53 A.M.	282	5'4" [2]	6286076; 1846078	1
4	9:59 A.M.	283	5'4"	6286195; 1846403	1
5	10:04 A.M.	2	5'4"	6286166; 1846494	1
6	10:16 A.M.	280	4'10"	6286479; 1846682	2
7	10:22 A.M.	274	4'10"	6286526; 1846701	2
8	10:27 A.M.	110	4'6"	6286668; 1846687	4
9	10:35 A.M.	200	4'10"	6286943; 1846299	4
10	10:42 A.M.	230	4'6"	6286966; 1845978	5
11	10:47 A.M.	180	4'10"	6286954; 1845836	5
12	10:55 A.M.	225	4'10"	6286946; 1845533	5
13	11:02 A.M.	72	4'5"	6286888; 1845394	5
14	11:06 A.M.	182	4'10"	6286856; 1845273	5
15	11:06 A.M.	114	4'10"	6286856; 1845273	6
16	11:22 A.M.	18	4'10"	6286935; 1845628	5
17	11:26 A.M.	340	4'10"	6286904; 1845997	4
18	11:34 A.M.	336	4'10"	6286891; 1846325	4
19	12:46 P.M.	28	4'10"	6286769; 1844804	5
20	12:46 P.M.	218	4'6"	6286769; 1844804	10
21	12:53 P.M.	174	4'10"	6286549; 1844714	9/10
22	13:08 P.M.	12	4'10"	6286935; 1844711	6
23	13:15 P.M.	354	4'10"	6286994; 1844825	6
24	13:29 P.M.	332	4'10"	6286407; 1844074	9
25	13:30 P.M.	180	4'10"	6286407; 1844074	8/9
26	13:56 P.M.	25	4'10"	6286355; 1845191	10
27	14:31 P.M.	48	5'5"	6287057; 1845650	3
28	14:36 P.M.	352	5'5"	6287040; 1845927	3

[1]Compass direction based on a 14-degree declination.

[2]Height for Photopoint 3 is measured from the landing of the Building 1 stairwell between levels 2 and 3.

FIGURE 1
Photo-Documentation Point Locations

PHOTOGRAPH 1

PHOTOGRAPH 2

PHOTOGRAPH 3

PHOTOGRAPH 4

PHOTOGRAPHS 1-4

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PHOTOGRAPH 5

PHOTOGRAPH 6

PHOTOGRAPH 7

PHOTOGRAPH 8

PHOTOGRAPHS 5-8

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PHOTOGRAPH 9

PHOTOGRAPH 10

PHOTOGRAPH 11

PHOTOGRAPH 12

PHOTOGRAPHS 9-12

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PHOTOGRAPH 13

PHOTOGRAPH 14

PHOTOGRAPH 15

PHOTOGRAPH 16

PHOTOGRAPHS 13-16

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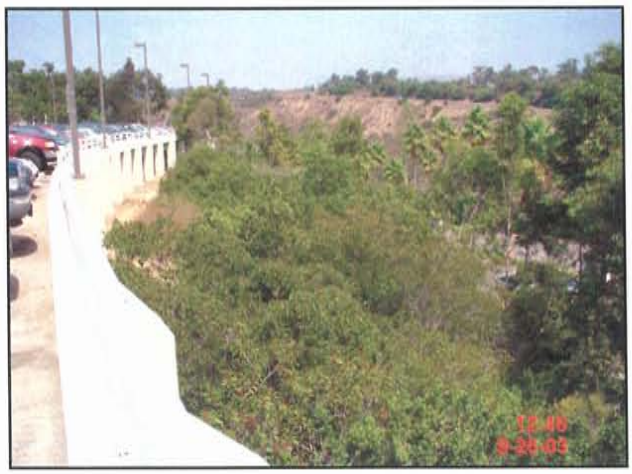
PHOTOGRAPH 17

PHOTOGRAPH 18



PHOTOGRAPH 19

PHOTOGRAPH 20

PHOTOGRAPHS 17-20

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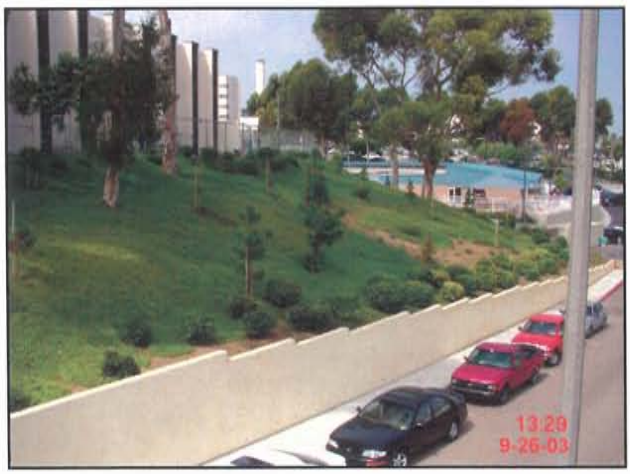
PHOTOGRAPH 21

PHOTOGRAPH 22

PHOTOGRAPH 23



PHOTOGRAPH 24

PHOTOGRAPHS 21-24

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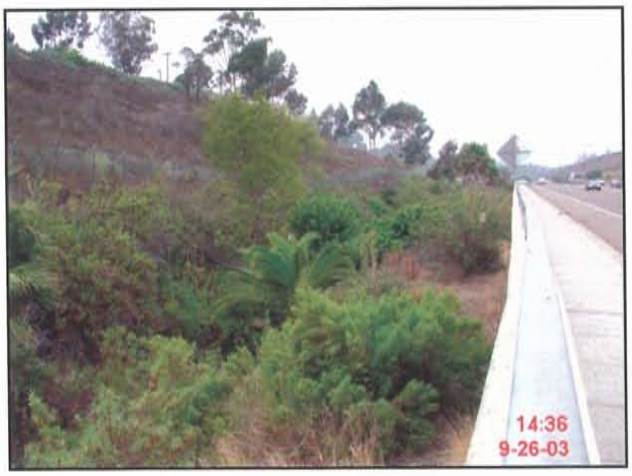
PHOTOGRAPH 25

PHOTOGRAPH 26

PHOTOGRAPH 27



PHOTOGRAPH 28

PHOTOGRAPHS 25-28

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APPENDIX B

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD

Project/Site: Naval Medical Center San Diego Applicant/Owner: SWDIV/US Navy Investigator(s): J. MacAller, V. Novik	Date: 12-16-02 County: San Diego State: CA
Do Normal Circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No Is the area a potential Problem Area? ☐ Yes ☒ No (if needed, explain on reverse or attach separate sheet.)	Community ID: SWS Transect ID: Plot ID: 1

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Arundo donax*	S	FAC+	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 100 percent

Remarks:
1. Assume presence of wetland vegetation? ☒ Yes ☐ No
2. Rooted emergent vegetation present? ☐ Yes ☒ No

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:
- Depth of Surface Water: 0 (in.)
- Depth to Water in Pit: > 18 (in.)
- Depth to Saturated Soil: >18 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in: ☐ Upper 12" ☐ 13-18"
- ☒ Water Marks
- ☒ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in: ☐ Upper 12" ☐ 13-18"
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Observations and Remarks: **Water marks on side of concrete channel. Algae near ordinary high water mark.**

1. *Filamentous or sheet forming algae present?* ☒ *Yes* ☐ *No*
2. *Slope:* ☒ *0-2%; or* ☐ *>2%*
3. *Oxidized rhizospheres:* ☐ *new roots only;* ☐ *old roots only;* ☐ *new and old roots,* ☒ *none*
4. *Flooding:* ☐ *none, flooding not probable;* ☐ *rare, unlikely but possible under unusual weather conditions;* ☐ *occasional, occurs on an average of once or less in 2 years; or* ☒ *frequent, occurs on an average of more than once in 2 years.*
5. *Duration:* ☐ *very brief, if <2 days;* ☐ *brief, if 2-7 days, or* ☒ *long, if >7 days*
6. *Site ponds water?* ☒ *Yes* ☐ *No*

SOILS

Map Unit Name (Series and Phase): Redding cobbly loam, 9 to 30 percent slopes Taxonomy (Subgroup): Abruptic Durixeralfs	Drainage Class: well-drained Permeability: very slow Runoff: medium to rapid Field Observations: Confirm Mapped Type? ☐ Yes ☒ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Contrast	Texture, Concretions, Structures, etc.
0-4		n/a			cobble substrate
4-18		10 YR 3/2			coarse sand w/ cobble

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Observations and Remarks: **Newly formed soils in urban drainage mask hydric soil indicators.**

1. *Smell:* ☐ *Neutral;* ☒ *Slightly fresh; or* ☐ *Freshly plowed field smell*
2. *Site:* ☐ *Irrigated;* ☐ *Land leveled;* ☐ *Ditch drained;* ☐ *Pumped;* ☐ *Graded to drain via slope*
3. *Soils:* ☒ *do* ☐ *do not become frequently ponded or saturated for long (>7 days) to very long durations (>30 days) during the growing season*

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ Yes	☐ No	Is this Sampling Point within a Wetland? ☒ Yes ☐ No
Wetland Hydrology Present?	☒ Yes	☐ No	
Hydric Soils Present?	☒ Yes	☐ No	

Remarks:

1. *Possibly water of the U.S.?* ☒ *Yes* ☐ *No*
2. *Possibly exempt from Corps/EPA Regulation?* ☐ *Yes* ☒ *No (If yes, check item(s) below.)*
   - (a) ☐ *Non-tidal drainage and irrigation ditches excavated on dry land*
   - (b) ☐ *Artificially irrigated areas which would revert to upland if the irrigation ceased.*
   - (c) ☐ *Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.*
   - (d) ☐ *Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.*
   - (e) ☐ *Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States (see 33 CFR 328.3(a)).*

Approved by HQUSACE 3/92

Additional Comments/Remarks: **Urban drainage–channelized with partially cemented banks. Soils are too new to show hydric soil features. Sedimentation is extensive from urban runoff.**

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD

Project/Site: Naval Medical Center San Diego Applicant/Owner: SWDIV/US Navy Investigator(s): J. MacAller, V. Novik	Date: 12-16-02 County: San Diego State: CA
Do Normal Circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No Is the area a potential Problem Area? ☐ Yes ☒ No (if needed, explain on reverse or attach separate sheet.)	Community ID: SWS Transect ID: Plot ID: 2

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Baccharis salicifolia*	S	FACW	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 100 percent

Remarks:
1. Assume presence of wetland vegetation? ☒ Yes ☐ No
2. Rooted emergent vegetation present? ☐ Yes ☒ No

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:
- Depth of Surface Water: 0 (in.)
- Depth to Water in Pit: > 18 (in.)
- Depth to Saturated Soil: >18 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in: ☐ Upper 12" ☐ 13-18"
- ☐ Water Marks
- ☒ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in: ☐ Upper 12" ☐ 13-18"
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Observations and Remarks:
1. *Filamentous or sheet forming algae present?* ☐ *Yes* ☒ *No*
2. *Slope:* ☒ *0-2%; or* ☐ *>2%*
3. *Oxidized rhizospheres:* ☐ *new roots only;* ☐ *old roots only;* ☐ *new and old roots,* ☒ *none*
4. *Flooding:* ☐ *none, flooding not probable;* ☐ *rare, unlikely but possible under unusual weather conditions;* ☐ *occasional, occurs on an average of once or less in 2 years; or* ☒ *frequent, occurs on an average of more than once in 2 years.*
5. *Duration:* ☐ *very brief, if <2 days;* ☒ *brief, if 2-7 days, or* ☐ *long, if >7 days*
6. *Site ponds water?* ☒ *Yes* ☐ *No*

SOILS

Map Unit Name (Series and Phase): Redding cobbly loam, 9 to 30 percent slopes Taxonomy (Subgroup): Abruptic Durixeralfs	Drainage Class: well drained Permeability: very slow Runoff: medium to rapid Field Observations: Confirm Mapped Type? ☐ Yes ☒ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Contrast	Texture, Concretions, Structures, etc.
0-18		10 YR 3/2			cobble and coarse sand
				Note: some organic matter in sand is being reduced	

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Observations and Remarks: **Soil color not exactly as expected due to urban runoff and sedimentation.**

1. *Smell:* ☐ *Neutral;* ☒ *Slightly fresh; or* ☐ *Freshly plowed field smell*
2. *Site:* ☐ *Irrigated;* ☐ *Land leveled;* ☐ *Ditch drained;* ☐ *Pumped;* ☐ *Graded to drain via slope*
3. *Soils:* ☒ *do* ☐ *do not become frequently ponded or saturated for long (>7 days) to very long durations (>30 days) during the growing season*

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ Yes	☐ No	Is this Sampling Point within a Wetland? ☒ Yes ☐ No
Wetland Hydrology Present?	☒ Yes	☐ No	
Hydric Soils Present?	☒ Yes	☐ No	

Remarks:

1. *Possibly water of the U.S.?* ☒ *Yes* ☐ *No*
2. *Possibly exempt from Corps/EPA Regulation?* ☐ *Yes* ☒ *No* *(If yes, check item(s) below.)*
   - *(a)* ☐ *Non-tidal drainage and irrigation ditches excavated on dry land*
   - *(b)* ☐ *Artificially irrigated areas which would revert to upland if the irrigation ceased.*
   - *(c)* ☐ *Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.*
   - *(d)* ☐ *Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.*
   - *(e)* ☐ *Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States (see 33 CFR 328.3(a)).*

Approved by HQUSACE 3/92

Additional Comments/Remarks: **Urban drainage–some organic material in the sandy soils is being reduced. Weak hydric soil indicators due to newly formed depositional soils within the ordinary high water mark.**

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD

Project/Site: Naval Medical Center San Diego Applicant/Owner: SWDIV/US Navy Investigator(s): J. MacAller, V. Novik	Date: 12-16-02 County: San Diego State: CA
Do Normal Circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No Is the area a potential Problem Area? ☐ Yes ☒ No (if needed, explain on reverse or attach separate sheet.)	Community ID: channel Transect ID: Plot ID: 3

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *unvegetated channel*			9. *few small weeds present:*		
2.			10. *Chrysanthemum*	H	UPL
3.			11. *Foeniculum vulgare*	H	FACU-
4.			12. *Ambrosia psilostachya*	H	FAC
5.			13. *Ricinis communis*	H	FACU
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 0 percent

Remarks:
1. Assume presence of wetland vegetation? ☐ Yes ☒ No
2. Rooted emergent vegetation present? ☐ Yes ☒ No

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:
- Depth of Surface Water: 0 (in.)
- Depth to Water in Pit: > 18 (in.)
- Depth to Saturated Soil: >18 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in: ☐ Upper 12" ☐ 13-18"
- ☐ Water Marks
- ☒ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in: ☐ Upper 12" ☐ 13-18"
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Observations and Remarks:
1. *Filamentous or sheet forming algae present?* ☐ *Yes* ☒ *No*
2. *Slope:* ☒ *0-2%; or* ☐ *>2%*
3. *Oxidized rhizospheres:* ☐ *new roots only;* ☐ *old roots only;* ☐ *new and old roots,* ☒ *none*
4. *Flooding:* ☐ *none, flooding not probable;* ☐ *rare, unlikely but possible under unusual weather conditions;* ☒ *occasional, occurs on an average of once or less in 2 years; or* ☐ *frequent, occurs on an average of more than once in 2 years.*
5. *Duration:* ☐ *very brief, if <2 days;* ☒ *brief, if 2-7 days, or* ☐ *long, if >7 days*
6. *Site ponds water?* ☐ *Yes* ☒ *No*

SOILS

Map Unit Name (Series and Phase): Redding cobbly loam, 9 to 30 percent slopes Taxonomy (Subgroup): Abruptic Durixeralfs	Drainage Class: well drained Permeability: very slow Runoff: medium to rapid Field Observations: Confirm Mapped Type? ☐ Yes ☒ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Contrast	Texture, Concretions, Structures, etc.
0-18		10 YR 3/2			cobble and coarse sand

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Observations and Remarks:

1. *Smell:* ☒ *Neutral;* ☐ *Slightly fresh; or* ☐ *Freshly plowed field smell*
2. *Site:* ☐ *Irrigated;* ☐ *Land leveled;* ☐ *Ditch drained;* ☐ *Pumped;* ☐ *Graded to drain via slope*
3. *Soils:* ☒ *do* ☐ *do not become frequently ponded or saturated for long (>7 days) to very long durations (>30 days) during the growing season*

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐ Yes	☒ No	Is this Sampling Point within a Wetland? ☐ Yes ☒ No
Wetland Hydrology Present?	☒ Yes	☐ No	
Hydric Soils Present?	☐ Yes	☒ No	

Remarks:

1. *Possibly water of the U.S.?* ☒ *Yes* ☐ *No*
2. *Possibly exempt from Corps/EPA Regulation?* ☐ *Yes* ☒ *No (If yes, check item(s) below.)*
   - (a) ☐ *Non-tidal drainage and irrigation ditches excavated on dry land*
   - (b) ☐ *Artificially irrigated areas which would revert to upland if the irrigation ceased.*
   - (c) ☐ *Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.*
   - (d) ☐ *Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.*
   - (e) ☐ *Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States (see 33 CFR 328.3(a)).*

Approved by HQUSACE 3/92

Additional Comments/Remarks: **Pocket of unvegetated channel within the greater wetland. Scoured due to flood event.**

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD

Project/Site: Naval Medical Center San Diego Applicant/Owner: SWDIV/US Navy Investigator(s): J. MacAller, V. Novik	Date: 12-16-02 County: San Diego State: CA
Do Normal Circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No Is the area a potential Problem Area? ☐ Yes ☒ No (if needed, explain on reverse or attach separate sheet.)	Community ID: SWS Transect ID: Plot ID: 4

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Baccharis salicifolia*	S	FACW	9.		
2. *Salix gooddingii*	S/T	FACW	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 100 percent

Remarks:
1. Assume presence of wetland vegetation? ☒ Yes ☐ No
2. Rooted emergent vegetation present? ☐ Yes ☒ No

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:
- Depth of Surface Water: 0 (in.)
- Depth to Water in Pit: 3 (in.)
- Depth to Saturated Soil: 3 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in: ☒ Upper 12" ☒ 13-18"
- ☐ Water Marks
- ☒ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Root Channels in: ☒ Upper 12" ☒ 13-18"
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Observations and Remarks:
1. *Filamentous or sheet forming algae present?* ☐ *Yes* ☒ *No*
2. *Slope:* ☒ *0-2%; or* ☐ *>2%*
3. *Oxidized rhizospheres:* ☐ *new roots only;* ☐ *old roots only;* ☒ *new and old roots,* ☐ *none*
4. *Flooding:* ☐ *none, flooding not probable;* ☐ *rare, unlikely but possible under unusual weather conditions;* ☐ *occasional, occurs on an average of once or less in 2 years; or* ☒ *frequent, occurs on an average of more than once in 2 years.*
5. *Duration:* ☐ *very brief, if <2 days;* ☐ *brief, if 2-7 days, or* ☒ *long, if >7 days*
6. *Site ponds water?* ☒ *Yes* ☐ *No*

SOILS

Map Unit Name (Series and Phase): Redding cobbly loam, 9 to 30 percent slopes

Taxonomy (Subgroup): Abruptic Durixeralfs

Drainage Class: well drained
Permeability: very slow
Runoff: medium to rapid
Field Observations:
Confirm Mapped Type? ☒ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Contrast	Texture, Concretions, Structures, etc.
0-3		n/a			gravel
3-18		2.5 Y 4/2	2.5Y 3/1 and 10 YR 4/6	common/distinct	sandy loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Observations and Remarks:

1. *Smell:* ☐ *Neutral;* ☒ *Slightly fresh; or* ☐ *Freshly plowed field smell*
2. *Site:* ☐ *Irrigated;* ☐ *Land leveled;* ☐ *Ditch drained;* ☐ *Pumped;* ☐ *Graded to drain via slope*
3. *Soils:* ☒ *do* ☐ *do not become frequently ponded or saturated for long (>7 days) to very long durations (>30 days) during the growing season*

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling Point within a Wetland? ☒ Yes ☐ No

Remarks:

1. *Possibly water of the U.S.?* ☒ *Yes* ☐ *No*
2. *Possibly exempt from Corps/EPA Regulation?* ☐ *Yes* ☒ *No* *(If yes, check item(s) below.)*
   - *(a)* ☐ *Non-tidal drainage and irrigation ditches excavated on dry land*
   - *(b)* ☐ *Artificially irrigated areas which would revert to upland if the irrigation ceased.*
   - *(c)* ☐ *Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.*
   - *(d)* ☐ *Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.*
   - *(e)* ☐ *Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States (see 33 CFR 328.3(a)).*

Approved by HQUSACE 3/92

Additional Comments/Remarks: **All three parameters met within this area.**

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD

Project/Site: Naval Medical Center San Diego Applicant/Owner: SWDIV/US Navy Investigator(s): J. MacAller, V. Novik	Date: 12-16-02 County: San Diego State: CA
Do Normal Circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No Is the area a potential Problem Area? ☐ Yes ☒ No (if needed, explain on reverse or attach separate sheet.)	Community ID: SWS Transect ID: Plot ID: 5

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Baccharis salicifolia*	S	FACW	9.		
2. *Schinus terebinthifolius*	T	NI	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 50 percent

Remarks:
1. Assume presence of wetland vegetation? ☐ Yes ☒ No
2. Rooted emergent vegetation present? ☐ Yes ☒ No

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:
- Depth of Surface Water: 5 (in.)
- Depth to Water in Pit: 0 (in.)
- Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in: ☒ Upper 12" ☒ 13-18"
- ☐ Water Marks
- ☒ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in: ☐ Upper 12" ☐ 13-18"
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Observations and Remarks:
1. *Filamentous or sheet forming algae present?* ☐ *Yes* ☒ *No*
2. *Slope:* ☒ *0-2%; or* ☐ *>2%*
3. *Oxidized rhizospheres:* ☐ *new roots only;* ☐ *old roots only;* ☐ *new and old roots,* ☒ *none*
4. *Flooding:* ☐ *none, flooding not probable;* ☐ *rare, unlikely but possible under unusual weather conditions;* ☐ *occasional, occurs on an average of once or less in 2 years; or* ☒ *frequent, occurs on an average of more than once in 2 years.*
5. *Duration:* ☐ *very brief, if <2 days;* ☐ *brief, if 2-7 days, or* ☒ *long, if >7 days*
6. *Site ponds water?* ☒ *Yes* ☐ *No*

SOILS

Map Unit Name (Series and Phase): Redding cobbly loam, 9 to 30 percent slopes Taxonomy (Subgroup): Abruptic Durixeralfs	Drainage Class: well drained Permeability: very slow Runoff: medium to rapid Field Observations: Confirm Mapped Type? ☐ Yes ☒ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Contrast	Texture, Concretions, Structures, etc.
0-18		10 YR 3/2			coarse sand

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Observations and Remarks: **Newly formed sandy soils show a different color than expected in Redding cobbly loams.**

1. *Smell:* ☒ *Neutral;* ☐ *Slightly fresh; or* ☐ *Freshly plowed field smell*
2. *Site:* ☐ *Irrigated;* ☐ *Land leveled;* ☐ *Ditch drained;* ☐ *Pumped;* ☐ *Graded to drain via slope*
3. *Soils:* ☐ *do* ☐ *do not become frequently ponded or saturated for long (>7 days) to very long durations (>30 days) during the growing season*

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ Yes	☐ No	Is this Sampling Point within a Wetland? ☒ Yes ☐ No
Wetland Hydrology Present?	☒ Yes	☐ No	
Hydric Soils Present?	☒ Yes	☐ No	

Remarks:

1. *Possibly water of the U.S.?* ☒ *Yes* ☐ *No*
2. *Possibly exempt from Corps/EPA Regulation?* ☐ *Yes* ☒ *No* *(If yes, check item(s) below.)*
   - *(a)* ☐ *Non-tidal drainage and irrigation ditches excavated on dry land*
   - *(b)* ☐ *Artificially irrigated areas which would revert to upland if the irrigation ceased.*
   - *(c)* ☐ *Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.*
   - *(d)* ☐ *Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.*
   - *(e)* ☐ *Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States (see 33 CFR 328.3(a)).*

Approved by HQUSACE 3/92

Additional Comments/Remarks: **Weak vegetation due to presence of invasive pepper tree species. Newly formed soils due to urban runoff and sedimentation do not show hydric soil indicators.**

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD

Project/Site: Naval Medical Center San Diego Applicant/Owner: SWDIV/US Navy Investigator(s): J. MacAller, V. Novik	Date: 12-16-02 County: San Diego State: CA
Do Normal Circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No Is the area a potential Problem Area? ☐ Yes ☒ No (if needed, explain on reverse or attach separate sheet.)	Community ID: SWS Transect ID: Plot ID: 6

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salix lasiolepis*	T	FACW	9.		
2. *Eleocharis macrostachya*	H	OBL	10.		
3. *Baccharis salicifolia*	S	FACW	11.		
4. *Anemopsis californica*	H	OBL	12.		
5. *Rorippa nasturtium aquaticum*	H	OBL	13.		
6. *Ambrosia psilostachya*	H	FAC	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 100 percent

Remarks:
1. Assume presence of wetland vegetation? ☒ Yes ☐ No
2. Rooted emergent vegetation present? ☐ Yes ☒ No

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:
- Depth of Surface Water: 4 (in.)
- Depth to Water in Pit: 0 (in.)
- Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in: ☒ Upper 12" ☒ 13-18"
- ☒ Water Marks
- ☒ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in: ☐ Upper 12" ☐ 13-18"
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☒ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Observations and Remarks:
1. *Filamentous or sheet forming algae present?* ☐ *Yes* ☒ *No*
2. *Slope:* ☒ *0-2%; or* ☐ *>2%*
3. *Oxidized rhizospheres:* ☐ *new roots only;* ☐ *old roots only;* ☐ *new and old roots,* ☒ *none*
4. *Flooding:* ☐ *none, flooding not probable;* ☐ *rare, unlikely but possible under unusual weather conditions;* ☐ *occasional, occurs on an average of once or less in 2 years; or* ☒ *frequent, occurs on an average of more than once in 2 years.*
5. *Duration:* ☐ *very brief, if <2 days;* ☐ *brief, if 2-7 days, or* ☒ *long, if >7 days*
6. *Site ponds water?* ☒ *Yes* ☐ *No*

SOILS

Map Unit Name (Series and Phase): Redding cobbly loam, 9 to 30 percent slopes Taxonomy (Subgroup): Abruptic Durixeralfs	Drainage Class: well drained Permeability: very slow Runoff: medium to rapid Field Observations: Confirm Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Contrast	Texture, Concretions, Structures, etc.
no pit	inundated				sand and cobble

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Observations and Remarks:

1. *Smell:* ☐ *Neutral;* ☐ *Slightly fresh; or* ☐ *Freshly plowed field smell*
2. *Site:* ☐ *Irrigated;* ☐ *Land leveled;* ☐ *Ditch drained;* ☐ *Pumped;* ☐ *Graded to drain via slope*
3. *Soils:* ☒ *do* ☐ *do not become frequently ponded or saturated for long (>7 days) to very long durations (>30 days) during the growing season*

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ Yes	☐ No	Is this Sampling Point within a Wetland? ☒ Yes ☐ No
Wetland Hydrology Present?	☒ Yes	☐ No	
Hydric Soils Present?	☒ Yes	☐ No	

Remarks:

1. *Possibly water of the U.S.?* ☒ *Yes* ☐ *No*
2. *Possibly exempt from Corps/EPA Regulation?* ☐ *Yes* ☒ *No (If yes, check item(s) below.)*
   - (a) ☐ *Non-tidal drainage and irrigation ditches excavated on dry land*
   - (b) ☐ *Artificially irrigated areas which would revert to upland if the irrigation ceased.*
   - (c) ☐ *Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.*
   - (d) ☐ *Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.*
   - (e) ☐ *Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States (see 33 CFR 328.3(a)).*

Approved by HQUSACE 3/92

Additional Comments/Remarks: **Inundation combined with hydrophytic vegetation (many obligate species) and wetland hydrology used to define wetland.**

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD

Project/Site: Naval Medical Center San Diego Applicant/Owner: SWDIV/US Navy Investigator(s): J. MacAller, V. Novik	Date: 12-16-02 County: San Diego State: CA
Do Normal Circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No Is the area a potential Problem Area? ☐ Yes ☒ No (if needed, explain on reverse or attach separate sheet.)	Community ID: SWS Transect ID: Plot ID: 7

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Eleocharis macrostachya*	H	OBL	9.		
2. *Baccharis salicifolia*	S	FACW	10.		
3. *Salix lasiolepis*	T	FACW	11.		
4. *Ambrosia psilostachya*	H	FAC	12.		
5. *Schinus terebinthifolius*	T	NI	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 80 percent

Remarks:
1. Assume presence of wetland vegetation? ☒ Yes ☐ No
2. Rooted emergent vegetation present? ☒ Yes ☐ No

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:
- Depth of Surface Water: 8 (in.)
- Depth to Water in Pit: 0 (in.)
- Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in: ☒ Upper 12" ☒ 13-18"
- ☐ Water Marks
- ☒ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in: ☐ Upper 12" ☐ 13-18"
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☒ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Observations and Remarks:
1. *Filamentous or sheet forming algae present?* ☐ *Yes* ☒ *No*
2. *Slope:* ☒ *0-2%; or* ☐ *>2%*
3. *Oxidized rhizospheres:* ☐ *new roots only;* ☐ *old roots only;* ☐ *new and old roots,* ☒ *none*
4. *Flooding:* ☐ *none, flooding not probable;* ☐ *rare, unlikely but possible under unusual weather conditions;* ☐ *occasional, occurs on an average of once or less in 2 years; or* ☒ *frequent, occurs on an average of more than once in 2 years.*
5. *Duration:* ☐ *very brief, if <2 days;* ☐ *brief, if 2-7 days, or* ☒ *long, if >7 days*
6. *Site ponds water?* ☒ *Yes* ☐ *No*

SOILS

Map Unit Name (Series and Phase): Redding cobbly loam, 9 to 30 percent slopes Taxonomy (Subgroup): Abruptic Durixeralfs	Drainage Class: well drained Permeability: very slow Runoff: medium to rapid Field Observations: Confirm Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Contrast	Texture, Concretions, Structures, etc.
no pit	inundated				sand and cobble

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Observations and Remarks:

1. *Smell:* ☐ *Neutral;* ☐ *Slightly fresh; or* ☐ *Freshly plowed field smell*
2. *Site:* ☐ *Irrigated;* ☐ *Land leveled;* ☐ *Ditch drained;* ☐ *Pumped;* ☐ *Graded to drain via slope*
3. *Soils:* ☒ *do* ☐ *do not become frequently ponded or saturated for long (>7 days) to very long durations (>30 days) during the growing season*

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ Yes	☐ No	Is this Sampling Point within a Wetland? ☒ Yes ☐ No
Wetland Hydrology Present?	☒ Yes	☐ No	
Hydric Soils Present?	☒ Yes	☐ No	

Remarks:

1. *Possibly water of the U.S.?* ☒ *Yes* ☐ *No*
2. *Possibly exempt from Corps/EPA Regulation?* ☐ *Yes* ☒ *No (If yes, check item(s) below.)*
   - (a) ☐ *Non-tidal drainage and irrigation ditches excavated on dry land*
   - (b) ☐ *Artificially irrigated areas which would revert to upland if the irrigation ceased.*
   - (c) ☐ *Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.*
   - (d) ☐ *Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.*
   - (e) ☐ *Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States (see 33 CFR 328.3(a)).*

Approved by HQUSACE 3/92

Additional Comments/Remarks: **Riprap at edges used to define the banks. Presence of strong hyrophytic vegetation and hyrdrology used to define wetland due to newly formed depositional soils which do not typically reveal hydric indicators.**

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD

Project/Site: Naval Medical Center San Diego Applicant/Owner: SWDIV/US Navy Investigator(s): J. MacAller, V. Novik	Date: 12-16-02 County: San Diego State: CA
Do Normal Circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No Is the area a potential Problem Area? ☐ Yes ☒ No (if needed, explain on reverse or attach separate sheet.)	Community ID: SWS Transect ID: Plot ID: 8

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salix lasiolepis*	S/T	FACW	9.		
2. *Salix gooddingii*	S/T	FACW	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 100 percent

Remarks:
1. Assume presence of wetland vegetation? ☒ Yes ☐ No
2. Rooted emergent vegetation present? ☐ Yes ☒ No

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:
- Depth of Surface Water: 5 (in.)
- Depth to Water in Pit: 0 (in.)
- Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in: ☒ Upper 12" ☒ 13-18"
- ☐ Water Marks
- ☒ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in: ☐ Upper 12" ☐ 13-18"
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☒ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Observations and Remarks:
1. *Filamentous or sheet forming algae present?* ☐ *Yes* ☒ *No*
2. *Slope:* ☒ *0-2%; or* ☐ *>2%*
3. *Oxidized rhizospheres:* ☐ *new roots only;* ☐ *old roots only;* ☐ *new and old roots,* ☒ *none*
4. *Flooding:* ☐ *none, flooding not probable;* ☐ *rare, unlikely but possible under unusual weather conditions;* ☐ *occasional, occurs on an average of once or less in 2 years; or* ☒ *frequent, occurs on an average of more than once in 2 years.*
5. *Duration:* ☐ *very brief, if <2 days;* ☐ *brief, if 2-7 days, or* ☒ *long, if >7 days*
6. *Site ponds water?* ☒ *Yes* ☐ *No*

SOILS

Map Unit Name (Series and Phase): Redding cobblyloam, 9 to 30 percent slopes Taxonomy (Subgroup): Abruptic Durixeralfs	Drainage Class: well drained Permeability: very slow Runoff: medium to rapid Field Observations: Confirm Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Contrast	Texture, Concretions, Structures, etc.
no pit	inundated				

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Observations and Remarks:

1. *Smell:* ☐ *Neutral;* ☐ *Slightly fresh; or* ☐ *Freshly plowed field smell*
2. *Site:* ☐ *Irrigated;* ☐ *Land leveled;* ☐ *Ditch drained;* ☐ *Pumped;* ☐ *Graded to drain via slope*
3. *Soils:* ☒ *do* ☐ *do not become frequently ponded or saturated for long (>7 days) to very long durations (>30 days) during the growing season*

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ Yes	☐ No	Is this Sampling Point within a Wetland? ☒ Yes ☐ No
Wetland Hydrology Present?	☒ Yes	☐ No	
Hydric Soils Present?	☒ Yes	☐ No	

Remarks:

1. *Possibly water of the U.S.?* ☒ *Yes* ☐ *No*
2. *Possibly exempt from Corps/EPA Regulation?* ☐ *Yes* ☒ *No (If yes, check item(s) below.)*
   - (a) ☐ *Non-tidal drainage and irrigation ditches excavated on dry land*
   - (b) ☐ *Artificially irrigated areas which would revert to upland if the irrigation ceased.*
   - (c) ☐ *Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.*
   - (d) ☐ *Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.*
   - (e) ☐ *Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States (see 33 CFR 328.3(a)).*

Approved by HQUSACE 3/92

Additional Comments/Remarks: **Riprap at edges used to define the banks. Presence of strong hyrophytic vegetation and hyrdrology used to define wetland due to newly formed depositional soils which do not typically reveal hydric indicators.**

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD

Project/Site: Naval Medical Center San Diego Applicant/Owner: SWDIV/US Navy Investigator(s): J. MacAller, V. Novik	Date: 12-16-02 County: San Diego State: CA
Do Normal Circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No Is the area a potential Problem Area? ☐ Yes ☒ No (if needed, explain on reverse or attach separate sheet.)	Community ID: SWS Transect ID: Plot ID: 9

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salix gooddingii*	S/T	FACW	9.		
2. *Vitis girdiana*	V	FAC	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 100 percent

Remarks:
1. Assume presence of wetland vegetation? ☒ Yes ☐ No
2. Rooted emergent vegetation present? ☐ Yes ☒ No

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:
- Depth of Surface Water: 3 (in.)
- Depth to Water in Pit: 0 (in.)
- Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in: ☒ Upper 12" ☒ 13-18"
- ☐ Water Marks
- ☒ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in: ☐ Upper 12" ☐ 13-18"
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☒ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Observations and Remarks:
1. *Filamentous or sheet forming algae present?* ☐ *Yes* ☒ *No*
2. *Slope:* ☒ *0-2%; or* ☐ *>2%*
3. *Oxidized rhizospheres:* ☐ *new roots only;* ☐ *old roots only;* ☐ *new and old roots,* ☒ *none*
4. *Flooding:* ☐ *none, flooding not probable;* ☐ *rare, unlikely but possible under unusual weather conditions;* ☐ *occasional, occurs on an average of once or less in 2 years; or* ☒ *frequent, occurs on an average of more than once in 2 years.*
5. *Duration:* ☐ *very brief, if <2 days;* ☐ *brief, if 2-7 days, or* ☒ *long, if >7 days*
6. *Site ponds water?* ☒ *Yes* ☐ *No*

SOILS

Map Unit Name (Series and Phase): Redding cobbly loam, 9 to 30 percent slopes Taxonomy (Subgroup): Abruptic Durixeralfs	Drainage Class: well drained Permeability: very slow Runoff: medium to rapid Field Observations: Confirm Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Contrast	Texture, Concretions, Structures, etc.
no pit	inundated				sand and cobble

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Observations and Remarks:

1. *Smell:* ☒ *Neutral;* ☐ *Slightly fresh; or* ☐ *Freshly plowed field smell*
2. *Site:* ☐ *Irrigated;* ☐ *Land leveled;* ☐ *Ditch drained;* ☐ *Pumped;* ☐ *Graded to drain via slope*
3. *Soils:* ☒ *do* ☐ *do not become frequently ponded or saturated for long (>7 days) to very long durations (>30 days) during the growing season*

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ Yes	☐ No	Is this Sampling Point within a Wetland? ☒ Yes ☐ No
Wetland Hydrology Present?	☒ Yes	☐ No	
Hydric Soils Present?	☒ Yes	☐ No	

Remarks:

1. *Possibly water of the U.S.?* ☒ *Yes* ☐ *No*
2. *Possibly exempt from Corps/EPA Regulation?* ☐ *Yes* ☒ *No (If yes, check item(s) below.)*
   - (a) ☐ *Non-tidal drainage and irrigation ditches excavated on dry land*
   - (b) ☐ *Artificially irrigated areas which would revert to upland if the irrigation ceased.*
   - (c) ☐ *Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.*
   - (d) ☐ *Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.*
   - (e) ☐ *Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States (see 33 CFR 328.3(a)).*

Approved by HQUSACE 3/92

Additional Comments/Remarks: **Riprap at edges used to define the banks. Presence of strong hyrophytic vegetation and hyrdrology used to define wetland due to newly formed depositional soils which do not typically reveal hydric indicators.**

APPENDIX C

FINAL
NAVAL MEDICAL CENTER SAN DIEGO
NATURAL RESOURCES INVENTORY AND
IMPLEMENTATION GUIDE
EROSION EVALUATION AND CONTROL PLAN

Contract Number N68711-00-D-4414; Delivery Order 0010

Prepared for

SOUTHWEST DIVISION, NAVFACENGCOM
CODE 5CPR.SB
1220 PACIFIC HIGHWAY
SAN DIEGO, CALIFORNIA 92132-5190
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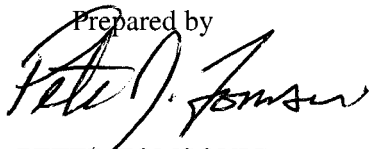
Prepared by



PETER TOMSOVIC
ANALYST

RECON NUMBER 3743B
AUGUST 25, 2005

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ATTACHMENTS

Introduction

The purpose of this Erosion Evaluation and Control Plan is to assist the Naval Medical Center San Diego (NMCSD) in complying with federal regulations dealing with the control of nonpoint source pollution. This plan includes best management practices (BMPs) to minimize pollution from storm water runoff. This plan addresses the topography, soils, land cover, adjacent properties, and principle drainages. This plan will also include instructions for ways to minimize erosion and vegetation removal. The Erosion and Sediment Control Field Manual (RWQCB 1999) has been included as an attachment to this document to provide additional guidance and techniques on erosion and sediment control through the use of BMPs that may not be covered in this Erosion Control Plan. Drawings and specifications are included in this Field Manual along with directions for BMP installation, maintenance, inspection, and removal schedules (Attachment 1).

This document refers to erosion control but, in practice, it will collectively address both erosion and sediment control. In planning, implementing, and maintaining an Erosion Control Plan, it is important to understand the difference between erosion and sediment control.

Erosion Control

Erosion control practices protect the soil surface and prevent soil particles from being detached by rainfall or wind. Erosion control treats soil as a resource with value and works to keep it in place.

Sediment Control

Sediment control practices trap soil particles after they have been dislodged and moved by wind or water. Sediment controls are typically passive systems that rely on filtering or settling soil particles out of the water or wind that is transporting them. Sediment control treats soil as a waste product and works to remove it from storm water runoff.

The primary protection on a site should be erosion control with sediment control implemented as a back-up system of protection.

Site Description and Location

The approximate 78-acre NMCSD is located within and adjacent to Powerhouse Canyon and Balboa Park in San Diego, California (Figures 1 and 2). The property is bound by Florida Drive to the east, Park Boulevard to the west, Zoo Place to the north, and Interstate 5 and Pershing Drive to the south.

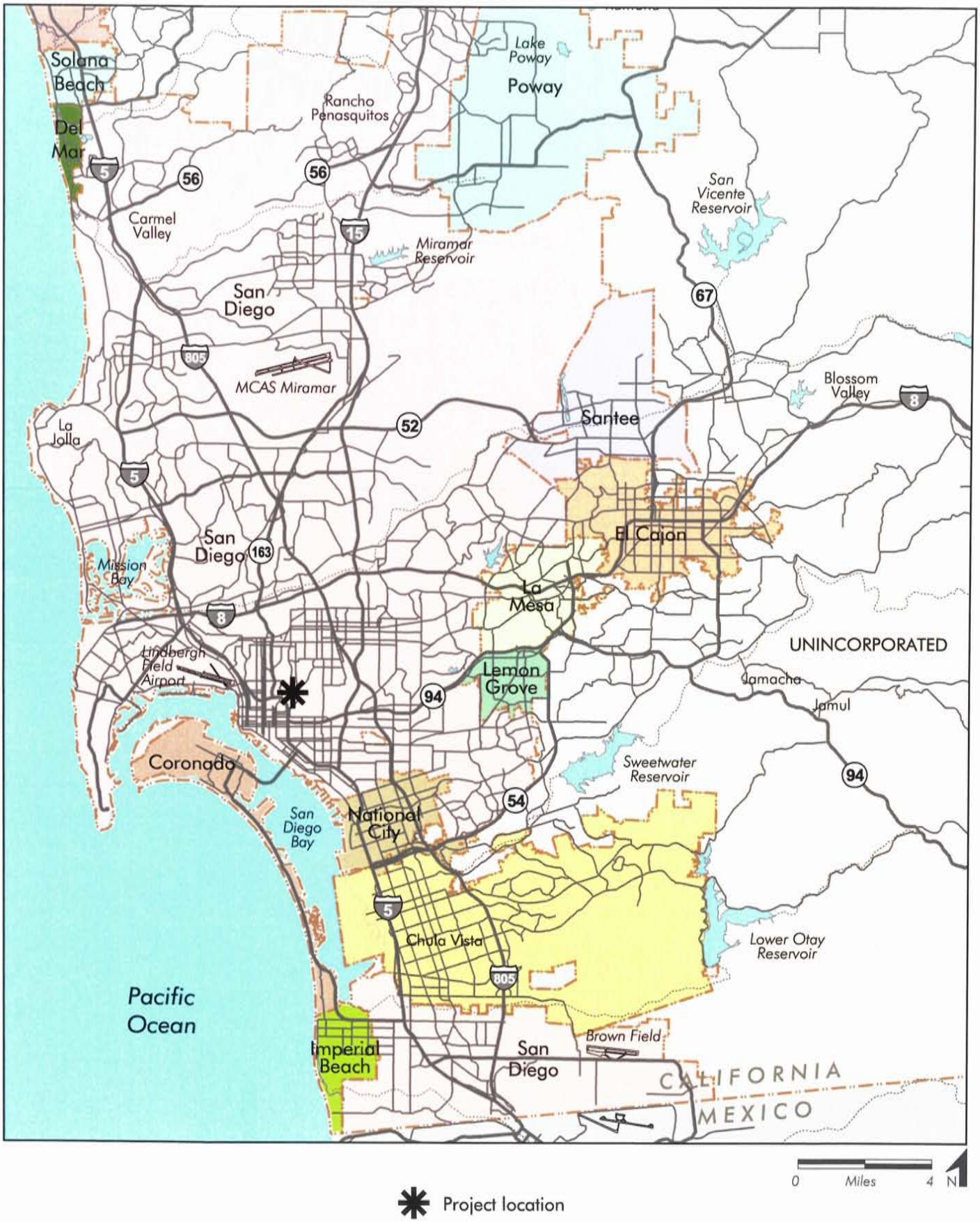

FIGURE 1
Regional Location

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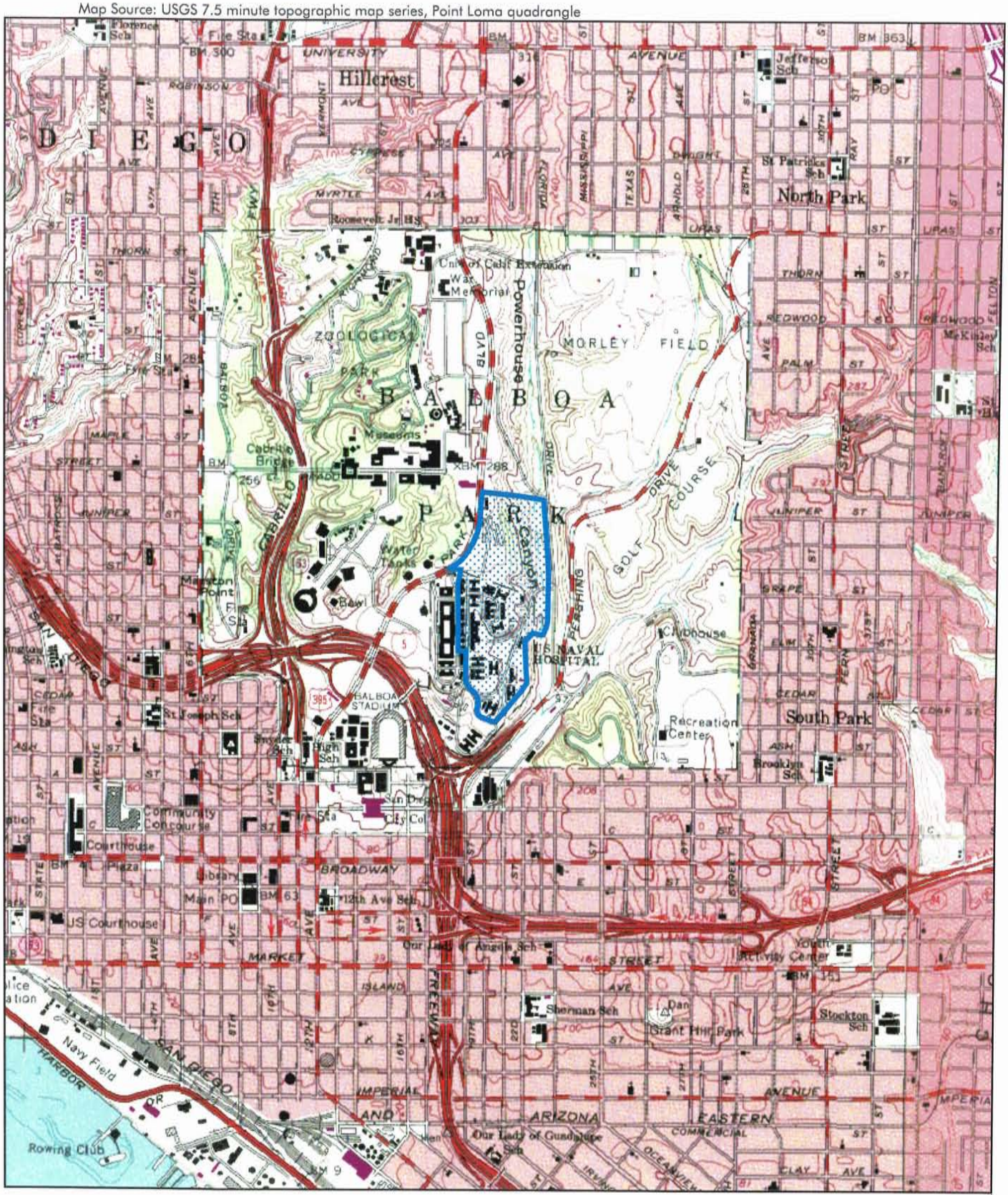
fig1 (regl) 11/04/03

Map Source: USGS 7.5 minute topographic map series, Point Loma quadrangle



Project location

FIGURE 2
Project Location on USGS Map

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fig2 (usgs) 11/04/03

A. Topography

The natural topography of the site has been altered for development by creating flat terraces for buildings, parking lots, and associated manufactured slopes. Elevations on the site range from 100 feet to 280 feet above sea level (Figure 3). The general slope of the site runs west to east with the highest point of the property in the northwest corner. A network of drains and gutters channel runoff from the site toward the southeast corner of the property and into an unnamed drainage that runs along Powerhouse Canyon and Florida Drive. The eastern boundary of the site includes 9.5 acres of revegetated manufactured slopes.

B. Soils

Three soil map units have been identified on the NMCSD property: Redding gravelly loam, 2 to 9 percent slopes; Redding cobbly loam, 9 to 30 percent slopes; and urban land (USDA 1973). The first two soil types belong to the Redding soil series that is well drained, undulating to steep gravelly loams that have a gravelly clay subsoil and a hardpan. The elevations of these soils typically range from 200 to 500 feet and the native vegetation on undisturbed areas typically consists of chaparral and sage scrub plant communities. Below is a detailed description of the three soil units.

Redding gravelly loam, 2 to 9 percent slopes: This mapping unit has a wide range of soil characteristics. Fertility is low and permeability is very slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. The rooting depth is 13 to 26 inches and the clay subsoil generally restricts root penetration. This soil type occurs on the northwestern corner of the project site where the steep slope levels off to Park Boulevard. Eucalyptus (*Eucalyptus* sp.) trees dominate the vegetated portions of this soil type.

Redding cobbly loam, 9 to 30 percent slopes: This strongly sloping to moderately steep soil is 10 to 20 inches deep over a hardpan. Cobblestones make up 20 to 30 percent of the surface layer and 25 to 35 percent of the subsoil. Runoff is medium to rapid, and erosion hazard is moderate to high. This soil type is found along the eastern third of the site to Florida Drive. The manufactured slopes on this soil type have been revegetated with a coastal sage scrub plant community.

Urban Land: The landscape in these areas has been altered significantly through cut and fill operations and leveling for building sites. The material exposed in the cuts is cobbly hardpan and the material in the fills is a mixture of cobbly and gravelly loam and clay. Between the building sites are very steep escarpments that are easily eroded.

C. Land Cover and Condition

The site encompasses approximately 78 acres and is comprised of buildings, paved parking lots, landscaped areas, and revegetated manufactured slopes (Figure 4). Table 1 lists a breakdown of the site by land use.

Image Source: Photo Geodetic Corporation (flown April 2002)

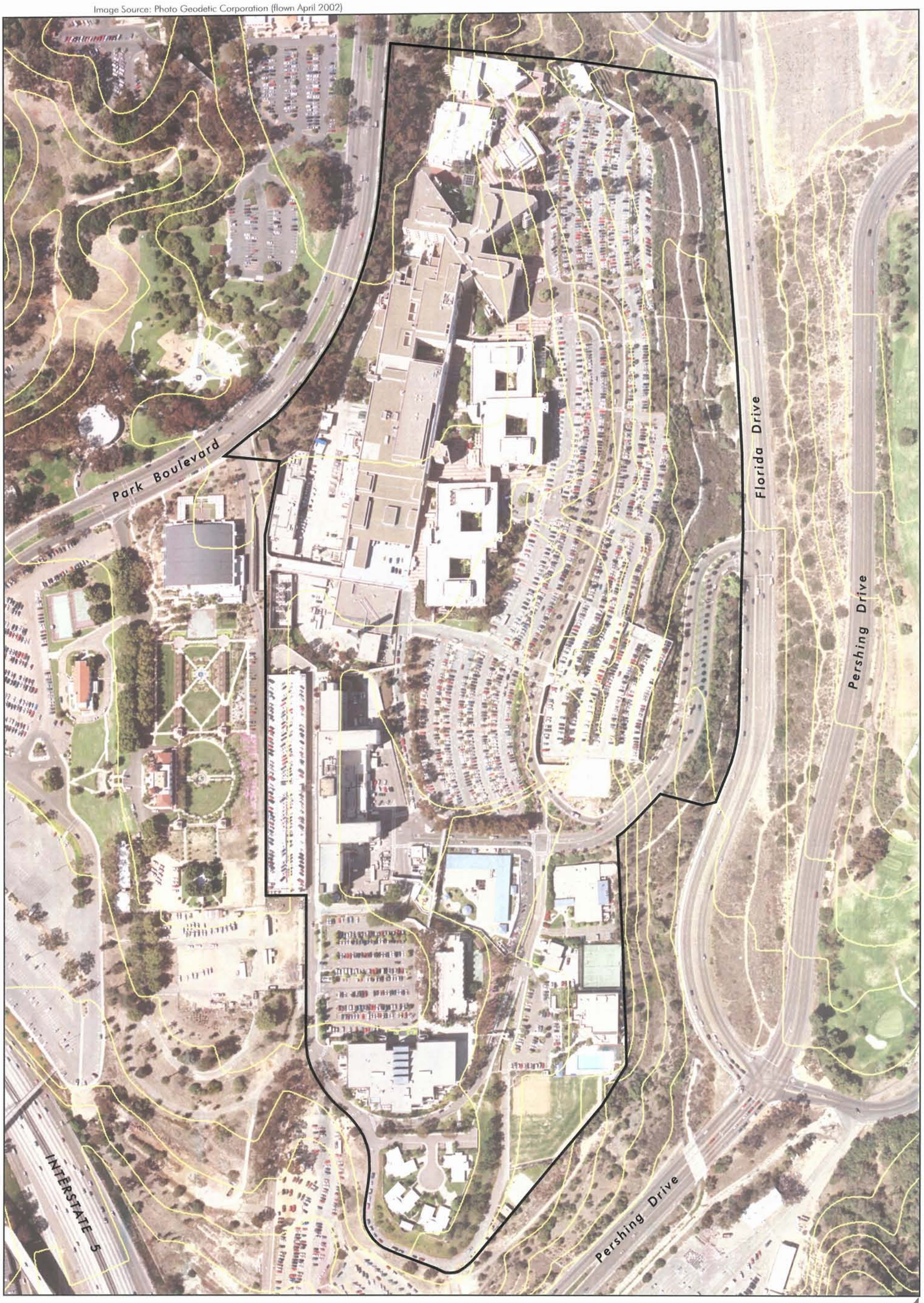

FIGURE 3
Topography Map

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hg3 (topo) 11/04/03

Image Source: Photo Geodetic Corporation (flown April 2002)

Project location

FIGURE 4
Aerial Photograph of Project

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fig4 (arcmap) 11/04/03

TABLE 1
NMCSD PROPERTY APPROXIMATE ACREAGE BY LAND USE

Land Use	Permeable	Acres (Approximate)	Percent of Site
Buildings	No	16	21
Parking Lots and Roads	No	42	54
Landscaping	Yes	10.5	13
Native Vegetated Slopes	Yes	9.5	12
Total permeable		58	74
Total non-permeable		20	26
TOTAL		**78**	

D. Percent of Impervious Area

Approximately 75 percent of the site contains impervious surfaces comprised of buildings and roadways. The remaining 25 percent of the site is landscaped and restored open space that is permeable to runoff and precipitation. A map of the vegetative communities within NMCSD is depicted in Figure 5.

E. Context in the Region

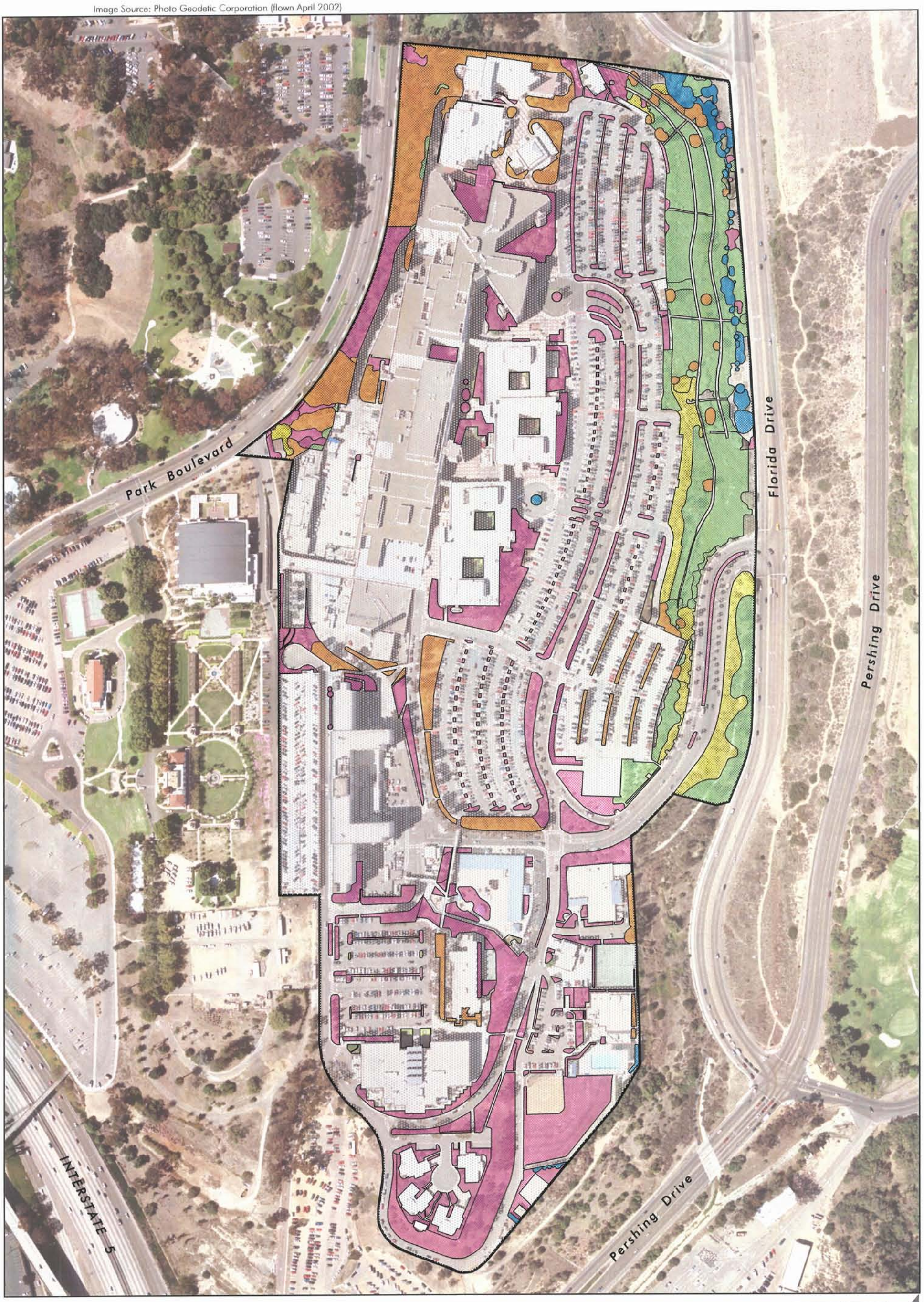
The NMCSD lies within the boundaries of Balboa Park, San Diego (Park). The 1,420-acre Park consists mostly of open space with museums and an assortment of recreational areas including a golf course, playgrounds, walking trails, Morley Field, and the San Diego Zoo. The more developed portions of the park lie in the southern end where San Diego City College, NMCSD, the San Diego Zoo, and various museums are located. Powerhouse Canyon bisects the Park and serves as the major drainage-way for the entire area. The NMCSD houses the largest and tallest buildings within this area and is one of the dominant features within the Park.

F. Responsible Parties

1. Property Owner

The Owner, NMCSD, will be responsible for funding and implementing this Erosion Evaluation and Control Plan. The Owner will be responsible for contracting with personnel qualified in installation, maintenance, and monitoring of erosion and sediment control practices described in this Plan. Upon contracting with a qualified person or organization to implement this Plan, the Owner will designate a person or group as the Erosion Control Manager.

Image Source: Photo Geodetic Corporation (flown April 2002)



Project boundary

Holland vegetation
- Diegan coastal sage scrub
- Southern willow scrub
- Ornamental landscape
- Acacia-dominated ornamental landscape
- Eucalyptus-dominated ornamental landscape
- Urban/Developed
- Not mapped

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fig5 freq holland 11/04/03

FIGURE 5
Holland Vegetation Map

2. Erosion Control Manager

An Erosion Control Manager acceptable to the Owner shall be hired to implement this Plan. The Erosion Control Manager can either be an individual or an organization as long as the person(s) actively managing the NMCSD meets the qualifications outlined below to the satisfaction of the Owner. If the Erosion Control Manager is an organization, a project manager shall be designated. The Erosion Control Manager will be responsible for the day-to-day implementation of this Plan and will carry out the requirements and objectives described herein.

Qualifications of the Erosion Control Manager

The individual or project manager identified by the organization contracted to implement this Plan must meet the following criteria:

- B.S. or B.A. degree in ecology, botany, biology, geology, landscape architecture, range management, or related field.

- At least two years of experience in landscaping, erosion, and sediment control in southern California, preferably San Diego County.

- Demonstrated experience in similar projects or in projects including similar skills.

Erosion and Sediment Control Plan

Erosion and sediment control on the NMCSD property can be divided into two categories: (1) those that need immediate attention and control and (2) long-term management of the site and utilization of BMPs when instances of erosion occur. The measures that require immediate attention were identified during Spring 2003 site visits when point sources of erosion and sedimentation were located and mapped. The long-term management items are areas that require no immediate corrective actions but may have the potential for future point source erosion or sedimentation. These areas should be monitored and corrected as needed.

The majority of the NMCSD is either impervious and non-erosive or pervious but well-vegetated with ornamental or native plants. The latter areas have no indication that erosion will occur because the plant root systems are well established, the soil is stabilized, and runoff is non-hazardous. However, there are several sites that were identified as being highly erodible and potentially hazardous to the integrity of the structures on NMCSD.

A. Short-term Erosion Control

Several areas that currently require immediate erosion and sediment control devices have been identified in Figure 6. All of these items should be considered a high priority and, if left unchecked, could pose

Image Source: Photo Geodetic Corporation (flown April 2002)

Project boundary

Short-term maintenance sites
- S1
- S2
- S3
- S4
- S5

FIGURE 6
Short-Term Sediment and Erosion Control Maintenance Sites

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bgb 3short-term 11/04/03

significant erosion problems in the near future. A description of corrective action by site ID is described below. Following any short-term corrective action, the site should be closely monitored for effectiveness and maintained as necessary until the site has become stabilized.

S1: Two sites are located in areas dominated by bare ground or sparsely distributed shrubs or herbs on highly erodible slopes. Recommended erosion control includes installation of native shrubs and annual herbs. The establishment of plants and their root systems will greatly reduce the amount of erosion over these areas by holding the soil in place as water from rain or runoff passes over the surface. Some maintenance will likely be necessary over the first two to three years until the plants have become established, but ultimately this solution is cost-effective and maintenance-free in the long term.

Any native plantings should include the use of locally grown, native plant material and should be consistent with native plants within the context of the planting area. A list of acceptable plants for native plantings is listed in Table 2.

TABLE 2
NATIVE SPECIES SUITABLE FOR PLANTING AT NMCSD

Scientific Name	Common Name
Artemisia californica	California sagebrush
Encelia californica	Common encelia
Eriogonum fasciculatum	California buckwheat
Malosma laurina	Laurel sumac
Mimulus aurantiacus	Bush monkeyflower
Nassella pulchra	Purple needlegrass
Rhus integrifolia	Lemonadeberry
Salvia mellifera	Black sage

Some of the areas recommended for native planting currently supports some scattered trees and shrubs. The recommended plantings should occur in open spaces no more than three feet apart from each other to fill in gaps within these areas. Following planting, the areas should be hand seeded with native annual plants and applied at rates suggested in Table 3.

TABLE 3
NATIVE ANNUAL SPECIES AND APPLICATION RATES
FOR HAND SEEDING AT NMCSD

Scientific Name	Common Name	Application Rate (lbs/acre)
Hemizonia fasciculata	Golden tarplant	4.0
Lessingia filaginifolia	California-aster	0.5
Nassella pulchra	Purple needlegrass	3.0
Sisyrinchium bellum	Blue-eyed grass	2.0
Castilleja exserta	Owl's clover	1.0

Planting and seeding should occur at the onset of the rainy season if irrigation systems are not currently installed in these areas. Likely, this will be in late November through January. If irrigation systems are installed then planting and seeding can occur at any time of the year.

S2: Four locations have been identified immediately off-site where runoff from the NMCSD has created erosion gullies that are several feet deep. The point source causes of these erosion gullies are generally drainpipes or concrete V-ditches that release concentrated flow onto unprotected slopes. These gullies will continue to erode upslope and may undercut walkways and other infrastructure associated with the NMCSD.

To repair the damage that has already occurred, the gullies can be packed with clean fill material and cobble and then planted with native shrubs. The shrubs and their root systems will help to anchor the soil. To prevent further erosion, point sources of runoff such as drain pipes and concrete culverts should be redirected so that the accumulation of runoff does not drain off-site in concentrated flows. A drainpipe to the bottom of the slope may be necessary to avoid future erosion problems if redirection of runoff is not possible. A redesign of the current drainage of water from adjacent impervious surfaces may identify a more permanent solution for gully erosion in these areas. An engineer should be consulted for design options.

S3: A catch basin inlet filter should be placed within the drain that receives runoff from the vegetated hillside. Currently, runoff from the hillside drains directly into the storm drain system with no sediment traps in place. A catch basin inlet filter will trap sediment as it enters the drain. The sediment bag should be cleaned out regularly and the drain grates should be kept clear of vegetative debris .

S4: Soil is slowly being eroded behind the retaining wall. While this erosion does not provide any immediate threat, long-term consequences could cause the wall to collapse. To eliminate the threat of erosion, a small berm or ditch should be constructed that will divert runoff toward the storm drain listed in item S3. Currently, runoff is not directed toward the drain and water flows toward the retaining wall.

S5: Sediment erosion is occurring behind the corner of the large retaining wall below the parking structure. A large cavity is forming and could compromise the structural integrity of the retaining wall and the parking structure that it supports. It appears that there may be a low point in the concrete culvert that lies at the top of this wall that causes runoff to spill over the ditch and behind the wall. An engineer should be consulted to develop plans to correct both the retaining wall and concrete ditch.

B. Long-term Erosion and Sediment Control

The sites identified for long-term sediment and erosion management should be regularly monitored for signs of erosion or sedimentation. These areas have been identified in Figure 7. Proper management of these areas will be critical. If problems are identified and corrected for minimal costs and effort in their early stages of development then larger more costly problems may be avoided.

Image Source: Photo Geodetic Corporation (flown April 2002)

Project boundary

Long-term maintenance sites

- L1
- L1
- L2
- L3

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fig7 (long-term) 11/04/03

FIGURE 7
Long-Term Sediment and Erosion Control Maintenance Sites

L1: Drains and culverts located on the steep hillsides of NMCSD may become obstructed by debris from surrounding vegetation, which can result in erosional hazards on the slopes. All drains and culverts should be inspected before and after a significant rainfall event and before the following rainfall event. The critical drains and culverts within the perimeter landscape areas are highlighted in Figure 7. All sediment and debris that is obstructing flow should be properly removed and disposed of in an area that is not subject to erosion. Special attention should be given to outlets and other points where concentrated flow is released. These areas should be inspected for scour holes and undermining. All sites of erosion should be repaired immediately by backfilling, gravel bags, or other means of erosion control.

L2: One of the components of an erosion control plan is to minimize pollution of watercourses or drainage systems from sediment or debris-laden storm water. The drainage outlets for the parking lots include three points where flow into the concrete drainage ditches is unrestricted. The accumulation of sediment and debris can clog these ditches and cause erosion problems.

Sediment and debris traps should be placed at the point where runoff from the parking lot enters the concrete drains on the west end of the parking lot. Keeping these drains free of debris will allow them to function as designed. A simple grate with filter fabric placed across the opening of the concrete ditch should eliminate sediment and debris from entering the ditch. Regular maintenance of these structures is necessary for proper operation.

L3: Debris and sediment has become trapped at the bottom of the concrete ditches where they pass beneath the perimeter fence on the western edge of NMCSD. An obstruction within these drainage structures ultimately compromises them. Water flow that is obstructed eventually flows around the obstruction and will erode adjacent areas. The drainages should be regularly swept free of accumulated sediment and debris following significant storm events.

C. Monitoring and Inspection

The Erosion Control Manager should inspect all sediment and erosion management sites within 24 hours of a significant storm event. For NMCSD, a storm is significant if precipitation reaches 0.25 inch or more in depth over the course of a 24-hour period. In this case, the maintenance designee must conduct an overall site inspection. The Erosion Control Manager should record any damages or deficiencies.

D. Maintenance

Erosion or sediment control damages or deficiencies recorded by the Erosion Control Manager should be repaired or replaced as soon as feasible and preferably before a subsequent storm event. A supply of erosion and sediment control materials such as sand or gravel bags, mulch, storm drain inlet protectors, and catch basin inlet filters should be stored in a maintenance facility on-site for repairs or emergencies. All temporary sediment control devices should be inspected and maintained more frequently and removed when the erosion/sedimentation problem is eliminated.

Best Management Practices Fact Sheets

Attachment 2 presents a range of permanent BMPs for continued control of stormwater pollution. The categories of BMPs addressed in this attachment include topsoiling, seeding, planting, and catchbasin inserts. Each BMP fact sheet presents a description, application and limitation information, as well as design parameters, implementation guidelines, and operation and maintenance tips. The most important factors for successful performance of these BMPs are adhering to the manufacturer's application specifications and regular inspection and maintenance following installation. The BMP fact sheets have been acquired through the Idaho Department of Environmental Quality Catalog of Stormwater Best Management Practices and modified for use at NMCSD (IDEQ 2001).

References

Idaho Department of Environmental Quality (IDEQ)

2001 Idaho Department of Environmental Quality in partnership with Brown and Caldwell, Environmental Engineering and Consulting, Catalog of Stormwater BMPs for Idaho Cities and Counties. August on-line edition. http://www.deq.state.id.us/water/stormwater_catalog/chapter1_1.asp

Regional Water Quality Control Board (RWQCB)

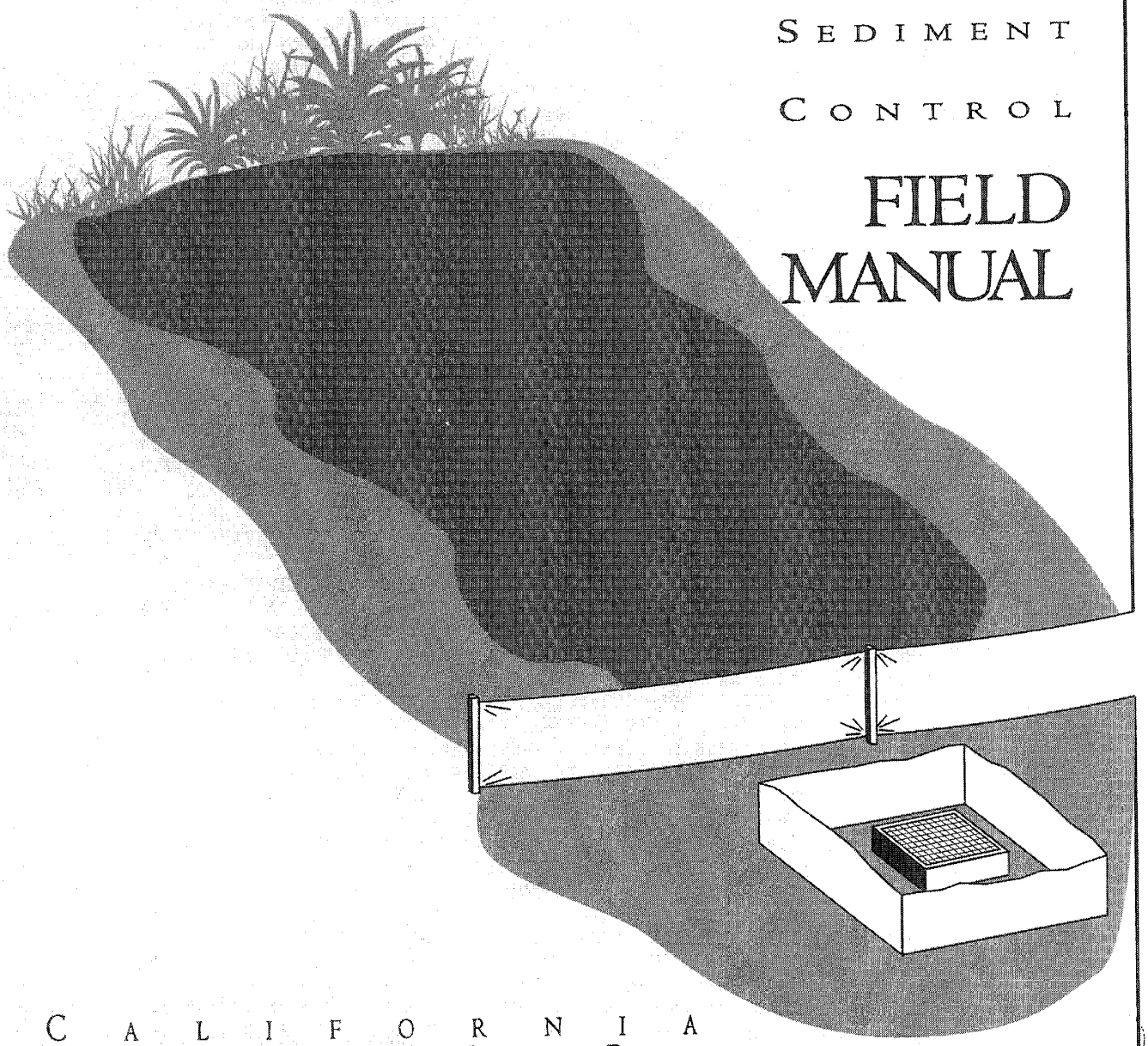
1999 Regional Water Quality Control Board, San Francisco Bay Region. Erosion and Sediment Control Field Manual, Third Edition. July.

U.S. Department of Agriculture (USDA)

1973 *Soil Survey, San Diego Area, California.* Edited by Roy H. Bowman. Soil Conservation Service and Forest Service. December.

ATTACHMENT 1

EROSION AND SEDIMENT CONTROL FIELD MANUAL



CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

EROSION AND SEDIMENT CONTROL

FIELD MANUAL

THIRD EDITION
JULY 1999

CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

C O N T E N T S

GETTING THE MOST FROM THIS MANUAL

In order to protect water quality during construction, three categories of control practices must be implemented:

1) erosion control practices,
2) sediment control practices, and
3) general site and materials management.

While erosion and sediment control practices are required primarily during earth moving activities such as excavation and grading, site and material management controls (such as waste management and vehicle fueling controls) will be necessary throughout the life of a construction project, from demolition to painting to landscaping.

Throughout this Manual, many terms—such as *best management practices, measures, controls*—are used to describe efforts to protect water quality. Some of the controls recommended here involve site planning (such as careful construction scheduling and the preservation of existing vegetation) while others refer to the physical installation of structural control materials (such as erosion control mats or silt fencing). Planning considerations should not be overlooked in favor of structural controls however, because existing vegetation and the natural topography are the best means of regulating the volume and quality of runoff from land surfaces to adjacent streams. Minimum disturbance activities are both more efficient and more economical than structural controls such as revegetation, especially over the long term, and should be attempted wherever possible.

Erosion control is more art than science.

The control practices described in this Manual are tools and methods intended to be adapted and modified as dictated by site-specific conditions. It should not be assumed, however, that all of the controls represented here are necessary or even appropriate for all construtions sites. Nor should it be assumed that the techniques represented are guarantees or quick-fixes for problems resulting from bad planning or sloppy Storm Water Pollution Prevention Plan (SWPPP) implementation. All control measures must be properly located, installed and maintained to be effective.

ACKNOWLEDGEMENTS

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Second Edition (July 1998) updates were provided by Hossain Kazemi and George Leyva, Regional Water Quality Control Board San Francisco Bay Region; Marcie Adams, San Francisco Estuary Project; Heather Nelson, Bay Area Storm Water Management Agencies Association (Materials Management); and Michael Mellon, Wood Recycling, Inc. (Hydroseeding/Mulching). Second Edition graphics produced by CSEC and the San Francisco Estuary Project. Third Edition (July 1999) updates and graphics prepared by staff of the San Francisco Estuary Project and the Regional Water Quality Control Board San Francisco Bay Region. All Manual updates and reprinting were made possible by supplemental environmental projects funded in lieu of civil penalty, by donations, and by the San Francisco Estuary Project.

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DISCLAIMER

The Field Manual should not be construed as policy of any regional water quality control board but used as a guidance document to minimize erosion and polluted runoff from construction sites. The controls described in this Manual are intended to serve as minimum control standards or "best management practices" for the construction industry and to allow for consistent regulation of construction activities by applying a uniform standard.

Although initially prepared for the San Francisco Bay Region, control techniques described in the Field Manual are broadly applicable to all of California.

The citing of products, companies, or trade names does not constitute an endorsement.

The Field Manual is a dynamic document that will be reviewed and updated periodically in accordance with new practices and technologies for erosion and sediment control and general site and materials management. Comments on the Field Manual may be directed to San Francisco Bay RWQCB staff Hossain Kazemi at (510)622-2369. Questions regarding Manual production and associated products may be directed to San Francisco Estuary Project staff Marcie Adams at (510)622-2304.

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I N T R O D U C T I O N

Soil erosion and sedimentation pose a serious threat to the quality of our waters. Erosion is the washing away of soil by rain. Sedimentation is the accumulation of soil and other matter washed into our waterways from the land.

When raindrops strike bare soil, large amounts of topsoil are dislodged and carried downstream in storm water runoff. When land is disturbed, therefore—by construction or road building, for example—its erodability greatly increases. As soil and other particles (construction-related materials and chemicals such as paints, solvents, vehicle fluids and concrete) are washed into streams, aquatic life dependent on clean water and gravel beds are severely stressed. The cumulative toll on the environment can be devastating (For Environmental Impacts, See pages 15 to 19).

Erosion and sedimentation can also cause flooding, and nuisance problems for downgradient property owners and on adjacent streets. Other problems resulting from sedimentation resulting from uncontrolled erosion include the clogging of streams, storm drains and culverts; artificial siltation of reserviors and other water bodies; as well as pollution of waterways and drinking water supplies.

Uncontrolled erosion is costly, violates state and federal pollution laws, exposes developers, contractors, and landowners to legal liabilities, and provides ammunition to those who argue that the development process itself is out of control.

As the flat lands are built out and as more and more development takes place on steep hillsides, the threat from erosion is increasing. In recent years, citizen groups and environmental organizations have recognized that the environmental losses and economic costs of development-related erosion are generally borne by the taxpayer rather than the polluter. More frequent citizen suits and better enforcement of environmental regulations reflect decreasing tolerance for this discrepancy.

Our Shared Roles in Pollution Prevention

The prevention of water pollution is a responsibility shared by everyone involved in the development/construction process. Before, during and after construction, various entities have decision making authority and as such, have a responsibility to do what they can to prevent pollution.

The controls described in this Manual are intended to address Phase 3: Pre-Contruction and Phase 4: Construction (below) by providing the latest information on "best management practices" for developers, contractors, inspectors and others responsible for oversight of on-site pre-construction and construction activity. Reliance on Pre-Construction and Construction controls alone represents a major flaw in pollution prevention, however. Efforts in Phase 1: Policy, Phase 2: Planning and Phase 5: Post Construction are also necessary to achieve comprehensive water resource protection.

Phase 1: Policy—Developing General Plans and regulations
Key Players: Elected officials, municipal planners and voting constituents
Responsibility: To develop policies and adopt local ordinances which encourage and support pollution prevention.

Phase 2: Planning—Creating new plans for development
Key Players: Decision-makers, planners, constituents, engineers and developers
Responsibility: To design and support plans which will best prevent pollution and include permanent storm water practices and controls.

Phase 3: Pre-Construction—Determining details of construction activities
Kay Players: Engineers, inspectors, developers and contractors
Responsibility: To work together to secure the necessary permits, to develop and review Storm Water Pollution Prevention Plans, and to select the practices that will best prevent pollution during construction.

Phase 4: Construction—Grading, street/structure construction, landscape installation
Key Players: Inspectors, developers, contractors and sub-contractors
Responsibility: To support and implement pollution prevention practices for all construction activities.

Phase 5: Post-Construction—Completing construction and property transfer
Key Players: Inspectors and property owners
Responsibility: To ensure that construction activity is completed as permitted, to implement permanent pollution prevention practices, and to maintain permanent structural controls.

EROSION CONTROL VS. SEDIMENT CONTROL

In planning, implementing, and maintaining an erosion and sediment control system, it is important to understand the difference between erosion control and sediment control.

EROSION CONTROL

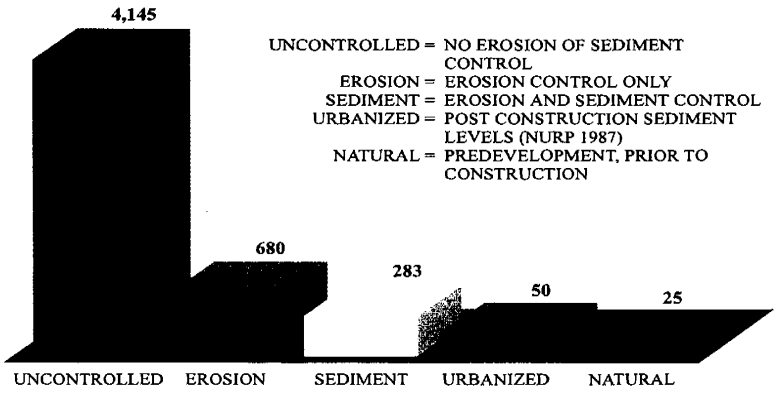
Erosion control practices protect the soil surface and prevent soil particles from being detached by rainfall or wind. Erosion control treats soil as a resource with value and works to keep it in place.

SEDIMENT CONTROL

Sediment control practices trap soil particles after they have been dislodged and moved by wind or water. Sediment controls are generally passive systems that rely on filtering or settling soil particles out of the water or wind that is transporting them. Sediment control treats soil as a waste product and works to remove it from storm water runoff.

Generally speaking, erosion controls are both more efficient and more cost-effective than sediment controls, and are preferred because they keep the soil in place and protect the resource. Whenever possible, the primary protection on a site should be erosion controls, with sediment controls implemented as a secondary or "back-up" system. The graph below compares sediment discharged from sites with various levels of controls in place.

STORM MEDIAN SEDIMENT CONCENTRATION (mg/l)



WHAT MAKES A CONTROL PLAN EFFECTIVE?

For an erosion and sediment control plan to be effective, it is essential that adequate best management practices (BMPs) be implemented before the rainy season begins. Once erosion has occured, it is extremely difficult to remove the soil suspended in storm water runoff. By initially protecting soil from raindrop impact and *preventing* erosion, the burden on more costly and less effective sediment controls is greatly reduced.

Provisions for both temporary and permanent erosion and sediment controls must be implemented in accordance with the Storm Water Pollution Prevention Plan (SWPPP) designed for the site. Once implemented, controls should be monitored, maintained and immediately repaired to ensure their effectiveness. Control measures should be updated and the SWPPP amended as necessary and as dictated by changes in construction and the construction schedule.

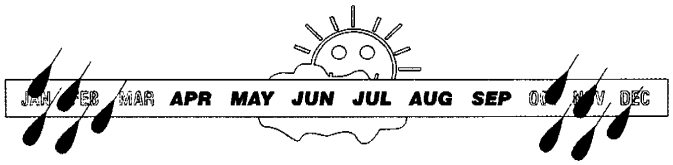
GROUND RULES

The following principles should be followed to the maximum extent practicable to control erosion and sedimentation from the disturbed areas of a construction site:

1. Fit grading to the surrounding terrain. Contour slopes in accordance with soil type and natural repose.
2. Retain existing vegetation to the extent feasible.
3. Time grading operations to minimize soil exposure in the rainy season.
4. Minimize the length and steepness of slopes.
5. Emphasize erosion controls by vegetating and mulching, or otherwise stabilizing disturbed areas.
6. Direct runoff away from disturbed areas.
7. Keep runoff velocities low, using energy dissipating control measures.
8. Prepare drainageways and outlets to handle concentrated runoff until permanent drainage structures are constructed.
9. Trap sediment on site using a combination of erosion and sediment control measures.
10. Inspect and maintain control measures before and after each rainstorm. A log of site inspections (including date, observations made and inspector) should be retained for at least three years.

WHAT IS THE OPTIMUM GRADING PERIOD?

In California, the optimum grading period is the non-rainy season, *generally* between April 1st and October 1st. If grading is to continue into the rainy season, then the length of time that soils are exposed and the total area of exposed soil must be minimized. Because of high demand and material shortages during winter months, materials used for erosion and sediment control should be stock-piled on-site throughout the rainy season. Control materials should be available at all times so that problems and failures may be immediately addressed.



TIMING IS CRITICAL

Properly timing the installation of erosion and sediment controls can determine whether or not a site will meet its NPDES Permit requirements. A specified work schedule coordinating timing of land disturbing activities with the installation of erosion and sediment control practices to reduce on site erosion and off site sedimentation should be an objective of project planning.

During the rainy months, any disturbed area that will remain exposed for more than 14 days should be provided with protective erosion control measures. Every attempt must be made to stabilize disturbed areas at least 48 hours before storm events. These measures may be temporary if they will be replaced by permanent measures at a later date, or they may be the permanent erosion controls.

It is not adequate to rely solely on sediment control measures to keep sediment-laden runoff from leaving a site during the wet season.

Diligent application of the following guidelines will prevent accelerated erosion:

- Minimize the length of time that soils are left exposed
- Reduce the total area of exposed soil during the rainy season
- Protect critical areas (drainage channels, creeks and natural watercourses)
- Monitor before and after each rain storm to assess the effectiveness of control measures

Clearing and grading activities are usually regulated at the local level through a variety of ordinances. Some municipal ordinances specify a maximum area that may be exposed at any given time on a site during the winter months. Check with the local jurisdiction for these requirements.

Regulatory Background

In 1990, the U.S. Environmental Protection Agency published regulations requiring that storm water discharges resulting from construction activities disturbing land areas of five or more acres be covered by a "National Pollutant Discharge Elimination System" or NPDES Permit. In California, the State Water Resources Control Board (State Board) is responsible for issuing such permits and has adopted a statewide General Permit to address discharges of storm water runoff associated with applicable construction activities. The nine regional water quality control boards oversee implementation and enforcement of the General Permit statewide.

What does the General Permit require?

The General Permit requires all owners of land where applicable construction activity occurs to:

- Submit a Notice of Intent (NOI) to comply with the General Permit, a site map and the appropriate filing fee to the State Board. A package containing an NOI and the General Permit can be obtained from your local regional board. For contact information, see page 13.
- Eliminate or minimize non-storm water discharges from the construction site to storm drains and other waterbodies. Non-storm water discharges may result from a variety of sources, including dumping, leaking storage and maintenance areas and spillage of chemicals and waste materials.
- Develop, implement, and update a Storm Water Pollution Prevention Plan (SWPPP) for the site. The Regional Board, San Francisco Bay Region has prepared "Guidelines for Preparing a SWPPP," which is available from the Board at (510)622-2419.
- Develop a site monitoring program and perform inspections of the measures implemented as part of the SWPPP. If the implemented measures do not adequately minimize storm water and non-storm water discharges, those measures must be modified.
- Annually certify, based on inspections, that the site is in compliance with the General Permit. The Regional Board, San Francisco Bay Region, requires annual submission of a report documenting the site's compliance with the State General Permit.

The State Board is in the process of revising and reissuing the General Permit. While the above requirements are not expected to change, status on this reissuance and a copy of proposed permit language are available from any local regional board. For information on the revised/adopted Permit, contact your local Regional Water Quality Control Board. For contact information, see pg. 13.

PROPOSED FRAMEWORK FOR THE SWPPP

I. Title Page
II. Certification Page
III. Amendments
IV. Table of Contents
V. Introduction
VI. Source Identification
    A. Topography Map
    B. Site Map
        1. Areas of Soil Disturbance
        2. Surface Water Locations
        3. Areas of Existing Vegetation
        4. Location of Control Practices Used During Construction
        5. Drainage Patterns and Slopes Anticipated After Major Grading Activities are Completed
        6. Areas Used to Store Soils and Wastes
            a. Soil Storage
            b. Waste Storage
            c. Materials Storage
        7. Vehicle and Equipment Storage and Service Areas
        8. Existing and Planned Paved Areas and Buildings
        9. Location of Post-Construction Control Practices
VII. Narrative Descriptions
    A. Site Estimates and Description of On Site Soil
    B. Pollutants Likely to be Present in Storm Water Discharges
    C. Toxic Materials
    D. Erosion and Sediment Control Practices
        1. General Practices
        2. Soil Stabilization
        3. Practices to Reduce Tracking Sediment Onto Public and Private Roads
        4. Wind Erosion:
            a. Dust Control
            b. Sweeping
        5. Practices to Minimize Contact with Storm Water
            a. Construction Vehicles and Equipment
                i) Maintenance
                ii) Fueling
                iii) Washing
            b. Materials
        6. Construction Material Loading, Unloading, and Access Areas
        7. Waste Management and Disposal
            a. Concrete Wash-Out
            b. Concrete / Asphalt Debris
            c. Miscellaneous Waste
        8. Preconstruction Control Practices
    E. Non-Storm Water Management
    F. Maintenance, Inspection, and Repair of Structural Controls
    G. Spill Prevention and Control
        1. Minor Spills
        2. Major Spills
    H. Post-Construction Storm Water Management
    I. Personnel Training
    J. List of Contractors / Subcontractors
    K. Monitoring
        1. General Plan Summary
        2. Site Inspections
        3. Compliance Certification
        4. Noncompliance Reporting
        5. Records

WHO IS RESPONSIBLE?

The owner of the land where the construction takes place is responsible for filing the Notice of Intent (NOI) and fee, complying with the terms of the General Permit, and seeing that all contractors comply with the General Permit as well. A separate NOI must be filed for each separate construction site. If a new owner is involved and construction is to continue, a separate NOI must be filed by the new owner. Once construction is complete or site ownership has been transferred, a Notice of Termination must be filed to verify that General Permit coverage is no longer necessary.

NOTICE OF TERMINATION

A construction project is considered complete only when the following conditions have been met:

1) all portions of the site have been transferred to a new owner

2) there is no potential for construction related storm water pollution

3) all elements of the SWPPP have been completed

4) construction materials and waste have been disposed of properly

5) the site is in compliance with all local storm water management requirements

6) a post construction storm water management plan is in place as described in the SWPPP for the site

Submission of a Notice of Termination containing falsified information is a violation of both the requirement to have a permit and the Clean Water Act. Such action makes the Notice of Termination applicant subject to enforcement action.

The regional board may not recognize a partial termination. If you wish to revise the "*total size of construction site*" information as stated on the original Notice of Intent, you should instead change the "*size of site*" data in Part B of your attached Compliance Status Report.

How Does a Site Receive Permit Coverage?

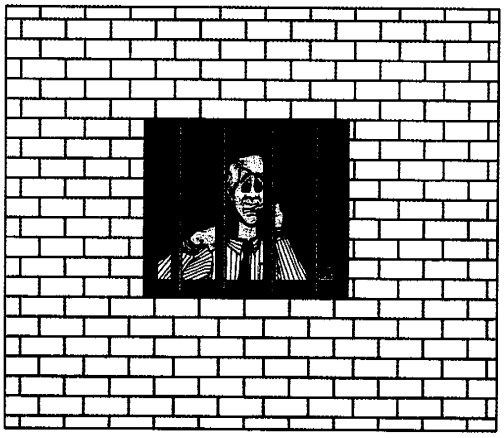
A package that contains the Notice of Intent (NOI) and the General Permit can be obtained from your local Regional Water Quality Control Board (See page 13).

The completed NOI, site map and appropriate fee should be submitted prior to construction to:

State Water Resources Control Board
Division of Water Quality - Storm Water Permit Unit
P.O. Box 19977 - Sacramento, CA 95812-1977

What are the Penalties for Non-Compliance?

The regional boards are responsible for enforcing the General Permit. A construction site may be inspected for compliance, and if found lacking, an inspector may issue a permit violation (Notice to Comply) to compel action or may recommend issuance of a Notice of Violation, or Civil Liability to the Executive Officer of the Regional Water Quality Control Board.



Failure to obtain Permit coverage, failure to develop or implement an adequate SWPPP, failure to minimize non-storm water discharges or to limit storm water discharges, or failure to monitor and perform inspections are all violations of the federal Clean Water Act and California Water Code.

Civil penalties of up to $10,000 per day plus $10 per gallon of sediment-laden runoff or wastewater discharged for each violation may be imposed administratively by the regional boards; fines of up to $25,000 per day for each violation may be assessed if imposed by the Superior Court.

404 PERMIT AND 401 CERTIFICATION REQUIREMENTS

Sections 404 and 401 of the Federal Clean Water Act require permitting and certification for construction and/or other work conducted in "waters of the United States." Such work includes levee work, dredging, filling, grading, or any other temporary or permanent modification of streams or other water bodies. By definition, "waters of the United States" includes the Bay-Delta, rivers, creeks, seasonal wetlands, grassy swales, seep wetlands, ponds and any other waterbodies.

404 PERMITTING—U.S. ARMY CORPS OF ENGINEERS

The U.S. Army Corps of Engineers (Corps) oversees issuance of four types of Section 404 permits: Individual, Regional, General and Nationwide. Each of these 404 permit types require prior Section 401 certification by the state in which the work is to take place. In California, the State Board has pre-issued 401 certification for certain types of activities authorized by Nationwide Permits. Contact your local regional board to determine if your activity may have been certified by the State Board, or check at http://www.ceres.ca.gov/wetlands/permitting/401_nwp.html. For more information regarding the Section 404 application/permitting process, contact the Corps district office.

401 CERTIFICATION—STATE WATER RESOURCES CONTROL BOARD

The State Board oversees Section 401 certifications to assure that any activity to be permitted by the Corps will not result in discharge or fill violating State and Federal water quality standards.

Each regional board maintains a Basin Plan for each hydrologic basin in California. Each Basin Plan includes lists of waterbodies in that basin, and water quality standards applicable to those waterbodies. An application for 401 certification may either be waived, certified, certified with conditions, or denied by the regional board or State Board.

According to the Basin Plan adopted for the San Francisco Bay Region, activities filling or impacting waterbodies are not permitted except in cases where no practical alternative to filling is available (with the exception of water dependent projects). Projects should be planned to avoid impacts to waterbodies, modified to minimize unavoidable impacts, and, once impacts have been minimized, mitigated to compensate for environmental damage done.

A regional board must act within sixty days of receipt of a complete application, satisfactory to the regional board, unless additional time is granted by the Corps District Engineer. A complete 401 certification application package should include:

1) a complete project description
2) the appropriate filing fee
3) a copy of the Section 404 permit application or pre-construction notification (if applicable)
4) final CEQA documentation (if available)
5) other: alternatives analysis, mitigation plan, monitoring plan

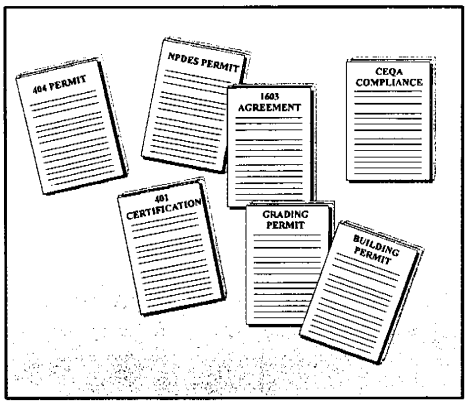
For more information regarding 401 certifications, contact the appropriate regional board.

WHAT OTHER AGENCIES REGULATE CONSTRUCTION?

Local cities and counties require that construction sites conform to local ordinances governing building and grading permits and plans, including erosion and sediment control plans. These local ordinances may be more or less stringent than the General Permit and must be addressed in planning for site construction. It is anticipated that by complying with the General Permit, site owners will largely conform with local ordinances. Appropriate portions of local requirements should be incorporated into the SWPPP.

The California Department of Fish and Game requires that a Streambed Alteration Agreement (1603) be completed prior to the disturbance of any stream in California. Such an agreement specifies when work can be performed in the stream, what erosion control and other measures will be necessary to protect the stream, and measures that will be required after work completion.

Before applying for a Fish and Game 1603 Agreement, you should first obtain 401 certifiication or Waste Discharge Requirements (WDRs) from your regional board to assure that water quality standards will not be violated. For further information on 1603 agreements contact any Department of Fish and Game warden or office.



Projects impacting coastal or estuarine water bodies may also require permits from the California Coastal Commission or, in the San Francisco Bay Area, from the Bay Conservation and Development Commission.

Up-to-date information and application materials for 1603 Agreements, 404 Permits, 401 Certifications and Coastal Development Permits can be accessed and downloaded on the Internet at http://www.ceres.ca.gov/wetlands/permitting.

Regional Water Quality Control Boards

Region 1
North Coast Region
5550 Skylane Boulevard, Suite A
Santa Rosa, California 95403
707-576-2220 ☎

Region 2
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612
510-622-2300 ☎

Region 3
Central Coast Region
81 Higuera Street, Suite 200
San Luis Obispo, California 93401-5427
805-549-3147 ☎

Region 4
Los Angeles Region
101 Centre Plaza Drive
Monterey Park, California 91754-2156
213-266-7500 ☎

Region 5 - S
Central Valley Region
3443 Routier Road, Suite A
Sacramento, California 95827-3098
916-255-3000 ☎

Region 5 - F
Fresno Office
3614 East Ashlan Avenue
Fresno, California 93726
209-445-5116 ☎

Region 5 - R
Redding Office
415 Knollcrest Drive
Redding, California 96002
530-224-4845 ☎

Region 6 - SLT
Lahontan Region
2501 Lake Tahoe Blvd.
South Lake Tahoe, California 96150
530-542-5400 ☎

Region 6 - V
Victorville Office
15428 Civic Drive, Suite 100
Victorville, California 92392
619-241-6583 ☎

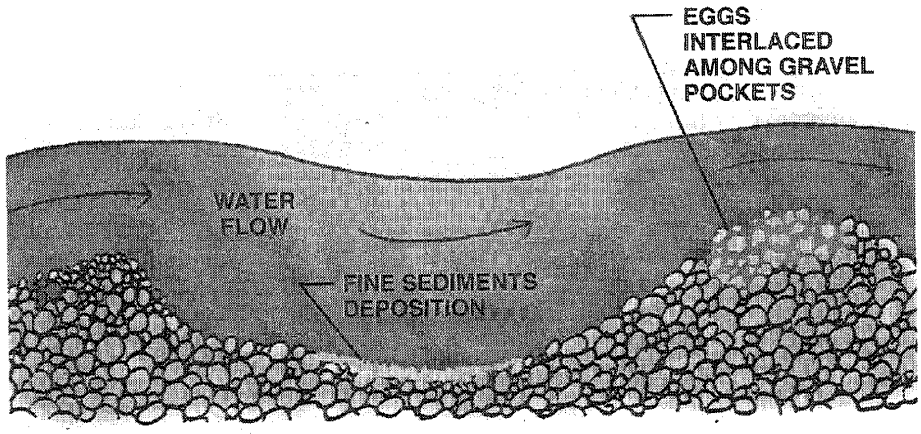
Region 7
Colorado River Basin Region
73-720 Fred Waring Drive, Suite 100
Palm Desert, California 92260
619-346-7491 ☎

Region 8
Santa Ana Region
3737 Main St., Suite 500
Riverside, California 92501-3339
909-782-4130 ☎

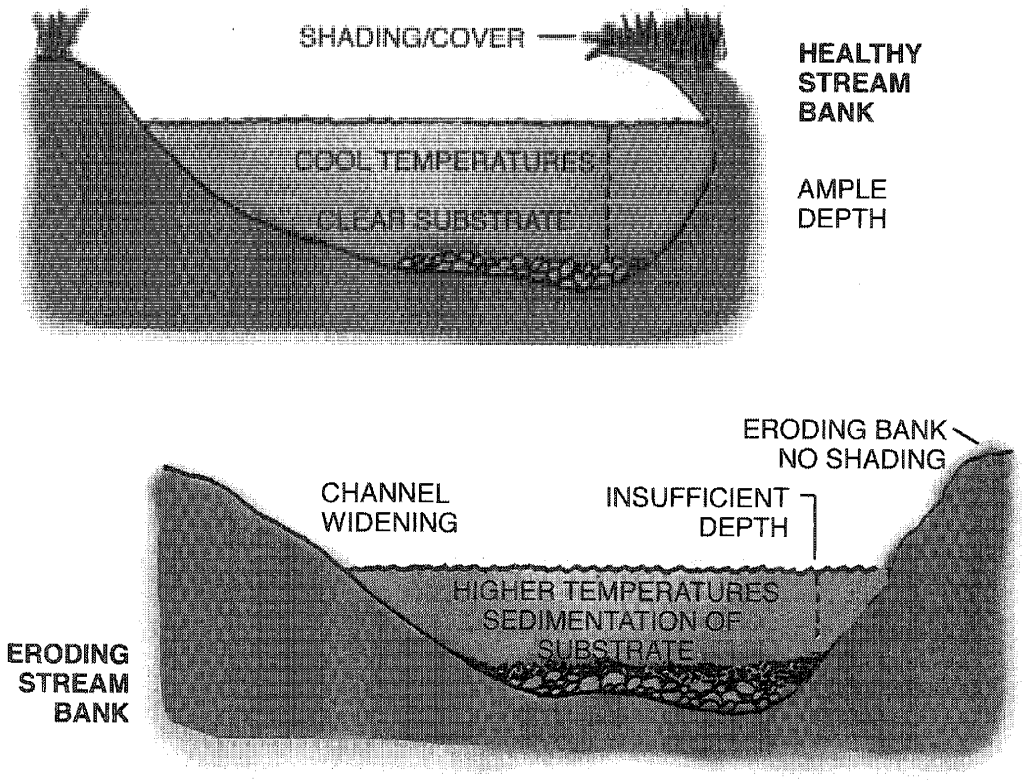
Region 9
San Diego Region
9771 Clairemont Mesa Blvd., Suite A
San Diego, California 92124
619-467-2952 ☎

ENVIRONMENTAL IMPACTS

- When raindrops strike bare soil, fine particles and organic matter are dislodged and transported in storm water flows. With the structure of the soil broken down, a hard crust often forms when the soil dries. This crust inhibits water infiltration and plant establishment, consequently increasing the volume of runoff and the potential for erosion in the future.
- Eroded soil contains nitrogen, phosphorous and other nutrients. When carried into water bodies in storm water runoff, these nutrients trigger algae growth with the effect of reducing water clarity, creating odors, depleting oxygen and leading to fish kills.
- Excessive deposition of sediments in streams "paves" stream bottoms, blankets the bottom fauna, and destroys fish habitat and spawning areas.
- Turbidity (cloudiness) from sediment reduces in-stream photosynthesis, leading to reduced food supply and habitat, and upsetting the food chain.



WATER INTERCHANGE BETWEEN STREAM AND SPAWNING BED WITHIN A PRISTINE STREAM



BENEFITS OF A HEALTHY STREAM BANK VERSUS AN ERODING BANK

Planning for Erosion Control

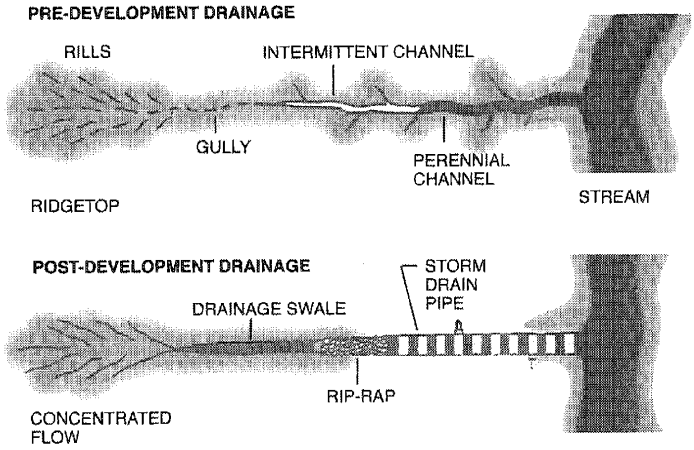
Impacts of Clearing and Grading

When a site is prepared for construction, clearing and grading practices eliminate vegetation and smooth over the depressions and gullies that are part of a natural landscape.

In an altered landscape, streamflows are delivered to receiving waters at a volume, velocity and pollutant concentration (especially sediment) dramatically greater than would occur in the natural environment. Flows in a developed watershed encounter little or no surface flow infiltration or pollutant filtration. Instead they travel quickly and directly to storm drain collectors, and then discharge directly into streams with equally large volumes and velocities.

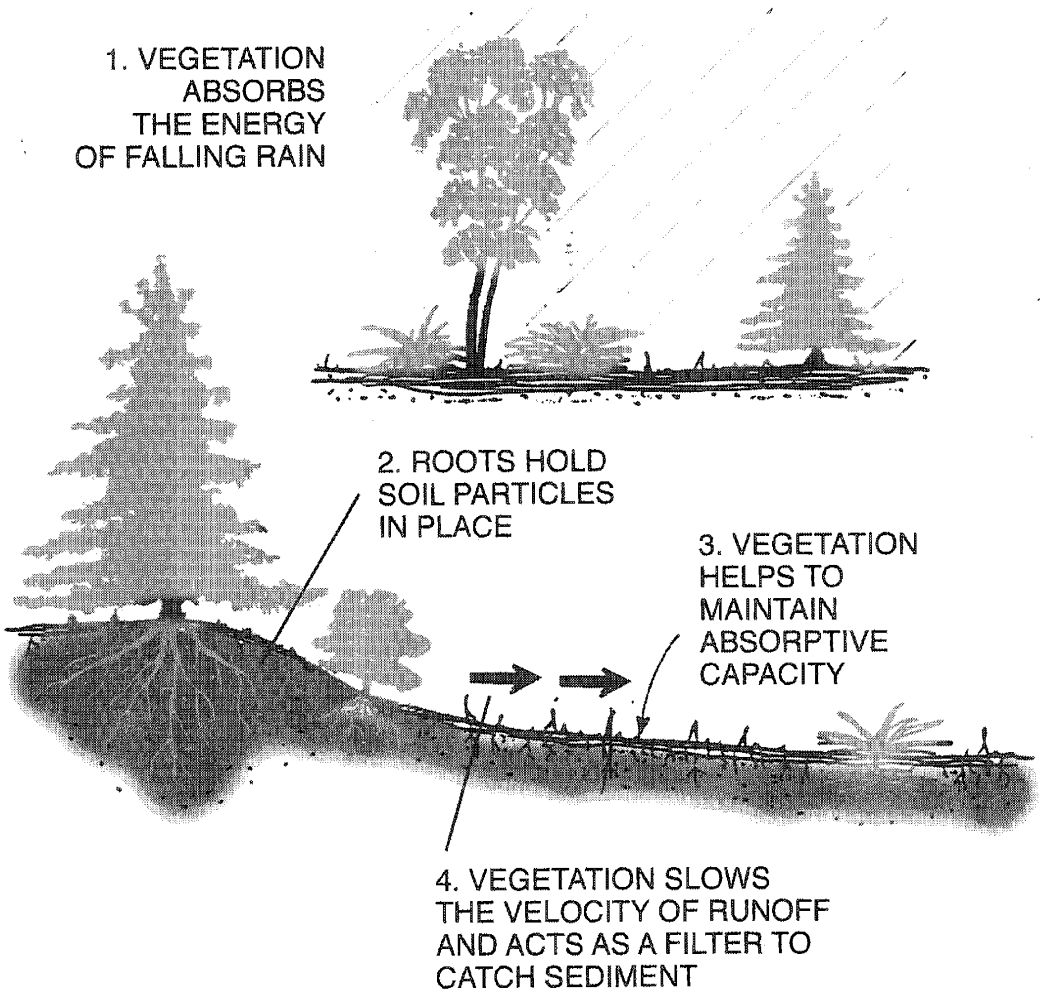
Clearing and grading practices upstream therefore increase the potential for erosion in downgradient property areas.

Minimum-disturbance activities (such as preservation of vegetation and grade) are preferable to structural control measures because they protect and preserve the natural drainage system. Natural drainage is the most effective means of filtering sediment and pollution and regulating the volume of runoff from land surfaces to adjacent streams. In addition, preservation and minimum-disturbance activities are more cost effective than re-vegetation practices or structural controls —especially over the long term.

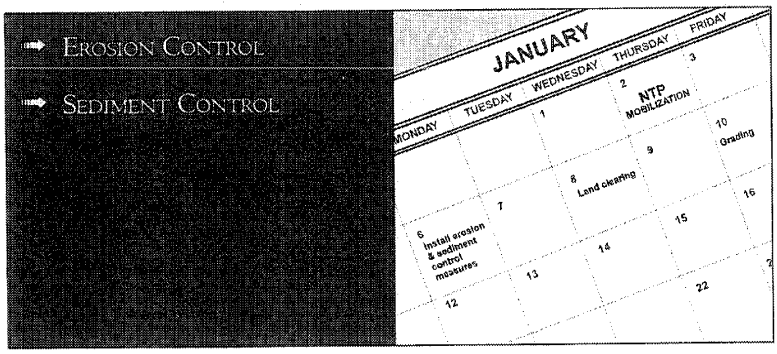


DRAINAGE PATTERNS FROM AN UNDEVELOPED VERSUS A DEVELOPED WATERSHED

Clearing and grading activities are usually regulated at the local level through a variety of ordinances including erosion and sediment control requirements, clearing and grading requirements, steep slope requirements, tree preservation requirements and natural resource protection ordinances.


1. VEGETATION ABSORBS THE ENERGY OF FALLING RAIN
2. ROOTS HOLD SOIL PARTICLES IN PLACE
3. VEGETATION HELPS TO MAINTAIN ABSORPTIVE CAPACITY
4. VEGETATION SLOWS THE VELOCITY OF RUNOFF AND ACTS AS A FILTER TO CATCH SEDIMENT

S C H E D U L I N G



Purpose:

The project schedule should sequence construction activities with the installation of erosion and sediment control measures. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking and to perform the construction activities and control practices in accordance with the planned schedule.

Application:

All projects involving land-disturbing activities.

Limitations:

None identified.

Inspection and Maintenance:

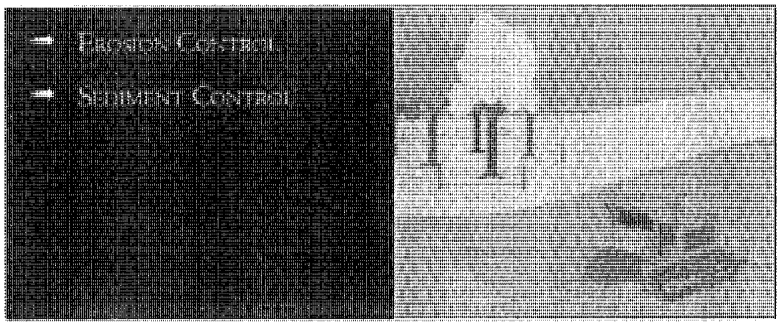
- Incorporate the use of a schedule or flow chart to layout the construction plan.
- Work out the sequencing and timetable for the starting and completion of each item such as site clearing, grading, excavation, pouring foundations, installing utilities, etc.
- Incorporate erosion and sediment control items in construction schedule.
- Avoid or minimize land disturbing activities scheduled between October and April 1st. Extra precautions (BMP's) should be implemented to protect the site from erosion.
- Schedule major grading operations in dry-weather months (April thru October).
- Allow enough time before rainfall begins to stabilize soil with vegetation or physical means or to install temporary sediment trapping devices.

- Erosion may be caused during dry seasons by unseasonal rainfall, wind, and vehicle tracking. Maintain site stabilization year-round, and keep wet-season sediment trapping devices in operational condition.
- Whenever possible, schedule work to minimize the extent of site disturbance at any one time.
- Incorporate staged revegetation of graded slopes and installation of geotextile blankets as work progresses.
- Sequence trenching activities by closing open portions before new trenching begins.

Inspection and Maintenance:

- Routinely verify that work is progressing in accordance with the project schedule. If progress deviates, take corrective actions.
- When changes to the project schedule are unavoidable, amend the sequence schedule well in advance to anticipate potential problems and maintain control.

Preservation of Existing Vegetation



Purpose:

Protection of plants and trees in any area subject to land-disturbing activities is beneficial and should be attempted wherever possible. Existing vegetation serves as an effective form of erosion and sediment control, and provides watershed protection, landscape beautification, dust control, pollution control, noise reduction, and shade cover.

Application:

- Appropriate to all types of construction sites
- Floodplains
- Wetlands
- Streambanks
- Steep slopes
- Areas where construction will occur at a later date
- Sensitive habitat areas where natural vegetation exists

Limitations:

- Protection of existing vegetation requires planning, and may constrict the area available for construction activities.

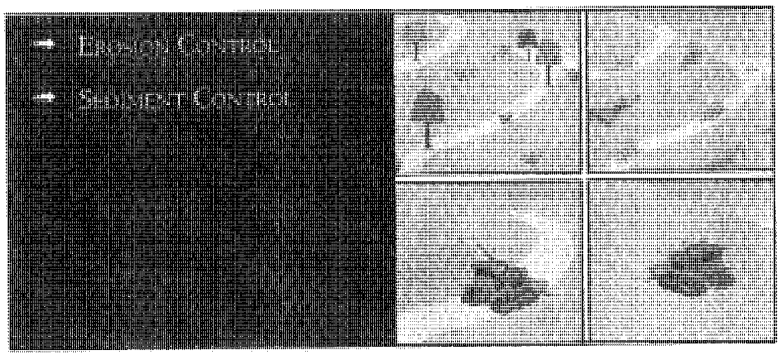
Timing:

Efforts to preserve existing vegetation should be made before site disturbance begins.

Installation Guidelines:

- Areas not to be disturbed must be clearly marked with construction fencing at all times and communicated to contractors.
- Any damage to the area must be repaired immediately in accordance with the landscaping plan.

SLOPE GRADING



Purpose:

Roughening and terracing are techniques for creating unevenness on bare soil by creating furrows across slopes, creating stair-steps, or by tracking the soil surface. Surface roughening or terracing reduces erosion potential by decreasing runoff velocities, trapping sediment, and increasing infiltration of water into the soil.

Application:

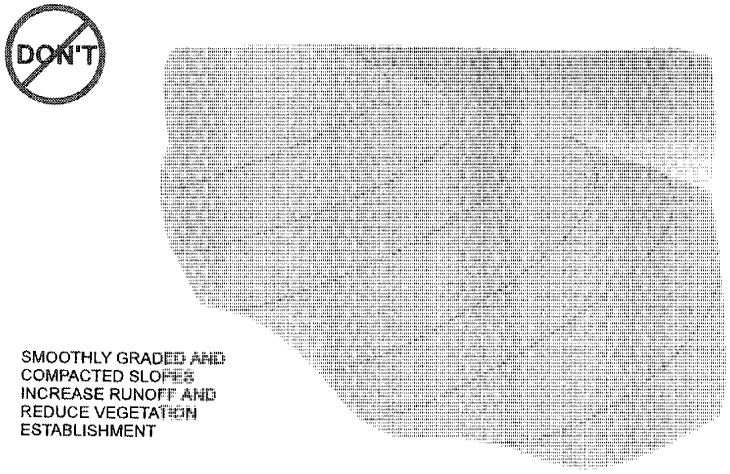
- All construction slopes require surface roughening or terracing of some kind to facilitate the long-term stabilization of vegetation.
- Where surface roughening will benefit seeding, planting, and mulching.
- Graded areas with smooth and hard surfaces.
- Where slope length needs to be shortened by terracing. Terracing is usually permanent, and should be designed based on site conditions and under the direction and approval of a registered civil engineer.

Limitations:

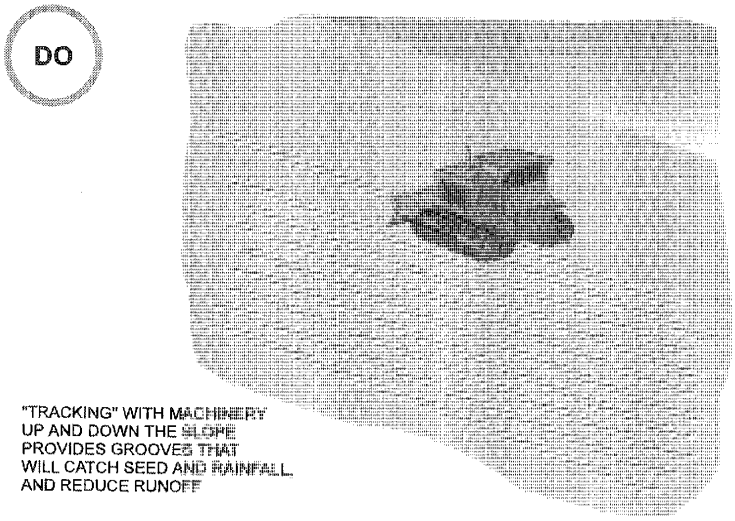
- Roughening may increase grading costs and result in sloughing in certain soil types.
- Sole reliance on roughening for temporary erosion control is of limited effectiveness in intense rainfall events. Roughening should be used in conjunction with temporary erosion control measures, such as seeding and mulching.
- Stair-step grading may not be practical for sandy, steep, or shallow soils.

Inspection and Maintenance:

- Periodically check seeded, planted and mulched slopes for rills and gullies, particularly after significant storm events. Fill these areas slightly above the original grade, then reseed and mulch as soon as possible.

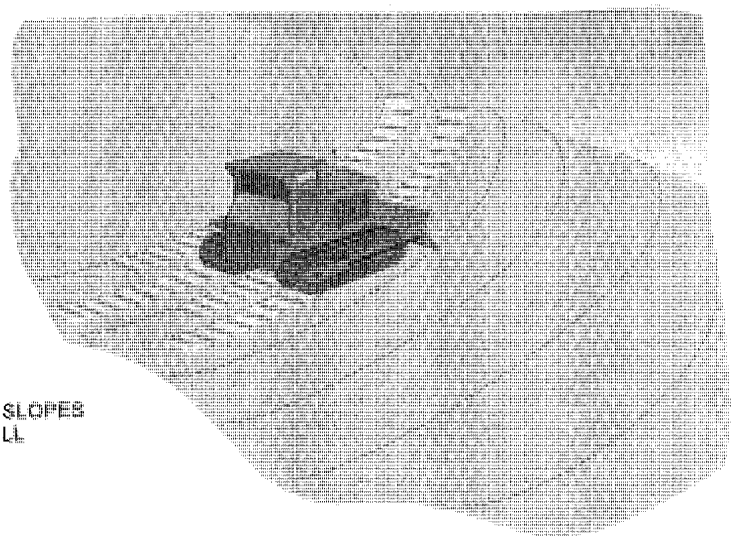


SMOOTHLY GRADED AND COMPACTED SLOPES INCREASE RUNOFF AND REDUCE VEGETATION ESTABLISHMENT

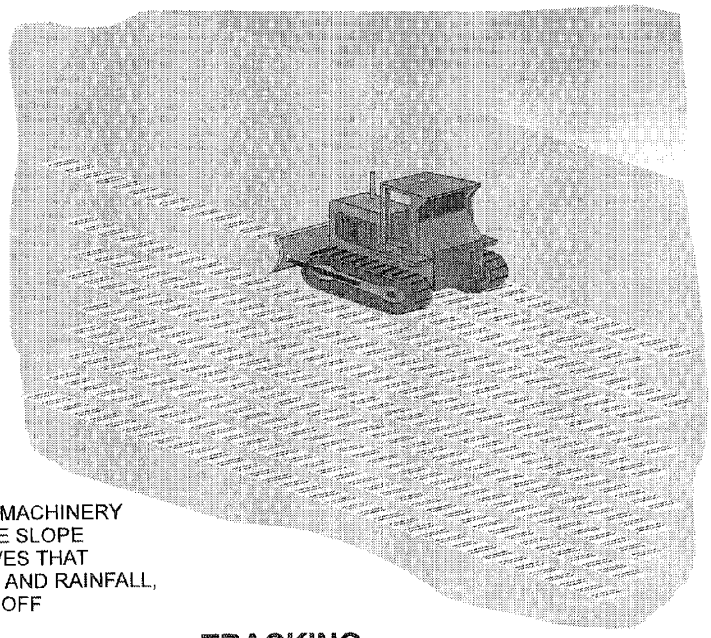


"TRACKING" WITH MACHINERY UP AND DOWN THE SLOPE PROVIDES GROOVES THAT WILL CATCH SEED AND RAINFALL AND REDUCE RUNOFF

TRACKING



DO NOT TRACK SLOPES
ACROSS THE HILL



"TRACKING" WITH MACHINERY
UP AND DOWN THE SLOPE
PROVIDES GROOVES THAT
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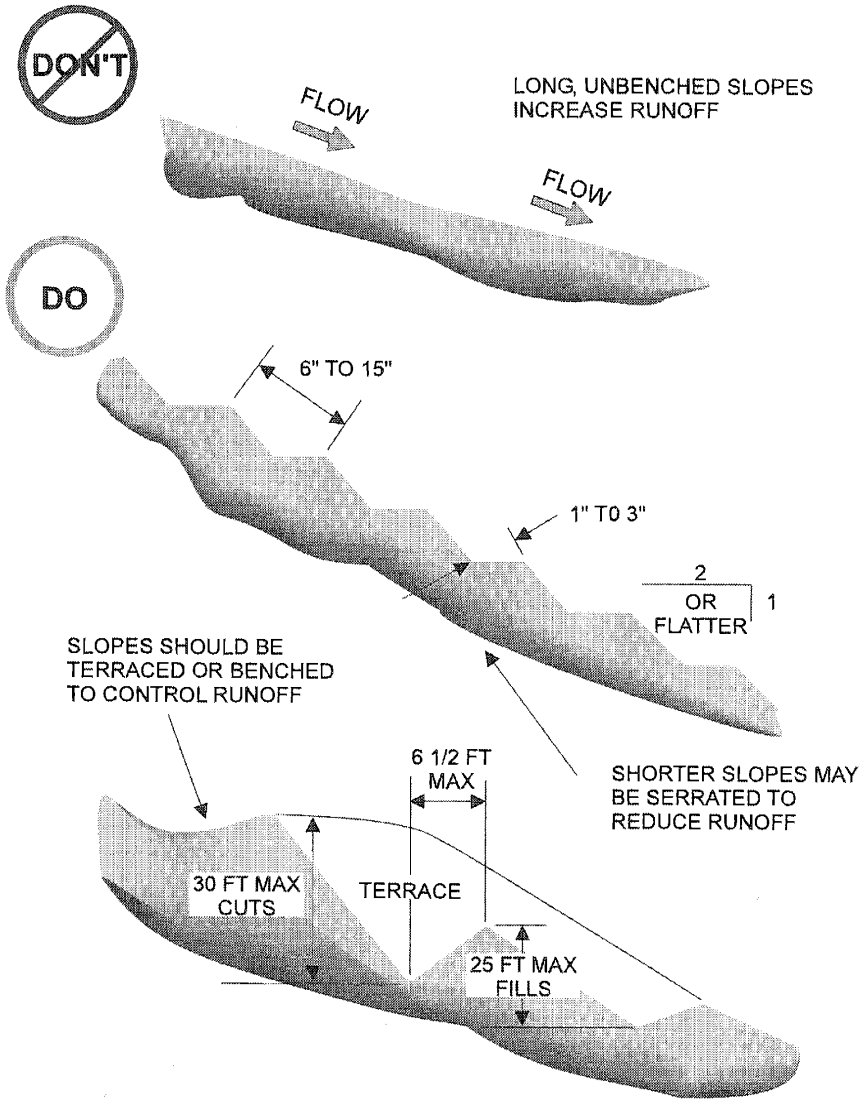
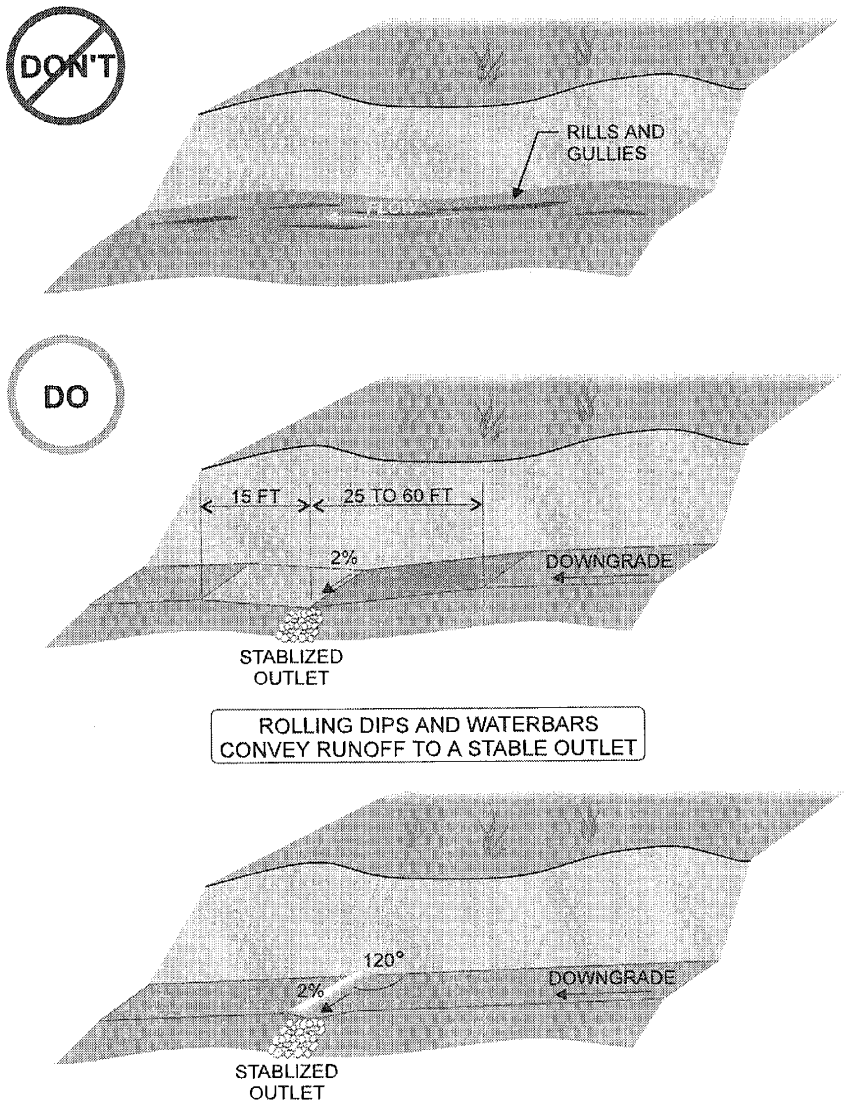
AND REDUCE RUNOFF

TRACKING

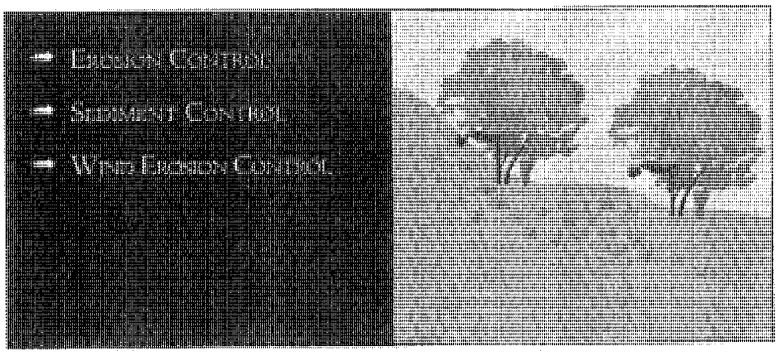


SLOPE TERRACES



ROAD DRAINAGE

Temporary Seeding and Mulching



Purpose:

The purpose of temporary vegetative protection is to reduce erosion by establishing quick growing plants to stabilize disturbed areas which will not have permanent landscaping installed for a period of time or which may be redisturbed at a later date. Generally inexpensive and easy to do.

Application:

- Construction projects where exposed soils require temporary erosion protection.
- Disturbed areas requiring temporary protection until permanent landscaping is established.
- Disturbed areas that must be redisturbed following an extended period of inactivity.

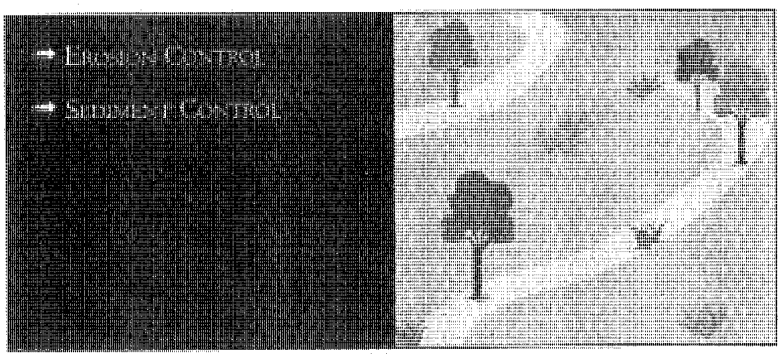
Limitations:

- If the site is susceptible to erosion, additional control measures may be necessary during the establishment of vegetation. Frequent inspection is necessary.
- Grasses may require regular maintenance and uncut dry grass may present a fire hazard.
- Temporary seeding for stabilization of steep slopes may be difficult without additional erosion measures such as blankets, matrices, matting, or other effective technique.

Inspection and Maintenance:

- All seeded areas must be inspected for failures during the rainy season and repaired immediately by temporary mulching or other revegetation practices.

Permanent Seeding and Mulching



Purpose:

The purpose of permanent seeding and planting is to establish a permanent perennial vegetative cover on areas that have been disturbed by construction. The establishment of permanent vegetation is beneficial for long-term aesthetics, reduces erosion by slowing runoff velocities, enhances infiltration and transpiration, traps sediment and other particulates, protects soil from raindrop impact, and provides habitat for wildlife. Relatively inexpensive.

Application:

- Cut and fill areas
- Slopes
- Waterways
- Buffer strips
- Landscape corridors
- Stream banks

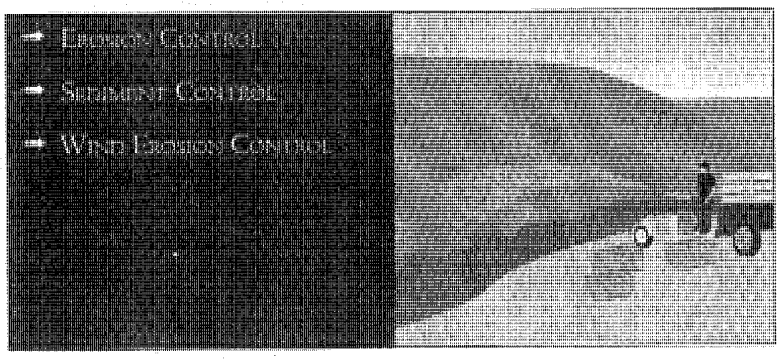
Limitations:

- May require irrigation to establish vegetation during dry weather or drought.
- If the site is susceptible to erosion, additional control measures may be necessary during the establishment of vegetation.

Inspection and Maintenance:

- If soil moisture is deficient, new vegetation should be supplied with supplemental water until firmly established.
- Cutting or mowing grasses will encourage the establishment and spread of the grass.
- All seeded areas should be inspected for failures and reseeded, fertilized, and mulched within the planting season, using half the original application rates.

HYDROMULCHING - HYDROSEEDING



Purpose:

To temporarily or permanently stabilize disturbed soils, to protect the soil surface from raindrop impact, to increase infiltration, to conserve moisture, to prevent soil compaction or crusting and to decrease runoff. Mulching also fosters growth of vegetation by protecting the seeds from predators, reducing evaporation and insulating the soil. The terms *hydroseeding* and *hydro-mulching* are often used interchangeably to describe a planting technique that employs a wet slurry of seed, mulch fiber, fertilizer and water and allowing for rapid plant growth on disturbed areas.

Application:

- Mulch is mixed in the tank along with water, seed and fertilizer. When sprayed on the ground, it forms a continuous blanket that protects the seeds by holding them in place and by retaining soil moisture.
- Coverage consistency is the most important thing. Each sprayed area should look about the same.
- On steep slopes greater than 2.5:1, or where applied mulch is susceptible to movement by wind or water, the mulch should be hydraulically applied or the straw mulch should be appropriately anchored. Hydraulic fiber mulches and/or tackifying agents are used effectively to bind the straw together and prevent displacement by wind and rain.

Applicable Materials:

- vegetable fibers (straw, hay)
- wood bark chips
- hydraulic mulches made from recycled paper
- hydraulic mulches made from wood fiber
- hydraulic matrices (Bonded Fiber Matrix)

Description and Limitations:

Vegetable Fibers (Hay or Straw): Primarily used as temporary or permanent measures for stabilizing disturbed areas. Potential for introduction of weed seed and unwanted plant material in sensitive areas. Most critical limitation is that where straw blowers are used to apply mulch, areas for treatment must be within 45 m (150 ft) of a road or surface capable of supporting large vehicular traffic. Of the two types of mulch (hay versus straw), straw is the preferred alternative.

Wood/Bark Chips: Primarily used in disturbed areas as a temporary ground cover around trees, shrubs and landscape plantings. Erosion control effectiveness unknown but considered poor. Chips are difficult if not impossible to anchor on steepened slopes and may be blown by high winds. Shredded products tend to hold together better than chips, and stay on slopes better and are less subject to wind erosion. Does not withstand concentrated flow and is prone to sheet erosion. May absorb nutrients necessary for plant establishment/growth.

Hydraulic Mulches (made from recycled paper): Rapid method for applying seed and fertilizer in almost any disturbed area. Good delivery mechanism for even dispersal of hydraulically-applied seeds. Short fiber length and lack of tackifier limits erosion control effectiveness and does little to moderate moisture and temperature in soils. Residual inks contained in mulch can be a potential problem in environmentally sensitive areas. Longevity significantly less than that of wood fiber mulches.

Hydraulic Mulches (made from wood fiber): Mulches derived from whole wood chips are the industry standard and provide a quick and uniform method and medium for planting large areas quickly and economically. With longer fiber length than paper mulch, wood fibers persist longer and offer better wet-dry characteristics than paper (cellulose) mulches. Provides limited erosion control protection, even with tackifier and moderate moisture and soil temperature when applied at higher rates.

Hydraulic Matrices (Bonded Fiber Matrix): This "mulch related" category includes hydraulic slurries composed of wood fiber, cellulose fiber or a combination, held together by the chemical bond, a mechanical bond, or a combination of the two. Rather than mix components from various manufacturers, all fibers and binding agents are contained in one bag to ensure uniformity and consistency throughout the project.

Well suited for sites with existing desirable vegetation and where worker safety and minimal disturbance of the site are desirable. Advantages are application using standard hydraulic seeding equipment forming a coverage and erosion control performance equivalent to rolled erosion control blankets, but more quickly. Chemically bonded products often require cure time (drying time) to be effective and limit application to dry soils where there is no threat of rainfall within 48 hours. However, mechanically bonded fiber matrices do not require *cure time* and are effective immediately on application.

Installation Guidelines:

➪ **Vegetable Fibers (Hay or Straw):** Loose hay and/or straw are the most common mulch materials used in conjunction with direct seeding of soil. Mulching is generally the second part of a multi-step process that should be implemented as follows:

- Apply seed and fertilizer to the bare soil (optional).
- Apply loose hay or straw over the top of the seed/fertilizer at a rate of 4,500 kg/ha (2 tons/ac) either by machine or by hand distribution. Straw is preferable to hay.
- Anchor the mulch in place by using a tackifier, netting, or crimp it into the soil mechanically.

Methods for holding the mulch in place depend upon the slope steepness, accessibility, soil conditions and longevity. Crimping straw or hay into the soil is the best way to anchor it in place:

- On small areas, a spade or shovel can be used.
- On slopes with soils which are stable and can safely support construction equipment without contributing to compaction and instability problems, straw or hay can be "punched" into the ground using a knife-blade roller or a straight-bladed coulter, known commercially as a "crimper."
- On small areas and/or steep slopes, straw or hay can also be held in place using plastic netting or jute. The netting should be held in place according to manufacturer's specification.
- For steep slopes or large areas, straw/hay should be held in place using appropriate tackifiers until vegetation is established.

➪ **Wood/Bark Chips:** Suitable for areas that will not be mowed closely or for ground cover in ornamental or landscape plantings.

- The mulch should be evenly distributed across the soil surface to a depth of 50 mm (2 in) to 75 mm (3 in).
- Should be distributed by hand (although pneumatic methods are currently being developed).
- Soils must be tested before application and a minimum of 6 kg of nitrogen per metric ton of mulch (12 lbs of nitrogen per ton of mulch) must be added to prevent nutrient deficiency in plants.

- **Hydraulic Mulches (made from recycled paper):** This mulch is made from recycled newprint, magazine, or other waste paper sources.

  - The mulch should be mixed with seed, fertilizer, and tackifier as specified and applied at a rate recommended by the manufacturer in order to achieve uniform, effective coverage.

- **Hydraulic Mulches (made from wood fiber):** This mulch is manufactured from wood waste from lumber mills or from urban sources.

  - The mulch is mixed with seed and fertilizer as specified and applied at a rate recommended by the manufacturer in order to achieve uniform, effective coverage and provide adequate distribution of seed.

- **Hydraulic Matrices (Bonded Fiber Matrix):** This mulch category includes hydraulic slurries composed of wood fiber, paper fiber or a combination of the two held together by a binding system.

  A hydraulic matrix is applied as aqueous slurry (with seed) using standard hydroseeding equipment to provide immediate dust control, temporary erosion control, and stabilization until permanent vegetation is reestablished.

  Another category of hydraulic matrices is known as a **Bonded Fiber Matrix (BFM).** Rather than mix components from various manufacturers to create a hydraulic matrix, all fiber and binders are contained in one bag. A typical construction specification and application for a BFM is as follows:

  Bonded Fiber Matrix shall be a commercially manufactured product designed specifically for such use. The BMF shall be a mixture of long wood fibers and various bonding agents that, when hydraulically applied, produce a sprayed-in-place matrix that:

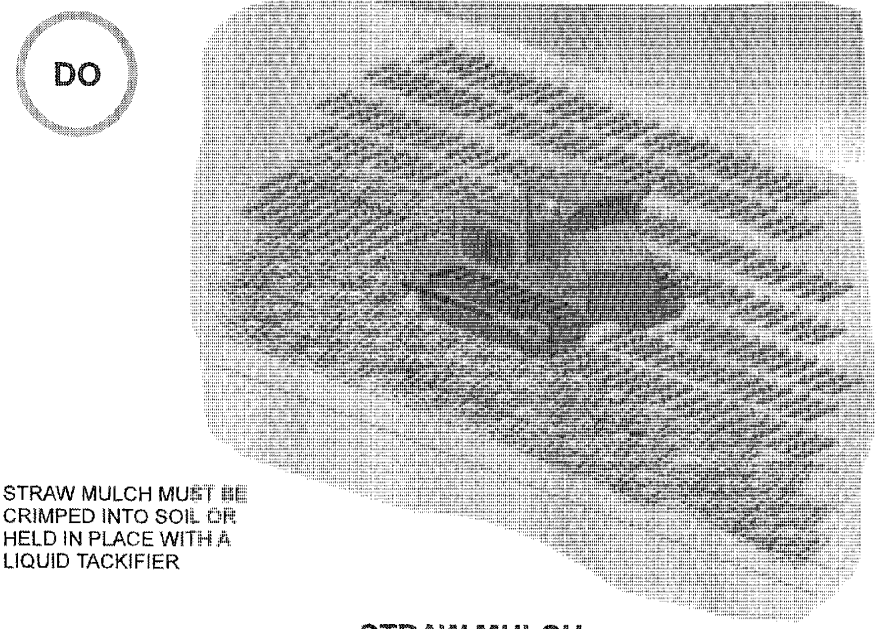
  - Does not dissolve or disperse upon rewetting.
  - Contains no germination or growth inhibiting factors.
  - Forms no water insensitive crust.

- The BFM should be applied at rates from 3,400 kg. ha (3,000 lbs/acre) to 4,500 kg/ha (4,000 Lbs/Acre) and based on manufacturer's recommendation.
- The BFM shall be a hydraulic matrix which when applied and upon drying, adheres to the soil to form a 100% cover which is biodegradable, promotes vegetation, and prevents soil erosion.
- The BFM shall not be applied immediately before, during, or immediately after rainfall so that the matrix will have an opportunity to dry fo 24 hours after installation.

Limitations:

- Hydraulic mulch application rates beyond 2,500 pounds may interfere with germination and are not usually recommended for turf establishment.
- Like any seedbed, the site should be kept moist, not wet, through the first few weeks or until the grass is established.
- If mulch is utilized as part of a revegetation strategy, then a balance needs to be struck between the degradation of the mulch and the emergence of vegetation over time. In other words, where vegetation is the ultimate cover, maintenance and inspection should focus on the quality and diversity of vegetation establishment through the mulch.

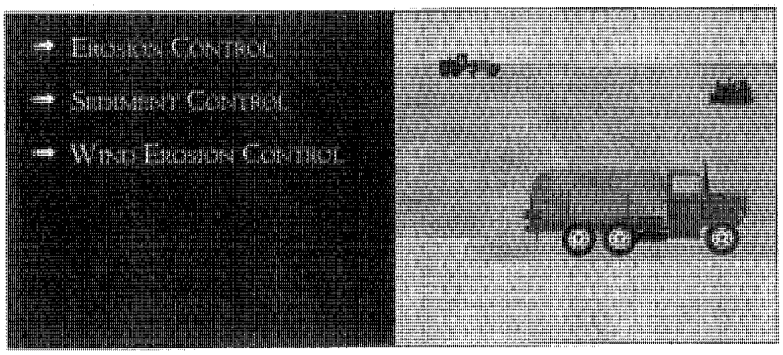
UNCRIMPED STRAW
(OR UNTACKED STRAW)
WILL BLOW OR BE
WASHED AWAY



STRAW MULCH MUST BE
CRIMPED INTO SOIL OR
HELD IN PLACE WITH A
LIQUID TACKIFIER

STRAW MULCH

Dust Control



Purpose:

Stabilizing materials are applied to the disturbed soil surface to prevent the transport of soil from exposed surfaces on construction sites either by wind or storm water runoff.

Dust control measures may consist of either chemical, structural or mechanical measures. Examples are shown in Table 1.

Application:

- Dust control should be practiced on all construction sites with exposed soils as needed.
- Dust control is particularly important in windy or wind-prone areas.
- Sites with silt and clay soils are particularly prone to dust.
- Dust control is considered a temporary measure and as an intermediate treatment between site disturbance and construction, paving, or revegetation.

Limitation:

- Dust control measures are temporary in nature and require reapplication.
- Chemical stabilization materials may have harmful effects on water quality if used incorrectly.
- Excessive sprinkling with water may result in non-storm water discharge from the site.

Inspection and Maintenance:

- Areas exposed to excessive wind, vehicle traffic, or rain should be inspected daily.
- Reapply soil stabilizers at appropriate intervals, and based on need.

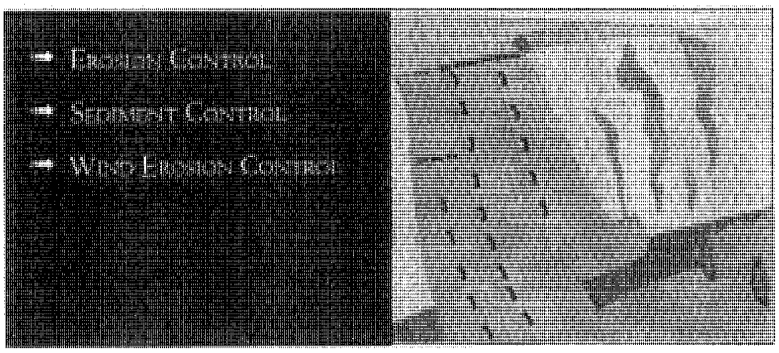
Table 1

Method	Selection	Site Preparation	Recommended Application Rate
Chemicals - Inorganic			
Water	– Most commonly used practice – Evaporates quickly – Lasts less than 1 day	For all liquid agents: – Blade a smooth surface. – Crown or slope surface to avoid ponding. – Compact soils if needed. – Uniformly pre-wet at 0.14-1.4 L/m^2 (0.03-0.3 gal/yd^2). – Apply solution under pressure. Overlap solution 100-300 mm (6-12 in). – Allow treated area to cure 0-4 hours. – Compact area after curing. – Apply second treatment before first treatment becomes ineffective, using 50% application rate. – In low humidities, reactivate chemicals by rewetting at 0.5-0.9 L/m^2 (0.1-0.2 gal/yd^2).	0.6 L/m^2 (0.125 gal/yd^2) every 20 to 30 minutes.
Salts – Calcium Chloride (CaCl)	– Restricts evaporation – Lasts 6-12 months – Can be corrosive – Less effective in low humidity – Can build up in soils and leach by rain		Apply 38% solution at 1.21 L/m^2 (0.27 gal/yd^2) or as loose, dry granules per manufacturer.
– Magnesium Chloride (MgCl)	– Restricts evaporation – Works at higher temperatures and lower humidity than CaCl – May be more costly than CaCl		Apply 26-32% solution at 2.3 L/m^2 (0.5 gal/yd^2).
– Sodium Chloride (NaCl)	– Effective over smaller range of conditions – Less expensive – Can be corrosive – Less effective in low humidity		Per manufacturer.
Silicates	– Generally expensive – Available in small quantities – Require second application		
Surfactants	– High evaporation rates – Effective for short time periods – Must apply frequently		

Table 1 (Continued)

Method	Selection	Site Preparation	Recommended Application Rate
Chemicals - Organic			
– Copolymers	– Form semipermeable transparent crust. – Resist ultraviolet radiation and moisture induced breakdown. – Last 1 to 2 years.	Same as above.	750-940 L/ha (80-100 gal/ac).
– Petroleum Products	– Bind soil particles – May hinder foliage growth – Environmental and aesthetic concerns – Higher cost		Use 57-63% resins as base. Apply at 750-940 L/ha (80-100 gal/ac).
– Lignin Sulfonate	– Paper industry waste product – Acts as dispersing agent – Best in dry climates – Can be slippery		Loosen surface 25-50 mm (1-2 in). Need 4-8% fines.
– Vegetable Oils	– Coat grains of soil, so limited binding ability – May become brittle – Limited availability		Per manufacturer.
– Spray-on Adhesives	– Available as organic or synthetic – Effective on dry, hard soils – Form a crust – Can last 3 to 4 years		Per manufacturer.

Erosion Control Blankets and Geotextiles



Purpose:

Erosion control blankets or mats are biodegradable or synthetic blankets that are used for temporary or permanent stabilization of disturbed soils at construction sites. Erosion control blankets and mats protect disturbed soil from rain and surface runoff impact, increase infiltration, decrease soil compaction and crusting, protect seeds from impact and predators, and moderate soil temperature to enhance the growth of vegetation.

Application:

- Slopes and disturbed soils where mulch must be anchored and other methods such as crimping or tackifying are not feasible or adequate.
- Steep slopes, generally steeper than 3:1.
- Slopes where erosion hazard is high.
- Critical slopes adjacent to sensitive areas such as streams, wetlands, or other highly valued resources.
- Disturbed soils where plants are slow to develop protective cover.
- Channels with flows from 0.6 m/s (2 fps) to 1.2m/s (4 fps).
- Channels intended to be vegetated and where the design flow velocity exceeds the permissible velocity.

Limitations:

- While blankets and mats are easy to install, are biodegradable, and effective in reducing erosion and enhancing vegetative growth, they are typically more expensive than other erosion control measures due to high material and labor costs.

- Rolled blankets are not suitable for rocky sites or areas where final vegetation will be mowed. Proper site preparation, including proper soil compaction, are necessary to ensure adequate contact of the blanket/matting with the soil.

- Plastic sheeting is easily vandalized, easily torn, not degradable, and should be disposed of at a landfill. Plastic results in 100% runoff, increasing the potential for serious erosion problems in downgradient areas receiving increased flows. Plastic use should be limited to covering stock piles, or very small graded areas as a temporary measure and for short periods of time.

Installation:

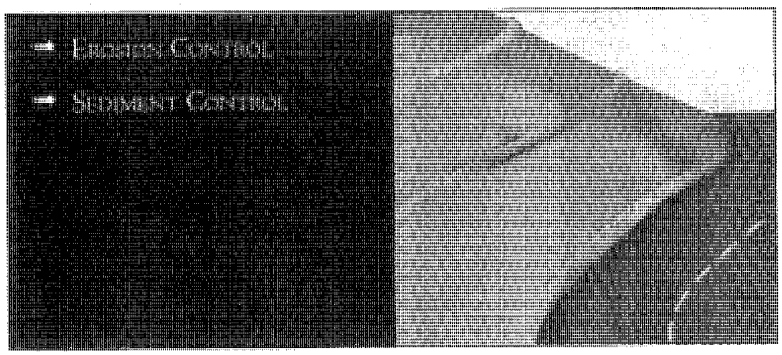
Follow manufacturer's recommendations for installation. In general these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 150 mm (6 in) deep by 150 mm (6 in) wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket downslope in the direction of water flow, not horizontally.
- Overlap the edges of adjacent parallel rolls 50mm (2 in) to 75 mm (3 in) and staple every 1 m (3 ft).
- When blankets must be spliced, place blankets end over end (shingle style) with 150 mm (6 in) overlap. Staple through overlapped areas, approximately 300 mm (12 in) apart.
- Lay blankets loosely and maintain direct contact with the soil—do not stretch.
- Staple blankets sufficiently to ensure that materials will maintain direct contact with soil.

Inspection and Maintenance:

- Inspect all blankets and mats after installation and periodically throughout the course of construction.
- Inspect blankets and mats before and after significant rain events for erosion and undermining. Repair failures immediately.
- If washout or breakages occur, re-install or re-anchor materials only after repairing damage to the slope or channel (rills, gullies etc.).

Fiber Rolls



Purpose:

Fiber rolls (sediment logs or wattles), composed of bio-degradable fibers stuffed in a photo-degradable open weave netting, are designed to reduce sediment runoff from disturbed soils into the storm drain system or watercourses. Fiber rolls are porous and allow water to filter through fibers and trap sediment, increase filtration rates, slow runoff and reduce sheet and rill erosion. Wattles also create a favorable environment for plant establishment.

Application:

- Along the face of exposed and erodible slopes to shorten slope length
- At grade breaks where slopes transition to a steeper slope
- In drainage swales to slow flows
- Along streambanks to assist stabilization and revegetation

Inspection and Maintenance:

Follow manufacturer's recommendations for installation. In general, these will be as follows:

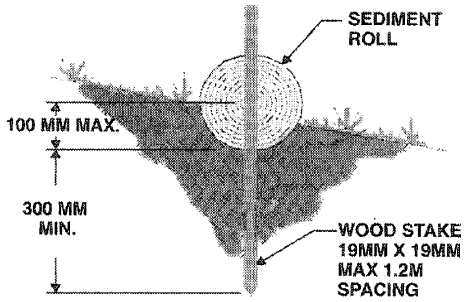
- Fine grade the subgrade by hand dressing where necessary to remove local deviations and to remove larger stones or debris that will inhibit intimate contact of the fiber roll with the subgrade.
- Prior to roll installation, contour a concave key trench 50 to 100 mm (2 to 4 inches) deep along the proposed installation route.
- Soil excavated in trenching should be placed on the uphill or flow side of the roll to prevent water from undercutting the roll.
- Place fiber rolls into the key trench and stake on both sides of the roll within 6 feet of each end and then every six inches with 1" x 2" x 23" stakes.
- Stakes are typically driven in on alternating sides of the roll. When more than one fiber roll is placed in a row, the rolls should be abutted securely to one another to provide a tight joint, not overlapped.

Limitations:

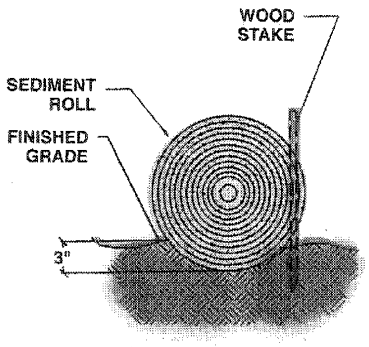
- Designed for low surface flows not to exceed 1 cfs for small areas.
- Designed for short slopes or slopes flatter than 3:1.
- Primary purpose is not sediment control, although do provide some sediment removal.

Inspection and Maintenance:

- Repair or replace split, torn, unraveling or slumping fiber rolls.
- Inspect fiber rolls when rain is forecast, following rain events and at least daily during prolonged rainfall. Perform required maintenance.
- In most cases, fiber rolls do not require removal and can be abandoned in place. If not excessively soiled, rolls may be removed, replaced and reused.

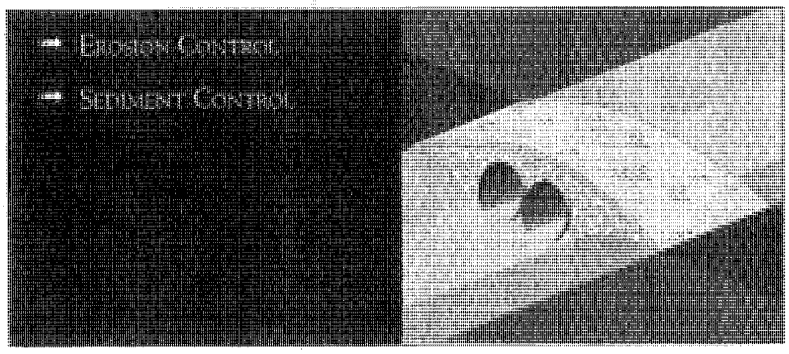


ENTRENCHMENT DETAIL IN SLOPE AREA



ENTRENCHMENT DETAIL IN FLAT AREA

Temporary Stream Crossing



Purpose:

A temporary stream crossing is a bridge or culvert placed across a waterway to allow vehicles to cross during construction without entering the water. This structure protects sensitive areas and eliminates erosion caused by vehicles.

Application Guidelines:

- Construction sites where construction equipment or vehicles will frequently cross a waterway.
- When alternate access routes impose significant constraints such as length, narrowness, or poor soil strength.
- Where duration of construction activities is not anticipated to be longer than one year.

There are three types of temporary stream crossings:

1. Culverts—used on perennial and intermittent streams.
2. Fords—appropriate during the dry season in arid areas for dry washes and ephemeral streams.
3. Bridges—appropriate for streams with high flow velocities, steep gradients, and/or where temporary restrictions in the channel are not allowed.

Limitations:

- Will require Army Corps 404 Permit, State Board 401 Certification, and California Department of Fish and Game Streambed Alteration Agreement.
- Waterway will be disturbed during installation and removal of structure-adequate erosion protection before and during installation, and during removal required therefore.
- May require dewatering or temporary diversion of the stream.
- May become an obstruction in the waterway, constricting flood flows and causing flow backups and washouts.
- Disturbed areas must be stabilized during construction and after structure removal.

Inspection and Maintenance:

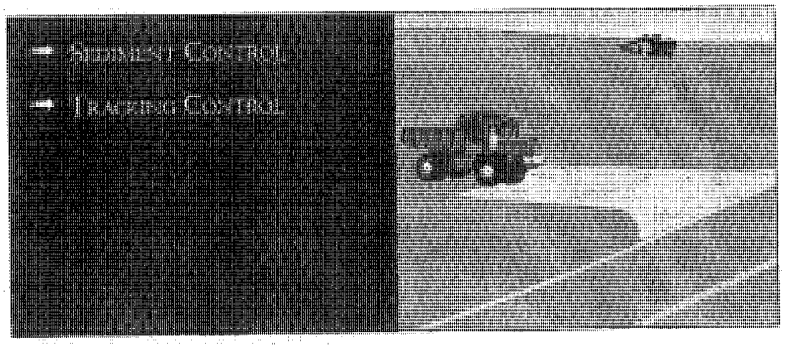
Inspection, at a minimum, should occur weekly during dry months and before and after each significant rain event, including:

- Checking for blockage in the channel, sediment buildup in culverts or behind fords, or trapped debris.
- Checking for erosion of abutments, channel scour, riprap displacement, or piping in the soil.
- Checking for structural weakening of the temporary crossing, such as cracks, and undermining of foundations and abutments.

Maintenance should include:

- Minimum disturbance.
- Periodic removal of silt behind fords, in culverts, and under bridges.
- Replacement of lost aggregate from inlets and outlets of culverts.
- Removal of temporary crossing promptly when it is no longer needed.

STABILIZED CONSTRUCTION ENTRANCE



Purpose:

Stabilizing the point of ingress/egress is an effective means of minimizing the tracking of mud and dirt onto public roads by construction vehicles.

Application:

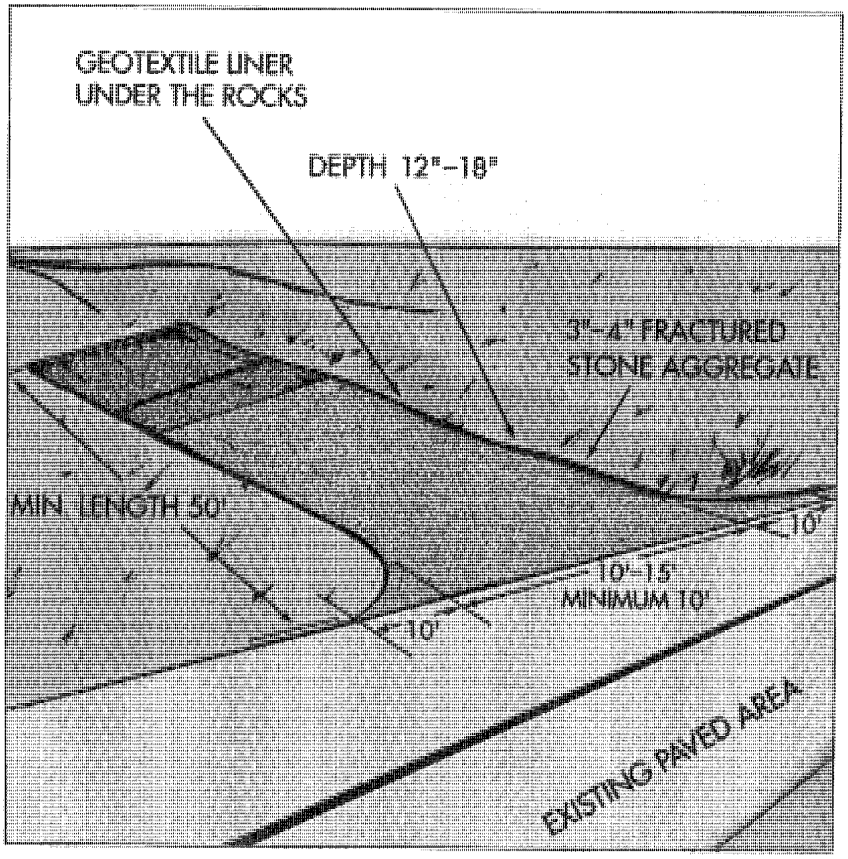
- On sites where tracking onto public roads is a potential problem.
- Site conditions will dictate design and need.

Installation Guidelines:

- Properly grade entrance to prevent runoff from construction site. Entrance elevation should be lower than street.
- Route runoff from stabilized entrance through a sediment trapping device before water is discharged.
- Design stabilized entrance to support the heaviest vehicles which will use it.
- Select entrance stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions.
- If aggregate is selected, place a 200 mm (8 inch thick) course of aggregate over the geotextile fabric or a thickness of aggregate recommended by a soils engineer.

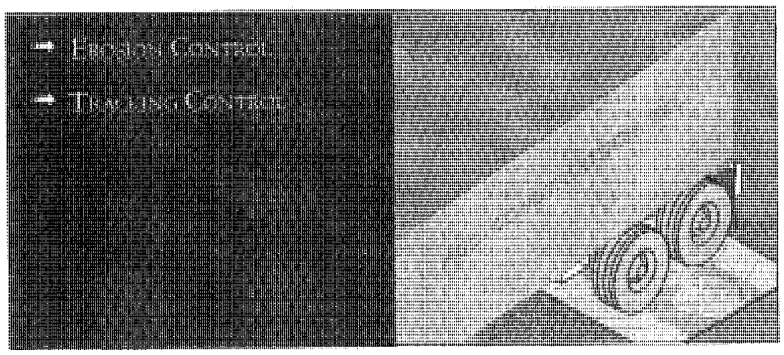
Inspection and Maintenance:

- Inspect routinely for damage and repair as needed.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction entrance.
- Service sediment trapping devices regularly.



length—minimum 50'
width—minimum 10'
(should be flared at the existing road to provide turning radius)
depth—12" to 18"

ENTRANCE / EXIT TIRE WASH



Application:

- On construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.

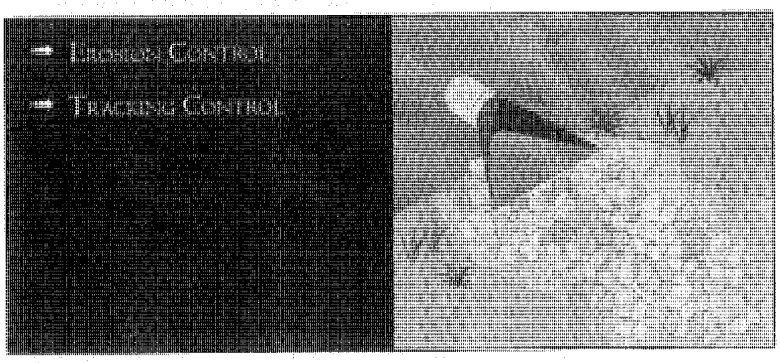
Limitations:

- A wash area requires a supply of wash water as well as a turnout or double wide exit to avoid entering vehicles from having to drive through the wash area.

Inspection and Maintenance:

- Inspect regularly to ensure the wash area is functioning efficiently.
- Maintain exits in a working and effective condition to prevent tracking of sediment onto public roads.

Outlet Protection - Energy Dissipation



Purpose:

Physical devices placed at pipe outlets and in channels reduce the velocity and energy of concentrated storm water flows. Outlet protection helps to prevent scour and to minimize the potential for downstream erosion.

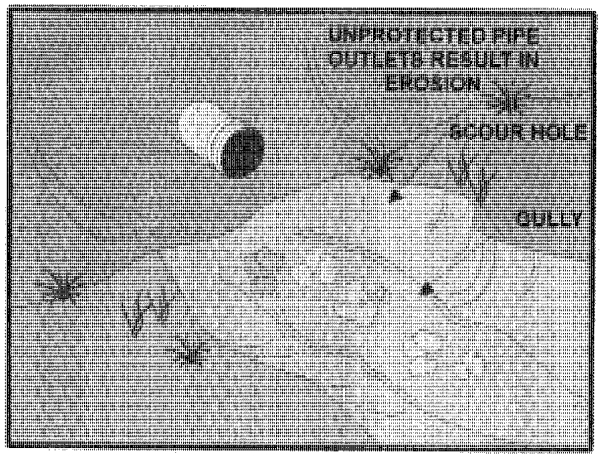
Application:

- Outlets of pipes, drains, culverts, conduits, or channels.
- Outlets located at the bottom of mild to steep slopes.
- Outlets of channels that carry continuous flows of water.
- Outlets subject to short, intense flows of water, such as from flash floods.
- Where lined conveyances discharge to unlined conveyances.

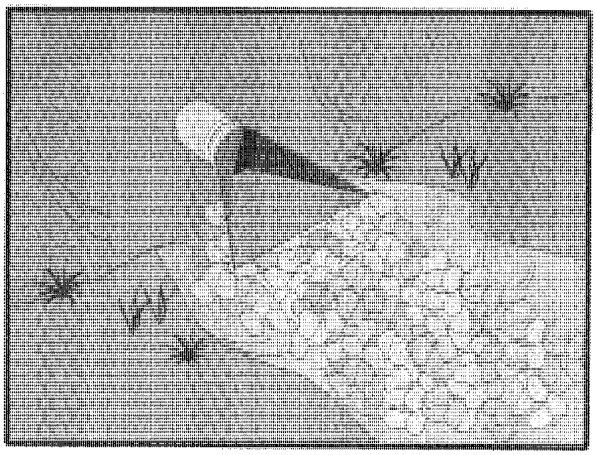
Limitations:

- Require 401 Water Quality Certification (State Water Resources Control Board) and 1603 Streambed Alteration Agreement (California Department of Fish and Game). See pages 11 and 12 for more information.
- May require frequent maintenence for rock outlets with high velocity flows.
- Loose rocks or stones may wash away during high flows. Grouted riprap may breakup from hydrostatic pressure without adequate drainage.

DON'T

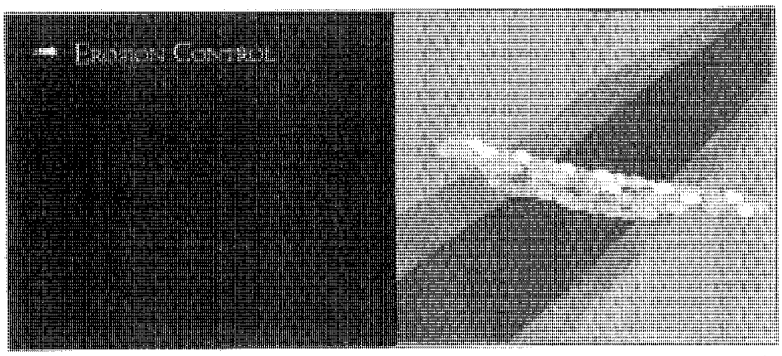


DO



ENERGY DISSIPATOR

CHECK DAMS



Purpose:

A check dam is a small, temporary dam constructed of rocks, logs/timbers or gravel/sand bags and placed across a natural or man-made channel or drainage ditch. By dissipating flow velocity, check dams reduce natural drainage ditch erosion caused by storm water runoff. Check dams are often used as temporary control measures while a channel is being permanently lined with vegetation or other materials.

Application:

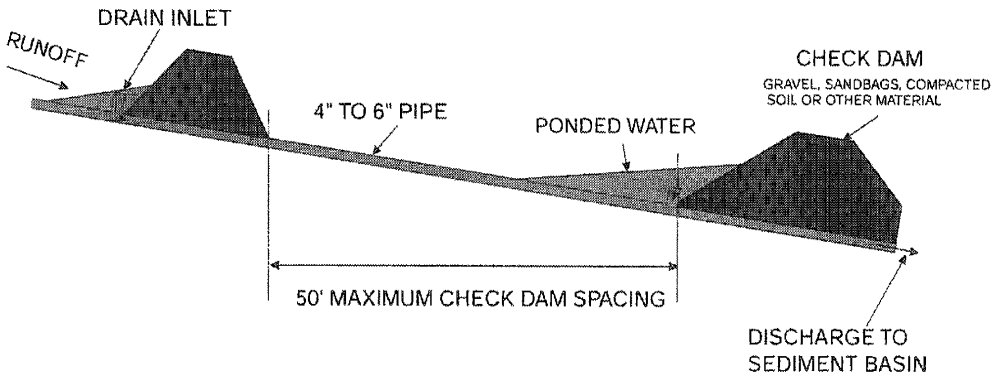
- In small open channels that drain 4 ha (10 ac) or less.
- In steep channels where storm water runoff velocities exceed 1.5 m/s (5 fps) and must be reduced to protect against erosion.
- During establishment of grass linings in drainage ditches/channels.
- In temporary ditches or channels where the short length of service does not allow or warrant establishment or construction of erosion-resistant linings.

Limitations:

- Not to be used in live streams.
- Not appropriate in channels draining areas over 4 ha (10 ac).
- Not to be placed in channels that are already grass lined unless erosion is expected.
- Require extensive maintenance following high velocity flows.
- Trapped sediment should be removed to prevent resuspension during subsequent storms.
- Not to be constructed of straw bales or silt fencing.

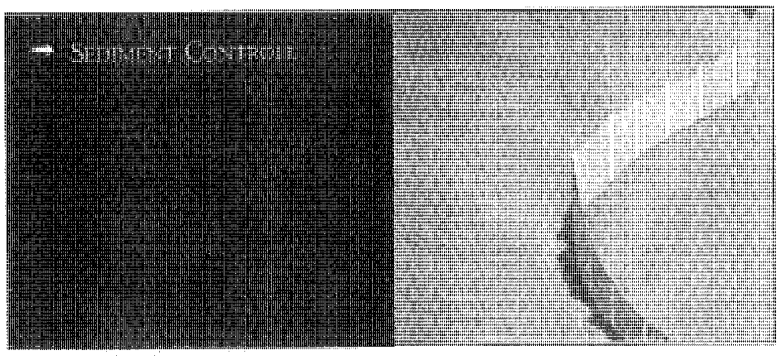
Inspection and Maintenance:

- Inspect check dams periodically before and after storm events to check for undermining.
- Repair failures by replacing loosed materials (rocks, gravel bags, etc.).


DRAIN INLET
RUNOFF
CHECK DAM
GRAVEL, SANDBAGS, COMPACTED SOIL OR OTHER MATERIAL
4" TO 6" PIPE
PONDED WATER
50' MAXIMUM CHECK DAM SPACING
DISCHARGE TO SEDIMENT BASIN

CHECK DAM

S I L T F E N C I N G



Purpose:

A silt fence is a temporary barrier of permeable fabric designed to intercept and slow the flow of sediment laden sheet flow runoff. Silt fencing ponds runoff, allows sediment to settle, and releases filtered water slowly.

Application:

- Along the perimeter of the site.
- Along streams and channels *(NOT across streams and channels)*.
- Below the toe of exposed and erodible slopes.
- Downslope of exposed soil areas.
- Around temporary soil stockpiles.

Application Guidelines:

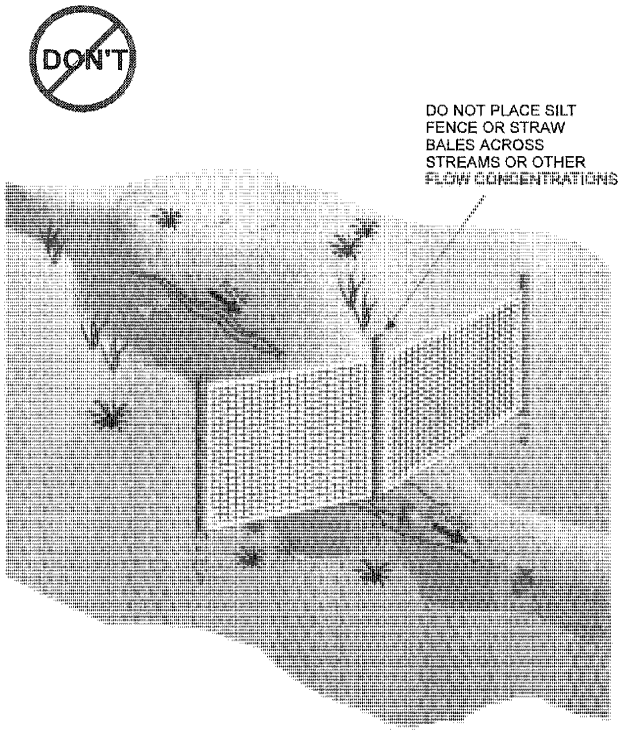
- Must be constructed along a level contour or will result in the creation of rills and gullies and consequent failure.
- Limit tributary drainage area upstream of the silt fence to less than 0.3 ha/100m (0.25 ac/100 ft) of fence.
- Limit the length of slope draining to any point along the silt fence to 30m (100 ft) or less.
- Limit length of any single run of fence to 150m (500 ft).
- Turn the last 6 feet of fence up slope in "J" or "L" shapes to allow for ponding. Silt fencing must pond runoff to be effective.
- Fence segments should not be connected.
- Limit to locations suitable for temporary ponding or deposition of sediment.

Limitations:

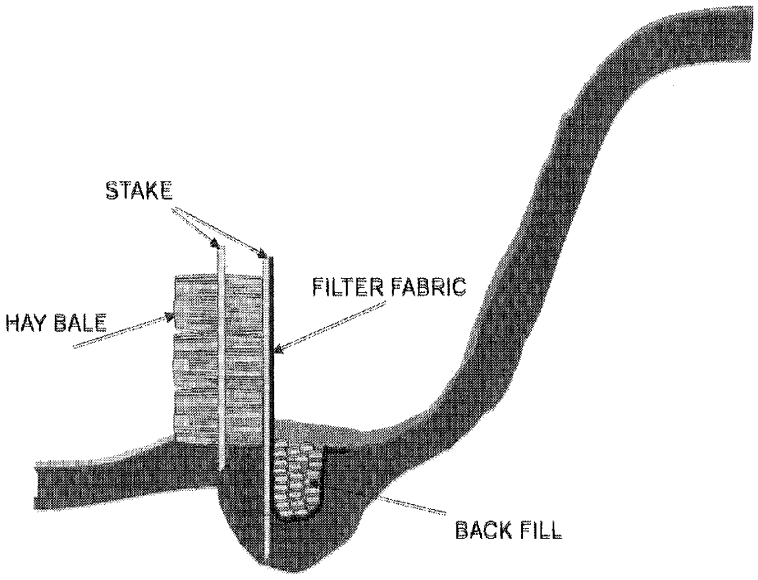
- Do not use in streams, channels, or anywhere flow is concentrated.
- Do not use silt fence to divert flow.
- Do not use silt fence on slopes.

Inspection and Maintenance:

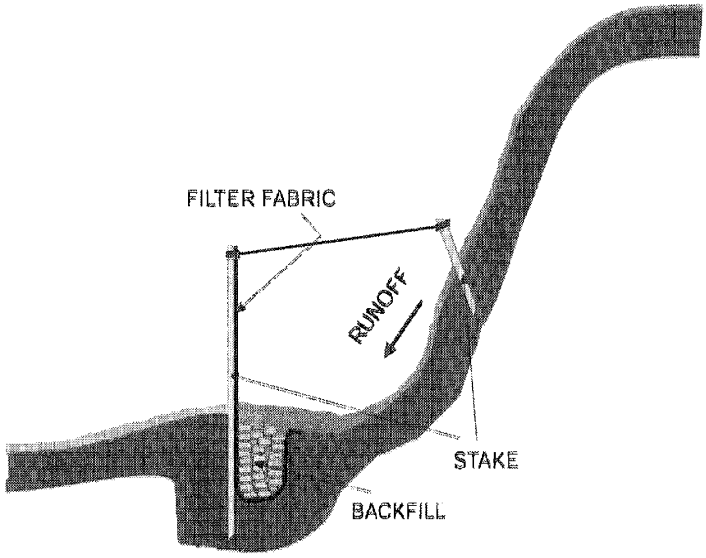
- Inspect when rain is forecast, and following rainfall events.
- Remove sediment when accumulations reach one-third fence height.
- Repair undercut silt fences, and repair or replace all split, torn, slumping, or weathered fabric.
- Remove silt fence when no longer needed.



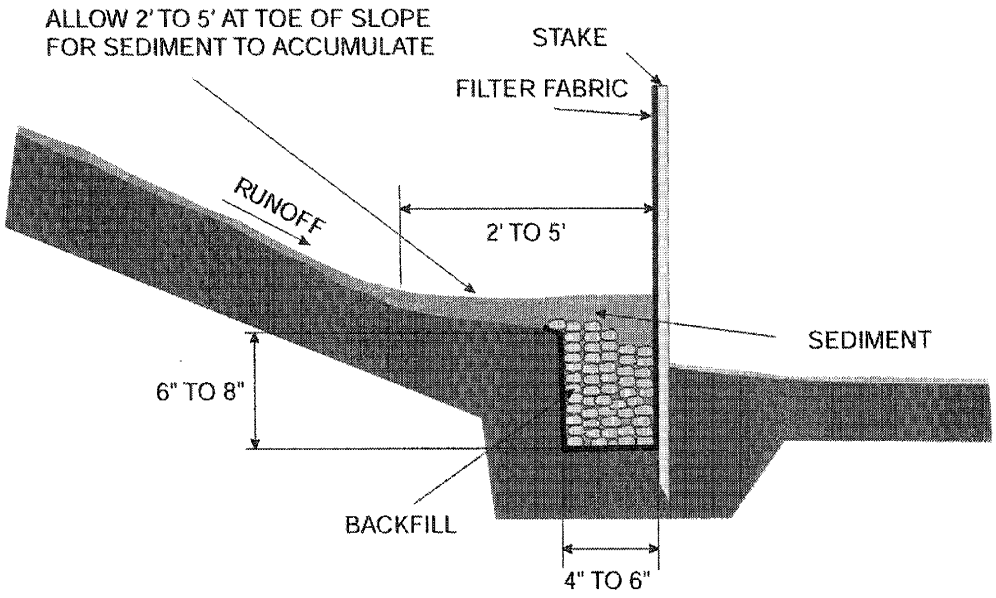
SILT FENCING PLACED ACROSS STREAMS OR OTHER FLOW CONCENTRATIONS IS INEFFECTIVE IN PONDING WATER AND LEADS TO UNDERCUTTING, GULLY FORMATION, AND FENCE FAILURE.



STRENGTHENING

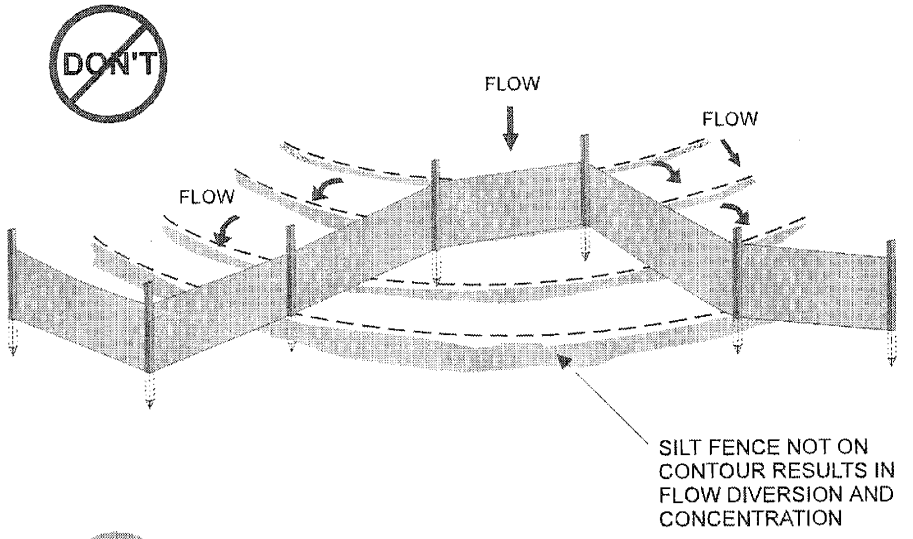


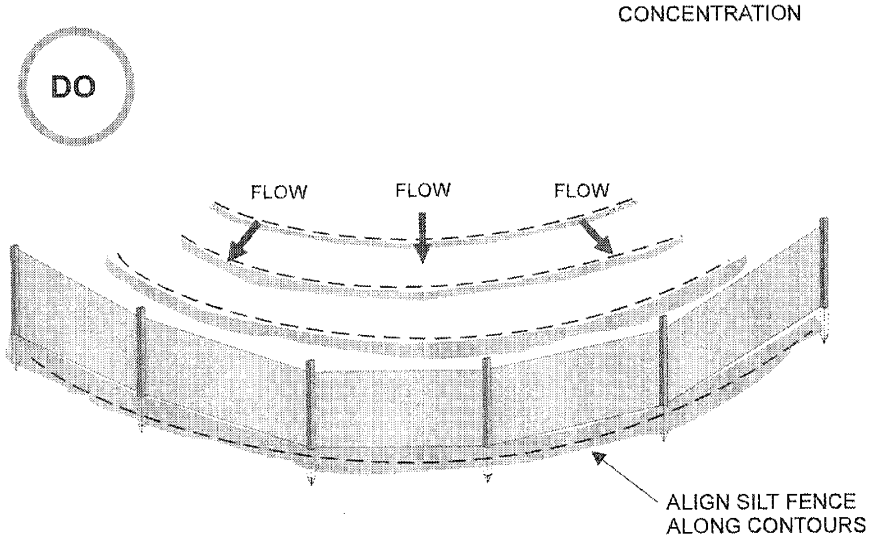
ANCHORING



RECOMMENDED INSTALLATION OF SILT FENCE

KEY IN FILTER FABRIC A MINUMUM OF 6" BELOW THE GROUND SURFACE AND 6" ACROSS, THEN BACKFILL WITH DIRT OR GRAVEL.

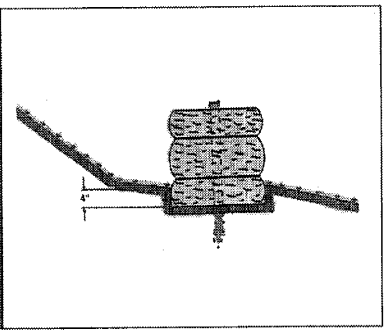

DON'T
FLOW
FLOW
FLOW
SILT FENCE NOT ON CONTOUR RESULTS IN FLOW DIVERSION AND CONCENTRATION


DO
FLOW
FLOW
FLOW
ALIGN SILT FENCE ALONG CONTOURS

SILT FENCE

Temporary Straw Bale Dike

➡ Sediment Control



Purpose:

Straw bales are temporary barriers which are entrenched, anchored, and installed end to end across or at the toe of a slope. Straw bale barriers are used to intercept and retain sediment in storm water runoff from unprotected areas by reducing the velocity of sheet flows and retaining sediment behind the barrier.

Application:

- ➤ Along the perimeter of the site.
- ➤ Beneath flat areas which have been disturbed and are subject to sheet and rill erosion.

Installation Guidelines:

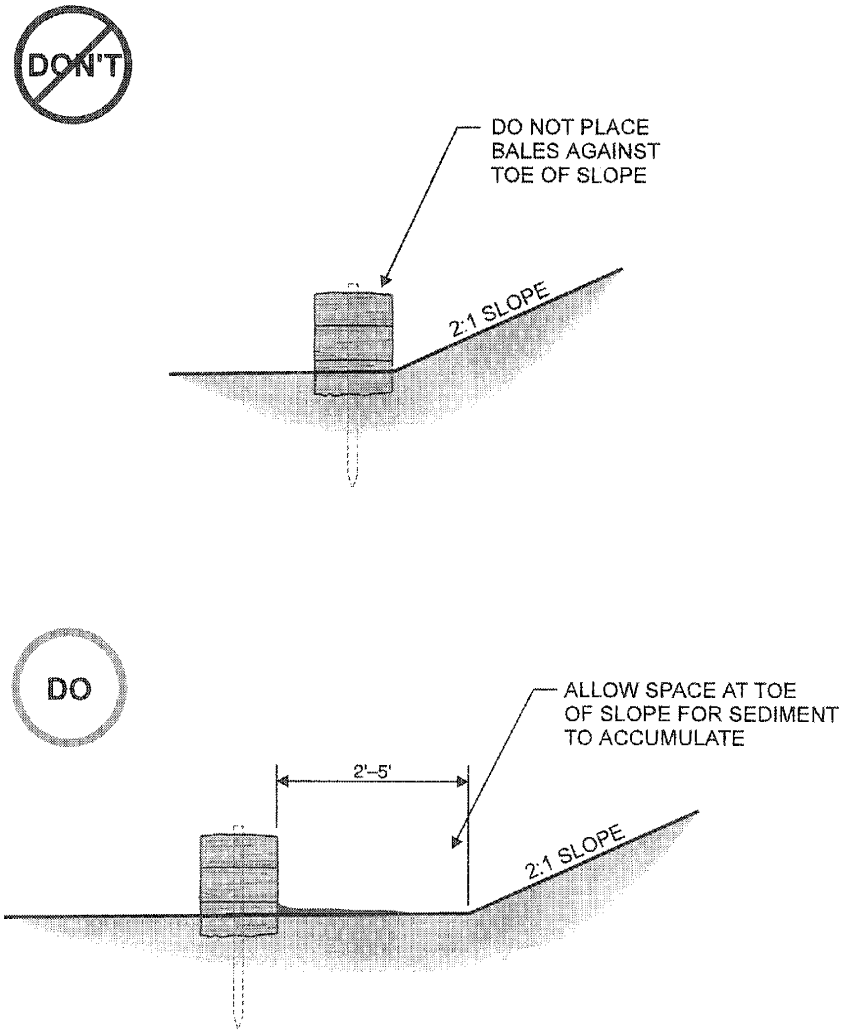
- ➪ Slopes 50:1 (2%) or flatter are preferred. If the slope exceeds 10:1 (10%), the length of slope upstream of the barrier must be less than 15 m (50 ft).
- ➪ Limit the drainage area upstream of the straw bale barriers to 0.3 ha/100 m (0.25 ac/100 ft).
- ➪ Limit the slope length draining to the barrier to 30 m (100 ft).

Limitations:

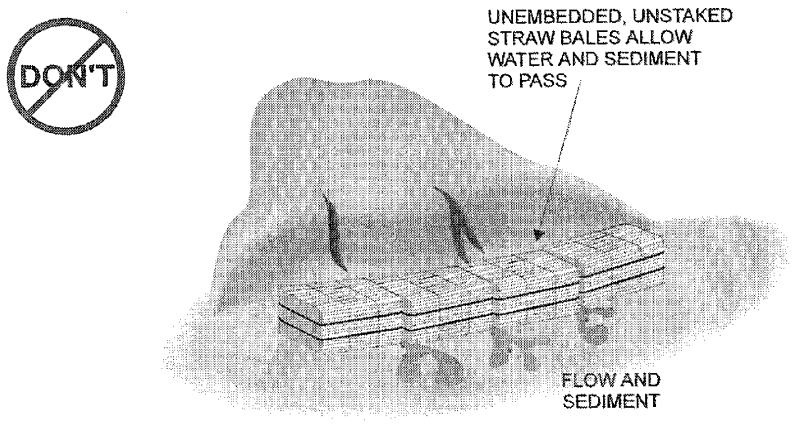
- Limit the use to construction activities that can be completed in less than three months.
- Do not use in paved areas or in areas subject to concentrated flow, channel flow, or in live streams.

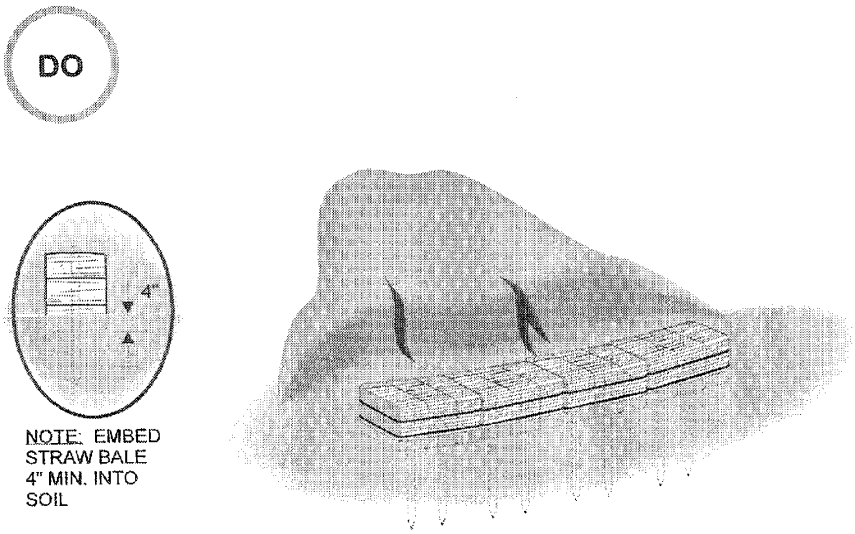
Inspection and Maintenance:

- ➡ Inspect after each significant rainfall event, and daily during prolonged storm events.
- ➡ Remove sediment when accumulations reach 1/3 barrier height.
- ➡ Remove straw bale dikes when no longer necessary.



STRAW BALE DIKE

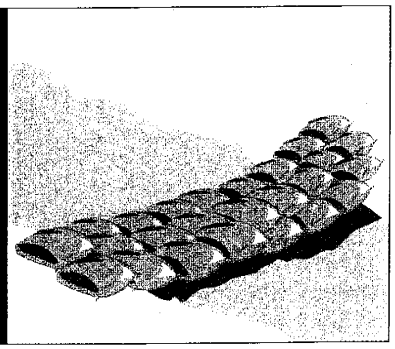




STRAW BALE DIKES WHICH ARE NOT PROPERLY ENTRENCHED ARE POWERLESS IN DISSIPATING FLOW ENERGY, INEFFECTIVE IN CAPTURING SEDIMENT AND MAY LEAD TO UNDERCUTTING AND GULLY FORMATION.

Sand / Gravel Bag Barrier

➡ Sediment Control



Purpose:

A temporary berm of stacked sand or gravel bags, installed along a level contour to detain sediment-laden runoff from disturbed areas, retains the sediment, and releases the water as sheet flow. Sand bags can also be used as check dams in small ditches, but only if the ditch has been lined to prevent erosion.

Application:

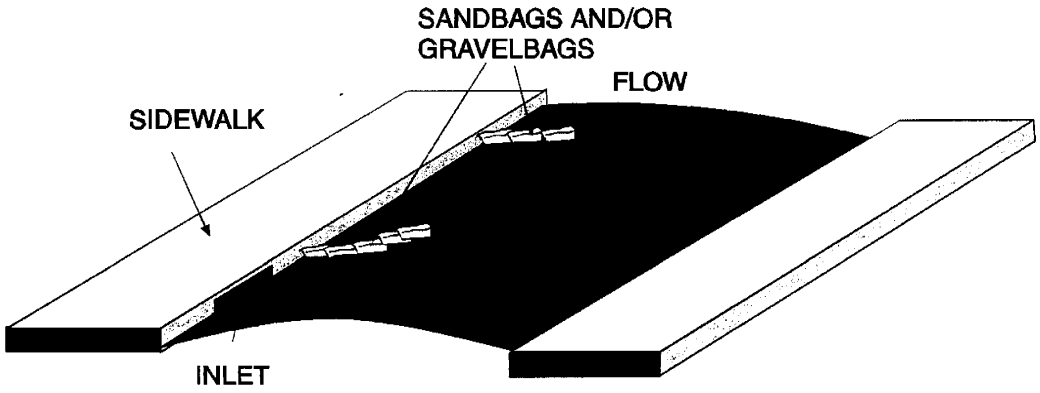
- ➤ Along the perimeter of the site.
- ➤ Across channels to serve as a barrier for utility trenches or to provide a temporary channel crossing for construction equipment.
- ➤ Parallel to roadways to keep sediment off paved areas.
- ➤ To divert or direct flow or to create a temporary sediment basin.
- ➤ When extended construction period limits the use of either silt fence or straw bale barriers.
- ➤ When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.

Limitations:

- Limit the drainage area upstream of the barriers to 2 ha (5 ac).
- Installation can be labor intensive.
- Should not be used to detain concentrated flows.
- Gravel bags preferable to sand bags near storm drain inlets.

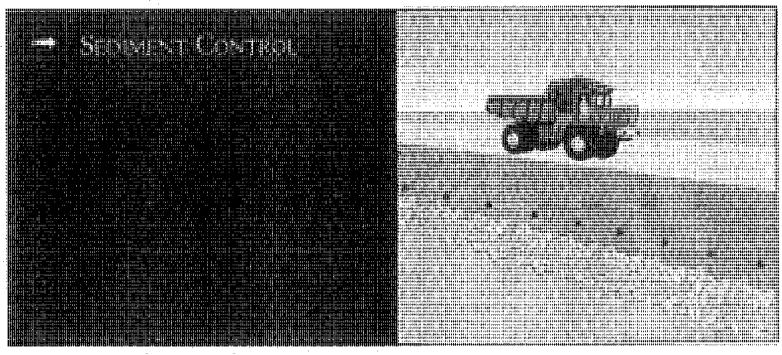
Inspection and Maintenance:

- ➡ Inspect before and after significant storm events
- ➡ Remove accumulated sediment when one-third barrier height.
- ➡ Repair washouts and other damage as needed.
- ➡ Remove barrier when no longer needed.



SAND OR GRAVEL BAGS (PREFERRED) USED IN ROADWAYS SERVE TO DIVERT FLOW, SLOW FLOW VELOCITY, AND POND AND FILTER RUNOFF.

Brush or Rock Filter



Purpose:

Effective temporary barriers are brush, wrapped in filter cloth and secured in place, or rock anchored in place to intercept and filter sediment-laden stormwater runoff from disturbed areas, retaining sediment and releasing water as sheet flow.

Application:

- Where contributing drain areas are less than or equal to 2 ha (5 ac).
- Along the perimeter of disturbed areas.
- Near the toe of slopes subject to sheet flow and rill erosion.
- Along streams and channels.
- Across mildly sloped construction roads (rock filter berms only).

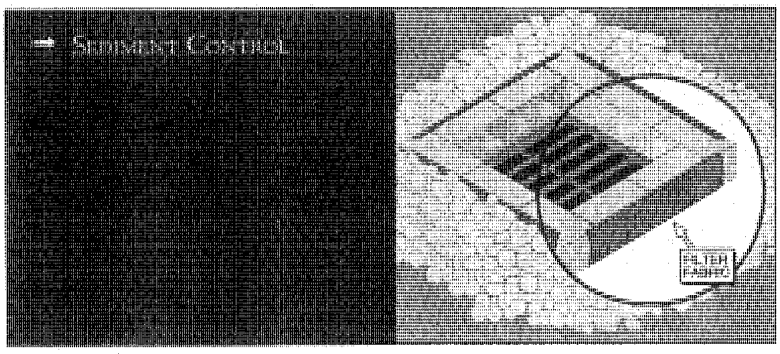
Limitations:

- Not appropriate for contributing drainage areas greater than 2 ha (5 ac).
- Require sufficient space for water to pond.
- Not effective for diverting runoff (filters allow runoff to seep through).
- Rock filter berms are difficult to remove.

Inspection and Maintenance:

- Inspect berms before and after each significant rainfall event, and weekly throughout the rainy season.
- Reshape berms as needed and replace lost or dislodged rock, brush and/or filter fabric.
- Inspect for sediment accumulation and remove sediment when depth reaches one-third the berm height or 300 mm (12 in), whichever occurs first.
- Remove filter barriers upon completion of construction activities.

STORM DRAIN INLET PROTECTION



Purpose:

Temporary devices constructed around storm drains improve the quality of water being discharged to inlets or catch basins by ponding sediment-laden runoff and increasing settling time. Appropriate for small drainage areas only.

Application:

- Where sediment laden surface runoff may enter an inlet.
- Where drainage areas have not been permanently stabilized.
- Where the drainage area is 0.4 ha (1 ac) or less.
- Appropriate during wet seasons.
- Appropriate in open areas subject to sheet flow and for flows not exceeding 0.014 m^3/s (0.5 cfs).
- Block and gravel bag barriers are applicable when sheet flows or concentrated flows exceed 0.014 m^3/s (0.5 cfs), and it is necessary to allow for overtopping to prevent flooding.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected and overflow capability is needed.

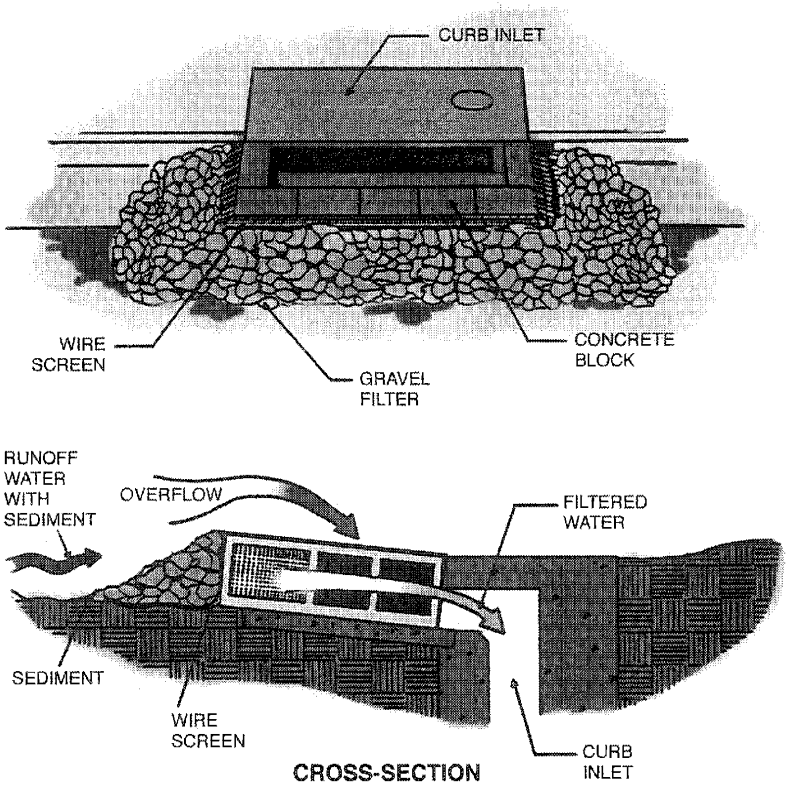
Limitations:

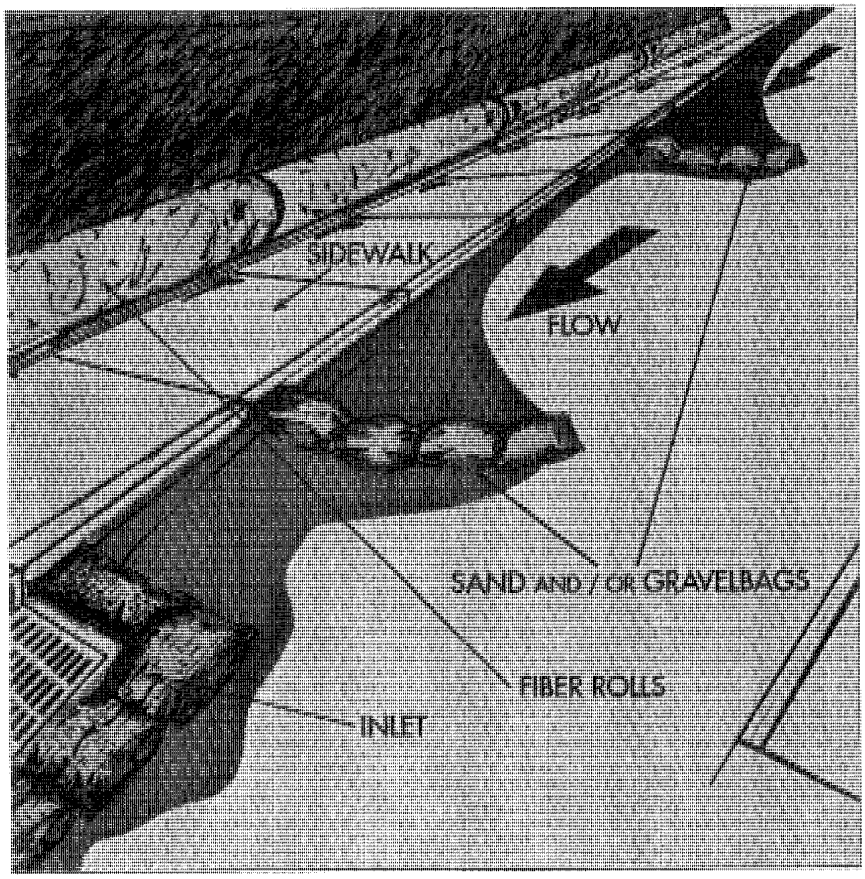
- Use only when ponding will not encroach into highway traffic or onto erodible surfaces and slopes.
- Sediment removal becomes more difficult in high flow conditions. If high flow conditions are expected, other on-site sediment trapping techniques should be used in conjunction with inlet protection.
- Frequent maintenance is required to minimize short-circuiting and to remove sediment deposits and buildup.

- For drainage areas larger than 0.4 ha (1 ac), runoff should be routed to a sediment trapping device designed for larger flows.
- Filter fabric should not be used to cover the inlet grate.

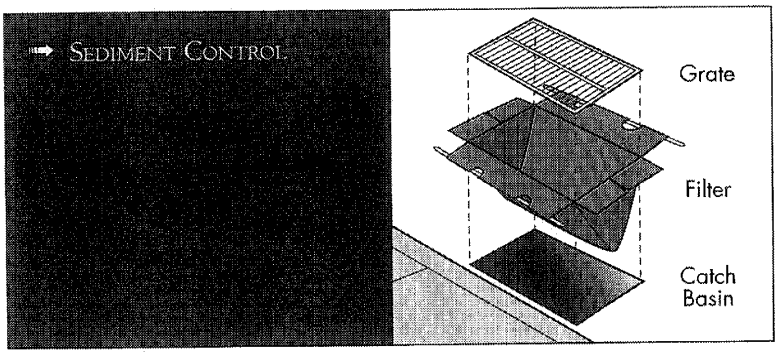
Inspection and Maintenance:

- Bring the disturbed area to the grade of the drop inlet and smooth and compact it. Appropriately stabilize all bare areas around the inlet.
- Properly dispose of accumulated sediment.
- Inspect all inlet protection devices before and after rainfall events, and weekly throughout the rainy season. During extended rainfall events, inspect inlet protection devices at least once every 24 hours.
- Remove all inlet protection devices within thirty days after the site is stabilized, or when inlet protection is no longer required.




SIDEWALK
FLOW
SAND AND / OR GRAVELBAGS
FIBER ROLLS
INLET

Catch Basin Inlet Filters



Purpose: Temporary inlet filter lowered into catch basins and held in place by the grate. Designed to improve the quality of the water being discharged to inlets or catchbasins by filtering silt and sediment from runoff.

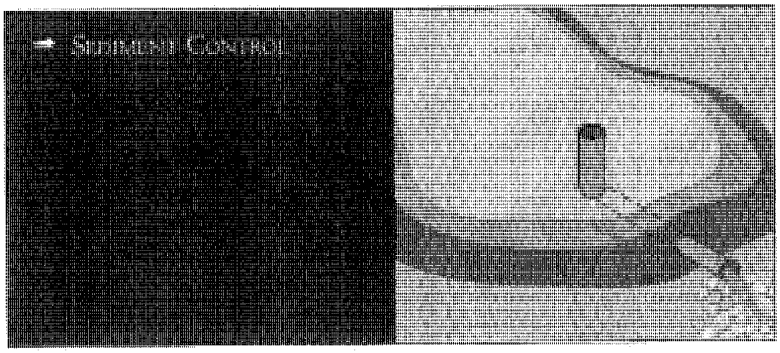
Application:
- Construction sites with disturbed or unvegetated areas where sediment laden water can enter catchbasins or inlets
- Where pollution of watercourses or drainage system clogging from sediment laden storm water is a concern.

Limitations:
- Should be used only as a secondary sediment control in conjunction with primary erosion control measures such as hydroseeding/hydromulching, or erosion control blankets

Installation:
- Remove drain grate
- Insert catch basin filter into basin leaving 3" flap exposed
- Replace grate to basin thereby pinching fabric between grate and catch basin and holding filter in place

Inspection and Maintenance:
- Inspect catch basin filters weekly and after every rain event
- Empty catch basin filters when filters appear to be half full
- Dispose of trapped sediment in accordance with local requirements
- Clean and reuse inlet filters or discard and replace as necessary.

SEDIMENT BASIN



Purpose:

A sediment basin is a controlled storm water release structure, formed by excavation or by construction of an earthen embankment across a waterway or low drainage area. Sediment basins collect and temporarily detain storm water runoff to provide ample settling time before runoff is discharged.

Application:

- On all construction projects with disturbed areas during the wet season.
- To prevent the sediment-laden storm water from entering streams, lakes, or drainage ways.
- At outlets of disturbed areas.
- Where practical, contributing drainage areas should be subdivided into smaller areas, and multiple sediment basins installed.

Limitations:

- Alternative measures must be thoroughly investigated for erosion control before selecting a sediment basin.
- Require large surface areas to permit settling of sediment.
- For drainage areas greater than 40 ha (100 ac), use multiple basins.
- Must be designed by a registered professional civil engineer with review or approval by the overseeing agency.
- Require regular maintenance to remove silt deposits.
- Not to be located in live streams.

Guidelines:

➡ Basin should be located:

(1) where a low embankment can be constructed across a swale or excavation

(2) where post-construction (permanent) detention basins will be constructed

(3) where failure would not cause loss of life or property damage

(4) in areas accessible for maintenance work, including sediment removal and sediment stockpiling in a protected area.

➡ Use the following equations when sizing the sediment basin:

1) $Q = C\,i\,A$

Where:

Q = Flow expected from the site, in cubic feet per second
C = Coefficient of runoff (typically between 0.4 to 0.7), depending on imperviousness of contributing area
i = Expected rainfall, in inches per hour
A = Contributing area, in acres

2) $A_s = 1.2Q/V_s$

Where:

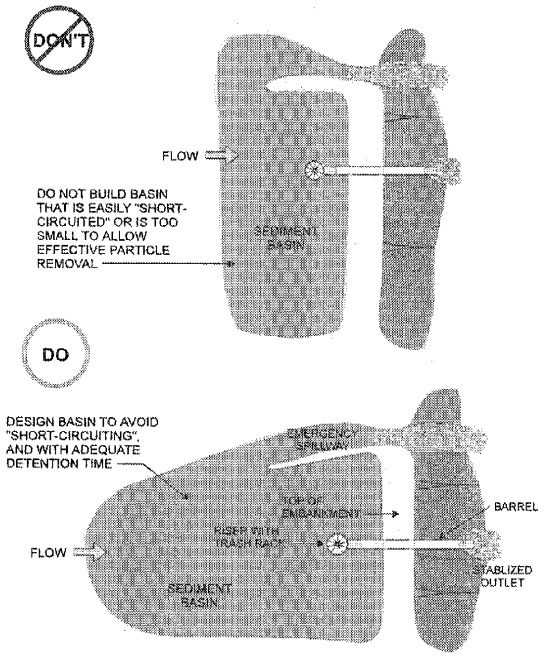
A_s = Surface area of settling basin with 2-foot of minimum depth
Q = Flow as calculated above
V_s = Settling velocity of particles, in feet per second

Particle Size (mm)	Particle Description	Settling Velocity V_s (fps)
0.5	coarse sand	0.19
0.2	Medium sand	0.067
0.1	fine sand	0.023
0.05	coarse silt	0.0062
0.02	medium silt	0.00096
0.01	fine silt	0.00024
0.005	clay	0.00006

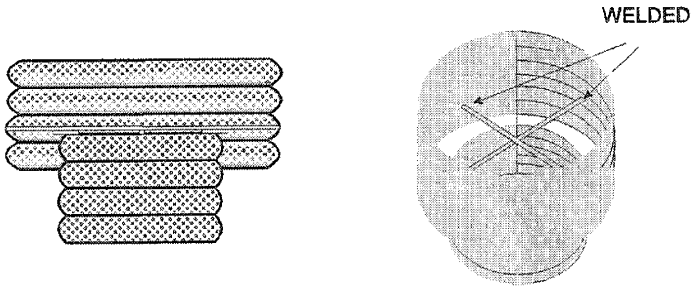
- Construct sediment basin prior to wet season and construction activities.
- Areas under embankments, structural works, and sediment basin must be cleared and stripped of vegetation.
- Basin length to width ratio should be greater than 3:1 (L:W).
- Baffles should be provided to prevent short-circuiting of inlet flow.
- Locate basin inlets to maximize travel distance to basin outlet.
- Rock or vegetation should be used to protect the basin inlet and slopes against erosion.
- A forebay, constructed upstream of the basin, may be provided to remove debris and larger particles.
- Principal outlet should consist of a corrugated metal or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser, to prevent floating debris from flowing out of the basin or obstructing the system. This principal structure should be designed to accommodate the inflow design storm.
- Place outlet structure on firm, smooth foundation with base securely anchored with concrete or other means to prevent floatation.
- Attach riser pipe (watertight connection) to a horizontal pipe (barrel) which extends through the embankment to toe of fill. Provide anti-seep collars on the barrel.
- Cleanout level should be clearly marked on the riser pipe.
- Construct an emergency spillway to accommodate flows not carried by the principal spillway. Spillway should consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible riprap.
- Use outlet protection at the pipe outlet.
- Safety fence should be installed to prevent unauthorized entry.
- Excavation, transport, and disposal of contaminated material and hazardous materials must be in accordance with the rules and regulations of the following agencies:
    1. United States Department of Transportation (USDOT)
    2. United States Environmental Protection Agency (USEPA)
    3. California Environmental Protection Agency (CAL-EPA)
    4. Department of Toxic Substances Control (DTSC)
    5. California Division of Occupational Safety and Health Administration (CAL-OSHA)
    6. Local Regulatory Agencies

Inspection and Monitoring:

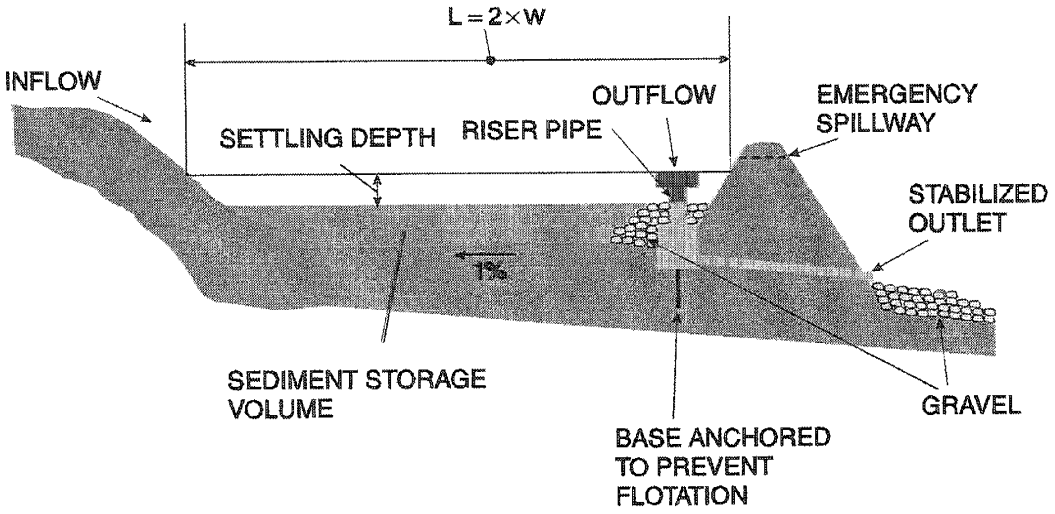
- Inspect sediment basins before and after rainfall events and weekly throughout the rainy season. During extended rainfall events, inspect sediment basins at least every 24 hours.
- Sample both inlet and outlet frequently during discharge for total suspended solids to monitor efficiency of erosion control measures and sediment basin, respectively.
- Examine basin banks for seepage and structural soundness.
- Check outlet structure and spillway for any damage or obstructions. Remove obstructions and repair damage as necessary.
- Check outlet area for erosion and stabilize if necessary.
- Remove sediment when storage zone is one-third full.
- Sediment removed from basin and stored on site must be protected against erosion (with plastic covering or silt barriers, for example).



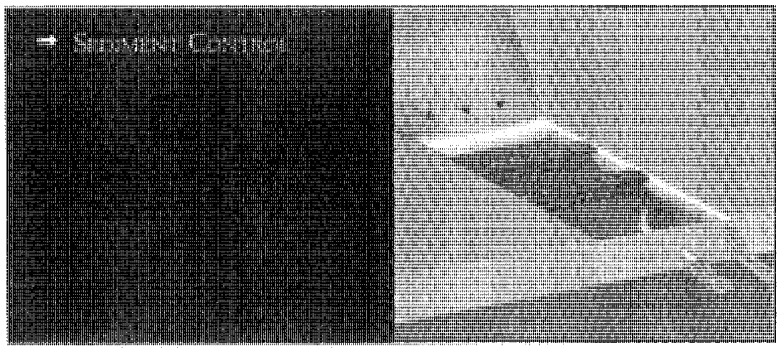
SEDIMENT BASIN SHOULD BE DESIGNED WITH LENGTH IN MIND TO PREVENT SHORT-CIRCUITING.



PERFORATED RISER PIPE OPEN AT TOP



SEDIMENT TRAPS



Purpose:

A sediment trap is a small basin with a controlled release structure, formed by excavating or by constructing an earthen embankment, straw bale check dam, or gravel bag barrier across the drainage path. The trap is used only to retain larger size sediment and should only be used in conjunction with upstream erosion control measures and a downstream sediment basin.

Application:

- Construction projects with disturbed areas during the wet season.
- Where sediment-laden storm water may enter the storm drain system or watercourses.
- For small drainage areas (less than 2 ha) before entering a sediment basin.

The size of the sediment trap should be designed utilizing the equations provided in the previous sediment basin description.

Limitations:

- Require large surface areas to permit settling of sediment.
- Not appropriate for drainage areas greater than 2 ha (5 ac).
- Traps only remove large and medium sized particles and require upstream erosion control.
- Attractive but dangerous to children - require protective fencing.
- Not to be located in live streams.

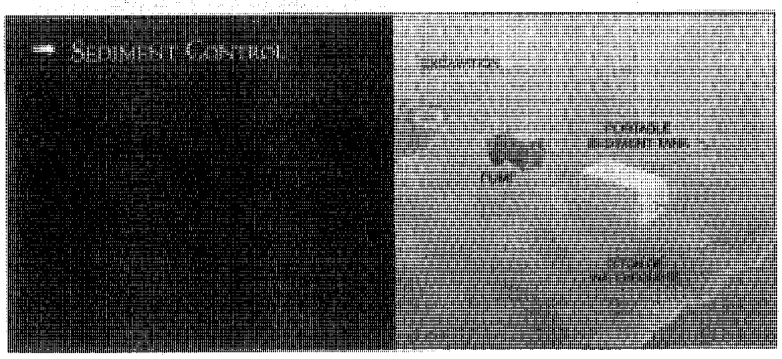
Installation Guidelines:

- Construct sediment traps prior to wet season and construction activities.
- Trap should be located:
  (1) where a low embankment can be excavated or constructed across a swale,
  (2) where failure would not cause loss of life or property damage, and
  (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- Trap length to width ratio should be greater than 3:1 (L:W) or baffles are required to prevent short circuiting of the inlet flow.
- Trap inlets should be located to maximize the travel distance to the trap outlet.
- Use rock or vegetation to protect the trap outlet against erosion.
- To dewater the trap, the outlet should be constructed in one of the following two ways:
  (1) Use corrugated metal or reinforced concrete riser pipe with dewatering holes encased in gravel to prevent floating debris from flowing out of the trap or obstructing the system.
  (2) Construct a crushed stone outlet section of the embankment at the low point of the trap. The stone section serves as a nonerosive spillway outlet for flood flows, and the bottom section provides a means of dewatering the trap between rainfall events.

Inspection and Maintenance:

- Inspect sediment traps before and after rainfall events and weekly during the rest of the rainy season. During extended rainfall events, inspect sediment traps at least every 24 hours.
- Examine trap banks for seepage and structural soundness.
- Check outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Check outlet area for erosion and stabilize, if required.
- Remove accumulated sediment when the volume has reached one-third the original trap volume.
- Properly dispose of sediment and debris removed from the trap.

DEWATERING



Purpose:

A temporary method to filter sediment-laden water from excavated areas on construction sites prior to discharge to the stormdrain or surface waters.

DISCHARGING SEDIMENT-LADEN WATER FROM A DEWATERING SITE INTO ANY WATER OF THE STATE WITHOUT FILTRATION IS PROHIBITED.

Application:

- Wherever sediment-laden water must be removed from the construction site using a dewatering pump.
- Sediment traps, basins, or excavations on construction sites.

Applicable Methods:

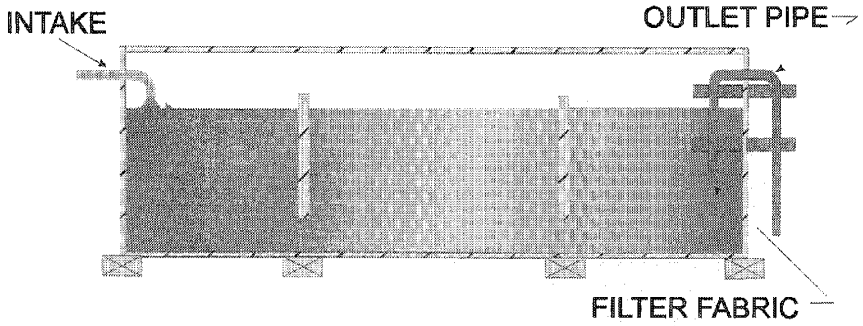
- Filter box
- Portable sediment tank—Figure 1
- Sump pit and perforated standpipe wrapped in filter pack and surrounded by stones—Figure 2

Limitations:

- A dewatering structure should be sized to allow water to flow through the filtering media without overflowing the structure.
- Dewatering practices should be considered as a last-resort control measure. Adequate erosion and sediment control measures are to be considered first.
- Construction site conditions will dictate design and use.

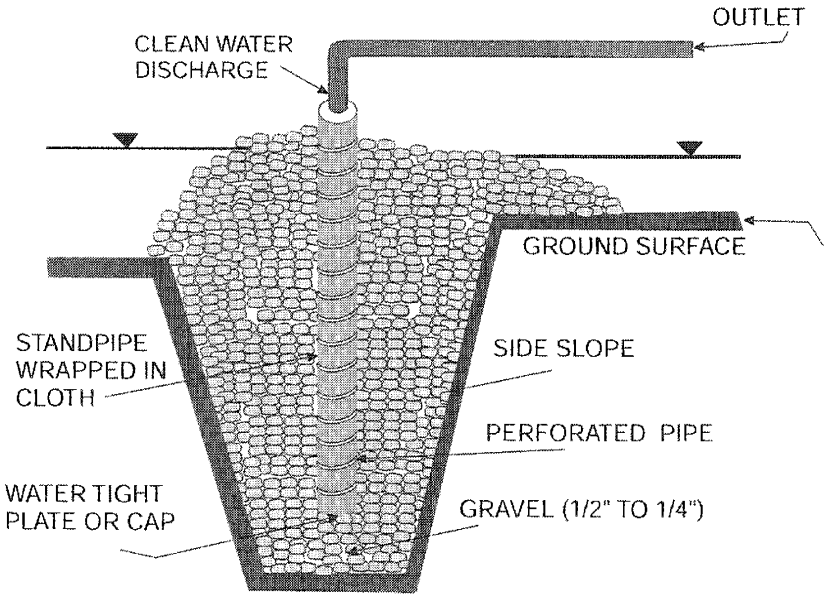
Inspection and Maintenance:

- The dewatering structure must be inspected frequently during operation and repaired or replaced once sediment build-up decreases the efficiency of the structure design.
- When floating suction hoses are used, personnel should be assigned to monitor dewatering operations and effluent to ensure that sediment is not discharged into a stormdrain or into a water of the State (Goal 100 mg/l Total Suspended Solid).



PORTABLE SEDIMENT TANK

FIGURE 1: PORTABLE SEDIMENT TANK

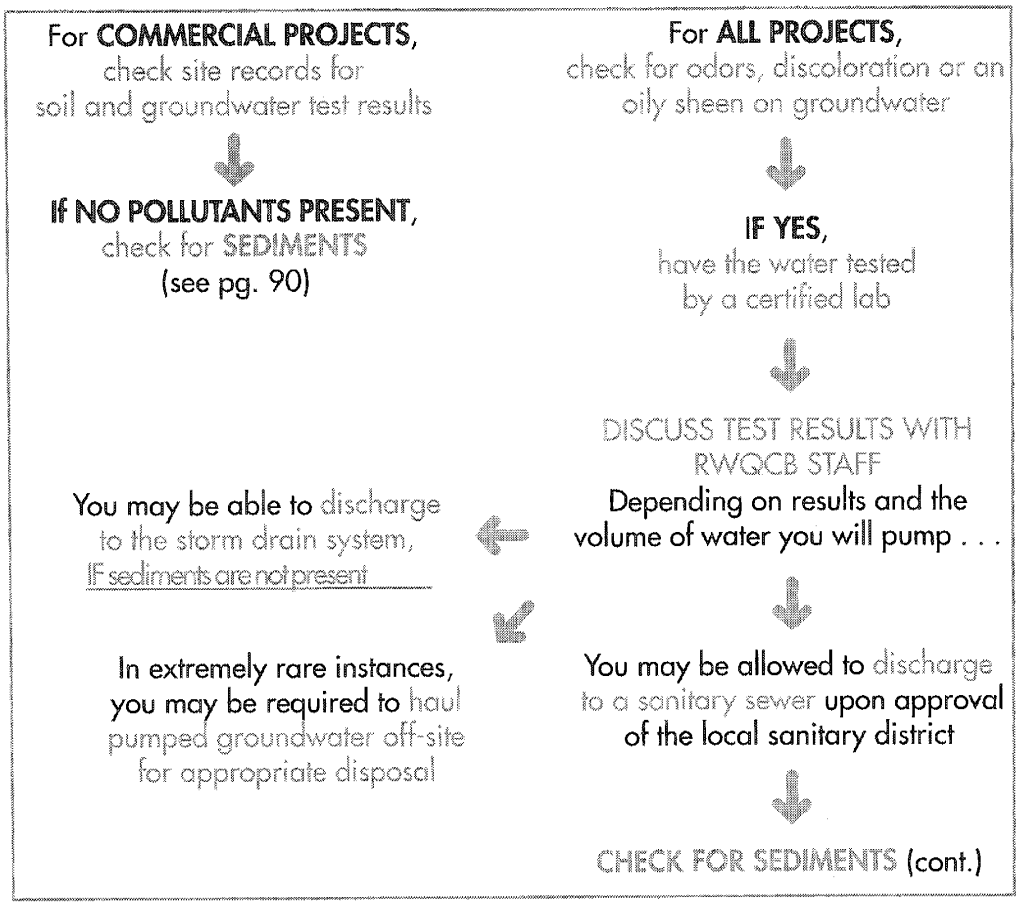


DEWATERING PIT

FIGURE 2: SUMP PIT AND PERFORATED STANDPIPE WRAPPED IN FILTER FABRIC AND SURROUNDED BY STONES.

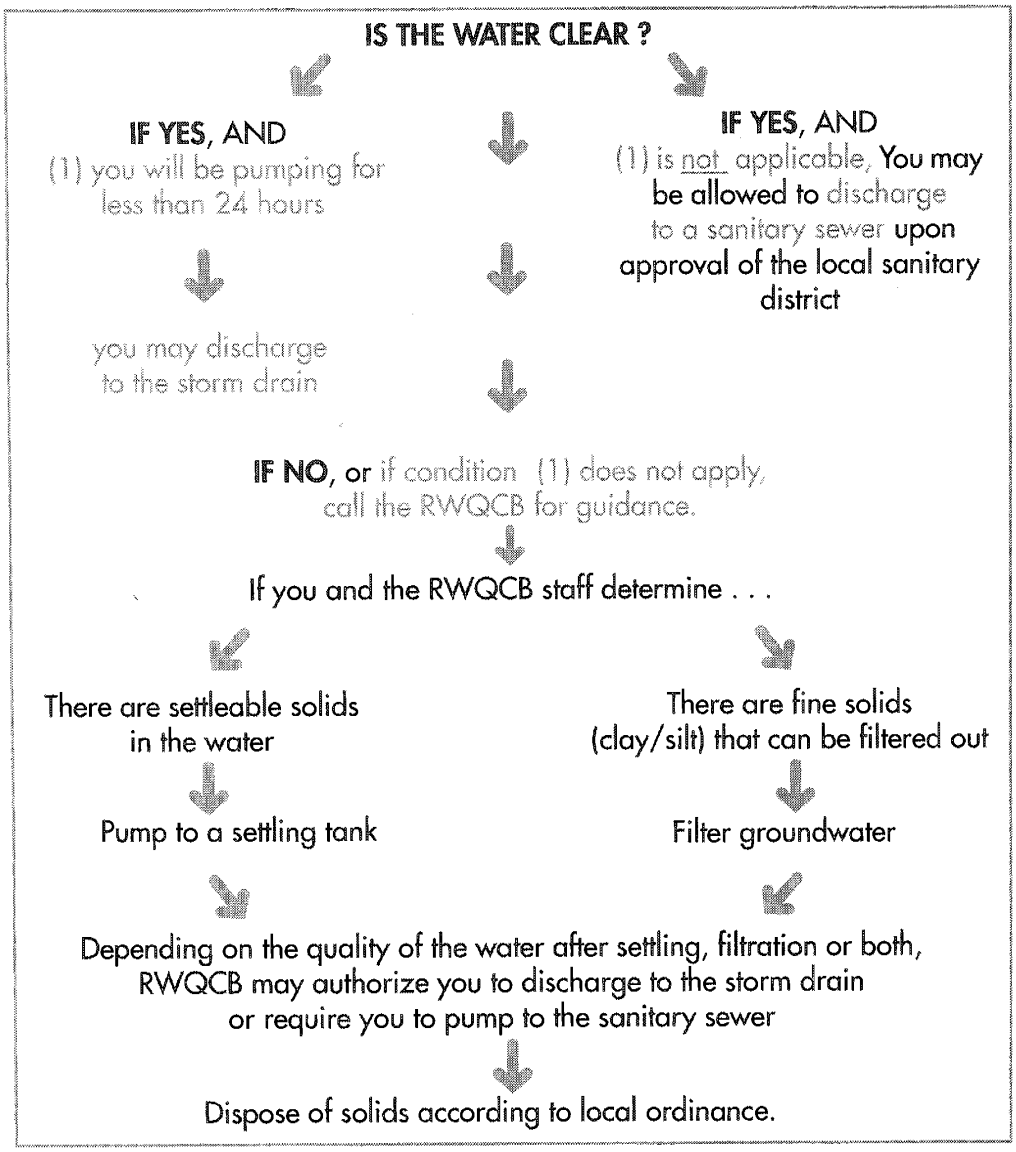
Toxic Pollutants in Soil or Groundwater

If your site requires dewatering, you should be concerned about TOXIC POLLUTANTS IN SOIL AND/OR GROUNDWATER:

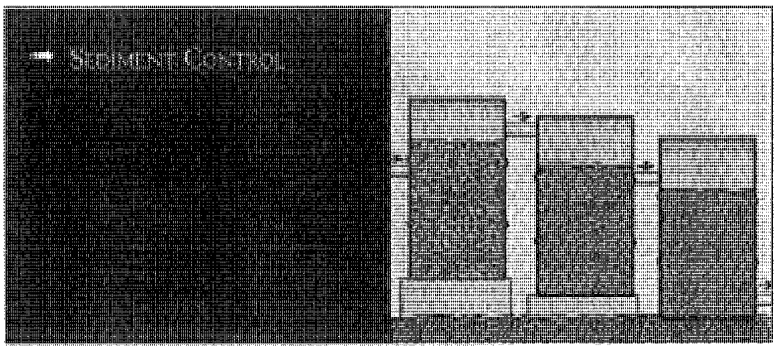


Sediments in Groundwater

If your site requires dewatering, you should be concerned about SEDIMENTS that will clog storm drains or sewer lines, or smother aquatic life in local creeks or the Bay:



Secondary Filtration



Purpose:

Secondary filtration of sediments using high efficiency filter cartridges may be necessary to remove fine particles such as clays from stormwater runoff, sediment ponds, and excavated areas on construction sites.

Application:

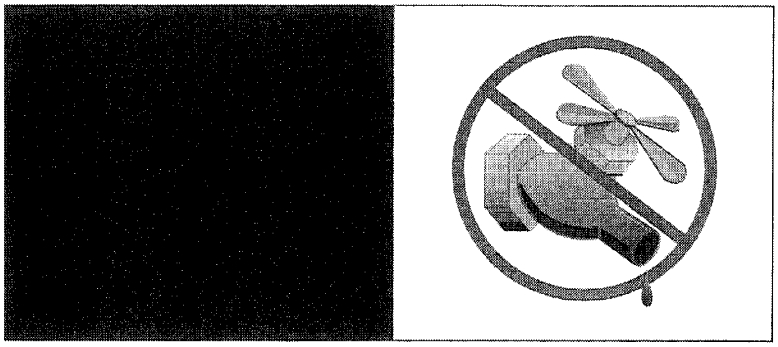
- To remove fine sediments not settled in sediment basins.
- Whenever fine sediment laden water is pumped from construction sites.
- To protect against discharge of heavily sediment laden water from overflow to sediment basins or from automatic pumping.
- As a pre-treatment, to remove sediments from hydrocarbon contaminated ground and surface water.

Limitations:

- Will not remove colloidal clays.
- Requires a pump to process water through system.
- Is not an efficient treatment of water with heavy sediment loads.
- Recommend a settling tank or sand filter as pretreatment when possible.

Inspection and Maintenance:

- Check operating pressures and flows periodically.
- Ensure that the discharge is not causing erosion.
- Change filter cartridges as pressures increase or as the quality of discharge water deteriorates.



Purpose: Appropriate uses and restrictions on the use of water on construction sites reduce the potential for erosion and the transport of pollutants off site.

Application: All construction sites where water is used.

Limitations: None identified.

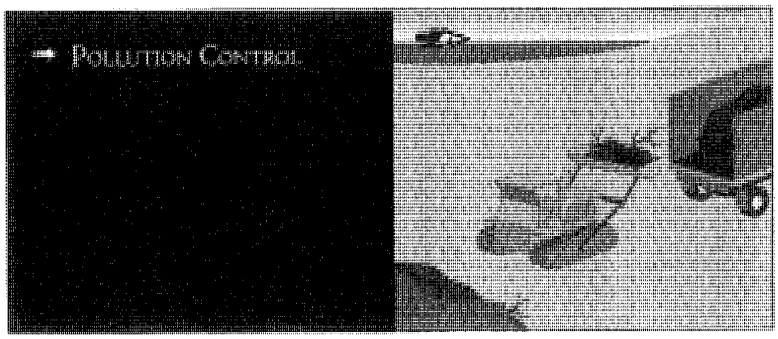
Installation Guidelines:

- Reset irrigation controllers according to seasonal needs.
- Keep water equipment in good working condition.
- Repair water leaks promptly.
- Discourage washing of equipment on the construction site.
- Avoid using water to clean construction areas. Sweep paved areas where practical.
- Direct construction water runoff to areas where it can soak into the ground.
- Apply dust control water sparingly to avoid washing sediments into drainage system. Use recycled water when possible.
- When washing vehicles and equipment:
  (1) minimize water use and retain all runoff on-site
  (2) do not use soaps or chemicals
  (3) use a commercial washrack facility whenever possible

Inspection and Maintenance:

- Inspect water equipment at least twice weekly.

Solid and Demolition Waste Management



Purpose: Proper management of demolition materials and solid waste created and stockpiled on site eliminates and minimizes the discharge of pollutants to the storm drain system and watercourses.

Application: Applicable to all nonhazardous materials.

Reusable materials:
- doors
- banisters
- floorboards
- windows
- 2x4s
- old, dense lumber

Recyclable materials:
- metal framing
- wood (framing, etc.)
- concrete, brick and cement mortar
- asphalt
- plate glass
- cleared vegetation, tree trimmings, plant material

Non-recyclable:
- dry paint; nonhazardous paint chips and dust from dry stripping and sand blasting
- absorbent materials (cat litter, sand, rags, mats) used to absorb nonhazardous spills. Materials used to absorb oil-based spills must be disposed of as hazardous waste.;
- steel and metal scraps
- pipe and electrical cuttings
- ground and/or broken paving materials
- domestic wastes (containers, cans, cups, bags etc.)
- other demolition waste

Practices:

- Reuse and recycle construction materials and waste when possible (see *Resources* for a list of recycling and disposal services).
- Designate waste collection areas away from streets, gutters, storm drains, and waterways, and close to construction entrances.
- Cover dumpsters securely at night and during rainy weather.
- Replace/exchange leaky dumpsters.
- Collect and properly dispose of leaking material from dumpsters.
- Return dumpsters to company for cleaning when necessary.
- Arrange for adequate debris disposal schedule to ensure dumpsters do not overflow.
- Clean and sweep roadways and paved areas where work is being conducted at the end of every working day.

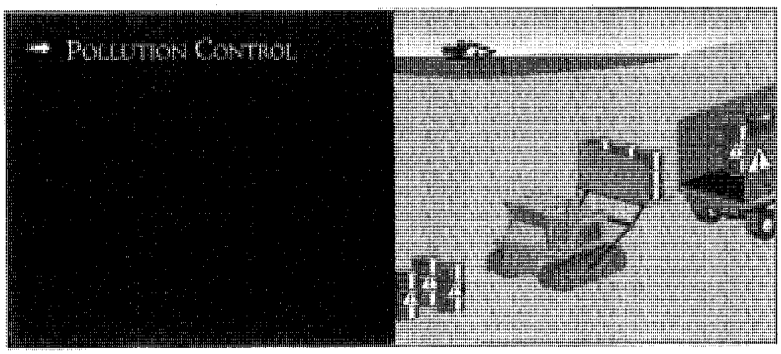
Limitations:

- Temporary stockpiling of certain construction wastes may necessitate stringent drainage-related controls during the wet season.

Inspection and Maintenance:

- Foreman and/or construction supervisor should monitor on-site solid waste storage and disposal procedures.
- Site should be routinely policed for litter and debris.
- Dumpsters should be inspected for leaks and secure covers.

Hazardous Waste Management



Purpose:

Proper handling and disposal of hazardous waste eliminates or minimizes the discharge of such pollutants to stormdrains and waterways.

Application:

- petroleum products such as oil, fuel, and grease
- asphalt products, including roofing tar
- concrete curing compounds
- herbicides and pesticides
- chemical additives used for soil stabilization
- acids for cleaning masonry
- septic wastes
- paints and solvents
- stains and wood preservatives
- materials which have been used to absorb hazardous spills
- hazardous demolition waste (such as lead paint, asbestos)
- any material considered a hazardous waste by the State of California

Practices:

- Properly label and store all hazardous wastes.
- Dispose of hazardous waste only at authorized treatment, storage and disposal facilities. Illegal dumping of hazardous waste is a violation subject to fine and/or time in jail. Contact your local agency for disposal site information.
- Use licensed hazardous waste haulers for threshold quantities as required by state and federal regulations.
- Be sure that trailers carrying hazardous materials are covered during transit. Illegal transit of hazardous waste is a violation subject to fine and/or jail time.

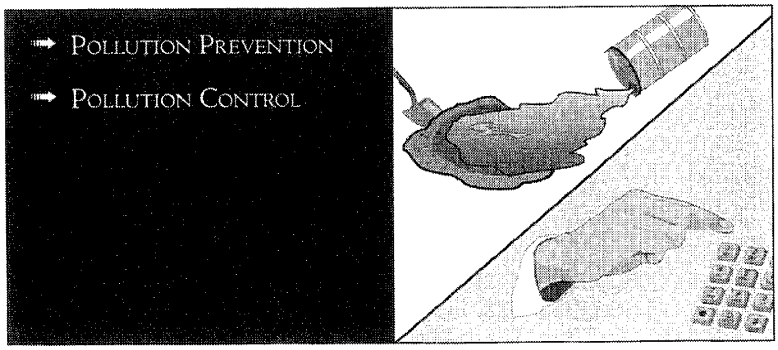
Limitations:

- This practice is not intended to address site-assessments and pre-existing contamination.
- Major contamination, large spills, and other serious hazardous waste incidents require immediate response from specialists.
- Demolition activities and potential pre-existing materials, such as asbestos, are not addressed by this manual.

Inspection and Maintenance:

- Check to make sure all wastes are properly labeled and stored.
- Monitor hazardous waste disposal procedures.

Spill Prevention and Control



Purpose:

Prevention and control of spills minimizes or eliminates the discharge of hazardous and nonhazardous materials to the storm drain system and to watercourses.

Application:

- Solid and liquid materials, including, but not limited to:
  - Fuels
  - Lubricants
  - Other petroleum distillates
  - Deicing/anti-icing chemicals
  - Paints, solvents
  - Cement, mortar
  - Soil stabilizers
  - Herbicides
  - Fertilizers
  - Growth inhibitors
- Storage areas for chemicals and/or hazardous substances
- Fuel areas
- Vehicles/equipment transporting and handling chemicals and other hazardous substances

Practices:

- Notify the State Office of Emergency Service (OES) at 800-852-7550 when a hazardous spill occurs. Construction sites located near natural watercourses, canals, and reservoirs are at highest risk of an uncontained spill contaminating surface waters.

- Locate chemical and/or hazardous materials storage and handling areas away from natural watercourses, canals, reservoirs and storm drains.
- Store chemicals and/or hazardous materials in areas not susceptible to rain and provide secondary containment in case of leaks or spills.
- Immediately clean up spills and properly dispose of contaminated soils and clean up materials:
  - dry spills should be swept, not washed/hosed.
  - wet spills on impermeable surfaces should be absorbed, and absorbent materials properly disposed.
  - wet spills on soil should be dug up and all exposed soils properly disposed.
- For fueling areas, provide secondary containment with enough capacity to contain a spill.
- Use only a reputable, licensed company to clean up large spills and dispose contaminated materials.

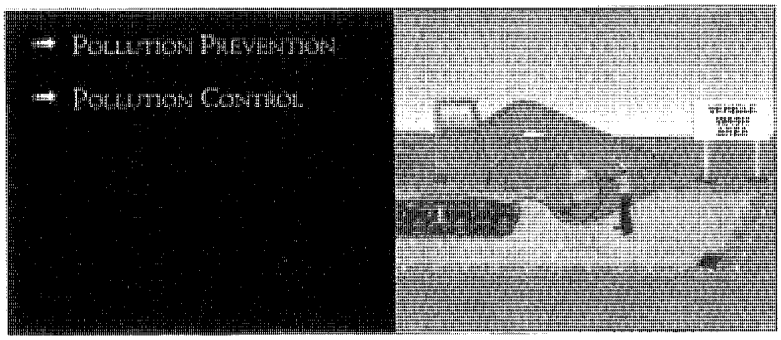
Limitations:

- Procedures and practices presented herein are general. Contractor should identify appropriate practices for the specific materials used or stored on site.

Inspection and Maintenance:

- Verify weekly that sufficient spill control clean up materials are located near material storage, unloading and use areas, as well as fueling areas.
- Inspect containment structures for storage and fueling areas.
- Fueling areas and storage tanks should be inspected on a regular basis.
- Update spill prevention and control plans and stock appropriate clean up materials whenever changes occur in the types of chemical on site.

Vehicle and Equipment Service



Purpose:

Prevention and control of leaks from equipment and vehicles and proper management of wash water eliminates or minimizes discharge of toxic pollutants to the storm drain system or watercourses.

Application:

- Fueling areas
- Maintenance and storage/parking areas
- Cleaning/wash areas

Practices:

- Conduct fueling, major maintenance/repair, and washing off-site whenever feasible.
- Regularly maintain and frequently inspect vehicles and equipment for damaged hoses, leaky gaskets, or other service problems.
- Clearly designate vehicle/equipment service areas away from waterways, storm drains, curbs and gutters.
- Properly contain areas with berms, sandbags, or other barriers.
- Only use water for any on-site cleaning. Do not use soap, solvents, degreasers, steam cleaning, or similar methods.
- Use drip pans/drip cloths if necessary to drain and replace fluids on-site.
- Collect all spent fluids, store in separate labeled containers, recycle when possible, and properly dispose (generally as hazardous waste).

Limitations:

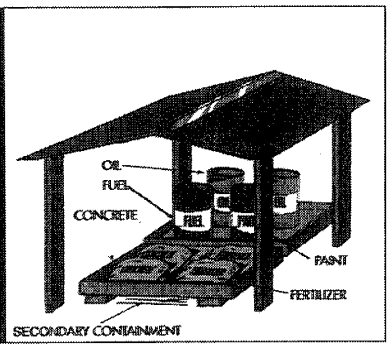
- Some municipalities may require pretreatment and monitoring of wash water discharges to sanitary sewer.

Inspection and Maintenance:

- Inspect containment structures (such as berms) to ensure they are intact.
- Maintain waste fluid containers in leak proof condition.
- Regularly service sumps associated with wash areas.

Material Delivery, Handling and Storage

➡ Pollution Prevention



Purpose:

Wet and dry building materials with the potential to pollute runoff should be handled and delivered with care and stored under cover and/or surrounded by berms when rain is forecast or during wet weather.

Application:

Construction sites with delivery, handling/preparation, and storage of the following materials:

- Soil
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster or related products
- Concrete compounds
- Asphalt and concrete components
- Petroleum products such as fuel, oil, and grease
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

Practices:

- Train employees and subcontractors in proper material delivery, handling, and storage practices.
- Purchase, transport to site, and use only the amount needed for the work on site.
- Purchase and use nonhazardous and environmentally-friendly materials when possible.
- Label and store all hazardous materials according to local, state, and federal regulations.

- Keep inventory of hazardous material for use in emergency.
- Store granular materials at least 10 feet from waterways, storm drains, curbs and gutters.
- Install barriers around storage areas to prevent contact with runoff.
- Provide indoor coverage, a temporary roof, or a secure impermeable tarp for plaster or other powders. These can create large quantities of suspended solids in runoff, which may be toxic to aquatic life and cause serious environmental harm. Water quality and air quality can be protected with secure cover.
- Provide a temporary roof, or secured plastic sheeting or tarp for stockpiled materials and wastes.
- Provide storage in accordance with secondary containment regulations and provide secondary cover for containers of paint, chemicals, solvents, and other hazardous materials during rainy periods.
- Use mats during delivery and storage.
- Control dust daily with reclaimed water.
- Do not apply hazardous chemicals outdoors during wet weather.
- Have proper storage instructions posted at all times in an open and conspicuous location.
- Keep ample supply of appropriate spill clean up materials near storage areas.

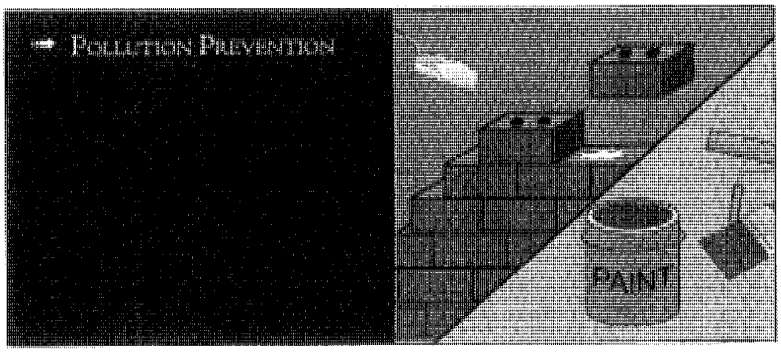
Limitations:

- Space limitations may preclude indoor storage
- Storage sheds must meet building and code requirements.
- Alternative materials which are less hazardous or polluting may be more difficult to obtain or may require different preparation and use.
- Materials must be stored according to fire code requirments.

Inspection and Maintenance:

- Inspect storage areas before and after rainfall events, and at least weekly throughout the job.
- Inspect to ensure that designated storage areas are kept clean and well organized.
- Repair and/or replace perimeter controls, containment structures, and covers as necessary to ensure their proper functioning.
- Spot check employees and subcontractors monthly throughout the job to ensure appropriate practices are being employed.

Paints and Liquid Materials



Purpose:

Hazardous and nonhazardous paint-related materials, paint wastes, adhesives and cleaning fluids must be recycled when possible and disposed of properly to prevent contact with stormwater and discharge into storm drains and watercourses.

Application:

Hazardous liquid residues from:
- paints
- glues
- thinners
- solvents
- cleaning fluids

Nonhazardous dry materials:
- paint cans
- used brushes
- rags
- absorbent materials
- drop cloths

Paint removal wastes, including:
- chemical paint stripping residues
- paint chips and dusts
- sand blasting material
- wash water

Practices:

For paints, adhesives, and related materials:

- ➪ Use safer products when available and possible.
- ➪ Designate area for cleaning of painting equipment and tools.
- ➪ Never clean brushes or rinse containers into a street, gutter, storm drain, or creek.

- For water-based paints, paint out brushes to the extent possible and rinse to a drain leading to the sanitary sewer (i.e. indoor plumbing). Where not possible, clean with water, disperse wash water over soil, and spade in.
- For oil-based paints, paint out brushes to the extent possible; filter and reuse thinner/solvents.
- Recycle, donate or return unwanted water-based (latex) paint to supplier.
- Recycle empty, dry paint cans as metal, after checking with recycling and disposal services.
- Dispose of dried latex paint, old brushes, rollers, etc. in garbage.
- Dispose of non-recyclable thinners, sludges, and unwanted paint as hazardous waste.

For paint removal wastes:

- Pre-1970 paint should be tested for lead content.
- Keep all paint wastes away from the gutter, street, and storm drains.
- Sweep up non-hazardous paint chips and dust from dry stripping and sand blasting, or collect in plastic drop cloths; dispose of in garbage.
- Cover or berm storm drain inlets during stripping of building exteriors with high pressure water. Collect wash water in tank and pump to the sewer; call the local wastewater authority to determine if the paint contains toxic pollutants and must be disposed of as hazardous waste.
- Dispose chemical paint stripping residue and chips and dust from marine paints or paints containing lead or tributyl tin as hazardous waste.
- Wash water free of oil-based paint, solvents or chemicles can be discharged onto a dirt area and spaded into the soil.
- Shovel or sweep any debris that remains in the gutter and dispose of in garbage.

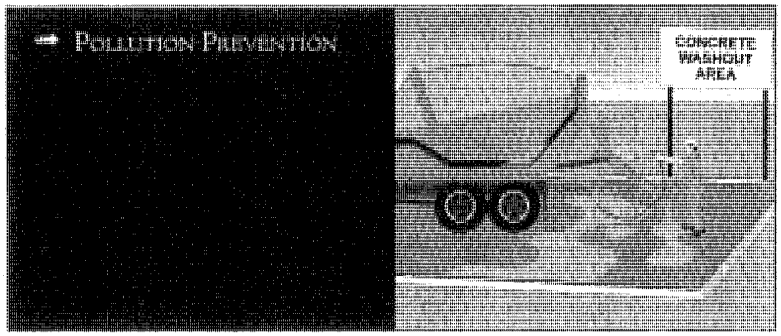
Limitations:

- Hazardous wastes that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Safer, alternative products may not be as readily available.

Inspection and Maintenance:

- Spot check employees and subcontractors monthly throughout the job to ensure appropriate practices are being employed.

Handling & Disposal of Concrete and Cement



Purpose:

Concrete and cement-related mortars are toxic to fish and the aquatic environment and require proper handling and disposal to minimize or eliminate discharges to gutters, storm drains, and watercourses.

Application:

- stored wet and dry concrete and cement mortar materials
- on-site preparation and use of concrete and cement mortar
- equipment wash-out
- concrete dust and debris from demolition activities

Practices:

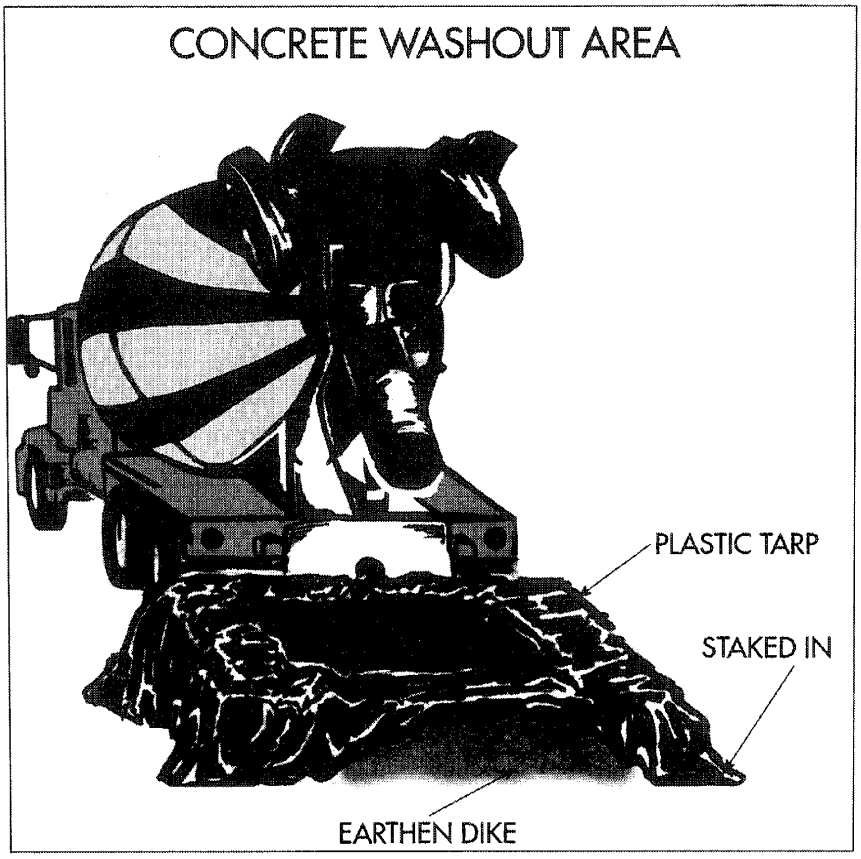
- Avoid mixing excess amounts of fresh concrete or cement mortar on-site.
- Store dry and wet materials away from waterways and storm drains; cover and contain to protect from rainfall and prevent runoff.
- Never dispose of wash-out into the street, storm drains, drainage ditches, or watercourses. Wash out concrete transit mixers only in designated wash-out areas where the water will flow into temporary pit in dirt area or onto stockpiles of aggregate base or sand.
- Identify location for waste water pit away from watercourses and storm drains. Dig a pit large enough to hold waste. Pump water from pit to the sanitary sewer, where allowed. When possible, recycle wash-out by pumping back into mixers for reuse. If neither practice is feasible, let water percolate through soil and dispose of settled, hardened concrete with trash.

Limitations:

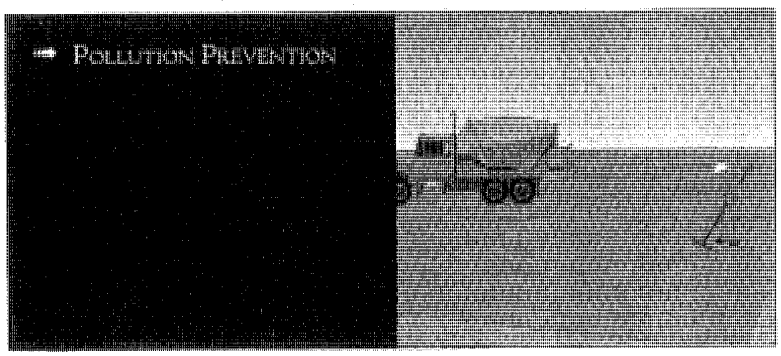
- An appropriate wash out area must be identified.

Inspection and Maintenance:

- Foreman and/or construction supervisor should monitor on-site concrete wash-out, waste storage and disposal procedures at least weekly.


CONCRETE WASHOUT AREA
PLASTIC TARP
STAKED IN
EARTHEN DIKE

Pavement Construction Management



Purpose:

Proper management of pavement construction materials and activities minimizes or eliminates discharges to gutters, storm drains, and watercourses resulting from on-site road paving, surfacing, and asphalt removal activities.

Application:

- application of concrete, asphalt, and seal coat during paving, surfacing, and resurfacing
- storage of paving equipment
- saw-cutting and sawcut slurry
- concrete cleaning (including rinse water and sweeping)
- concrete and asphalt removal

Practices:

- Apply concrete, asphalt, and seal coat during dry weather to prevent contaminants from contacting stormwater runoff.
- Cover storm drain inlets and manholes when paving or applying seal coat, tack seal, slurry seal, fog seal, or similar materials.
- Always park paving machines over drip pans or absorbent materials, since they tend to drip continuously.
- Protect drainage ways by using earth dikes, straw bales, sand bags, or other controls which will divert or trap and filter runoff.

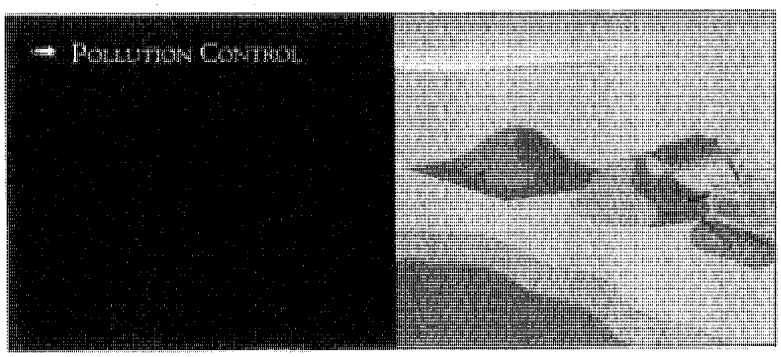
- When making saw-cuts:
  - use as little water as possible.
  - cover each catch basin completely with filter fabric and contain the slurry by placing barriers around the catch basin (straw bales, sand bags, gravel dams).
  - shovel, absorb or vacuum the slurry residue from pavement or gutter and remove from site at the end of the day or job (whichever is sooner).
  - immediately remove any sawcut slurry entering storm drain.
- When washing down exposed aggregate concrete:
  - wash only when wash water can either: flow into a dirt area, drain onto a bermed surface from which it can be pumped and disposed of in sanitary sewer or by a hazardous waste disposal program, or be vacuumed from a catchment created by blocking a storm drain inlet.
  - if necessary, place straw bales downslope, or divert runoff with temporary berms.
  - make sure runoff does not reach gutters or storm drains.
  - allow aggregate rinse to settle, and pump the water to the sanitary sewer if allowed by local waste water authority.
- Collect and return sweepings from exposed aggregate concrete to stockpile or dispose with trash; never wash into a street or storm drain.
- Recycle broken concrete and asphalt.

Inspection and Maintenance:

- Inspect and maintain machinery regularly to minimize leaks and drips.
- Inspect inlet protection measures before and after rainfall events. During extended storms, inspect at least every day. If subjected to non-stormwater flows, inspect daily.
- Maintain inlet protection so that water is not allowed to back up onto areas subject to traffic. If such back up occurs, the protective device must be removed and alternative measures deployed.
- Check with employees and subcontractors to ensure that measures are being followed.

Limitations:

- Finer solids are not effectively removed by filtration systems.
- Proper management limits paving opportunities during wet weather.



Purpose:

Soil, ponded stormwater, and groundwater may become contaminated if exposed to hazardous materials and should be properly managed to prevent health hazards and minimize or eliminate discharge of pollutants to the storm drain system and watercourses.

Application:

- Areas of previous commercial or industrial activity.
- Sites with history of illegal dumping on site or adjacent properties.
- Sites subject to Superfund, state, or local cleanup order.
- Ponded stormwater, groundwater, or dewatering areas which exhibit an oily sheen or smell of petroleum.
- Soils which appear discolored, smell of petroleum, or exhibit other unusual properties.
- Site where abandoned underground storage tanks, drums, or other buried debris are encountered during construction activities.
- On site or adjacent site spills of pesticides and herbicides; fertilizers; detergents; plaster and other products; petroleum products such as fuel, oil, and grease; or other hazardous chemicals such as acids, lime, glues, paints, solvents, and curing compounds.
- Highway construction projects, especially those in highly urbanized or industrial areas, where soil contamination may have occurred due to spills, illicit discharges, and underground storage tanks.
- Highway widening projects in older areas where median and shoulder soils may have been contaminated by transportation-related lead deposits.

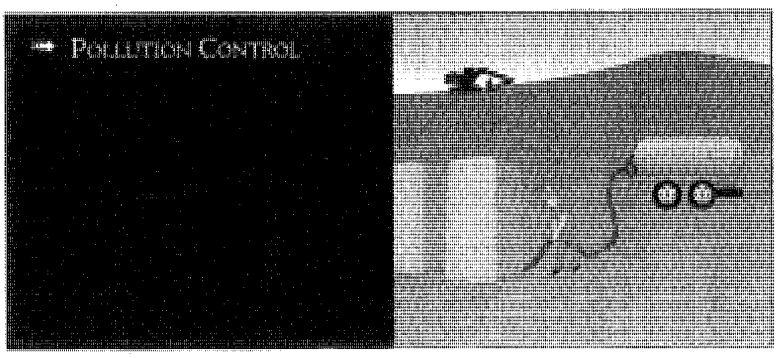
Limitations:

- The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered on site.
- Excavation, transport, and disposal of contaminated material and hazardous waste must be in accordance with the rules and regulations of the following agencies:
  - United States Department of Transportation (USDOT)
  - United States Environmental Protection Agency (USEPA)
  - California Environmental Protection Agency (CAL-EPA)
  - Department of Toxic Substances Control (DTSC)
  - California Division of Occupational Safety and Health Administration (CAL-OSHA)
  - Local Regulatory Agencies

Practices:

- Inspect sites for contamination, particularly when preexisting site conditions make contamination likely, when spills are reported, or when leaks are detected.
- If project is in an area of known contamination or contamination is suspected, the water should be contained and held for testing. Call the appropriate local agency and/or the regional water quality control board for further guidance.
- Never discharge contaminated soil and water to street, gutter, or storm drain.

Sanitary / Septic Waste Management



Purpose:

Leaking and portable toilets are a potential health and environmental hazard. Proper management will minimize or eliminate human and natural resource exposure to hazards.

Application:

- portable toilets
- other portable or temporary septic systems

Limitations:

- The leasing company must have a permit to dispose of waste to the sanitary sewer.

Practices:

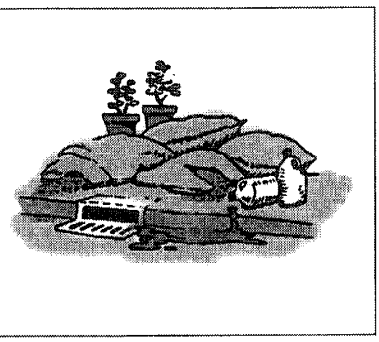
- Inspect facilities for leaks.

Inspection and Maintenance:

- Monitor on-site sanitary/septic waste storage and disposal procedures at least weekly.
- Be sure the leasing company adequately maintains, promptly repairs, and replaces units as needed.

LANDSCAPING MANAGEMENT

- EROSION CONTROL
- SEDIMENT CONTROL
- POLLUTION PREVENTION



Purpose:

Proper use and management of soils, materials, and chemicals used in landscaping eliminates or minimizes erosion and the discharge of pollutants to the storm drain system or watercourses.

Application:

- modification of soils in preparation for landscaping
- planting of trees, shrubs, grasses and other vegetation
- use of fertilizers, pesticides and other chemicals
- storage of materials

Practices:

- Use plant vegetation that is native, non-invasive, drought tolerant, and pest tolerant to decrease chemical and labor use over the short/long term.
- Store stockpiles and landscaping materials under tarps to protect from wind and rain.
- Schedule landscaping-related grading and excavation for dry weather.
- Use check dams or ditches to divert runoff away from storm drains.
- Protect storm drains with sediment control measures.
- Minimize use of chemicals:
  - purchase less toxic alternatives
  - purchase only amount necessary
  - use only the minimum amount necessary
- Rinse all chemical containers, using rinsewater as product. Recycle or dispose of rinsed containers in garbage.
- Check on disposal guidelines for chemicals (many are hazardous wastes).

Limitations:

- Plants that are native, non-invasive, drought tolerant, and pest tolerant may not be readily available from suppliers and vendors .

Inspection and Maintenance:

- Inspect areas being revegetated for establishment of new vegetation. Add plantings, replant, and control erosion where necessary.

WHAT CAN GO WRONG?

The difference between the schedule for SWPPP implementation and actual progress of the project is a common problem in achieving Permit compliance.

An erosion control plan is always based on a grading plan, which defines the sequence of grading and the schedule. However, the grading plan often undergoes modification, and all too often the erosion control plan is not updated accordingly. Therefore, as the rainy season draws near, the erosion control plan is often out of date.

PROBLEM

A common situation is where the grading has proceeded slower than expected and continues into the rainy season, and the erosion control plan does not address this situation. The result is unavoidable erosion because it is too late in the season to apply vegetation or other erosion control measures.

SOLUTION

A solution to this problem is to require October 1st (or other dates depending on geographic regions) as a cut-off date for mass grading, and to adjust grading targets accordingly. A builder should realize that if a project is running four weeks late (into the rainy season) the rain will wait for grading to be completed.

Another common reason that erosion and sediment control measures fail is either:

(1) they were not installed correctly, or
(2) they were not maintained properly.

It is imperative that the measures be inspected for proper installation, as well as maintained for proper performance.

WHAT ARE COMMON INSTALLATION PROBLEMS?

There are many common installation problems that can result in failure of an erosion or sediment control measure. The contractor must carefully follow the project plans, specifications and product manufacturer's guidelines to avoid installation-related failures and costly repairs. Common installation problems and their respective corrective measures are provided on the following pages.

PROBLEM	CORRECTIVE MEASURES
Sediment flowing under or over silt fence. Concentrated flow discharging down a slope. Damaged silt fence. Silt fence buried underneath sediment.	Bury the toe of silt fences. Silt fence should be level on the slope contours, otherwise a "flume" will be created resulting in concentrated flow. Do not place silt fence across concentrated flow and expect it to function properly. Ensure that sediment buildup is frequently removed.
Straw bales found removed and carried downstream or damaged.	Embed straw bales into a 4" deep trench when used for sedimentation control. Stake straw bales securely.
Check dam washed out on the sides resulting in discharge flowing around the dam.	Install check dams with the center lower than the sides to allow the control of discharge over the top of the dam.
Accumulated material in sediment traps and basins resulting in overflow and decrease in sediment holding capacity.	Regularly clean out sediment traps and basins for effective performance.
Sediment being discharged off the toe of slopes causing damage to sediment barriers.	Place sediment barriers away from the toe of slopes to allow room for sediment accumulation. Regularly remove sediment buildup.
Relying on sediment control measures alone to keep sediment from leaving the site, without including erosion control measures to form a composite system.	Do not rely on sediment control measures alone to keep sediment from leaving the site, particularly if soil is fine-grained; include erosion control measures to form a composite system.
Increased runoff and erosion of smoothly graded slopes.	Finish slopes with a rough texture to promote infiltration and decrease runoff velocity and erosion.
Roughening the slope surface texture has little effect on erosion control.	Track walk slopes up-and-down the slope rather than across the slope to reduce erosion.
Evidence of erosion occurring in areas where vegetative control measures have been applied.	Seed must be properly and evenly distributed over bare areas to produce uniform vegetation cover. Check for needed seed, fertilizer, and/or water.
Mulched areas are not completely covered or the mulch has blown away.	Apply adequate amounts (2 tons per acre) of surface mulches or tackifier for the site conditions. Place mulch with a tackifier or mechanically crimp it so as to minimize wash off or blowing.

PROBLEM	CORRECTIVE MEASURES
Rolled erosion control blankets have moved downslope and are not covering intended areas, or have "pillowed" with accumulations of sediment underneath.	Use enough staples to hold rolled erosion control blankets in place. Do not allow water to flow under the material.
Slope failures and large erosion areas.	Do not rely on surficial erosion control measures to address inadequate drainage and slope stability problems.
Sediment and soil are tracked offsite from construction trucks and equipment even though gravel is in place at the entrance and exit to the site.	Do not rely solely on gravel construction entrances to construction sites. Consider installing wheel wash facilities to prevent tracking of sediment off site.
Ponding occurring around protected storm drain inlets.	Install storm drain inlet protection that filters the flow and discharges it, rather than just diverts the flow.
Erosion occurring around and underneath a discharging storm drain outlet.	Provide an energy dissipator at discharging storm drain outlet pipes to prevent unprotected soil from eroding.
A sediment basin is short-circuited and discharge is highly sediment-laden.	Ensure that sediment basins are designed long enough to allow sediment particles to settle before flow is discharged.
Rill and gully development on and around unpaved roads resulting in transport of sediment downstream.	Provide rolling dips and waterbars on unpaved roads to prevent rill and gully development and transport of sediment.
Billowing dust clouds being formed due to wind and site traffic conditions.	Provide adequate dust control, such as wetting, for traffic and wind conditions.

MAINTENANCE

Once properly installed, erosion and sediment control measures must be operated and maintained using specific guidelines and procedures.

Examples are as follows:

Hydraulic erosion control applications (including binders, bonded fiber matrices, dry straw mulch, and hydraulic mulches)

- should be monitored for short term performance (e.g., longevity of surface treatment)
- should be monitored for long term erosion control performance (e.g., vegetation establishment)
- loss of mulch material and seed through sheet and rill erosion should be repaired through reapplication
- general surface slippage or lack of vegetation establishment should be investigated and treated on a site-specific basis with mitigation or repairs as appropriate

Rolled erosion control materials (such as jute netting, biodegradable or synthetic mats or blankets)

- should have adequate staples to hold the material in complete contact with the ground
- material should not bridge over the soil
- no new rills or gullies should develop under the material
- no trapped soil should pillow under the material
- the material should allow the seeded or natural vegetation to emerge in a timely manner through the mat itself
- netting should remain on the ground and not be lifted by the plants where it would become a mowing problem or hazard to wildlife

Silt fences

- should be inspected and sediment removed before overtopping the device or causing flow diversions (in most cases, this occurs when the accumulation is one-third the height of the fabric)
- breaks or overtopped areas should be replaced or repaired immediately
- fences should be removed and the accumulated sediment dispersed to a stable area when the surrounding vegetation provides effective erosion protection.

Check dams

- should be checked for undermining and/or short circuiting and repaired or replaced if necessary
- check dams should be cleaned after each storm event or when accumulated sediment reaches one-third the height of the dam

Temporary and permanent sediment basins

- should be cleaned of accumulated sediment after every significant storm event, or when sediment reaches thirty percent of the basin capacity
- removed sediment should be properly disposed of in a stable area that is not susceptible to erosion

Straw bale barriers (or gravel bag or sand bag barriers)

- should be inspected after every storm event
- accumulated sediment should be removed when it reaches one-third the height of the barrier
- removed sediment should be properly disposed of in a stable area that is not susceptible to erosion

Stabilized gravel construction entrances

- should be inspected for the transport of sediment onto public rights-of-way
- any tracked sediment should be removed immediately
- no washing of sediment into the storm drain

Inlet filters (for storm drains)

- should be inspected and cleaned after each storm event and repaired promptly
- sediment should be removed after each storm event and deposited in a stable area where it will not be subject to erosion
- if the gravel becomes clogged with sediment, the gravel must be carefully removed from the inlet and either cleaned or replaced

Slope drains

- should be inspected after every storm event and repairs should be made prior to next storm event
- should be checked for scour holes and undermining, particularly at inlet and outlet points

Rolling dips and waterbars (on roads)

- should be inspected periodically and after major storm events
- sediment should be removed from the flow areas, and erosion damage should be repaired prior to next storm event
- outlet areas should be checked for erosion, and repairs made promptly

Lined drainage channels and energy dissipators

- should be inspected at regular intervals and after major storms
- debris should be removed and repairs made where necessary
- special attention should be given to outlets and points where concentrated flow enters the channel
- eroded areas should be repaired prior to the next storm event
- check for sediment accumulation, piping, bank instability, and scour holes, and repair promptly
- outlet areas shall be checked for erosion, and repairs made promptly

WHY DO INSPECTIONS AND WHEN?

The control measures identified in the SWPPP are intended to minimize the transport of pollutants to receiving waters. The performance of the measures is dependent on how the measures are operated and maintained, and the severity of the weather conditions for one to five years following their implementation. To provide for the continued performance of the measures, they must be inspected before, during, and after significant storm events.

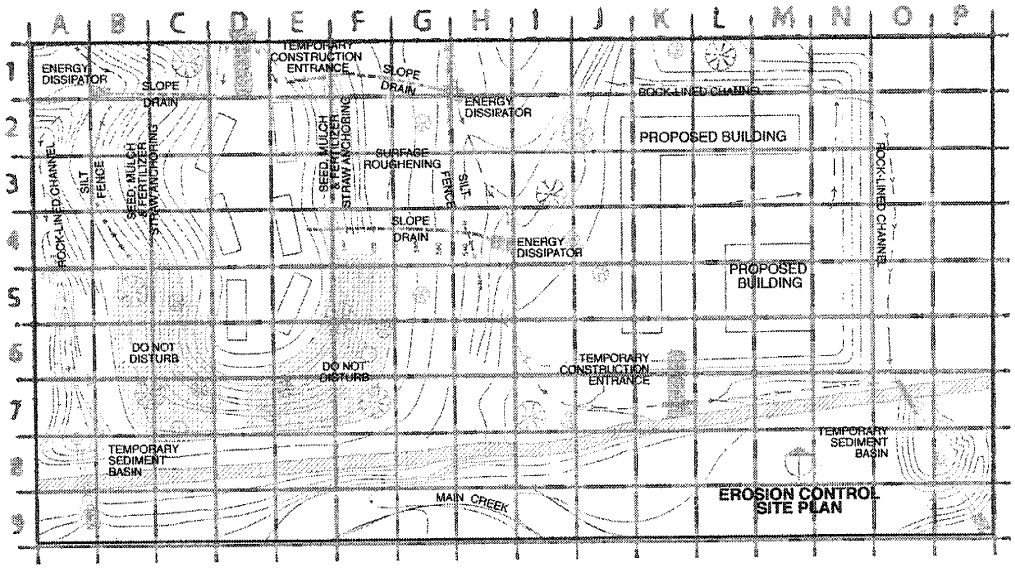
The General Permit requires inspection of the site before, during, and after storm events, so that the effectiveness of controls is observed first-hand. During seasonal wet periods, the site should be inspected at least weekly. All disturbed areas of the site, areas for material storage, locations where vehicles enter or exit the site, and all erosion and sediment controls that are identified as part of the plan must be inspected. The problem areas must be documented, and control measures identified and implemented immediately. This effort must continue for the duration of time it takes for the site to be fully stabilized and the permanent measures to be in place and performing adequately. An annual certification that the site is in compliance with the General Permit and the SWPPP is required by July 1st of each year. Inspections form the basis for this certification.

Qualified inspectors should be highly familiar with the requirements of the General Permit and the intent of regulations. The inspector must also be familiar with the project SWPPP and all the measures to be implemented at the site, as well as their proper installation and maintenance. The inspector should also be knowledgable about how to make emergency repairs and evaluate appropriate control measure alternatives.

Inspection Procedures

Following installation of erosion and sediment controls, as well as other control measures, a maintenance designee should meet with the contractor to review the SWPPP. A walk-through or site inspection should be performed to ascertain that all measures have been implemented in the field, that erosion is being controlled, and that transport of sediment and other pollutants into critical areas or off of the site is being prevented. Any improper installations or repairs necessary to complete the job should be noted at this time.

The SWPPP requires that all erosion and sediment controls be shown on a map of the site. To facilitate the identification of inspection locations that will be visited routinely, a grid may be overlain on the site map, and a grid reference associated with each inspection location, as shown below. These grid locations may then be cross-referenced to the inspection checklists.



Inspection Checklists

The Pre-Storm, Post-Storm and Weekly Report (below) is to be used with the map on Page 120. The coordinates on this sample chart correspond with the coordinates of that map. This Inspection Checklist may be used for pre-storm inspection reports, post-storm inspection reports and weekly inspection reports.

Pre-Storm, Post-Storm and Weekly Inspection Report

Date of Inspection:_____ Time:_____ Weather Conditions:_____

Location/ Coordinate	BMPs Implemented	Status	Actions Taken	Inspected by	Sample & Analysis
6A, 7A, 8A	Settlement Pond				
9A	Energy Dissipator				TSS Turb.
8O, 8P	Settlement Pond				
9P	Energy Dissipator				TSS Turb.
1D	Rock Egress Pad				

Recording Site Inspections

The contractor should maintain records of the major grading and stabilization activities occurring at the site and the timing of each activity. The contractor should also keep track of the dates that required control measures (best management practices) are to be installed, and by whom.

The site inspector should keep a weekly and pre-storm inspection report that provides the location description (and/or grid location), the maintenance or repairs needed, actions taken, the date completed, and any other observations made. Additionally, the inspector should keep post-storm inspection reports that include similar information plus the size and duration of the storm. Each report must include the inspector's name, the date of the inspection, and the inspector's qualifications to perform the inspections. These reports should be kept with the SWPPP. The inspections may be summarized on a form that shows cumulatively for the site all the weekly as well as the pre- and post-storm inspections, when they were completed, and by whom.

The site inspector should also perform a monthly vegetation inspection to evaluate whether seeded or planted vegetation is becoming successfully established, or whether additional measures are needed, such as watering, fertilizing, or additional seeding.

What Should Be Inspected?

Site inspections must identify all areas where BMPs have been implemented and check them for proper functioning and efficiency, including:

- All disturbed areas of the site
- Locations where vehicles enter or exit the site
- All erosion and sediment control measures
- Material storage areas

A vegetation inspection is important to evaluate whether seeded or planted vegetation is becoming successfully established, or whether additional measures are needed, such as watering, fertilizing, or additional seeding.

A reportable quantity release report should also be kept for the site that provides the date, type of material spilled, approximate quantity, and agencies notified. This form must be completed on any occasion that a reportable quantity (as established under 40 CFR Parts 110, 117, or 302) spill occurs at the site.

What should the inspector be looking for?

Controls must be in good operating condition until the area they protect has been completely stabilized and the construction activity is complete. In the absence of significant storm events, all monitoring points must be inspected by the maintenance designee at least once a week and before any predicted, significant rain event (greater than 0.25 inches). Experience demonstrates that even the best control measures can fail if they are not properly and regularly maintained.

How does inspection relate to certification?

All dischargers under the General Permit must annually certify that their construction activity is in compliance with the requirements of the General Permit and the site's SWPPP by July 1st of each year. This certification should be based on the site inspections described above and should be attached to the SWPPP. The Regional Board also requires submittal of the certification as part of an Annual Compliance Certification Report.

Confronting problems

During significant rainfall events, the maintenance designee should be empowered to call out maintenance crews to inspect and repair the erosion and sediment control measures. Appropriate materials and equipment should be kept on hand to effect a quick and rapid response. Within 24 hours of a storm of 0.25 inches or more in depth, the maintenance designee must conduct an overall site inspection. The inspector must record any damages or deficiencies in the control measures on an inspection report form. Damage or deficiencies should be corrected as soon as practicable after the inspection. Substantial efforts should be expended to minimize sediment discharge from the site if continued precipitation is forecast.

When are inspection reports required?

Inspection reports must be prepared weekly and before and after all significant storm events (0.25 inches or more). They must include information on damages or deficiencies, maintenance or repair activities, monitoring information, and vegetation establishment. Inspection reports must be kept with the SWPPP during site construction and for a period of three years after completion of final site stabilization.

Storm Water Pollution Prevention Plan Checklist

The following is an example of a checklist to be used in evaluating the adequacy of a Storm Water Pollution Prevention Plan.

(1) LOCATION INFORMATION
__ Project Location
__ Road/Street Profiles (Planned and Existing)
__ Scale

(2) TOPOGRAPHIC FEATURES
__ Property line
__ Legend, scale, north Indicator
__ Existing contours
__ Limit and acreage of disturbed area
__ Wetland limits
__ Water Bodies/Features: drainage ways, seeps, springs, lakes, streams, ponds, dams, rock outcrops
__ Planned and existing buildings (including elevations)
__ Land use of surrounding areas
__ Easements
__ Storage areas: Stockpile, waste, etc.

(3) VEGETATIVE STABILIZATION
__ Areas and acreage to be stabilized
__ Planned vegetation (with details of plants, seed, mulch and fertilizer)
__ Specifications for temporary and permanent vegetation
__ Method of soil preparation

(4) EROSION CONTROL MEASURES
__ Legend
__ Construction details for temporary and permanent measures
__ Design calculations for controls
__ Maintenance requirements and responsible person during construction
__ Maintenence requirements and respon sible persons for permanent measures

(5) SITE DRAINAGE FEATURES
__ Name of receiving watercourse(s)
__ Name of municipal operator (for stormwater discharges)
__ Existing and planned drainage patterns (including off-site areas that drain through the projects
__ Acreage
__ Soils information
__ Size and location of culverts and sewers
__ Design calculations and construction details for culverts and storm sewers (including soils reports)
__ Design calculations for peak discharges of runoff (incuding construction phase and final runoff coefficients)
__ Design calculations, cross sections and method for stabilizing existing and planned channels
__ Design calculations and construction details of energy dissipators
__ Design calculations and construction details to control groundwater-seeps/ high water table/etc.

(6) OTHER REQUIREMENTS
__ Nature and purpose of construction
__ Ownership Form / 24 hour contact
__ Construction sequence including installation and removal of controls

Erosion and Sediment Control Plan Checklist

The following is an example of a Storm Water Pollution Prevention Plan (SWPPP) checklist for use by municipoal staff:

EROSION AND SEDIMENT CONTROL PLAN REVIEW CHECKLIST

PROJECT NUMBER: _____

ENGINEER / PHONE NUMBER: _____

REVISION DATE: _____

ASSIGNED TO:: _____

RE: _____

SUBMITTAL DATES:	REVIEW DATES AND INITIALS:
_____	_____
_____	_____
_____	_____

DESIGN APPROVAL DATE: _____

Your submission for Erosion and Sediment Control Plan approval has been reviewed. The review was made per the following minimum acceptable criteria checklist. Please return this checklist with your resubmittal.

LEGEND:

____ Acceptable	X Unacceptable	INC Incomplete
R Required	N/A Not Aplicable	NR Not Reviewed

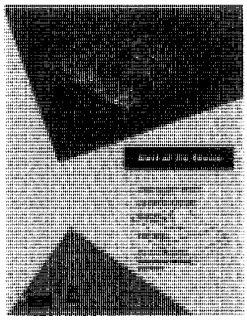
REVIEW:

____ 1st ____ 2nd ____ 3rd

SUPPORTING INFORMATION:

____ Transmittal explaining purpose of submission
____ Sediment Control/Stormwater Mgmt. Application *(First time submissions only)*
____ Storm Drain Plans

REFERENCES

1. 
Start at the Source

MANUALS OF STANDARDS FOR EROSION AND SEDIMENT CONTROL—There are a number of good manuals currently available including the Association of Bay Area Governments *Manual of Standards for Erosion and Sediment Control Measures (second edition, May 1995)*, the *State Water Resources Control Boards California Stormwater Best Management Practice Handbook—Construction Activity* (1993), the Bay Area Stormwater Management Agencies Association *Start at the Source—Residential Site Planning and Design Manual for Stormwater Quality Protection*, the Caltrans Storm Water Quality Handbooks (1997), the North Carolina Department of Environment, Health, and Natural Resources *Erosion and Sediment Control Planning and Design Manual*, and others. To order *Start at the Source*, call (510) 622-2465.

2. AGENCIES—There are a number of local agencies who can provide technical assistance, including the Regional Boards, the State Board, local flood control district, local planning and building departments, local Clean Water Programs, the Natural Resources Conservation Service, the United States Geologic Service, the State of California Department of Fish and Game, and the United States Fish and Wildlife Service.

3. INTERNATIONAL EROSION CONTROL ASSOCIATION—The International Erosion Control Association (IECA) annually provides an erosion control Products and Services Directory, erosion control conference proceedings, and technical assistance. The IECA has a Western Chapter that includes the State of California, and addresses erosion issues that are unique to the Western United States. The IECA may be reached at (800) 455-4322.

4. CERTIFICATION PROGRAM—The IECA and Soil and Water Conservation Society co-sponsor the Certified Professional in Erosion and Sediment Control (CPESC) certification program that is designed to provide certification for those with adequate erosion and sediment control qualifications and experience. Some jurisdictions are considering requiring erosion control plan preparers to have this certification. For information call (800) 455-4322.

5. PRODUCT DESIGN SOFTWARE AND STANDARD DRAWINGS AND SPECIFICATIONS —There are a number of erosion control, channel and slope lining software packages available to assist in the design of various systems. These are available from product maufacturers. Additionally, there are software packages available that provide standardized drawings and specifications for a wide range of erosion and sediment control measures. Information is available through the IECA at (800) 455-4322.

6. COMPARATIVE EROSION CONTROL PRODUCT PERFORMANCE DATA—The Utah Water Research Laboratory, the Texas Transportation Institute, and other research institutes perform field and laboratory comparative tests of erosion and sediment control products and techniques, and publish the results in industry publications such as *Erosion Control* magazine and the IECA conference proceedings.

7. *EROSION CONTROL* MAGAZINE—An industry-specific magazine is published that provides case studies, research results, current technologies, and other up-to-date industry information. To subscribe, call (805) 681-1300.

8. WORKSHOPS AND SHORT COURSES—The San Francisco Estuary Project, the Regional Water Quality Control Board San Francisco Bay Region and the Bay Area Stormwater Management Agencies Association conduct workshops on erosion and stormwater pollution control topics. The International Erosion Control Association also sponsors a series of on-going educational short courses. Contact the San Francisco Estuary Project at (510) 622-2419 for more information.

9. VIDEOS—*"Hold on to Your Dirt: Preventing Erosion from Construction Sites"* and *"Keep it Clean: Preventing Pollution from Construction Sites"* are available from Friends of the San Francisco Estuary. Call (510) 622-2419 to order.

10. GUIDELINES FOR CONSTRUCTION PROJECTS includes the State NPDES General Permit for Construction Activity, Notice-of-Intent to Comply form and line instructions, proposed framework for preparing a Storm Water Pollution Prevention Plan and explanation of terms, information on permits needed for streambed alteration. Available from Friends of the San Francisco Estuary. Call (510) 622-2419 to order.

The *Erosion and Sediment Control Field Inspectors Manual*
is available from Friends of the San Francisco Estuary.
Call (510) 622-2419 to order.

ATTACHMENT 2

A. Topsoiling

1. Description

This BMP includes the placement of topsoil or other suitable plant growth material over disturbed lands to provide a suitable soil medium for vegetative growth and a supply of native or locally occurring seeds and propagules. Topsoiling may involve bringing in soils from off-site or merely replacing fertile topsoils that were stripped by erosion activities.

2. Applications

Topsoiling is recommended on slopes with a ratio of 2:1 or flatter, where the native soil is unsuitable for vegetative growth. It is an effective way of improving plant establishment on sites where moisture, nutrients, or pH levels are low, or where the remaining soil is too shallow to support root systems.

3. Limitations

Do not apply topsoil over a subsoil of contrasting texture. For instance, a clay-like topsoil placed over a sandy soil may cause the topsoil to slough as water flows between the two soil layers of different permeability. Also, topsoil should not be applied when the subsoil is extremely wet.

4. Design Parameters

Topsoiling should reestablish the existing or established grade of the subsoil. The topsoil should be uniformly distributed at a minimum compacted depth of two inches (50 millimeters [mm]) on slopes 3:1 or steeper, and four inches (100 mm) deep on flatter slopes. The soil should be a loam, sandy loam, clay loam, silt loam, sandy clay loam, or other mixture approved by an agronomist. It should be free of subsoil, refuse, sticks, noxious weed seeds, other extraneous materials, and stones larger than 1.5 inches (40 mm) diameter.

Topsoil can either be obtained commercially or salvaged from sediment traps. If desired, it is possible to place a thin layer of topsoil 1 to 2 inches (30 to 50 mm) thick on benched slopes. The soil may need some form of stabilization before the next rain event. Consider whether mulch, matting, geotextiles or seeding is required and when.

5. Construction Guidelines

The following guidelines apply to the placement of topsoil:

- The existing or established grade of subsoil should be maintained.

- Prior to spreading topsoil, loosen the subgrade by discing (or other method) to a depth of 2 inches (50 mm) to permit bonding of subsoil to topsoil.

- Spread the topsoil uniformly at a minimum compacted depth of two inches (50 mm) on 1:3 or steeper slopes and four inches (100 mm) on flatter slopes. A depth of 6 to 12 inches (150 to 300 mm) is preferred. Any surface irregularities should be corrected in an effort to prevent formation of water-holding depressions.

- Where quantities of stockpiled topsoil on-site are limited, it is more desirable to cover all areas of exposed subsoil to a lesser depth than to cover partial areas to the suggested minimum depth of 3.1 inches (80 mm).

- Topsoil should not be placed when the subgrade is excessively wet or in a condition that may otherwise be detrimental to proper grading or proposed sodding or vegetation establishment.

6. Maintenance

Periodically and after major storm events, inspect, repair, and reseed as necessary to control slope erosion and subsequent topsoil losses.

B. Seeding

1. Description

Seeding means growing a long-term or permanent vegetative cover (plants) on disturbed areas or areas that need assistance in revegetation. The purpose of seeding is to reduce erosion and sedimentation and to establish desirable competitive ground cover for wildlife habitat and ease roadside maintenance. This practice uses prescribed native grasses and shrubs that will hold the soils, reduce storm water runoff, and act as a bio-filtering system on long term basis.

2. Applications

Seeding should be considered as slope protection and erosion control practice on bare slopes in native habitat areas.

The primary advantages of seeding are:

- It establishes good soil stabilization.
- It prevents soil erosion and sedimentation.
- It contains and filters storm water runoff.

Additional advantages specific to permanent seeding are:

- It provides wildlife ground cover and habitat.
- It competes with undesirable vegetation and noxious weeds.
- It provides aesthetic qualities.
- It reduces the cost of maintenance.

3. Limitations

Permanent vegetative ground cover will take several years before sufficient establishment takes place. If ground cover is needed for immediate erosion control over large areas, then seed should be applied with a hydroseed containing bonded fiber mulch.

Other factors that contribute to the success or failure of permanent seeding are:

- Seeding should be done at the proper time of year.

- Proper application of fertilizers as prescribed will contribute to the success of the seeding.
- Once seeded, the site should not be disturbed.
- Irrigation may have to be used in low precipitation area (arid/semi-arid) for establishment.
- Consult with a biologist to determine an appropriate seed mix that will not impact any adjacent native plant communities.

4. Design Parameters

All permanent seeding and fertilizing should be conducted in accordance with local requirements.

5. Construction Guidelines

Permanent seeding is the last phase of reclaiming any disturbed soils.

6. Maintenance

- Inspect all seeded areas on a regular basis and after each major storm event to check for areas where corrective measures may have to be made.
- Indicate which areas need to be reseeded or where other remedial actions are necessary to assure establishment of permanent seeding.
- Continue monitoring of the site/area until permanent vegetation is established.

C. Planting

1. Description

This BMP fact sheet describes the process of establishing vegetation by setting out plants that have been grown to a specified size or age. The plants may be potted in plastic tubes or in containers of various sizes, root wrapped, or may be bare-root stock.

Plantings are often specified for aesthetic purposes (landscaping) but can serve various erosion control functions as well. The living trees and shrubs in a planted area will grow large enough to provide soil stabilization and erosion control benefits sooner than the seeds of woody species can germinate and grow to effective size.

The use of trees and shrubs also provides greater aesthetic and biological diversity and, in many areas, is more compatible with vegetation on lands adjoining the planted site.

2. Applications

Planting is the preferred method of revegetation in many situations where seeding and other slope treatments are either not effective or not appropriate as permanent measures. Such areas may include:

- Any finished slope that will remain undisturbed for at least 10 years, especially if the area is bordered by forests, wetlands, or other naturally occurring woody vegetation. On such sites, trees and shrubs may be the desirable vegetation from a long-term perspective, but may be very difficult or unreliable to establish from seed.
- Extremely rocky slopes or sites: If natural vegetation is present in significant amounts, such areas are difficult to seed and mulch effectively. Plantings can be used to provide additional stabilization.
- Streets or materials source sites that have been abandoned permanently.
- All types of landscaping, including urban thoroughfares and interchanges, and residential streets where landscape aesthetics are a concern.
- Wetlands and wildlife habitat areas: In such areas, it may be critical to plant the desired species initially, so that the site is not overrun by weeds or undesirable plant species that detract from the intended use of the site.
- Areas where the higher rate of transpiration for trees and shrubs (compared to grasses and forbs) helps remove excess moisture from the soil.

3. Limitations

- Purchase and installation costs are higher than for seeding.
- Continued or periodic irrigation may be required if planting occurs during dry season or on sandy soils. Watering may also be necessary up to two years after planting and during periods of drought or intense heat.
- Specific seasons of work apply for planting. Planting outside the designated season should not be allowed unless provisions for special care and maintenance of the plants are enforceable.
- Consult with a biologist to determine an appropriate plant mix that will not impact any adjacent native plant communities.

4. Design Parameters

Advantages of Planting: Many shrubs and trees are difficult to establish from seed in natural environments and natural seed crops vary widely from year to year. Rapid invasion from native vegetation and rapid establishment of sown seed of woody species is therefore unreliable. Vegetative plantings are used to provide living shrubs and trees that will grow to adequate size to provide soil stabilization and erosion control faster than seeds of woody species can germinate and grow to these dimensions.

Materials: Planted material may be grown from either cuttings or seed. At delivery to a job site, the plants may be potted (in containers), root wrapped, or bare-root stock. Some species are successfully planted as sprigs or tubelings.

Use of Native Species: Species that are native to the area should be used in all plantings. Native species provide long-term soil stabilization which is aesthetically harmonious with natural vegetation and which requires little long-term maintenance. Short-term maintenance is necessary to ensure the establishment of the vegetation.

Maximizing Effectiveness: Successful planting projects depend on selecting suitable plant species, using healthy planting stock, and planting when the season and weather conditions are favorable. The site must be properly prepared for planting, and must be properly maintained after planting to ensure long-term survival of the plants. Make sure the contract and plans include adequate provisions for all aspects of the planting process.

Planting places living plants on a site, decreasing the length of time necessary to establish a vegetation project. It is more effective than seeding methods for revegetation. Adequate maintenance is absolutely necessary to achieve this effectiveness since planting requires irrigation for at least the first year, and will benefit from irrigation for two or more years.

5. Construction Guidelines

Planting sites should be adequately graded and tree locations and planting areas (for shrubs, vines, and ground covers) should be marked and approved before planting begins.

Plant materials should be examined before use to ensure that species, container sizes, and root and soil condition are acceptable. If possible, the growth medium for container stock plants should be similar to the soil type on the revegetation site. Container size guidelines are as follows:

- Tree species may be of bare-root stock or of potted stock. Pots should be one gallon (4 liter) size or larger.
- Shrub species may be of bare-root stock or of potted stock. The preferred planting pot is a tube of woven plastic that is planted with the plant contained in it. The pot deteriorates over time. The pots should be two inches (50 mm) long, with both ends open.
- Paper pots must be 2 to 3 inches (50 to 80 mm) square and 8.5 to 12 inches (220 to 300 mm) long. The paper around the rim should be removed to ground level at planting.
- Peat pots are not recommended since research has shown greater mortality of plantings in peat pots due to drying. If peat pots are used, any exposed peat pot material showing after planting should be removed.
- In general, no container should be less than two inches (50 mm) wide and six inches (150 mm) deep.

Store bundled bare-root planting stock, whether tree or shrub species, in a cool, moist place from time of receipt until time of planting. This time should not exceed 10 days.

Store potted planting stock in shade, out-of-doors, and kept lightly sprinkled with water to maintain a moist soil from the time of receipt to the time of planting. This time should not exceed 30 days.

Planting procedures:

- Plant the mixture of trees and shrubs that has been prescribed. In no case should this be less than 690 plants per acre (1,700 plants per hectare). If bare-root stocks are used, planting rates should be increased by 1.25 times the stated rate.
- Voluntary or unskilled labor may be used in planting. However, a supervisor who is skilled in the techniques being used should direct the labor.

- Construct a basin 12 inches (300 mm) in diameter and depressed no more than two inches (50 mm) from the elevation of the downslope lip.
- Open the planting hole with a planting bar or shovel, then place the plant near the downslope lip of the basin. This allows sloughing from the slope to fall in to the basin without burying the young plant.
- Carefully remove plants from their containers, if any, and place them in the planting holes so that the crown of the plant is at the surface of the soil. No air space should be allowed around the roots, nor should the roots be folded under. Plants in individual containers made of decomposable material are planted without removing them from the container.
- If appropriate, apply wood chip or wood fiber mulch to a depth of two inches (50 mm) around each plant.
- The soil should be wetted to field capacity to a depth of 3.1 to 4 inches (80 to 100 mm) at the time of planting and each time the soil moisture level drops below the permanent wilting percentage.

6. Maintenance

- Irrigation of vegetative plantings during the first two years following planting is required to increase the survival rate. Water as often as necessary during periods of intense heat or lack of rain.
- Inspect plantings frequently after first installed to see if plants are thriving. Remove and replace dead plants to restore the prescribed number of living plants per hectare.
- After storm events, examine the planting basins and mulch cover and make any needed repairs.

D. Catchbasin Inserts

1. Description

These BMPs are devices installed under a storm drain grate that provide water quality treatment through filtration, settling, or adsorption. Catchbasin inserts are commercially available products and are generally configured to remove one or more of the following contaminants: coarse sediment, oil and grease, and litter and debris. Units must be routinely maintained to achieve maximum removal efficiency. Maintenance frequency will vary depending on the amount and type of pollutant targeted.

2. Applications

Catchbasin inserts are nominally effective at removing fine (silt and clay) sediment and associated pollutants. Inserts are successful in capturing coarse material and debris. Petroleum product removal efficiencies for inserts in good condition ranged from 20 to 90 percent when exposed to oil concentrations near the high end for urban runoff and performance dropped off rapidly with use. Possible locations for catchbasin insert implementation include: parking lots, streets, driveways, industrial or commercial facilities, and municipal corporation yards.

3. Limitations

The greatest difficulties with implementing catchbasin inserts for stormwater treatment includes the small physical space inside the catchbasin, the tendency for sediments to clog or blind filter media, and the fluctuating nature of the flow. Catchbasin inserts are also very maintenance-intensive. The problems may be compounded from street sanding and other activities.

4. Design Parameters

The catchbasin insert must meet the following criteria.

1. The total maximum tributary area should be 5,000 square feet (465 meters-squared ($\pm$ five percent) per unit for new development projects and 7,000 feet (650 meters-squared) per unit for redevelopment projects.

2. A catchbasin insert for a new development project should be designed to fit with a standard grate. If the insert is installed in an existing catchbasin, the insert should be demonstrated to fit properly so that there is a positive seal around the grate to prevent low-flow bypass. The maximum height of

the grate above the top of the frame, with the insert installed, should not exceed 3/16-inch (4.8 mm), and the grate should be non-rocking.

3. The bottom of the filter media (oil absorbent/absorbent material) must be above the level of normal low-flows. If the media is above the crown of the outlet pipe, it is assumed to be above the normal low-flows. An alternative method to demonstrate that the media is above the normal low-flow is to show (by backwater analysis method described in Section 4.3.4) that the bottom of the media is above the water surface elevation corresponding to the water quality design flow.

4. The catchbasin insert should be located to be accessible as needed for maintenance and not limited by continuous vehicle parking. This may require elimination of a parking stall for redevelopment projects.

5. Construction Guidelines

While no pretreatment is required with a catchbasin insert, the use of source control BMPs on-site will decrease maintenance needs. Installation of a catchbasin insert for a new or redevelopment project should follow the manufacturer's recommended procedures. The catchbasin insert should be installed in the catchbasin after the site has been paved or stabilized (for new development) or after completion of construction (for a redevelopment site that is already paved). When used for sediment control, the insert should be inspected at least weekly and maintained if needed.

To minimize the generation of solid waste and the consumption of natural resources, systems constructed of or using recycled products are preferred. Reusable filter materials should be refreshed according to the manufacturer's instructions.

6. Maintenance

The catchbasin insert should be fitted with oil-absorbent filter media, to be inspected monthly and changed whenever the filter media surface is covered with sediment. Inspections are especially important during the wet season. Acceptable filter media include absorbent whole fibrous moss (not necessarily sphagnum moss), Petrolok, and general purpose absorbent (i.e., wood fiber).

APPENDIX D

FINAL
NAVAL MEDICAL CENTER SAN DIEGO
NATURAL RESOURCES INVENTORY AND IMPLEMENTATION GUIDE
EXOTIC INVASIVE PLANT REMOVAL PLAN

Contract Number N68711-00-D-4414; Delivery Order 0010

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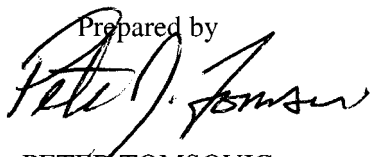

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Introduction

A. Project Description

The Naval Medical Center San Diego (NMCSD) is located within and adjacent to Powerhouse Canyon and next to Balboa Park in San Diego, California (Figures 1 and 2). The property is bound by Florida Drive to the east, Park Boulevard to the west, Zoo Place to the north, and Interstate 5 and Pershing Drive to the south. The NMCSD encompasses approximately 78 acres and is comprised of buildings, paved parking lots, landscaped areas, and revegetated manufactured slopes (Figure 3).

The NMCSD lies within the boundaries of Balboa Park, San Diego (Park). The 1,420-acre Park is mostly open space with museums and an assortment of recreational areas including a golf course, playgrounds, walking trails, Morley Field, and the San Diego Zoo. The more developed portions of the park lie in the southern end where San Diego City College, NMCSD, the zoo, and museums are located. Powerhouse Canyon bisects the Park and serves as the major drainage-way for the entire area. The NMCSD houses the largest and tallest buildings within this area and is one of the dominant features within the Park.

The purpose of this Exotic Invasive Plant Removal Plan (EIRP) is to describe an adaptive management strategy for controlling existing populations of invasive exotic plants and measures to prevent the establishment of new exotics throughout the native open space.

B. Exotic Invasive Plant Removal Plan Goals and Objectives

The goal of this EIRP is to prevent the degradation and loss of habitat caused by the spread of invasive weed species. The EIRP will apply to all native open space areas. This EIRP will describe problem areas and prioritize those areas that should be managed, describe weed control methods, and provide a schedule for implementation of the recommended actions.

The areas covered under this EIRP should be reassessed every three years by the Exotic Invasive Manager (see below), beginning in 2007, to review its effectiveness and make changes to the control methods, problem areas, or priorities, where necessary, in order to achieve the goals set forth in this plan.

C. Responsible Parties

1. Property Owner

The Owner, NMCSD, will be responsible for funding and implementing this EIRP. The Owner will be responsible for contracting with personnel qualified in implementation, maintenance, and monitoring of exotic and invasive plant removal practices described in this Plan. Upon contracting with a qualified

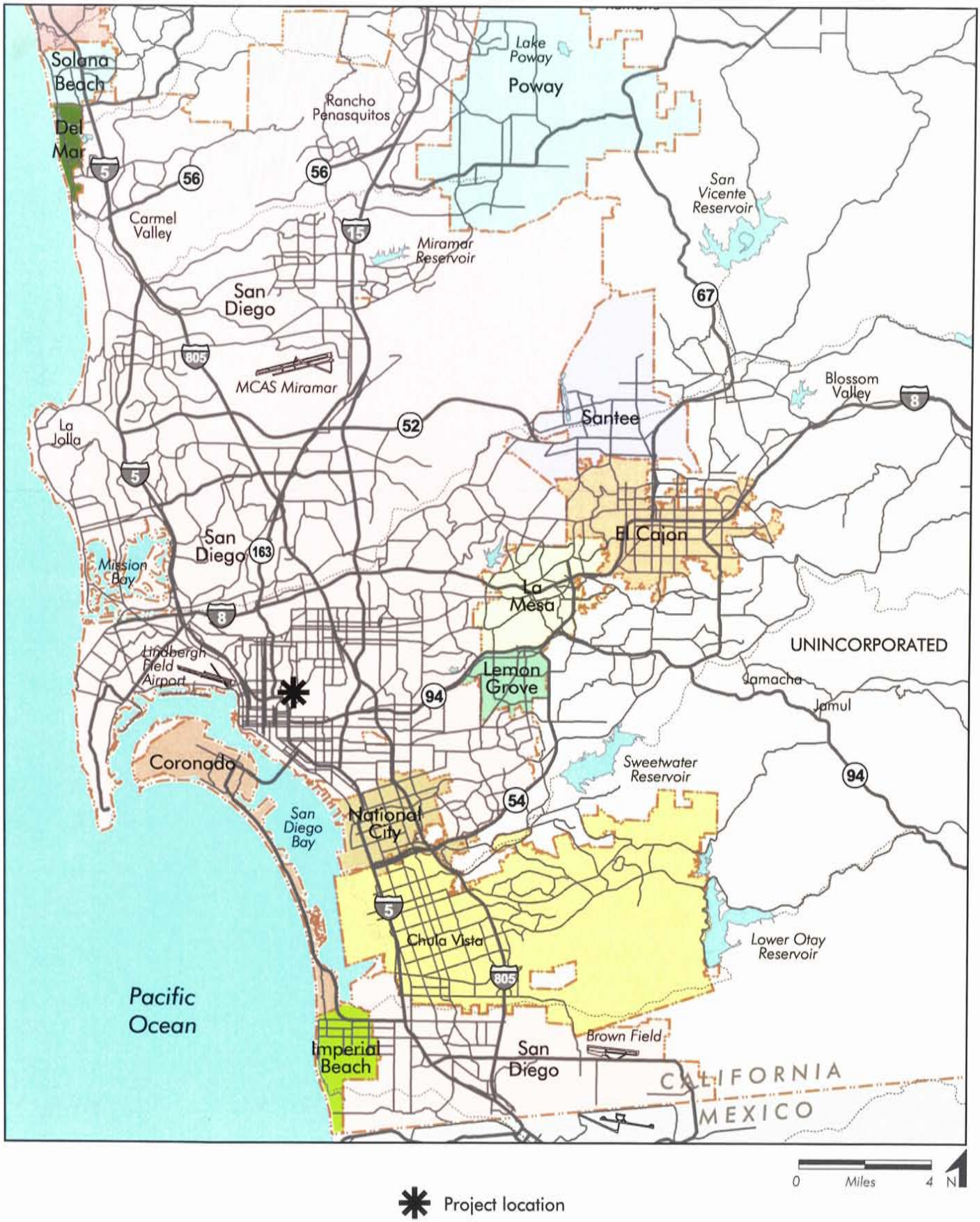

FIGURE 1
Regional Location

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fig1 (regl) 11/05/03

Map Source: USGS 7.5 minute topographic map series, Point Loma quadrangle

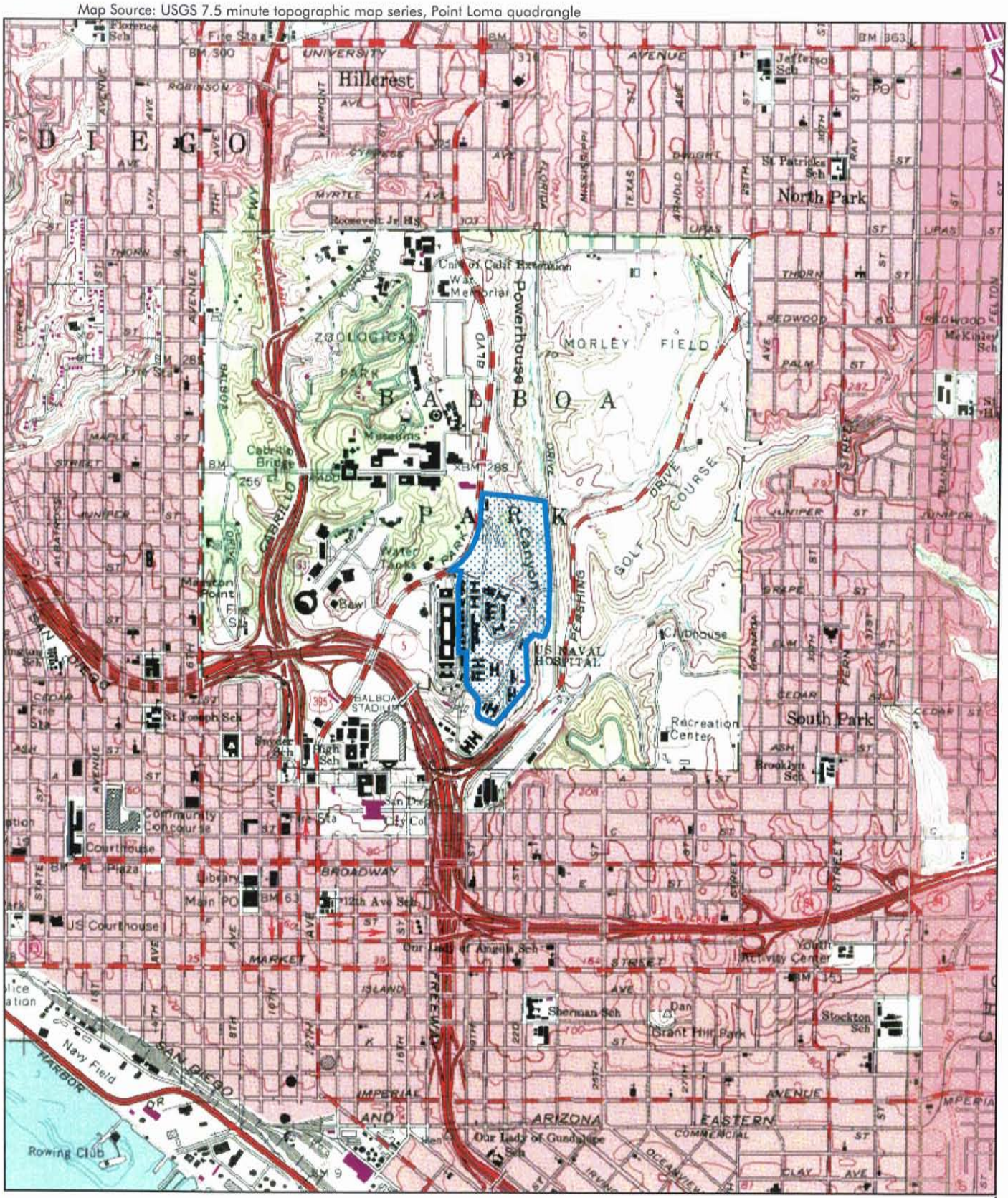

FIGURE 2
Project Location on USGS Map

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fig2 (usgs) 11/05/03

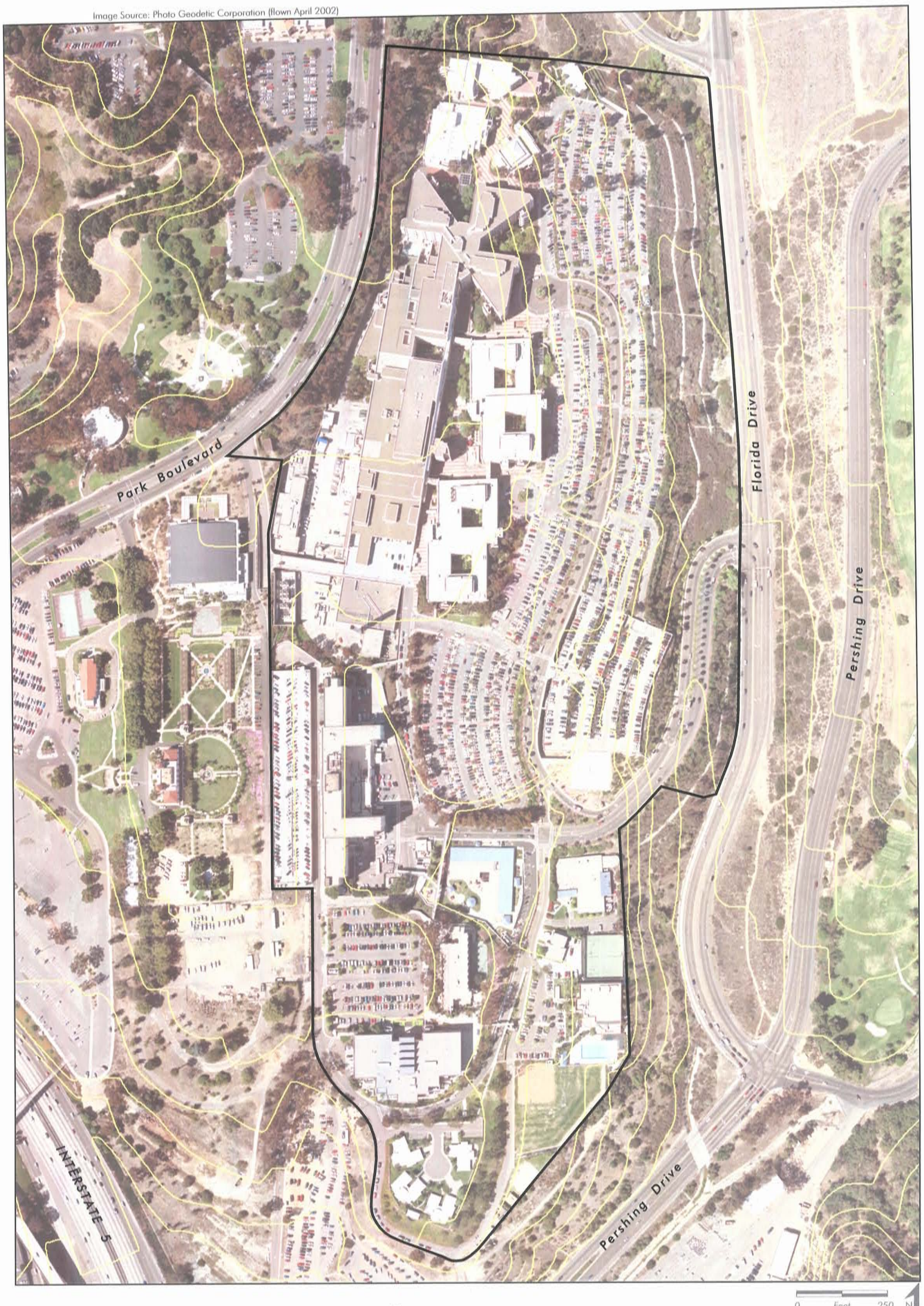

FIGURE 3
Topography Map

person or organization to implement this Plan, the Owner will designate a person or group as the Exotic Invasive Manager.

2. Exotic Invasive Manager

An Exotic Invasive Manager acceptable to the Owner shall be hired to implement this Plan. The Exotic Invasive Manager can either be an individual or an organization as long as the person(s) actively managing the NMCSD meets the qualifications outlined below to the satisfaction of the Owner. If the Exotic Invasive Manager is an organization, a project manager shall be designated. The Exotic Invasive Manager will be responsible for the day-to-day implementation of this Plan and will carry out the requirements and objectives described herein.

Qualifications of the Exotic Invasive Manager

The individual or project manager identified by the organization contracted to implement this Plan must meet the following criteria:

- B.S. or B.A. degree in ecology, botany, biology, landscape maintenance, range management, or related field.
- At least two years of experience in native or horticultural landscaping including invasive and exotic weed control in southern California, preferably San Diego County.
- Demonstrated experience in similar projects or in projects including similar skills.

Biological Resources

A. Topography

The natural topography of the site has been altered for development by creating flat terraces for buildings and parking lots and associated manufactured slopes. Elevations on the site range from 100 feet to 280 feet above sea level (see Figure 3). The general slope of the site runs west to east with the highest point of the property in the northwest corner. A network of drains and gutters channel runoff from the site toward the southeast corner of the property and into an unnamed drainage that runs along Powerhouse Canyon and Florida Drive. The eastern boundary of the site includes 9.5 acres of manufactured slopes that have been revegetated with native upland species (coastal sage scrub).

B. Soils

Three soil map units have been identified on the NMCSD property: Redding cobbly loam, 9 to 30 percent slopes; Redding gravelly loam 2 to 9 percent slopes; and urban land (USDA 1973). The first two soil

types belong to the Redding soil series that is well drained, undulating to steep gravelly loams that have a gravelly clay subsoil and a hardpan. The elevations of these soils typically range from 200 to 500 feet and the native vegetation on undisturbed areas typically consists of chaparral and sage scrub plant communities. Below is a detailed description of the three soil units.

Redding cobbly loam, 9 to 30 percent slopes: This strongly sloping to moderately steep soil is 10 to 20 inches deep over a hardpan. Cobblestones make up 20 to 30 percent of the surface layer and 25 to 35 percent of the subsoil. Runoff is medium to rapid, and erosion hazard is moderate to high. This soil type is found along the eastern third of the site to Florida Drive. The manufactured slopes on this soil type have been revegetated with a coastal sage scrub plant community.

Redding gravelly loam, 2 to 9 percent slopes: This mapping unit has a wide range of soil characteristics. Fertility is low and permeability is very slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. The rooting depth is 13 to 26 inches and the clay subsoil generally restricts root penetration. This soil type occurs on the northwestern corner of the project site where the steep slope levels off to Park Boulevard. Eucalyptus (*Eucalyptus* sp.) trees dominate the vegetated portions of this soil type.

Urban Land: The landscape in these areas has been altered significantly through cut and fill operations and leveling for building sites. The material exposed in the cuts is cobbly hardpan and the material in the fills is a mixture of cobbly and gravelly loam and clay. Between the building sites are very steep escarpments that are easily eroded.

C. Vegetation Communities

Complete descriptions of the vegetation communities present within NMCSD are described in the Natural Resources Inventory and Implementation Guide for NMCSD (RECON 2003). Discussed below are brief descriptions of the dominant vegetation communities that occur within weed management areas. These plant communities and the weed management area are depicted in Figure 4.

1. Diegan Coastal Sage Scrub

Diegan Coastal sage scrub (DCSS) is a plant community comprised of low-growing, aromatic, drought-deciduous soft-woody shrubs that have an average height of approximately three to four feet. The plant community is typically dominated by facultatively drought deciduous shrubs. The community typically is 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. Diegan coastal sage scrub is found in coastal areas from Los Angeles County south into Baja California, Mexico (Holland 1986). This plant community is dominated by species such as California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), broom baccharis (*Baccharis sarothroides*), and fourwing saltbush (*Atriplex canescens*).

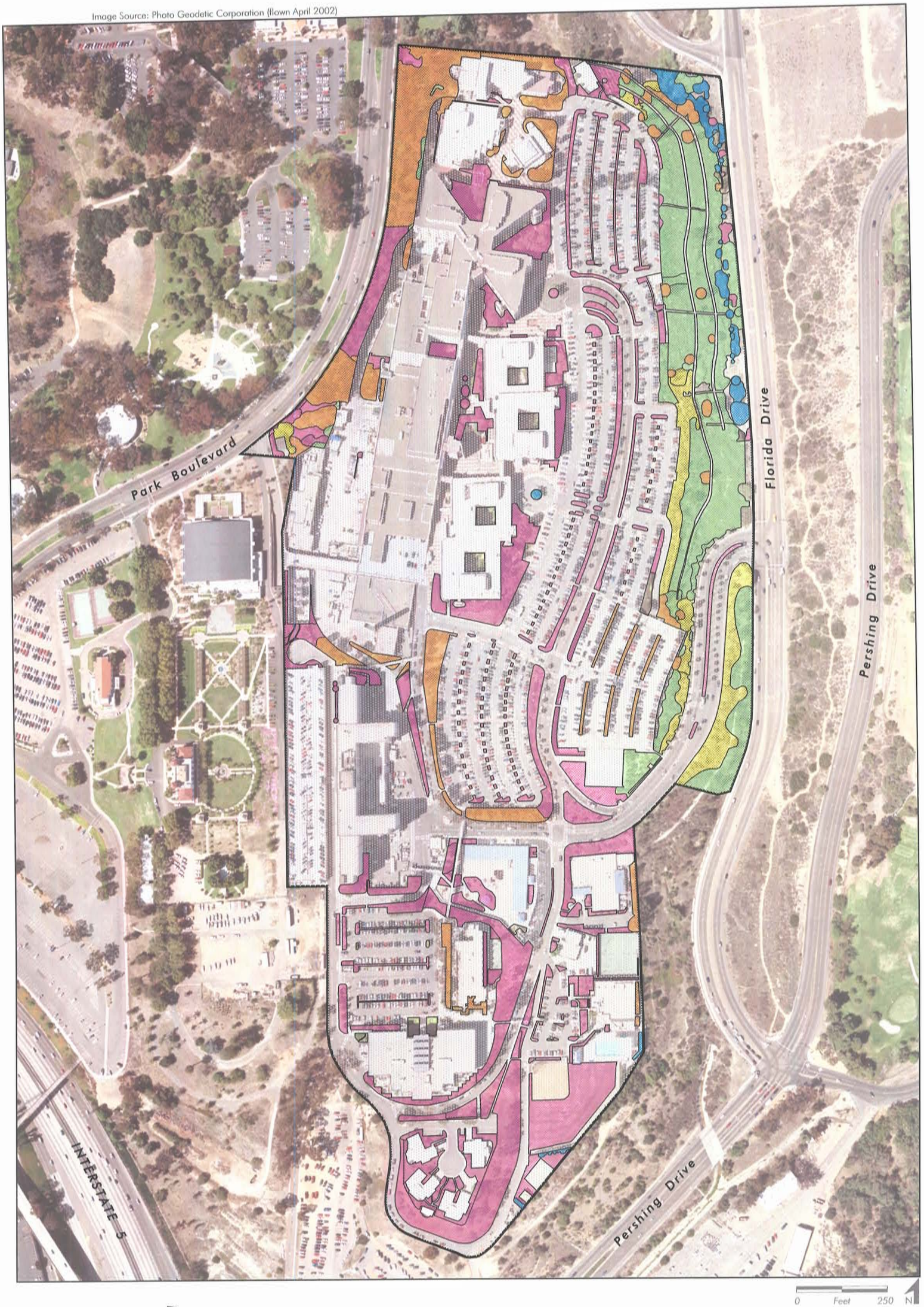

FIGURE 4
Vegetation Map
(Holland Classification System)

2. Southern Willow Scrub

Southern willow scrub (SWS) is a dense riparian community dominated by broad-leaved, winter-deciduous trees. Goodding's black willow (*Salix gooddingii*), arroyo willow (*Salix lasiolepis*), and mule fat (*Baccharis salicifolia*) dominate the SWS in the on-site urban drainage. The community contains a variety of invasive non-native species including palm trees (*Washingtonia robusta* and *Phoenix canariensis*), giant reed (*Arundo donax*), Peruvian pepper tree (*Schinus molle*), and pampas grass (*Cortaderia* sp.).

3. Ornamental Vegetation

Ornamental vegetation dominates the site and consists of a wide variety of non-native species that were planted for landscape purposes. Two additional categories have been identified: eucalyptus-dominated and acacia-dominated ornamental landscaping. These are areas that are dominated by either eucalyptus trees (*Eucalyptus* spp.) or acacia trees (*Acacia* spp.) and are generally located within or adjacent to the native slopes around the perimeter of the site.

4. Disturbed Habitat

Disturbed habitat on-site includes areas of disturbance that are mainly vegetated with invasive annual species, such as crown daisy (*Chrysanthemum coronarium*), mustard (*Brassica* spp.), and tocolote (*Centaurea melitensis*). The majority of disturbed habitat occurs in the northeast corner of the property adjacent to the intersection of Morley Field Drive and Florida Drive.

D. Species of Concern

Complete descriptions of the habitats present within NMCSD are described in the Natural Resources Inventory and Implementation Guide for NMCSD (RECON 2003). The wildlife present are typical of those commonly found in urban, DCSS, and SWS plant communities and habitat.

No rare plant species were observed during focused surveys. One bird species, the coastal California gnatcatcher (*Polioptila californica californica*), a federally threatened and California species of special concern, was observed foraging along the native slopes above Powerhouse Canyon during many of the focused ornithological surveys.

Exotic Invasive Plant Removal Plan

A. Overview of Exotic Invasive Plant Removal Plan

The EIRP is one component of long-term property management. This plan is based on enhancing the desired plant species and habitats, rather than only eliminating weeds. Preventative programs are described to keep the management area free of species that are not yet established and are known to be

pests elsewhere in the region. Priorities are set to reduce or eradicate weeds that have been established on the property, according to their actual and potential impact on land management goals, and according to the ability to control the nuisance species. Management actions will be taken only when careful consideration indicates that leaving a weed species unchecked would result in more damage than controlling it with the most practical methods.

The native open space areas on NMCSD are not entirely isolated, but are part of a larger ecosystem that includes neighboring open space areas and developed lands, as well as ornamental landscaping. For many plants, the mechanism for weed dispersal may include travel by wind, water, or transport by animals (including humans). For this reason, any adjacent areas occupied by invasive weeds may pose a threat to neighboring lands, as these modes of seed transport may carry unwanted species into the native open spaces. Surveys for invasive plant species should include reconnaissance surveys on neighboring lands, with landowners' approval, for invasive species and potential sources of weed seed production. If populations of invasive species are discovered in parcels immediately adjacent to native open space, and these species have the potential to disperse viable seed into these areas, then the NMCSD should try and work with the respective landowner to eradicate or manage the off-site problem.

The strategy for the EIRP is to create a "living document" that uses the lessons learned from previous seasons of work to mold future efforts. This strategy can be broken down into six steps:

1. Establish both short-term and long-term management goals for weed prevention, eradication, and control.

2. Identify the weeds interfering with management goals and assign priorities based on their impacts.

3. Select weed control options. Assessments are made on the effects of target (and non-target) species and, if necessary, priorities should be adjusted.

4. Develop and implement an Exotic Invasive Plant Removal Plan (this document).

5. Monitor and assess impacts of management actions on target and non-target species.

6. Evaluate the effectiveness of methods (measured against the site goals) and use this information to refine control priorities, methods, and goals.

From this six-step process, a practical, effective, and realistic approach to weed management may be obtained. Every year, the data collected can provide useful information for improved management practices and, in turn, may increase the overall quality of habitat within the NMCSD.

B. Management Tools

The species, location, and extent of weed infestation will largely determine the management tools used to control weed populations. Consideration will also be given to the difficulty of controlling a particular weed species. The focus of management will be placed on preservation of the desired vegetation community or functioning ecosystem rather than eliminating single exotic species.

All options of control will be considered before action is taken. These methods may include removal by hand, machine, or biological agents, plating native plants, or applications of herbicides. Each of these management tools has advantages and disadvantages, and often the best approach is a combination of methods (Bossard *et al.* 2000). It is likely that one or more of these methods may not be appropriate for situations within the NMCSD and these methods should not be used.

A number of operational considerations should be taken into account when considering any weed management tool. The first consideration a land manager faces is the varying cost of management tools that are available. Hand removal operations consist of the expense of the removal equipment as well as significant labor costs. If ground in the removal site is disturbed, reseeding or container planting and costs associated with these tasks should be considered. If soil is disturbed (by excavation) to kill a noxious weed and not replaced with native plants, then other invasive weeds will be encouraged to recruit into the available space. Revegetating disturbed areas will be an important preventative strategy for suppressing future weed infestations.

1. Prevention

The most effective and efficient weed control strategies prevent invasions by exotic plant species and quickly detect invasions that occur so weeds can be eradicated or contained before they spread (Bossard *et al.* 2000). Management tools to prevent the establishment of weeds within a given area include regular monitoring for invasive species, removing exotic seed sources from neighboring areas, and revegetating areas as soon as disturbances occur.

2. Eradication

Eradication is the elimination of a weed from a given area. Weed eradication is possible if the populations on-site are targeted for removal. However, the species is likely to reinvade from adjacent properties if there is no barrier to prevent dispersal. Early detection and removal of a new weed infestation is critical if eradication is the management goal of a particular weed.

3. Physical Control

a. Material Removal

Physical control often involves hand dethatching, pulling, cutting, or removal by mechanical means. These methods are labor intensive and may be used for smaller populations of weed infestations or around sensitive habitats. Physical methods of weed control may provide an advantage in these situations where

desirable species may be left in place while surrounding weeds may be removed. Dethatching is a useful tool that removes the dead or dying plant material from the soil surface. Dethatching also removes weed seed that may still be attached to the plant and will also increase the effectiveness of subsequent herbicide applications.

b. Mulching

Applying mulch, black paper, or black plastic excludes light from reaching weeds and prevents them from photosynthesizing. Commonly used mulch includes grass clippings, hay, manure, straw, sawdust, wood chips, or rice hulls. Mulches can be a very effective form of weed control in small areas and can aid in soil stabilization, moisture retention, and soil insulation. If mulch is used as a form of weed control it is imperative that weed-free material is used to prevent the introduction of other weeds.

c. Soil Solarization

Soil solarization controls weeds by killing weed seeds that have not yet germinated. A clear plastic sheet is placed over the soil surface and left in place for at least one month. The plastic sheet creates a greenhouse effect, increasing soil temperatures. High temperatures kill some seeds while weakening others, making them more susceptible to attack by pathogens (Schlesseman *et al.* 1989).

4. Competition and Restoration

Competition and restoration involves the planting and rearing of native species so they may out-compete invasive species. By increasing the density and distribution of native trees, shrubs, and forbs, there is less space available for weed species to occupy. Planting will often involve a maintenance period where watering and weeding will be necessary until the plants have become established. This method of weed management should be implemented in conjunction with another form of weed control, such as dethatching and/or herbicide use.

5. Chemical Control

The chemical means of controlling weeds is the application of herbicides. Herbicides kill or inhibit plant growth and can be very effective in controlling many weed species. Different weed species may require alternate herbicides, application rates, and time of application.

Using herbicides to control weeds requires careful planning and a professional staff familiar with the application areas and herbicides they are using. The use of herbicides should be under the direction of a professional pesticide applicator with either a Qualified Applicators License (QAL) or Pesticide Applicators License (PAL). Before applying any herbicides, the applicators should be aware of all safety regulations, applicable environmental regulations, and be familiar with target versus native plants. The land manager is responsible for meeting these requirements and approving any trained staff or certified pesticide applicators that will handle herbicides. The land manager should be consulted before actions are taken.

The method of application varies greatly from one species to the next and also with the degree of infestation. The application method ultimately chosen should minimize risks of harming non-target plants. The herbicide used should be appropriate for the given species and environmental condition. The environmental risks of using herbicides include drift, volatization, persistence in the environment, groundwater contamination, and harmful effects on animals.

All of the vegetation communities that fall under the management of this plan have exotic weeds, to some degree, but priority should be given to areas where there are fewer weeds or to buffer areas around high-quality habitat to prevent infestations.

C. Weed Management Target Species

The California Exotic Pest Plant Council (CalEPPC) has published a list of "exotic pest plants of greatest ecological concern" (List) (CalEPPC 1999). This List is based on information submitted by land managers, botanists, and researchers throughout the state, and on published sources. The List highlights non-native plants that are serious problems in areas that support native ecosystems, including parks, reserves, wildlife areas, and national forests, as well as some working landscapes such as rangelands.

Several ornamental plants on NMCSD that have been planted in landscaping beds are considered invasive weeds when they escape into native open areas. For this reason, different control and monitoring programs are planned for different areas within NMCSD. In general, CalEPPC listed plants that occur in native areas will be monitored and controlled. CalEPPC listed plants that occur in landscaped areas should be monitored and managed on a case-by-case basis. Ornamental plants that have recruited outside of their designated planting area or were planted immediately adjacent to native areas should be considered for removal.

The CalEPPC listed plants that occur within NMCSD and their category are listed in Table 1. The CalEPPC List of exotic pest plants is categorized by ecological threat. The categories break down as follows:

List A: Most Invasive Wildland Pest Plants; documented as aggressive invaders that displace natives and disrupt natural habitats. Includes two sub-lists:

List A-1: Widespread pests that are invasive in more than three Jepson regions[1]

List A-2: Regional pests invasive in three or fewer Jepson regions.

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[1] The Jepson Manual has described the function of providing geographic ranges in a botanical context to help the user of the manual predict where plant taxa can be expected to grow. There are 10 regions, which cover the State of California.

TABLE 1
EXOTIC INVASIVE PLANT SPECIES OBSERVED

Scientific Name	Common Name	CalEPPC Status
Acacia redolens	Acacia	none
Aptenia cordifolia (L.F.) N.E.Br.	Baby sun rose	Need more Info
Arundo donax L.	Giant reed	A-1
Asphodelus fistulosus L.	Hollow-stem asphodel	Need more Info
Atriplex semibaccata R.Br.	Australian saltbush	A-2
Brassica nigra (L.) Koch.	Black mustard	B
Bromus madritensis L. ssp. *rubens* (L.) Husnot	Foxtail chess	A-2
Carpobrotus chilensis (Molina) N.E. Brown	Sea fig	Considered
Carpobrotus edulis (L.) Bolus.	Hottentot fig	A-1
Centaurea melitensis L.	Tocolote, star-thistle	B
Coprosma repens A. Rich.	Mirror Plant	Considered
Cortaderia jubata (Lemoine) Stapf	Pampas grass	A-1
Cotoneaster sp.	Cotoneaster	Need more Info
Cynara cardunculus L.	Cardoon	A-1
Echium plantagineum L.	Viper's bugloss	Need more Info
Eucalyptus globulus	Eucalyptus	A-1
Ficus carica L.	Edible fig	A-2
Foeniculum vulgare Mill.	Fennel	A-1
Hedera helix L.	English ivy	B
Malephora crocea (Jacq.) Schwantes	Croceum iceplant	Need more Info
Medicago polymorpha L.	California bur clover	Considered
Mesembryanthemum crystallinum L.	Crystalline ice plant	B
Mesembryanthemum nodiflorum L.	Slender-leaved ice plant	Need more Info
Myoporum parvifolium L.	Myoporum	A-2
Nerium oleander L.	Oleander	Considered
Nicotiana glauca Grah.	Tree tobacco	Need more Info
Olea europeae L.	Common olive	B
Oxalis sp.	Wood-sorrel	Need more Info
Pennisetum setaceum Forsskal	Fountain grass	A-1
Picris echioides L.	Bristly ox-tongue	Considered
Oryzopsis miliaceae (L.) Benth.	Smilo grass	Need more Info
Ricinus communis L.	Castor bean	B
Salsola tragus L.	Russian thistle, tumbleweed	Need more Info
Schinus molle L.	Peruvian pepper tree	B
Schinus terebinthifolius Raddi	Brazilian pepper tree	B
Tamarix sp.	Tamarisk	A-1
Vinca major L.	Greater periwinkle	B
Zantedeschia aethiopica L.	Common calla lily	Considered

Key to CalEPPC List Categories:

A-1 = Widespread pests that are invasive in more than three Jepson regions.

A-2 = Regional pests invasive in three or fewer Jepson regions.

B = Wildland Pest Plants of Lesser Invasiveness; invasive pest plants that spread less rapidly and cause a lesser degree of habitat disruption; may be widespread or regional.

Considered = Plants that, after review of status, do not appear to pose a significant threat to wildlands.

Need more Info = Plants for which current information does not adequately describe the nature of threat to wildlands, distribution or invasiveness. Further information is requested from knowledgeable observers.

List B: Wildland Pest Plants of Lesser Invasiveness; invasive pest plants that spread less rapidly and cause a lesser degree of habitat disruption; may be widespread or regional.

Red Alert: Pest plants with potential to spread explosively; infestations currently small or localized. If found, alert the California Invasive Plant Council (Cal-IPC), the County Agricultural Commissioner, or the California Department of Food and Agriculture.

Need More Information: Plants for which current information does not adequately describe nature of threat to wildlands, distribution or invasiveness. Further information is requested from knowledgeable observers.

Considered But Not Listed: Plants that, after review of status, do not appear to pose a significant threat to wildlands. Plants that fall into the following categories are not included in the List:

- Plants found mainly or solely in disturbed areas, such as roadsides and agricultural fields.
- Plants that are established only sparingly, with minimal impact on natural habitats.

D. Weed Management Target Areas

Highest priorities should be given to CalEPPC List A weed species that occur in either DCSS or riparian habitats on-site. Higher priority within this list is given to plants that interfere with the most important management goals and whose populations are small and easiest to control in the short-term before they spread. All listed species should be monitored at least every three years and mapped, if possible. Schedules for weed control are dependent on the type of weed species being controlled. As certain species are removed, new exotic species may move into these areas. Therefore, these areas must be monitored and controlled as needed.

1. Native Upland Habitat

Native upland habitat is confined to the western slopes of NMCSD. The most widespread weed over this habitat is salt cedar (*Tamarisk* sp.). Other problematic species in this area include artichoke thistle (*Cynara cardunculus*), Pampas grass (*Cortaderia jubata*), tocolote (*Centaurea melitensis*), yellow star thistle (*C. solstitialis*), fountain grass (*Pennisetum setaceum*), and other potentially invasive herbaceous species. These species out-compete native species for light, nutrients, and water and can form dense uniform stands. Many of these species are prolific seed producers that may build up the seed bank quickly once established.

Control of the problematic species for native upland habitat is high priority. All of the high-priority native upland habitat weed species should be removed when detected by a method appropriate for each situation. Other, less invasive species, such as iceplant (*Carpobrotus edulis*) and (*Mesembryanthemum crystallinum*), blue gum (*Eucalyptus globules*), and acacia (*Acacia redolens*), may commonly occur in

these areas and have a medium to low priority for removal unless evidence suggests that the populations are becoming detrimental to native habitats.

2. Riparian Areas

Riparian areas are vegetated zones surrounding watercourses and are highly susceptible to weed infestations. Weeds occurring within NMCSD riparian areas include, giant reed (*Arundo donax*), sweet fennel (*Foeniculum vulgare*), castor bean (*Ricinus communis*), blue gum, iceplant, and salt cedar. These six species can alter riparian community composition and structure if allowed to spread. These changes would result in a significant decline in habitat quality.

Elimination and monitoring of invasive weeds from riparian areas is a high priority. All six of the high-priority riparian weed species should be removed when detected by a method appropriate for each situation. Other, less invasive species that may commonly occur in these areas have a low priority unless evidence suggests that the populations are becoming detrimental to native habitats.

3. Ornamental Areas

Several ornamental landscape areas within NMCSD contain tree and shrub species that are considered invasive weeds when they are introduced to native landscapes. These species include Brazilian pepper tree (*Schinus molle*), iceplant (*Carpobrotus chilensis* and *C. edulis*), fountain grass, and Eucalyptus. Unless the species in question is a CalEPPC List A plant, this EIRP will not require the removal of these ornamental species (see Table 1). Instead, it is recommended that precautions be taken to reduce the threat of these plants from recruiting into native areas. Precautions may include:

- Cut seed heads off selected plants.
- Sweep or rake seeds off the ground when they fall from trees.
- Trim ornamental plants to ensure they don't overgrow their planters or designated planting area.

F. Monitoring and Education Plan

Management and monitoring of the EIRP should be coordinated with other land management practices on NMCSD. All landscaping personnel working on NMCSD should become educated in identifying problem weeds so that the weed locations can be mapped. This will serve both to monitor known weed populations and act as an early warning system for new invasions of target pest species.

It is important to know the distribution of the weed species on NMCSD. It will allow the land manager to track the spread of each species and the efficacy of weed control tactics used. Blank survey maps should be made available to landscaping personnel working on the site. Workers can make notes on these maps when invasive weeds are encountered during routine maintenance activities. These maps should be compiled at the end of each year and will be used to assist in focused surveys.

Focused surveys should be conducted every three years. Focused surveys will include tracking the density and distribution of invasive weeds on and adjacent to NMCSD. Surveys should be conducted by walking along concrete drainages, roads, and slopes. Invasive weeds can often be spotted from far distances by color or growth habit. Specific attention should be given to riparian areas and drainage ways, as they serve as corridors for seed dispersal. Detailed aerial photographs should be used with focused surveys to pinpoint exact locations of new weed populations.

Specific Weed Control Plans

Focused surveys were conducted in summer 2003 by RECON botanist, Brant Primrose to determine the current extent of invasive exotic plant species on-site. Figures 5–5c map the distribution of these species. The following sections describe the target exotic invasive species that should be managed and controlled, the current distribution of that species on-site, goals for management, control options, and treatment schedule. Attachment 1 includes detailed photographs of the problematic exotic weed species mentioned in this section. These photographs should assist the Exotic Invasive Manager in identifying these weed species.

A. Salt Cedar

Priority: High (in all areas)—Four invasive species of *Tamarisk* have been identified within California: *T. ramosissima, T. chinensis, T. gallica,* and *T. parviflora.* Presence of any one of these species can have devastating effects on the native habitats where they are found. Some of the more profound effects include dramatic narrowing of stream channels and sediment trapping, lowering water tables, increases in soil salinity, fire frequency, plant community composition, and native wildlife diversity. The populations of these species are small and it is likely that they may be successfully extirpated.

Description: Salt cedar (*Tamarix* spp.) is a rhizomatous rooted noxious weed that may occur as spotty to heavy infestations along drainages and shores of water bodies. All four species of salt cedar are many branched, or are trees with small scale-like leaves. Leaves have salt glands and flowers are small, white to deep pink, and densely packed on racemes. The bark is reddish-brown with smooth stems less than one inch in diameter. Tamarisk is found throughout much of central Asia. Tamarisk may have been introduced into North America by the Spaniards but was also used in the 1800s as erosion control, windbreaks, shade, and as an ornamental. It spreads by seed and vegetative growth. An individual plant can produce 500,000 seeds per year.

Current Distribution within the NMCSD: Small populations of salt cedar have been located on-site (see Figures 5–5c).

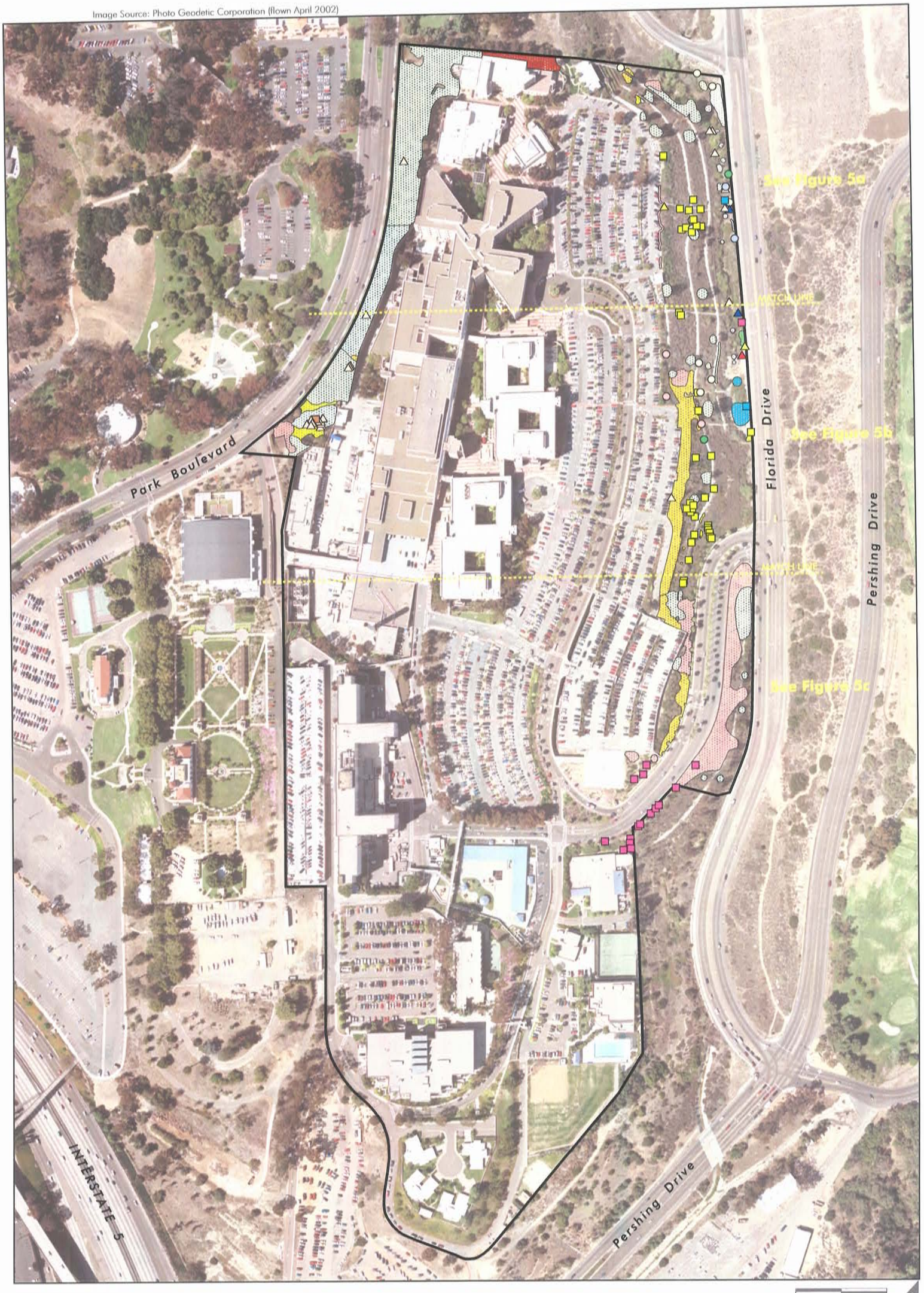

FIGURE 5
Distribution of
Exotic Invasive Plants

Image Source: Photo Geodetic Corporation (flown April 2002)

Project boundary

Exotics invasive plants (invidual)
- Castor bean
- Crown daisy
- Fountain grass
- Giant reed
- Ice plant
- Mexican fan palm
- Pampas grass
- Sweet fennel
- Tree tobacco

Exotics invasive plants (multiple inviduals)
- Acacia
- Acacia, Eucalyptus
- Black mustard
- Castor bean
- Crown daisy
- Eucalyptus
- Eucalyptus, English Ivy
- Eucalyptus, Ice plant
- Ice plant
- Washington palm

0 Feet 100 N

FIGURE 5a
Distribution of
Exotic Invasive Plants

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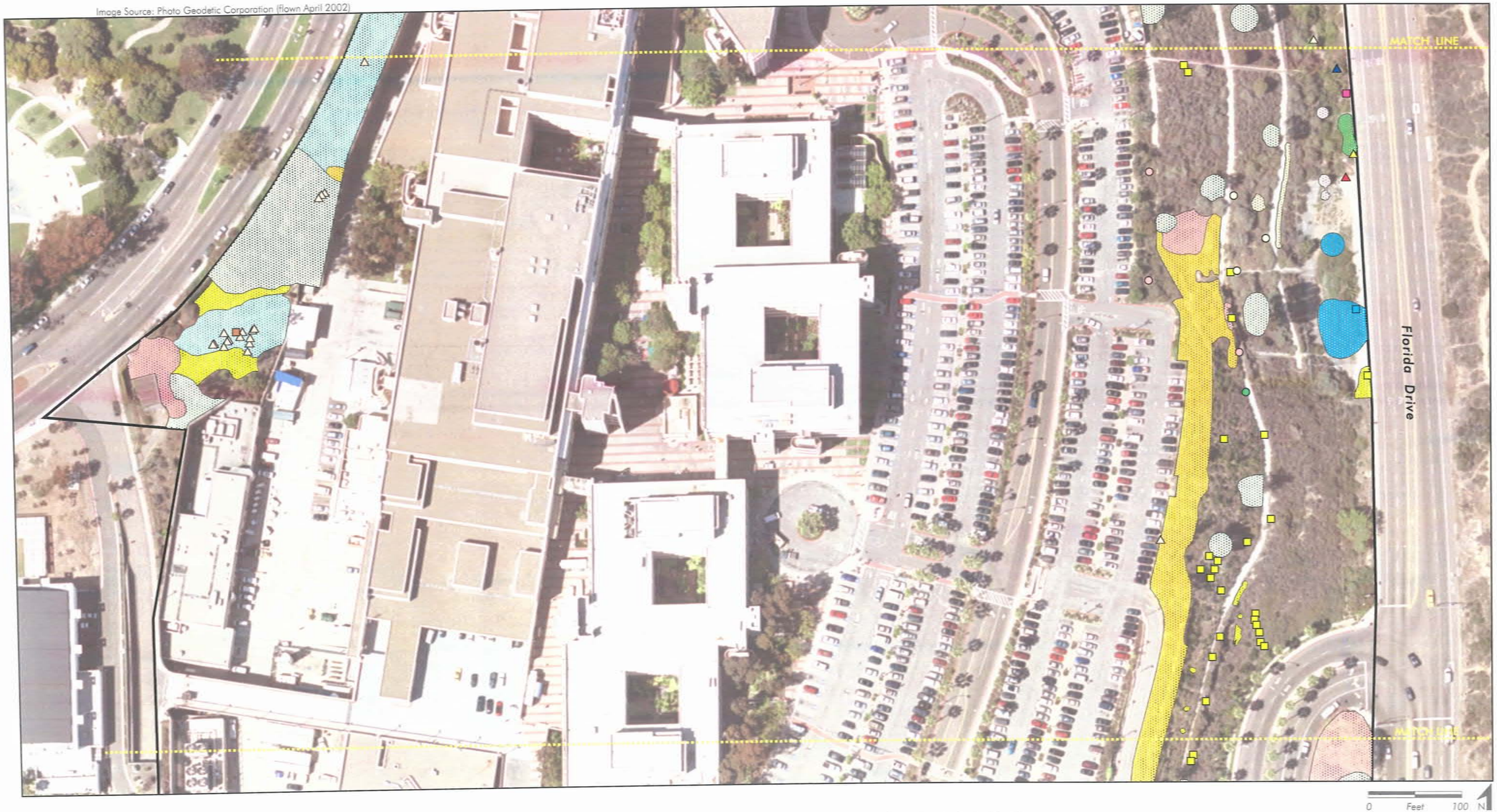
fg5a (exotics) 11/06/03

Image Source: Photo Geodetic Corporation (flown April 2002)



Project boundary

Exotics invasive plants (invidual)
- Acacia
- Crown daisy
- Fountain grass
- Giant reed
- Hollow-stem asphodel
- Ice plant
- Mexican fan palm
- Pampas grass
- Sweet fennel
- Tamarisk
- Tree tobacco

Exotics invasive plants (multiple individuals)
- Acacia
- Acacia, Eucalyptus
- Crown daisy
- Eucalyptus
- Eucalyptus, Ice plant
- Fountain grass
- Giant reed
- Ice plant
- Washington palm

FIGURE 5b
Distribution of
Exotic Invasive Plants

Image Source: Photo Geodetic Corporation (flown April 2002)

Project boundary

Exotics invasive plants (invidual)
- Hollow-stem asphodel
- Ice plant

Exotics invasive plants (multiple inviduals)
- Acacia
- Acacia, Eucalyptus
- Eucalyptus
- Ice plant

0 Feet 100 N

FIGURE 5c
Distribution of
Exotic Invasive Plants

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hg3c /exarcs 11/06/03

Measurable Objectives and Goals: Eradicate and prevent establishment within the NMCSD.

- Locate and map all specimens within the NMCSD.
- Eradicate existing plants within three years.
- Continue yearly surveillance. Consider restoration at areas of dense infestations if they do not recover within three years.

Control Options: Like many other invasive species, salt cedar is easily spread and difficult to eradicate. Therefore, early detection and control are critical to the successful control of this species. Post treatment monitoring is also essential since salt cedar is capable of resprouting following treatment. Seedlings will continue to establish as long as salt cedar infestations persist upwind or upstream of the NMCSD.

Physical Control

Removal by mechanical methods is not an effective means of controlling salt cedar since it tends to resprout vigorously following cutting. Seedlings and small plants may be successfully uprooted by hand if the entire root system can be removed.

Chemical Control

The most frequently used and effective method in California is to cut the salt cedar shrub near the ground and immediately (in less than 30 seconds) apply a triclopyr or glyphosate herbicide to the cut stump. This technique usually results in a 90 percent kill rate.

Biological Control

The USDA is currently conducting numerous studies on biological control agents for salt cedar. Numerous insect species have been found in Asia and Europe that feed only on salt cedars and cause them much damage. Fifteen species are being tested as candidate biological control agents for salt cedar. Final approval for release awaits a determination that biological control will not harm endangered species that inhabit areas infested with salt cedar. In the near future, biological control may be an effective and inexpensive means of controlling salt cedar.

Treatment Schedule:

- Winter–early spring: Locate all salt cedar individuals in the NMCSD.
- Spring–Summer: Treat all seedlings and mature trees with an appropriate control method. Avoid treatment of mature trees in summer months in areas where nesting birds occur. All cut vegetative material should be bagged and carried off-site.

B. Giant Reed

Priority: High (in all areas because this species can quickly move from upland to riparian habitats)—Giant reed (*Arundo donax*) can infest riparian areas and interfere with primary management goals.

Description: Giant reed is a rhizomatous perennial cane-like grass with light green leaves that diverge from the stem in a distinctive herringbone pattern. It grows up to eight meters tall in riparian areas, seeps, and ditch banks. Giant reed is indigenous to the Mediterranean Basin or to warmer regions of the Old World. Giant reed was brought to North America and grown for roofing material, to construct musical instruments, and for erosion control. Invasive populations resulted from escapes and displacements of plants from managed habitats. This plant grows vegetatively from rhizomes or fragments.

Giant reed reduces groundwater availability by transpiration of water through stems and leaves. It alters stream flow and channel morphology by the retention of sediments and constricting stream flows. During storm flows, the shallow roots of giant reed are undercut. The roots then slump and break away from the stream banks, taking the soil with them. The material then floats downstream and clogs culverts, channels, and bridge crossings. This results in the giant reed spreading vegetatively downstream. These obstructions have been known to cause flooding and to wash out bridges, causing millions of dollars in damages.

Current Distribution within the NMCSD: Surveys have been conducted and populations are currently established within the riparian portions of NMCSD (see Figures 5–5c).

Measurable Objectives and Goals: Eradicate and prevent establishment within the NMCSD.

- Locate and map all specimens within the NMCSD.
- Eradicate existing plants within three years.
- Continue yearly surveillance. Consider restoration at areas of dense infestations if they do not recover within three years.

Control Options: There are several different widely accepted methods to control giant reed and many of them rely on the presence or absence of native plants, size of the stand, the amount of biomass that must be dealt with, the terrain, and the season. No matter which method is ultimately used, future maintenance visits to ensure that giant reed has been effectively removed will be required.

Post-flowering and Pre-dormancy Method

The key to all giant reed removal is killing of the root mass. This requires treatment of the plant with a systematic herbicide at appropriate times of the year to ensure translocation to the roots. Currently, Rodeo® and Aquamaster® are the only herbicides that are approved for use in wetlands and has proven

very effective against giant reed. The herbicide treatment should include a foliar application of a two to five percent solution (or at the manufacturers recommendations) applied post-flowering and pre-dormancy at a rate of 0.5 to 1 L/hectare (0.2 to 0.6 L/acre) (Bell 1997). During this time, usually mid-August to early November, the plants are actively translocating nutrients to the root mass in preparation for winter dormancy that results in effective movement of herbicide to the roots.

Two to three weeks after foliar herbicide application, the leaves and stems should begin to brown and soften. After these indicators are present, the biomass should be removed from the site.

Cut-stem Treatment Method

The cut-stem treatment involves cutting the giant reed stems by machete, chainsaw, or shears near the base of the stalk. The cut stalks must be removed from the site and flowering stalks should be plastic bagged. Stems left on moist ground will sprout vegetatively; therefore, a thorough cleanup is essential to success. After the stems are cut, a concentrated herbicide must be applied to the cut stem within one to two minutes in order to ensure tissue uptake (Monsanto 1989).

The cut-stem treatment is a more costly method because it requires more man-hours to be effective. However, this method is less time-specific as long as cuttings occur post-flowering (Bell 1997).

Multiple Treatment Method

This method of giant reed removal is the most labor intensive and costly but may be applied at any time of year. First, cut the stalks and completely remove cut stems and flowering stalks from the site, wait three to six weeks, then treat the resprouts with a foliar herbicide (Bell 1997). The benefit to this method is that less herbicide is used to treat the plants. However, by cutting the stalks and not immediately treating them with herbicide, the plants may return to their growth phase and nutrients would be drawing from the root mass upward, making herbicide translocation to the roots much less effective and frequent follow-up treatments necessary.

Removing Giant Reed Biomass Method

Methods for removal of the giant reed biomass include prescribed fire, heavy machinery (e.g. bulldozers), hand cutting by chainsaw or brush cutter, Hydro-ax®, chipper, or vehicle. Hauling the biomass by vehicle is very costly and most landfills will not accept the material unless it has been cut into short lengths and plastic bagged. If chipping is done, it must be chipped very finely to prevent shoot regeneration. Prescribed fire is the most effective and cheapest method if burn permits can be obtained.

Treatment Schedule:

- April–May: Locate any giant reed infestations.
- August: Treat giant reed.

C. Cardoon

Priority: High (in riparian, grassland, and DCSS areas)—Cardoon (*Cynara cardunculus*) reduces forage production and prevents wildlife movement where it has become overgrown. This species is widely branching and out-competes native plants for light, nutrients, and water.

Description: Cardoon, also called artichoke thistle, is a perennial herb that may grow up to two-meters high and two-meters wide with a cluster of large purple flower heads. Cardoon reproduces from seed. Cardoon may colonize in riparian woodlands and natural openings in chaparral and sage scrub, as well as in native grasslands (Pepper and Kelly 1994). Cardoon is native to the Mediterranean and has become widespread over California, Australia, New Zealand, and South America. It is believed that invasive populations of cardoon are derived from the cultivated variety of artichoke. Cardoon out competes native plants for light, water, and nutrients.

Current Distribution within the NMCSD: Surveys have been conducted and populations are currently established within the NMCSD (see Figures 5–5c).

Measurable Objectives and Goals: Eradicate and prevent establishment within the NMCSD.

- Locate and map all specimens within the NMCSD.
- Eradicate existing plants within three years.
- Continue yearly surveillance. Consider restoration at areas of dense infestations if they do not recover within three years.

Control Options: Cardoon has the ability to resprout after chemical spraying and build up a seed bank that lasts five years or more. Repeat treatments and yearly monitoring are necessary for complete eradication.

Manual Methods of Control

Grubbing is practical where populations are small and distribution is limited. When grubbing, the taproot must be removed to prevent resprouting. Cutting and removing seed heads can stop seed production in small populations where timely eradication of the plant is not possible (Pepper and Kelly 1994).

Chemical Control

Glyphosphate is effective at killing cardoon and may be utilized as a cut-stump application. In cut-stump applications, a solution of 25 percent glyphosphate should be applied to the stump immediately following cutting. A foliar spray of two percent may also be effective on killing mature bolting (growing a long

flower stalk from its center) plants. Spraying the plants before the plant sends up its flower stalk may have less successful results and will need repeated treatments.

Treatment Schedule:

- February-March: Locate all seedlings in the NMCSD.

- April: Successful eradication of cardoon is most successful when the plants are bolting, usually in spring. Earlier eradication efforts may be less successful where individuals will resprout from their base.

D. Tocolote and Yellow Star Thistle

Priority: High in grassland and DCSS areas where populations are not already established.

Description: Tocolote (*Centaurea melitensis*) and yellow star thistle (*Centaurea solstitialis*) are both winter annuals that produce one to several solitary, spiny, yellow flowers. Tocolote was brought to California during the Spanish mission period. It may have been a contaminant of wheat, barley, and oat seed and was widely distributed in dry-farmed grain fields. Reproduction is by seeds which are transported by humans, animals, or wind.

Current Distribution within the NMCSD: Both species of thistle are widely distributed throughout California, although they are currently more common in northern regions of the state. Populations of these species are on the move to southern counties, and once established, populations explode. There are several programs statewide to control these pest species. Surveys have been conducted within the NMCSD and small populations of tocolote are currently established (see Figures 5–5c).

Measurable Objectives and Goals: Eradicate and prevent establishment within the NMCSD.

- Locate and map all specimens within the NMCSD.

- Eradicate existing plants within three years.

- Continue yearly surveillance. Consider restoration at areas of dense infestations if they do not recover within three years.

Control Options: The strategy for management of tocolote and yellow star thistle will be to control new invasions, should they occur. Spot eradication is the least expensive and most effective means of preventing the establishment of these species. In the beginning stages of infestation, it will be critical to control the plants before they set seed. Once established, control strategies should focus on eliminating seed production, follow-up treatments, and multiple years of management.

Manual Methods of Control

Line trimmers or mowers are effective at controlling thistle if the life form of the weed is from a main stem rather than a basal rosette. Manual control methods should be conducted at a stage where two to five percent of the seed heads are flowering (Benefield *et al.* 1999). Trimming too early may result in more vigorous plant growth and higher seed production.

Chemical Control

Glyphosphate (one percent solution) is effective at killing tocolote and yellow star thistle. Another effective compound is clopyralid (as Transline). Transline is a selective, broadleaf herbicide that provides excellent control of many tough, broadleaved invasive plants, yet is tolerant to a wide variety of herbaceous and woody plants, including grasses. It is applied as a foliar spray and translocates throughout the plant to the root system, thereby reducing the potential for resprouting in perennial plants. It is active in controlling many invasive plants, particularly in the Asteraceae and Fabaceae families.

Treatment Schedule:

- Mechanical: Line trimming and mowing shows best results after bolting (when the plant sends up a flower stalk) to very early flowering. Care should be taken to minimize soil disturbance.

- Chemical: If Chlopyralid is used, late fall to early spring is the ideal time for application. Control may still be achieved in late spring but higher application rates will need to be used.

E. Iceplant

Priority: Medium (in riparian and DCSS areas)—Iceplant species tolerate a wide range of soil conditions and may establish and grow in the presence of competitors and herbivores. In many areas, these species have formed nearly impenetrable mats that dominate resources.

Description: Hottentot fig (*Carpobrotus edulis*), also commonly called iceplant, is a ground-hugging succulent perennial that roots at the nodes, has a creeping habit, and often forms deep mats covering large areas. The leaves are three-sided with large radial pink, yellow, or whitish showy flowers. This species has been widely planted along roads and in planters for soil stabilization and landscaping. The species is native to coastal areas of South Africa and was brought to California in the early 1900s for stabilizing soil along railroad tracks.

Crystalline iceplant (*Mesembryanthemum crystallinum*) is a succulent, low-growing herb spreading over ground with flat, fleshy leaves. Leaves and stems are covered with distinctive tiny, clear, blister-like outgrowths. Flowers are small and radial from white to pinkish. The species is native to South Africa and is thought to have been introduced into California, perhaps as early as the 1500s, in sand used as ship ballasts. This species has also been used as an ornamental plant for erosion control.

Current Distribution within the NMCSD: Surveys have been conducted and populations are currently established within native habitat on NMCSD (see Figures 5–5c).

Measurable Objectives and Goals: Eradicate and prevent establishment within native areas on NMCSD. Crystalline iceplant should be eradicated over the entire site including populations within ornamental areas.

- Locate and map all specimens within native areas on NMCSD.
- Eradicate existing plants within three years (excluding ornamental areas for hottentot fig).
- Continue yearly surveillance. Consider restoration at areas of dense infestations if they do not recover within three years.

Control Options: Iceplant has the ability to resprout from nodes after removal. Repeat treatments and yearly monitoring are necessary for complete eradication.

Manual Methods of Control

Iceplant is easily removed by hand pulling. Because the plant can grow roots and shoots from any node, all live shoot segments should be completely removed from the weeded area. At least one follow-up visit is required for effective removal.

Chemical Control

Glyphosphate is effective at killing iceplant in concentrations of two percent or higher. The addition of one percent surfactant to break apart the cuticle on the leaves increases mortality. After herbicide application, it may take several weeks for the plant to die off, and resprouting can occur from apparently dead individuals for several months afterward. Care should be taken when herbicides are applied near native species to avoid overspray.

Treatment Schedule:

- Year-round: Locate all seedlings in the NMCSD and treat as needed.
- Mid-winter: Impacts to native species may be reduced by treating iceplant in early or mid-winter when most native plants are dormant. Subsequent herbicide applications may be necessary for effective control.

F. Fountain Grass

Priority: Low over most of the site.

Description: Fountain grass is a coarse perennial grass with a densely clumped growth form and erect stems up to five feet tall. The flower heads are prominent, nodding, and feathery. They resemble bottlebrushes six to fifteen inches long, with many, small, pink to purple flowers. Fountain grass is a native of Africa and the Middle East, but has become a widely popular ornamental plant. It easily reproduces from seed that is transported by humans, animals, and short distances by wind. Fountain grass has the ability to adapt physiologically and morphologically to different environments. Thick infestations of fountain grass can interfere with regeneration of native plant species.

Current Distribution within the NMCSD: Fountain grass is distributed as an ornamental planting within landscaped beds on NMCSD. Populations have been located on the fringe of native slopes (see Figures 5–5c).

Measurable Objectives and Goals: Prevent the spread of fountain grass into native habitats within the NMCSD.

- Locate and map all specimens within native areas on NMCSD.

- Conduct annual fall surveys to determine if fountain grass is recruiting into native areas.

Control Options: Fountain grass is difficult to eliminate. The long-lived seeds make control extremely difficult, and continued monitoring is essential. Control efforts are most effective when initial treatments are focused on satellite populations and then control is focused on core populations.

Manual Methods of Control

Small infestations can be removed by hand, weed-whip, shovel, or mattock. Root balls should be removed to prevent resprouting. If inflorescences are present when removing, the heads should first be cut and bagged to prevent seed shedding. Removal by hand may need repeated visits until all of the root mass has been removed.

Chemical Control

Chemical control of fountain grass has had limited success but may be effective in some situations. Foliar applications of glyphosphate may be applied prior to bolting.

Treatment Schedule:

- Physical: This perennial grass may be pulled at any time of the year. If flower heads are present (July through October), they should first be cut, bagged, then removed from the site. Repeat applications are necessary.

- Chemical: Herbicides should be applied prior to bolting in early spring.

G. Pampas Grass

Priority: High in riparian and native upland habitats where populations are not already established.

Description: Pampas grass (*Cortaderia jubata*) is a tall, coarse grass with a feather-like flower head. Pampas grass forms a large tussock three feet or more in diameter and over six feet high. The seed heads may reach 12 feet high. This grass is a long-lived perennial. Pampas grass is spread by splitting the basal tussock or by sexual reproduction. The viable seeds are formed when a female plant is pollinated by a bisexual plant and can produce 100,000 or more seeds from each flower head. Subsequently, winds can spread seeds for distances of up to 15 miles.

Pampas grass is native to Argentina, Brazil, and Uruguay, where it grows in damp soils along river margins. The plant was introduced to California in the 1800s as an ornamental and was planted throughout southern California to help prevent erosion. Pampas grass was available in California nurseries as an ornamental plant until recently when its invasive properties were realized. Heavy infestations of pampas grass can occur where these dense clumps of grass will out compete native vegetation.

Current Distribution within the NMCSD: Pampas grass is widely distributed throughout California and, until recently, was being sold in retail stores as an ornamental grass. In many urban areas, these ornamental plantings have escaped into disturbed and neighboring open spaces. There are several programs statewide to control this pest species. Surveys have been conducted within the NMCSD and populations have been identified (see Figures 5–5c).

Measurable Objectives and Goals: Eradicate and prevent establishment within the NMCSD.

- Locate and map all specimens within the NMCSD.
- Eradicate existing plants within three years.
- Continue yearly surveillance. Consider restoration at areas of dense infestations if they do not recover within three years.

Control Options:

Mechanical control

Excavating the root mass by hand or machinery is an effective means of eradicating small- to medium-sized plants. If the plants are removed while in flower, the seed head should first be cut off and bagged prior to removal. This will prevent the weed seeds from dispersing while removing the plant. After the root masses are excavated, the plant should be left upside down with roots exposed to die, or completely trucked from the site, as pampas grass can grow from uprooted plants.

When removing pampas grass by hand it is important to wear protective clothing. Pampas grass blades can inflict cuts.

Chemical control

Larger plants can be controlled by using one of the herbicides containing glyphosphate. To improve the effectiveness of herbicides, the following steps should be taken prior to application:

- Using a brush cutter, reduce the pampas grass plant to a clump three to four feet high. If plants are cut too short then the leaf surface area is too small for effective herbicide uptake.
- Clear away the debris and apply herbicide to exposed leaves immediately.
- Follow-up treatment may be necessary after original knockdown of plant. Treat accordingly.

Treatment Schedule:

Chemical: Plants may be treated at any time of the year, but preferably before the bolting of flower heads and seed-set. Pampas grass flowers and sets seed in autumn with March and April being the peak months.

H. Sweet Fennel

Priority: High in grassland and DCSS areas where populations are not already established.

Description: Sweet fennel (*Foeniculum vulgare*) is a perennial herb, three to six feet tall, with a strong anise-like (licorice) odor. The seeds can germinate at almost any time of the year, but plants generally do not flower until 18 months to two years. Once a plant is established, flowering stems are produced from the perennial crown each spring. Sweet fennel may also reproduce from its crown. Fennel is native to Europe and the Mediterranean region, where it has been used for centuries as a spice and for medicinal purposes. Fennel was presumably brought to North America for the same reasons and has escaped from cultivation. Fennel will reproduce from both root crown and seed. Seeds are dispersed by water, humans, birds, and rodents.

Current Distribution within the NMCSD: Surveys have been conducted within the NMCSD and populations have been established on-site (see Figures 5–5c).

Measurable Objectives and Goals: Eradicate and prevent establishment within the NMCSD.

- Locate and map all specimens within the NMCSD.
- Eradicate existing plants within three years.

- Continue yearly surveillance. Consider restoration at areas of dense infestations if they do not recover within three years.

Control Options:

Mechanical control

Deep tillage is effective in killing sweet fennel, but in many circumstances, this method is not practical because of the types of situations in which the plant occurs. Mattocking has proven successful. If the plants are to be removed by hand, immediate revegetation is needed to prevent reinfestation.

Chemical control

Sweet fennel is susceptible to sprays containing amine and ester formulations of triclopyr (Garlon 3A and Garlon 4, respectively), which should be applied by spot spraying at a dilution of one pound/acre. Application should be done when the plant is actively growing but before the flowering stage. Herbicide containing glyphosphate at the manufacturers recommended rate has also proven effective. Herbicide application rates should wet the plant thoroughly, particularly the crowns.

Treatment Schedule:

Control methods should be applied before the plants set seed and while the plants are actively growing. Seeds are produced during the summer and autumn, and the flowering stems die back during winter to be replaced by new growth in late winter. Therefore, the optimal time to control sweet fennel occurs from late winter to early summer.

I. Other Invasive Tree and Shrub Species

Priority: Medium—Tree of heaven (*Ailanthus altissima*), castor bean (*Ricinus communis*), blue gum (*Eucalyptus globules*), Brazilian pepper tree (*Schinus molle*), and prostrate acacia (*Acacia redolens*) can infest riparian areas and interfere with management goals. The populations of these species range from small to widespread and it is likely that they may be successfully extirpated over time.

Description:

Tree of heaven is a deciduous tree 30 to 60 feet high, with gray bark, and generally with root sprouts. This tree has large compound leaves and distinctive clusters of fruits. The leaves have a distinctive foul odor when crushed. Tree of heaven is a native of eastern China and was introduced throughout the northern hemisphere as a horticultural tree in the 1700s. Alianthus spreads by root sprouts and wind-dispersed seeds.

Castor bean is a perennial shrub, 3 to 15 feet tall, with large palmately lobed leaves, and sharply toothed leaf margins. The leaves are usually deep green but sometimes have a reddish cast. The fruit is a quarter-sized spiny capsule. Castor bean is native to warmer parts of Asia and Africa and has been cultivated as an oil crop and as an ornamental. Castor bean spreads by seed and is capable of resprouting from the root crown if cut. Castor bean seeds are extremely toxic to humans, cattle, horses, rabbits, sheep, pigs, goats, gophers, cats, dogs, and poultry. Ingestion of two beans to humans can be lethal.

Blue gum is a 150 to 180 foot tall aromatic tree. The leaves are a waxy blue color, sickle-shaped, and hang vertically. Trees produce abundant fruit and drop leaf and bark litter. Blue gum is native to Australia and was first cultivated in California in 1853 as an ornamental. It was planted widely for timber and fuel but later lost popularity because of unsuitable wood characteristics. Blue gum aggressively invades neighboring plant communities from original plantings, and where adequate moisture is available for propagation by seed and by resprouting. Understory establishment of shrubs and herbs is inhibited by the allelopathic chemicals that are leached from leaves and from a high volume of forest debris.

Brazilian pepper tree is a many stemmed shrub or small tree. The tree is covered with round, bright red fruit from December to February. The leaves are generally opposite with a somewhat resinous coating and emit a distinctive odor. Brazilian pepper tree is native to Argentina, Paraguay, and Brazil. It was first introduced as an ornamental, but eventually escaped from cultivation. This tree reproduces from seed dispersed by birds and other animals and can resprout, especially after fire. Brazilian pepper tree spreads aggressively and creates a dense canopy that shades out all other competitors. Like eucalyptus, this tree may also produce allelopathic chemicals which inhibit other plant growth.

Prostrate acacia is a fast growing, low to the ground, evergreen shrub native to western Australia. Its growth habit is prostrate, or close to the ground and usually will grow between two to five feet tall and six to twelve feet wide. This shrub is widely cultivated as an ornamental plant for erosion control on slopes and embankments. Prostrate acacia has not been identified by CalEPPC as an exotic invasive plant but its widespread population within NMCSD suggests that this species has the potential to out-compete native plants for available space, water and soil nutrients. This plant should be managed such that there is a buffer between Diegan coastal sage scrub habitat and ornamental planting areas where this was intentionally planted.

Current Distribution within the NMCSD (see Figures 5–5c)**:**

Tree of heaven has not been identified on-site but is a species likely to occur over time.

Castor bean has been identified within riparian areas.

Blue gum is widely cultivated within ornamental planting areas on NMCSD. A few individuals have recruited into native habitats, including riparian areas, and should be controlled.

Brazilian pepper tree is distributed sporadically over NMCSD. See distribution map for details of a particular species occurrence.

Prostrate acacia is widely distributed along the manufactured slope on the eastern side of NMCSD.

Measurable Objectives and Goals: For blue gum the goal is to eliminate the spread of this individual into native areas. For all other species, the goal is to eradicate and prevent establishment within the entire NMCSD.

- Locate and map all specimens within the NMCSD.
- Eradicate existing plants within three years (for eucalyptus, ornamental plantings will remain).
- Continue yearly surveillance. Consider restoration at areas of dense infestations if they do not recover within three years.

Control Options: These species may resprout following cutting, or girdling, especially if they are not treated with herbicide immediately after cutting. To minimize this, trees will be treated with herbicides, preferably triclopyr or glyphosate plus dye. Cut stump treatment may be used against any size tree or shrub. Basal bark treatment is effective only on young, thin barked trees. Foliar treatments may be used against small trees, but this method has the highest potential for herbicide drift that will result in injury to non-target vegetation.

Hand-pull or weed-wrench all seedlings and saplings. All vegetative material should be bagged and removed from the site.

Cut any mature trees and treat stumps immediately with herbicide. Triclopyr or glyphosate is effective. All vegetative material should be bagged and removed from the site.

Treatment Schedule:

- April-May: Locate and remove all seedlings in the riparian habitats of the NMCSD.
- Summer-fall: Treat mature trees. Avoid treatment in summer months in areas where nesting birds occur. Leave snags if they provide useful roosting habitat and do not endanger human safety.

J. Potentially Invasive Herbaceous Species

Priority: Low to Medium over entire site—Hollow-stem asphodel (*Asphodelus fistulosus*), Australian saltbush (*Atriplex semibaccata*), black mustard (*Brassica nigra*), English ivy (*Hedera helix*), Russian thistle (*Salsola tragus*), greater periwinkle (*Vinca major*), and crown daisy (*Chrysanthemum coronarium*), as well as other invasive species listed in the Attachment 2 can infest riparian and native habitat areas and interfere with management goals. The populations of these species are small, where present, and it is likely that they may be successfully extirpated over time.

Description: Weedy annuals are short-lived and generally produce an abundance of seeds. As soon as it rains, often in the fall or early winter, annual weeds germinate. With shallow roots, they rapidly exhaust the water in the top six inches of soil and move all nutrients from roots, stems, and leaves into many large seeds, which fall by the millions. Control of weedy herbaceous annuals is often dependent upon controlling the individuals before seeds are set.

Current Distribution within the NMCSD: (see Figures 5–5c).

Measurable Objectives and Goals: For herbaceous weeds, the goal is to eliminate the spread of these individual into native areas and to manage the populations that are already established.

- Locate and map all specimens within the NMCSD.
- Manage and control existing populations within three years.
- Continue yearly surveillance. Consider restoration at areas of dense infestations if they do not recover within three years.

Control Options: Potentially invasive herbaceous species should be removed by hand, mechanical weed cutters, or herbicide applications (Roundup®) by maintenance workers familiar with and trained to distinguish weeds from native species.

Treatment Schedule: Weeds will be killed or removed before seed sets. Appropriate weed control measures will be implemented under the direction of the maintenance manager. A list of exotic species with the potential to grow on the site is presented in Table 1, and a supplementary list compiled by CalEPPC is included in Attachment 2. In the event that additional invasive plant species are encountered, the maintenance manager will refine control measures to include them.

Priority of Target Exotic Species

Priority for removing exotic invasive plants should be given to particular species that pose a greater ecological threat. The CalEPPC list has categorized plants according to this need. Some plants which have a lower CalEPPC status have been given a higher priority on NMCSD because their presence or influence on the site have significant ecological effect on the distribution of native habitats. Other plants that have a higher CalEPPC status have been given a lower priority because their populations on NMCSD are small, isolated, or grown as ornamentals throughout the property. Figure 6 and Table 1 illustrate High, Medium, and Low priority for removing target exotic species within NMCSD.

FIGURE 6
Priority for Removal of
Exotic Invasive Plants

Restoration, Weed Prevention, and Post-Weeding Erosion Control

An important component of an EIRP is to revegetate the areas with native plants following weed removal. The goal of revegetating weeded areas with native plants is to enhance the quality of habitat by excluding the recruitment of non-native weeds into the area. Planting or seeding a newly weeded area will also restore soil stability and promote the establishment of native annuals and perennials.

The plant palette ultimately selected for seeding or planting will rely upon the type of habitat surrounding the area impacted by weeding. Most likely, the two plant palettes used in restoration efforts will be Diegan coastal sage scrub for upland areas and riparian/wetland for drainage swales and ephemeral stream corridors.

A. Native Materials Collection

Native seed collection will commence as soon as possible and will continue during each year of the weed management period. Locally adapted genotypes for plants should be maintained as much as possible. The NMCSD land manager will endeavor to collect seed from all appropriate native species and respective habitats occurring on-site for propagation as needed.

B. Plant Production

Plant production will be used on an as-needed basis for habitat enhancement following weeding. Native plant species to be propagated are listed in Table 2. Plants will be grown in containers including one-gallon pots, greenhouse flats, and in raised beds. Container plants will be inoculated with mycorrhizae (mutualistic fungi) by using native soil, which can increase seedling survival rates (Allen 1988).

C. Timing of Planting and Seeding

Planting and seeding of enhancement areas will be limited from approximately October 15 to February 1, in order to coincide with appropriate moist and cool weather conditions. The diversity and density of the container plants to be planted on the site will be directly correlated to nearby functioning (but not mature) native communities.

D. Seed Application Methods

Seeds of native annuals will be applied by hand as they become available and after the salvaged plants and container plants are in place. Seeding rates will be determined by the NMCSD land manager using information from field observations of plant densities and distribution in adjacent natural communities.

TABLE 2
RECOMMENDED SEEDING RATES AND CONTAINER PLANT DENSITIES FOR COASTAL SAGE SCRUB ON NMCSD

Scientific Name	Hand seed Application Rates Per Acre	Number Per Acre	Container Size
Artemisia californica			
California sagebrush	2	125	1 gallon
Eriogonum fasciculatum			
Flat-topped buckwheat	0.75	25	1 gallon
Hemizonia fasciculata			
Golden tarplant	0.5	–	–
Heteromeles arbutifolia			
Toyon	0.75	30	1 gallon
Isocoma menziesii			
Coast goldenbush	0.5	–	–
Lasthenia californica			
Goldfields	0.5	–	–
Malosma laurina			
Laurel sumac	1	20	1 gallon
Mimulus aurantiacus			
Bush monkeyflower	1	25	1 gallon
Nassella pulchra			
Purple needlegrass	0.75	50	Plugs
Rhus integrifolia			
Lemonadeberry	0.5	15	1 gallon
Salvia apiana			
White sage	0.5	–	–
Salvia mellifera			
Black sage	1	75	1 gallon
Sisyrinchium bellum			
Blue-eyed grass	0.5	–	–

NOTE: These recommendations are guidelines that may be changed due to a variety of circumstances, including to reflect the reference area monitoring and the amount of natural habitat being lost.

E. Planting Layout/Densities

Prior to installation of any plant material on enhancement sites, similar habitats in the vicinity of the site will be selected and surveyed in order to estimate quantity, diversity, and density of plants to be installed in the riparian/wetland enhancement areas. Planting layout of these areas should be similar in terms of density and diversity of adjacent areas. Initially, propagated stock will be arranged in the field while still in containers and, prior to planting, the NMCSD land manager will approve layout of the planting scheme. A preliminary list of plant materials and planting quantities is listed in Table 2. Actual planting quantities and seeding rates will be determined following site surveys as mentioned above. The goal of supplemental plantings will be to enhance the existing habitat in terms of density and diversity.

References Cited

Allen, M. F.

1988 Below Ground Structure: A Key Reconstructing A Productive Arid Ecosystem. In *The Reconstruction of Disturbed Lands: An Ecological Approach.* E. B. Allen ed. Westview Press, Boulder, CO.

Bell, Gary.

1997 Ecology and Management of *Arundo donax*, and approaches to riparian habitat restoration in southern California. In Brock, J. H., Wade, M., Pysek, P., and Green, D. (Eds.): *Plant Invasions: Studies from North America and Europe.* Blackhuys Publishers, Leiden, The Netherlands, pp. 103-113.

Benefield, C. B., J. M. Tomaso, K. R. Orloff, D. B. Churches, and G. A. Nader.

1999 Succeses of mowing to control yellow starthistle depends on timing and plants branching form. California Agriculture. 53(2):17-21.

Bossard, C. C., J. M. Randall, and M. C. Hoshovsky

2000 Invasive Plants of California's Wildlands. University of California Press.

California Exotic Pest Plan Council (CalEPPC)

1999 California Exotic Pest Plant Council. The CalEPPC List: Exotic Pest Plants of Greatest Ecological Concern in California. October.

Holland, R. F.

1986 Preliminary Descriptions of the Terrestrial Natural Communities of California. Nongame-Heritage Program, California Department of Fish and Game. October.

Monsanto Company

1989 Label for Rodeo® aquatic herbicide. Monsanto Company, St Louis, MO.

Pepper, A. and M. Kelly
1994 The Ecology and Management of the Wild Artichoke *Cynara cardunculus*. CalEPPC News. Winter 94:4-6.

RECON
2003 Final Work Plan for Naval Medical Center San Diego Natural Resources Inventory and Implementation Guide. July 9.

Schlesselman, J. T., G. L. Ritenour, and M. M. Hile
1989 Cultural and Physical Control Methods. In Proceedings of the California Weed Conference on Principles of Weed Control in California, Davis, California.

U.S. Department of Agriculture (USDA)
1973 *Soil Survey, San Diego Area, California.* Edited by Roy H. Bowman. Soil Conservation Service and Forest Service. December.

ATTACHMENT 1

Photo source: RECON

Giant Reed *(Arundo donax)*

Photo source: RECON

Hollow-stem Asphodel *(Asphodelus fistulosus)*

Photo source: RECON

Black Mustard *(Brassica nigra)*

Photo source: Barry Meyers-Rice

Engish Ivy *(Hedera helix)*

Photo source: RECON

Blue Gum *(Eucalyptus globules)*

Photo source: JMR

Austrailian Saltbush *(Atriplex semibaccata)*

Photo source: Brother Alfred Brousseau

Brazilian Pepper Tree
(Schinus terebinthifolius)

Photo source: Brother Alfred Brousseau

Peruvian Pepper Tree
(Schinus molle)

RECON

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Photo source: RECON

Cardoon (*Cynara cardunculus*)

Photo source: RECON

Fennel (*Foeniculum vulgare*) and Iceplant (*Carpobrotus edulis*)

Photo source: CDFA

Fountain Grass *(Pennisetum setaceum)*

Photo source: RECON

Iceplant *(Carpobrotus edulis)*

Photo source: RECON

Pampas Grass (*Cortaderia jubata*)

Photo source: RECON

Salt Cedar (*Tamarix* spp.)

Photo source: RECON

Prostrate Acacia (*Acacia redolens*)

Photo source: RECON

Crown Daisy (*Chrysanthemum coronarium*)

Photo source: RECON

Russian Thistle *(Salsola tragus)*

Photo source: Brother Alfred Brousseau

Greater Periwinkle *(Vinca major)*

Photo source: Steven Thorsted

Tocolote (*Centaurea melitensis*)

Photo source: CDFA

Yellow Star Thistle (*Centaurea solstitialis*)

Photo source: Alfred Brousseau

Tree of Heaven (*Ailanthus altissima*)

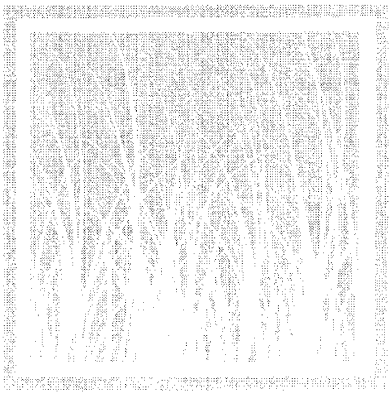
Photo source: RECON

Castor Bean (*Ricinus communis*)

ATTACHMENT 2

The CalEPPC List: Exotic Pest Plants of Greatest Ecological Concern in California

October 1999



The CalEPPC list is based on information submitted by our members and by land managers, botanists and researchers throughout the state, and on published sources. The list highlights non-native plants that are serious problems **in wildlands** (natural areas that support native ecosystems, including national, state and local parks, ecological reserves, wildlife areas, national forests, BLM lands, etc.).

The List includes:

List A: Most Invasive Wildland Pest Plants; documented as aggressive invaders that displace natives and disrupt natural habitats. Includes two sub-lists; List A-1: Widespread pests that are invasive in more than 3 Jepson regions (see page 3), and List A-2: Regional pests invasive in 3 or fewer Jepson regions.

List B: Wildland Pest Plants of Lesser Invasiveness; invasive pest plants that spread less rapidly and cause a lesser degree of habitat disruption; may be widespread or regional.

Red Alert: Pest plants with potential to spread explosively; infestations currently small or localized. If found, alert CalEPPC, County Agricultural Commissioner or California Department of Food and Agriculture.

Need More Information: Plants for which current information does not adequately describe nature of threat to wildlands, distribution or invasiveness. Further information is requested from knowledgeable observers.

Annual Grasses: New in this edition; a preliminary list of annual grasses, abundant and widespread in California, that pose significant threats to wildlands. Information is requested to support further definition of this category in next List edition.

Considered But Not Listed: Plants that, after review of status, do not appear to pose a significant threat to wildlands.

Plants that fall into the following categories are not included in the List:

- Plants found mainly or solely in disturbed areas, such as roadsides and agricultural fields.
- Plants that are established only sparingly, with minimal impact on natural habitats.

1999 List Review Committee:

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Aquatic Weed Research Lab.

Dr. Joe DiTomaso, Extension Weed Ecologist
Weed Science Program
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The CalEPPC list is updated regularly. Please use the form provided to send comments, suggestions or new information to: **Peter Warner, 555 Magnolia Avenue, Petaluma, CA, 94952-2080**, or via email at **peterjwarner@earthlink.net**

Thanks to all those who submitted comments for the 1999 list.

California Exotic Pest Plant Council

List A.1: Most Invasive Wildland Pest Plants, Widespread

Latin Name[1]	Common Name	Habitats of Concern and Other Comments	Distribution[2]
Ammophila arenaria	European beach grass	Coastal dunes	SCo,CCo,NCo
Arundo donax	giant reed, arundo	Riparian areas	cSNF,CCo,SCo,SnGb,D,GV
Bromus tectorum	cheat grass, downy brome	Sagebrush, pinyon-juniper, other desert communities; increases fire frequency	GB,D
Carpobrotus edulis	iceplant, sea fig	Many coastal communities, esp. dunes	SCo,CCo,NCo,SnFrB
Centaurea solstitialis[C]	yellow starthistle	Grasslands	CA-FP (uncommon in SoCal)
Cortaderia jubata	Andean pampas grass, jubatagrass	Horticultural; many coastal habitats, esp. disturbed or exposed sites incl. logged areas	NCo,NCoRO,SnFrB, CCo,WTR,SCo
Cortaderia selloana	pampas grass	Horticultural; coastal dunes, coastal scrub, Monterey pine forest, riparian, grasslands; wetlands in ScV; also on serpentine	SnFrB,SCo,CCo,ScV
Cynara cardunculus[B]	artichoke thistle	Coastal grasslands	CA-FP, esp. CCo,SCo
Cytisus scoparius[C]	Scotch broom	Horticultural; coastal scrub, oak woodlands, Sierra foothills	NW,CaRF,SNF,GV, SCo,CW
Eucalyptus globulus	Tasmanian blue gum	Riparian areas, grasslands, moist slopes	NCoRO,GV,SnFrB, CCo,SCoRO,SCo,nChI
Foeniculum vulgare	wild fennel	Grasslands; esp. SoCal, Channel Is.; the cultivated garden herb is not invasive	CA-FP
Genista monspessulana[C]	French broom	Horticultural; coastal scrub, oak woodlands, grasslands	NCoRO,NCoRI,SnFrB, CCo,SCoRO,sChI,WTR,PR
Lepidium latifolium[B]	perennial pepperweed, tall whitetop	Coastal, inland marshes, riparian areas, wetlands, grasslands; potential to invade montane wetlands	CA (except KR,D)
Myriophyllum spicatum	Eurasian watermilfoil	Horticultural; lakes, ponds, streams, aquaculture	SnFrB,SnJV,SNH(?); prob. CA
Pennisetum setaceum	fountain grass	Horticultural; grasslands, dunes, desert canyons; roadsides	Deltaic GV,CCo,SCo, SnFrB
Rubus discolor	Himalayan blackberry	Riparian areas, marshes, oak woodlands	CA-FP
Senecio mikanioides (=*Delairea odorata*)	Cape ivy, German ivy	Coastal, riparian areas, also SoCal (south side San Gabriel Mtns.)	SCo,CCo,NCo,SnFrB,SW
Taeniatherum caput-medusae[C]	medusa-head	Grasslands, particularly alkaline and poorly drained areas	NCoR,CaR,SNF,GV,SCo
Tamarix chinensis, T. gallica, T. parviflora & *T. ramosissima*	tamarisk, salt cedar	Desert washes, riparian areas, seeps and springs	SCo,D,SnFrB,GV,sNCoR, sSNF,Teh,SCoRI,SNE, WTR
Ulex europaeus[B]	gorse	North, central coastal scrub, grasslands	NCo,NCoRO,CaRF, n&cSNF,SnFrB,CCo

Noxious Weed Designations

F: Federal Noxious Weed, as designated by the USDA; targeted for federally-funded prevention, eradication or containment efforts.

A: CA Dept. of Food & Agriculture, on "A" list of Noxious Weeds; agency policies call for eradication, containment or entry refusal.

B: CA Dept. of Food & Agriculture, on "B" list of Noxious Weeds; includes species that are more widespread, and therefore more difficult to contain; agency allows county Agricultural Commissioners to decide if local eradication or containment is warranted.

C: CA Dept. of Food & Agriculture, on "C" list of Noxious Weeds; includes weeds that are so widespread that the agency does not endorse state or county-funded eradication or containment efforts except in nurseries or seed lots.

Q: CA Dept. of Food & Agriculture's designation for temporary "A" rating pending determination of a permanent rating.

For most species nomenclature follows *The Jepson Manual: Higher Plants of California* (Hickman, J., Ed., 1993).

List C: Plants of Greatest Ecological Concern in California

List C-2: Most Invasive Wildland Pest Plants: Regional

Latin Name[1]	Common Name	Habitats of Concern and Other Comments	Distribution[2]
Ailanthus altissima	tree of heaven	Riparian areas, grasslands, oak woodlands, esp. GV, SCo	CA-FP
Atriplex semibaccata	Australian saltbush	SoCal, coastal grasslands, scrub, "high marsh" of coastal salt marshes	CA (except CaR,c&sSN)
Brassica tournefortii	Moroccan or African mustard	Washes, alkaline flats, disturbed areas in Sonoran Desert	SW,D
Bromus madritensis ssp. *rubens*	red brome	Widespread; contributing to SoCal scrub, desert scrub type conversions; increases fire frequency	CA
Cardaria draba[B]	white-top, hoary cress	Riparian areas, marshes of central coast; also ag. lands, disturbed areas	Problem only in CCo
Conicosia pugioniformis	narrow-leaved iceplant, roundleaf iceplant	Coastal dunes, sandy soils near coast; best documented in San Luis Obispo and Santa Barbara cos.	CCo
Cotoneaster pannosus, C. lacteus	cotoneaster	Horticultural; many coastal communities; esp. North Coast, Big Sur; related species also invasive	CCo,SnFrB,NW
Cytisus striatus	striated broom	Often confused with C. scoparius; coastal scrub, grassland	SnFrB,CCo,SCo,PR
Egeria densa	Brazilian waterweed	Streams, ponds, sloughs, lakes; Sacramento-San Joaquin Delta	n&sSNF,SnJV,SnFrB, SnJt,SNE
Ehrharta calycina	veldt grass	Sandy soils, esp. dunes; rapidly spreading on central coast	CCo,SCoRO,WTR
Eichhornia crassipes	water hyacinth	Horticultural; established in natural waterways, esp. troublesome in Sacramento-San Joaquin Delta	GV,SnFrB,SCo,PR
Elaeagnus angustifolia	Russian olive	Horticultural; interior riparian areas	SnJV,SnFrB,SNE,DMoj
Euphorbia esula[A]	leafy spurge	Rangelands in far no. CA, also reported from Los Angeles Co.	eKR,NCo,CaR,MP,SCo
Ficus carica	edible fig	Horticultural; Central Valley, foothill, South Coast and Channel Is. riparian woodlands	nSNF,GV,SnFrB,SCo
Lupinus arboreus	bush lupine	Native to SCo, CCo; invasive only in North Coast dunes	SCo,CCo,NCo
Mentha pulegium	pennyroyal	Santa Rosa Plain (Sonoma Co.) and Central Valley vernal pools; wetlands elsewhere	NW,GV,CW,SCo
Myoporum laetum	myoporum	Horticultural; coastal riparian areas in SCo	SCo,CCo
Saponaria officinalis	bouncing bet	Horticultural; meadows, riparian habitat in SNE, esp. Mono Basin	NW,CaRH,nSNF,SnFrB, SCoRO,SCo,PR,MP,SNE, GV
Spartina alterniflora	Atlantic or smooth cordgrass	S.F. Bay salt marshes; populations in Humboldt Bay believed extirpated	CCo(shores of S.F. Bay)

Distribution: Please see the footnotes for the pertinent California floristic province

CA=California
CA-FP=California Floristic Province
CaR=Cascade Ranges
CaRF=Cascade Range Foothills
CCo=Central Coast
ChI=Channel Islands
CW=Central Western CA
D=Deserts
DMoj=Mojave Desert
DSon=Sonoran Desert
GB=Great Basin
GV=Great Valley
KR=Klamath Ranges
MP=Modoc Plateau
NCo=North Coast
NCoRI=Inner NCo Ranges
NCoRO=Outer NCo Ranges
NW=Northwestern CA
PR=Peninsular Ranges
SCo=South Coast
SCoRI=Inner SCo Ranges
SCoRO=Outer SCo Ranges
ScV=Sacramento Valley
SnJV=San Joaquin Valley
SN=Sierra Nevada
SNE=East of SN
SNF=SN Foothills
SNH=High SN
SnFrB=San Francisco Bay Area
SnGb=San Gabriel Mtns
SW=Southwestern CA
Teh=Tehachapi Mtns
WTR=Western Transverse Ranges

List B: Wildland Pest Plants of Lesser Invasiveness

Latin Name[1]	Common Name	Habitats of Concern and Other Comments	Distribution[2]
Ageratina adenophora[F]	eupatory	Horticultural; coastal canyons, coastal scrub, slopes, Marin to San Diego Co; San Gabriel Mtns.	CCo,SnFrB,SCo,SCoRO
Bassia hyssopifolia	bassia	Alkaline habitats	CA (except NW,SNH)
Bellardia trixago	bellardia	Grasslands, on serpentine, where a threat to rare natives	NCoRO,CCo,SnFrB
Brassica nigra	black mustard	Coastal communities, esp. fog-belt grasslands; disturbed areas	CA-FP
Cardaria chalepensis[B]	lens-podded white-top	Wetlands of Central Valley	CA
Carduus pycnocephalus[C]	Italian thistle	Grasslands, shrublands, oak woodlands	sNCo,sNCoR,SNF,CW, SCo,ScV
Centaurea calcitrapa[B]	purple starthistle	Grasslands	NW,sCaRF,SNF,GV,CW,SW
Centaurea melitensis	tocalote, Malta starthistle	Widespread; sometimes misidentified as C. solstitialis; perhaps a more serious invader than currently recognized	CA-FP,D
Cirsium arvense[B]	Canada thistle	Especially troublesome in riparian areas	CA-FP
Cirsium vulgare	bull thistle	Riparian areas, marshes, meadows	CA-FP,GB
Conium maculatum	poison hemlock	Mainly disturbed areas but may invade wildlands; known to poison wildlife; early expanding stage in many areas, esp. San Diego Co. riparian, oak understory	CA-FP
Crataegus monogyna	hawthorn	Horticultural; recent invader, colonizing healthy native forest around Crystal Springs reservoir on S.F. peninsula	SnFrB,CCo,NCo,NCoR
Ehrharta erecta	veldt grass	Wetlands, moist wildlands; common in urban areas; potential to spread rapidly in coastal, riparian, grassland habitats	SnFrB,CCo,SCo
Erechtites glomerata, E. minima	Australian fireweed	Coastal woodlands, scrub, NW forests, esp. redwoods	NCo,NCoRO,CCo,SnFrB, SCoRO
Festuca arundinacea	tall fescue	Horticultural (turf grass); coastal scrub, grasslands in NCo, CCo	CA-FP
Hedera helix	English ivy	Horticultural; invasive in coastal forests, riparian areas	CA-FP
Holcus lanatus	velvet grass	Coastal grasslands, wetlands in No. CA	CA exc. DSon
Hypericum perforatum[C]	Klamathweed, St. John's wort	Redwood forests, meadows, woodlands; invasion may occur due to lag in control by established biocontrol agents	NW,CaRH,n&cSN,ScV, CCo,SnFrB,PR
Ilex aquifolium	English holly	Horticultural; coastal forests, riparian areas	NCoRO,SnFrB,CCo
Iris pseudacorus	yellow water iris, yellow flag	Horticultural; riparian, wetland areas, esp. San Diego, Los Angeles cos.	SnFrB,CCo,sSnJV,SCo
Leucanthemum vulgare	ox-eye daisy	Horticultural; invades grassland, coastal scrub	KR,NCoRO,n&cSNH, SnFrB,WTR,PR
Mesembryanthemum crystallinum	crystalline iceplant	Coastal bluffs, dunes, scrub, grasslands; concentrates salt in soil	NCo,CCo,SCo,ChI
Myriophyllum aquaticum	parrot's feather	Horticultural; streams, lakes, ponds	NCo,CaRF,CW,SCo
Olea europaea	olive	Horticultural and agricultural; reported as invasive in riparian habitats in Santa Barbara, San Diego	NCoR,NCoRO,CCo, SnFrB,SCoRO,SCo
Phalaris aquatica	Harding grass	Coastal sites, esp. moist soils	NW,cSNF,CCo,SCo
Potamogeton crispus	curlyleaf pondweed	Scattered distribution in ponds, lakes, streams	NCoR,GV,CCo,SnFrB, SCo,ChI,SnGb,SnBr,DMoj
Ricinus communis	castor bean	SoCal coastal riparian habitats	GV,SCo,CCo
Robinia pseudoacacia	black locust	Horticultural; riparian areas, canyons; native to eastern U.S.	CA-FP,GB
Schinus molle	Peruvian pepper tree	Horticultural; invasive in riparian habitats in San Diego, Santa Cruz Is.	SNF,GV,CW,SW,Teh

List B: Continued

Latin Name[1]	Common Name	Habitats of Concern and Other Comments	Distribution[2]
Schinus terebinthifolius	Brazilian pepper	Horticultural; riparian areas	sSCo
Senecio jacobaea[B]	tansy ragwort	Grasslands; biocontrol agents established	NCo,wKR,s&wCaR, nSNF, nScV,SW
Spartium junceum	Spanish broom	Coastal scrub, grassland, wetlands, oak woodland, NW forests, esp. redwoods; also roadcuts	NCoRO,ScV,SnFrB, SCoRO,SCo,sChI,WTR
Verbascum thapsus	woolly or common mullein	SNE meadows, sagebrush, pinyon-juniper woodlands; shores of Boggs Lake (Lake Co.)	CA
Vinca major	periwinkle	Horticultural; riparian, oak woodland, other coastal habitats	NCoRO,SnFrB, CCo, sSCoRO,SCo

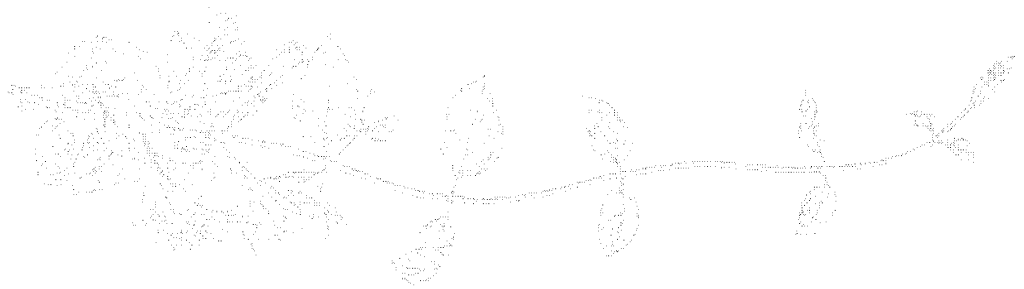
List C: Wildland pest plants with potential to spread explosively if their current status is not altered

Latin Name[1]	Common Name	Habitats of Concern and Other Comments	Distribution[2]
Alhagi pseudalhagi[^]	camel thorn	Noxious weed of arid areas; most infestations in California have been eradicated	GV,sSNE,D
Arctotheca calendula[^]	Capeweed	Seed-producing types are the problem; most are vegetative only	NCo,SnFrB,CCo
Centaurea maculosa[^]	spotted knapweed	Riparian, grassland, wet meadows, forest habitats; contact CA Food & Ag if new occurrences found	CaR,SN,nScV,nCW,MP, nSNE,sPR,NW
Crupina vulgaris[F,^]	bearded creeper, common crupina	Aggressively moving into wildlands, esp. grassland habitats	NCoR (Sonoma Co.),MP
Halogeton glomeratus[^]	halogeton	Noxious weed of Great Basin rangelands; report locations to CA Food & Ag; goal is exclusion from CA	GB
Helichrysum petiolare	licorice plant	North coastal scrub; one population on Mt. Tamalpais, w. Marin Co.	Not in Jepson
Hydrilla verticillata[F,^]	hydrilla	Noxious water weed; report locations to CA Food & Ag; eradication program in place; found in Clear Lake (Lake Co.) in 1994	NCoRI,n&cSNF,ScV,SCo,D
Lythrum salicaria[B]	purple loosestrife	Horticultural; noxious weed of wetlands, riparian areas	sNCo,NCoRO,nSNF,ScV, SnFrB,nwMP
Ononis alopecuroides[Q]	foxtail restharrow	Eradication efforts underway in San Luis Obispo Co.; to be looked for elsewhere in CA	CCo; not in Jepson
Retama monosperma	bridal broom	First noted at Fallbrook Naval Weapons Station, San Diego Co; could rival other invasive brooms	San Diego Co.; not in Jepson
Salvinia molesta[F]	giant waterfern	Ponds, lakes, reservoirs, canals	Napa, Sonoma cos., lower Colorado River; not in Jepson
Sapium sebiferum	Chinese tallow tree	Horticultural; riparian, wetland habitats, open areas and understory	ScV,SnFrB; not in Jepson
Sesbania punicea	scarlet wisteria tree	Horticultural; riparian areas; American River Parkway, Sacramento Co., Suisun Marsh, San Joaquin River Parkway	ScV,SnJV; not in Jepson
Spartina anglica	cord grass	Scattered in S.F. Bay	Not in Jepson
Spartina densiflora	dense-flowered cord grass	Scattered in S.F. Bay, Humboldt Bay salt marshes	CCo,NCo
Spartina patens	salt-meadow cord grass	One site in S.F. Bay, also Siuslaw Estuary, OR and Puget Sound, WA	CCo

Need More Information

Latin Name[1]	Common Name	Habitats of Concern and Other Comments	Distribution[2]
Acacia dealbata	silver wattle	Aggressive in natural areas?	SnFRB,SCoRO,SCoRI,CCo
Acacia decurrens	green wattle	Sometimes confused with A. dealbata; aggressive in natural areas?	Unknown
Acacia melanoxylon	blackwood acacia	Reported from S.F. Bay area, central coast, Santa Cruz Is.; spreads slowly; other areas?	SnFrB,SCoRO,SCo,CCo
Aeschynomene rudis[B]	rough jointvetch	Princeton area, Colusa Co.; pest of rice crops; potential threat to riparian, wetland habitats?	ScV
Agrostis avenacea	Pacific bentgrass	Invading vernal pools in San Diego area; attempts at manual eradication unsuccessful so far; problem in other areas?	sNCo,sNCoR,SNF, GV,CW,nSCo
Aptenia cordifolia	red apple	Habitats where invasive?	CCo,SCo,sChl
Asphodelus fistulosus	asphodel	Common in SCo highway rights-of-way, other disturbed sites; threats to wildlands?	sSnJV,SCo
Carduus acanthoides[A]	giant plumeless thistle	Threatens wildlands?	NCoRI,nSN,SnFrB, nSCoRO,MP
Cistus ladanifer	gum cistus	Horticultural; invades coastal sage scrub, chaparral; areas where problematic?	sCCo,SnGb
Cordyline australis	New Zealand cabbage	Infestation at Salt Point State Park; bird-dispersed; other problem areas?	Not in Jepson
Cotoneaster spp. (exc. C. pannosus, C. lacteus)	cotoneaster	Horticultural; bird-distributed; which species are problems in wildlands?	Unknown
Cupressus macrocarpa	Monterey cypress	Native only to Monterey Peninsula; planted and naturalized CCo, NCo; threat to wildlands?	CCo
Descurainia sophia	flixweed, tansy mustard	Entering Mojave wildlands through washes; threat to wildlands?	CA
Dimorphotheca sinuata	African daisy, Cape marigold	Horticultural; reported as invasive in w. Riverside Co., Ventura Co.; problem elsewhere?	SnJV,SCoRO,SCo,PR
Echium candicans, E. pininana	pride of Madeira, pride of Teneriffe	Horticultural; riparian, grassland, coastal scrub communities; spreads by seed	CCo,SnFrB,SCo,sNCo
Ehrharta longiflora	veldt grass	Reported from San Diego	Not in Jepson
Erica lusitanica	heath	Threat to wildlands?	NCo (Humboldt Co.)
Euphorbia lathyris	caper spurge, gopher plant	Invades coastal scrub, marshes, dunes; Sonoma, Marin cos.; threat to wildlands?	NCo,CCo,GV,SCo
Gazania linearis	gazania	Horticultural; invades grassland in S.F., coastal scrub?	CCo,SCo
Glyceria declinata		Although reported from Central Valley vernal pools, genetic research is needed to confirm identity; plants that have been called G. declinata key in Jepson to native G. occidentalis	Uncertain; not in Jepson
Hedera canariensis	Algerian ivy	Horticultural; invasive in riparian areas in SoCal?	Not in Jepson
Hirschfeldia incana	Mediterranean or short-pod mustard	Increasing in western, southern Mojave; threat to wildlands?	NCo,SNF,GV,CW,SCo, DMoj
Hypericum canariense	Canary Island hypericum	Reported in San Diego area, coastal sage scrub, grassland; threat to wildlands?	SCo
Hypochaeris radicata	rough cat's-ear	Widespread in coastal grasslands, wetlands; threat to wildlands?	NW,CaRF,nSNF,ScV, CW,SCo
Isatis tinctoria[B]	dyers' woad	Well-known invader in Utah; threat to wildlands?	KR,CaR,nSNH,MP
Ligustrum lucidum	glossy privet	Horticultural; spreading rapidly on Mendocino coast; problem in other areas?	NCo; not in Jepson
Limonium ramosissimum ssp. provinciale	sea lavender	Reported spreading in Carpinteria Salt Marsh; problem in other areas?	Not in Jepson

Latin Name[1]	Common Name	Habitats of Concern and Other Comments	Distribution[2]
Ludwigia uruguayensis (= *L. hexapetala*)	water primrose	Invasive in aquatic habitats; non-native status questioned?	NCo,sNCoRO,CCo, SnFrB,SCo
Malephora crocea	ice plant	Invades margins of wetlands, bluffs along SCo	CCo,SCo,sChI
Maytenus boaria	mayten	Horticultural; scattered in riparian forests, ScV; east SnFrB	ScV,SnFrB
Mesembryanthemum nodiflorum	slender-leaved iceplant	Abundant on Channel Islands; invades wetlands; habitats where problematic?	SnFrB,SCo,ChI
Nicotiana glauca	tree tobacco	Disturbed places; not very competitive with natives in coastal scrub, chaparral; spreading along Putah Creek (Yolo Co.); problems elsewhere?	NCoRI,c&sSNF, GV,CW,SW,D
Oxalis pes-caprae	Bermuda buttercup	Invades disturbed sites; invasive in undisturbed habitats?	NCo,NCoRO,CCo, SnFrB,SCoRO,SCo
Parentucellia viscosa		Threat to NCo (Humboldt Co.) dune swales?	NCo,NCoRO,CCo,SCo
Passiflora caerulea		Horticultural; reported from SoCal; threat to wildlands?	SCo; not in Jepson
Pennisetum clandestinum[F,C]	Kikuyu grass	Disturbed sites, roadsides; threat to wildlands?	NCo,CCo,SnFrB,SCo, Santa Cruz Is.
Phyla nodiflora	mat lippia	Most varieties in CA are native; taxonomy unclear; status of plants in vernal pools, wetlands?	NW(except KR,NCoRH), GV,CCo,SnFrB,SCo, PR,DSon
Pinus radiata cultivars	Monterey pine	Cultivars invading native Monterey, Cambria forests, where spread of pine pitch canker is a concern	CCo
Piptatherum miliaceum	smilo grass	Aggressive in SoCal creeks, canyons; threats to wildlands?	NCo,GV,CW,SCo
Pistacia chinensis	Chinese pistache	Horticultural; invades riparian areas and woodlands in ScV	ScV
Prunus cerasifera	cherry plum	Oak woodland, riparian areas; esp. Marin, Sonoma cos.; bird-distributed; problems elsewhere?	SnFrB,CCo
Pyracantha angustifolia	pyracantha	Horticultural; spreads from seed in S.F. Bay area; bird-distributed; problem elsewhere?	sNCoRO,CCo,SnFrB, SCo
Salsola soda	glasswort	Threat to salt marshes?	nCCo,SnFrB
Salsola tragus[C]	Russian thistle, tumbleweed	Abundant in dry open areas in w. Mojave Desert, Great Basin; not limited to disturbed sites; threats?	CA
Salvia aethiopis[B]	Mediterranean sage	Creates monocultures in E. Oregon grasslands; threat to CA wildlands?	MP
Stipa capensis		Distribution and threats?	Not in Jepson
Tamarix aphylla	athel	Spreading in Salton Sea area; threats to wildlands?	nSnJV,nSCo,D
Tanacetum vulgare	common tansy	Jepson reports as uncommon, escape from cultivation in urban areas; problem in wildlands?	NCo,NCoRO,CaRH, SCoRO
Verbena bonariensis, *V. litoralis*	tall vervain	Horticultural; invades riparian forests, wetlands; extensive along ScV riparian corridors; roadsides (Yuba Co.); elsewhere?	ScV,nSnJV,nSnFrB,CCo



Moderate Invasive Exotic Plants (continued)

Annual Grasses

Latin Name[1]	Common Name	Habitats of Concern and Other Comments	Distribution[2]
Aegilops triuncialis[B]	barbed goatgrass	Serpentine soils, grasslands	sNCoR,CaRF, n&cSNF, ScV,nCW
Avena barbata	slender wild oat	Lower elev. in SoCal; coastal slopes, coastal sage scrub, disturbed sites	CA-FP,MP,DMoj
Avena fatua	wild oat	Lower elev. in SoCal; coastal slopes, coastal sage scrub on deeper soil, disturbed sites	CA-FP,MP,DMoj
Brachypodium distachyon	false brome	Expanding in SoCal; common in Orange Co.	sNCoR,sCaRF, SNF,GV,CW,SCo,sChI
Bromus diandrus	ripgut brome	Coastal dunes, coastal sage scrub, grasslands	CA
Lolium multiflorum	Italian ryegrass	Wetland areas, esp. vernal pools in San Diego Co.; common in disturbed sites	CA-FP
Schismus arabicus	Mediterranean grass	Threat to Mojave and Colorado desert shrublands?	SnJV,CW,sChI,D
Schismus barbatus	Mediterranean grass	Threat to Mojave and Colorado desert shrublands?	SnJV,SW,D

Considered, but not listed

Latin Name[1]	Common Name	Habitats of Concern and Other Comments
Albizia lophantha	plume acacia	Not invasive
Anthoxanthum odoratum	sweet vernal grass	Disturbed sites on coast; Marin, Sonoma, Mendocino cos.
Carpobrotus chilensis	sea fig	Native status in question; not a threat to wildlands
Centranthus ruber	red valerian	Horticultural; roadcuts in Marin Co.; not a threat to wildlands
Convolvulus arvensis[C]	field bindweed	Disturbed sites; ag lands
Coprosma repens	mirror plant	No evidence of wildland threat
Crocosmia x crocosmiiflora		Generally in disturbed coastal, urban areas, roadsides
Digitalis purpurea	foxglove	Horticultural; scattered in prairies, meadows, disturbed sites; not a major wildland threat
Dipsacus sativus, D. fullonum	wild teasel, Fuller's teasel	Roadsides, disturbed sites
Fumaria officinalis, F. parviflora	fumitory	S.F. Bay area, Monterey Bay salt marshes, sandy disturbed sites
Medicago polymorpha	California bur clover	Grasslands, moist sites; mainly restricted to disturbed sites
Melilotus officinalis	yellow sweet clover	Restricted to disturbed sites in CA
Nerium oleander	oleander	Horticultural; not invasive, although reported from riparian areas in Central Valley, San Bernardino Mtns.
Picris echioides	bristly ox-tongue	Disturbed areas
Silybum marianum	milk thistle	Disturbed areas, especially overgrazed moist pasturelands; may interfere with restoration
Xanthium spinosum	spiny cocklebur	Identified as native in *The Jepson Manual* (Hickman, 1993) and *A California Flora* (Munz and Keck, 1968); restricted to disturbed areas
Zantedeschia aethiopica	calla lily	Horticultural; mainly a garden escape in wet coastal areas
Zoysia cultivars	Amazoy and others	Horticultural; no evidence of wildland threat

ATTACHMENT B

NAVAL MEDICAL CENTER SAN DIEGO

Erosion Evaluation and Control

November 2009

NAVAL MEDICAL CENTER SAN DIEGO
THE PRIDE OF NAVY MEDICINE

Navy Region Southwest
One Team, One Voice, One Mission

NAVFAC

Table of Contents

Erosion Evaluation at Naval Medical Center San Diego

1.0 Introduction

As part of Naval Facilities Engineering Command Southwest (NAVFAC SW) Contract #N62473-06-D-2402, Task Order 0017, an erosion survey was conducted at Naval Medical Center San Diego (NMCSD or Center) for the purposes of identifying erosion concerns and providing solutions for mitigation/restoration. Over the course of four site visits conducted between January and September of 2009, separate erosion control planning was developed for each of the twelve sites where erosion was identified. This report includes suggested mitigation measures for each site in the Results Section (Section 3.0). Areas of erosion concern included steep areas, drainage ditches, and most notably, crib walls.

2.0 Methodology

Four site visits were made to NMCSD. The first was on 23 January 2009 on a clear day to assess all areas of erosion concern at the NMCSD property. Another site visit was conducted on 10 February 2009 to evaluate the southeastern portion of the property during a storm event. On 24 July 2009, a third site visit was made with a sub-contracted, certified hydrologic engineer[1] to assess what areas might require more extensive efforts to remedy erosion concerns. The fourth site visit was conducted on 14 September 2009, to revisit sites identified by Ruben A. Guieb (Natural Resources Specialist Coastal IPT, NAVFAC SW) as part of the draft review process for this report. During Mr. Guieb's visit two more sites (11 and 12) were identified and are included in this report. The entire project area, as well as areas on city of San Diego land downstream from NMCSD, was walked to identify any off-property erosion problems originating from the Center. Photos were taken during all site visits. Refer to Map 3-1 for a depiction of locations of erosion concern. Notes were recorded and photographs were taken at each site and are presented in the following section.

3.0 Results

The following sections detail erosion concerns and provide suggested erosion control plans for each of the survey points identified (Refer to Map 3-1).

1. Tory Walker, PE, CFM. TORY R. WALKER ENGINEERING, INC. Water Resources Planning and Engineering. 973 Vale Terrace, Suite 202, Vista, CA 92084. 760.414.9212, Ext. 302.

Map 3-1. Specific locations of erosion concerns at Naval Medical Center San Diego.

3.1 Site 1: Below Helipad Site

Site 1 is dominated by lemonadeberry (*Rhus integrifolia*), about five bare patches not more than 15 square meters (m^2). The site shows minor erosion concerns due to water flowing off the crib wall and along the steep navigated slope. The site appears to have held up well during the storm of 10 February 2009. However, a small area under the crib wall shows minor rill erosion and soil movement into the concrete gutter (Photo 3-1).

Suggested Mitigation

This could be easily mitigated by revegetating the slope with native shrubs using drip irrigation.

Photo 3-1. Slope lacking shrub cover beneath concrete bracing. Circled area shows soil movement.

3.2 Site 2: Inside Parking Structure near Helipad

Runoff from walking paths near the helipad are causing the development of large earthen holes inside the crib wall. There is an imminent threat of continued erosion and potential failure of the crib wall if this is not addressed (Photo 3-2). Note that a concrete pathway (Photo 3-3) has settled, presumably due to the erosion of soil beneath it. Note runoff settling near a stair well at the edge of the parking lot (Photo 3-4).

Photo 3-2. Photo showing erosion within crib-wall.

Photo 3-3. Concrete along walkway settling down over eroded area beneath.

Photo 3-4. Smaller circle shows location of soil loss inside concrete bracing. Larger circle shows soil movement into the gutter system.

Suggested Mitigation

Build a metal gutter to direct runoff away from the crib wall and into the drain system (See suggested location in Photo 3-5). The collection gutter should be approximately four feet wide and sealed to the concrete where it intersects the metal walkway. Reinsert soil into crib spaces and compact.

Photo 3-5. Yellow line depicts suggested route of proposed gutter.

3.3 Site 3: Transportation Office

Site 3 consists of the steepest slopes of the NMCSD property, with up to 100 percent plus slopes in places. Rain water falling in situ has slowly eroded the site due to its steep slopes. Vegetation is dominated by *Eucalyptus* spp and *Acacia* spp., and patches of horticultural ice plant. Where it exists, tree canopy cover and detritus dampens rain impact and decreases water velocity, reducing erosion. Other small areas not larger than $1m^2$– $2m^2$ show sheet erosion and expose cobbly subsurface material (Photo 3-6 and Photo 3-7).

The threat of erosion at this site is rather low as it appears what little erosion has been occurring here has been a feature of this area for many years. Additionally, there are no high value structures (mostly storage sheds) beneath the slope that are threatened in the case of slope failure.

Photo 3-6. Two areas of exposed cobbly subsurface (encircled) above the transportation office, that are outside the cover of the eucalyptus stand.

Photo 3-7. Exposed slope (encircled) outside the cover of eucalyptus trees.

Suggested Mitigation

The erosion threat is low, since the eroded areas may have been a feature of this site for some time. Additionally, the structures below appear to be low in value if the slope did fail. Nonetheless, methods to strengthen the slope's integrity entail the following: install strategically placed straw waddles immediately above areas of the highest slope with netting placed across the exposed cobbly surface immediately down slope; cover with a hydroseed mulch of California buckwheat (*Eriogonum fasciculatum*) and deerweed (*Lotus scoparius*).

3.4 Site 4: North East Corner

Site 4 is dominated by mature eucalyptus with steep, nearly 100 percent, slopes in places. Ice plant and a low-growing shrub are present at the base of the hill, drawing water from a broken irrigation system located above (Photo 3-8). The understory is predominately covered by eucalyptus detritus. This site contains a large gully representing the deepest erosion found on the NMCSD property. There is a large quantity of slash and duff deposited into the gully (Photo 3-9). The derelict irrigation system appears to be the source of the erosion problem. There is evidence of soil moving off-site at the base of the hill and into the gutter (Photo 3-10).

Photo 3-8. Large gully halfway upslope. Note broken PVC pipe (encircled) above and vegetation below.

Photo 3-9. Large gully erosion filled with slash. Note irrigation system in disrepair.

Photo 3-10. Drain showing sandy soil transported from hillside.

Suggested Mitigation

Remove all derelict irrigation PVC pipe that is leaking and has created large erosion concerns. Full remediation would require minor engineering tasks, importing of soil, compaction, erosion prevention, revegetation, irrigation with a drip system, and maintenance.

3.5 Site 5: Eastern Slope

The eastern slope is intact, dominated by California sagebrush (*Artemisia californica*) and brittlebush (*Encelia californica*). There are no erosion concerns (Photo 3-11).

Photo 3-11. Eastern slope showing intact hillside.

3.6 Site 6: Hillside below ball field

Hillside vegetation below the ball field is completely composed of filaree (*Erodium* spp.) and common ice plant (*Mesembryanthemum crystallinum*). This could pose a potential sheet and rill erosion hazard in the future.

Photo 3-12. Hillside below the ball field offers potential for revegetation with native shrubs.

Suggested Mitigation

Remove non-native vegetation. Install one row of straw wattles halfway down the slope along its length, and one row at the slope's base. Apply hydroseed mulch consisting of a coastal sage scrub seed palette.

3.7 Site 7: Aluminum and Ribbon Gutters

Site 7 previously experienced two large erosion problems (water here is runoff from the tennis courts and softball field) that were mitigated by installing both a large aluminum chute and an improperly used ribbon gutter to channel water over a deep, eroding gully. Flow is now undercutting the concrete ribbon gutter (Photo 3-13) and sheet and rill erosion is developing underneath a pine tree outside of the fence (Photo 3-14). There are indications that the erosion was significant in previous years, with large gullies toward the toe of the slope off-property. At the base of the aluminum gutter water flow can be quite significant during rain events (Photo 3-15).

Suggested Mitigation

Remove debris at the base of pipes and chutes and install rip-rap at the bottom end of pipe where run-off crosses the fenceline onto city of San Diego land. Install siding to the concrete ribbon gutter to prevent overtopping of the sides during heavy water flow. Monitor for erosion concerns around the previously installed aluminum water chute. Remove debris from gutters before and during the rainy season.

Photo 3-13. Undercutting of concrete chute.

Photo 3-14. Minor erosion on city of San Diego property outside of fence.

Photo 3-15. Water flowing off the aluminum chute on February 16, 2009.

3.8 Site 8: Fischer House

As discussed in the meeting minutes (Tierra Data 2008) the Fischer House was targeted as part of this survey. However, no erosion concerns were identified at the Fischer House (Photo 3-16).

Photo 3-16. Retaining wall below Fischer House.

3.9 Site 9: Parking Structure Corner

Site 9 is experiencing erosion much like Site 2, where water is getting inside the crib wall and eroding it from within (Photo 3-17). At Site 9, water coming from two holes drilled in the wall of the top floor of the parking structure (Photo 3-18 and Photo 3-19) has worn a hole in the soil near the top of a crib wall. Over time water has flowed into the structure, eroding the soil inside the framing. Eroded soil now fills much of the drainage system beneath.

Suggested mitigation

First, clean and repair the drain on the top floor of the parking garage. Fill in ad hoc drainage holes. Install more soil into the eroded crib structure. Compact the soil, and blanket the soil with about $1m^2$ of concrete.

Photo 3-17. Point of entry of water, just outside the concrete drainage ditch.

Photo 3-18. Drainage holes in parking structure above that provide the water source.

Photo 3-19. Note clogged drain, and ad hoc drainage holes at top.

Photo 3-20. View looking down from the roof of the parking lot. Note drainage holes at bottom center and the eroded hole at top center.

3.10 Site 10: Healing Garden

This site shows signs of erosion similar to Site 2 and Site 9. Erosion is occurring within the crib wall used stabilize the steep slope (Photo 3-21). This site is eroding because of a lack of maintenance of the above brow ditch (Photo 3-22). As water overflows the brow ditch due to debris buildup, it migrates to the top of the crib wall and erodes it from inside.

Suggested mitigation

Regularly clean brow ditch above crib wall structure. Install more soil into the crib structure, compact, and plant native shrubs with drip irrigation to secure the structure.

Photo 3-21. Areas (encircled) where crib wall is eroding from within.

Photo 3-22. Source of erosion: a brow ditch is filled with debris.

3.11 Site 11: Northern Boundary Brow Ditches

This site in the northwestern corner of the Center was surveyed by Jason Giessow and Ruben Guieb in early August 2009, and revisited on September 14th by Robert Wolf (Tierra Data Inc.). This site exhibits three areas of concern. First, a brow ditch seems to have overflowed in the past, presumably due to debris blockage, and eroded the soil beneath the brow ditch downslope (Photo 3-23). Secondly, a brow from city of San Diego property (parkland just south of the Rose Garden) empties onto Navy property where a Brazilian pepper tree has grown over and is partially blocking flow into the brow ditch on the Navy side of the fence. There is heavy sedimentation and debris at this confluence, which could potentially lead to future erosion (Photo 3-24). At the third site, a brow ditch on the Navy side of the fence abruptly ends without offering proper conveyance of water downslope.

Suggested mitigation

First site: Regularly monitor and clean brow ditch. Fill in eroded area underneath brow ditch. Replant with drought tolerant natives.

Second Site: Regularly monitor and clean brow ditch. Remove any blockage of the ditch caused by the Brazilian pepper tree itself. Coordinate proper City grounds keepers to ensure debris buildup from City land does not encroach.

Third Site: This site seems as though it would create significant erosion issues, but does not appear to be the source of any major existing erosion problem. It has most likely existed in its current state for some time. Monitor regularly to determine if remediation is required. If erosion begins to become a problem, consider engineering a brow ditch that extends downslope (Photo 3-25), or a series of terraces.

Photo 3-23. Brow ditch with soil eroding downslope.

Photo 3-24. View from the City's side of the fence, where debris is entering NMCSD property and clogging the confluence of the two brow ditches. Note Brazilian pepper tree in upper left corner also blocking flow.

Photo 3-25. Base of hill where proposed brow ditch would tie in to the network.

3.12 Site 12: Eastern Slope Beneath Eucalyptus

This site is just above the second broad brow ditch as one descends the western slope from the parking lot in the north east corner of the property. It is unclear what precipitated the 9' x 4' slope failure (Photo 3-26). Perhaps the fill was too steep, or during major storms water rushes down the main brow ditch and hits up against the inside of the turn as it makes its way south. Significant vegetation exists above the failure, and water does not seem to be entering the location laterally from the water chute to the right.

Suggested mitigation

While this site does not seem to elicit prioritization, consider replenishing with imported soil, jute netting, and replanting with natives, specifically *Lotus scoparius* and *Eriogonum fasciculatum,* both of which grow well on steep slopes.

Photo 3-26. Erosion above and to the right of brow ditches on the eastern slope looking south.

4.0 Conclusions and Discussion

Despite the complexity and expansiveness of the property only a few looming erosion concerns were identified. Of the twelve sites identified, three were identified as representing an imminent erosion threat to structures (Sites 2, 9, and 10). These sites of concern were all associated with the use of crib walls as a design feature for holding together steep slopes. These sites require action to remove the water source, followed by repacking the crib wall with soil and planting where possible. Due to the fact that these crib walls most likely would not or could not be replaced, we recommend that in the future the NMCSD use Verdura (tm) soil retention systems (Soil Retention 2009), which is an industry leader in retaining wall planting systems.

Apart from Site 4, which would require minor engineering plans to properly address, all other sites can be mitigated through the use of simple erosion control and revegetation measures as identified herein.

In addition, given the current movement towards water rationing and conservation in Southern California, it is imperative that NMCSD develop a water conservation plan if it does not already exist. This would include immediate efforts to regularly monitor sprinkler systems for needed repairs (i.e. Site 4) and adjustment to enhance effectiveness and reduce damage (Photo 4-1). Over the mid-term, NMCSD should focus on replacing landscaping with drought tolerant species that eliminate the requirement for irrigation. In the long term, NMCSD should incorporate Low Impact Development (LID) techniques into infrastructure redevelopment projects (USDOD 2004). LID is a stormwater management strategy concerned with restoring the natural hydrologic functions of a site, while complying with regulatory requirements. LID focuses on

design techniques to reduce run-off from paving, increase infiltration, and recapture runoff for irrigation needs or direct it to natural areas for infiltration. These efforts should be in concert with adjacent landowners, especially where run-off and debris from San Diego City property potentially affects the NMCSD, or vice-versa (Photo 4-2). Because the Center is already heavily developed, LID projects should consider a micro scale approach as infrastructure ages requires redevelopment. These micro systems increase infiltration, slow down run-off, add retention and detention systems, and improve water quality by filtering. Where appropriate, these systems could include soil amendments, bioretention, dry wells, filter strips, vegetated buffers, grassed swales, infiltration trenches, inlet devices, rain barrels, cisterns, tree box filters, vegetated roofs, and permeable pavement (USDOD 2004).

Photo 4-1. Ineffective sprinkler on the north side of the Fischer House directed to the wall (note premature wear on stucco) surrounded by drought tolerant ice plant.

Photo 4-2. The City property to the north drains into Naval Medical Center San Diego property in several places. Some of these structures, like the one pictured above, is not well maintained and could result in future erosion problems.

5.0 References

Soil Retention. 2009. Website. Last accessed August 6, 2009. http://www.soilretention.com/

Tierra Data Inc. 2008. Wildlife Surveys, Biological Survey Review and Update, Erosion Evaluation and Control Plan and Educational Brochures for Naval Medical Center San Diego, California. Contract # N62473-06-D-2402, Task Order-0017. Kickoff Meeting Minutes Draft.

U.S. Department of Defense. 2004. Unified Facilities Criteria. Design: Low Impact Development Manual.

ATTACHMENT C

Agri Chemical & Supply, Inc.

Draft Vegetation Management Plan
Navy Medical Center San Diego

Contract:
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December 2009

Prepared for
Navy Medical Center San Diego, California
Under contract with Southwest Division, Naval Facilities Engineering Command

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1.0 INTRODUCTION

The Vegetation Management Plan for Navy Medical Center San Diego (NMCSD or Center) will provide guidelines to Natural Resource Managers on NMCSD for short-term and long-term vegetation management on the facility. Vegetation management includes both the treatment of invasive non-native plant species and the restoration or enhancement of native plant communities. This plan includes baseline descriptions of existing vegetation communities within MNCSD, discusses threats to those communities and systematically lays out a planned step by step as to how these threats may be remedied.

Natural resource reports prepared for NMCSD were reviewed to ensure that the guidelines provided in this plan met the overall needs of the facility and to ensure that they did not conflict with NMCSD's natural resources conservation goals and objectives. In addition to document review, Agri Chemical ecologists conducted a site visit to identify sites that required vegetation management. The following criteria was used to prioritize sites:

- Habitat Improvement Value
- Fire Risk Reduction
- Flood Risk Reduction
- Reduce Potential for Erosion
- Aesthetic Value
- Efficiency (Combine Effort with Adjacent Site)

Twenty-two sites have been identified and prioritized for treatment. Initial recommendations for treatments and/or restoration are included, but each site will require a Restoration or Work Plan. It is expected that the priority of these sites may change over time, dependant on outside influences that may include new invasive weed populations, erosion and human disturbances. Based on the potential for change it is recommended that this plan be reviewed and updated every three to five years.

1.1 Site Description

The Naval Medical Center San Diego is located in the City of San Diego on approximately 78 acres (Figure 1). The Center is in the southeast corner of Balboa Park and is bordered by Florida Canyon to the east. Florida Canyon contains upland, riparian and wetland habitats with plant communities including coastal sage scrub, southern willow scrub, and mulefat scrub. This section of NMCSD provides habitat for numerous wildlife species, including the federally listed California gnatcatcher (*Polioptila californica*).

This Vegetation Management Plan has been prepared to meet natural resource requirements as outlined in the Integrated Natural Resource Plan prepared by Tierra Data Systems in 2001 and updated by RECON in 2006. These requirements include invasive non-native plant species control, erosion control and habitat preservation.

2.0 DOCUMENT REVIEW

In preparation for this Vegetation Management Plan the following documents were reviewed:

- Integrated Natural Resource Plan (RECON 2006)
- Navy Medical Center San Diego Erosion Evaluation (Tierra Data 2009, draft)
- Naval Medical Center San Diego Natural Resources Inventory and Implementation Guide Erosion Evaluation and Control Plan (RECON 2005)
- Naval Medical Center San Diego Natural Resources Inventory and Implementation Guide Exotic Invasive Plant Removal Plan (RECON 2005)
- Urban Forestry Management Plan for Navy Medical Center San Diego (KTUA 2004)

The progress reports 9 Quarterly Report 2 Jan-Mar 2009 and Quarterly Report 3 Apr-Jun 2009) prepared by Agri Chemical and Supply Inc. provided updated information regarding vegetation surveys conducted on NMCSD in 2009, including rare plant surveys. Section 4 of the INRMP outlined objectives for vegetation management including soil erosion prevention, native plant community management, control of invasive plant species, and landscaping requirements. The NMCSD Natural Resources and Inventory Plans provide details on erosion and exotic species control and the Urban Forestry Management Plan provides details on existing trees and appropriate management for those trees. The Urban Forestry Management Plan was written primarily to educate natural resource personnel of the proper maintenance of damaged or diseased trees, where as this plan identifies non-native species that may be appropriate for removal.

3.0 VEGETATION MANAGEMENT GOALS AND OBJECTIVES

This Vegetation Management Plan (Plan) has been developed to provide direction and strategies that will allow Naval Medical Center San Diego personnel to preserve and enhance the native vegetation located within its boundaries. The primary goals of vegetation management are (1) to maintain existing healthy native ecosystems, (2) enhance habitat adjacent to healthy native plant communities, (3) reduce or eradicate select invasive non-native species throughout NMCSD and, (4) encourage the use of native plant species in landscaping. Objectives to be used to accomplish these goals include:

- Native and non-native vegetation monitoring and habitat health assessment
- Treatment of new invasive non-native species populations and eradication or control existing invasive non-native plant populations
- Identification of threats and potential impacts to native vegetation
- Assessment of past and current restoration and enhancement projects
- Identification of potential sites for restoration
- Develop landscaping guidelines that include the use of native plants and restrict the use of invasive non-native plants
- Education of landscape personnel on identifying invasive non-native plant species and sensitive habitat areas

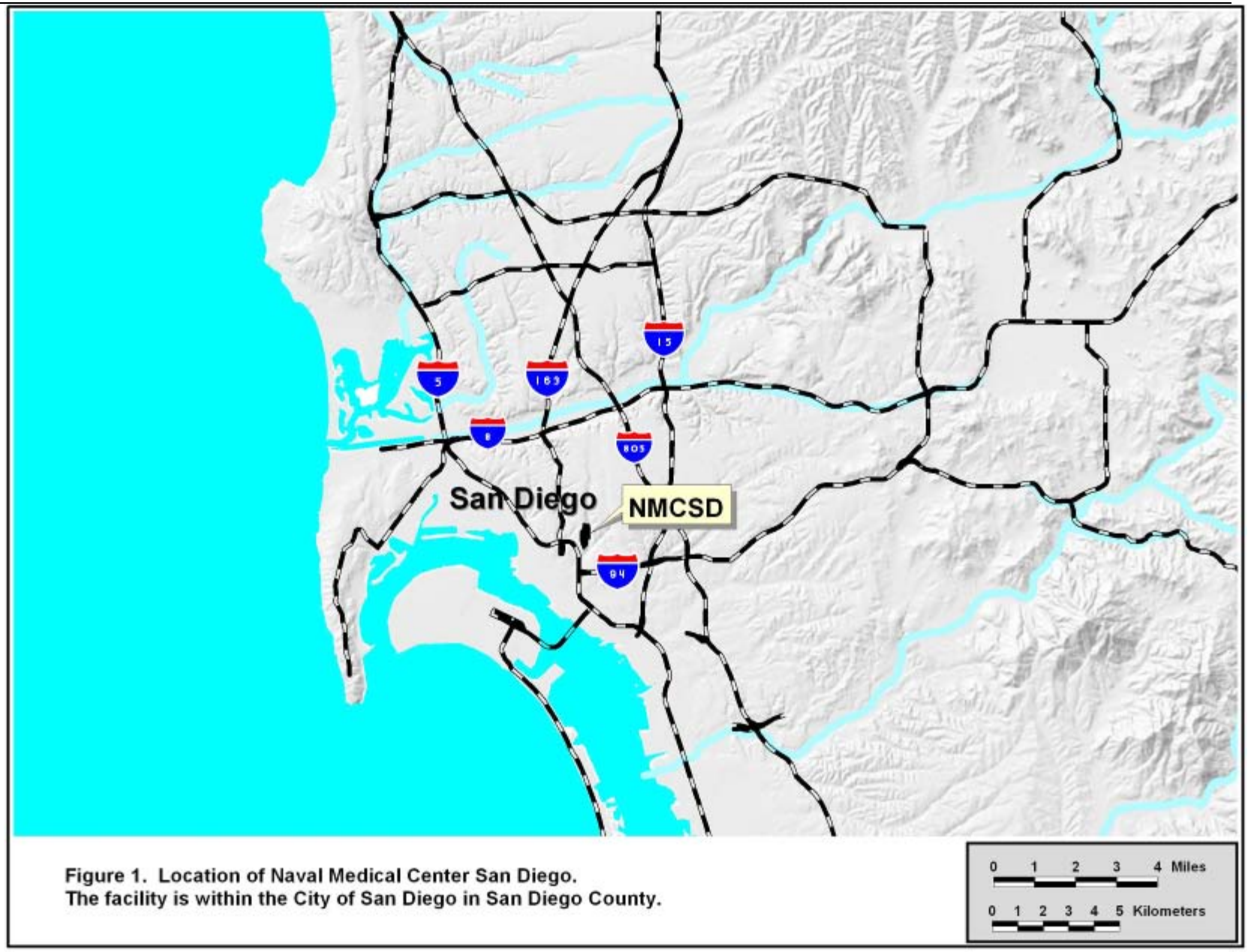


Figure 1. Location of Naval Medical Center San Diego.
The facility is within the City of San Diego in San Diego County.

3.1 Vegetation Monitoring and Habitat Health Assessment

Vegetation monitoring and habitat health assessments will initially occur annually. Once it has been determined that native habitat is stable – little to no change or an increase in native cover, density and diversity over a three-year period – full surveys can be reduced to every three years. Determining an increase or decrease in cover, density and diversity will be done though data collection and vegetation mapping, as outlined in Section 4.

Baseline vegetation monitoring for NMCSD was conducted in 2002 and 2003 (RECON 2005) and was updated in 2009 (Agri Chemical and Supply Inc. 2009). Vegetation monitoring included: (a) vegetation mapping, (b) sensitive plant surveys, (c) invasive non-native plant surveys, and (d) site specific surveys in relation to erosion and habitat enhancement priorities. Baseline vegetation monitoring data and methodologies for collecting data are provided in Section 4 of this Plan.

The overall goal of vegetation monitoring is to determine if native habitat is increasing or decreasing in size and to characterize the health of the vegetation communities. Surveys will include native plant cover, density and diversity as described in Section 4. Data collected can be used to determine if habitat quality is improving or declining, based on cover, density, and diversity of both native and non-native species. Once this data has been analyzed it can be determined if active measures need to be taken to prevent negative change. Active measures may include, but are not limited to: (a) increased non-native control, (b) active restoration activities such as seeding or plant installation, and/or (c) erosion control implementation. When assessing vegetation, outside influences should also be noted, including recent disturbances to the habitat or adjacent to the habitat. Additionally, surveys will allow for the identification of new invasive species that may spread on NMCSD and will allow for early eradication before new populations become well established.

3.2 Invasive Non-native Species Control

An Exotic Invasive Plant Removal Plan was prepared for NMCSD in 2005 (Recon 2005) and will be implemented on the Center. Invasive plant species control shall be a high priority in the vegetation management program on NMCSD. Existing native habitat will be given the highest priority for treatments, followed by sites that have been, or are in the process of being restored, followed by native habitat containing varying levels of non-native species or that is adjacent to high quality native habitat. The short-term goal for monocultures of non-natives, or highly disturbed habitat areas will be containment until such a time that funding is available for long-term treatment and revegetation with native species.

As part of the invasive non-native plant species control program it is recommended that NMCSD collaborate with the City of San Diego on the control of invasive non-native plant species adjacent to the Center. While it may not be possible to always time projects to best work with the City of San Diego's efforts, it would allow for more effective control on sites adjacent or downstream from City of San Diego properties if treatments occurred simultaneously. If, for example, the City is planning a restoration or weed control effort on a property adjacent to NMCSD then NMCSD should consider modifying the ranking of sites to allow for a collaborative effort.

3.3 Threats and Potential Impacts to Vegetation

Native plant communities on NMCSD may be threatened by the following impacts either through natural events or human disturbance:

- Soil erosion
- Non-native plant species
- Fragmentation of populations
- Loss of biodiversity
- Habitat loss/conversion
- Non-point source pollution
- Hydrological alterations
- Fire regime alteration

Manmade and/or naturally occurring events can threaten the health of native plant communities. Often it is a combination of the two that can result in significant disturbance that then requires human intervention to correct. This section discusses the potential threats to native vegetation and makes recommendations for prevention or restoration, as required.

NMCSD is located on an eastward sloping site that has undergone significant development. These developed areas may contribute to impacts to native habitat through increased water runoff due to impermeable surfaces that can result in soil erosion; irrigation runoff from landscaped (potentially resulting in pesticides and fertilizers being introduced into native vegetation communities); landscape plants and weeds moving into native vegetation communities; fragmentation of native plant communities; and the introduction of trash and non-point source pollution. These developed areas can also interrupt the natural process of seed dispersal and pollination due to the fragmented nature of the remaining native plant populations.

Soil erosion is of concern of NMCSD because the topography of the site lends itself to erosion. Tierra Data Systems conducted site visits in 2009 to identify erosion sites and provide guidance on the repair of these sites. In most cases erosion was caused by inappropriate flow of water, often from irrigation systems or from runoff due to impenetrable surfaces such as parking lots (Tierra Data 2009). The primary goal is to repair the erosion and remove the water source that created the problem. In most cases it is recommended that revegetation of the sites will provide long-term stabilization of the soil.

Invasive non-native plant species may be the most significant threat to native habitat within NMCSD. If new species are introduced and left untreated they may outcompete the natives and become established. Existing populations of the most invasive non-native plants that have not become fully established should be controlled as a high priority. Established stands should be treated to prevent them from expanding.

Ongoing maintenance to structures, including building repairs, parking lots repairs, and fence repair often result in impacts to surrounding native habitat that may include laydown areas, vehicle damage and the potential for the introduction of weed seed from vehicles, equipment and human activities. These impacts can include direct mechanical disturbances, erosion, and the introduction of non-native plant species. To reduce these impacts natural resource managers should be involved in determining where staging areas should be placed to reduce impacts, and if there are ways to reduce the overall

footprint of the project area. This type of good communication between natural resource managers and facilities maintenance can result in fewer impacts to native habitat. In addition, vehicles and equipment that have been used on work sites with non-native plant species should be cleaned before entering the work site to remove any non-native weed seeds.

Landscape irrigation can negatively impact native habitat in a number of ways including increasing soil moisture and disturbing the soil moisture and nutrient balance required by native plant populations, increasing the potential for erosion, introducing chemicals into native habitat, and introducing seed from non-native landscape plants or weeds. These impacts can be greatly reduced by incorporating more native plants into landscape areas. Properly selected native plants can greatly reduce the amount of water and fertilizer used.

Invasive non-native plant species present in existing landscaped areas should be removed and landscape designers should be educated as to which plants native or non-native, must be avoided due to their excessive water requirements or their potential to be invasive. In addition, landscaping guidelines should be developed to provide long-term maintenance requirements for native and drought tolerant, non-invasive, non-native plant species to ensure the grounds remain attractively landscaped.

The potential for native plant biodiversity to decrease can occur due to soil erosion, the introduction of non-native plant species or a change in soil chemistry due to increased runoff. Native plant populations throughout NMCSD should be monitored if it has been determined that an adverse impact, such as those discussed above, has occurred. If native cover and/or diversity are decreasing it is important to determine the cause, correct it, and enhance the habitat with seed or installed seedlings to improve the quality of the habitat. It is a particular importance to pay attention to the outside edges of populations as this is where the change in diversity may often first be noted.

Fire suppression of native vegetation around developed areas can result in significantly altered fire regimes. Over time this can lead to a buildup of fuel within native habitat areas. On NMCSD this may become of particular concern in Florida Canyon. The vegetation on NMCSD may have been reestablished in or around 1946 and there are no indications of fire within the native habitat areas. Controlled burns are not feasible, so all fuel modification would have to be manual thinning of vegetation. Non-native vegetation is contributing significantly to fuel loads. Non-native palms, pepper trees, acacia, and Arundo are dense in areas. Throughout the facility, has will be seen in Section 4.3, eucalyptus groves and scattered trees are present. Removal of this non-native plant biomass and treatment of the plants presents an opportunity to reduce fuel loads at the facility. In a naturally occurring system fire can benefit native habitat areas by removing fuel build-up and allowing for natural succession within native habitats. While human intervention will not mimic fire nor result in the same benefits fire can provide it can reduce the likelihood of fire occurring within stands of native vegetation and potentially burning through developed areas. The removal of non-native plant species that are generating excessive fuel loads will also create openings for native plants to become established or be planted. Large non-native plants- particularly arundo, palms, and pepper trees in the riparian areas in Florida Canyon also encourage transient camps. These camps directly introduce an ignition source (smoking and camp/cooking fires) into the habitat areas. These camps are often within or under the Arundo/palm/tree fuel, presenting a significant threat as ignition source and fuel are in close proximity. The resulting fire is at the base of the slope and would easily migrate upslope. Palms in particular can

disperse large embers and flaming fronds large distances during fire storms/Santa Anna's. Scrub vegetation on the hill combined with eucalyptus groves could generate a large and dangerous fire event.

3.4 Assessment of Past and Current Restoration and Enhancement Projects

As part of the vegetation management program native plant restoration projects that have occurred on NMCSD will be identified and a review of these projects will be conducted. Both completed and current habitat restoration and/or enhancement projects will be evaluated for success and restoration methods reviewed to determine which are the most cost efficient and effective. If there are projects that have not progressed adequately they will be evaluated to determine what remedial methods can be applied to meet success criteria. Success criteria shall include, at a minimum, native and non-native cover and native diversity. Section 5 provides details on how to assess these projects.

3.5 Identify Potential Sites for Restoration

This Vegetation Management Plan identifies and prioritizes twenty-two sites that require restoration and/or enhancement. These sites are presented in Section 6. Sites were evaluated based on their potential to enhance native habitat especially if they have the potential to benefit sensitive fauna. Identified sites that have the potential to enhance scarce habitat types (riparian/wetlands) or create a buffer zone between existing habitat and developed areas were given higher priority. Of the sites identified those that are spatially separated from native habitat area were ranked lowest.

Prioritization of sites may change over time, or additional sites may be added as new issues are identified. For example, if a site develops an erosion issue that poses an immediate threat to habitat or structures then that site will become a higher priority. The identification of a new invasive species on a site would also increase the priority of a site, although in this case it may be that the treatment of the species identified could be conducted without actual restoration and the site would then be moved back down on the priority list.

3.6 Develop Landscaping Guidelines

Landscaped areas can contribute to the decline of native habitat through the introduction of invasive non-native plant species and increased soil moisture caused by supplemental watering and the introduction of herbicides and fertilizers downstream from the landscaped area. Increased soil moisture can negatively impact habitat by supporting species, both native and non-native, not appropriate for the area.

Landscaped areas will be assessed for species composition and water use. Recommendations for the replacement of potentially invasive plant species and species requiring high water use shall include regionally appropriate native plants whenever possible. Non-natives recommended shall be drought tolerant and non-invasive. Landscaping guidelines shall include appropriate methods for eradicating species that threaten native habitat and methods for replacing them in a timely manner to prevent erosion issues or the establishment of invasive non-native plant species in the disturbed area.

3.7 Education for Landscape Personnel

To reduce the impacts landscaping has on native habitat and to increase the opportunities of identifying non-native plant species an education program for landscaping personnel shall be implemented. Once landscaping guidelines have been developed landscaping managers shall be provided with copies and landscaping personnel will be provided with photographs of known or potential invasive non-native species to watch for. Communications between the Natural Resources office and landscaping teams shall be open and ongoing as this will allow for rapid response should a species of concern be identified. This open communication may also prevent inappropriate landscaping before it is installed.

An initial effort to create awareness of the impacts of invasive species has already been developed in the form of a brochure (Appendix A). The brochure provides information on invasive species found on NMCSD and suggests using alternatives, both native and non-invasive non-native species. The brochure also stresses the importance of preserving native habitat and taking an active role in preventing the introduction on invasive species.

4.0 BOTANICAL RESOURCES

The 2005 plant surveys conducted by RECON identified 205 plant species on NMCSD of which 64 species are native to southern California. No rare plants were identified during the 2003 efforts conducted by RECON or during the 2009 efforts conducted by Agri Chemical and Supply Inc. Appendix B provides a list of all species documented during these surveys.

4.1 Vegetation Communities

Vegetation mapping was conducted on NMCSD in 2002 and 2003 by RECON and updated in 2009 by Agri-Chemical and Supply. The mapping is spatially of very high resolution- units as small as 10-foot square polygons in native areas and landscaped areas were mapped to equal to or greater than 20-foot square polygons (RECON 2005).

Two vegetation community classification systems were used: the Holland system (1995) and the Sawyer Keller Wolf ‘Series’ system (1995). A map depicting the Holland classification system is presented in Figure 2 and a map depicting the Sawyer Keller Wolf classification system is presented in Figure 3.

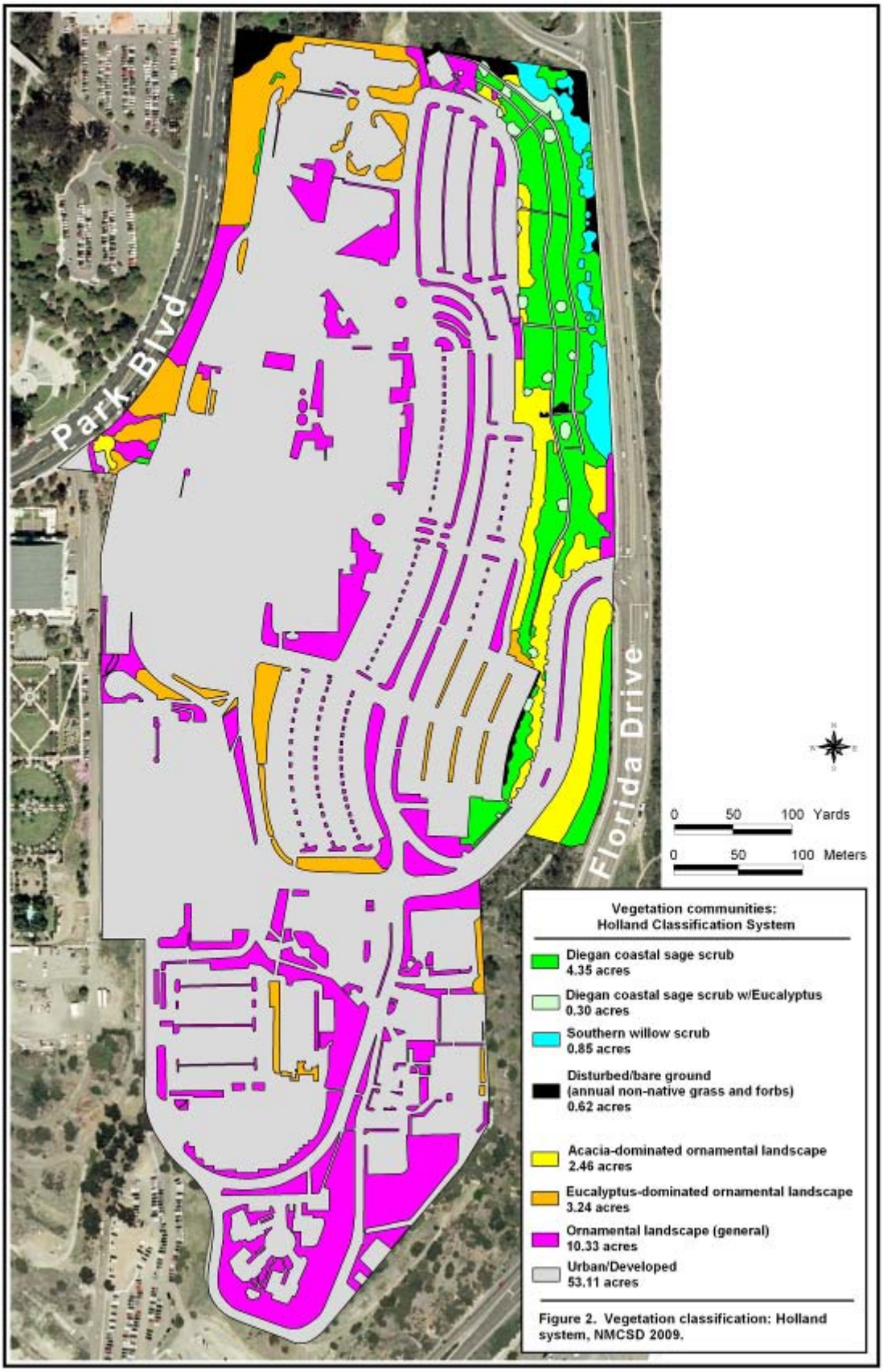
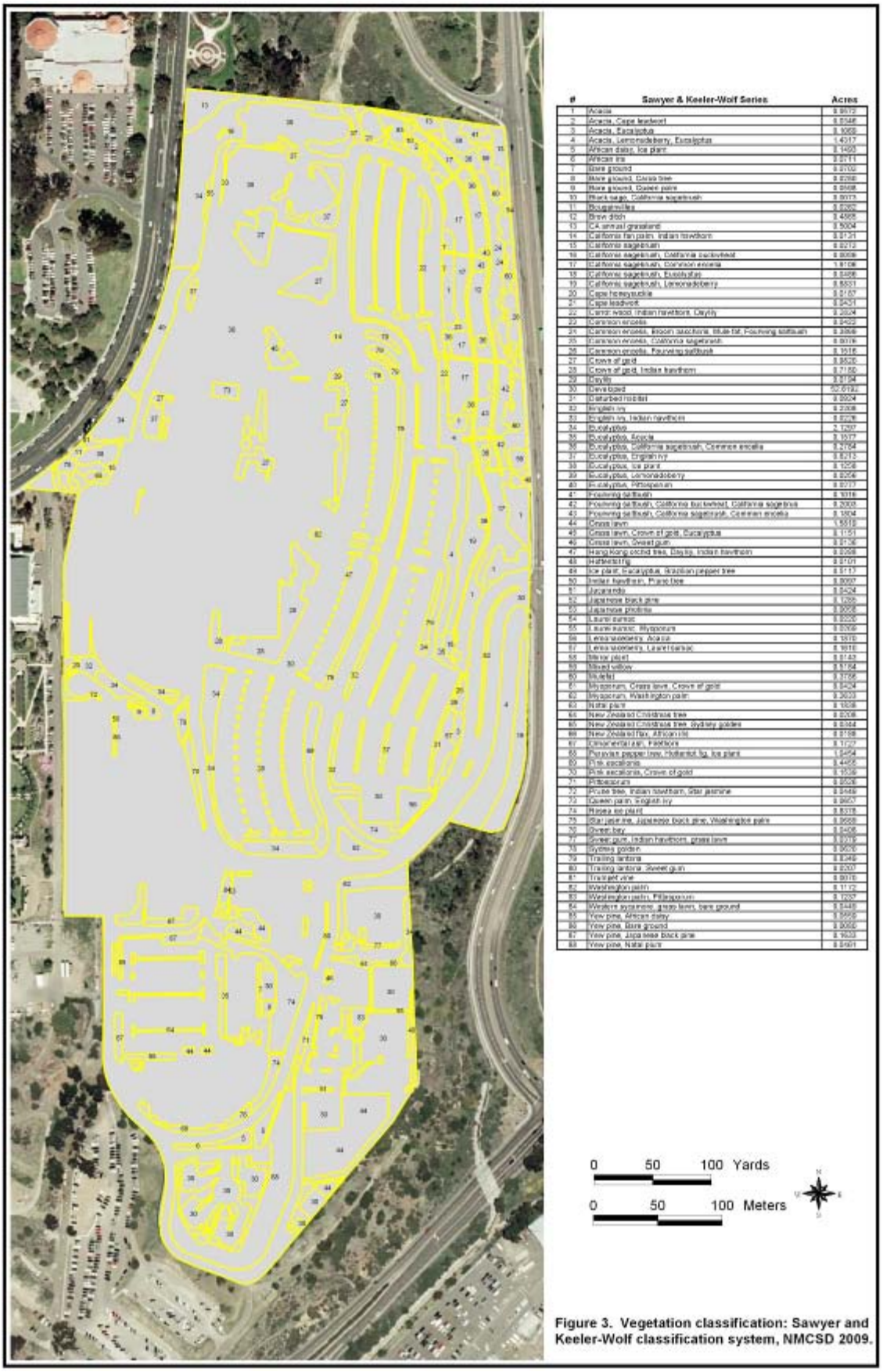


Figure 2. Vegetation classification: Holland system, NMCSD 2009.



#	Sawyer & Keeler-Wolf Series	Acres
1	Acacia	0.9972
2	Acacia, Cape leadwort	0.5548
3	Acacia, Eucalyptus	0.3068
4	Acacia, Lemonadeberry, Eucalyptus	1.4317
5	African daisy, Ice plant	0.1400
6	African iris	0.0711
7	Bare ground	0.5102
8	Bare ground, Canary tree	0.0768
9	Bare ground, Queen palm	0.0498
10	Black sage, California sagebrush	0.9973
11	Bougainvillea	0.0362
12	Brow ditch	0.4568
13	CA annual grassland	0.5004
14	California fan palm, Indian hawthorn	0.2121
15	California sagebrush	0.0272
16	California sagebrush, California buckwheat	0.0059
17	California sagebrush, Common encelia	1.9706
18	California sagebrush, Eucalyptus	0.5498
19	California sagebrush, Lemonadeberry	0.5551
20	Cape honeysuckle	0.2157
21	Cape leadwort	0.3421
22	Carob wood, Indian hawthorn, Daylily	0.2824
23	Common encelia	0.9422
24	Common encelia, Bloom saxifrage, Blue-fat, Pouncing saltbush	0.3868
25	Common encelia, California sagebrush	0.9019
26	Common encelia, Pouncing saltbush	0.1518
27	Crown of gold	0.8526
28	Crown of gold, Indian hawthorn	0.7180
29	Daylily	0.8704
30	Developed	52.6192
31	Disturbed habitat	0.0924
32	English ivy	0.2308
33	English ivy, Indian hawthorn	0.8226
34	Eucalyptus	2.7297
35	Eucalyptus, Acacia	0.1577
36	Eucalyptus, California sagebrush, Common encelia	0.2764
37	Eucalyptus, English ivy	0.8213
38	Eucalyptus, Ice plant	0.1258
39	Eucalyptus, Lemonadeberry	0.2054
40	Eucalyptus, Pittosporum	0.8717
41	Pouncing saltbush	0.1016
42	Pouncing saltbush, California buckwheat, California sagebrush	0.2003
43	Pouncing saltbush, California sagebrush, Common encelia	0.1804
44	Cross lawn	0.5818
45	Cross lawn, Crown of gold, Eucalyptus	0.1151
46	Cross lawn, Sweet gum	0.2136
47	Hong Kong orchid tree, Daylily, Indian hawthorn	0.2268
48	Hottentot fig	0.2101
49	Ice plant, Eucalyptus, Brazilian pepper tree	0.5117
50	Indian hawthorn, Prune tree	0.8097
51	Jacaranda	0.5424
52	Japanese black pine	0.1286
53	Japanese photinia	0.3058
54	Laurel sumac	0.8220
55	Laurel sumac, Myoporum	0.0709
56	Lemonadeberry, Acacia	0.1978
57	Lemonadeberry, Laurel sumac	0.1978
58	Mirror plant	0.5143
59	Mixed willow	0.5764
60	Mulefat	0.3756
61	Myoporum, Crape lawn, Crown of gold	0.5424
62	Myoporum, Washington palm	0.2623
63	Natal plum	0.1938
64	New Zealand Christmas tree	0.8208
65	New Zealand Christmas tree, dyckisky golden	0.2464
66	New Zealand flax, African iris	0.5198
67	Ornamental bush, Hedione	0.1727
68	Peruvian pepper tree, Hottentot fig, Ice plant	1.5454
69	Pink escallonia	0.4498
70	Pink escallonia, Crown of gold	0.1536
71	Pittosporum	0.8526
72	Prune tree, Indian hawthorn, star jasmine	0.5448
73	Queen palm, English ivy	0.9957
74	Riviera ice plant	0.8378
75	Star jasmine, Japanese black pine, Washington palm	0.9668
76	Sweet bay	0.5408
77	Sweet gum, Indian hawthorn, grass lawn	0.9313
78	Wykiwa golden	0.9626
79	Trailing lantana	0.5498
80	Trailing lantana, sweet gum	0.8207
81	Transient vine	0.9016
82	Washington palm	0.1112
83	Washington palm, Pittosporum	0.1257
84	Western sycamore, grass lawn, bare ground	0.5448
85	Yew pine, African daisy	0.5498
86	Yew pine, bare ground	0.3092
87	Yew pine, Japanese black pine	0.1623
88	Yew pine, Natal plum	0.5461

Figure 3. Vegetation classification: Sawyer and Keeler-Wolf classification system, NMCSD 2009.

Actual changes to vegetation composition and distribution in the field were minor, too small to be detected by vegetation mapping- in general. However, significant revisions were made to the mapping. These changes are related to the classification of the individual polygons that make up the mapping. Using the Holland system of vegetation- these changes are still minor, as the Holland classification system is fairly course in structure. Significant changes were made to the Sawyer Keeler-Wolf series mapping. Most of these changes are directly related to the use of individual species being used to designate individual series levels. Individual plants do not constitute vegetation habitat series. Series classification is dictated by one to several key species, but it should not be used to map out unconnected polygons of habitat consisting of individual plant occurrences. Part of the reason that this may have occurred was that all invasive non-native plant species were being mapped out in high resolution (in general). This single species occurrence data should be presented separately as invasive non-native plant distribution data- but not used to determine series level community mapping (see section 4.3 for presentation of this data). These classification changes were most evident in the riparian zone where many polygons had been presented as a non-native plant series. The new mapping classifies these areas as specific riparian tree or scrub series (where non-native plants occur). This also occurred in some coastal sage scrub series, but to a much smaller degree. Eucalyptus cover also obscured the distribution of some vegetation that occurred under the broad canopy of these trees. Some areas are still mapped as eucalyptus, but areas with developed native understory were sometimes used to characterize the vegetation. The distribution of eucalyptus is best captured in the GIS data layer that mapped out the full canopy of the species on NMCSD (section 4.3).

There are five vegetation communities on NMCSD, as defined by the Holland classification system. The site is dominated by ornamental landscaping, but also contains Diegan coastal sage scrub, southern willow scrub, disturbed areas, and developed areas (RECON 2005, updated by Agri Chem 2009). Table 1 provides acreage for each vegetation community and descriptions of each community are provided below. Vegetation series and acreage using the Sawyer, Keeler-Wolf classification system is provided in Table 2.

Table 1. Holland Vegetation Classification Acreage.

Holland Vegetation Classifications	**Acreage**
1. Diegan coastal sage scrub	5.34
2. Southern willow scrub	0.62
3. Ornamental landscape	10.18
4. Ornamental landscape – eucalyptus dominated	3.73
5. Ornamental landscape – acacia dominated	1.50
6. Disturbed habitat	0.54
7. Urban/Developed	53.26
Total	**75.17**

Table 2. Sawyer and Keeler-Wolf Vegetation Series Acreage.

Vegetation Series	Acreage
Acacia	0.9572
Acacia, Cape leadwort	0.0346
Acacia, Eucalyptus	0.1069
Acacia, Lemonadeberry, Eucalyptus	1.4317
African daisy, Ice plant	0.1493
African iris	0.0711
Bare ground	0.0702
Bare ground, Carob tree	0.0280
Bare ground, Queen palm	0.0598
Black sage, California sagebrush	0.0073
Bougainvillea	0.0262
Brow ditch	0.4865
CA annual grassland	0.5004
California fan palm, Indian hawthorn	0.0131
California sagebrush	0.0272
California sagebrush, California buckwheat	0.0086
California sagebrush, Common encelia	1.9106
California sagebrush, Eucalyptus	0.0486
California sagebrush, Lemonadeberry	0.8831
Cape honeysuckle	0.0187
Cape leadwort	0.0431
Carrot wood, Indian hawthorn, Daylily	0.2824
Common encelia	0.0422
Common encelia, Broom baccharis, Mule fat, Fourwing saltbush	0.3869
Common encelia, California sagebrush	0.0076
Common encelia, Fourwing saltbush	0.1516
Crown of gold	0.9820
Crown of gold, Indian hawthorn	0.7180
Daylily	0.0194
Developed	52.6192
Disturbed habitat	0.0924
English ivy	0.2308
English ivy, Indian hawthorn	0.0226
Eucalyptus	2.1297
Eucalyptus, Acacia	0.1577
Eucalyptus, California sagebrush, Common encelia	0.2784
Eucalyptus, English ivy	0.8213
Eucalyptus, Ice plant	0.1258
Eucalyptus, Lemonadeberry	0.0256
Eucalyptus, Pittosporum	0.0277
Fourwing saltbush	0.1016
Fourwing saltbush, California buckwheat, California sagebrus	0.2003
Fourwing saltbush, California sagebrush, Common encelia	0.1804
Grass lawn	1.5819
Grass lawn, Crown of gold, Eucalyptus	0.1151
Grass lawn, Sweet gum	0.0136
Hong Kong orchid tree, Daylily, Indian hawthorn	0.0388

Vegetation Series	Acreage
Hottentot fig	0.0101
Ice plant, Eucalyptus, Brazilian pepper tree	0.5117
Indian hawthorn, Prune tree	0.0097
Jacaranda	0.0424
Japanese black pine	0.1285
Japanese photinia	0.0058
Laurel sumac	0.0220
Laurel sumac, Myoporum	0.0269
Lemonadeberry, Acacia	0.1870
Lemonadeberry, Laurel sumac	0.1610
Mirror plant	0.0143
Mixed willow	0.5184
Mulefat	0.3786
Myoporum, Grass lawn, Crown of gold	0.0424
Myoporum, Washington palm	0.2633
Natal plum	0.1838
New Zealand Christmas tree	0.0208
New Zealand Christmas tree, Sydney golden	0.0344
New Zealand flax, African iris	0.0188
Ornamental ash, Firethorn	0.1727
Peruvian pepper tree, Hottentot fig, Ice plant	1.0454
Pink escallonia	0.4455
Pink escallonia, Crown of gold	0.1539
Pittosporum	0.0526
Prune tree, Indian hawthorn, Star jasmine	0.0449
Queen palm, English ivy	0.0657
Rosea ice plant	0.8378
Star jasmine, Japanese black pine, Washington palm	0.0689
Sweet bay	0.0408
Sweet gum, Indian hawthorn, grass lawn	0.0379
Sydney golden	0.0620
Trailing lantana	0.8349
Trailing lantana, Sweet gum	0.0207
Trumpet vine	0.0070
Washington palm	0.1172
Washington palm, Pittosporum	0.1237
Western sycamore, grass lawn, bare ground	0.0449
Yew pine, African daisy	0.0559
Yew pine, Bare ground	0.0080
Yew pine, Japanese black pine	0.1633
Yew pine, Natal plum	0.0461

4.1.1 Diegan Coastal Sage Scrub

Diegan coastal sage scrub is a low-growing plant community comprised of aromatic, drought-deciduous shrubs and sub-shrubs. Often found on clay slopes this plant community can survive with little soil moisture through the summer months. Diegan coastal sage scrub on NMCSD is dominated by *Artemisia*

californica (California sagebrush), *Eriogonum fasciculatum* (California buckwheat), *Baccharis sarathroides* (broom baccharis), and *Salvia mellifera* (black sage).

Diegan coastal sage scrub is considered a sensitive habitat by the City and County of San Diego and is given the highest inventory priority by the CNDDB. Coastal sage scrub was listed as the third most extensive vegetation community in the county over 25 years ago (CDFG 1965); however, Oberbauer (1979) suggested that up to 70 percent of the county's original sage scrub habitat had been destroyed or modified, and this loss has continued throughout the last decade, primarily due to urban expansion. Additional evidence of the decline of this once common habitat is the growing number of declining plant and animal species dependent upon it, including the California gnatcatcher, which is present on site.

4.1.2 Southern Willow Scrub

Southern willow scrub is found on loose, sandy, or fine gravelly alluvium deposited near stream channels during floods, and most stands are too dense to allow much understory to develop (Holland 1986). This habitat can be a dense broad-leaved, winter-deciduous association dominated by willow species to a mule-fat dominated scrub. Understory is often composed of weedy species or in dense stands not present at all. Southern willow scrub habitat on NMCSD is dominated by *Salix gooddingii. Salix lasiolepis* and *Baccharis salicifolia.*

4.1.3 Ornamental

NMCSD is dominated by a variety of non-native ornamental landscape including eucalyptus-dominated slopes and acacia dominated hedges. Much of the native habitat on NMCSD is adjacent to non-native landscaping, some of which is drought tolerant and has the potential to move into native habitat. Many of the eucalyptus-dominated areas are dense enough to exclude native habitat.

4.1.4 Disturbed

Disturbed habitat is any land on which the native vegetation has been significantly altered by agriculture, construction, or other land-clearing activities, and the species composition and site conditions are not characteristic of the disturbed phase of one of the plant associations within the study region. Most disturbed habitat on NMCSD is located in the northeast corner of the site (RECON 2005). Typical plant species include crown daisy (*Chrysanthemum coronarium*), mustard (*Brassica* spp.), mustard, lamb's quarters (*Chenopodium album*), fountain grass (*Pennisetum setaceum*), and castor bean (*Ricinus communis*), among others. Nonnative trees, such as eucalyptus, pepper trees, and acacia also occur in this association.

4.1.5 Developed

Developed areas are defined as areas that do not generally support native vegetation and may be additionally characterized by the presence of man-made structures such as buildings or roads. The level of soil disturbance is such that only the most ruderal plant species would be expected.

4.2 Rare Plant Surveys

Rare plant surveys were conducted on 24 April and 4 May 2009. While understory annuals were largely towards the end of their lifecycle, they were still identifiable. Surveys were conducted throughout the native vegetation on NMCSD, but focused on the coastal sage scrub habitat covering the east-facing slope above Florida Canyon. Figure 4 provides an overview of the areas surveyed.

In order to avoid damage to the generally dense shrub cover within the coastal sage scrub habitat, surveys were primarily conducted from the cement drain channels running along the slope with occasional forays into the vegetation where the shrub canopy was more open. *Encelia californica* (coast sunflower) was the dominant shrub across the slope with *Artemisia californica* (coastal sagebrush), *Rhus integrifolia* (lemonade berry), *Salvia mellifera* (black sage), and occasional *Eriogonum fasciculatum* (California buckwheat), *Lotus scoparius* (deerweed), *Mimulus aurantiacus* (bush monkey flower), and *Pluchea sericea* (arrow weed). A variety of ornamental shrubs and trees were also present within the habitat.

The coastal sage scrub understory was mainly composed of many *Encelia californica* seedlings and common nonnative annual grasses and forbs (e.g. *Bromus madritensis* ssp. *rubens*, *Bromus diandrus*, *Melilotus indicus*, *Centarea melitensis*), though some natives were noted including *Nassella lepida* (small flowered needlegrass), *Phacelia cicutaria* (caterpillar phacelia), *Antirrhinum nuttallianum* (Nuttall's snapdragon), *Eucrypta chysanthemifolia* (spotted eucrypta), and *Pterostegia drymarioides* (granny's hairnet).

No rare plants were found during the surveys. Native vegetation on NMCSD is primarily created habitat installed during or since the construction of the site. Most likely the plant palette used consisted of common perennial species for each habitat type. It is unlikely that sensitive plant species will become established on NMCSD unless they are included in a plant palette for a restoration project or expand onto the site from a nearby off-site population. Rare plant surveys should be conducted every 3 to 5 years, during the same season, and the same survey routes should be covered, as provided in Figure 4.

4.3 Invasive Non-native Plant Species Mapping

Invasive non-native plant species mapping data is presented in Figures 5 and 6 and acreage is provided in Table 3. Figure 5 provides the location of all invasive non-native plant species minus eucalyptus. Figure 6 provides the locations of eucalyptus on site, including in developed areas and within native habitat. Mapping presented in this Plan was conducted by Agri Chem in 2009 and uses the same methodologies used for vegetation community mapping. Invasive non-native plant species mapping will be conducted every 3 to 5 years.

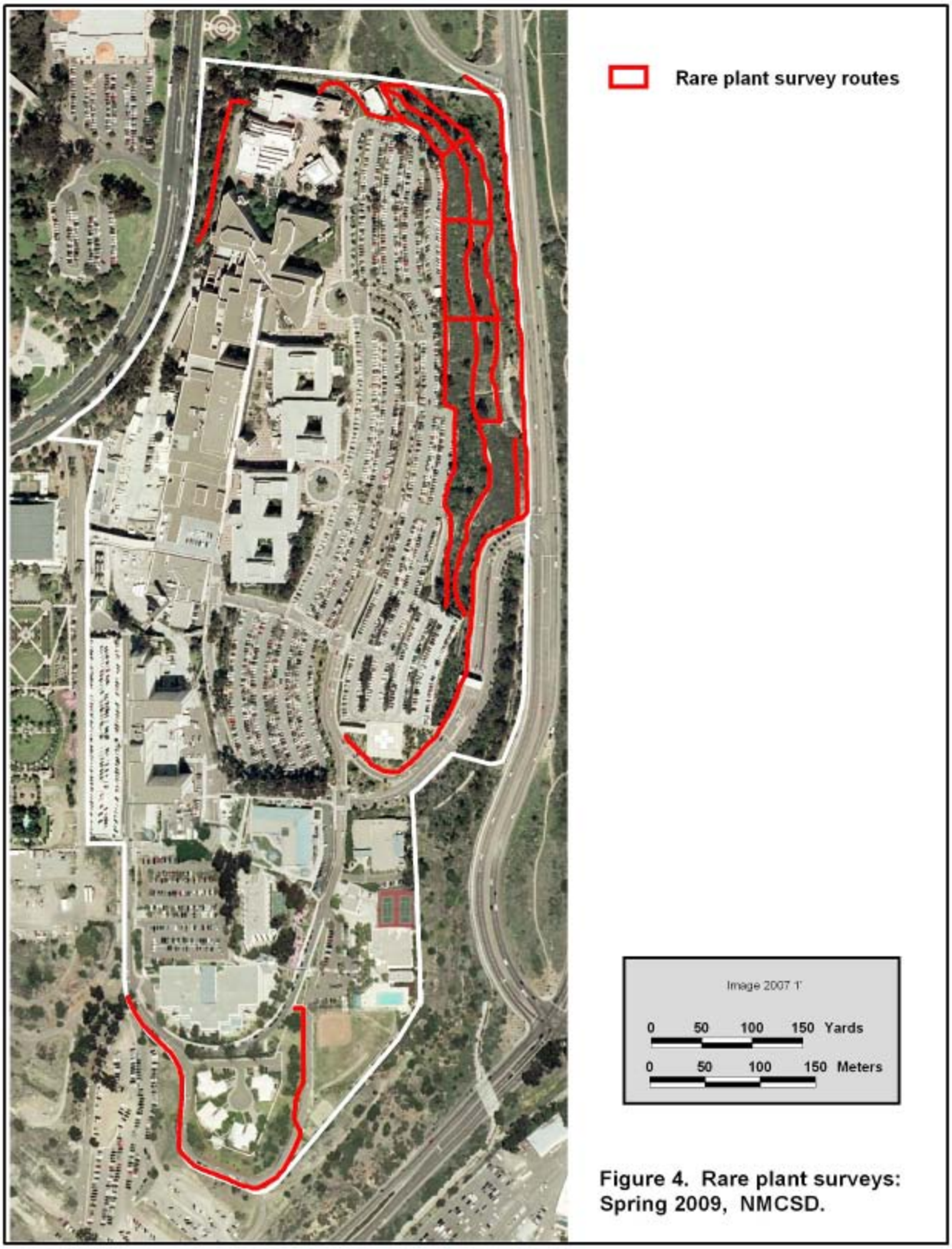


Figure 4. Rare plant surveys: Spring 2009, NMCSD.

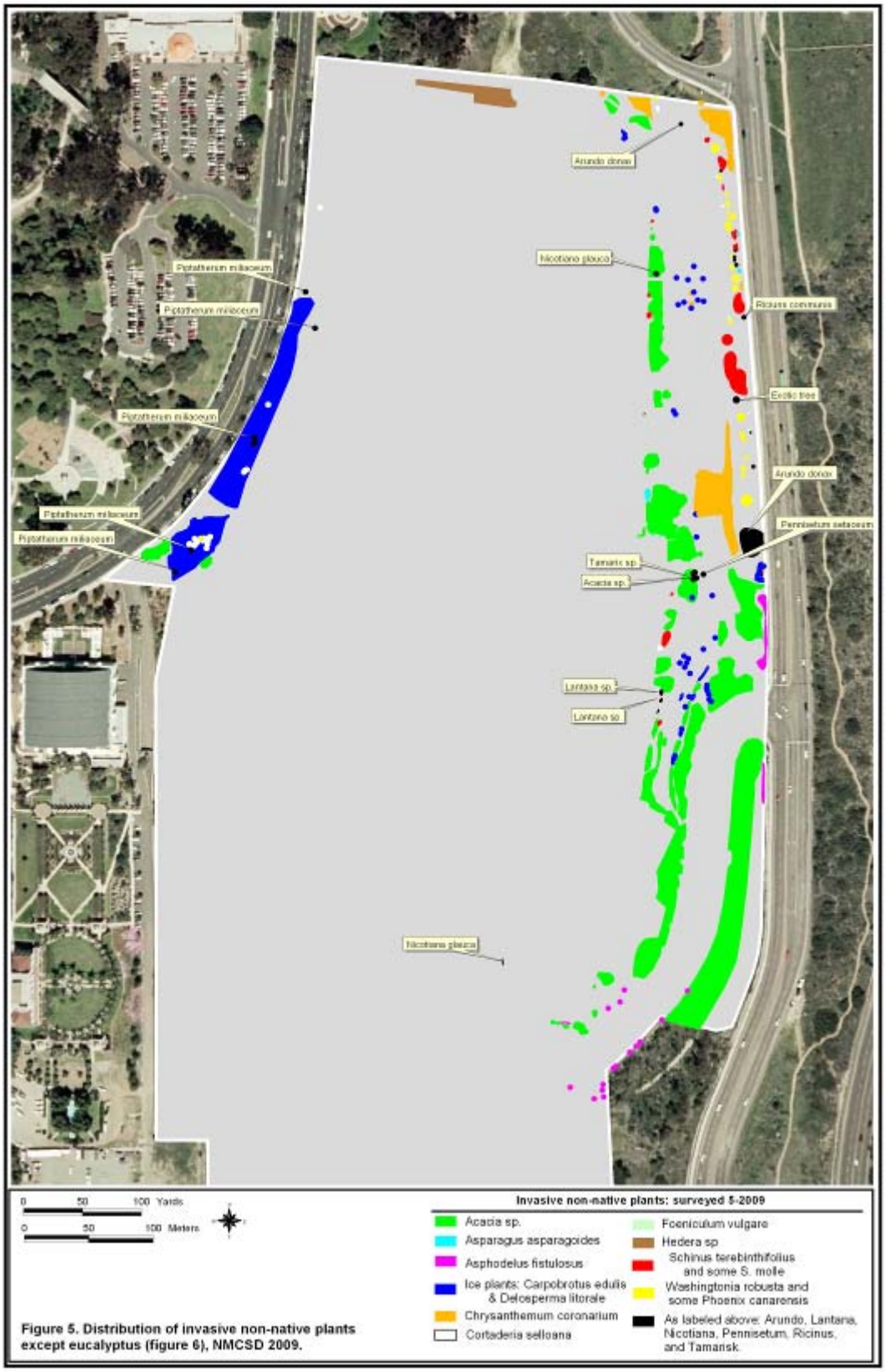


Figure 5. Distribution of invasive non-native plants except eucalyptus (figure 6), NMCSD 2009.

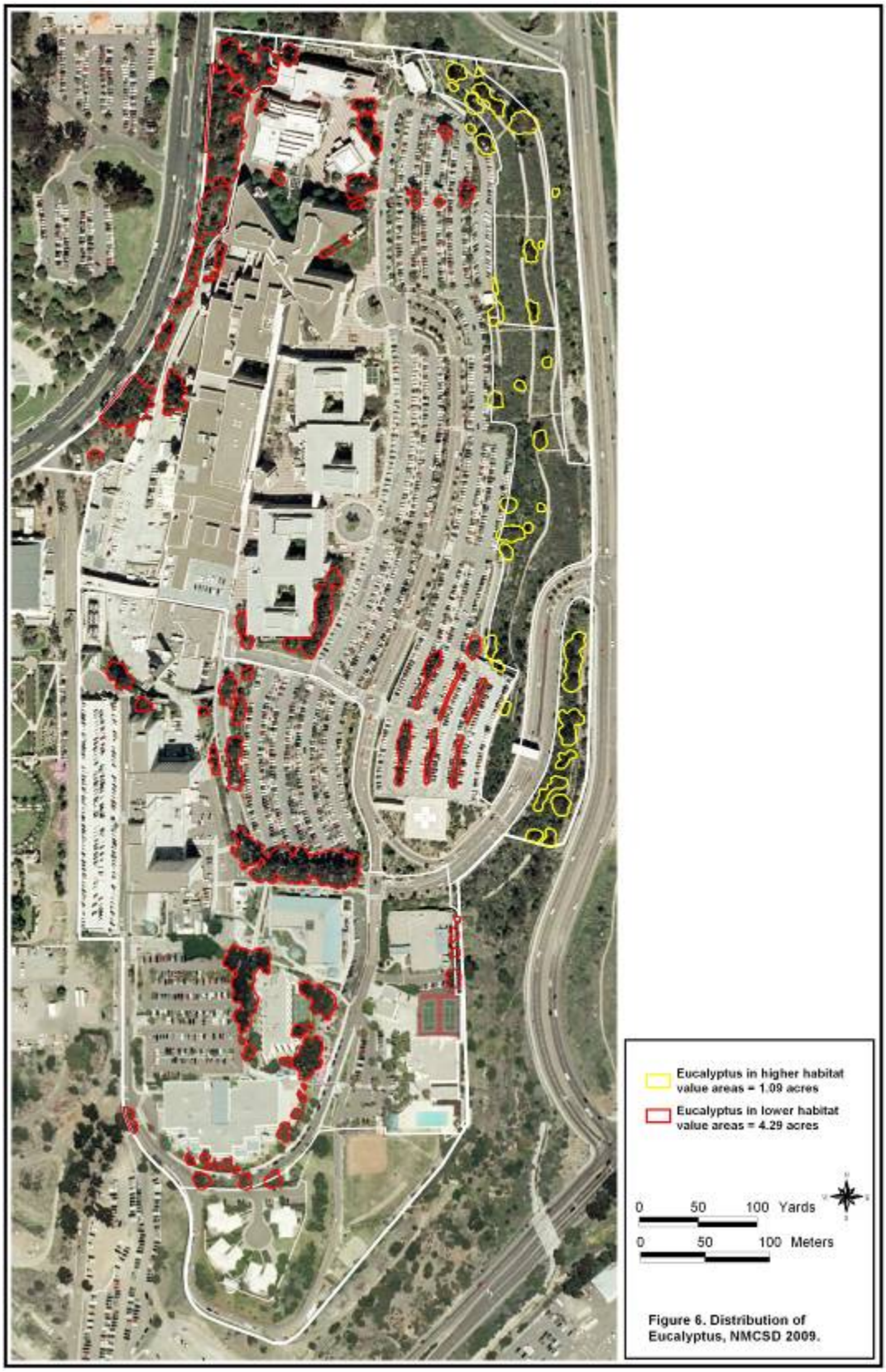


Figure 6. Distribution of Eucalyptus, NMCSD 2009.

Invasive non-native plant species are grouped as: List 1- highly invasive and/or high impact, List 2- moderate invasiveness and impact, and List 3- low invasiveness/impact. While these levels generally follow the California Invasive Plant Councils (Cal-IPC) ranking, some are ranked higher in this Plan as their level of invasiveness is higher based on location and/or potential impact to the NMCSD. Conditions that would result in a higher ranking than that of Cal-IPC includes established populations of a non-native species adjacent to native habitat, increased potential for growth due to man-made circumstances, such as supplemental water and nutrients from landscape run-off, and a decrease in cost for treatment by combining one non-native species treatments with another due to its proximity to a higher ranked species.

Table 3. Invasive Non-Native Plant Species Acreage and Ranking.

Common Name	Scientific Name	Acreage	Cal IPC Ranking*
Acacia	*Acacia* sp.	2.4421	List 1
African asparagus fern	*Asparagus asparagoides*	0.0111	List 2
Bottlebrush	*Callistemon* sp.	0.0032	List 2
Brazilian pepper tree	*Schinus terebinthifolius*	0.1227	List 2
Canary Island date palm	*Phoenix canariensis*	0.0215	List 2
Castor bean	*Riciuns communis*	0.0022	List 1
English ivy	*Hedera* sp	0.1200	List 1
Exotic tree	Exotic tree	0.0044	List 3
Fennel	*Foeniculum vulgare*	0.0046	List 1
Fountain grass	*Pennisetum setaceum*	0.0006	List 1
Garland chrysanthemum	*Chrysanthemum coronarium*	0.3764	List 1
Giant reed	*Arundo donax*	0.0661	List 1
Iceplant	*Carpobrotus edulis*	0.7778	List 1
Lantana	*Lantana* sp.	0.0047	List 3
Mexican fan palm	*Washingtonia robusta*	0.0507	List 2
Onionweed	*Asphodelus fistulosus*	0.0477	List 2
Pampas grass	*Cortaderia selloana*	0.0042	List 1
Peruvian pepper tree	*Schinus molle*	0.0197	List 2
Tamarisk	*Tamarisk sp*	0.0026	List 1
Tree tobacco	*Nicotiana glauca*	0.0011	List 2

*The Cal-IPC rank is determined by completing a plant assessment form, which uses a invasiveness, impact, and distribution to determine the negative ecological impact of a species. For more information on ranking see http://www.cal-ipc.org/ip/inventory/index.php

5.0 PAST AND CURRENT RESTORATION SITE ASSESSMENT

Assessing existing and past restoration sites will provide information that will assist in future restoration projects. Successful projects can be analyzed for treatments that have proven successful and can be implemented on future projects. Restoration projects that failed to meet success criteria can be assessed for ineffective methods that should not be used in the future or that can be modified to be more effective. In addition, remedial efforts can be applied to unsuccessful projects in order to return them to pre-disturbance quality.

Prior to conducting site visits the Restoration Plan for each site will be reviewed to determine what the ultimate goal of the project was, methodologies used, and success criteria. If the project is no longer active the final report will also be reviewed to determine if the site met success criteria or if remedial actions are required. At a minimum each site will be assessed for native and non-native cover, native diversity and overall health of the habitat. If overall plant health is low soil samples should be collected and analyzed for texture, organic matter and macro and micronutrients.

Total cover, cover by species, and relative cover of native coastal sage scrub species will be determined using the point intercept method. Transect size will be determined by the size of each site, but will equal a total of 50 meters per acre. Transect locations will be noted in the first annual progress report. Points will be sampled along each transect at 0.5-meter intervals. A one meter long, ¼ inch diameter rod will be placed vertically at each sampling point. All live plant species that come into contact with the rod or its upward extension will be counted. If no vegetation is intercepted at a sampling point, it will be recorded as bare. Total cover is determined by how many points are covered by vegetation along each transect, relative to the total number of possible intercepts. Total cover by an individual species is determined by dividing the number of points covered by the species by the total number of sample points for that transect. Relative cover is determined for each species by dividing the percent cover for each species by the sum of percent cover for all species. If this success criterion is not achieved, remedial measures, in the form of re-seeding, may be deemed necessary by the government.

Plant diversity will be monitored by walking 3-meter belts, centered on each transect and every live perennial plant identified within this belt is recorded, including those counted within the point-intercept method.

If conditions are identified they should be documented to ensure that they are addressed and prevented in future restoration projects. Conditions that may negatively affect a project include improper soil nutrients, invasive non-native plant species, erosion, and herbivory. Sites that are progressing on schedule should be evaluated and the methods documented so that they can be applied to future restoration projects.

Once all past and current projects have been evaluated the data can be used to develop guidelines for native plant restoration on NMCSD. These guidelines shall be considered a work in progress and updated every five years. This adaptive management approach will allow for the improvement of restoration and enhancement practices on NMCSD.

6.0 POTENTIAL FUTURE RESTORATION/ENHANCEMENT SITES

On 8 January 2008 Agri Chem ecologists Jason Giessow and Julie Janssen conducted a site visit to determine what areas on NMCSD would benefit from restoration efforts and to prioritize the sites selected. Individual sites were assessed based on 1) its location in relation to native habitat; 2) the habitat health adjacent to the site; and 3) existing erosion or the potential for future erosion and the presence of invasive non-native plant species.

A total of 22 sites were identified (Figure 7). Some sites are not actual “sites” but consist of removing all List 1 species within the Center or the removal of all eucalyptus under six inches in diameter. The

priority of the sites may change over time if new issues arise or if funding allows one site to be completed before another. The list of sites will be reviewed annually to determine if modifications or additions need to be made. Sites are listed in the order they were visited. Prioritization of the sites is provided in the next section.

Criteria used to rank potential restoration sites were:

- Habitat Improvement Value – Sites located adjacent to native habitat and would improve or increase the amount of native habitat if restored. Included in this criterion was the site health as well as that of adjacent habitat. Sites with moderate to high native cover and diversity were ranked highest. Consideration was also given to location; for example, sites that have the potential to increase wildlife movement were ranked higher than more isolated sites.
- Fire Risk Reduction – Sites that contain plants that pose a serious fire risk or would increase the movement of fire due to density or thick thatch.
- Flood Risk Reduction – Sites that, if restored, would improve the flow of seasonal rainfall run-off.
- Reduce Potential for Erosion – Sites with existing erosion, or the potential for erosion that could be reduced by implementing erosion control and/or re-vegetating with native plants.
- Aesthetic Value – Sites located in areas that are in view of buildings or walkways and that through weed control or active restoration would improve the overall aesthetics of the area.
- Efficiency (part of another site) – Sites that are adjacent to a site that requires restoration and that by combining the two sites reduces the overall effort and costs.
-

Table 4 provides an overview of the sites and the numerical values used to prioritize the sites. Numerical values are 0-5, with 0 meaning there is no benefit for that criteria and 5 meaning there is substantial benefit.

Table 4. Criteria and numerical values (0-5) given to sites assessed for restoration needs.

Rank	Site Number	Site Name	Habitat value improvement	Fire risk reduction	Flood Risk reduction	Reduce Potential for Erosion	Aesthetic	Efficiency (part of another site)	Summary
1	5	Florida Canyon Riparian Site*	5	5	4	2	1	0	17
2	20	Treatment of all List 1 Species on *NMCSD	5	3	1	3	2	2	16
3	19	Treatment of all Eucalyptus Under 6”*	5	4	0	2	2	2	15
4	3	Florida Canyon NE Corner Riparian* Scrub	4	4	0	1	1	3	13
5	16	Florida Canyon Chrysanthemum Site	4	3	0	3	2	0	12
6	7	Slope Adjacent to Florida Canyon Outfall	4	4	0	3	1	0	12
7	22	Erosion Site 6 (TDS 2009)	4	2	0	4	2	0	12
8	6	High Quality CSS Slope	4	2	0	3	2	0	11
9	11	Northwest Corner Non-native Grassland	4	3	0	3	1	0	11
10	4	Middle Slope NE Corner CSS	4	2	0	3	1	0	10
11	9	Crib Wall Restoration	3	2	0	3	2	0	10
12	13	Gate Entrance - North	3	2	0	2	3	0	10
13	14	Gate Entrance - South	3	2	0	2	3	0	10
14	15	Southeast Corner - Top of Slope	3	3	0	3	1	0	10
15	1	Fisher House Future Native Garden Site	3	0	0	3	3	0	9
16	2	Fisher House Slope	3	2	0	2	2	0	9
17	8	Acacia and Rhus Dominated Parking Lot	3	3	0	2	1	0	9
18	12	Healing Garden	2	2	0	2	3	0	9
19	17	Mature Acacia and NN** Trees - Parking Lot	3	3	0	2	1	0	9
20	10	Helipad Slope	3	0	0	3	2	0	8
21	21	Erosion Site 4 (TDS 2009)	1	0	0	5	1	2	9
22	18	Eucalyptus in Parking Structures	0	5	0	0	1	0	6

- Coastal Sage Scrub (CSS)

** Non-native (NN)

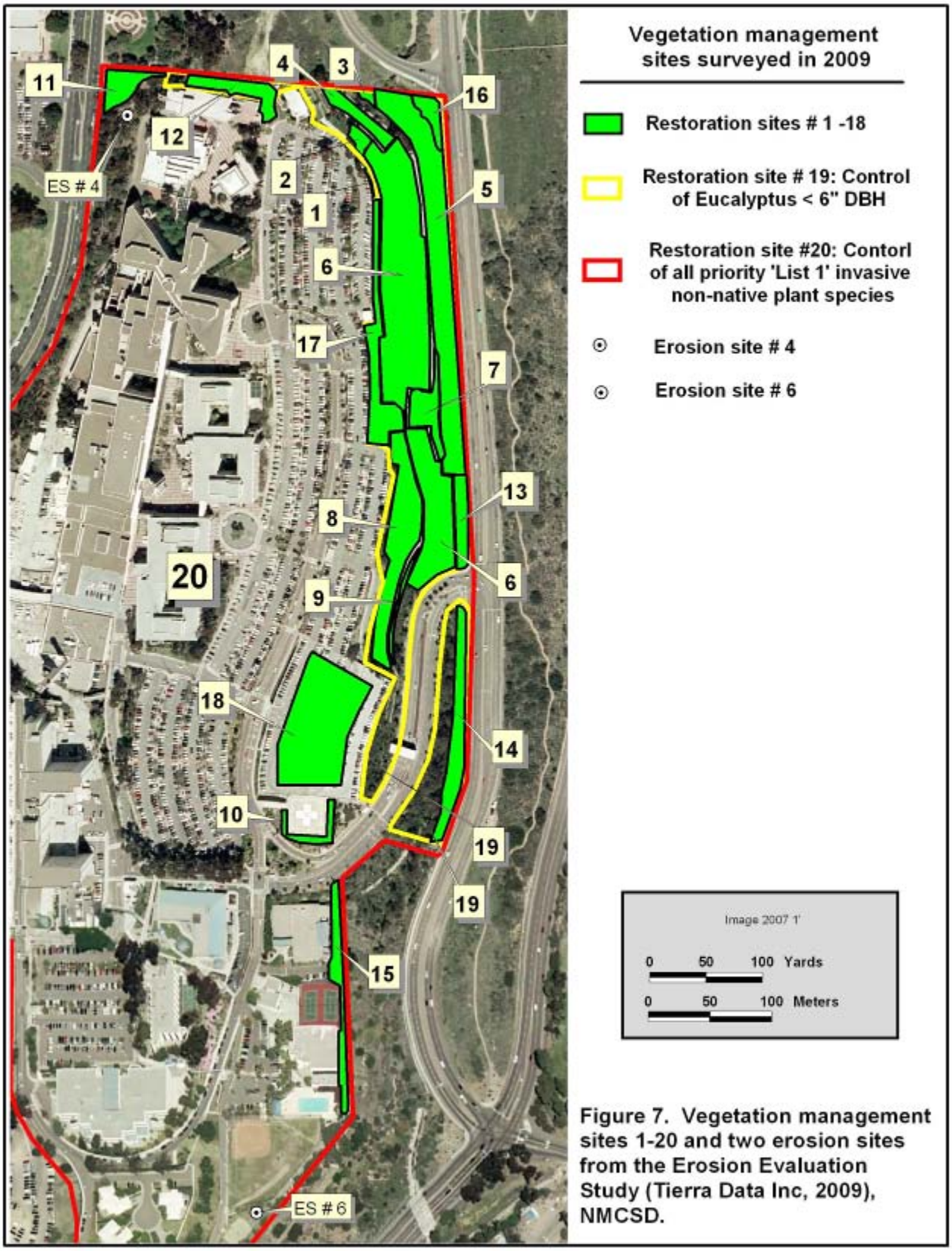


Figure 7. Vegetation management sites 1-20 and two erosion sites from the Erosion Evaluation Study (Tierra Data Inc, 2009), NMCSD.

Administrative Project Details	
Project name: Site 1 - Fisher House Future Native Garden Site	
Acreage: 0.0154	
Restoration Site Assessment	
Plant community type: Disturbed. Bare dirt with non-native annual grasses, forbs	
Sensitive species benefiting: Coastal sage scrub community	
Plant Community Health: Poor	
	Potential Community: Coastal Sage Scrub
	Plant cover: 2 percent, all weedy annual non-native cover
	Native plant species present: **Tree:** **Shrubs:** *Encelia californica* canopy hangs over portions of the site **Half-shrubs/vines/ground covers:**
	Non-native plant species present: Non-native grasses, horseweed, eucalyptus (canopy only), iceplant
	Surrounding plant community health: Coastal sage scrub (moderate quality)
Recommendations	
Plant Palette: Install coastal sage scrub species at a minimum rate of 400 per acre. Develop plant list from adjacent CSS habitat. Species may include *Artemisia californica*, *Eriogonum fasciculatum*, *Encelia californica*, *Heteromeles arbutifolia*, and *Isomeris arboria*. This site is planned as a 'native css garden'.	
Non-native plant eradication: Treat all non-natives on site. Treatments should occur in conjunction with planting and should occur for a minimum of five years or until non-natives are controlled below 5 percent cover.	
Other: Soil is fill from when site was build and may require some treatment for compaction prior to planting. This site is adjacent to a parking lot and has native plants adjacent to it. It will increase the CSS habitat and may provide foraging habitat for gnatcatchers.	

Figure 1. Site 1: Future Fisher House Native Plant Garden

Figure 2. *Artemisia californica* dominated slope adjacent to Site 1.

Administrative Project Details	
Project name: Site 2 - Fisher House Slope	
Acreage: 0.0620	
Restoration Site Assessment	
Plant community type: CSS and non-native grasses, forbs, shrubs/trees	
Sensitive species benefiting: Coastal sage scrub community	
Plant Community Health: Poor	
	Potential Community: Coastal Sage Scrub
	Plant cover: 20 percent
	Native plant species present: **Tree:** **Shrubs:** *Heteromeles arbutifolia, Encelia californica* **Half-shrubs/vines/ground covers:**
	Non-native plant species present: Non-native grasses, eucalyptus (canopy), iceplant
	Surrounding plant community health: Moderate coastal sage scrub to the east and disturbed with non-natives to the west
Recommendations	
Plant Palette: Install coastal sage scrub species at a minimum rate of 400 per acre. Develop plant list from adjacent CSS habitat. Species may include *Artemisia californica*, *Eriogonum fasciculatum*, *Encelia californica*, *Heteromeles arbutifolia*, and *Isomeris arborea*.	
Non-native plant eradication: Treat all non-natives on site	
Other: Check site for soil compaction and treat as necessary. This site is sloped and may require erosion control as part of the restoration activities. Erosion control may include jute and or wattles as needed. Restoration of this site will expand existing CSS habitat and may provide foraging habitat for gnatcatchers.	

Figure 3. Site 2 - Fisher House Slope.

Figure 4. Drainage and non-native species on Site 2.

Administrative Project Details	
Project name: Site 3 – Florida Canyon NE Corner Riparian Scrub	
Acreage: 0.0343	
Restoration Site Assessment	
Plant community type: Mulefat – transitional riparian scrub	
Sensitive species benefiting: riparian	
Plant Community Health: Poor to moderate	
	Potential Community: mulefat scrub
	Plant cover: 10 percent native, 30 percent nonnative shrubs, 40 percent non-native grasses
	Native plant species present: **Tree:** **Shrubs:** *Baccharis salicifolia, Salvia mellifera, Baccharis sarathroides, Heteromeles arbutifolia* **Half-shrubs/vines/ground covers:**
	Non-native plant species present: Dominated by on-native grasses, chrysanthemum, acacia, tamarisk, eucalyptus (canopy).
	Surrounding plant community health: Moderate coastal sage scrub and riparian (southern willow scrub)
Recommendations	
Plant Palette: Install riparian scrub species and CSS as appropriate at a minimum rate of 400 per acre. Develop plant list from adjacent CSS and riparian scrub habitat. Species my include *Baccharis salicifolia, Salvia mellifera, Baccharis sarathroides, Heteromeles arbutifolia, Artemisia californica, and Eriogonum fasciculatum.*	
Non-native plant eradication: Treat all non-natives on site for a minimum of five years. There is high probability that non-natives will continue to be introduced from off-site.	
Other: Restoration of this site will reduce the flow of non-native seed onto adjacent habitat. Will expand existing native habitat and provide potential foraging habitat for birds and wildlife.	

Figure 5. Site 3 - Mulefat transitional riparian scrub.

Administrative Project Details	
Project name: Site 4 – Middle Slope NE Corner CSS	
Acreage: 0.1719	
Restoration Site Assessment	
Plant community type: CSS/nonnative, but with significant eucalyptus cover and litter	
Sensitive species benefiting: future potential for California gnatcatcher	
Plant Community Health: Poor	
	Potential Community: CSS
	Plant cover: 30 percent cover- CSS is sparse and there is high eucalyptus canopy over portions of the site
	Native plant species present: **Tree:** **Shrubs:** Varies from scattered bushes to a few denser patches, comprised of *Artemisia californica, Eriogonum fasciculatum, Salvia mellifera Heteromeles arbutifolia* **Half-shrubs/vines/ground covers:**
	Non-native plant species present: Non-native grasses, eucalyptus (high canopy- but generates significant litter), acacia
	Surrounding plant community health: Low quality coastal sage scrub, although some dense pockets exist.
Recommendations	
Plant Palette: Install CSS as appropriate at a minimum rate of 400 per acre. Develop plant list from adjacent CSS habitat. Species may include *Artemisia californica*, *Eriogonum fasciculatum*, *Encelia californica*, *Heteromeles arbutifolia*, *Salvia mellifera*, and *Isomeris arborea*.	
Non-native plant eradication: Treat all non-natives on site. Large eucalyptus can be left in place or removed over time as native habitat fills in.	
Other: Restoration of this site will increase CSS habitat. Some erosion exists in the lower southern edge of the site (a 4’ x 9’ bare soil cut bank) that should be stabilized and planted during restoration.	

Figure 6. Site 4 - Middle Slope

Figure 7. Site 4 - Middle Slope

Administrative Project Details	
Project name: Site 5 – Florida Canyon Riparian Site	
Acreage: 1.4513	
Restoration Site Assessment	
Plant community type: Riparian	
Sensitive species benefiting: future potential for foraging habitat for California gnatcatcher	
Plant Community Health: Poor to moderate	
	Potential Community: Southern willow woodland and southern willow scrub
	Plant cover: 50-80 percent
	Native plant species present: **Tree:** *Salix goodingii, Salix lasiolepis, Platanus racemosa, Populus fremontii, Sambucus mexicana* **Shrubs:** *Baccharis salicifolia, Baccharis sarathroides, Sambucus mexicana, Artemisia californica, Heteromeles arbutifolia* **Half-shrubs/vines/ground covers:** *Vitis californica*
	Non-native plant species present: Arundo, Brazilian pepper tree, pampas grass, eucalyptus, acacia, bottlebrush, Mexican fan palm, Carey Island Date palms, fennel.
	Surrounding plant community health: Riparian habitat of varying quality from poor to good.
Recommendations	
Plant Palette: Install riparian species as appropriate at a minimum rate of 400 per acre. Develop plant list from existing riparian habitat.. Species list may include *Salix goodingii, Salix lasiolepis, Platanus racemosa, Populus fremontii, Sambucus mexicana,* Baccharis *salicifolia, Baccharis sarathroides, Sambucus mexicana, Artemisia californica, and Heteromeles arbutifolia*	
Non-native plant eradication: Treat all non-natives on site. Large trees, palms, and Arundo will have to have biomass removed from the site. Treatments should occur for a minimum of five years.	
Other: Restoration of this site will improve the riparian habitat (food and structure) and reduce the risk of fire and flood damage. To reduce the movement of non native plant seed and biomass from moving onto newly restored sites, restoration should occur starting upstream and moving down, as funds allow. Some areas will require more plantings than others to prevent re-colonization of non-natives.	

Figure 8. Site 5 - Florida Canyon Riparian Habitat site.

Figure 9. Florida Canyon riparian habitat, Site 5.

Administrative Project Details	
Project name: Site 6 – High Quality CSS Slope	
Acreage: 2.5743	
Restoration Site Assessment	
Plant community type: CSS	
Sensitive species benefiting: Californica gnatcatchers	
Plant Community Health: Good to High Quality	
	Potential Community: High quality CSS
	Plant cover: 50-80 percent
	Native plant species present: **Tree:** **Shrubs:** *Artemisia californica, Heteromeles arbutifolia, Atriplex canescens, Eriogonum fasciculatum, Baccharis pilularis* **Half-shrubs/vines/ground covers:**
	Non-native plant species present: Non-native annual grasses, eucalyptus, acacia, fennel, tree tobacco, tamarisk. Southern portion of #6 has large stands of low acacia (3').
	Surrounding plant community health: CSS of varying quality from good to high.
Recommendations	
Plant Palette: Install CSS species as appropriate at a minimum rate of 400 per acre. Develop plant list from existing CSS habitat.	
Non-native plant eradication: Treat all non-natives on site. Large eucalyptus can be left in place or removed over time as native habitat fills in. Some treatment areas are on steeper slopes and will require erosion control following treatment of non-natives. Erosion control can include cloth, jute or fiber rolls. Some section may benefit from hydroseeding or mulching if the slopes are not too steep.	
Other: Restoration of this site will improve and potentially expand existing habitat. Some areas will require more plantings than others to prevent re-colonization of non-natives. Attention should be paid to areas that require intense non-native species to determine if erosion control should be installed. The removal of large patches of acacia will be followed by active restoration to prevent the disturbed areas from being re-colonized by non-natives.	

Figure 10. Site 6 - High Quality Coastal Sage Scrub.

Figure 11. Site 6 – eucalyptus of varying sizes.

Administrative Project Details	
Project name: Site 7 – Slope Adjacent to Florida Canyon Outfall	
Acreage: 0.2414	
Restoration Site Assessment	
Plant community type: CSS	
Sensitive species benefiting: Californica gnatcatchers	
Plant Community Health: Poor	
	Potential Community: High quality CSS
	Plant cover: 50-80 percent
	Native plant species present: **Tree:** **Shrubs:** *Artemisia californica, Heteromeles arbutifolia, Atriplex canescens, Eriogonum fasciculatum, Baccharis pilularis, Rhus integrifolia* **Half-shrubs/vines/ground covers:**
	Non-native plant species present: Non-native annual grasses, eucalyptus, acacia, fennel, tree tobacco, tamarisk, iceplant and sections dominated by chrysanthemum.
	Surrounding plant community health: CSS of varying quality from good to high.
Recommendations	
Plant Palette: Install CSS species as appropriate at a minimum rate of 400 per acre. Develop plant list from existing CSS habitat. Species may include *Artemisia californica, Heteromeles arbutifolia, Atriplex canescens, Eriogonum fasciculatum, Baccharis pilularis, and Rhus integrifolia.*	
Non-native plant eradication: Treat all non-natives on site. Large eucalyptus can be left in place or removed over time as native habitat fills in.	
Other: Restoration of this site will improve and potentially expand existing habitat. Some areas will require more plantings than others to prevent re-colonization of non-natives. Attention should be paid to areas that require intense non-native species to determine if erosion control should be installed.	

Figure 12. Site 7 - Slope Adjacent to Florida Canyon Outfall.

Figure 13. Moderate CSS on Site 7.

Administrative Project Details	
Project name: Site 8 – Acacia and Rhus Dominated Parking Lot	
Acreage: 0.7638	
Restoration Site Assessment	
Plant community type: Acacia and Rhus dominated	
Sensitive species benefiting: Potential for California gnatcatcher foraging habitat	
Plant Community Health: Poor	
	Potential Community: Rhus dominated CSS
	Plant cover: 60-80 percent
	Native plant species present: **Tree:** **Shrubs:** *Rhus integrifolia, Artemisia californica, Heteromeles arbutifolia, Eriogonum fasciculatum* **Half-shrubs/vines/ground covers:**
	Non-native plant species present: Tall (up to 12') woody acaia in many areas, Brazilian pepper tree, and eucalyptus with scattered non-native annual grasses, eucalyptus, fennel, iceplant
	Surrounding plant community health: CSS of varying quality from good to high.

Recommendations
Plant Palette: This site has a large amount of mature acacia and Brazilian pepper tree cover. It has to be removed and revegetated in phases and as funding permits. Re-vegetation must occur or erosion of the slopes will occur. Install CSS species as appropriate at a minimum rate of 400 per acre. Develop plant list from existing CSS habitat. Species list may include *Rhus integrifolia, Artemisia californica, Heteromeles arbutifolia,* and *Eriogonum fasciculatum.*
Non-native plant eradication: Treat all non-natives on site. Acacia and other large woody species must be cut and the biomass removed from the site. Large eucalyptus can be left in place or removed over time as native habitat fills in.
Other: This site has high acacia cover that is functional as vegetation cover in reducing erosion, but should be removed and replaced with native species. Work on this site must be conducted when there are enough funds to conduct removal of non-natives and follow with restoration. The removal of non-natives alone may result in significant erosion on the slopes. Erosion control may be required prior to the installation of native seedlings. Just and fiber rolls can be used.

Figure 14. Site 8 - Rhus Dominated Slope Adjacent to Parking Garage.

Figure 15. Site 8 – High Lemonade berry cover.

Administrative Project Details	
Project name: Site 9 – Crib Wall Restoration	
Acreage: 0.0625	
Restoration Site Assessment	
Plant community type: Non-native	
Sensitive species benefiting:	
Plant Community Health: Poor	
	Potential Community: CSS
	Plant cover: 40-90 percent non-native cover
	Native plant species present: N/A **Tree:** **Shrubs:** **Half-shrubs/vines/ground covers:**
	Non-native plant species present: Low acacia, iceplant, and non-native grasses
	Surrounding plant community health: CSS of varying quality and disturbed habitat
Recommendations	
Plant Palette: Install CSS species as appropriate at a minimum rate of 400 per acre. Develop plant list from existing CSS habitat. Low growing species such as *Lotus scorparius, Salvia mellifera, Artemisia californica, Eriogonum fasciculatum,* and *Baccharis pilularis* would be appropriate.	
Non-native plant eradication: Treat all non-natives on site.	
Other: This linear site is adjacent to some moderate quality CSS and restoration will remove a potential non-native seed source Site must be re-vegetated with natives following non-native removal.	

Figure 16. Site 9 - Crib Wall Restoration.

Figure 17. Site 9 is dominated by ice plant and low growing acacia species.

Administrative Project Details	
Project name: Site 10 – Helipad Slope	
Acreage: 0.1110	
Restoration Site Assessment	
Plant community type: Rhus dominated	
Sensitive species benefiting:	
Plant Community Health: Moderate, with poor diversity	
	Potential Community: Rhus dominated CSS
	Plant cover: 75 percent with bare dirt between and under shrubs
	Native plant species present: **Tree:** **Shrubs:** *Rhus integrifolia, Isocoma menziesii*
	Non-native plant species present: Acacia
	Surrounding plant community health: Landscaped, developed
Recommendations	
Plant Palette: Install CSS species as appropriate at a minimum rate of 400 per acre. Use common, fire resistant natives to fill in bare spots	
Non-native plant eradication: Treat all non-natives on site.	
Other: Some erosion exists in the bare spots and should be treated prior to planting Erosion control in the form of jute and/or wattles can be used as appropriate.	

Figure 18. Site 10 - Helicopter Pad.

Figure 19. Bare area on Site 10.

Administrative Project Details	
Project name: Site 11 – Northwest Corner Non-native Grassland	
Acreage: 0.1960	
Restoration Site Assessment	
Plant community type: Non-native grassland and non-native trees	
Sensitive species benefiting:	
Plant Community Health: Poor	
	Potential Community: Native Landscaped Area
	Plant cover: 75-90 percent
	Native plant species present: N/A **Tree:** **Shrubs:**
	Non-native plant species present: non-native grasses and olive trees
	Surrounding plant community health: Landscaped, developed
Recommendations	
Plant Palette: Create a landscaped area with coastal sage scrub species, possibly with a native grassland component. Possible species include *Artemisia californica, Heteromeles arbutifolia, Atriplex canescens, Eriogonum fasciculatum, Baccharis pilularis, Rhus integrifolia and Nassella pulchra.*	
Non-native plant eradication: Treat all non-natives on site. Because there are no native species on this site a pre-emergent may be appropriate.	

Figure 20. Site 11 - Northwest Corner Non-native Grassland.

Administrative Project Details	
Project name: Site 12 – Healing Garden	
Acreage: 0.2353	
Restoration Site Assessment	
Plant community type: Native landscaping	
Sensitive species benefiting:	
Plant Community Health: Good	
	Potential Community: Native landscaped Area
	Plant cover: 75 percent
	Native plant species present: Many CSS species **Tree:** **Shrubs:**
	Non-native plant species present: Appears to be regularly maintained.
	Surrounding plant community health: Landscaped, developed
Recommendations	
Plant Palette: Use current palette to increase density and diversity	
Non-native plant eradication: Treat all non-natives on site.	
Other: Repair blocked brow ditch above site. Fill in to increase density and diversity. Contact City of San Diego about treating a swath outside the property boundaries to prevent constant influx of non-native seed.	

Administrative Project Details	
Project name: Site 13 – Gate Entrance –North; Site 14 Gate Entrance South	
Acreage: 0.1970 (N), 0.4795 (S)	
Restoration Site Assessment	
Plant community type: Native and non-native landscaping	
Sensitive species benefiting:	
Plant Community Health: Moderate to Poor	
	Potential Community: Native Landscaped Area
	Plant cover: 40 percent
	Native plant species present: Numerous native plant species including *Lotus scoparius, Artemisia californica, Encelia californica, Eriogonum fasciculatum* and *Rhus integrifolia* ***Tree:*** **Shrubs:**
	Non-native plant species present: Salvia gregii, ice plant, rock rose
	Surrounding plant community health: Landscaped, developed, riparian scrub to the north and CSS to the south
Recommendations	
Plant Palette: Create a landscaped area with coastal sage scrub species icluding *Lotus scoparius, Artemisia californica, Encelia californica, Eriogonum fasciculatum* and *Rhus integrifolia.*	
Non-native plant eradication: Treat all non-natives on site. Because existing vegetation is sparse a pre-emergent can be considered for this site.	

Figure 21. Site 13 - Gate Entrance – North.

Figure 22. Site 14 - Gate Entrance - South

Administrative Project Details	
Project name: Site 15 - Southeast Corner – Top of Slope	
Acreage: 0.2900	
Restoration Site Assessment	
Plant community type: Eucalyptus dominated ornamental landscape	
Sensitive species benefiting: Potential for raptors	
Plant Community Health: Poor	
	Potential Community: Native Landscaping
	Plant cover:
	Native plant species present: none **Tree:** **Shrubs:**
	Non-native plant species present: Eucalyptus trees, scattered non-natives in understory.
	Surrounding plant community health: Landscaped
Recommendations	
Plant Palette: Create a landscaped area with coastal sage scrub species including *Lotus scoparius, Artemisia californica, Encelia californica, Eriogonum fasciculatum* and *Rhus integrifolia.*	
Non-native plant eradication: Remove all small eucalyptus. Large eucalyptus can be removed over a period of several years.	

Administrative Project Details	
Project name: Site 16 – Florida Canyon Chrysanthemum Site	
Acreage: 0.1239	
Restoration Site Assessment	
Plant community type: Non-native	
Sensitive species benefiting:	
Plant Community Health: Poor	
	Potential Community: Riparian scrub to CSS transitional zone
	Plant cover: 80 percent non-native cover
	Native plant species present: *Baccharis sarathroides, Artemisia californica*
	Non-native plant species present: Chrysanthemum, tamarisk
	Surrounding plant community health: riparian scrub and CSS
Recommendations	
Plant Palette: Develop plant list based on surrounding native plant communities and elevations within the site.	
Non-native plant eradication: Treat all non-natives on site.	
Other: Chrysanthemum should be treated promptly before it moves into adjacent native habitat.	

Figure 23. Florida Canyon Chrysanthemum Site.

Administrative Project Details	
Project name: Site 17 – Mature Acacia and Non-native Trees at Parking Lot edge	
Acreage: 0.4706	
Restoration Site Assessment	
Plant community type: Non-native	
Sensitive species benefiting:	
Plant Community Health: Poor	
	Potential Community: CSS
	Plant cover: 80 percent non-native cover
	Native plant species present:
	Non-native plant species present: Acacia and non-native tree species
	Surrounding plant community health: Developed
Recommendations	
Plant Palette: This site has a large number of mature acacia and Brazilian pepper tree cover. Trees and shrubs are to be removed and re-vegetated with native plant species in phases and funding permits. Re-vegetation must follow removal of non-natives or erosion on the slopes will occur. Install CSS species as appropriate at a minimum rate of 400 per acre. Develop plant list from existing CSS habitat.	
Non-native plant eradication: Treat all non-natives on site in conjunction with re-vegetation. Biomass will have to be cut and removed.	
Other: This site has high acacia cover that is functional as vegetation cover in reducing erosion. Converting the site to native plants will increase habitat value.	

Administrative Project Details	
Project name: Site 18 – Eucalyptus in Park Structures	
Acreage: 0.1239	
Restoration Site Assessment	
Plant community type: Non-native	
Sensitive species benefiting:	
Plant Community Health: Poor	
	Potential Community: Native Landscaping
	Plant cover:
	Native plant species present: None
	Non-native plant species present: Eucalyptus trees
	Surrounding plant community health: Developed
Recommendations	
Plant Palette: Native shrub and tree species. Potentially *Heteromeles arbutifolia* and *Rhus integrifolia*.	
Non-native plant eradication: Treat and replace eucalyptus.	

Administrative Project Details	
Project name: Site 19a and 19b Site wide removal of small Eucalyptus	
Acreage: 8.3322 (a) and 1.3185 (b)	
Restoration Site Assessment	
Plant community type: Non-native	
Sensitive species benefiting:	
Plant Community Health: Poor	
	Potential Community: N/A
	Plant cover:
	Native plant species present:
	Non-native plant species present: Eucalyptus trees under 8 inches
	Surrounding plant community health: Varies
Miscellaneous:	
	Irrigation type: unknown
	Debris present: none
	Soil health: unknown
	Recent disturbance: no
	Other observations:
Recommendations	
Plant Palette: Native trees appropriate to the area or not replacement	
Non-native plant eradication: Cut and treat all eucalyptus with trunks 8 inches or smaller	
Other: Trees may be replaced with a native species, but may not be needed in all cases.	

Administrative Project Details	
Project name: Site 20 – Treatment of all List 1 Species on NMCSD	
Acreage: 77.0929	
Restoration Site Assessment	
Plant community type: Various	
Sensitive species benefiting:	
Plant Community Health: Various	
	Potential Community: Various
	Plant cover:
	Native plant species present:
	Non-native plant species present: All list 1 species on NMCSD
	Surrounding plant community health: Varies
Miscellaneous:	
	Irrigation type: unknown
	Debris present: none
	Soil health: unknown
	Recent disturbance: no
	Other observations:
Recommendations	
Plant Palette: Depends on habitat type	
Non-native plant eradication: Cut and treat all List 1 invasive plant species on site	
Some areas may require a restoration component, whereas others may have enough existing native cover for passive restoration.	

Administrative Project Details	
Project name: Erosion Site 4 (Tierra Data Systems 2009)	
Acreage: unknown	
Restoration Site Assessment	
Plant community type: Eucalyptus, ice plant and low growing non-native shrubs	
Sensitive species benefiting:	
Plant Community Health: Poor	
	Potential Community: Shade tolerant CSS species
	Plant cover: 100 percent with eucalyptus canopy
	Native plant species present: unknown
	Non-native plant species present: Eucalyptus, ice plant, low growing shrub species
	Surrounding plant community health: Developed
Recommendations	
Plant Palette: Shade tolerant CSS species	
Non-native plant eradication: Treat all low growing non-native species. Eucalyptus trees can be left in place or treated as funding allows.	
Other: Soil may be compacted. This site may require some engineering to address the erosion problems. Removal of non-natives must be followed by revegetation and the installation of erosion control devices as recommended by the engineering plans.	

Administrative Project Details	
Project name: Erosion Site 6 (Tierra Data Systems 2009)	
Acreage: unknown	
Restoration Site Assessment	
Plant community type: Filaree (*Erodium* spp.) and ice plant	
Sensitive species benefiting: Potential for California gnatcatcher	
Plant Community Health: Poor	
	Potential Community: CSS
	Plant cover: 100 percent non-native
	Native plant species present: unknown
	Non-native plant species present: Filaree and ice plant
	Surrounding plant community health: non-native, but CSS is on adjacent property
Recommendations	
Plant Palette: CSS species including *Artemisia californica, lotus scoparius, Salvia mellifera,* and *Eriogonum fasciculatum.* This site could be hydro seeded with mulch.	
Non-native plant eradication: Treat all non-native.	
Other: Due to the potential for erosion straw wattles should be placed on this slope following treatment of non-natives.	

6.1 Prioritization of Potential Restoration Sites

6.1.1 Tier 1 Priority Sites

Site 5 - Florida Canyon Riparian Site – this site is located on the western section of NMCSD and is approximately 105 acres. The site has significant native southern willow scrub cover, but is mixed with numerous species on non-natives including palms, bottlebrush trees, pampas grass and tamarisk. The potential to lose healthy habitat to non-natives is high and the treatment of these species now may reduce the overall costs that could be associated with this site.

Site 3 - Florida Canyon NE Corner Riparian Scrub – this site is northwest of Site 5 and may continually re-introduce non-native species to site 5 if left untreated. In addition, Site 5 borders it and restoration activities will benefit both sites by creating additional riparian habitat. The site is currently in poor condition with approximately 10 percent native cover. The site should be restored to mulefat scrub.

Site 20 - Treatment of all List 1 Species on NMCSD – this project involves the treatment of all List 1 species, considered highly invasive, to be treated throughout NMCSD. This project will remove the risk of additional populations of List 1 species from becoming established and may open up areas where

passive revegetation by native species can occur. If large areas are treated that may pose an erosion risk it is important that erosion control measures be included in the project.

Site 19 - Treatment of all Eucalyptus Under 6" in Diameter on NMCSD – eucalyptus trees under 6 inches in diameter are, most likely, not being used by raptors on a regular basis and should be removed before they become more mature.

Site 16 – Florida Canyon Chrysanthemum Site – this site is above Site 3 and the potential for chrysanthemum to spread into adjacent habitat is high. This site should be treated for 3 to 5 years and will require active restoration to ensure the sit is not re-colonized with non-native species.

6.1.2 Tier 2 Priority Sites

The remaining sites selected for treatments can be implemented as funds become available. Each year the sites should be reviewed to determine if there is a reason to raise any site to higher priority. Sites with existing erosion issues, such as Erosion Site 4 and 6 should be considered first, followed by sites adjacent to native habitat. New or potential erosion issues and/or the establishment of an invasive plant species should also be considered when determining which project to fund.

6.2 Restoration Work Plan

Prior to implementing work on Tier 1 and Tier 2 sites a Work/Restoration Plan shall be prepared by the contractor awarded the project. The Plan shall provide details on how non-natives will be treated, the timetable for treatments and a detailed section on restoration activities, if they are required. As part of the Work Plan preparation, the contractor will review the NMCSD Erosion Evaluation Plan prepared by Tierra Data (2009) and the Exotic Invasive Plant Removal Plan prepared by RECON (2005). At a minimum the Restoration Plan shall include:

- Site History
- Site Preparation
- Planting Design
- Planting Methodologies
- Maintenance
- Success Criteria and Monitoring Protocols
- Remedial Measures
- Project Timeline
- Conclusion/Recommendations

Restoration sites should be restored to an appropriate habitat type based on original, undisturbed conditions, or if the site has been modified to such a degree that this is not possible the soil type, adjacent native habitat (if present) slope and aspect, and availability of water may be used to help determine the most appropriate habitat type.

7.0 REFERENCES SITED

Holland, L.V. and David J Keil. 1995. California vegetation. Kendall/Hunt Publishing Company. Dubuque, IA.

KTUA 2004. Urban Forestry Management Plan for Navy Medical Center San Diego. Prepared for Navy Medical Center San Diego.

RECON 2006. Draft Integrated Natural Resource Plan. Prepared for Navy Medical Center San Diego.

RECON 2005. Naval Medical Center San Diego Natural Resources Inventory and Implementation Guide Erosion Evaluation and Control Plan. Prepared for Navy Medical Center San Diego.

RECON 2005. Naval Medical Center San Diego Natural Resources Inventory and Implementation Guide Exotic Invasive Plant Removal Plan. Prepared for Navy Medical Center San Diego.

Sawyer, John and Todd Keeler-Wolf. 1995. A Manual of California Vegetation. California Native Plant Society.

Tierra Data 2009. Draft Navy Medical Center San Diego Erosion Evaluation. Prepared for Navy Medical Center San Diego.

8.0 APPENDIX A - INVASIVE SPECIES BROCHURE

INSERT :The Good, The Bad, The Nasty" BROCHURE

9.0 APPENDIX B – PLANT SPECIES ON NMCSD

Plant Species on NMCSD.

Scientific Name	Common Name	Native (N) Introduced (I)
Acacia longifolia	Sydney golden	I
Acacia redolens	Acacia	I
Acer macrophyllum	Big-leaf maple	N
Achillea millefolium	Yarrow, milfoil	N
Agapanthus africanus	Lily of the Nile	I
Agave americana	Century plant	I
Agrostis exarata	Spike redtop	N
Allium sp.	Onion	N
Alnus rhombifolia	White alder	N
Ambrosia psilostachya	Western ragweed	N
Amorpha fruticosa	False indigo	N
Anagallis arvensis	Scarlet pimpernel, poor-man's weatherglass	I
Anemopsis californica	Yerba mansa	N
Apium graveolens	Celery	I
Aptenia cordifolia	Baby sun rose	I
Archontophoenix cunninghamiana	King palm	I
Arctotis sp.	African daisy	I
Arecastrum romanzoffianum	Queen palm	I
Artemisia californica	California sagebrush	N
Arundo donax	Giant reed	I
Asparagus densiflorus	Asparagus fern	I
Asparagus officinalis ssp. *officinalis*	Garden asparagus	I
Asphodelus fistulosus	Hollow-stem asphodel	I
Aspidistra elatior	Cast iron plant	I
Atriplex canescens	Fourwing saltbush, shad-scale	N
Atriplex lentiformis ssp. *lentiformis*	Big saltbush	N
Atriplex semibaccata	Australian saltbush	I
Avena sp.	Wild oats	N
Azalea sp.	Azalea	I
Baccharis salicifolia	Mule fat, seep-willow	N
Baccharis sarothroides	Broom baccharis	N
Bauhinia blakeana	Hong Kong orchid tree	I
Bougainvillea sp.	Bougainvillea	I
Brachychiton acerifolius	Flame tree	I
Brachychiton populneus	Kurrajong	I
Brassica nigra	Black mustard	I
Brassica rapa	Field mustard	I
Bromus madritensis . ssp. *rubens*	Foxtail chess	I
Callistemon citrinus	Bottlebrush	I
Calystegia macrostegia ssp. *intermedia*	Chaparral morning-glory	N
Camellia japonica	Common camellia	I
Camissonia sp.	Sun cup	N
Carpobrotus chilensis	Sea fig	N
Carpobrotus edulis	Hottentot fig	I
Carissa grandiflora	Natal plum	I
Cassia excelsa	Crown of gold	I
Ceanothus sp.	Ceanothus	I

Scientific Name	Common Name	Native (N) Introduced (I)
Centaurea melitensis	Tocolote, star-thistle	I
Ceratonia silique	Carob tree	I
Chamaesyce sp.	Prostrate spurge	I
Chamomilla suaveolens	Pineapple weed, rayless chamomile	N
Chenopodium sp.	Goosefoot	I
Chenopodium album	Lamb's quarters, pigweed	I
Chrysanthemum coronarium	Garland, crown daisy	I
Cistis creticus	Rock-rose	I
Citrus sp.	Citrus	I
Conyza canadensis	Horseweed	N
Coprosma repens	Mirror plant	I
Cortaderia jubata	Pampas grass	I
Cotoneaster sp.	Cotoneaster	I
Crassula argentea	Jade plant	I
Cupaniopsis anacardioides	Carrot wood	I
Cuphea hyssopifolia	False heather	I
Cycas revoluta	Sago palm	I
Cynara cardunculus	Cardoon	I
Cynodon dactylon	Bermuda grass	I
Cyperus sp.	Nutsedge	N
Cyperus alternifolius	Umbrella-plant	I
Delosperma alba	Ice plant	I
Dietes vegeta	African iris	I
Distichlis spicata	Saltgrass	N
Distictis sp.	Trumpet vine	I
Dracaena draco	Dragon tree	I
Drosanthemum floribundum	Rosea ice plant	I
Echium plantagineum	Viper's bugloss	I
Eleocharis macrostachya	Pale spikerush	N
Encelia californica	Common encelia	N
Eriobotrya japonica	Loquat	I
Eriogonum fasciculatum var *foliolosum*	California buckwheat	N
Eriophyllum confertiflorum var. *confertiflorum*	Golden-yarrow	N
Erodium sp.	Filaree, storksbill	I
Erythrina sp.	Coral tree	I
Escallonia laevis	Pink escallonia	I
Eschscholzia californica	California poppy	N
Eucalyptus globulus	Eucalyptus	I
Eucalyptus spp.	Eucalyptus	I
Euphorbia peplus	Petty spurge	I
Ficus carica	Edible fig	I
Ficus pumila	Creeping fig	I
Filago sp.	Herba impia	N
Foeniculum vulgare	Fennel	I
Fraxinus sp.	Ash	I
Gardenia sp.	Gardenia	I
Gazania sp.	African daisy	I
Gelsemium sempervirens	Carolina jessamine	I

Scientific Name	Common Name	Native (N) Introduced (I)
Gnaphalium sp.	Cudweed, everlasting	N
Hebe buxifolia	Boxleaf hebe	I
Hedera helix	English ivy	I
Heliotropium curassavicum	Chinese pusley	N
Hemizonia fasciculata	Golden tarplant	N
Hemerocallis sp.	Daylily	I
Heteromeles arbutifolia	Toyon, christmas berry	N
Heterotheca grandiflora	Telegraph weed	N
Hibiscus sp.	Hibiscus	I
Hordeum jubatum	Foxtail barley	N
Impatiens balsamina	Impatiens	I
Ipomoea purpurea	Common morning-glory	I
Isocoma menziesii	Coast goldenbush	N
Jacaranda mimosifolia	Jacaranda	I
Juniperus sp.	Juniper	I
Lactuca serriola	Prickly lettuce	I
Lamarckia aurea	Goldentop	I
Lantana montevidensis	Trailing lantana	I
Lathyrus splendens	Pride of California, campo pea	N
Laurus nobilis	Sweet bay	I
Lepidium nitidum var. *nitidum*	Shining peppergrass	N
Lessingia filaginifolia var. *filaginifolia*	California-aster	N
Ligustrum japonicum	Wax-leaf privet	I
Limonium perezii	Perez rosemary	I
Liquidambar styraciflua	Sweet gum	I
Liriope muscari	Big Blue lily turf	I
Lonicera japonica	Japanese honeysuckle	I
Lotus sp.	Trefoil	N
Lotus scoparius var. *scoparius*	California broom	N
Malephora crocea	Croceum ice plant	I
Malosma laurina	Laurel sumac	N
Malva parviflora	Cheeseweed, little mallow	I
Marah macrocarpus	Wild cucumber	N
Marrubium vulgare	Horehound	I
Medicago polymorpha	California bur clover	I
Melaleuca nesophylla	Western tea myrtle	I
Melilotus alba	White sweet clover	I
Melilotus indica	Sourclover	I
Mesembryanthemum crystallinum	Crystalline ice plant	I
Mesembryanthemum nodiflorum	Slender-leaved ice plant	I
Metrosideros excelsus	New Zealand christmas tree	I
Mimulus aurantiacus	Bush monkeyflower	N
Mirabilis californica	Wishbone bush	N
Myoporum laetum	Ngaio	I
Myoporum parvifolium	Myoporum ground cover	I
Nandina domestica	Heavenly bamboo	I
Nassella sp.	Needlegrass	N
Nephrolepis exaltata	Sword fern	I
Nerium oleander	Oleander	I

Scientific Name	Common Name	Native (N) Introduced (I)
Nicotiana glauca	Tree tobacco	I
Olea europeae .	Common olive	I
Opuntia ficus-indica	Indian fig	I
Opuntia littoralis	Shore cactus	N
Opuntia prolifera	Cholla	N
Oxalis sp.	Wood-sorrel	N
Paspalum dilatatum	Dallis grass	I
Pennisetum setaceum	Fountain grass	I
Phoenix canariensis	Canary Island date palm	I
Phoenix roebelenii	Date palm	I
Phormium tenax	New Zealand flax	I
Photinia glabra	Japanese photinia	I
Picris echioides	Bristly ox-tongue	I
Pinus sp.	Pine	I
Pinus thunbergiana	Japanese black pine	I
Piptatherum miliaceum	Smilo grass	I
Pittosporum tobira	Pittosporum	I
Plantago sp.	Plantain	N
Platanus racemosa	Western sycamore	N
Plumbago auriculata	Cape leadwort	I
Plumeria sp.	Plumeria	I
Podocarpus sp.	Yew pine	I
Prunus sp.	Prune tree	I
Pyracantha sp.	Firethorn	I
Pyrus kawakamii	Evergreen pear	I
Quercus agrifolia	Coast live oak, encina	N
Raphanus sativus	Radish	I
Raphiolepis indica	Indian hawthorn	I
Rhus integrifolia	Lemonadeberry	N
Ricinus communis	Castor bean	I
Rorippa nasturtium-aquaticum	Water cress	I
Rumex crispus	Curly dock	I
Salix gooddingii	Goodding's black willow	N
Salix lasiolepis	Arroyo willow	N
Salsola tragus	Russian thistle, tumbleweed	I
Salvia mellifera	Black sage	N
Sambucus mexicana	Blue elderberry	N
Schinus molle	Peruvian pepper tree	I
Schinus terebinthifolius	Brazilian pepper tree	I
Senna covesii	Coue's cassia	N
Sisymbrium irio	London rocket	I
Solanum douglasii	Douglas nightshade	N
Sonchus oleraceus	Common sow thistle	I
Spergularia macrotheca	Large-flowered sand spurrey	N
Stephanomeria virgata ssp. *virgata*	Slender stephanomeria	N
Sterlitzia nicolai	Large Bird of paradise	I
Tamarix sp.	Tamarisk	I
Tecomaria capensis	Cape honeysuckle	I
Trachelospermum jasminoides	Star jasmine	I

Scientific Name	Common Name	Native (N) Introduced (I)
Trifolium sp.	Clover	N
Typha latifolia	Broad-leaved cattail	N
Ulmus parvifolia	Chinese elm	I
Urtica dioica ssp. *holosericea*	Hoary nettle	N
Vinca major	Greater periwinkle	I
Vitis girdiana	Desert wild grape	N
Washingtonia robusta	Washington palm	I
Xanthium strumarium	Cocklebur	N
Zantedeschia aethiopica	Common calla lily	I

ATTACHMENT D

THE CITY OF SAN DIEGO

Water Department
Water Resources Management
Commercial Landscape Survey Program

December 10, 2004

Mr. Jorge Perez
Naval Facilities Engineering Command Southwest Division
1220 Pacific Highway, Bldg 110, Code 5.GWE.JP
San Diego, Calif. 92132-5190

Dear Mr. Perez:

Thank you for participating in the City of San Diego's Commercial Landscape Survey Program (CLSP). Your time and assistance in evaluating the Naval Medical Center San Diego site was greatly appreciated.

The CLSP Irrigation Audit Report provides valuable water conserving recommendations. The report is the result of meeting with you and Jim Kirkpatrick and contains detailed information about the site's irrigation system, historical water usage and water use budgets. It also provides recommendations that range from simple repairs to modifications to your landscape watering schedules. The goal of this program is to provide site managers with cost effective measures to improve water conservation.

The Irrigation Audit Report includes the following:

- Executive Summary: Findings and Recommendations;
- Site Map;
- Landscape Irrigation Estimate;
- Watering Schedule;
- Summary of Data Collection; and
- Appendix: Billing/Usage History, Glossary, Irrigation Evaluation Checklist, etc.

Should you have additional questions or comments about the report, please contact Kevin Farrer or Rich Namba, Water Conservation Irrigation Specialists, at 619/533-5378.

Sincerely,

Dan Carney

Dan Carney
Program Manager
Commercial Landscape Survey Program

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Naval Medical Center Irrigation Audit Report

Prepared By
The City of San Diego Water Department
Water Resources Management
Commercial Landscape Survey Program
November 24, 2004

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Naval Medical Center San Diego
Irrigation Audit Report
The City of San Diego
Commercial Landscape Survey Program

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Executive Summary: Findings and Recommendations

This report presents the findings and recommendations resulting from the evaluation of the site and testing of the irrigation system at Naval Medical Center San Diego, 34800 Bob Wilson Drive in October 2004.

Findings

- The Naval Medical Center San Diego:
    - Occupies 3,479,410 square feet or 79.9 acres of land; and
    - Has approximately 625,581 square feet or 14.36 acres or 18% of the site as common landscaped area (lawn, trees and shrubs).

- The Naval Medical Center San Diego common landscaped area is serviced by:
    - 3 City of San Diego Water Department accounts;
    - 3 City of San Diego Water Department meters;
    - 1 Irrigation Use Only and 2 Mixed Use meter designation; with
    - 1 Mixed Use meter account with no water usage since February 2004.

  Specific listing of accounts and meters servicing site is provided in Checklist 2. Accounts and Meters.

- The City of San Diego mainline point of connection water usage is monitored by city installed and city read water meters. Naval Medical Center San Diego water usage history is available at mainline point of connections on the three water meters servicing the site:
    - 174,870 HCF or 130,890,195 gallons is the previous one year total water consumption used from 2 mixed-use City of San Diego accounts and 1 irrigation account.

  The water bill received from the city of San Diego identifies the amount of water used during the billing period measured in hundred cubic feet (HCF) units. One HCF equals 748 gallons of water.

- While sub-meters are installed on back flow devices to monitor water usage at site specific, irrigated areas of Naval Medical Center San Diego, sub-meter water usage data was not available during the irrigation audit. Within the City of San Diego, the installation, maintenance and data analysis of a sub-metering system is the responsibility of the customer or their designated sub-contractor.

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- Based upon a review of the Naval Medical Center San Diego's ET factors, field audit and the Landscape Irrigation Estimate:

    - 10,896 HCF or 8,155,656 gallons is the recommended irrigation requirement for next year.

- Irrigation system equipment or landscape practices identified included the following:

    - Mixed sprinkler heads on same station;
    - Mixed nozzles on same sprinkler station;
    - Sprinkler heads blocked by vegetation;
    - Sprinkler heads out of alignment, tilted, not vertical to ground;
    - Sprinkler head water pressures too high or too low;
    - Overspray from sprinklers impacting walls, sidewalks, streets and running into gutters and storm drains;
    - Non-uniform spacing of sprinkler heads;
    - Leaking or broken irrigation pipe in ball field raising turf; and
    - Twenty nine (29) independent irrigation timers service the site with the majority being Irritrol and Rain Dial models.

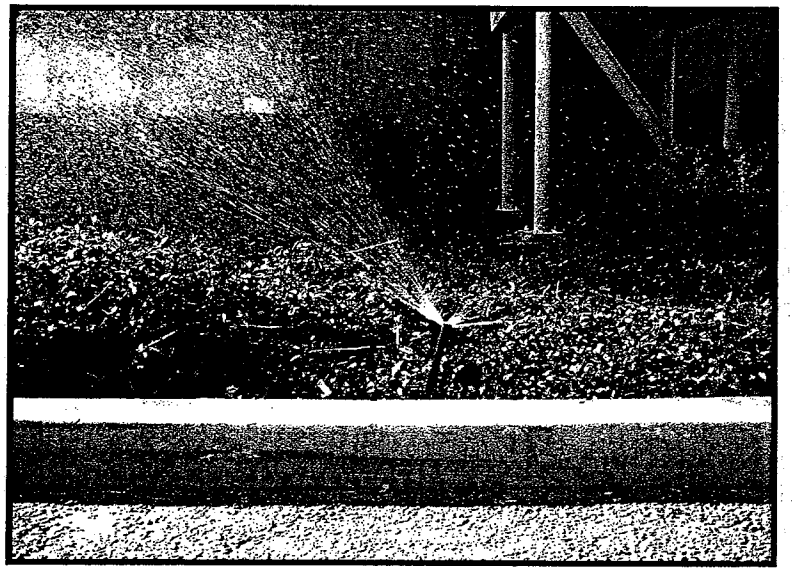
- Based on a combination of the irrigation equipment and design factors listed above, the actual Distribution Uniformity (D.U.) at site specific station(s)was:

    - 53% @ timer 8, station 8 with rotor sprinkler heads;

    - 67% @ timer 1, station 4 with spray sprinkler heads;
    - 50% @ timer 2, station 2 with spray sprinkler heads; or
    - 58% Actual Average D.U. for spray sprinkler heads.

    To determine the Distribution Uniformity(D.U.) of the irrigation system, a catch can test was performed on turf areas watered by rotor or spray sprinkler heads. Distribution uniformity is a critical indicator of the efficiency of an irrigation system. Based on percentage, a perfect irrigation system would apply water at a D.U. of 100%. A very high D.U. is indicative of an efficient, well designed irrigation system. A very low D.U. is indicative of a very inefficient, poorly designed irrigation system. Since the irrigation industry recommended standard is 70% -- 75% D.U. for rotor sprinkler heads; while 60% -- 65% D.U. is standard for spray sprinkler heads, **70% D.U. was used for rotor sprinkler head Watering Schedules and 60% D.U. was used for spray sprinkler head Watering Schedules provided in this report.**

Heads not vertical to the ground



Heads blocked by plant material

- The irrigation system water pressure was:

    - 64 -- 76 p.s.i. at the irrigation backflow prevention valves;
    - 22 -- 30 p.s.i. at the spray sprinkler heads; and
    - 36 -- 44 p.s.i. at the rotor sprinkler heads.

    Water pressure was measured using a pressure gauge or pitot tube for sprinkler heads. The recommended operating pressure for spray sprinkler heads is 30 p.s.i. The recommended operating pressure for geared rotor, stream rotor and impact rotor sprinkler heads is 40 – 60 p.s.i. Operating pressure is a critical factor when assessing sprinkler performance since pressure has a direct impact on water droplet size, flow rates and distribution uniformity.

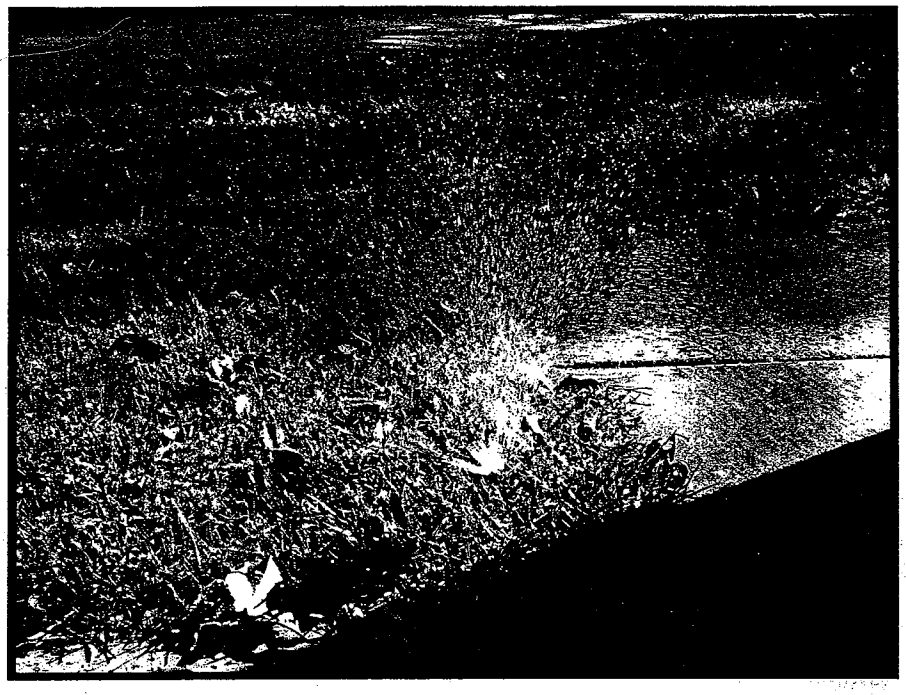
Recommendations

Based on the findings from the Irrigation Audit Report, recommendations will be categorized into short term and long term goals. Short term recommendations are based on the necessity to immediately deal with items that are relatively low cost, "easy fixes," yet require prompt action to minimize water usage. The long term recommendations include items that may require major equipment replacement or design changes to insure optimal water savings in the future.

Short Term Recommendations (Refer to Appendix: Irrigation Evaluation Checklist)

- Raise, adjust or move sprinkler heads based upon height of surrounding plant material.
- Trim or prune plant material where it is not feasible to adjust sprinkler head location.
- Adjust sprinkler head spray arc to eliminate over spray impacting buildings, sidewalks, streets and draining into storm drains.
- Align sprinkler heads so spray arc is parallel to ground and grade.
- Program each station on the irrigation timer and adjust on a seasonal basis accounting for each station's respective type of sprinkler head, Distribution Uniformity, soil, slope and plant material.
- Review the Watering Calculator Schedule provided in this report as a general recommendation to follow to initiate water savings. Based upon irrigation industry recommended standards of 70 -- 75 % D.U. for rotor sprinkler heads and 60 -- 65% D.U. for spray sprinkler heads, **generic watering schedules are provided for those stations with a specific type of sprinkler head.** If the irrigated area has a lower or higher D.U. than the industry standard, watering schedules may need to be adjusted to increase or decrease watering times to achieve the best appearance and health for the type of plant material being irrigated.

Sunken sprinkler heads in turf areas



- Perform periodic field testing of the irrigation system to minimize water loss from broken or improperly functioning equipment.

- Use mulch around appropriate plant material and replace as necessary. Once mulch is added, adjust irrigation timer to reduce watering frequency.

- If feasible during the summer months, consider reducing irrigation scheduling – or cutting out water use altogether – on Mondays, Tuesdays and Wednesdays. This request to conserve water is based upon the increased demand and limited production capability of the Metropolitan Water District's Lake Skinner Treatment Plant near Hemet, California. An analogy illustrating the potential magnitude of this request for voluntary compliance is the energy crisis faced by the state of California during rolling energy blackouts. Just as energy plants were not able to keep up with demand, the water treatment plant is not able to process enough clean drinking water to meet peak demands which when researched were Mondays, Tuesdays and Wednesdays. Compounding the availability of water is the on-going negotiations and legal actions pertaining to California's Colorado River allotment and Imperial Irrigation District's sale of water to the San Diego County Water Authority.

- Sub-meters are available to monitor water usage at site specific areas of Naval Medical Center San Diego. However, data was not available to identify water usage and correlate that usage to site specific irrigated areas of the site. Consider implementing a sub-meter data collection process to facilitate the quantification of water usage that can be correlated to Navy management objectives on a monthly, quarterly or annualized basis. The development of an irrigation sub-metering system provides the following benefits: accurate tracking of water usage for irrigation and potable uses; water budgeting comparisons by zones; and irrigation system leak detection capability by "reading" the sub-meter.

Long Term Recommendations (Refer to Appendix: Irrigation Evaluation Checklist)

- The irrigation system water pressure ranged from:

    - 64 -- 76 p.s.i. at the irrigation backflow prevention valves;
    - 22 -- 30 p.s.i. at the spray sprinkler heads; and
    - 36 -- 44 p.s.i. at the rotor sprinkler heads.

  The range of water pressures is due in part to the installation of a booster pump and reflects pre and post booster pump impact. The recommended operating pressure for spray sprinkler heads is 30 p.s.i. The recommended operating pressure for gear rotor, stream rotor and impact rotor sprinkler heads is 40 – 60 p.s.i. Very low operating pressure is a critical factor when assessing sprinkler performance since water pressure has a direct impact on water droplet size, flow rates and distribution uniformity. Generally, on stations exhibiting low water pressure, an excessively high number of sprinkler heads is usually responsible for low water pressure. However, the solution to irrigation water pressure issues is not normally as simple and

straightforward as the example cited. Since this site exhibits low water pressure ranges on timer stations, a complex mix of hydraulic factors are interacting with one another. On those stations where sprinkler head water pressure is below irrigation industry standards, additional investigation by your landscape contractor is recommended.

- Continue to replace malfunctioning master irrigation valves as necessary. The master irrigation valve on each irrigation line is a major component of the irrigation system and vital to the efficient application of water to plant material.

- As older irrigation valves need replacement, consider replacing with valves that include a water pressure regulating module to maintain desired system pressure. Due to the complexities of the irrigation system design and existing hydraulic factors, self regulating irrigation valves will assist in the efficient operation of the irrigation system.

- Consider installing separate irrigation meter(s) at point of contact to service plant material only. Currently, one mixed use meter provides the primary service to the site providing water to both the plant material and potable uses to the interior of the buildings. While the cost of installation is a limiting factor to provide an irrigation meter, the long term cost/benefits should be considered when the elimination of sewer charges is factored into the equation.

- Consider reducing the amount of grass adjacent to buildings. In addition to reducing the potential water damage to buildings, significant water savings can be achieved by implementing this recommendation.

  1 acre of cool season grass per year = 1,320 HCF of water;
  1 acre of low water use plants per year = 566 HCF of water; or
  57% water savings per acre after converting from grass to low water use plants.

- Run-off should be avoided to reduce unnecessary water usage and to prevent damage to foundation or structural areas. Irrigation run-off may be contaminated with fertilizers, pesticides and herbicides that are carried into the nearest storm drain down the street. In San Diego, the storm drains are not connected to a treatment system, so everything that flows down the drain goes directly into the watersheds, beaches and bays. Irrigation run-off combined with other urban runoff sources pollutes beaches, causes illnesses and threatens fish and wildlife. Call the City of San Diego's Storm Water Pollution Prevention Division at 619/525-8647 for additional information.

- To prevent run-off, consider programming the irrigation system with multiple start times for stations that are contributing run-off water to the storm drain system. Program separate run-times so the soil has an opportunity to absorb water between programmed watering times. As an example, a recommendation that was discussed at the time of the field audit with the landscape supervisor would be to program multiple start times at 12:00 a.m. and 3:30 a.m. to eliminate run-off.

- Establish hydrozones where water dependency is the same for all plants on each station. Do not mix grass and shrubs on the same station since the watering needs are varied for each type of plant material. This may require the adjustment of plant material or the addition of valves, pipes and sprinkler heads.

- Improve irrigation Distribution Uniformity (D.U.) by matching sprinkler head types on each station. Maintain same type of head on each station, whether rotor, spray, drip, bubbler or micro-spray. To insure maximum efficiency, use matched precipitation rate heads and consider flow rates when installing sprinkler heads and nozzles. If assistance is necessary in selecting a replacement sprinkler or nozzle for the existing system, contact the technical service representative of a major manufacturer of irrigation system components for professional, free guidance.

- Future landscaping plans on site should utilize California native plants, low water use plants or drought tolerant plants to achieve the greatest water savings. Consult with local nurseries that have professionally certified nursery staff for recommendations on water conserving plants that are recommended for your site.

- On warmer, sun facing south and west slopes, consider planting drought tolerant ground covers or plants that need very low amounts of water once established (refer to Appendix: Bluff Plant Materials List).

- Consider installing an irrigation central control system or weather based irrigation timer as existing timers are replaced. This recommendation to upgrade the existing irrigation system will reduce the time spent on adjusting seasonal watering schedules on the 29 irrigation timers currently in use on the site. The City of San Diego Commercial Landscape Survey Program does not officially endorse any of the product information provided in this report, but rather provides manufacturer's specification sheets as informational items for purposes of review and education (refer to Appendix: Weather Based Irrigation Controllers).

- Since RECON (Regional Environmental Consultants) is completing a native plant study on the Naval Medical Center San Diego site, review their report to determine if any mitigation issues exist with reference to irrigation system upgrades or proposed watering schedules.

- Consider upgrading the existing irrigation system with the addition of the items checked on the Post Audit Irrigation Component Recommendation Checklist (#1).

Landscape Watering Calculator

Your Landscape Watering Schedule

Instructions for use:

1. Using your Landscape Watering Schedule as a guide, program your automatic irrigation controller as indicated for the currrent month.
2. Watch your plants for moisture stress and skip watering days when it rains or when the soil is already wet.
3. Re-program your controller each month using your Landscape Watering Schedule as a guide.

Note: Your Landscape Watering Schedule is intended only as a guide. Your actual landscape water use will vary during the year depending on weather, irrigation system design, and individual landscape conditions.

Property zip code: 92101

Vivarium Building | Cool Season Grass | Clay Loam | Sprinkler | 1.50 Inches/Hour

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Minutes per start time	6	6	6	6	6	6	6	6	6	6	6	6
Start times per week*	2	3	4	6	6	7	7	7	6	4	3	2
Total minutes per week	12	18	24	36	36	42	42	42	36	24	18	12

*Start times per week may not equal days per week. Multiple start times per day may be needed to avoid runoff.

Vivarium Building | Warm Season Grass | Clay Loam | Sprinkler | 1.50 Inches/Hour

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Minutes per start time	6	6	6	6	6	6	6	6	6	6	6	6
Start times per week*	2	2	4	5	5	6	6	6	5	4	2	2
Total minutes	12	12	24	30	30	36	36	36	30	24	12	12

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per week													

*Start times per week may not equal days per week. Multiple start times per day may be needed to avoid runoff.

Restart the Landscape Watering Calculator.

Note: Your Landscape Watering Schedule is intended only as a guide. Your actual landscape water use will vary during the year depending on weather, irrigation system design, and individual landscape conditions.

If you want more detailed information about historical weather conditions, plants soils and sprinkler systems, visit the Wateright web site.

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Landscape Watering Calculator

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3. Re-program your controller each month using your Landscape Watering Schedule as a guide.

Note: Your Landscape Watering Schedule is intended only as a guide. Your actual landscape water use will vary during the year depending on weather, irrigation system design, and individual landscape conditions.

Property zip code: 92101

Officer Housing | Cool Season Grass | Clay Loam | Sprinkler | 2.63 Inches/Hour

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Minutes per start time	3	3	3	3	3	3	3	3	3	3	3	3
Start times per week*	3	3	5	7	7	8	8	8	7	5	3	2
Total minutes per week	9	9	15	21	21	24	24	24	21	15	9	6

*Start times per week may not equal days per week. Multiple start times per day may be needed to avoid runoff.

Officer Housing | Warm Season Grass | Clay Loam | Sprinkler | 2.63 Inches/Hour

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Minutes per start time	3	3	3	3	3	3	3	3	3	3	3	3
Start times per week*	2	3	4	6	6	7	7	7	6	4	3	2
Total minutes	6	9	12	18	18	21	21	21	18	12	9	6

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per week												

*Start times per week may not equal days per week. Multiple start times per day may be needed to avoid runoff.

Restart the Landscape Watering Calculator.

Note: Your Landscape Watering Schedule is intended only as a guide. Your actual landscape water use will vary during the year depending on weather, irrigation system design, and individual landscape conditions.

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Landscape Watering Calculator

Your Landscape Watering Schedule

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2. Watch your plants for moisture stress and skip watering days when it rains or when the soil is already wet.
3. Re-program your controller each month using your Landscape Watering Schedule as a guide.

Note: Your Landscape Watering Schedule is intended only as a guide. Your actual landscape water use will vary during the year depending on weather, irrigation system design, and individual landscape conditions.

Property zip code: 92101

Ball Field | Warm Season Grass | Clay Loam | Gear Rotor | .36 Inches/Hour

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Minutes per start time	25	25	25	25	25	25	25	25	25	25	25	25
Start times per week*	2	2	4	5	5	6	6	6	5	3	2	2
Total minutes per week	50	50	100	125	125	150	150	150	125	75	50	50

*Start times per week may not equal days per week. Multiple start times per day may be needed to avoid runoff.

Restart the Landscape Watering Calculator.

Note: Your Landscape Watering Schedule is intended only as a guide. Your actual landscape water use will vary during the year depending on weather, irrigation system design, and individual landscape conditions.

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Please e-mail your comments to the City of San Diego Water Conservation

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Landscape Watering Calculator

Your Landscape Watering Schedule

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2. Watch your plants for moisture stress and skip watering days when it rains or when the soil is already wet.
3. Re-program your controller each month using your Landscape Watering Schedule as a guide.

Note: Your Landscape Watering Schedule is intended only as a guide. Your actual landscape water use will vary during the year depending on weather, irrigation system design, and individual landscape conditions.

Property zip code: 92101

Mixed Plants | Moderate Water Use | Clay Loam | Gear Rotor | .24 Inches/Hour

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Minutes per start time	38	38	38	38	38	38	38	38	38	38	38	38
Start times per week*	2	2	3	4	4	5	5	5	4	3	2	1
Total minutes per week	76	76	114	152	152	190	190	190	152	114	76	38

*Start times per week may not equal days per week. Multiple start times per day may be needed to avoid runoff.

Mixed Plants | Low Water Use | Clay Loam | Gear Rotor | .24 Inches/Hour

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Minutes per start time	38	38	38	38	38	38	38	38	38	38	38	38
Start times per week*	1	2	2	3	3	4	4	4	3	2	2	1
Total minutes per week	38	76	76	114	114	152	152	152	114	76	76	38

*Start times per week may not equal days per week. Multiple start times per day may be

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needed to avoid runoff.

Restart the Landscape Watering Calculator.

Note: Your Landscape Watering Schedule is intended only as a guide. Your actual landscape water use will vary during the year depending on weather, irrigation system design, and individual landscape conditions.

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Irrigation Audit Report
The City of San Diego
Commercial Landscape Survey Program

Post Audit Irrigation Component Recommendation Checklist

Date of Irrigation Audit: October 2004

CSD Irrigation Auditor: Kevin Farrer and Richard Namba

Checklist 1.

Component	Recommended	Non-Applicable
Pressure Regulator (s)		
Irrigation Timer Central Control System	X	
Weather Based Irrigation Controller / ET Timer (s)	X	
Backflow Prevention Valve (s)		
Sprinkler Heads	X	
Sprinkler Head Nozzles	X	
Pressure Compensating Sprinkler Heads	X	
Sprinkler Head Risers	X	
Solenoid (s)		
Irrigation Valve (s)		
Pressure Regulating Irrigation Valve (s)		
Check Valves		
Flow Interruption Sensor		
Irrigation Pipe and Fittings		
Swing Joint (s)		
Quick Coupling Valve (s) and Key		
Booster Pump		
Hydrozone Plant Material by Water Dependency		
Replant with Drought Tolerant / Native Plants		
Reduce or Replace Turf		
Redesign Existing Irrigation System (worst case scenario that includes the majority of the irrigation components listed above)		

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Summary of Data Collection

Accounts and Meters

The following City of San Diego Water Department account(s) and respective water meter(s) currently service the site. Refer to the Billing History section of the Appendix for a specific account number's billing and water usage history.

Checklist 2. Accounts and Meters

Account Number	Meter Number	Bill Code	Irrigation/Mixed
19-05637-10	98398005	35	Irrigation
19-08036-10	09820953	33	Mixed
19-06121-30	09820952	33	Mixed/No usage since February 2004

Hydrozone Area

The irrigated landscape area at this site consisted of several hydrozones or groups of plant material sited by similar water dependency. In those areas of the landscape that had mixed plant material, an appraisal of the most water dependent plant material determined its generic classification. Area estimates for each classification are listed in the table.

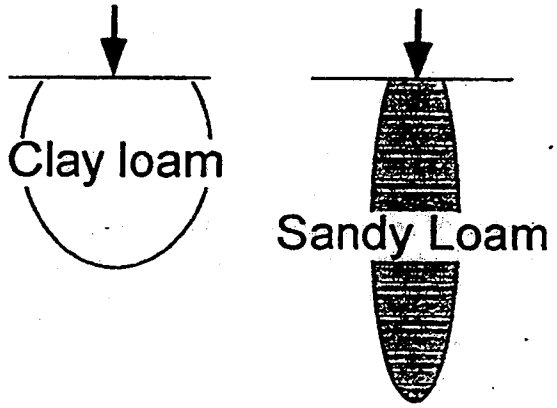
Checklist 3. Hydrozone Area

	Area	
Hydrozone	Square Feet	Acres
Cool Season Grass	14,668	.33
Warm Season Grass	54,994	1.26
Ground Cover		
Trees		
Mixed Plants with moderate watering needs	295,219	6.77
Mixed Plants with low watering needs	260,700	5.98
TOTAL	625,581	14.36

Soil Characteristics

The purpose of irrigation is to replace the water that is removed from the soil by evapotranspiration. Therefore it is important to understand the relationship of soil and irrigation water. The texture of soil is identified by the amount of sand, clay or silt present in the sampled area. The texture of the soil is critical in irrigation scheduling since it determines how much water can be stored within the root zone of the plant material in that hydrozone. Depending upon the soil texture and initial moisture content of the soil, one inch of irrigation water may infiltrate to a soil depth of 6 – 24 inches. While the application rate (A.R.) of the irrigation system is a value given as the depth of water applied to a given area measured in inches per hour, the actual infiltration depth into the soil is a function of the soil texture.

The shape of the infiltration areas of two soil textures when watered by an irrigation source indicated by the arrow



Generally, the more clay the less infiltration depth, while the presence of more sand and loam accounts for greater infiltration depth.

Checklist 4. Soil Characteristics

Texture	Soil Depth	Moisture Depth	Root Depth
Clay			
Clay Loam	3" – 4"	3" – 4"	3" – 4"
Loam			
Sandy Loam			
Sand			
Silt			

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Irrigation System Hydraulics

From field audit data, the following table lists relevant irrigation system hydraulic factors. Water pressure was measured using a pressure gauge or pitot tube for sprinkler heads. Sprinkler heads are designed to operate within a certain pressure range for best performance. If a sprinkler is operated at a pressure higher or lower than recommended, the distribution uniformity will be affected. Industry accepted standards for spray heads recommend 30 p.s.i., have application rates ranging between 1.5 – 2.5 inches/hour and head spacing from 5 – 15 feet apart. Geared rotor, stream rotor and impact heads operate between 40 – 60 p.s.i., with an application rate of 0.1 – 1.5 inches/hour and head spacing from 20 – 100 feet apart. Operating pressure is critical when assessing sprinkler performance since pressure has a direct impact on water droplet size, flow rates and distribution uniformity.

Distribution uniformity (D.U.) was calculated for the site by selecting a representative station(s) and following the Catch Can Test protocol established by the Irrigation Training and Research Center at California Polytechnic State University, San Luis Obispo.

Checklist 5. Irrigation System Hydraulics

		Station					
		#	#	#	Yes	No	Notes
Timer #	1	4					
#	2		6				
#	3			6/8			
Sprinkler Head Pressure (psi)		22/22	30	36/44			Pre/Post Booster Pump
Distribution Uniformity (%)		67	50	53			
Application Rate (Inch/Hour)		1.5	2.63	0.36			
Sprinkler Head Type		spray	spray	rotor			
Static Pressure @ POC		76	76	76			64 prior to booster pump installation Oct. 2004
Dynamic Pressure @ POC							
Site Reference % ET							NA: mixed use meters
Pressure Regulating Valve					X		
Backflow Prevention Valve					X		

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Irrigation Timer

The irrigation timer is a key component of a good water management program. Whether the site utilizes one or several timers, the timer is the means to accomplish water conserving irrigation goals resulting in lower total water costs. As weather changes from day to day and week to week, it is desirable when possible to follow these subtle changes. Real time scheduling is possible when a master timer is used or when other recent technological developments (percent adjustable timer, wireless addressable timer, ET based timer) are utilized. If the audit indicates that the timer is not able to apply the water evenly, a retrofit(s) of a new irrigation timer(s) may be recommended. Once retrofitted, the irrigation system should be re-audited to develop proper irrigation schedules with the new timer.

Checklist 6. Irrigation Timer

Timer	Brand	Model	Stations	Features/Appraisal
1	Irritrol	MC – 8, 12, 18, 30 Plus, et. al.	8 - 30	29 timers service site
2	Rain Dial		9	Free standing, independent units
3				
4				
5				
6				

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Appendix

Billing and Usage History

Irrigation Evaluation Checklist

Recommendations to Improve Irrigation System Efficiency

Glossary of Irrigation System Terms

Weather Based Irrigation Controller Information

Bluff Plant Materials List

The city of San Diego Commercial Landscape Survey Program does not officially endorse any of the product information provided in the appendix, but rather provides manufacturer's specification sheets as informational items for purposes of review and education.

CO/NFWC/N68711-70-C-1234 CIS Acct: 19-06121-030 Thomas Bros: Council District:

0 US NAVAL HOSP Parcel: Lot Size/First Floor Area: 0 Construct Date:

CA. 92134-6500 SIC Code: 8060

Work Phone: Premise Class: 16

Home Phone: Sewer Rate Cd: B07 Bill Rate: 33 COMMERCIAL - REG WATER/SPEC RATE SEWER (PER HCF) -

Meter Serial: 09820952 Meter Size/Make/Style: 10/4/7 10" HERSEY-TURBINE

Meter Location: 175' N OF SPACE THEATRE WY ON PARK BL

BILLING HISTORY

Meter Read Date	Billing Days	Billing Code	Actual Reading	Consump hcf	Avg Daily Consump hcf	Water Amount	Sewer Amount	Storm Amount	Other Amount	Total Cost	Avg Cost Per Day	Avg Gal Per Day
OCT 05 04	33	F	37796	0	0.00	2323.85	1.83	0.95	0	2,326.63	70.50	0.0
SEP 02 04	29	F	37796	0	0.00	2323.85	0.63	0.95	0	2,325.43	80.19	0.0
AUG 04 04	20	F	37796	0	0.00	1549.23	0.42	0.63	0	1,550.28	77.51	0.0
JUL 15 04	42	F	37796	0	0.00	3063.41	0.88	1.33	0	3,065.62	72.99	0.0
JUN 03 04	30	F	37796	0	0.00	2120.3	0.63	0.95	0	2,121.88	70.73	0.0
MAY 04 04	32	F	37796	0	0.00	2120.3	0.63	0.95	0	2,121.88	66.31	0.0
APR 02 04	18	F	37796	0	0.00	1272.18	0.38	0.57	0	1,273.13	70.73	0.0
MAR 15 04	29	F	37796	0	0.00	2120.3	0.61	0.95	0	2,121.86	73.17	0.0
FEB 15 04	31	F	37796	0	0.00	2120.3	0.59	0.95	0	2,121.84	68.45	0.0
JAN 15 04	31	F	37796	239	7.71	2507.64	527.82	15.46	0	3,050.92	98.42	5,767.2
DEC 15 03	30	E	37557	86	2.87	2249.12	190.31	5.56	0	2,444.99	81.50	2,144.4
NOV 15 03	31	E	37471	149	4.81	2352.07	329.28	9.64	0	2,690.99	86.81	3,595.5
Meter Total	356			474	1.33	26,122.55	1054.01	38.89	0.00	27,215.45	76.45	996.0
TOTAL	356			474	1.33	26,122.55	1054.01	38.89	0.00	27,215.45	76.45	996.0

Average Water Used in Summer Month (May to Oct) gpd: 0

Average Water Used in Winter Months (Nov to Apr) gpd: 2082

Average Water Used (hcf/month): 39.9

Average Cost ($/hcf): $57.42

3949 US NAVAL HOSPITAL
CA. 92134-5000
Work Phone: (619)696-1120
Home Phone:

Parcel:
SIC Code: 8060
Sewer Rate Cd: B07
Meter Serial: 09820953

Thomas Bros: 1289 G4
Lot Size/First Floor Area: 0
Premise Class: 16
Bill Rate: 33 COMMERCIAL - REG WATER/SPEC RATE SEWER (PER HCF) -
Meter Size/Make/Style: 10/4/7 10" HERSEY-TURBINE
Meter Location:

Council District:
Construct Date:

BILLING HISTORY

Meter Read Date	Billing Days	Billing Code	Actual Reading	Consump hcf	Avg Daily Consump hcf	Water Amount	Sewer Amount	Storm Amount	Other Amount	Total Cost	Avg Cost Per Day	Avg Gal Per Day
OCT 05 04	33	A	587761	17922	543.09	33454.36	42821.18	574.99	0	76,850.53	2,328.80	406,259.2
SEP 02 04	29	A	569839	15878	547.52	29903.94	37647.37	555.82	0	68,107.13	2,348.52	409,570.3
AUG 04 04	29	A	553961	15458	533.03	29174.4	36651.55	555.82	0	66,381.77	2,289.03	398,736.4
JUL 06 04	33	A	538503	15960	483.64	28885.11	37841.79	574.99	0	67,301.89	2,039.45	361,784.2
JUN 03 04	30	A	522543	14064	468.80	25522.8	33346.37	574.99	0	59,444.16	1,981.47	350,685.8
MAY 04 04	32	A	508479	14008	437.75	25429.61	33213.6	574.99	0	59,218.20	1,850.57	327,458.9
APR 02 04	30	A	494471	12540	418.00	22986.86	29732.97	574.99	0	53,294.82	1,776.49	312,684.9
MAR 03 04	29	A	481931	10390	358.28	19409.26	23039.16	555.82	0	43,004.24	1,482.90	268,008.3
FEB 03 04	29	A	471541	9997	344.72	18755.31	22053.97	555.82	0	41,365.10	1,426.38	257,870.9
JAN 05 04	33	A	461544	19798	599.94	34531.94	43674.98	574.99	0	78,781.91	2,387.33	448,784.7
DEC 03 03	28	A	441746	10768	384.57	19703.51	23754.8	536.66	0	43,994.97	1,571.25	287,678.7
NOV 05 03	21	A	430978	16270	774.76	28061.2	35892.03	402.43	0	64,355.66	3,064.56	579,560.6
Meter Total	356			173053	486.10	315,818.30	399669.77	6612.31	0.00	722,100.38	2,028.37	363,630.1
TOTAL	356			173053	486.10	315,818.30	399669.77	6612.31	0.00	722,100.38	2,028.37	363,630.1

Average Water Used in Summer Month (May to Oct) gpd: **375199**
Average Water Used in Winter Months (Nov to Apr) gpd: **350982**
Average Water Used (hcf/month): **14583**
Average Cost ($/hcf): **$4.17**

CO/NFWO/N68711-76-C-1234 CIS Acct: 19-05637-010 Thomas Bros: 1209 G6 Council District:

0 US NAVAL HOSP
CA. 92134-6500

Parcel: Lot Size/First Floor Area: 0 Construct Date:

SIC Code: 8090

Work Phone:
Home Phone: (619)556-7994

Premise Class: 16
Sewer Rate Cd: Bill Rate: 35 COMMERCIAL - REGULAR WATER/IRRIGATION ONLY - RATE
Meter Serial: 98398005 Meter Size/Make/Style: 05/0/5 2" PRECISION
Meter Location: ON PARK BL.OPP SPACE THEATER WAY15FT.R.O.FH

BILLING HISTORY

Meter Read Date	Billing Days	Billing Code	Actual Reading	Consump hcf	Avg Daily Consump hcf	Water Amount	Sewer Amount	Storm Amount	Other Amount	Total Cost	Avg Cost Per Day	Avg Gal Per Day
OCT 05 04	33	A	8544	467	14.15	907.42	0	30.21	0	937.63	28.41	10,586.0
SEP 02 04	29	A	8077	190	6.55	426.27	0	12.29	0	438.56	15.12	4,901.0
AUG 04 04	29	A	7887	101	3.48	271.68	0	6.53	0	278.21	9.59	2,605.3
JUL 06 04	33	A	7786	111	3.36	275.02	0	7.18	0	282.20	8.55	2,516.2
JUN 03 04	30	A	7675	98	3.27	250.88	0	6.34	0	257.22	8.57	2,443.6
MAY 04 04	32	A	7577	64	2.00	194.31	0	4.14	0	198.45	6.20	1,496.1
APR 02 04	30	A	7513	51	1.70	172.67	0	3.3	0	175.97	5.87	1,271.7
MAR 03 04	29	A	7462	10	0.34	104.45	0	0.95	0	105.40	3.63	258.0
FEB 03 04	29	A	7452	28	0.97	134.4	0	1.81	0	136.21	4.70	722.3
JAN 05 04	33	A	7424	43	1.30	157.54	0	2.78	0	160.32	4.86	974.7
DEC 03 03	28	A	7381	53	1.89	173.63	0	3.43	0	177.06	6.32	1,416.0
NOV 05 03	35	A	7328	127	3.63	294.55	0	8.22	0	302.77	8.65	2,714.4
Meter Total	370			1343	3.63	3,362.82	0.00	87.18	0.00	3,450.00	9.32	2,715.2
TOTAL	370			1343	3.63	3,362.82	0.00	87.18	0.00	3,450.00	9.32	2,715.2

Average Water Used in Summer Month (May to Oct) gpd: **4145**
Average Water Used in Winter Months (Nov to Apr) gpd: **1266**
Average Water Used (hcf/month): **108.9**
Average Cost ($/hcf): **$2.57**

CITY OF SAN DIEGO
COMMERCIAL LANDSCAPE SURVEY PROGRAM
Irrigation Evaluation Checklist

Control # _____
Surveyor: _____
Date: __-__-__

Project Site: _____ Acct #: __-_____-____

Meter # _____ 1st Read: _____ Final Read: _____

Irrigation Control System
Controller # 2 Type/Manufacturer: Mc-10 / Turf Total Stations: 18 Programs: ___
Backflow Prevention: (Yes) No Sensors: Rain Flow Interruption Moisture
Pressure Regulator: (Yes) No Pressure Regulating Valve (s): Yes No
Static Pressure @ POC: ___ Dynamic Pressure: ___ Location: Off Main Road

Station by Station Evaluation (x) indicates problem

Station #	6	7	8	9	10	11												
Minutes per Station	15	15	15	15	15	15												
Runs per Station																		
Times per Week	3	3	3	3	3	3												
SYSTEM TYPE: Spray, Micro, Impact, Gear, Drip, Bubbler	S	S	S	S	S	S												
GROUND COVER: High, Average, Low																		
MIXED: High, Average, Low	A					A												
SHRUBS: High, Average, Low																		
TREES: High, Average, Low																		
TURF: High, Average, Low	A	A/A	A/A	A/A	A													
Valve Malfunction																		
Valve Leaking																		
Leaking Seals																		
Low Pressure																		
High Pressure / Misting																		
Broken Components / Pipes																		
Spacing Uneven (poor D.U.)				X														
Pressure @ Head (psi):	30																	
Heads / Nozzles Not Matched																		
Heads – Broken or Missing		B																
Heads not vertical to ground																		
Heads not turning (Gear/Impact)																		
Sunken Heads			X	X	X													
Low Head Drainage																		
Unequal Pressures																		

Comments:

Sprinkler Head Pressure Fluctuated from 26 PSI to 34 PSI

Surveyor: _____ Control # _____

Project Site: _____ Acct #: ___ - _____ - ____ Date: ___ - ___ - ___

Station #																			
Minutes per Station																			
Runs per Station																			
Times per Week																			
Station Location				9															
Heads / Nozzles Clogged				X															
Spray Pattern Blocked																			
Spray Misdirected																			
Over-spray																			
Arc Misalignment																			
Leaky Fittings																			
Outdated Equipment																			
Retrofit Spray to Drip.																			
Not zoned for plant requirements																			
Not zoned for exposure																			
Soil compaction (aeration needed)																			
Poor soil (amend)																			
Excess turf thatch																			
Add Mulch to plant areas																			
Reduce lawn to shrub/mulch																			
Area Over-watered																			
Slow Drainage or Ponding																			
Site Runoff																			
DRIP LINES:																			
Filter – missing / clogged																			
High Pressure																			
Low Pressure																			
Broken or pinched tubing																			
Tubing pulled off emitters																			
Missing / Broken Emitters																			
Clogged Emitters																			
ELECTRIC:																			
Ohms																			
Volts																			

Comments:

CITY OF SAN DIEGO
COMMERCIAL LANDSCAPE SURVEY PROGRAM
Irrigation Evaluation Checklist

Control # _____
Surveyor: _____
Project Site: Naval Hospital Acct #: ___-_____-____ Date: 05-29-02

Meter # _____ 1st Read: _____.___ Final Read: _____.___

Irrigation Control System
Controller # _____ Type/Manufacturer: MC-12 / Rain Bird Total Stations: 8 Programs: ___
Backflow Prevention: (Yes) No Sensors: (Rain Flow Interruption Moisture
Pressure Regulator: (Yes) No Pressure Regulating Valve (s): Yes No
Static Pressure @ POC: ___ Dynamic Pressure: ___ Location: #9 Vi Vaults

Station by Station Evaluation (x) indicates problem

Station #	1	2	3	4		6	7	8										
Minutes per Station 10-15	15			15														
Runs per Station																		
Times per Week	5	5	5	6														
SYSTEM TYPE: Spray, Micro, Impact, Gear, Drip, Bubbler	I	S	S	S		S	S	S										
GROUND COVER: High, Average, Low																		
MIXED: High, Average, Low	L	A																
SHRUBS: High, Average, Low																		
TREES: High, Average, Low			A	A		A	A	A										
TURF: High, Average, Low																		
Valve Malfunction																		
Valve Leaking																		
Leaking Seals																		
Low Pressure																		
High Pressure / Misting																		
Broken Components / Pipes																		
Spacing Uneven (poor D.U.)																		
Pressure @ Head (psi):				27														
Heads / Nozzles Not Matched																		
Heads – Broken or Missing																		
Heads not vertical to ground			X															
Heads not turning (Gear/Impact)																		
Sunken Heads			X	X														
Low Head Drainage																		
Unequal Pressures																		

Comments:

Surveyor: _____ Control # _____

Project Site: _____ Acct #: __ __ - __ __ __ __ __ __ - __ __ __ Date: __ __ - __ __ - __ __

Station #																		
Minutes per Station																		
Runs per Station																		
Times per Week																		
Station Location		2				6												
Heads / Nozzles Clogged																		
Spray Pattern Blocked		X				X												
Spray Misdirected																		
Over-spray																		
Arc Misalignment																		
Leaky Fittings																		
Outdated Equipment																		
Retrofit Spray to Drip																		
Not zoned for plant requirements																		
Not zoned for exposure																		
Soil compaction (aeration needed)																		
Poor soil (amend)																		
Excess turf thatch																		
Add Mulch to plant areas																		
Reduce lawn to shrub/mulch																		
Area Over-watered																		
Slow Drainage or Ponding																		
Site Runoff																		
DRIP LINES:																		
Filter – missing / clogged																		
High Pressure																		
Low Pressure																		
Broken or pinched tubing																		
Tubing pulled off emitters																		
Missing / Broken Emitters																		
Clogged Emitters																		
ELECTRIC:																		
Ohms																		
Volts																		

Comments:

CITY OF SAN DIEGO
COMMERCIAL LANDSCAPE SURVEY PROGRAM
Irrigation Evaluation Checklist

Control # _____
Surveyor: _____
Project Site: Naval Hospital Acct #: ___-_____-____ Date: 5-21-05

Meter # _____ 1st Read: _____.___ Final Read: _____.___

Irrigation Control System
Controller # _____ Type/Manufacturer: Rain Bird / Irritrol Total Stations: 9 Programs: ___
Backflow Prevention: (Yes) No Sensors: (Rain) Flow Interruption Moisture
Pressure Regulator: (Yes) No Pressure Regulating Valve (s): Yes No Slope
Static Pressure @ POC: 64 Dynamic Pressure: ___ Location: Office-Back

Station by Station Evaluation (x) indicates problem

Station #	1	2	3	4	5	6	7	8	9								
Minutes per Station	25	10	25	25	35	25	25	10	7								
Runs per Station	2	→															
Times per Week	4	→															
SYSTEM TYPE: Spray, Micro, Impact, Gear, Drip, Bubbler	6	6				S			S								
GROUND COVER: High, Average, Low	A	A				L											
MIXED: High, Average, Low									A								
SHRUBS: High, Average, Low	L	L															
TREES: High, Average, Low	L	L				L											
TURF: High, Average, Low																	
Valve Malfunction																	
Valve Leaking																	
Leaking Seals																	
Low Pressure																	
High Pressure / Misting																	
Broken Components / Pipes																	
Spacing Uneven (poor D.U.)																	
Pressure @ Head (psi):	30																
Heads / Nozzles Not Matched																	
Heads – Broken or Missing																	
Heads not vertical to ground	X								X								
Heads not turning (Gear/Impact)																	
Sunken Heads																	
Low Head Drainage																	
Unequal Pressures																	

Comments:
(T-Bird & Rotor
T-30

#1 Slope needs trimming around heads

Surveyor: _____ Control # _____

Project Site: _____ Acct #: __ __ - __ __ __ __ __ __ - __ __ __ Date: __ __ - __ __ - __ __

Station #																			
Minutes per Station																			
Runs per Station																			
Times per Week																			
Station Location																			
Heads / Nozzles Clogged																			
Spray Pattern Blocked	X																		
Spray Misdirected																			
Over-spray																			
Arc Misalignment																			
Leaky Fittings																			
Outdated Equipment																			
Retrofit Spray to Drip																			
Not zoned for plant requirements																			
Not zoned for exposure																			
Soil compaction (aeration needed)																			
Poor soil (amend)																			
Excess turf thatch																			
Add Mulch to plant areas																			
Reduce lawn to shrub/mulch																			
Area Over-watered																			
Slow Drainage or Ponding																			
Site Runoff																			
DRIP LINES:																			
Filter – missing / clogged																			
High Pressure																			
Low Pressure																			
Broken or pinched tubing																			
Tubing pulled off emitters																			
Missing / Broken Emitters																			
Clogged Emitters																			
ELECTRIC:																			
Ohms																			
Volts																			

Comments:

CITY OF SAN DIEGO
COMMERCIAL LANDSCAPE SURVEY PROGRAM
Irrigation Evaluation Checklist

Control # _____
Surveyor: _____
Project Site: _____ Acct #: ___-_____-____ Date: ___-___-___

Meter # _____ 1st Read: _____ Final Read: _____

Irrigation Control System
Controller # 1 Type/Manufacturer: Maxicom Total Stations: _____ Programs: ___
Backflow Prevention: Yes No Sensors: Rain Flow Interruption Moisture
Pressure Regulator: Yes No Pressure Regulating Valve (s): Yes No
Static Pressure @ POC: ___ Dynamic Pressure: ___ Location: Office Houses

Station by Station Evaluation (x) indicates problem

Station #	5	6	7	8	9	10	11	12	13	14								
Minutes per Station	15	10	10	10	15	20	10	10	10	10								
Runs per Station	2	2	2	2	2	2	2	2	2	2								
Times per Week	3	3	2	3	2	2	3	3	3	3								
SYSTEM TYPE: Spray, Micro, Impact, Gear, Drip, Bubbler	S	S	S				S	S	S	S								
GROUND COVER: High, Average, Low																		
MIXED: High, Average, Low			A															
SHRUBS: High, Average, Low																		
TREES: High, Average, Low																		
TURF: High, Average, Low	H/A	H/A					A	A	A	A								
Valve Malfunction																		
Valve Leaking																		
Leaking Seals	X		X															
Low Pressure																		
High Pressure / Misting																		
Broken Components / Pipes																		
Spacing Uneven (poor D.U.)	X																	
Pressure @ Head (psi):							30											
Heads / Nozzles Not Matched																		
Heads – Broken or Missing		(B)																
Heads not vertical to ground																		
Heads not turning (Gear/Impact)																		
Sunken Heads	X						X	X		X								
Low Head Drainage																		
Unequal Pressures																		

Comments:

Surveyor: _____ Control # _____

Project Site: _____ Acct #: __ __ - __ __ __ __ __ __ - __ __ __ __ Date: __ __ - __ __ - __ __

Station #																			
Minutes per Station																			
Runs per Station																			
Times per Week																			
Station Location			7																
Heads / Nozzles Clogged																			
Spray Pattern Blocked			X																
Spray Misdirected																			
Over-spray																			
Arc Misalignment																			
Leaky Fittings																			
Outdated Equipment																			
Retrofit Spray to Drip.																			
Not zoned for plant requirements																			
Not zoned for exposure																			
Soil compaction (aeration needed)																			
Poor soil (amend)																			
Excess turf thatch																			
Add Mulch to plant areas																			
Reduce lawn to shrub/mulch																			
Area Over-watered																			
Slow Drainage or Ponding																			
Site Runoff																			
DRIP LINES:																			
Filter – missing / clogged																			
High Pressure																			
Low Pressure																			
Broken or pinched tubing																			
Tubing pulled off emitters																			
Missing / Broken Emitters																			
Clogged Emitters																			
ELECTRIC:																			
Ohms																			
Volts																			

Comments:

CITY OF SAN DIEGO
COMMERCIAL LANDSCAPE SURVEY PROGRAM
Irrigation Evaluation Checklist

Control # _____
Surveyor: _____
Date: 05-25-05

Project Site: _____ Acct #: ___-_____-____

Meter # _____ 1st Read: _____.___ Final Read: _____.___

Irrigation Control System
Controller # _____ Type/Manufacturer: Rain Bird Total Stations: 12 Programs: ____
Backflow Prevention: (Yes) No Sensors: Rain Flow Interruption Moisture
Pressure Regulator: (Yes) No Pressure Regulating Valve (s): Yes No
Static Pressure @ POC: 44 Dynamic Pressure: ____ Location: Buildings #41 Fac. Sup.

Station by Station Evaluation (x) indicates problem

Station #	1	2	3	4	5	6	7	8	9	10	11	12
Minutes per Station	10	20	10	10	10	25	20	10	10	10	9	25
Runs per Station	2 →											
Times per Week	6 →											
SYSTEM TYPE: Spray, Micro, Impact, Gear, Drip, Bubbler			S	G		G	G		S	S		G
GROUND COVER: High, Average, Low				A		A	A					A
MIXED: High, Average, Low			A	A					A	A		A
SHRUBS: High, Average, Low												
TREES: High, Average, Low												
TURF: High, Average, Low												
Valve Malfunction												
Valve Leaking												
Leaking Seals												
Low Pressure												
High Pressure / Misting												
Broken Components / Pipes												
Spacing Uneven (poor D.U.)												
Pressure @ Head (psi):			24			28	20					
Heads / Nozzles Not Matched												
Heads – Broken or Missing												
Heads not vertical to ground												
Heads not turning (Gear/Impact)												
Sunken Heads												
Low Head Drainage												
Unequal Pressures												

Comments:
Hardie 1¼-1½ Valves standard

18 Heads # 10 Valve

Surveyor: _____ Control # _____

Project Site: _____ Acct #: ___-_____-____ Date: __-__-__

Station #																		
Minutes per Station																		
Runs per Station																		
Times per Week																		
Station Location			3															
Heads / Nozzles Clogged																		
Spray Pattern Blocked			X															
Spray Misdirected			X															
Over-spray																		
Arc Misalignment																		
Leaky Fittings																		
Outdated Equipment																		
Retrofit Spray to Drip																		
Not zoned for plant requirements																		
Not zoned for exposure																		
Soil compaction (aeration needed)																		
Poor soil (amend)																		
Excess turf thatch																		
Add Mulch to plant areas																		
Reduce lawn to shrub/mulch																		
Area Over-watered																		
Slow Drainage or Ponding																		
Site Runoff																		
DRIP LINES:																		
Filter – missing / clogged																		
High Pressure																		
Low Pressure																		
Broken or pinched tubing																		
Tubing pulled off emitters																		
Missing / Broken Emitters																		
Clogged Emitters																		
ELECTRIC:																		
Ohms																		
Volts																		

Comments:

COMMERCIAL LANDSCAPE SURVEY PROGRAM
Irrigation Evaluation Checklist

Control # 05-007
Surveyor: T.K.
Date: 9-25-05

Project Site: Naval MED Center Acct #: ___-_____-____

Meter # _____ 1st Read: _____ Final Read: _____

Irrigation Control System
Controller # 1/2 Type/Manufacturer: MC-24 / MC-12 / Irritrol Total Stations: _____ Programs: ____
Backflow Prevention: Yes No Sensors: Rain Flow Interruption Moisture
Pressure Regulator: Yes No Pressure Regulating Valve (s): Yes No
Static Pressure @ POC: ___ Dynamic Pressure: ___ Location: Park lot

Station by Station Evaluation (x) indicates problem

Station #	1	2	3	4	5	6	7	9	10	23	1
Minutes per Station	5→8	→									
Runs per Station											
Times per Week	6 →										
SYSTEM TYPE: Spray, Micro, Impact, Gear, Drip, Bubbler	S	S	S	S	S	S	S	S	S	S	S
GROUND COVER: High, Average, Low											
MIXED: High, Average, Low	L/A	A	A	A	A	A	A	A	A	A	A
SHRUBS: High, Average, Low											
TREES: High, Average, Low											
TURF: High, Average, Low											
Valve Malfunction				!	!	!					
Valve Leaking						C					
Leaking Seals			X								
Low Pressure											
High Pressure / Misting											
Broken Components / Pipes											
Spacing Uneven (poor D.U.)											
Pressure @ Head (psi):	30										
Heads / Nozzles Not Matched											
Heads – Broken or Missing		B						B		B	
Heads not vertical to ground											
Heads not turning (Gear/Impact)											
Sunken Heads											
Low Head Drainage											
Unequal Pressures											

Comments: Parking strips, need strip type nozzles

Surveyor: _____ Control # _____

Project Site: _____ Acct #: ___ - ___ ___ ___ ___ ___ - ___ ___ ___ Date: ___ ___ - ___ ___ - ___ ___

Station #																			
Minutes per Station																			
Runs per Station																			
Times per Week																			
Station Location			3																
Heads / Nozzles Clogged																			
Spray Pattern Blocked			X																
Spray Misdirected																			
Over-spray																			
Arc Misalignment																			
Leaky Fittings																			
Outdated Equipment																			
Retrofit Spray to Drip																			
Not zoned for plant requirements																			
Not zoned for exposure																			
Soil compaction (aeration needed)																			
Poor soil (amend)																			
Excess turf thatch																			
Add Mulch to plant areas																			
Reduce lawn to shrub/mulch																			
Area Over-watered																			
Slow Drainage or Ponding																			
Site Runoff																			
DRIP LINES:																			
Filter – missing / clogged																			
High Pressure																			
Low Pressure																			
Broken or pinched tubing																			
Tubing pulled off emitters																			
Missing / Broken Emitters																			
Clogged Emitters																			
ELECTRIC:																			
Ohms																			
Volts																			

Comments:

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COMMERCIAL LANDSCAPE SURVEY PROGRAM
Irrigation Evaluation Checklist

Control # _____
Surveyor: _____

Project Site: _____ Acct #: ___-_____-____ Date: ___-___-___

Meter # _____ 1st Read: _____ Final Read: _____

Irrigation Control System
Controller # _____ Type/Manufacturer: MC-8 / Toro Total Stations: 93 Programs: ___
Backflow Prevention: (Yes) No Sensors: Rain Flow Interruption Moisture
Pressure Regulator: (Yes) No Pressure Regulating Valve (s): Yes No
Static Pressure @ POC: ___ Dynamic Pressure: ___ Location: Ball Field

Station by Station Evaluation (x) indicates problem

Station #	4	5	6	7	8														
Minutes per Station 15-25																			
Runs per Station																			
Times per Week	4	3																	
SYSTEM TYPE: Spray, Micro, Impact, Gear, Drip, Bubbler	6	6	6	6	6														
GROUND COVER: High, Average, Low																			
MIXED: High, Average, Low																			
SHRUBS: High, Average, Low																			
TREES: High, Average, Low																			
TURF: High, Average, Low	A	A	A	A	A														
Valve Malfunction																			
Valve Leaking																			
Leaking Seals																			
Low Pressure																			
High Pressure / Misting																			
Broken Components / Pipes																			
Spacing Uneven (poor D.U.)																			
Pressure @ Head (psi):			36		37														
Heads / Nozzles Not Matched																			
Heads – Broken or Missing			B																
Heads not vertical to ground																			
Heads not turning (Gear/Impact)																			
Sunken Heads																			
Low Head Drainage																			
Unequal Pressures																			

Comments:

Naval Medical Center San Diego
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Recommendations to Improve Irrigation System Efficiency

Irrigation System Maintenance

- Is the irrigation system checked once a month for malfunctions?
- Are sprinkler heads adjusted on a regular maintenance schedule to reduce over spray?
- Are pressure compensating devices used on spray heads for radius reductions of more than 25%
- Are broken sprinklers replaced with a compatible type?
- Are the correct gear and stream rotor nozzle sizes installed?
- Are anti-drain valves installed to prevent low head drainage?
- Does the timer have an automatic rain shut-off device?
- Does the timer have wireless capability or remote system activators to facilitate operating system during field checks?
- Is water use being tracked and analyzed?
- Is there a budget for irrigation system upgrades? Is it being used?

Irrigation Scheduling

- Does the site have modern solid state multi-program timers?
- Is there a map that shows the coverage of each timer station?
- Are stations grouped into hydrozones?
- Are all timer programs being utilized?
- Are plants with deeper root systems being irrigated less frequently than turf areas?
- Are irrigation "windows" split into short cycles to prevent runoff?
- Are timer station run times being fine tuned after checking soil moisture with a soil probe?
- Is the watering schedule being adjusted for weather related factors?
- Is CIMIS weather data being used to determine watering schedule adjustments?

Accurate irrigation scheduling is essential if optimum water savings is desired. Any improvements in the sprinkler system may not result in any water savings if the irrigation schedules are inadequate. The following are recommendations for developing sound irrigation scheduling practices and resolving the questions posed above.

- **Develop Irrigation Maps.** Each irrigation timer should have a map that accurately describes and illustrates the coverage areas of each station on the timer. This will allow the scheduler to know which station as numbered requires a run time change when a specific area is too wet or dry. A map should be kept in each timer and a master map for the entire complex should be kept in a safe place.

- **Develop Hydrozones.** Hydrozones are areas with similar water requirements. Water use requirement for landscaped area is affected by the plant type and the micro-climate of the area. Micro-climates are areas within the landscape that vary from normal, full sun exposure to shaded, canopied areas. In large turf areas such as parks and sport fields, there are few micro-climates. In home owner association common ground areas or other commercial landscapes, small mixed plant zones surrounded by turf or asphalt are representative of many micro-climate zones.

Each program on the timer should contain stations that are in the same hydrozone. Each program should then have different irrigation intervals (irrigation days per week). As an example, program 1 may have turf stations that need 3 days of water per week. Program 2 may have slope area stations with groundcover that need 2 days of water per week. Program 3 may have planters of mixed shrubs and trees without groundcover that needs only 1 day of water per week.

- **Develop a Base Irrigation Schedule.** Once hydrozones are determined, the run time for each station needs to be determined. In large turf areas the run times may be similar since the irrigation system performance will probably be similar throughout. In HOA's and other commercial sites, the amount of water applied may vary considerably and therefore the run times will vary even if the plant water requirements are the same. The base schedules included in this audit report are for the tested stations indicated. The report schedules can be used as a guide for the other stations.

- **Fine Tune Timer Station Run Times As Needed.** Due to irrigation system performance differences between timer stations, run times should vary as required. An effective way of arriving at the correct run times for each timer station is to make soil moisture observations and adjust each timer station as needed. Useful tools in this process are the timer stations coverage maps and a soil probe. For participating in the Commercial Landscape Survey Program, one soil probe per site is provided.

- **Set Timer Run Times to Prevent Run-off**. Sometimes the necessary timer run times will create surface water run-off from the irrigation due to the inability of the soil to absorb water as quickly as it is being applied (slow infiltration rate). In this case, the application of water should be split into two or three applications to allow the water to percolate downward into the soil and to allow the soil adequate time to absorb the necessary amount of water. Run-off should be avoided to reduce unnecessary water usage and to prevent damage to foundation or structural areas. In addition, irrigation run-off may be contaminated with fertilizers, pesticides and herbicides that are carried into the nearest storm drain down the street. In San Diego, the storm drains are not connected to a treatment system, so everything that flows down the drain goes directly into the watersheds, beaches and bays. Irrigation run-off combined with other urban runoff sources pollutes beaches, causes illnesses and threatens the health of marine and wildlife. Preventing irrigation run-off will protect San Diego's beautiful beaches and bays by insuring a safe and clean coastline for both residents and tourists.

- **Use Landscape Watering Schedule.** The Landscape Watering Schedule provided in this report is provided as a basic guide to conserve water. The actual landscape water used will vary during the year depending on weather, irrigation system components and plant material. While water schedules are provided in this report that reflect existing site conditions during the field audit, extensive irrigation system upgrades will require a recalculation of the water schedules. New water schedules can be created by going directly to the Water Department's Web Calculator site: http://interapp.sannet.gov/landcalc/Landscape . Additional water conservation program information provided by the City of San Diego is available at the following site: http://sandiego.gov/water/conservation/ .

- **Adjust Landscape Watering Schedules for Weather Changes Using ET Data.** Once the base landscape watering schedule has been developed, scheduling changes due to weather should be made as a percentage of the base schedule. For example, if a rain storm indicates that 25% less water is needed, all scheduled run times should be adjusted accordingly. These percentage adjusted schedules can be pre-calculated and implemented as needed. By keeping track of the ETo factor on a weekly basis, changes in ETo can be converted into the needed irrigation schedule by calculating the percentage change of ETo from the base schedule. San Diego regional ETo data is available from the California Department of Water Resources CIMIS(California Irrigation Management Information System) web site: www.cimis.water.ca.gov . While a free program, first time users of this web site must follow the protocol and establish a user identification and password. Based upon scientific research and a lot of common sense, turn the irrigation timer off when it rains or use an irrigation timer that will adjust automatically to seasonal weather conditions.

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Glossary of Irrigation System Terms

Absorption Rate: The rate at which a soil will accept water. Rate deceases as soil "capacity" is reached. (Also called percolation rate)

Anti-siphon Device: Any device that introduces air into the system to prevent "back siphonage." Refer to definitions for atmospheric vacuum breaker or pressure type vacuum breaker.

Application Rate: A measurement of the volume of water applied to landscape in a certain pattern in a specific amount of time. Usually expressed in inches per hour or gallons per hour.

Arc: The area of a circle a sprinkler head irrigates expressed in degrees of a circle. For example, a 90 degree arc provides a quarter of a circle coverage.

Atmospheric Vacuum Breaker: A backflow prevention device which introduces air into piping system to prevent back siphonage. No back pressure can exist for proper operation. Must be installed six (6) inches higher than highest sprinkler head.

Backflow: Reverse flow of water in a piping system.

Backflow Preventers: A device installed between the P.O.C. and sprinklers that is designed to prevent the backflow of contaminated water into the potable water supply. Type of backflow preventers include:

- Air Gap: A backflow technique utilizing a physical separation or air gap between two piping systems or hydraulic devices.
- Atmospheric Vacuum Breaker (AVB) : An anti-siphon device that uses a disc float assembly that allows air to enter the system when the lateral line is shut off or when the pressure drops to atmospheric levels or below.
- Double Check (DC) : A device containing two inline, independent spring loaded check valves that also include two shut off valves and ball valve test cocks.
- Pressure Vacuum Breaker (PVB) : A device consisting of either one or two positive seating check valves and a force loaded disc assembly downstream of the check valves. Since the disc float is force loaded on the pressure side of a shut off valve, it is designed to prevent back siphonage only and is not effective against backflow due to backpressure.
- Reduced Pressure (RP, RPA, RPZ) : A device consisting of two positive seating check valves and an automatically operating pressure differential relief valve internally located between the two check valves, installed as a unit between two tightly closing shut off valves, and fitted with test cocks. If the zone pressure starts to approach the supply pressure, the differential pressure relief valve will automatically maintain pressure between the two check valves by discharging to the atmosphere and is effective against backflow caused by back pressure and back siphonage.

Back Pressure: Any condition that could create pressure in the non-potable piping system greater than in the potable waer system. Pressure caused by gravity due to elevation differences is an example.

Back Siphonage: A form of backflow due to a negative or sub-atmospheric pressure within a potable water system.

Booster Pump: A pump which is installed in the water supply line and is designed to raise the pressure in the irrigation system.

Central Control Irrigation Management System: A centralized computer system located at a specific site that allows direct real time access to run stations, set programs, check for flows, check master valve operation and turn timers on or off. Based upon need, a central control system can monitor flow rate, moisture, ET, wind, rain, etc. and automatically adjust irrigation watering schedules throughout the year.

Check Valve: A valve that allows water to flow in one direction only. Check valves are used to prevent low head drainage.

Controller: A timer device that activates control valves according to a user defined program.

Control Valve: A valve that is operated manually or actuated by an automatic timer.

Control Wires: The wires which transmit the signals to open and close from the automatic timer to the automatic electric valves.

Coverage: The area of landscape watered by a sprinkler or group of sprinklers.

Cycle: Refers to one complete operation of a timer through programmed stations.

Design Pressure: The sum total of the desired head pressure added to the total of all pressure losses. A stated pressure indicating the minimum pressure required if the system is to operate properly.

Diaphragm: The flexible membrane of an automatic sprinkler valve which regulates the passage of water through the valve.

Distribution Uniformity(D.U.): A numerical expression which serves as an index of the uniformity of water application to a given area determined by the geometric arrangement of sprinklers on one timer station. Normally expressed as a percentage with the higher the percentage D.U., the more efficient the irrigation system. 100% D.U. would represent an irrigation system with perfect water application in an area.

Domestic Water: Potable or drinking water. It can be used as a source of irrigation water, but once water enters an irrigation system it is no longer considered domestic nor portable.

Double Check Valve: Backflow prevention device using two gate valves and two check valves designed to physically block the backflow of water. Also called a double gate valve.

Elevation Loss / Gain: 0.433 psi water pressure is lost or gained per foot of elevation change as water is used either uphill or downhill from supply source.

Evaporation: The natural process of changing water into vapor.

Evapotranspiration (ET/ETo): The amount of water needed by a plant is the sum of the amount lost through the evaporation of moisture at the soil's surface and transpiration of the water through the plant. The daily evaportranspiration rate or ET is used in scheduling the irrigation needs of plant material.

E.T. Based Timer: An irrigation timer (controller) that either has a pre-programmed historical ET index factor that is appropriate for specific climate zones or has a real time capability to download ET data either with a hard wire modem or wire less receiver. Irrigation watering schedules are adjusted automatically by the programming capabilities of the timer to correlate watering needs of specific types of plant material located within specific climate zones based upon precise ET data.

Flow Control Valve: A valve that modulates in order to maintain a pre-determined water supply flow rate without drastically altering the pressure.

Friction Loss: Pressure loss due to friction as water flows through the component parts of an irrigation system.

Head to Head: This phrase describes the correct placement of sprinkler heads. One sprinkler head must be placed so that it will spray another sprinkler head. This layout of sprinkler heads provides for complete coverage and prevents dry spots.

Hydrozone: A section of an irrigation system served by a single control valve. Zones are comprised of similar sprinkler types and plant material types with similar water requirements and soil types.

Impact Drive: A sprinkler that rotates using a weighted or spring loaded arm which is propelled by the water stream and hits the sprinkler body, causing movement.

Infiltration Rate: The rate at which water enters the soil profile, usually expressed in depth of water in inches per hour.

Irrigation Efficiency: The percentage of irrigation water which is actually stored in the soil and available for use by landscapes compared to the total amount of water provided to the landscape.

Irrigation Requirement: The quantity of water need by the landscape to satisfy the evapotranspiration of the plant material. The irrigation requirement is usually expressed in depth of water in inches per week and equals the net irrigation requirement divided by the irrigation efficiency.

Irrigation System: A set of components which includes the water source, water distribution network piping, timer, sprinklers or emitters, and other general irrigation equipment such as quick coupler and backflow prevention valve.

Lateral: The pipe installed downstream from the irrigation valve and not subject to constant main line pressure on which the sprinklers or emitters are located.

Looped Main Line: A main line designed to provide water to any valve from two or more directions.

Low Head Drainage: Residual flow from low elevation sprinkler heads in a system after the control valve has been closed.

Main (Mainline): A pipe under consistent pressure which supplies water from the point of connection (POC) to the irrigation valves.

Non-point Source Pollution: Man-made or man-induced alteration of the chemical, physical, biological, or radiological integrity of water, originating from any source other that a point source.

Non-potable Water: Water not suitable for human consumption.

Operating Pressure: The pressure at which a system of sprinklers operates. Calculated as static pressure less pressure losses. Usually measured at the base or nozzle of a sprinkler.

P.O.C.: Abbreviation for "point of connection."

P.S.I.: Abbreviation for "pounds per square inch."

P.V.C. Pipe: Abbreviation for unplasticized "poly vinyl chloride" pipe.

Pitot Tube: A small ell shaped tube which can be attached to a pressure gauge to measure the pressure of water discharging from a nozzle.

Point Source Pollution: Any discernible, confined or discrete conveyance from which pollutants are or may be discharged, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft.

Potable Water: Treated water which is meant for human consumption. It can be used for irrigation systems as long as protection is provided to prevent a cross connection or backflow into the domestic water supply

Pressure: The force per unit area measured. Usually expressed in pounds per square inch (p.s.i.)

Pressure Compensating: A valve feature which maintains a constant discharge flow regardless of inlet pressure.

Pressure Loss: The loss of pressure under flow conditions caused by friction or elevation.

Pressure Regulator: A device that maintains constant downstream operating pressure that is lower than the upstream operating pressure. Provides precise pressure settings to maximize efficiency of the irrigation systems application of water to the landscape.

Pressure Relief Valve: A valve which will open when the inlet pressure exceeds a preset pressure.

Pressure To Design To: A general rule of thumb used in irrigation system design equal to the low static pressure less 10% allowance for fluctuation.

Pressure Vacuum Breaker: A backflow prevention device that introduces air into the system to prevent "back siphonage." Incorporates the use of a spring loaded seat for positive opening to atmosphere. Commonly used for high hazard application with no back pressure.

Program: The watering schedule set on the timer.

Quick Coupler Key: A "key" device with a handle which insets into a quick coupling valve for supplemental water.

Quick Coupling Valve: A constantly pressurized valve set vertically in the ground to provide supplemental water when a coupler key is inserted and turned one and a quarter revolutions. May be fit with a sprinkler head, hose swivel or faucet.

R.P.P., RPZ, or R.P.: Reduced pressure principle backflow prevention device commonly used for high hazard applications. Uses a combination of check valves and an air chamber or zone which is open to the atmosphere.

Rain Shut Off Device: Prevents voltage from the timer from activating the irrigation valves when predetermined amount of rain falls.

Remote Control Valve: A valve actuated by an automatic timer by electric or hydraulic means. Synonymous with "Automatic Control Valve."

Run-Off: Water not absorbed by the soil and draining to another location. Run-off occurs when water is applied in excessive amounts or too quickly.

Spacing: The triangular or square distance between sprinkler heads.

Static Pressure: The pressure of water when it is not moving.

Station: A circuit on the timer that has the ability to be programmed with a run time unique and separate from other circuits and provides power to one or more remote control valves.

Surge: An energy wave in pipe lines caused by sudden opening or closing of valves.

Swing Joint: A threaded nipple and elbow connection between the lateral pipe and sprinkler which allows movement to be taken up in the threads rather than as a sheer force on the pipe. Also use to raise or lower sprinklers to final grade.

Timer: A controller device that activates control valves according to a user defined program.

Transpiration: The process where a plant's moisture is lost to the atmosphere through its stomata on the leaves.

Uniformity: How evenly water is distributed over an irrigated area.

Water Hammer: A shock wave created in a water pipe by a fast closing valve or high velocity water flow.

Weather Based Irrigation Controllers-Commercial

October 2004

Manufacturer	Model	Features	Where to Buy		Other Information
AccuWater www.accuwater.com	All Models (Weather-Aware)	• Real Time Weather Data	Order Direct 512. 331.9283 or e-mail sales@accuwater.com		• High speed internet access required • Certified installers available
Aqua Conserve www.aquaconserve.com	All ET Series	• Historical Weather Data	Order Direct on-line or call 877.922.2782		
Calsense www.calsense.com	All ET1 and ET2000 Models*	• Historical and Real Time Weather Data • On Site Weather Station • ET Sensor	Ewing, Imperial Irrigation, Major Irrigation, United Green Mark		
ET Water Systems www.etwater.com	All Models	• Real Time Weather • ET Sensor	Order Direct on-line		• High speed internet access recommended • Certified installers available
Griswold www.griswoldcontrols.com	IDC*	• On Site Weather Station • ET Sensor	Order Direct by calling 949.559.6000, x329		
HydroEarth www.hydroearth.com	All Models* (Hydrosaver)	• Historical and Real Time Weather Data • On Site Weather Station • ET Sensor	Order Direct on-line or call 877.367.2841		•
HydroPoint Data Systems www.hydropoint.com	All Models (WeatherTRAK)	• Real Time Weather • ET Sensor	Hydro-Scape		• Certified installers available
Irrisoft www.weatherreach.com	All Models (WeatherReach)	• Real Time Weather • ET Sensor	(list to be provided)		
Rain Bird www.rainbird.com	All IM Series Models	• ET Sensor	Ewing, Hydro-Scape, Major Irrigation, Poway Irrigation, United Green Mark, North County Irrigation, Imperial Sprinkler Supply, Ramona Irrigation, A-1 Irrigation,		

Rain Bird www.rainbird.com	Maxicom*	• On Site Weather Station	Ewing, Hydro-Scape, Major Irrigation, Poway Irrigation, United Green Mark, North County Irrigation, Imperial Sprinkler Supply, Ramona Irrigation, A-1 Irrigation.		
Rain Master www.rainmaster.com	Eagle	• Historical Weather Data • ET Sensor	Ewing, Hydro-Scape, Major Irrigation, United Green Mark		
Rain Master www.rainmaster.com	Evolution DX2*	• On Site Weather Station	Hydro-Scape		
Toro www.toro.com	Sentinel*	• On Site Weather Station	Californa Turf (pending)		
Toro www.toro.com	Site Pro*	• On Site Weather Station	California Turf (pending)		
Weathermatic www.weathermatic.com	All Models	• Historical Weather Data • ET Sensor	Hydro-Scape, Horizon Irrigation		
WeatherSet Co. www.weatherset.com	All Models	• Real Time Weather • ET Sensor	Order Direct on line		

**Central Control System*

Note:

►Professional Installation is highly recommended. Average cost to install is $250.00-$350.00+.

►For licensed landscape contractors:

- Contact the manufacturer directly
- California Landscape Contractors Association in San Diego www.clcasandiego.org or call 858.658.0471

►San Diego County Water Authority does not endorse or recommend any contractor listed on the CLCA website or any contractor certified or referred by a product manufacturer. These resources are provided as a convenience to customers of the San Diego County Water Authority (SDCWA) Landscape Assistance Program. SDCWA, its consultants and their subconsultants do not assume any liability for services performed and are not responsible for any agreements made between customers and landscape contractors.

►**Questions?** Call 800.986.4538, option 5.

Bluff Plant Materials List

All of the plants included in this list will survive on average natural rainfall after they are established, usually a period of 3-5 years. In fact, most of them will live longer and have fewer disease and pest problems without supplemental watering. To assist you in locating them properly on the bluff they are grouped into two categories, one for plants to use in moderate to very steep slope areas of the bluff, and the other for areas which are moderately steep.

Plants for Moderate to Steep Slope Areas

Shrubs

Artemesia californica - California Sagebrush : Small to medium shrub 1-3ft. high and wide. Needle-like grey green foliage and inconspicuous flowers. California native that is very drought tolerant and does best without supplemental irrigation. May loose some foliage during summer and in long droughts, but will recover with fall rains.

Artemesia pycnocephala - Beach Sagewort : Small mounding shrub 12-18in. high and wide. Feathery silvery-grey-green foliage with small yellow flowers in late spring. California native.

Atriplex lentiformis 'breweri' - Quail Bush : Large shrub to 5ft. high and 6ft. wide. Small oval blue-grey leaves on dense branches. California native survives in all bluff conditions. Good for erosion control, loses some foliage during summer and drought periods.

Atriplex semibaccata - Creeping Saltbush : Low spreading shrub 1-2ft. high and 3-5 ft. wide. Light grey-green leaves. Deep rooted vigorous grower. Good for erosion control.

Baccharis pilularis - Coyote Brush : Low spreading shrub 1-2ft. high and 6ft. wide. Small medium green leaves on arching branches. Vigorous growth and tolerates all bluff conditions. More attractive if branches cut back in early spring to stimulate new growth.

Calocephalus brownii - Cushion Bush : Small mounding shrub to 3ft. high and wide. Silver-grey narrow leaves 1/8in. long. Showy cream-yellow flowers in the spring. Very drought tolerant Requires well drained soil.

Ceanothus gloriosus - Point Reyes Ceanothus : Low growing spreading shrub 1-2ft. high and 4-6ft. wide. 1in. wide deep-green spiny leaves on woody branches. Attractive light blue flower clusters along branches in the spring. Prefers well drained soils. No summer water when established.

Ceanothus griseus - Carmel - Ceanothus : Low growing spreading shrub 1-2ft. high and 8-12ft. wide. Bright green oval leaves 2in. wide. Vigorous grower. Attractive light-blue 1in. flower clusters in early spring. Prefers well-drained soils. California native.

Ceanothus maritimus - Maritime Ceanothus : Low growing spreading shrub 1-3ft. tall and 4-6ft. wide. Small oval leaves grey-green on top and white below. Flowers in late winter to early spring with colors ranging from white to pale lavender. Prefers well drained soils.

Cleome isomeris - Bladderpod : Medium shrub 3-5ft. high and wide. Small grey-green leaves. Attractive yellow flowers cover the branches in the spring. Numerous green pea pods remain after flowering. California native-hardy in all bluff conditions.

Correa backhousiana - Australian Fuchsia : Medium upright shrub 3-5ft. high and wide. Medium green oval leaves 1/2-1" long on thin branches. Small attractive red-pink tubular flowers winter thru spring. Must have excellent drainage.

Coreopsis maritima - Sea Dahlia : Small herbaceous shrub 1-2ft. high and 2-3 wide. Bright green narrow leaves 1-2in. long. Showy yellow flowers on 12in. stems in spring. Good for cut flowers and accent planting. California native does well in all bluff conditions.

Diplacus puiceus - Red Bush Monkeyflower : Medium herbaceous shrub 3-5ft. high and 3ft. wide. Medium green narrow leaves 1-2in. long. Covered with small lime-green tubular flowers periodically through the year. California native-prefers well drained soils-thrives on bluffs. Prune back in early spring for new vigorous growth.

Encelia californica - California encelia : Small mounding shrub 2-3ft. high and wide. Deep green narrow leaves on densely branching stems. Showy yellow daisy-like flowers throughout the year. California native- it is very well suited for all bluff conditions. Valued for flowers and erosion control.

Epilobium 'Catalina' - Catalina Fuchsia : Small spreading herbaceous shrub 1-2ft. high and 3-4ft.wide. Narrow grey-green leaves on arching stems. Attractive 1-2in. red-orange tubular flowers at ends of stems in summer. California native-invasive roots can help control erosion.

Erigeron glaucus - Seaside Daisy : Small mounding shrub 1-2ft. high and 2-3ft. wide. Blue-green leaves on thin upright stems. Attractive daisy-like lavender flowers in spring and summer. California native.

Eriogonum fasciculatum - California Buckwheat : Small clumping shrub 2-4ft. high and wide. Deep-green needle-like leaves along thin branches. White flowers cover shrub in spring-turn brown in summer. California native-excellent choice for erosion control. Provides pollen and seeds that benefit bees and birds.

Eriogonom grande rubescens - Red Buckwheat : Small spreading shrub 1ft. high and 2-3' wide. Grey-green leaves oval leaves 2-3in. long on woody stems. Rose-red flower clusters on upright stems in summer.

Eriogonum parvifolium - Coastal Buckwheat : Small spreading shrub 1-2ft. high and 4-6ft. wide. Medium green leaves with white undersides on loose spreading branches. Light-pink summer flowers in summer. California native.

Groundcovers and Grasses

Armeria maritima var. California - Sea-Pink : Low growing groundcover 8-12in. high and wide. Mounds of grasslike leaves with showy rose-pink flower clusters throughout the year. Deep tap root provides strong hold in steep areas and good drought resistance

Carex pansa - California meadow sedge : Low growing grass 3-4in. tall. Narrow bright green leaves grow in dense clumps. A good groundcover, spreads by underground stems. Plant on bluffs where regular groundwater is available. Goes dormant in drought conditions.

Dudleya brittonii - Britton's Chalk Dudleya : Small succulent perennial. 1ft. wide leaf rosettes grow on 1-2ft. fleshy stems. Light-yellow flowers on 2-3ft. stems in spring. Slow growing plant with chalky white powder covering leaves. California native-use as interesting accent plant.

Elymus condensatus 'Canyon Prince' - Giant Blue Wild Rye : Medium clumping grass 3-4ft.. high and 2-3ft. wide. Tall slender grey-green leaves. Light blue flowers on 2-5ft. stems in summer. Aggressive and spreads by underground stems. Cut back each year for best foliage quality.

Myoporum parvifolium - Myoporum : Low spreading groundcover 3-6in. high and 6-8ft. wide. Medium green 1/2" long leaves cover trailing green branches. Tiny white flowers along branches throughout the year. Fast growing. Use to cover large areas.

Oenothera berlandieri - Mexican Evening Primrose : Low spreading groundcover 8-12in. high on flexible upright stems. Showy and profuse rose-pink flowers in summer and some throughout the year. Thrives in all bluff conditions. Dense root system controls erosion.

Pennisetum setaceum 'Cupreum' - Purple Fountain Grass : Medium clumping grass 2-3ft. high and wide. Dense arching 3-4ft leaves reddish-brown color. Showy red-purple flowers on 3-4ft. high stems in summer. Fast growing and hardy.

Senecio mikanioides - German Ivy : Trailing vine 1ft. high and 15-20ft. wide. Dense, medium green, ivy-like leaves 1-3in. long on twining stems. Small yellow flowers along stems in winter. Very hardy, vigorous and invasive. This vine will smoother more delicate plants

Sisyrinchium bellum - Blue-eyed Grass : Small clumping grass 12-18in. high and wide. Narrow blue-green leaves that sprout from base. Attractive small purple flowers with yellow centers in spring. Use as a special accent. Self-sows and will naturalize on the bluffs. Prefers well drained soils

Plants for Moderately Steep Slope Areas

Trees

Acacia longifolia - Sydney Golden Wattle : Small tree/Large shrub 15-20ft. high and wide. Bright green long narrow leaves. Showy yellow flowers late winter, early spring. May require occasional pruning if located in areas with regular irrigation or large amounts of ground water.

Pinus torreyana - Torrey Pine : Large upright tree 40-60ft. high and 30-40ft. wide. Medium to Dark green needles 8-12in. long. Open branching habit. Hardy and picturesque. California native. Pruning branches causes branch to die back to trunk.

Prunus ilicifolia - Hollyleaf Cherry : Large shrub/Small tree 15-20ft. high and wide. Light to medium green oval leaves with spiky edges. Showy white flower spikes in spring followed by round fruit which turns from green to purple. California native-extensive root system makes it valuable for erosion control. Prune to desired shape and size. Hardy, prefers well drained soils and no summer water.

Prunus lyonii - Catalina Cherry : Small tree/Large shrub 30-40ft. high and 20-30ft. wide. Medium to dark green leaves 3-5in. long. Showy cream-white flower clusters in spring. Prune to desired shape and size. Native to islands off coast of southern California.coast. Hardy, prefers well drained soils and no summer water.

Shrubs

Acacia redolens - Prostrate Acacia : Low growing shrub. 2-3 ft. high, spreading to 15ft. wide. Long narrow grey-green leaves with yellow flowers in spring, not showy. Excellent erosion control on banks. Fast growing.

Agave attenuata - Foxtail Agave : Large succulent shrub to 5ft. high and wide. Medium to light grey green fleshy leaves. Showy cream-yellow flowers on 10-14ft. spikes in the fall. Use as an accent or barrier plant at the top of slope..

Aloe arborescens - Tree Aloe : Large succulent shrub mounding to 12-15ft. high and wide. Medium to light green fleshy leaves with spines on the edges. Showy red-orange flowers on spikes from Dec.-Feb. Excellent barrier and accent shrub. Performs best in well drained soil.

Bougainvillea spp. - Bougainvillea : Medium to large shrub. Varieties range from 3-10ft. high and 4 to 20ft. wide. Leaf colors range from medium-green to variegated cream-yellow. Branches are whip-like and have thorns along their length. Leaves are shredded on the thorns in strong winds. Branches should be tied to supports when young. Very showy leaf bracts from white to crimson throughout the year. Requires careful planting to avoid root damage. Prefers well drained soils.

Callistemon citrinus - Lemon Bottlebrush : Large shrub or small tree 15-20ft. tall and 10-15ft. wide. Narrow light-green leaves on woody branches. Bright red flowers in narrow clusters 5-6in. long. Dense vigorous growth, good as a barrier or large accent plant. Attracts hummingbirds.

Cassia spp. - Senna : Medium shrubs range from 3-6ft. high and wide. Narrow needle-like leaves range in color from dark-green to light grey-green on woody stems. Showy yellow flowers from mid-winter through spring followed by 2-3in. pea pods.

Cistus spp. - Rockrose : Medium shrubs 3-5ft. high and wide. 2-3in. long grey-green leaves. Showy spring flowers vary in color from white to pink or lavender, depending on the variety. Hardy in all bluff conditions. Fast growing with an extensive root system that is helpful in erosion control.

Crasula argentea - Jade Plant : Medium succulent shrub 5-8ft. high and wide. Fleshy pale green 1-2in. leaves with reddish edges. Showy light-pink flowers in winter. Prefers well drained soils. Good barrier plant or mix with other succulents.

Echium fastuosum - Pride of Madeira : Large upright shrub 5-8ft. high and wide. Dull-green narrow leaves cover tall stems. Dramatic clusters of blue-purple flowers at the top of stems late spring to early summer. Fast growing and hardy.

Eriogonum giganteum - St. Catherines Lace : Medium to large shrub 5-8ft. high and 4-6ft. wide. 1-2in. long light grey-green leaves on open branching stems. Interesting flat clusters of pale pink flowers form in spring and turn brown over several months. Useful in dry flower arrangements.

Escallonia exoniensis - Escallonia : Large shrub 6-8ft. high and wide. Glossy green leaves on dense drooping branches. Profuse light-pink flower clusters at branch ends in summer and fall. Fast growing and dependable. Best used as barrier plant.

Euphorbia milii - Crown of Thorns : Small upright shrub 3-4ft. high and 2-3ft. wide. Long thin medium green leaves at ends of stiff thorny branches. Interesting red flower bracts at branch ends throughout the year. Use as accent plant with succulents. White milky sap is toxic.

Galvezia speciosa - Island Bush Snapdragon : Large mounding shrub 6-8ft. high and 8-10ft. wide. Narrow bright green leaves along arching branches. Attractive scarlet tubular flowers at branch ends throughout the year. Will climb over fences and rocks. Attracts hummingbirds

Hakea suaveloens - Sweet Hakea : Large upright shrub 10-15ft. high and 5-6ft. wide. Sharp dark green needle-like leaves on dense upright branches. Sweet smelling white flowers form along branches in fall and winter. Fast growing. Use as barrier plant.

Juniperus conferta - Shore Juniper : Low spreading groundcover 1ft. high and 6-8ft. wide. Soft medium green needle-like leaves on trailing stems. Excellent choice for cascading over banks and rocks. Very dependable.

Lavatera species - Mallow : Large upright shrub 6-10ft. high and 4-6ft. wide depending on the variety. Medium green maple-like leaves 2-5in. long on dense upright branches. Showy flowers (2-3in. across) range from pink to lavender throughout the year. Fast growing. Use as barrier or windbreak.

Leptospermum laevigatum - Australian Tea Tree : Large shrub/Small tree 15-20ft. high and wide. Small round grey-green leaves cover dense woody branches. Attractive white flowers 1/2in. wide cover the branches in spring. Long-lived dependable plant. Use as solitary accent tree or barrier hedge. Must have good drainage.

Limonium perzii - Sea Lavender : Small clumping shrub 1-2ft. high and wide. Large showy rounded leaves on stems to 1ft. long. Showy purple and white flower clusters on 2-3ft. stems. Flower clusters last for many weeks in spring and summer. Useful for erosion control on all parts of the bluffs, however are very invasive.

Lupinus arboreus - Bush Lupine : Large shrub 6-8ft. tall and wide. Light-green finger-like leaves on open branching stalks. Showy yellow, blue or white flower 6-12in. flower clusters in the spring. California native-usually started from seed.

Malosma laurina - Laurel Sumac : Large woody shrub 8-12ft. high and wide. Light green rounded leathery leaves on dense branches. Branchlets are reddish in color. Long-lasting cream-white flower cluster cover the branch ends in spring and summer. Extensive root system make it valuable for erosion control. California native-berries attract birds.

Melaleuca nesophila - Pink Melaleuca : Large woody shrub 10-15ft. high and 12-15ft. wide. Medium green rounded 1in. long leaves on open twisting branches. Interesting pale pink puff-ball flowers on branch ends throughout the year. Hardy and dependable plant. Use as windbreak, barrier, or accent shrub.

Myoporum 'Pacificum' - NCN : Low spreading shrub 2-3ft. high and 15-25ft. wide. Shiny 2-3" elongated green leaves cover sprawling branches. Attractive white flowers along branches in spring and summer. Very fast growth, dependable. Use to cover large areas quickly.

Myporum 'South Coast" : Medium spreading shrub 2-3ft. high and 10-12ft. wide. Shiny medium green oblong leaves 1-2in. long. Showy white flowers in spring. Fast growing.

Nerium oleander - Oleander : Large woody shrub 8-10ft. high and wide. Dark green pointed leaves on flexible branches. Very showy flowers 2-3in. wide. Available in white, pink, salmon, and red depending on the variety. Fast growth in all conditions. Can be pruned to any shape. All parts of the plant are very poisonous.

Pittosorum crassifolium - Pittosporum : Large shrub 8-10ft. high and wide. Grey-green rounded 1-2in. leaves cover flexible branches. Small clusters of pale-purple flowers at branch ends in spring, followed by noticeable berries. Very hardy and tolerant of all bluff conditions.

Rhamnus crocea illicifolia : Large woody shrub 4-15ft. high and wide. Deep green rounded leaves with spiny edges 1-1 1/2in. long. Dense stiff branches. Showy red berries late spring - early summer attracts birds. California native.

Rhus integrifolia - Lemonadeberry : Large woody shrub 6-10ft. high and wide. Thick deep green oval leaves 1-2in. long on dense reddish-brown branches. Light pink flowers at branch ends spring-early summer followed by attractive red-orange berries. Useful for erosion control in all bluff areas. Southern California native- provides wildlife habitat.

Romneya coulteri - Matilija Poppy : Large spreading shrub 5-8ft. high and wide. Grey-green lobed leaves on sprawling grey-green stems. Very showy 6-9in. wide white flowers with golden centers from spring thru fall. Dense spreading root system makes it valuable for erosion control and very invasive. Will crowd out weaker plants. Use as accent plant or to cover large area. Cut back after flowering in fall for best results. Southern California native.

Salvia apiana - White Sage : Medium upright shrub 3-5ft. high and wide. Light grey-green foliage on tall upright stems. White flowers along stems in spring attracts butterflies and bees. Prune back after flowering for best results. California native.

Salvia leucantha - Mexican Bush Sage : Medium sprawling shrub 3-5ft. high and wide. Narrow grey-green leaves 3-5in. long along flexible grey stems. Showy purple flower clusters summer thru fall. Fast growing and hardy. Use as accent planting anywhere on the bluffs.

Salvia mellifera - Black Sage : Medium woody shrub 3-5ft. high and wide. Dark dusty-green leaves 2-3in. long on upright stems. Small white flowers along stems in late-spring and early summer. Flowers attract bees. California native-extensive root system makes it useful for erosion control

ATTACHMENT E

WHAT WE DO

Here at Naval Medical Center San Diego we do our part to prevent the introduction and spread of invasive plants through several programs:

- Exotic Invasive Plant Removal Plan
- Habitat Restoration
- Invasive Plant Eradication
- Biological Surveys and Monitoring

WHAT YOU CAN DO

Vote with your garden and landscaping purchases. Buy native plants!

Plant natives such as ceanothus, wild lilac, elderberry, oak and toyon instead of invasive iceplant or African daisies. Natives use less water and attract native wildlife.

Volunteer in parks, preserves, and campgrounds to assist in control of non-natives.

Manage beneficial native plants for healthy growth.

Have a weed party! Share the load! Work with others. Eradication of weeds conserves water and allows natives to thrive.

Clean your shoes and garden tools. Be careful what you transport; even checking your luggage for invasive species that 'hitchhike' is helpful.

WEBSITES to educate yourself and others:

California Invasive Plant Council
Responsible Landscaping
http://www.cal-ipc.org/landscaping/index.php

U.S. Department of Agriculture
National Invasive Species Information Center
http://www.invasivespeciesinfo.gov/plants/main.shtml

California Department of Food and Agriculture
Encycloweedia
http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm

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Together we can make a DIFFERENCE!

Non-native Plants on Naval Medical Center San Diego

Doing our part to CONSERVE native habitats in an urban landscape.

San Diego is a haven for horticultural enthusiasts. The region's mild climate allows for a stunning diversity of plants introduced from all over the world and celebrated in home and community gardens. Landscaped areas at Naval Medical Center reflect this horticultural heritage.

Balboa Park and Naval Medical Center San Diego carry on horticultural traditions as old as Mesopotamia and the hanging gardens of Babylon. Egyptian art depicts some of the earliest known records of voyages to collect plants for food, fiber, medicine, and perfumery. Gardening originated from a people with a deep respect and love for plants and trees, and whose stories of Paradise and afterlife took shape around bringing water and plants from the wild to the spaces where they lived. The garden became the transition between home and wilderness.

Egyptian irrigating a garden (Shaduf ca. 1300 BCE)

Through thousands of years, landscaped gardens have offered beauty, relaxation, comfort, pleasure, gathering places, and cultural connection. They even help with energy management of our living spaces and reduce the carbon footprint of our urban lifestyles.

Here in San Diego, these traditions continue with a floral and nursery industry, and dozens of local horticultural societies and garden clubs. Balboa Park itself features over 15,000 trees and 14 specialty gardens that attract wordwide visitors. Proper management is needed to ensure horticultural plants remain separate from areas with natural landscapes...

The very climate that gives horticulture such a prominent stage in San Diego also allows for weedy invasive plants to enter into and alter natural landscapes. Such aggressive plants thrive in the mild weather and out-compete natives, replacing them at a cost to the wildlife that cannot adapt to the invaders. Native plants provide food, prey, shelter, and cover from predators for local wildlife. Exotic plants contribute little to the surrounding ecosystem, due to their excessive use of precious water supplies and crowding out native vegetation. Invasive species made especially prevalent with the globalization of travel, have become a global and very expensive problem due to the amount of resources needed to manage their impacts on the local environment.

Here at Naval Medical Center San Diego, we do our part to prevent the introduction and spread of invasive plants.

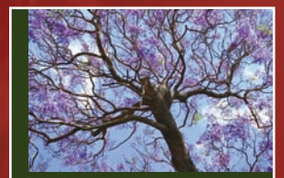
Horticultural beauties...

Our landscaped grounds feature certain of San Diego's most lauded ornamentals. Kate Sessions, called the "Mother of Balboa Park" for her horticultural contributions is credited with introducing a number of new plants that have become symbolic of San Diego. An example is the Purple orchid tree (*Bauhinia purpurea*) you can see here on the hospital grounds. While this plant is beautiful and nonaggressively thrives here it is not actually from this region. This plantis originally from China and India however it finds a home here given its ornamental properties.

Purple orchid tree (*Bauhinia purpurea*)


Bird of Paradise (*Strelitzia reginae*)

Bird of Paradise (*Strelitzia reginae*) From South Africa, this exotic-looking flower that resembles a **flying bird** is highly sought by floral designers and is popular as a **symbol of paradise.**


Blue Jacaranda (*Jacaranda mimosifolia*)

Jacaranda (*Jacaranda mimosifolia*) The **lavender-blue** blossoms are some of the most treasured in southern California street scenes. Their soft, fernlike leaves also attract attention. The tree is native to the Amazon River basin.

Keeping native landscapes natural...

It is when non-natives are invasive and escape from managed habitats, or are internationally transported that problems arise.

Horticultural plants that migrate where they are unintendeddon't stay where they unwelcomed guests. Their color and form can be **eye-pleasing**, while their ecological impact is displeasing. These exotics may go unnoticed until they establish in great numbers outside of their intended landscapes. There, they rob water and other resources. Measures are needed to keep these plants from escaping outside their intended place in the garden or landscape. Give them an inch and they take an acre!

Brazilian pepper (*Schinus terebinthifolius*), from Argentina, Paraguay, and Brazil, inhibits native plants by shading them with its dense canopy. This aggressive, tenacious plant is fast-growing and quickly resprouts. They sometimes **thrive** in local canyons and along streams, replacing native willows used by migratory birds.


Brazilian Pepper (*Schinus terebinthifolius*)


Canary Date Palm (*Phoenix dactylifera*)

Canary Island Date Palm (*Phoenix dactylifera*), from what is now the Middle East, contains an **edible fruit**, but is invasive. This palm forms a dense canopy that prevents sunlight from reaching native plants growing underneath. It is commonly found in wetlands competing with native willows and elderberry trees.

Blue Gum Eucalyptus (*Eucalyptus globulus*), introduced from Australia, is one of several eucalyptus species that occur in the United States. Eucalyptus trees were popular in California in the 1850s as a fast growing **source of timber,** fuel and shade. But these same characteristics allow them to exclude native plants by battling with them for limited rescources like water. Compared to native oaks and willows, eucalyptus provide little benefit to wildlife and are extremely flammable.


Blue Gum (*Eucalyptus globulus*)

and protecting THE BEAUTIFUL...

Some weedy plants are so invasive they become a global threat to biodiversity, second only to out-right habitat destruction. It can be difficult to catch them in time to prevent ecological damage. By the time they are established in numbers, it may be too late to effectively control them without huge financial expenditure.


Salt Cedar (*Tamarix ramosissima*)

Salt Cedar (*Tamarix ramosissima*), or Tamarisk, is native to Asia and can produce up to **500,000 seeds per year**, which are dispersed by the wind. This invasive grows quickly, and each broken twig can spread a new plant.

Fennel (*Foeniculum vulgare*) is a real nuisance to many local environments. From the Mediterranean, fennel invades and prevents reestablishment of natives, drastically altering plant communities like grasslands, coastal scrub, riparian and wetlands. Fennel out-competes natives for light, nutrients and water. It goes so far as to exude substances that inhibit growth of other plants. It is **dense**, difficult to control, with a prolific, viable seed production.


Fennel (Foeniculum vulgare)


Giant Reed (*Arundo donax*)

Giant Reed (*Arundo donax*), from the Mediterranean, came to the United States in about 1820. **Propagated horticulturally** for erosion control, Giant Reed escaped into native habitats. As Giant Reed replaces natural vegetation it steals shade from willows and instream habitats throughout California. This increases water temperature, which reduces the ability of aquatic wildlife to survive. Millions of dollars are expended on giant reed control in California.


Pampas Grass (*Cortaderia selloana*)

Pampas Grass (*Cortaderia selloana*) is native to South America, and is planted ornamentally for its grand size and **beautiful fronds**. But these fronds carry seed that disperse in the wind and become established throughout the coast of California. This plant depletes the water available to nearby native plants. Pampas Grass is a major control problem from redwood parks of Northern California to our own beaches, bluffs, and streams.


Castor Bean (*Ricinus communis*)

Castor Bean (*Ricinus communis*), a native of Asia and Africa, produces an **abundance of seed** that lasts many years and can be harmful if consumed by animals and people. This plant is fast growing and even when mature plants are destroyed, new plants may sprout for years to follow.

THE ENVIRONMENT

Coastal Sage Scrub at Naval Medical Center San Diego

This small sliver of natural resources is nearly surrounded by urban development. Adjacent to a golf course on the east and an extensive municipal park to the north and west the land serves as part of a corridor for wildlife moving among patches of habitat. The natural area at Naval Medical Center provides refuge to a variety of species as well. To ensure that the value of natural resources at the Naval Medical Center San Diego remains as a healthy habitat for native plants and wildlife, while sustaining the military mission, environmental management programs were developed.

- Habitat Restoration
- Plant and Wildlife Population Management
- Invasive Plant Control
- Erosion Control
- Biological Surveys and Monitoring
- Pollution Prevention
- Migratory Bird Surveys
- Recycling
- Environmental Awareness and Education/Outreach
- Reduced Water Use and Water Conservation
- Healing Garden

Prepared for:
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Natural Resources at Naval Medical Center San Diego

RESPECT-PROTECT-ENJOY
NATURAL RESOURCES

Downtown San Diego is a surprising place to find a haven for native wildlife and plants.

Less than two miles from San Diego Bay, Naval Medical Center San Diego rests on a bluff called Inspiration Point. Bordering Florida Canyon it is part of a wildlife corridor consisting of native Coastal Sage Scrub that is home to many species including the federally listed Coastal California Gnatcatcher.

HISTORY

Naval Medical Center San Diego began as a tent field hospital during the first World War. Given its location the field hospital became the site of the first Navy hospital. Activity increased by the end of World War II and during the Korean War. As hospital demand increased, additional buildings were built and state-of-the-art technology became customary at the complex. Today, Naval Medical Center San Diego is considered "The Pride of Navy Medicine" and is the largest, most advanced military health complex in the world! Medical care for the military, the primary goal of the facility, is provided by a staff of more than 6,000 personnel. The natural relict at Naval Medical Center San Diego plays a fundamental role as a natural resource relic. The Coastal Sage Community and Wetland Habitat serve as sanctuaries and corridors for San Diego County wildlife species facing threats as a result of urbanization. A Healing Garden on the property serves as a demonstration of these important environments. Protecting and managing natural resources at Naval Medical Center San Diego is an important element toward sustainability of both the military mission and wildlife.

California Gnatcatcher
(Polioptila californica)

Habitat for the California Gnatcatcher is found on an east-facing slope of the property west of Florida Drive. The fragrant sage dominated vegetation on this slope consists of Coastal Sage Scrub planted as part of a revegetation project before construction in 1981. The presence of the federally threatened California Gnatcatcher within the property is impressive. The small but vocal Gnatcatcher inhabits the property for nesting. Its kitten-like mew may catch your attention near sage-brush or buckwheat. Naval Medical Center takes stewardship of natural resources seriously by maintaining different habitats that occur on the property through restoration and weed control.

California Gnatcatcher (*Polioptila californica*)

Red Tailed Hawk *(Buteo jamaicensis)*

The Red-tailed Hawk on Naval Medical Center San Diego dines on the abundant reptiles and medium sized birds that inhabit the property. These hawks are secretive, relying on a series of perches used for scanning habitat to find prey.

Red Tailed Hawk (*Buteo jamaicensis*)

Hooded Oriole
(Icterus cucullatus)

The Hooded Oriole, originally from desert oases, is now at home in the suburban southwest, attracted to palm trees. Some spend winters in southern California.

Hooded Oriole (*Polioptila californica*)

This brightly colored yellow and black bird is a social species that flocks with other orioles. Some of their nests suspend from palm leaves. The female pokes holes in the leaf from below and pushes fibers through, "sewing" the nest to the leaf.

Western Scrub Jay *(Aphelocoma californica)*

The Western Scrub Jay is a vibrant component of coastal sage scrub. This species often eats in small groups consuming lizards, insects, and berries. When food is abundant they typically take advantage of the surplus and store their food. Recognized as one of the most intelligent species, they often live up to ten years.

Western Scrub Jay (*Aphelocoma californica*)

California Towhee *(Pipilo crissalis)*

This coastal resident adapts well to the urban environment and is found in the remaining open areas of developed regions such as those at Naval Medical Center. California Towhees make nests in low branches of trees and shrubs. Surprisingly, the young usually leave the nest within only eight days of hatching.

Anise Swallowtail Butterfly *(Papilio zelicaon)*

Anise Swallowtails can be found feeding on wildflowers and flowering trees throughout the Naval Medical Center's property. They are also seen in flight searching for a host plant or potential mate. Caterpillars of this species have a very unique defense. When disturbed, bright orange horns emerge and emit a foul smell, which is repulsive to predators such as birds.

Anise Swallowtail Butterfly *(Papilio zelicaon)*

Dusky-footed Woodrat *(Neotoma fuscipes)*

Dusky-footed Woodrats, commonly referred to as packrats, are solitary nocturnal creatures. They build immense dens with dead branches and twigs that are often several feet tall. These large homes include a nest and several food storage areas. Studies have shown that this intelligent rodent selectively places bay leaves around their home to repel fleas.

Cottontail Rabbit *(Sylvilagus bachmani)*

Cottontails are a charming and important part of the natural environment at Naval Medical Center. They are mainly nocturnal; however, they often emerge during the day to sunbathe and sometimes to find a snack. These rabbits eat grasses and berries. Cottontails often make tunnels through dense vegetation between their home and favorite eating places.

Western Fence Lizard *(Sceloporus occidentalis)*

Western Fence Lizard *(Pituophis catenifer catenifer)*

The Western Fence Lizard, climbs fences, walls, and rocks as well as trees and shrubs. From a higher perch, the Western Fence Lizard seeks grasshoppers, other insects, scorpions and spiders. Cats (especially feral cats) are a threat to this species in urban areas.

Gopher Snake *(Pituophis catenifercatenifer)*

The natural habitat of the gopher snake is canyons and meadows, but gopher snakes are good at co-existing with humans. At Naval Medical Center San Diego, the gopher snake likely eats mice, small ground squirrels, and gophers it seeks throughout cool under-ground burrows. Gopher snakes can snatch bird eggs and even small birds. A gopher snake vibrates its tail, which in loose, dry vegetation sounds like a rattlesnake! Dorsal blotches might be mistaken for a rattlesnake's diamond pattern, so this benign snake may unintentionally frighten people.

Gopher Snake *(Pituophis catenifer catenifer)*

Flat Top Buckwheat *(Eriogonum fasciculatum)*

Flat Top Buckwheat is a fairly common shrub species within most Coastal Sage Scrub communities. It regularly attracts numerous pollinators and was historically used by Native Americans for various medicinal purposes.

Flat Top Buckwheat (*Eriogonum fasciculatum*)

Lemonade Berry *(Rhus integrifolia)*

The seeds of Lemonade Berry develop a soft sour coating when ripe. This tart citrus flavor has been used to make lemonade flavored drinks, hence the common name "Lemonade Berry."

Lemonade Berry (*Rhus integrifolia*)

Scarlet Monkey Flower *(Mimulus cardinalis)*

A stunning shrub species, Scarlet Monkey Flower, is an attractive component of the Coastal Sage Scrub habitat. Its bright red flowers attract pollinators in search of nourishment and lured by the showy color.

Scarlet Monkey Flower (*Mimulus cardinalis*)

Coast Prickly Pear *(Opuntia littoralis)*

This native cactus species can be seen throughout southern California and northern Mexico. While it clearly has potential to be harmful, it is an important part of the natural environment. Coast Prickly Pear provides a shelter and protection for various creatures, including small birds, lizards, and rabbits. Humans take advantage of this cactus by collecting and eating the tasty fruit it produces; of course the spines are carefully removed prior to eating.

Toyon *(Heteromeles arbutifolia)*

Toyon is a drought adapted shrub producing bright red berries during the winter, sought after by bears and coyotes. Toyon also attracts birds. Native Americans used Toyon berries for food and to make jelly. Leaves of this shrub have been used to make a tea, historically promoted as a stomach remedy.

Western Sycamore *(Platanus racemosa)*

The Western Sycamore is a grand and distinctive native with light-colored patchy bark; a tree that contributes greatly to the natural habitat. Large birds like the Red-tailed Hawk and Cooper's Hawk use this tree's tall stature and strong branches that make it perfect for perching nesting, and stalking.

Western Sycamore *(Platanus racemosa)*

White Sage *(Salvia apiana)*

One of the most intriguing plants found here at the Naval Medical Center San Diego is White Sage. This species contributes to the natural habitat as a source of food for many insects and even hummingbirds. Historically, this plant was used by humans for a variety of purposes including: food, medicine, incense, and making shampoo! The intense, distinct aroma of White Sage helps define Coastal Sage Scrub.

White Sage *(Salvia apiana)*

Wild Grape *(Vitis girdiana)*

Wild Grape plays an important wildlife habitat role at the Naval Medical Center San Diego. This vine adds to the structure of wetland communities. Beyond supplying multiple layers of vegetation for wildlife, the Wild Grape provides food sought after by many. It is edible for humans too!

Wild Grape *(Vitis girdiana)*

Coast Live Oak *(Quercus agrifolia)*

The Coast Live Oak is an evergreen species; it does not lose its leaves during the Fall and Winter months. This native tree commonly has a multi-branched trunk and produces two unique leaf types; one specialized for bright sunlight, and the other for shade. Coast Live Oaks are slow growing trees with quite a long lifespan. There are examples of this species living to more than 250 years old!

ATTACHMENT F

Multiple Species
Conservation Program

City of San Diego MSCP Subarea Plan

March 1997

Prepared by the City of San Diego
Community and Economic Development Department

MULTIPLE SPECIES CONSERVATION PROGRAM

City of San Diego
MSCP Subarea Plan

March 1997

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1.0 CITY OF SAN DIEGO MSCP SUBAREA PLAN

1.1 INTRODUCTION

The City of San Diego's MSCP Subarea Plan (Subarea Plan) has been prepared pursuant to the general outline developed by the United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDF&G) (herein referred to as the "wildlife agencies") to meet the requirements of the California Natural Communities Conservation Planning (NCCP) Act of 1992. This Subarea Plan forms the basis for the implementing agreement which is the contract between the City and the wildlife agencies that ensures implementation of the Subarea Plan and thereby allows the City to issue take permits at the local level. This Subarea Plan is also consistent with the MSCP plan and qualifies as a stand-alone document to implement the City's portion of the MSCP preserve.

The City of San Diego Multi-Habitat Planning Area (MHPA) was developed by the City in cooperation with the wildlife agencies, property owners, developers and environmental groups. The Preserve Design Criteria contained in the MSCP plan and the City Council adopted criteria for the creation of the MHPA were used as guides in the development of the City's MHPA. The Multi-Habitat Planning Area delineates core biological resource areas and corridors targeted for conservation. Within the MHPA limited development may occur.

1.1.1 Boundary Adjustments

Adjustments to the MHPA boundaries may be made without the need to amend either this Subarea Plan or the MSCP plan in cases where the new MHPA boundary results in an area of equivalent or higher biological value. The determination of the biological value of a proposed boundary change will be made by the City in accordance with the MSCP plan, with the concurrence of the wildlife agencies. If the determination is that the adjustment will result in the same or higher biological value of the MHPA, no further action by the jurisdictions or wildlife agencies shall be required.

Any adjustment to the MHPA boundary will be disclosed in the environmental document (project description) prepared for the specific project. An evaluation of the proposed boundary adjustment will be provided in the biological technical report and summarized in the land use section of the environmental document. An adjustment that does not meet the equivalency test shall require an amendment to this Subarea Plan.

If lands designated as MHPA within the County of San Diego, or other local jurisdiction are annexed into the City of San Diego, these lands will be incorporated into the City's Subarea Plan and shall be considered covered under the City's implementing agreement.

1.2 DESCRIPTION OF SUBAREA

The City of San Diego subarea encompasses 206,124 acres within the MSCP study area. The subarea is characterized by urban land uses with approximately three-quarters either built out or retained as open space/park system. The 1997 population within the subarea was approximately 1.3 million. The City of San Diego MHPA represents a “hard line” preserve, in which boundaries have been specifically determined. It is considered an urban preserve which is constrained by existing or approved development, and is comprised of linkages connecting several large areas of habitat.

The City's MHPA is approximately 56,831 acres and includes approximately 47,910 acres within City jurisdiction, and additional City-owned lands (8,921 acres) in the unincorporated areas around San Vicente Reservoir, Otay Lakes and Marron Valley (**Table 1**). The City’s MHPA comprises 29 percent of the regional MHPA and 58 percent of all habitat and vacant lands. The conserved lands within the City’s MHPA total 53 percent of the vacant land in the City (61 percent of total habitat land in City). The City’s MHPA preserves 77 percent of the core biological resource areas and 77 percent of the habitat linkages within its subarea. Lands which are outside of the biological core or linkage areas but are currently dedicated or designated as open space and provide some long term conservation value are included in the City’s MHPA. In addition, a few small holdings of military properties within the City of San Diego have been included in the MHPA. While these lands are shown pictorially in the MHPA, nothing in the Subarea Plan or implementing ordinances will apply to federally-owned military property.

Approximately 90 percent of the MHPA lands (52,012 acres) within the City’s subarea will be preserved for biological purposes. This is an overall average and in some cases 100 percent of an area will be preserved as a result of negotiations conducted during the Subarea planning process. Most of the following listed projects are approved with a certified EIR (See Section 9.17 and Exhibit H of the San Diego Implementing Agreement).

- Dennery Ranch
- Remington Hills
- Bougainvillea
- Hidden Trails
- Baldwin Otay Business Park
- Carmel Valley Neighborhood 10 Precise Plan
- NCFUA Subarea 5
- Montana Mirador
- Otay Corporate Center North and South
- Spring Canyon Planned Residential Development
- Black Mountain Ranch
- NCFUA Subarea 4
- Robinhood Ridge
- California Terraces

The majority (roughly 94 percent) of public lands would be preserved, except as noted in **Section 1.2.6**. Development impacts on private lands within the remainder of the MHPA will be restricted to no more than 25 percent of the parcel (75 percent preservation). Development within the MHPA will be directed to areas of lower quality habitat and/or areas considered less important to the long-term viability of the MHPA. Documented populations of covered species within the City's portion of the MHPA will be protected to the extent feasible. **Figure 1** identifies the City's MHPA

TABLE 1

VEGETATION COMMUNITY ACRES CONSERVED IN CITY OF SAN DIEGO AREAS; CORNERSTONE LANDS, AND SAN PASQUAL VALLEY

Vegetation Community	Southern Area	Eastern Area	Urban Area	Northern Area	Hodges/San Pasqual	Otay Lakes[1]	San Vicente[1]	Marron Valley[1]	TOTAL
Beach	1	0	55	60	0	0	0	0	115
Saltpan	127	0	9	0	0	0	0	0	136
Southern Foredunes	0	0	9	0	0	0	0	0	9
Southern Coastal Bluff Scrub	0	0	9	126	0	0	0	0	135
Coastal Sage Scrub	1257	3759	2901	3739	3443	1228	940	1685	18951
Maritime Succulent Scrub	236	0	78	367	0	0	0	0	681
Chaparral	0	1449	729	4225	2474	153	1159	236	10424
Southern Maritime Chaparral	0	0	20	1082	0	0	0	0	1102
Coastal Sage/Chaparral	0	11	1	65	9	1	6	3	95
Grassland	201	819	951	2649	176	121	23	1	4942
Southern Coastal Salt Marsh	237	0	120	579	0	0	0	0	936
Freshwater Marsh	10	2	5	94	69	52	1	0	232
Riparian Forest	62	75	73	152	137	38	1	77	614
Oak Riparian Forest	0	41	93	22	172	0	36	105	469
Riparian Woodland	0	24	261	283	1	0	0	0	567
Riparian Scrub	1172	197	424	421	389	23	15	106	2749
Oak Woodland	1	25	46	48	129	0	51	29	329
Torrey Pine Forest	0	0	0	144	0	0	0	0	144
Tecate Cypress	0	0	0	0	0	2	0	0	2
Eucalyptus Woodland	2	0	41	118	4	1	6	0	170
Open Water	689	35	322	222	623	929	787	0	3699
Disturbed Wetlands	110	3	11	80	218	2	148	10	583
Natural Flood Channel	4	24	9	1	229	3	3	23	295
Shallow Bays	91	0	134	0	0	0	0	0	225
Other Habitat[2]	104	0	47	1	4	0	0	0	157
Habitat Subtotal	(5084)	(6463)	(6346)	(14477)	(8076)	(2552)	(3266)	(2278)	(47762)
Disturbed	86	227	155	438	585	56	21	100	2447
Agriculture	745	0	0	682	375	1	0	0	1803
TOTAL	5915	6690	6501	15597	9036	2609	3287	2378	52012

Note: Numbers may not sum to total as shown due to rounding. Acreage figures do not reflect exclusions of areas from the MHPA (see **Section 1.2.6**). The above acreages reflect the estimated conservation for each vegetation community based upon the application of various targeted percent conservation factors (e.g., 75%, 94%, 100%). All wetlands are assumed to be 100 percent conserved. The acreage figures are approximate and do not reflect minor MHPA boundary modifications made during the public hearing process.

1. Cornerstone lands outside City of San Diego jurisdiction.
2. Developed areas with habitat value.

1.2.1 Southern Area

The City proposes to preserve about three-quarters of the Otay Lakes/River Valley core area within its subarea (see also **Section 1.2.5** for a discussion of Otay Lakes).

Otay Mesa

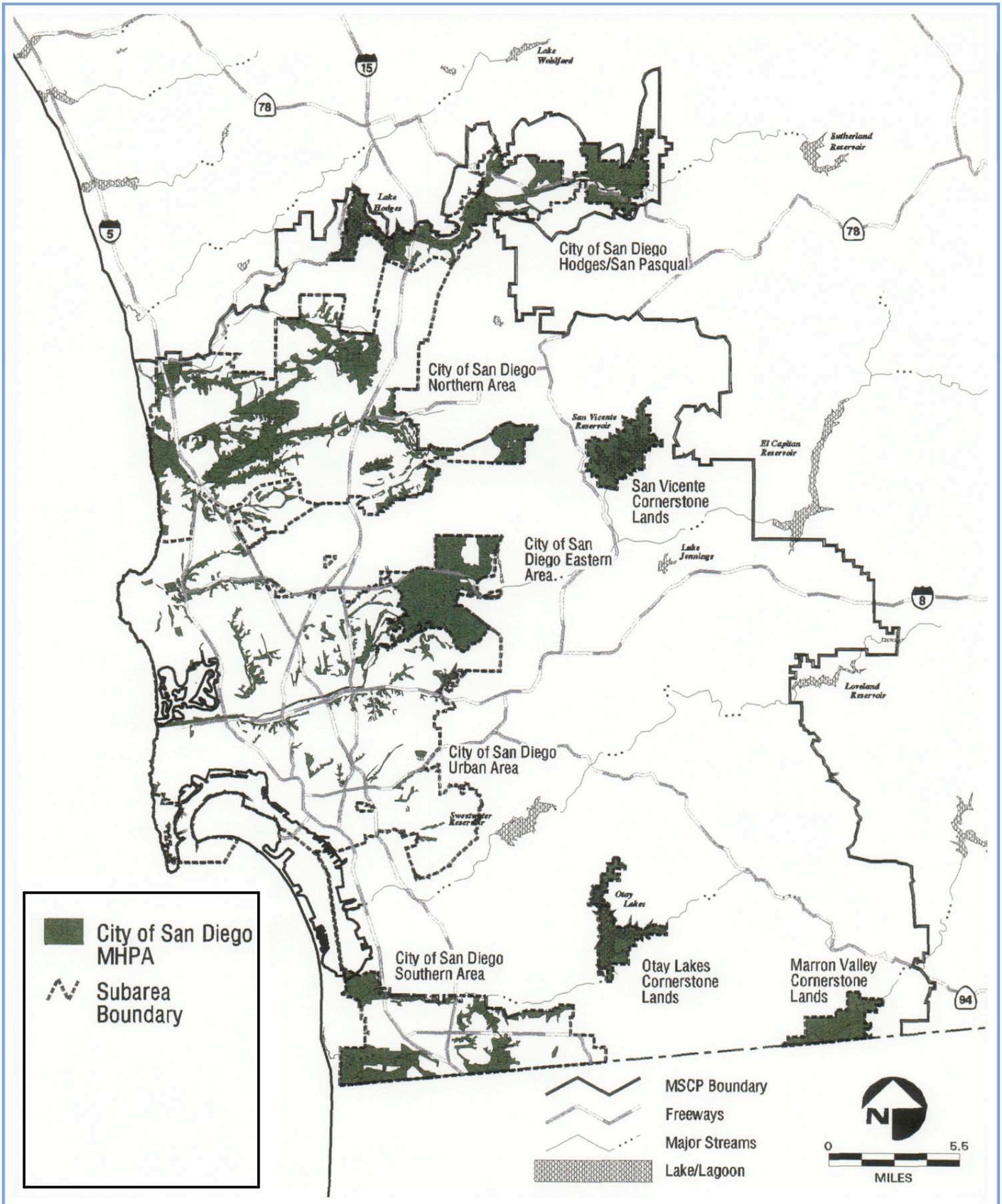
The Otay Mesa areas of the MHPA consists primarily of slopes and wide, deep canyons draining the vast mesas into the Otay River Valley or towards Mexico, with one linkage connecting south to north across Otay Mesa Road (see **Figure 2**). The optimum future condition envisioned for the Otay Mesa area is a network of open and relatively undisturbed canyons containing a full ensemble of native species and providing functional wildlife habitat and movement capability. Integrated into the canyon network will be recreational trails and border patrol access roads.

The Otay Mesa area is located generally east of Interstate 805 (I-805) and south of the Otay River Valley. It runs south to the international border and east to the edge of Johnson Canyon at the eastern edge of the City of San Diego. Mesa top land included in this area of the MHPA comprises several areas supporting grasslands and vernal pools directly north and northeast of Brown Field, as well as limited areas adjacent to Spring Canyon south of Otay Mesa Road and west of Cactus Road. The canyon areas of the MHPA contain primarily maritime succulent scrub and coastal sage scrub vegetation communities which include components unique to the border area.

The northwestern half of the Otay Mesa area consists predominately of Dennery Canyon and its tributaries, and is highly constrained by planned and approved development that completely surrounds and in some areas encroaches into the canyon areas. Virtually no mesas are included in the MHPA system here, which results in some constraints on the ecosystem function and natural processes in this area. This portion of the MHPA contains populations of sensitive plants and very high quality maritime succulent scrub, along with areas disturbed by historic grazing, off-road vehicle use, and a former bentonite mine.

The northeastern portion of the MHPA, north and east of Brown Field, includes mesa top lands containing tilled land, non-native grasslands high in native components, and vernal pools, along with coastal sage and succulent scrub on the north facing slopes adjacent to the Otay River Valley.

South of Otay Mesa Road, the MHPA incorporates most of Spring Canyon and its tributaries, as well as some areas of adjoining mesa top with vernal pools, grasslands, and coastal sage scrub. This portion connects to the MHPA lands on the west, which contain cactus wrens, through a narrow linkage across relatively flat lands in the southwest corner. The Spring Canyon area contains a mixture of pristine succulent scrub, regenerating



City of San Diego MHPA

MSCP Subarea Plan

1 FIGURE

coastal sage scrub and severely eroded and disturbed lands. One of the primary causes of disturbance has been off-road vehicle use, including the border patrol in its pursuit of illegal immigrants crossing the international border. It is acknowledged that the border patrol will continue its activities in this area; therefore, management strategies have been identified in the management section of this Subarea Plan. The federal government has installed a fence and night lights along the international border with Mexico in an attempt to control illegal crossings.

This area supports prime examples of sensitive habitats of the coastal lowlands, such as high quality coastal sage scrub, maritime succulent scrub, wetlands, vernal pools and significant populations of MSCP covered species. These include San Diego thorn-mint, Orcutt's bird's-beak, Orcutt's brodiaea, variegated dudleya, San Diego button-celery, coast barrel cactus, Otay tarplant, prostrate navarretia, snake cholla, California orcutt grass, Otay Mesa mint, San Diego goldenstar, small-leaved rose, Riverside fairy shrimp, San Diego horned lizard, orange-throated whiptail, Wright's checkerspot butterfly, northern harrier, Cooper's hawk, golden eagle, peregrine falcon, burrowing owl, cactus wren and California gnatcatcher.

Otay River Valley

The City of San Diego's portion of the Otay River Valley generally consists of a moderately narrow and well-defined floodplain bounded on both sides by urban development. The area extends from I-805 to the Western Salt Ponds at the south end of the San Diego Bay (see **Figure 2**). The valley is currently a mixture of mining and processing activities, riparian scrub and forest, coastal sage scrub, disturbed habitats, several ponds and wetland mitigation areas, areas disturbed by trash dumping, off-road vehicle activities, salt extraction ponds and tilled land. The proposed South San Diego Bay National Wildlife Refuge boundary extends over the salt ponds area at the western end of the river valley, west of Interstate 5 (I-5).

The City of San Diego's boundaries with Chula Vista cut the floodplain in two and in a few areas jog back and forth in square patterns bearing no relationship to the natural processes or the floodplain. The MHPA follows these unnatural boundaries on its north side. Otherwise, the MHPA follows the boundaries of the areas designated for natural open space, riparian corridor, passive recreation, ponds, salt marsh and salt ponds by the proposed draft Otay Valley Regional Park in its "Progress Plan." A Joint Exercise of Powers Agreement between the Cities of San Diego and Chula Vista, and the County of San Diego has allowed conceptual planning to occur for the proposed Otay Valley Regional Park. This joint effort has developed an updated "Concept Plan."

The MHPA boundaries within the City of San Diego generally incorporate the river corridor and floodway areas, with some upland slopes on the south

side of the river that are currently in coastal sage scrub and disturbed habitats. Some of these slopes are separated from the river corridor by active recreational areas, creating disjunctive habitat areas. At the western end, where the river delta mouth opens into the San Diego Bay at its southern end, the area is diked into salt ponds. These ponds support several threatened and endangered species. The Otay River flows on a circuitous path around the salt ponds levees, encountering saltmarsh habitat and eventually drains into the San Diego Bay.

The Otay River Valley area supports a number of sensitive and target species while providing an important linkage from the Otay Mountain and Lakes area and beyond, to the San Diego Bay. Covered species include Otay tarplant, Orcutt's bird's-beak, variegated dudleya, San Diego barrel cactus, western snowy plover, long-billed curlew, Belding's savannah sparrow, large-billed savannah sparrow, light-footed clapper rail, California least tern, least Bell's vireo, and California gnatcatcher. In addition, various raptors, including the northern harrier, use the valley for foraging and nesting.

MHPA Guidelines

The City has developed the following general guidelines for the Otay Mesa and Otay River Valley areas of the MHPA. The notes under "MHPA Guidelines" include features that have been incorporated into the MHPA and thus were considered in the evaluation for species coverage. The guidelines are required to be implemented for take authorization, except if noted with an asterisk (*). As appropriate, the MHPA guidelines noted with an asterisk should be considered during preserve assembly. The notes are keyed to the extent possible to specific locations on the accompanying figure for the area. The notes include: 1) approved project requirements (e.g., Note #C1); 2) guidelines to be incorporated into the design of future projects within or adjacent to the MHPA (e.g., Note #D11); 3) clarifications of the MHPA design in a particular area (e.g., Note #A8); or 4) locations of existing and future uses within or adjacent to the MHPA (e.g., Note #B8). Responsibility for implementation will be determined at the time of discretionary approvals for individual projects. Except if noted, the MHPA guidelines do not apply to existing approved site-specific project entitlements, unless a modification, revision, or amendment to the entitlement is requested by the property owner.

1. Maintain and/or provide trail access for border patrol use around the rim of canyons, where feasible.* Motorized off-road vehicle use in the MHPA should be prohibited except by border patrol, MHPA (Preserve) managers or emergency vehicles.

2. In the area south of proposed State Route 905 (SR-905), minimize road crossings of Spring Canyon. Where road crossings must occur, use bridges or culverts (see #3 below). Manufactured slopes adjacent to roadways should be revegetated with appropriate native vegetation.

3. Unless noted otherwise, culvert dimensions should be at least 30 feet wide by 15 feet high and, where feasible, have a maximum 2:1 length-to-width ratio. The floor of the culvert must be natural/soft bottom, and the ceiling constructed using skylights where possible to provide adequate visibility for wildlife.

4. Vernal pool areas should be preserved per adopted regulations. Where development is considered, the vernal pools should be assessed for transplantation of sensitive plants and soils containing the propagule (i.e., seeds, eggs, cysts) of sensitive flora and fauna. Any wetland impacts will be mitigated for losses to meet the state and federal goal of "no net loss of wetland function and value." Mitigation should occur in accordance with requirements to be determined through the 404 and 1601 permitting process for individual projects.

The following specific guidelines for the Otay Mesa and Otay River Valley areas are shown as locations A1 through A14 on **Figure 2**:

A1. Improve the wildlife/pedestrian corridor in Dennery Canyon by incorporating two culverts in Dennery Canyon Road. Revegetate the disturbed portions of Dennery Canyon with coastal sage scrub species.

A2. Modify street alignments to retain additional natural areas. Reduce street classifications and roadbed width where possible to reflect reduced development.*

A3. The Robinhood Ridge project has a legal right to develop under an existing approved Tentative Map. In the event that the approved map expires, future development proposals would be required to conform to the MHPA boundaries as depicted by the Subarea Plan and associated land use regulations.

A4. Provide a culvert under Otay Mesa Road to facilitate wildlife crossing. Ideally, the culvert would provide both limited pedestrian and wildlife access from the Otay River Valley Regional Park through Dennery Canyon to areas to the south in Spring Canyon. However, if this dimension is not possible due to engineering constraints, the culvert must be large enough to allow mid-size mammal and predator undercrossing.

A5. Enhance/restore disturbed areas within the wildlife crossing. This will entail revegetation with coastal sage scrub species and if necessary possible experimental restoration of graded vernal pools immediately north of Otay Mesa Road. The revegetation effort should not use medium to tall shrubs and trees, to address border patrol concerns. Provide fencing to direct animals into the undercrossing.

A6. The SR-905 design shall include a bridge-type structure over the wildlife corridor south of Otay Mesa Road. This crossing shall be enhanced with grading and revegetation.

A7. Prior to any development impacts in this area, mitigation must include collecting and reseeding vernal pool species into other preserved Otay Mesa pools.

A8. Final configuration of this area is subject to redesign of approved maps.

A9. The MHPA designation on the Baldwin property at the far northeastern end of the Otay Mesa area will need to be fenced at the time of development. Depending on the future use of adjacent areas outside the MHPA, the frequency and monitoring for disturbance, fence repairs, and other maintenance will be determined at the time of development. Due to the sensitivity of the vernal pools and other sensitive species in this area, public access should be carefully directed.

A10. Upon completion of aggregate extraction activities, revegetate extraction areas within and adjacent to the MHPA with native vegetation.

A11. The existing Western Salt Company salt extraction use is expected to continue for an undetermined period. The sensitive animal and plant species should continue to be managed to ensure protection. If the extraction use is terminated, the site should be converted to a use compatible with the resource goals and objectives of the MHPA and other regulations and policies applicable to the site, or enhanced/restored.

A12. Work with SANDAG, South Bay jurisdictions, and the Bayshore Bikeway Committee to develop a bike path in or adjacent to the MHPA in the South San Diego Bay area. Design of the bikeway should minimize disturbance to natural areas.*

A13. If Hollister Street is widened or improved, a bridge facility should be used to elevate the road above the floodplain at least 12 feet (bottom of bridge to existing grade). The bridge should be designed to allow for maximum flood flows, provide for riparian woodland to regenerate and for sediments to build over time, and provide for wildlife, pedestrian, and equestrian movement.

A14. The MHPA boundaries within the proposed Special Study Areas of the Otay-Nestor Community Plan may be modified to reflect future changes to land use designations and may require an amendment to the Subarea Plan. Any such modifications shall include a wildlife corridor approximately 1,000 feet in width, preserving connections between the Otay River and San Diego Bay.

Tijuana Estuary and Tijuana River Valley

The Tijuana Estuary and adjacent Tijuana River Valley comprise one of the largest and most important wetland systems in San Diego County. The estuary supports the most extensive saltmarsh and saltpan habitat within the MSCP area, and small areas of southern foredunes occur adjacent to this system at Monument Beach. The City proposes to preserve approximately 94 percent of the Tijuana Estuary/Tijuana River Valley core area within its subarea (see **Figure 2**).

The Tijuana River Valley area generally consists of a broad floodplain with high natural mesas to the south, bounded on three sides by urban development, and on the fourth by the Pacific Ocean. The valley floodplain is a mixture of agricultural fields, equestrian facilities, rural housing, riparian woodland and disturbed habitats, several ponds and a lake created by sand mining, the riverbed and pilot channel, and areas disturbed by dumping, off-road activities, grading and recontouring (berming), and the effects of flooding. The mesas and canyon areas contain healthy coastal sage and maritime succulent scrub communities, some chaparral and disturbed riparian scrub, agricultural fields on Spooner's Mesa, and additional disturbed areas in the Border Highlands area and in the canyons.

The southern boundary of the area is the international border, with the urbanized city of Tijuana, Mexico lying immediately to the south on the other side. To the east lies the community of San Ysidro; to the north, Otay Mesa Nestor and Imperial Beach; and to the west lies a National Estuarine Research Reserve on the edge of the City's jurisdiction to the Pacific Ocean.

The MHPA incorporates the 25-year floodplain within the City's jurisdiction and much of the 100-year floodplain in the valley. The MHPA also includes the mesa and canyon areas on the south side of the floodplain and the Dairy Mart Ponds, some of which are in the San Ysidro Community Plan.

The county of San Diego is developing a Regional Park in the Tijuana River Valley that will include a mixture of recreational opportunities, sustainable agriculture, and native habitats. The entire park area and the management framework governing its development are considered to be generally compatible with the MHPA even though many of the proposed uses are not specifically habitat related. Portions of the valley not included in the MHPA will remain in an open space designation that allows for more active open space uses (e.g., agriculture, recreation), giving the County flexibility to plan the regional park. Areas within the 25-year floodplain, currently leased for agriculture are expected to remain in these uses for up to 10-20 years, depending on flooding and other considerations. However, in the long term these areas will be evaluated for restoration and widening of the riparian corridor consistent with the County's Framework Management Plan and the

MSCP. The area is unique in its relationships with local, state, federal, and international agencies and citizen groups, and in its issues, including a proposal to consider the valley a United Nations designated Biosphere Reserve which incorporates a sustainable, multiple use, and conservation concept.

Covered species in this area include Shaw's agave, Orcutt's bird's-beak, wart-stemmed ceanothus, San Diego barrel cactus, least Bell's vireo, light-footed clapper rail, Belding's savannah sparrow, California least tern, Western snowy plover, northern harrier, Cooper's hawk, and California gnatcatcher.

MHPA Guidelines

The following specific guidelines for the Tijuana River Valley area are shown as locations A15 through A19 on **Figure 2**. The notes under "MHPA Guidelines" include features that have been incorporated into the MHPA and thus were considered in the evaluation for species coverage. The guidelines are required to be implemented for take authorization, except if noted with an asterisk (*). As appropriate, the MHPA guidelines noted with an asterisk should be considered during preserve assembly. The notes are keyed to the extent possible to specific locations on the accompanying figure for the area. The notes include: 1) approved project requirements (e.g., Note #C1); 2) guidelines to be incorporated into the design of future projects within or adjacent to the MHPA (e.g., Note #D11); 3) clarifications of the MHPA design in a particular area (e.g., Note #A8); or 4) locations of existing and future uses within or adjacent to the MHPA (e.g., Note #B8). Responsibility for implementation will be determined at the time of discretionary approvals for individual projects. Except if noted, the MHPA guidelines do not apply to existing approved site-specific project entitlements, unless a modification, revision, or amendment to the entitlement is requested by the property owner.

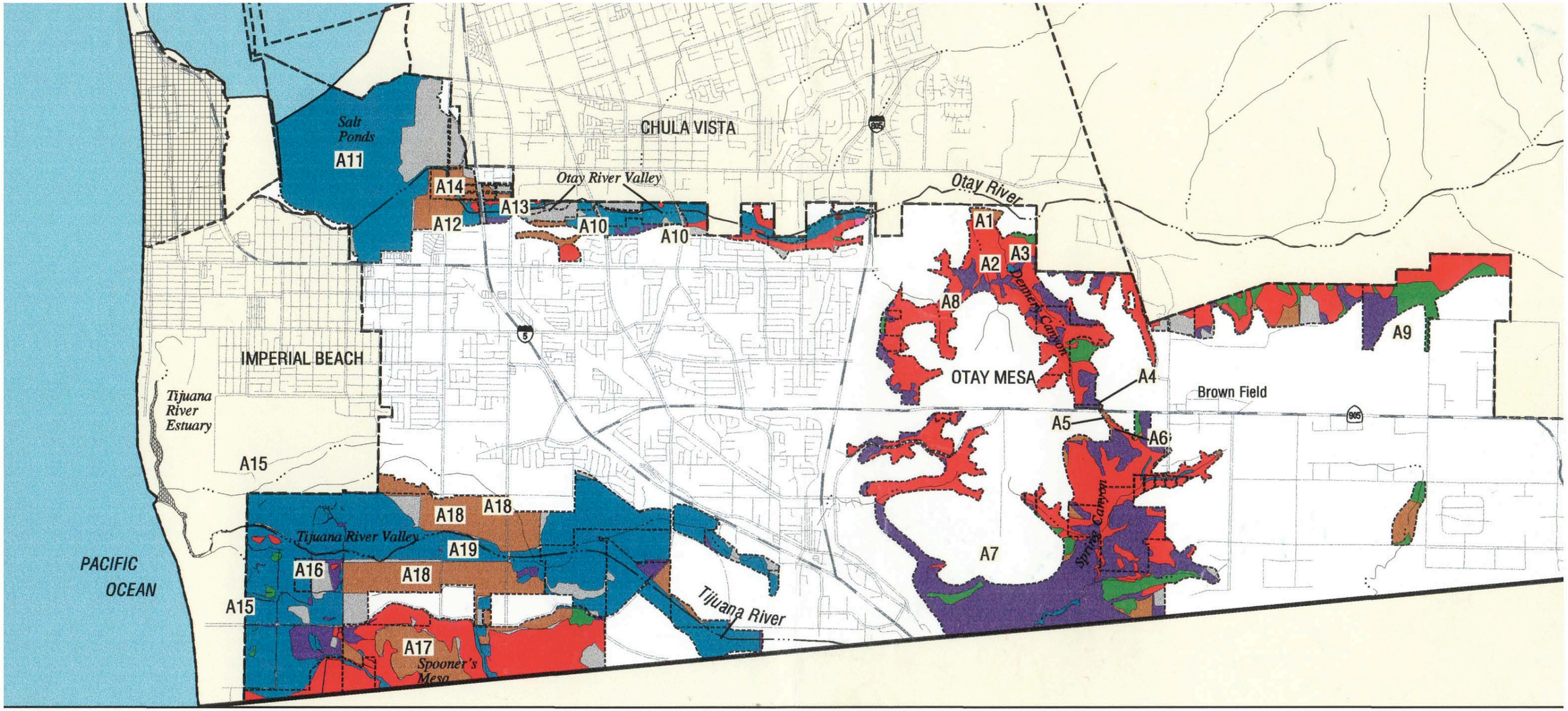
A15. Maintain existing reserve (estuary) and park uses.*

A16. Maintain a buffer around all wetland areas.

A17. Maintain existing agricultural uses on Spooner's Mesa, with a long-term goal of phased restoration to coastal sage scrub, maritime succulent scrub or native grasslands.

A18. Maintain agricultural use on County-owned lands, with a long-term goal of restoration to native vegetation where possible, consistent with the County's Framework Management Plan.

A19. Retain and enhance, where possible, existing riparian habitat along the Tijuana River.



Vegetation Communities

- Coastal Sage Scrub
- Chaparral
- Coastal Sage Scrub/ Chaparral
- Grassland
- Riparian/Wetlands
- Oak Woodland
- Coniferous Forest
- Beach/Foredunes
- Eucalyptus Woodland
- Disturbed Habitat
- Shallow Bay
- Developed
- Agriculture

Letter/number indicates MHPA Guideline. See text.

- Subarea Boundary
- MHPA Boundary
- Water District
- Subarea
- Military Lands

Base Map Features

- MSCP Boundary
- U.S. - Mexico Border
- Freeway
- Major Road
- Minor Road
- Major Stream
- Minor Stream
- Lake/Lagoon

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Conserved Vegetation Communities in Southern Area

MSCP Subarea Plan

2 FIGURE

1.2.2 Eastern Area

The Eastern area includes the remaining undeveloped lands in the eastern portion of the City of San Diego including the area known as East Elliott (approximately 2,300 acres), and Mission Trails Regional Park (approximately 5,700 acres (see **Figure 3**). The eastern edge of this area forms the San Diego border with the City of Santee.

NAS Miramar

A conservation plan for NAS Miramar has not been completed at this time. The City's MHPA design will not preclude corridor options on Miramar and assumes there will be a connection between East Elliott and the General Dynamics property/Beeler Canyon area to the north through Miramar (**Figure 3**, B1*). Miramar is in the process of transferring operational control from the Navy to the Marine Corps as part of the base realignment and closure program. The Navy and Marine Corps are currently in the planning process to determine the facilities needed to meet Miramar's new mission requirements as a Marine Corps Air Station (MCAS). The Department of the Navy is preparing a habitat conservation plan that will identify Habitat Management Zones at Miramar. Miramar has prepared a Comprehensive Natural Resources Management Plan which provides the basis and criteria for the management and decisions regarding natural and cultural resources. Coastal sage scrub and vernal pools are two key resources to be addressed by the Miramar plan. Habitat linkages to the regional habitat preserve network also will be addressed.

East Elliott and Mission Trails Regional Park

The City proposes to preserve about 80 percent of the Mission Trails/East Elliott/Santee core area within its subarea (excluding Miramar). Important resources in this area include coastal sage scrub, riparian scrub, and vernal pools. Significant populations of willowy monardella, San Diego thorn-mint, Orcutt's brodiaea, variegated dudleya, San Diego goldenstar, San Diego ambrosia, least Bell's vireo, and California gnatcatchers are a few of the covered species that occur in this area.

The majority of Mission Trails Regional Park is owned and maintained by the City of San Diego, with minor portions both jointly and separately owned by the County of San Diego, and the state of California. Most of the East Elliott community is privately owned with the central portion (approximately 500 acres) owned and operated as the County of San Diego Sycamore Landfill. State Route 52 (SR-52) generally divides Mission Trails Regional Park from East Elliott, though bridges span Spring and Oak Canyons and provide wildlife movement through both areas and further north to Miramar.

MHPA Guidelines

The following specific guidelines for the Eastern area are shown as locations B2 through B14 on **Figure 3**. The notes under "MHPA Guidelines" include features that have been incorporated into the MHPA and thus were considered in the evaluation for species coverage. The guidelines are required to be implemented for take authorization, except if noted with an asterisk (*). As appropriate, the MHPA guidelines noted with an asterisk should be considered during preserve assembly. The notes are keyed to the extent possible to specific locations on the accompanying figure for the area. The notes include: 1) approved project requirements (e.g., Note #C1); 2) guidelines to be incorporated into the design of future projects within or adjacent to the MHPA (e.g., Note #D11); 3) clarifications of the MHPA design in a particular area (e.g., Note #A8); or 4) locations of existing and future uses within or adjacent to the MHPA (e.g., Note #B8). Responsibility for implementation will be determined at the time of discretionary approvals for individual projects. Except if noted, the MHPA guidelines do not apply to existing approved site-specific project entitlements unless a modification, revision, or amendment to the entitlement is requested by the property owner.

B2. Maintain the existing County landfill with eventual restoration and use as a passive park/open space preserve.* An adequate buffer (1,000 feet) should be maintained around the landfill. Development of a future closure plan for the landfill shall incorporate measures to transition from the future use to the MHPA. If the landfill site is redeveloped as an active park, consideration of adjacency issues such as lighting and noise will be required.

B3. In the event that a future landfill is located in East Elliott, the area shown for development will revert to open space and the landfill development footprint and ancillary uses will be outside of the MHPA. Development of a landfill would not require an amendment to the Subarea Plan if the extent of impacts associated with the landfill are essentially equivalent to the eastern development. The determination of equivalency shall be based on the following:

- The landfill development footprint and all ancillary uses (roads, recycling centers, etc.) shall not exceed 25 percent of the MHPA area in East Elliott (including the area that reverts to open space).
- Active landfill operations including ancillary uses and all other areas of native habitat modification shall not exceed 280 acres.
- Areas that are no longer receiving waste shall be restored with native species that will not adversely affect the function of the closed landfill, while fulfilling maintenance measures required by law. Areas will be considered part of the active landfill operations until a habitat restoration program is initiated.

- Development of the landfill shall not preclude wildlife movement through more than one of the three wildlife corridors in East Elliott (i.e., Spring, Oak or Quail Canyon).

  All mitigation for landfill impacts, including ancillary uses, should occur in the East Elliott area. Evaluation of any impacts to covered species shall occur at such time that a landfill footprint is determined. Avoidance, transplantation, or other mitigation measures will be determined at that time.

B4. A condition of coverage for San Diego ambrosia requires 90 percent preservation of the population at the Mission Trails Regional Park site.

B5. Pursue an active cowbird management program, where deemed necessary, in areas adjacent to the San Diego River.

B6. Active park uses in Mission Trails Regional Park are located outside of and adjacent to the MHPA. Uses include campgrounds, visitors center, interpretive centers, and archery range.*

B7. Potential location of a future 30-40 acre equestrian center and buffer. This is a conceptual location only and may be adjusted in order to minimize disturbance to adjacent land uses and biological resources.*

B8. Location of a future day use area, water pump station and associated parking lot.*

B9. Location of a future western staging area.*

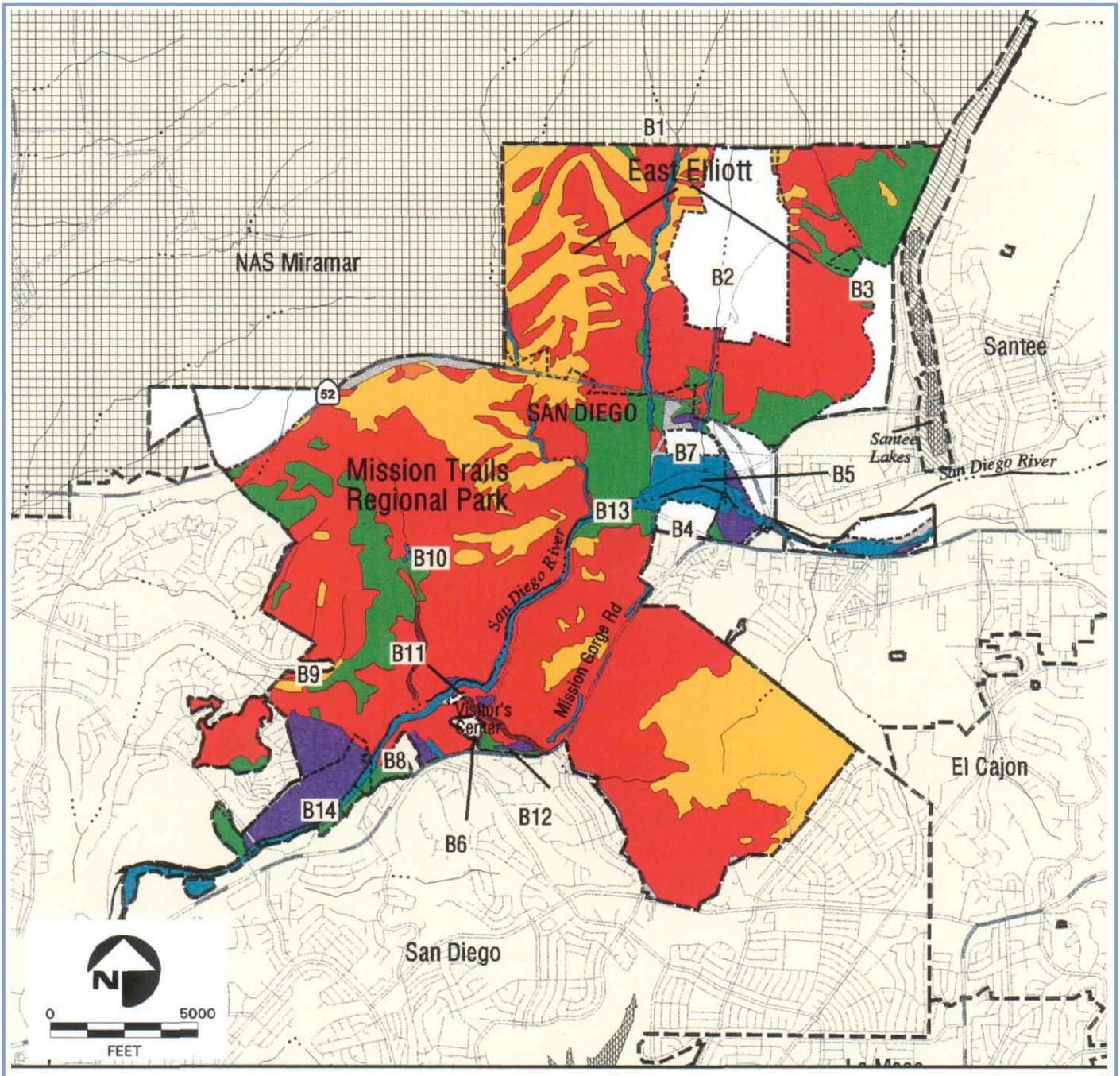
B10. Passive uses identified in the Mission Trails Regional Park Master Development Plan are considered compatible within the MHPA, unless otherwise noted.*

B11. Potential future site for an archery range.*

B12. Location of future picnic areas. Access will be provided along existing trails or unpaved roads.*

B13. Location of the existing Old Mission Dam parking lot and future restrooms.*

B14. Upon cessation of extractive uses, this site should be reclaimed/restored for open space.



Vegetation Communities

- Coastal Sage Scrub
- Chaparral
- Coastal Sage Scrub/ Chaparral
- Grassland
- Riparian/Wetlands
- Oak Woodland
- Coniferous Forest
- Beach/Foredunes
- Eucalyptus Woodland
- Disturbed Habitat
- Shallow Bay
- Developed
- Agriculture

Letter/number indicates MHPA Guideline. See text.

- Subarea Boundary
- MHPA Boundary
- Water District Subarea
- Military Lands

Base Map Features

- MSCP Boundary
- U.S. - Mexico Border
- Freeway
- Major Road
- Minor Road
- Major Stream
- Minor Stream
- Lake/Lagoon

Conserved Vegetation Communities in Eastern Area

MSCP Subarea Plan

3 FIGURE

1.2.3 Urban Areas

Point Loma

The City proposes to preserve approximately three quarters of the habitat within its subarea in the Point Loma core area (excluding the Point Loma Naval Complex) (**Figure 4**). Important resources in this area include coastal bluff scrub, maritime succulent scrub, southern foredunes, Shaw's agave, wart-stemmed ceanothus, snake cholla, roosting seabirds, and migratory birds.

A Natural Resources Management Plan (NRMP) for Point Loma has been prepared by the Navy in cooperation with the USFWS, National Park Service, Veterans Administration, U.S. Coast Guard, and the City of San Diego, in accordance with executive orders and Navy guidelines mandating a balanced program for the management of natural resources on naval installations. The NRMP primarily covers the Point Loma Naval Complex (five naval commands) and Cabrillo National Monument (**Figure 4**, E1). The NRMP includes long-term, in-place mitigation that will allow the Navy to proceed with planned development and continue to achieve its military mission and mandate, while providing good stewardship of the sensitive and unique natural resources under its jurisdiction. The NRMP document was finalized in July 1994. The Navy currently is developing a draft Memorandum of Understanding (MOU) with the USFWS, and is pursuing the formal Navy Ecological Reserve Area (ERA) designation from the Chief of Naval Operations. The Point Loma NRMP proposes to set aside approximately 614 acres of native habitat or other vegetation with habitat value (e.g., eucalyptus woodland) in an ERA. Lands within the ERA will constitute approximately 77 percent of the habitat available on Point Loma. The NRMP ensures relatively high preservation of most of the sensitive associations onsite, including southern foredunes, coastal bluff scrub, maritime succulent scrub, Diegan coastal sage scrub, intertidal habitat, and cultivated Torrey pine forest.

Preservation of southern maritime chaparral (62 percent) is expected to be increased through revegetation/habitat enhancement measures. The ERA will protect at least 15 of the 18 NRMP target plant species (including all six MSCP target plant species found on Point Loma) and all of the target animal species. In addition to the high percentage of sensitive habitats and species included within the ERA, the final ERA design will provide a high degree of connectivity between reserved habitats and will include the majority of lands designated as Very High and High biological value in the NRMP Habitat Evaluation Model.

Other Urban Habitat Areas

Urban habitat areas within the City of San Diego included in the MHPA are primarily concentrated in existing urbanized locations, and include areas not

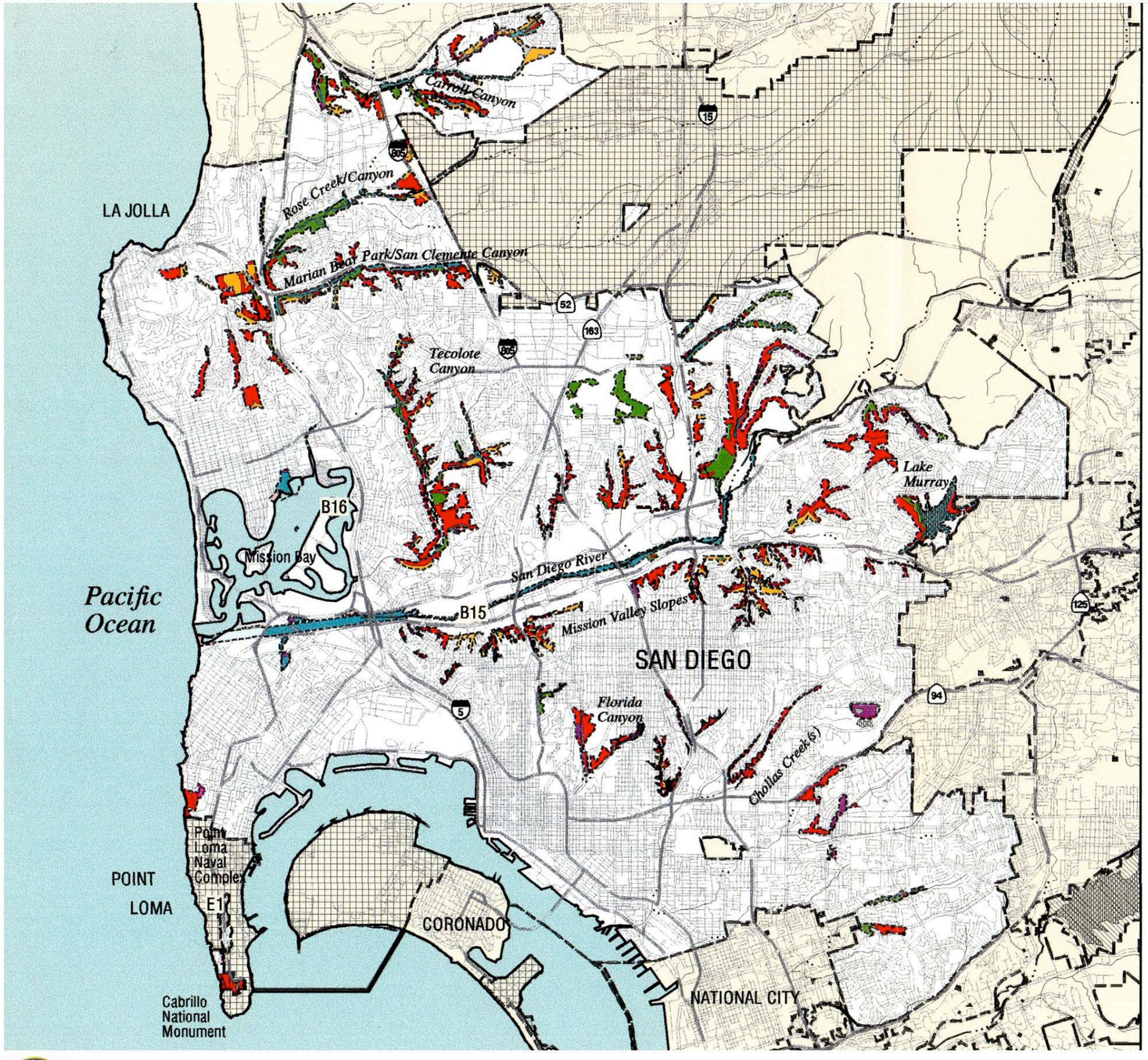
incorporated in the major planned areas of the MHPA (see **Figure 4**). The majority of these lands consist of canyons with native habitats in relative proximity to other MHPA areas providing habitat. These areas contribute in some form to the MHPA, either by providing habitat for native species to continue to reproduce and find new territories, or by providing necessary shelter and forage for migrating species (mostly birds).

The urban habitat areas within the City's MHPA include existing designated open space such as Mission Bay, Tecolote Canyon, Marian Bear Memorial Park, Rose Canyon, San Diego River, the southern slopes along Mission Valley, Carroll and Rattlesnake Canyons, Florida Canyon, Chollas Creek and a variety of smaller canyon systems dispersed throughout the more urban areas of the City. These areas contain a mix of habitats including coastal sage scrub, grasslands, riparian/wetlands, chaparral, and oak woodland. The lands are managed pursuant to existing Natural Resource Management Plans, Landscape Maintenance Districts, as conditions of permit approval, or are currently unmanaged. The areas also contribute to the public's experience of nature and the local native environment.

Covered species found in these areas include Orcutt's brodiaea, wart-stemmed ceanothus, short-leaved dudleya, San Diego button-celery, San Diego barrel cactus, willowy monardella, San Diego goldenstar, snake cholla, California gnatcatcher, least Bell's vireo, California least tern, Belding's savannah sparrow, coastal cactus wren, western snowy plover, light-footed clapper rail, mule deer, and orange-throated whiptail.

MHPA Guidelines

The following specific guidelines for the urban area are shown as locations B15 and B16 on **Figure 4**. The notes under "MHPA Guidelines" include features that have been incorporated into the MHPA and thus were considered in the evaluation for species coverage. The guidelines are required to be implemented for take authorization, except if noted with an asterisk (*). As appropriate, the MHPA guidelines noted with an asterisk should be considered during preserve assembly. The notes are keyed to the extent possible to specific locations on the accompanying figure for the area. The notes include: 1) approved project requirements (e.g., Note #C1); 2) guidelines to be incorporated into the design of future projects within or adjacent to the MHPA (e.g., Note #D11); 3) clarifications of the MHPA design in a particular area (e.g., Note #A8); or 4) locations of existing and future uses within or adjacent to the MHPA (e.g., Note #B8). Responsibility for implementation will be determined at the time of discretionary approvals for individual projects. Except if noted, the MHPA guidelines do not apply to existing approved site-specific project entitlements, unless a modification, revision, or amendment to the entitlement is requested by the property owner.



Vegetation Communities

- Coastal Sage Scrub
- Chaparral
- Coastal Sage Scrub/ Chaparral
- Grassland
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- Oak Woodland
- Coniferous Forest
- Beach/Foredunes
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Base Map Features

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- U.S. - Mexico Border
- Freeway
- Major Road
- Minor Road
- Major Stream
- Minor Stream
- Lake/Lagoon

Letter/number indicates MHPA Guideline. See text.

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Conserved Vegetation Communities in Urban Area — **4** FIGURE

MSCP Subarea Plan

B15. Native vegetation shall be restored as a condition of future development proposals along this portion of the San Diego River corridor.

B16. Management of the least tern area shall be pursuant to the adopted Mission Bay Master Plan and associated Natural Resources Management Plan (1990).

1.2.4 Northern Area

The City proposes to include about two-thirds of the Los Peñasquitos Lagoon/Canyon Del Mar Mesa core area within its subarea (see **Figure 5**). 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 to the east. Los Peñasquitos Canyon is a regional corridor linking coastal habitats to inland habitats on Black Mountain and in Poway. Important resources in this area include saltmarsh, coastal sage scrub and southern maritime chaparral. Covered species include San Diego thorn-mint, Shaw's agave, Del Mar manzanita, Encinitas baccharis, Orcutt's brodiaea, wart-stemmed ceanothus, short-leaved dudleya, variegated dudleya, San Diego button-celery, San Diego barrel cactus, willowy monardella, San Diego goldenstar, Torrey pine, San Diego mesa mint, Riverside fairy shrimp, southwestern pond turtle, San Diego horned lizard, orange-throated whiptail, California brown pelican, white-faced ibis, Canada goose, northern harrier, Cooper's hawk, golden eagle, western snowy plover, California least tern, burrowing owl, coastal cactus wren, California gnatcatcher, California rufous-crowned sparrow, Belding's savannah sparrow, grasshopper sparrow, mountain lion and mule deer.

The northern area encompasses a large amount of developed and undeveloped land stretching from the Black Mountain Ranch area of the North City Future Urbanizing Area (NCFUA) south to Lopez Canyon in Los Peñasquitos Canyon Preserve in Mira Mesa, and from the coast to Interstate 15 (I-15). The area encompasses the communities of Carmel Valley, Sorrento Hills, Torrey Pines, Rancho Penasquitos, a portion of Mira Mesa, the Via de la Valle Specific Plan area, and the entire 12,000-acre NCFUA. In addition, the area also includes Torrey Pines State Preserve, the Los Peñasquitos Lagoon, and Los Peñasquitos Canyon Preserve. The majority of the undeveloped private land is disturbed habitat, much of it having been farmed or grazed for decades or longer.

The MHPA in this area is largely comprised of regional linkages leading to biological core areas within existing reserves and parks. In the north lies the area surrounding Black Mountain Park, much of which serves as core area immediately in and surrounding the park, with the remainder of the lands allowing connections to the San Dieguito River Valley to the north and west, and providing one end of a lengthy regional corridor to the south. The core area contains valuable native habitats: mixed and chamise chaparral, coastal

sage scrub, and native grassland. The corridor/linkage areas currently contain much non-native and disturbed habitat, including invasive exotic species, and are in need of enhancement/restoration. The corridors also contain areas with non-native grasslands that are considered important raptor foraging habitats.

The central portion of the northern area is comprised of the heart of the City's North City Future Urbanizing Area, known as NCFUA Subareas 2, 3, 4 and 5. These encompass the San Dieguito Lagoon area, Gonzales Canyon, and most of the area lying between the communities of Carmel Valley and Rancho Peñasquitos. NCFUA Subareas 3 and 4 contain only extended regional corridors, linking to the north, west and south. These corridors primarily lie in canyons or drainages (e.g., La Zanja Canyon, McGonigle Canyon and Gonzales Canyon), and the majority require restoration to enhance their long-term habitat value, as they are currently in agriculture and disturbed lands. The NCFUA Subarea 5 contains core habitat area on the Del Mar Mesa north of Los Peñasquitos Canyon Preserve as well as linkages containing disturbed lands and habitat leading toward Carmel Valley and Carmel Creek. NCFUA Subarea 2 contains a portion of the San Dieguito Lagoon enhancement area east of the I-5 freeway. The proposed MHPA boundary in this area is consistent with the open space configuration of the NCFUA Framework Plan, and contains wetlands including the San Dieguito River, limited coastal sage, chaparral, grasslands, and agriculturally disturbed lands.

The southwestern portion of this area contains Torrey Pines State Park, Crest Canyon, Los Peñasquitos Lagoon, and Los Peñasquitos Canyon Preserve which are core biological resource areas with high to moderate habitat values. Los Peñasquitos Canyon Preserve contains large expanses of non-native grassland, and contains some restoration opportunities within its boundaries. This portion of the MHPA also contains linkages and habitat within the southern Carmel Valley neighborhoods (e.g., 8, 8A and 10) and the Carmel Valley Restoration and Enhancement Project (CVREP), which is intended to serve as a wildlife linkage to the Los Peñasquitos Lagoon and Torrey Pines State Park. Carmel Valley Neighborhood 10 contains two major wildlife corridors that converge at CVREP, where they link to adjacent core habitat on and north of Neighborhood 8A. Neighborhood 8, where CVREP is located, also contains existing houses, ranches, and rural-oriented businesses. These are incorporated within the MHPA boundary as low-density areas conditionally compatible with the MHPA.

The linkages to Torrey Pines State Reserve and Los Peñasquitos Lagoon from the east are tentative at best. In the south, a rip-rap channel winds west from Los Peñasquitos Canyon, underneath freeways, local roads and railroad tracks to gain access to the lagoon and state park. The northern connection to the lagoon is located at the western terminus of CVREP, with six to eight feet of clearance under the I-5 freeway to allow for Carmel Creek to drain into the lagoon. This wildlife connection is constrained as well.

The eastern portion of the northern area includes linkages and open space within the Rancho Peñasquitos, Mira Mesa, Sabre Springs, Scripps Ranch and Miramar Ranch communities, Miramar Lake and the General Dynamics property/Beeler Canyon area. This area includes core habitat in the Miramar-Poway areas as well as linkages that extend from Los Peñasquitos Canyon Preserve east through Sabre Springs into the Miramar Lake area, MCAS Miramar and Sycamore Canyon Regional Park. The proposed MHPA in this area is consistent with the open space of the existing communities and includes a large block of habitat in the easternmost portion. This block of habitat is a mixture of chaparral and coastal sage scrub and is located immediately west of Sycamore Canyon Regional Park and north of MCAS Miramar.

MHPA Guidelines

Carmel Valley

The following specific guidelines for the northern area are shown as locations C1 through C8 on **Figure 5**. The notes under "MHPA Guidelines" include features that have been incorporated into the MHPA and thus were considered in the evaluation for species coverage. The guidelines are required to be implemented for take authorization, except if noted with an asterisk (*). As appropriate, the MHPA guidelines noted with an asterisk should be considered during preserve assembly. The notes are keyed to the extent possible to specific locations on the accompanying figure for the area. The notes include: 1) approved project requirements (e.g., Note C1); 2) guidelines to be incorporated into the design of future projects within or adjacent to the MHPA (e.g., Note D11); 3) clarifications of the MHPA design in a particular area (e.g., Note A8); or 4) locations of existing and future uses within or adjacent to the MHPA (e.g., Note B8).

Responsibility for implementation will be determined at the time of discretionary approvals for individual projects. Except if noted, the MHPA guidelines do not apply to existing approved site-specific project entitlements, unless a modification, revision, or amendment to the entitlement is requested by the property owner.

Unless otherwise noted, culvert dimensions shall be at least 30 feet wide by 15 feet high with a maximum 2:1 length-to-width ratio, where feasible. The floor of the culvert must be natural/soft bottom, with skylights where possible to provide adequate visibility for wildlife.

C1. In Neighborhood 10, a 90-foot span bridge is required where Carmel Mountain Road crosses the western canyon connection to facilitate wildlife crossing. The wildlife corridor must be at least 400 feet wide at its narrowest point. Elsewhere, the corridor maintains a 500-foot width for 500 feet through the canyon. The topography in this area provides additional protection for this corridor.

C2. Two culverts (or a bridge if funding becomes available) are required to facilitate wildlife crossing at this major link to Carmel Valley, Los Peñaquitos Lagoon and north to the San Dieguito River Valley.

C3. An arch pipe style culvert is required to facilitate wildlife crossing. The culvert will be 30 feet wide by 15 feet high and will extend for a length of 100-150 feet. Modifying the existing grade (saddle) is required to allow wildlife crossing below the proposed adjacent road grade.

C4. Ensure continued wildlife movement through this significant corridor.

C5. When funding becomes available, redesign or relocate the existing sedimentation basin to minimize obstruction of wildlife movement. If the basin is relocated it should be revegetated with native plant species.*

C6. When funds become available in the future, enhance the channel and provide noise barriers along I-805 to encourage wildlife movement (Los Peñasquitos Canyon to Torrey Pines link).

C7. Caltrans will provide a bridge over Carmel Creek in association with the widening of I-5. Incorporate an enlarged culvert (or bridge if funding becomes available) to facilitate wildlife movement under Sorrento Valley Boulevard on the west side of I-5 (Carmel Valley to Los Peñasquitos Lagoon link).

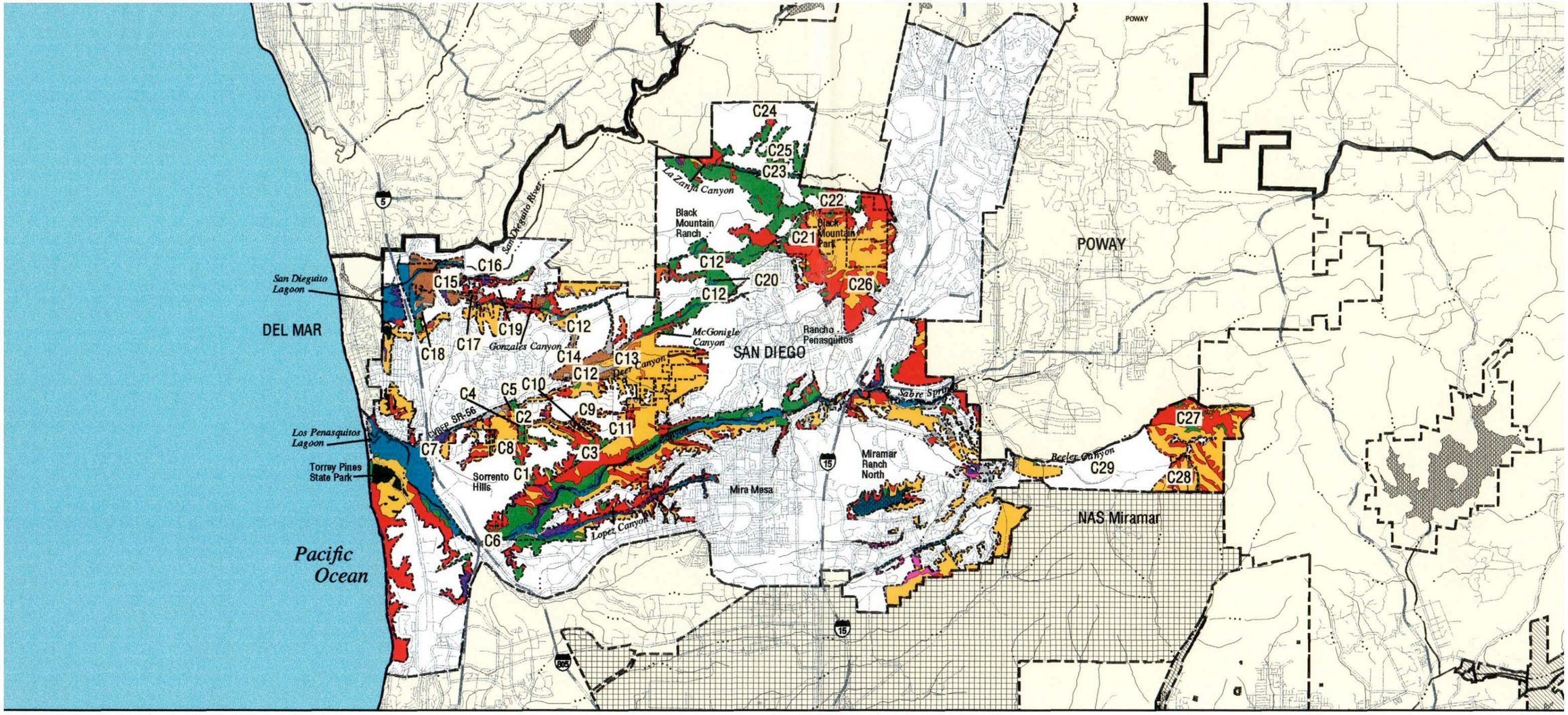
C8. The MHPA boundaries are unresolved and may be modified by City Council action on the Carmel Valley Neighborhood 8A Precise Plan.

Future Urbanizing Area (FUA)

The following specific guidelines for the FUA area are shown as locations C9 through C23 on **Figure 5**:

C9. The MHPA excludes golf course greens and fairways, although these areas may provide for some wildlife movement. The precise layout and configuration of the golf course greens and fairways has been established by the approval of the bougainvillea project by the City of San Diego. Adjustments to the MHPA in this location will require an amendment to the Subarea Plan.

C10. Within this approximately 70-acre area, residential and accessory uses shall be limited to up to 25 percent of the area and clustered on the flatter portions, with no disturbance on slopes or the remainder of the lots. Development in this area may be ten-acre lots. No development except brush management Zone 2 should occur within 100 feet of the MHPA.



Conserved Vegetation Communities in Northern Area

MSCP Subarea Plan **5** FIGURE

C11. For the Shaw Texas property (Area No. 61 on Figure 21 of the Subarea V Specific Plan) and Areas 70, 59 and 44 abutting the MHPA to the east, and extending to the border of the A-1-1 zoned areas to the north, all brush management shall occur within the defined development area for lots contiguous to the MHPA. This requirement also applies to Area Nos. 9, 23, 32 and 33, abutting the A-1-1 zoned areas to the east and the MHPA to the north. Deviations from brush management standards shall be considered consistent with the alternative compliance provision of the Landscape Technical Manual.

C12. Incorporate bridges to facilitate wildlife crossing.

C13. Due to its relatively pristine condition and the sensitivity of habitats within it, Deer Canyon should remain free of utilities, facilities and roads.

C14. Provide fences or barriers along the edges of the shallow north-south trending canyon that connects Carmel Valley to Gonzales Canyon to direct public access to appropriate locations.

C15. When funds become available, place a large culvert or bridge undercrossing for wildlife movement where El Camino Real crosses the outlet of Gonzales Canyon into the San Dieguito River.*

C16. Enhance and restore a riparian corridor/wildlife connection through the golf course at Fairbanks Country Club and from the FUA boundary at El Camino Real to the county line.*

C17. If this area develops or redevelops, the MHPA boundary should be accommodated with the majority of the floodplain to be placed in open space and restored where possible to natural habitats.

C18. A minimum 200-foot-wide wetland buffer is recommended adjacent to the wetlands in this area. The buffer may include detention/ sedimentation basins to reduce impacts associated with water quality and sedimentation.*

C19. In the event that the MHPA configuration is not implemented pursuant to the “Pardee Settlement Agreement,” then the MHPA configuration shall be per the NCFUA Framework Plan. Provide an undercrossing of San Dieguito River Road for wildlife movement from Gonzales Canyon of the San Dieguito River.

C20. If an at-grade crossing is approved for this area, the crossing should remain unlit at night and provide adequate cover (native plantings) on both sides of the road and leading up to the crossing to facilitate wildlife movement.

C21. If purchased by the City's Water Utilities Department for water facility uses, the development areas shown may expand slightly.*

C22. Study the need for a future grade-separated wildlife crossing.*

C23. The La Jolla Valley area (Lusardi Creek) will be enhanced and restored into a fully-functional native riparian corridor and maintained at an average 400-500-foot width along its entire length as part of the Black Mountain Ranch project.

C24. Provide a 400-foot-wide corridor at this location as part of the Black Mountain Ranch project.

C25. Development in this area should provide barriers such as fencing to prevent encroachment into the MHPA. Other adjacency planning guidelines such as plantings, lighting and drainage should also be incorporated into any future development proposal.

Rancho Peñasquitos and Beeler Canyon Area

C26. The Montana Mirador project has a legal right to develop under an existing approved Tentative Map. In the event that the approved map expires, future development proposals would be required to conform to the MHPA boundaries, as depicted by the Subarea Plan and associated land development regulations.

C27. This area will be a permanent open space subject to an agreement between the City and landowners. Existing use areas, including all existing cleared areas and all existing firebreaks, are excluded from the MHPA and will remain subject to existing zoning designations. The landowners will dedicate a conservation easement to the City of San Diego or other acceptable entity. The limits of the dedication, subject to the foregoing exclusions, will follow the MHPA boundaries north to the existing access road and will follow the existing ridgetop firebreak immediately south of Site "J," south of the existing access road. Existing firebreaks may continue to be cleared by mechanical means in accordance with existing practice. New firebreaks shall not be created within the MHPA.

C28. Parcels containing areas of the MHPA outside of the conservation easement will be subject to potential rezones as OR-1-2 Zone. Seventy-five percent of this area will be preserved as permanent open space while the remaining 25 percent may be developed subject to all applicable sections of the Land Development Code. Any potential development associated with the areas of the MHPA outside of the conservation easement will be required to avoid all impacts to willowy monardella (Monardella lioides ssp. viminea) and must assure continued wildlife movement through West Sycamore Canyon.

C29. This area is not included within the MHPA and will not be subject to rezoning as OR-1-2. Development may occur as permitted in accordance with applicable zoning regulations or potential rezoning.

1.2.5 Cornerstone Lands and San Pasqual Valley

The following Cornerstone Lands and San Pasqual Valley will be protected as habitat lands, as described in this section, as part of the City's MHPA (see **Table 1**):

- Watershed management lands around Hodges Reservoir include that portion of San Pasqual Valley from Hodges Reservoir east to the area referred to as the "narrows;"
- Lands surrounding portions of Upper and Lower Otay Lakes;
- Lands surrounding San Vicente Reservoir;
- Lands owned by the City of San Diego in Marron Valley; and
- Portions of San Pasqual Valley from the "narrows" east to Boden Canyon; this area of San Pasqual Valley is not part of the Cornerstone Lands.

The majority of these areas were ranked very high biological value on the Habitat Evaluation Map, and each has been identified as a core biological resource area.

Cornerstone Lands

The City Water Department owns four large contiguous areas of land in the study area containing valuable biological resources (Figure 6). These lands total 10,400 acres and are commonly referred to as the Cornerstone Lands because they are considered essential building blocks for creating a viable habitat preserve system. The Cornerstone Lands have been largely maintained by the Water Department in an undisturbed natural condition to serve as watershed for Lake Hodges, San Vicente and Otay Reservoir. A 2,600-acre area of the Cornerstone Lands in the southeastern portion of the study area, known as Marron Valley, was purchased by the Water Department many years ago as a potential dam site. However, today Marron Valley is not considered suitable for that purpose and some of this surplus land is currently leased by the City of San Diego for cattle grazing.

The San Diego City Charter restricts the use and disposition of water utility assets. The Water Department must be compensated for any title restrictions placed on the Cornerstone Lands and for any financial burdens which do not directly benefit the City's water utility rate payers. Therefore, to meet the policy objectives of the MSCP and comply with the City Charter, the City of San Diego intends to enter into a Conservation Land Bank Agreement with the wildlife agencies for the Cornerstone Lands.

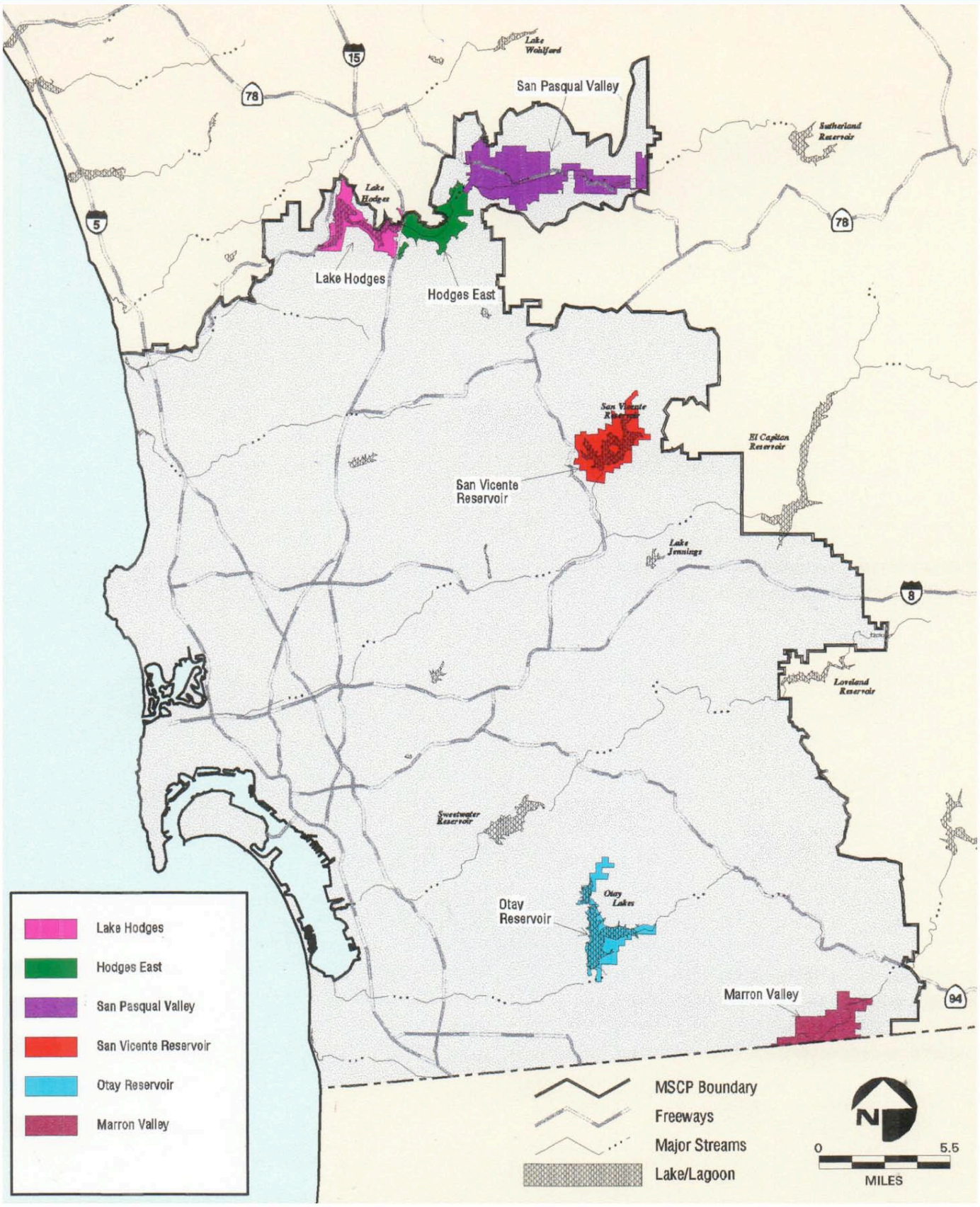
As part of this agreement, the City will commit to phasing in conservation easements over all 10,400 acres of the Cornerstone Lands. The conservation easements will allow the Water Department to continue to use the Cornerstone Lands as watershed and for water utilities facilities for the benefit of water utility rate payers, but will restrict those lands from being used for other purposes inconsistent with habitat preservation. In turn, the wildlife agencies will permit the Water Department to establish a mitigation bank to sell 3,900 mitigation credits at fair market value to public entities, public utility/service providers and private property owners doing projects in San Diego County and needing mitigation. For consumers purchasing the credits, each mitigation credit will be treated by the wildlife agencies as the functional equivalent of purchasing one acre of high quality offsite mitigation land. The easements will be phased in over time by the City in correlation with threshold sales of mitigation credits.

Hodges Reservoir/San Pasqual Valley

The Hodges Reservoir/San Pasqual Valley core area represents one of the largest continuous blocks of habitat in the MSCP study area and serves as a major east-west corridor. This area includes core gnatcatcher and cactus wren populations, one of the two "centers of distribution" for Encinitas baccharis in the MSCP study area, large expanses of grassland that provide valuable raptor foraging habitat and valuable wetland habitat in San Pasqual Valley which supports several MSCP target species dependent on riparian habitats. The western portion of the valley, east of I-15 and above the drawdown area of the lake, is currently an intensively farmed agricultural preserve which has been cultivated since before this century.

The most important areas for conservation are those natural areas around Hodges Reservoir, the riparian habitat along the San Dieguito River and its tributaries through San Pasqual Valley, and the naturally vegetated slopes above the river valley. The majority of the riparian habitats in the river valley provide excellent opportunities for restoration and enhancement of the wildlife corridor through the valley. Conserved lands in the Hodges Reservoir/San Pasqual Valley area will be the cornerstone for a natural east/west open space corridor within the San Dieguito River Valley and San Pasqual Valley. Vegetation communities in these areas are depicted in **Figure 7**.

Conservation and management of Cornerstone Lands around Hodges Reservoir and native habitats in San Pasqual Valley will be guided by the 1995 City of San Diego San Pasqual Valley Plan. Many of the goals, policies, and specific proposals of the San Pasqual Valley Plan address sensitive resources and open space and are compatible with the MSCP conservation goals.



City of San Diego Cornerstone Lands and San Pasqual Valley
MSCP Subarea Plan

6 FIGURE

The San Pasqual Valley Plan designates a riparian corridor along the San Dieguito River and its tributaries and the remaining coastal sage scrub, oak woodland and chaparral as open space. Only land designated for agriculture in the land use plan is recommended to be leased for agricultural purposes in the future. However, agricultural uses, consistent with the San Pasqual Valley Plan, shall not be precluded by the implementation of the MSCP.

The San Pasqual Valley Plan recommends restoration of some agricultural and dairy farm lands to riparian vegetation. The plan also recommends maintenance of the riparian vegetation and wildlife corridor, and maintenance of a 40-foot wide flood control pilot channel bottom to maintain flood carrying capacity. The plan recommends that the City study environmentally and economically sound approaches to providing minimum necessary flood control to support agriculture within the San Pasqual Valley. The vegetation around Hodges Reservoir is recommended to be retained as well. A 24-foot-wide multi-use trail corridor (right-of-way), forming the San Pasqual Valley segment of the "Coast to Crest Trail," shall be aligned to minimize impacts to sensitive resource areas and to agriculture. The San Pasqual Valley Plan also states that any future sand mining activities are to be located outside of the riparian corridor on land designated for agriculture. Periodic sand removal in the riparian open space corridor beyond maintenance of the 40-foot-wide pilot channel can be considered only if determined to be beneficial to the riparian corridor as part of the implementation of an approved restoration plan.

MHPA Exclusions and Guidelines

The following areas are excluded from the MHPA in order to provide for current and future requirements of the City of San Diego Water Department (the property owner) and the County Water Authority (CWA). These requirements relate to either the City's known Capital Improvement Program projects, the City's proposed reservoir management program, or the CWA's Emergency Storage Project. The notes under "MHPA Guidelines" include features that have been incorporated into the MHPA and thus were considered in the evaluation for species coverage. The guidelines are required to be implemented for take authorization, except if noted with an asterisk (*). As appropriate, the MHPA guidelines noted with an asterisk should be considered during preserve assembly. The notes are keyed to the extent possible to specific locations on the accompanying figure for the area. The notes include: 1) approved project requirements (e.g., Note #C1); 2) guidelines to be incorporated into the design of future projects within or adjacent to the MHPA (e.g., Note #D11); 3) clarifications of the MHPA design in a particular area (e.g., Note #A8); or 4) locations of existing and future uses within or adjacent to the MHPA (e.g., Note #B8). Responsibility for implementation will be determined at the time of discretionary approvals for individual projects. Except if noted, the MHPA guidelines do not apply to existing approved site-specific project entitlements, unless a modification,

revision, or amendment to the entitlement is requested by the property owner. The following notes are MHPA Guidelines rather than exclusions: Note #13 under Hodges Reservoir/Hodges East and Note #'s 3-6 under San Pasqual Valley.

Hodges Reservoir/Hodges East

1. The areas not designated as open space in the San Pasqual Valley Plan;

2. Where owned by the City of San Diego, the area of the existing Hodges Reservoir and dam, including the shoreline area within 300 feet horizontally from the high water level for water elevation of spillway (315 feet msl), for water quality protection;

3. Existing employee residences (D1 on **Figure 7**);

4. Existing boating and recreation facilities (located within active park use areas, D2 on **Figure 7**);

5. Area for the proposed pump station and pipeline to the CWA's Second Aqueduct (approximately 5 acres, site not yet identified). This City project would not be pursued if the alternative CWA project, as identified in item #16 below, is implemented;

6. Area for the proposed I-15 bridge widening (approximately 6 acres, D3 on **Figure 7**);

7. Area for the existing pump station #77 and related pipelines and facilities (D4 on **Figure 7**);

8. Area for the existing CWA aqueduct crossing;

9. Approximately 70 acres for urban runoff diversion and water quality protection along Green Valley, Del Dios, Felicita, and Kit Carson creeks (approximate general location on the north side of the lake at six major drainages, D5 on **Figure 7**);

10. Area for the proposed North City Water Treatment Plant (approximately 40 acres to be located somewhere on the south side of the lake, D6 on **Figure 7**);

11. Approximately 35 acres for urban runoff diversion and water quality protection in areas where existing Rancho Bernardo developments encroach near Hodges Reservoir (approximate general location on the south side of the lake at four major drainages, D7 on **Figure 7**);

12. Existing and proposed expansion for the Aquaculture III facilities (approximately six acres, D8 on **Figure 7**);

13. Interim agricultural use on City lands in this area. The goal is eventual long-term restoration to native upland habitat (D9 on **Figure 7**);

14. Area for the proposed pumped storage project to the Olivenhain (formerly Mount Israel) Reservoir (approximately eight acres);

15. All existing and proposed access and service roads;

16. All proposed pump stations associated with the CWA Emergency Storage Project including, but not limited to, the North City Pump Station (PS2), the Hodges Re-operation Pump Station (PS6), and the Hodges to Olivenhain Reservoir Pump Station (PS9) (approximately five acres each site); and

17. All permanent impact areas related to the CWA's proposed staging areas, tunnel portals, permanent access roads, and interconnection facilities associated with pipeline and pump station construction (approximately 13 acres).

San Pasqual Valley

1. Areas not designated as open space in the San Pasqual Valley Plan;

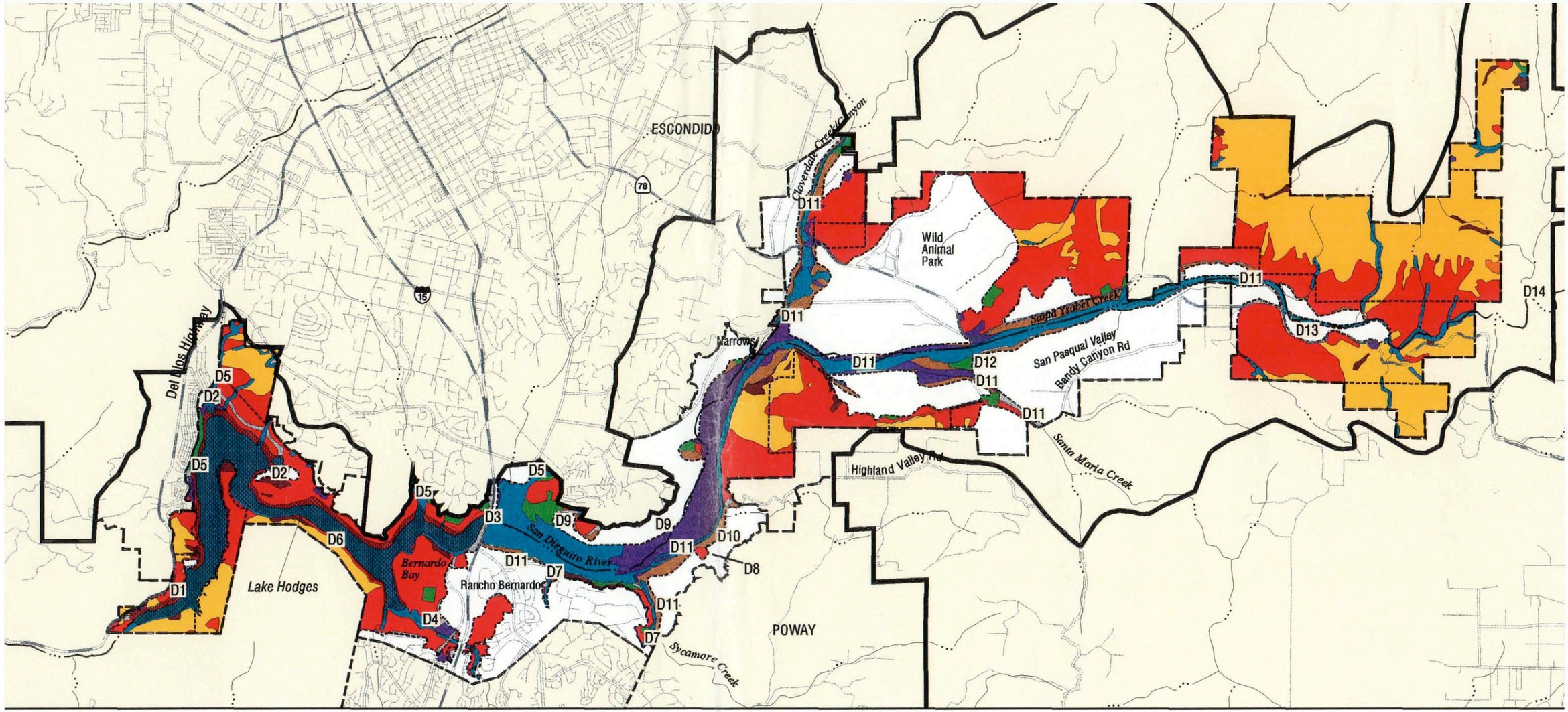
2. Existing and proposed water wells and pipelines and future recharge basin (approximately 30 acres near the existing aquaculture plant, D10 on **Figure 7**);

3. Existing leases. As leases come up for renewal, modify existing leases to incorporate the riparian corridor as depicted on the MHPA boundaries (D11 on **Figure 7**) and in the Open Space Element of the San Pasqual Valley Plan. Minimum corridor width should be 300-500 feet. If the land use is changed (i.e., requires a community plan amendment), adjacency guidelines will be incorporated into the project design;

4. Location of future sand mining operations to be outside the riparian corridor and limited to land designated for agriculture (approximately 26 acres, D12 on **Figure 7**). Periodic sand removal in the riparian corridor beyond maintenance of the 40-foot pilot channel can be considered only if determined to be beneficial to the riparian corridor as part of an approved restoration plan;

5. Existing orchards. Any change in agriculture use (i.e., from orchard to any other use) shall trigger an evaluation of widening the existing wildlife corridor, which generally follows Santa Ysabel Creek, to improve its functioning as a regional corridor (D13 on **Figure 7**).

6. A minimum 1,000-foot-wide corridor will be maintained along Santa Ysabel Creek through the Water Department owned property east to the Cleveland National Forest (D14 on **Figure 7**).



Vegetation Communities

- Coastal Sage Scrub
- Chaparral
- Coastal Sage Scrub/ Chaparral
- Grassland
- Riparian/Wetlands
- Oak Woodland
- Coniferous Forest
- Beach/Foredunes
- Eucalyptus Woodland
- Disturbed Habitat
- Shallow Bay
- Developed
- Agriculture

Letter/number indicates MHPA Guideline. See text.

- Subarea Boundary
- MHPA Boundary
- Water District Subarea
- Military Lands

Base Map Features

- MSCP Boundary
- U.S. - Mexico Border
- Freeway
- Major Road
- Minor Road
- Major Stream
- Minor Stream
- Lake/Lagoon

N

0 5000 FEET

Conserved Vegetation Communities in Hodges Cornerstone Lands and San Pasqual Valley

MSCP Subarea Plan **7** FIGURE

Otay Lakes

The Water Department-owned lands around the Otay Lakes are known for high quality coastal sage scrub, supporting over 40 pairs of gnatcatchers. A significant riparian forest occurs where Dulzura Creek empties into Lower Otay Lake, and raptors are abundant in the large expanses of grassland and sage scrub around the lakes.

The land around Upper Otay Lake is leased for grazing, and the CDFG has a fish-stocking agreement with the City. The City leases the area east of Lower Otay Lake for an aircraft landing strip and allows public fishing access on Lower Otay Lake. The Olympic Training Center is planned for the west side of Lower Otay Lake. The areas south of the lakes are naturally vegetated lands used for watershed management. Conservation of City of San Diego lands around Otay Lakes will form the Cornerstone Lands for a natural open space corridor in the South Bay area. Vegetation communities around Otay Lakes are depicted in **Figure 8**.

MHPA Exclusions

The following areas are excluded from the MHPA in order to provide for current and future requirements of the City of San Diego Water Utilities Department (the property owner):

1. Existing Otay Water Treatment Plant (WTP) and proposed expansion (approximately five acres);

2. A 50-foot right-of-way (approximately 23 acres) for pipelines within the eastern edge of the Otay Lakes Cornerstone Lands as depicted on **Figure 8**; right-of-way to be aligned approximately along the south and east side of Lower Otay Lake;

3. Existing Lower Otay boat launching facilities and associated recreation facilities;

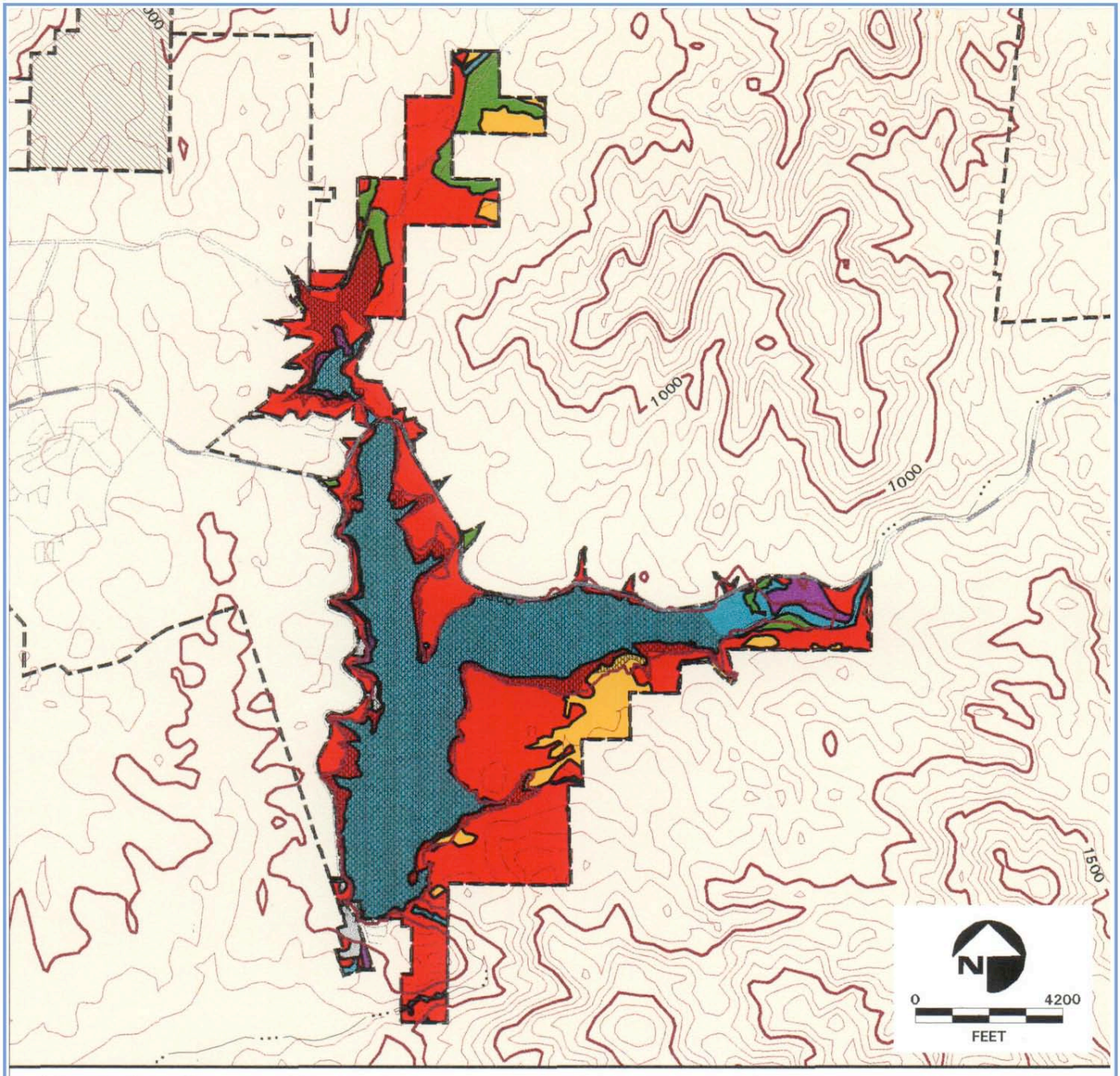
4. Where owned by the City of San Diego, the area of Lower Otay Lake and dam, including the shoreline area within 300 feet horizontally from the high water level, water elevation of spillway with gates closed at 490.7 feet, for water quality protection;

5. Area of Upper Otay Lake and dam (i.e., the area enclosed by the 550-foot contour) and the shoreline area within 300 feet horizontally from the 550-foot contour;

6. Existing County Park leased from the City;

7. Existing and proposed Olympic Training Center boat facilities;

8. All existing access and service roads and existing lake recreation facilities.



Vegetation Communities

- Coastal Sage Scrub
- Chaparral
- Coastal Sage Scrub/ Chaparral
- Grassland
- Riparian/Wetlands
- Oak Woodland
- Coniferous Forest
- Beach/Foredunes
- Eucalyptus Woodland
- Disturbed Habitat
- Shallow Bay
- Developed
- Agriculture

- Subarea Boundary
- MHPA Boundary
- Water District Subarea
- Military Lands

Base Map Features

- MSCP Boundary
- U.S. - Mexico Border
- Freeway
- Major Road
- Minor Road
- Major Stream
- Lake/Lagoon

Otay Lakes Cornerstone Lands with Vegetation Communities Identified

MSCP Subarea Plan

8 FIGURE

San Vicente Reservoir

The area around San Vicente Reservoir provides important north-south and east-west connections and supports a rich assemblage of sensitive plant and wildlife species. Important habitats in this area include coastal sage scrub, oak woodland, and oak and riparian forest. The reservoir is used as a year-round water source by wildlife and as a wintering habitat for waterfowl and bald eagles. The lake is used for water recreation on a part-time basis. San Vicente Reservoir has been identified by the CWA as a possible location for increased storage of emergency water supplies. Three of the four primary storage alternatives currently being examined include modifications to San Vicente Reservoir. Alternatives range from changing the way the reservoir is operated to raising the water level by approximately 50-80 ft. Cornerstone Lands would apply only to lands above this future level of expansion. Conservation of these lands around the reservoir will form the cornerstone for an east-west natural open space corridor that eventually will include key lands between San Vicente Reservoir and NAS Miramar and the U.S. Forest Service. Vegetation communities around San Vicente Reservoir are depicted in **Figure 9**.

MHPA Exclusions

The following areas are excluded from the MHPA in order to provide for current and future requirements of the City of San Diego Water Department (the property owner) and the CWA. These requirements relate to either the City's known Capital Improvement Program **Figure 9** projects, the City's proposed reservoir management program, or the CWA's Emergency Storage Project:

1. Area of the existing San Vicente Reservoir and dam, within 300 feet horizontally from the ultimate high water level;

2. All permanent impact areas related to the CWA's proposed staging areas, tunnel portals, permanent access roads, relocated roads, and interconnection facilities associated with reservoir expansion and pipeline and pump station construction (approximately 88 acres);

3. Right-of-way of the existing CWA bypass pipeline;

4. Area for the proposed pump station (approximately 5 acres) at the bottom of the dam;

5. Area for the proposed pump station and pipeline to Miramar Lake (approximately 11 acres);

6. Area for the proposed Boulder Valley Pumped Storage project (approximately 162 acres);

7. Right-of-way for a pipeline from the terminus of the existing Sutherland/San Vicente pipeline to San Vicente Reservoir, aligned along San Vicente Creek (approximately eight acres);

8. Area below the dam for the proposed sand and rock mining operation for aggregate materials for the dam expansion (approximately 33 acres, 5,000 feet wide by 2,800 feet long);

9. Right-of-way for the proposed reclaimed water pipeline from the North City Wastewater Treatment Plant into the reservoir (approximately three acres);

10. Existing employee residences;

11. Area sufficient for new boat launch and recreation facilities (ten acres) and access road from Highway 67 above the high water line of the proposed expanded reservoir (i.e., above elevation 800 feet);

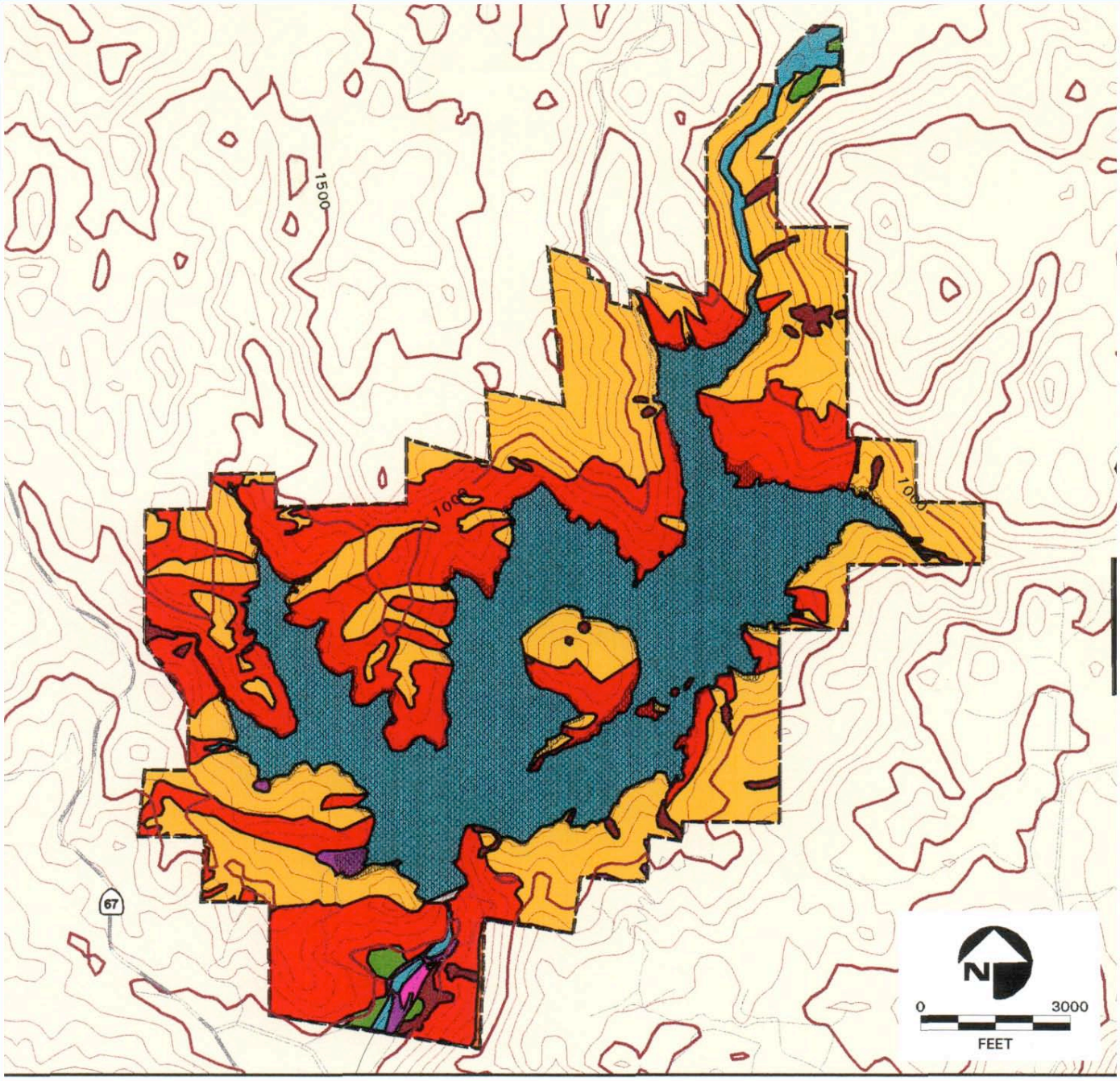
12. All existing access and service roads, lake recreation facilities, and similar or proposed facilities associated with the CWA's Emergency Storage Project.

Marron Valley

Marron Valley occupies approximately 2,600 acres in the southeastern portion of the MSCP study area and supports the greatest concentration of target species and other sensitive species in the study area. The large drainages through this area (e.g., the Tijuana River, Bee Canyon, and Cottonwood Creek) support significant stands of riparian habitat and function as major wildlife corridors. These riparian areas offer excellent opportunities for restoration and enhancement. Much of the area is currently leased for cattle grazing. Portions of the lands are overgrazed, but likely could be restored with removal of grazing or decreased intensity and rotation of grazing. Management of this area for biological resources will pose special problems because of its remoteness and proximity to the Mexican border. Conservation of Marron Valley will provide wildlife habitat, offer opportunities for the creation and enhancement of various habitat types (i.e., riparian, coastal sage scrub), and extend the sphere of protected lands surrounding the San Ysidro Mountains. Vegetation communities in Marron Valley are depicted in **Figure 10**.

MHPA Exclusions

No exclusions required.



Vegetation Communities

- Coastal Sage Scrub
- Chaparral
- Coastal Sage Scrub/ Chaparral
- Grassland
- Riparian/Wetlands
- Oak Woodland
- Coniferous Forest
- Beach/Foredunes
- Eucalyptus Woodland
- Disturbed Habitat
- Shallow Bay
- Developed
- Agriculture

- Subarea Boundary
- MHPA Boundary
- Water District Subarea
- Military Lands

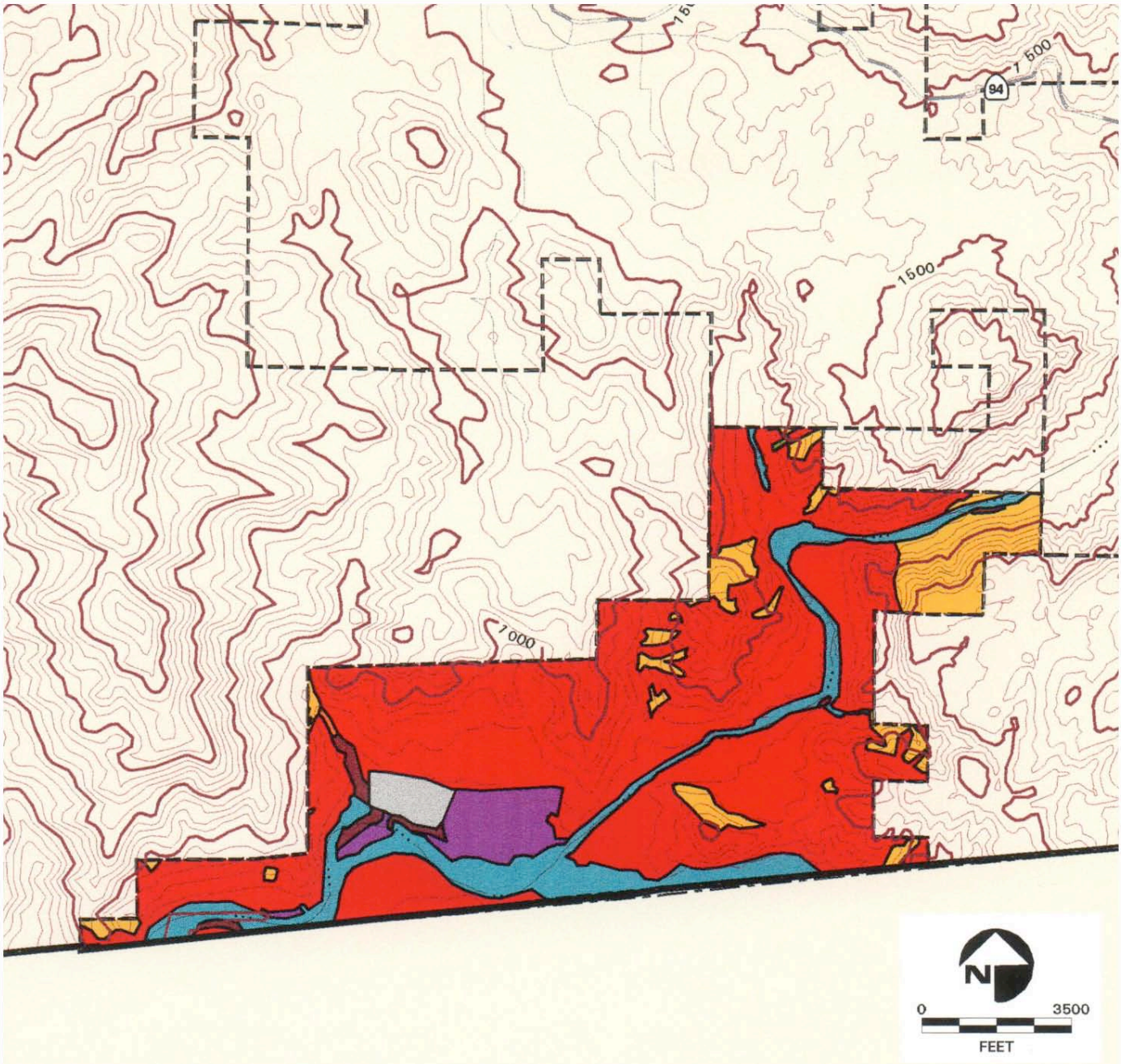
Base Map Features

- MSCP Boundary
- U.S. - Mexico Border
- Freeway
- Major Road
- Minor Road
- Major Stream
- Lake/Lagoon

San Vincente Cornerstone Lands with Vegetation Communities Identified

MSCP Subarea Plan

9 FIGURE



Vegetation Communities

- Coastal Sage Scrub
- Chaparral
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- Grassland
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- Shallow Bay
- Developed
- Agriculture

- Subarea Boundary
- MHPA Boundary
- Water District
- Subarea
- Military Lands

Base Map Features

- MSCP Boundary
- U.S. - Mexico Border
- Freeway
- Major Road
- Minor Road
- Major Stream
- Lake/Lagoon

Marron Valley Cornerstone Lands with Vegetation Communities Identified

MSCP Subarea Plan

10 FIGURE

1.3 COVERED SPECIES LIST

Flora and Fauna Covered by the Multiple Species Conservation Program

Flora:

Acanthomintha ilicifolia	San Diego thornmint	PE/SE/1B/232
Agave shawii	Shaw's agave	--/--/2/333
Ambrosia pumila	San Diego ambrosia	--/--/1B/322
Aphanisma blitoides	Aphanisma	--/S2/3/222
Arctostaplylos glandulosa var. crassifolia	Del Mar manzanita	FE/--/1B/332
Arctostaphylos otayensis	Otay Manzanita	--/--/1B/323
Astragalus tener var. titi	Coastal dunes milk vetch	F1/SE/1B/333
Baccharis vanessae	Encinitas Coyote brush	F1/SE/1B/233
Brodiaea filifolia	Thread-leafed brodiaea	PT/SE/1B/333
Brodisea occuttii	Orcutt's brodiaea	--/--/1B/132
Calamagrostis (Satureja) densa	Dense reed grass	--/--/4/122
Calochortus dunnii	Dunn's mariposa lily	--/SR/1B/222
Caulanthus stenocarpus	Slender-pod jewelflower	--/SR/--/--
Ceanothus cyaneus	Lakeside ceantothus	--/--/1B/322
Ceanothus verrucosus	Wart-stemmed ceanothus	--/--/1B/121
Cordylanthus maritimus ssp. maritimus	Salt marsh bird's-beak	FE/SE/1B/222
Cordylanthus orcuttianus	Orcutt's bird's-beak	--/--/2/331
Corethrogyne filaginifolia var. linifolia	Del Mar sand aster	--/--/1B/323
Cupressus forbesii	Tecate cypress	--/--/1B/322
Dudleya blochmaniae ssp brevifolia	Short-leaved dudleya	--/SE/1B/333
Dudleya variegata	Variegated dudleya	--/--/4/122
Dudleya viscida	Sticky dudleya	F1--/1B/323
Ericameria palmeri ssp. palmeri	Palmer's ericameria	--/--/2/221
Erysimum ammophilum	Coast wallflower	--/--/4/123
Eryngium aristulatum spp. parishii	San Diego button-celery	FE/SE/1B/232
Ferocactus viridescens	San Diego barrel cactus	--/--/2/131
Hemizonia conjugens	Otay tarplant	PE/SE/1B/332
Lepechinia cardiophylla	Heart-leaved pitcher sage	--/--/1B/322
Lepechinia ganderi	Gander's pitcher sage	--/--/1B/312
Lotus nuttallianus	Nuttall's lotus	--/--/1B/332
Mahonia (Berberis) nevinii	Nevin's barberry	F1/SE/1B333
Monardella hypoleuca ssp. lanata	Felt-leaved monardella	--/--/1B/223
Monardella linoides ssp. viminera	Willowy monardella	PE/SE/1B/232
Muilla clevelandii	San Diego goldenstar	--/--/1B/222
Navarretia fossalia	Prostrate navarretia	--/--/1B/232
Nolina interrata	Denesa bear-grass	F1/SE/1B/332
Opuntia parryi var. serpentina	Snake cholla	--/--/1B/332
Orcuttia californica	California Orcutt grass	FE/SE/1B/332
Pogogyne abramsii	San Diego mesa mint	FE/SE/1B/233
Pogogyne nudiuscula	Otay Mesa mint	F1/SE/1B/332
Pinus torreyana ssp. torreyana	Torrey pine (native populations)	--/--/1B/323
Rosa minutifolia	Small leaved rose	--/SE/2/331
Satureja chandleri	San Miguel savory	--/--/4/122
Senecio ganderi	Gander's butterweed	--/SR/1B/323
Solanum tenuilobatum	Narrow-leaved nightshade	--/--/--/--
Tetracoccus dioicus	Parry's tetracoccus	--/--/1B/322

Fauna:

Panoquina errans	Saltmarsh skipper	--/--
Mitoura thornei	Thorne's hairstreak	--/S2
Branchinecta sandiegoensis	San Diego fairy shrimp	FE/--
Streptocephalus woottonii	Riverside fairy shrimp	FE/--
Bufo microscaphus ssp. californicus	Arroyo southwestern toad	FE/SSC
Rana aurora ssp. draytoni	California red-legged frog	FT/SSC
Clemmys marmorata ssp. pallida	Southwestern pond turtle	--/SSC
Chemidophorus hyperythrus ssp. beldingi	Orange-throated whiptail	--/SSC
Phyrnosoma coronatum ssp. blainvillei	San Diego horned lizard	--/SSC
Accipiter cooperii	Cooper's hawk	--/SSC
Agelaius tricolor	Tricolores blackbird	--/SSC
Aguila chrysaetos	Goleen Tagle	--/SSC
Aimophila ruficeps ssp. cancescens	Southern California rofous crowned sparrow	--/SSC
Branta canadensis ssp. moffitti	Canada goose	--/--
Buteo swainsoni	Swainson's hawk	--/ST
Buteo regalis	Ferruginous hawk	--/SSC
Campylorhynchus brunneicapillus ssp. couesi	Coastal cactus wren	PE/SSC
Charadrius alexandrinus ssp. nivosus	Western snowy plover	FT/SSC
Charadrius montanus	Mountain plover	--/SSC
Circus cyaneus	Northern harrier	--/SSC
Egretta rufescens	Redish egret	--/--
Empidonax traillii ssp. extimus	SW. willow flycatcher	FE/SE
Falco peregrinus anatum	American peregrine falcon	--/ST
Haliaeetus leucocephalus	Bald eagle	FE/SE
Numenius americanus	Long-billed curlew	--/SSC
Passerculus sandwichensis ssp. beldingi	Belding's savannah sparrow	--/SE
Passerculus sandwichensis ssp. rostratus	Large-billed savannah sparoow	--/SSC
Pelcanus occidentalis ssp. californicus	California brown pelican	FE/SE
Plegadis chihi	White-faced ibis	--/SSC
Polioptila californica ssp. californica	California gnatcatcher	FT/SSC
Rallus longirostris ssp. levipes	Light-footed clapper rail	FE/SE
Sialia mexicana	Westerm bluebird	--/--
Speotyto (Athene) cunicularia ssp. hypugaea	Burrowing owl	--/SSC
Sterna elegans	Elegant tern	--/SSC
Sterna antillarum ssp. browni	California least tern	FE/SE
Vireo bellii ssp. pusillus	Least Bell's vereo	FE/SE
Taxidea taxus	American badger	--/SSC
Felis concolor	Mountain lion	--/--
Odocoileus hemionus fuliginata	Southern mule deer	--/--

F- Federal Listing
S – State of California Listing
CNPS – California Native Plant Society's (CNPS) List
RED – CNPS's Rarity, Endangerment and Distribution Code

The majority of the covered species are considered adequately conserved provided that the conditions described in "Species Evaluated For Coverage Under the MSCP" (Appendix A) are implemented. Refer to **Appendix A** for a full description of the conditions for coverage. Implementation of the conditions have been assured by incorporation of policies and/or guidelines into the appropriate section(s) of this Subarea Plan, associated land development regulations and/or biology guidelines.

1.4 LAND USE CONSIDERATIONS

1.4.1 Compatible Land Uses

The following land uses are considered conditionally compatible with the biological objectives of the MSCP and thus will be allowed within the City's MHPA:

- Passive recreation
- Utility lines and roads in compliance with policies in **1.4.2** below
- Limited water facilities and other essential public facilities
- Limited low density residential uses
- Brush Management (Zone 2)
- Limited agriculture

Under the proposed revised environmental land use regulations described in **Section 1.6**, development on private property in the MHPA will not exceed 25 percent of the parcel, with 75 percent remaining as open space. When combined with the 100 percent preservation in negotiated areas on private lands, the approximately 94 percent preservation on publicly owned lands in the MHPA, and strategic acquisitions, the overall 90 percent preservation goal within the City's MHPA can be met.

Some disturbed lands within the MHPA may be targeted for enhancement and restoration in order to more fully contribute to the functioning of the MHPA. Existing development within the MHPA such as single-family residences on A-1-10 lots are considered conditionally compatible. Expansion of existing permitted uses within the MHPA would need to be in compliance with applicable land use regulations and should provide measures to minimize impacts on the MHPA including lighting, noise, or uncontrolled access. Expansion of uses should be generally restricted to the existing approved development areas. Other existing uses within the MHPA which are not listed above may be managed for compatibility as noted above in **Section 1.2** or phased out in the long term.

1.4.2 General Planning Policies and Design Guidelines

The following general planning policies and design guidelines should be applied in the review and approval of development projects within or adjacent to the MHPA. More specific policies and guidelines which are unique to individual MHPA areas are identified under **Sections 1.2.2 - 1.2.5**, and management policies and directives are in **Section 1.5**.

Roads and Utilities - Construction and Maintenance Policies:

1. All proposed utility lines (e.g., sewer, water, etc.) should be designed to avoid or minimize intrusion into the MHPA. These facilities should be routed through developed or developing areas rather than the MHPA, where possible. If no other routing is feasible, then the lines should follow previously existing roads, easements, rights-of-way and disturbed areas, minimizing habitat fragmentation.

2. All new development for utilities and facilities within or crossing the MHPA shall be planned, designed, located and constructed to minimize environmental impacts. All such activities must avoid disturbing the habitat of MSCP covered species, and wetlands. If avoidance is infeasible, mitigation will be required.

3. Temporary construction areas and roads, staging areas, or permanent access roads must not disturb existing habitat unless determined to be unavoidable. All such activities must occur on existing agricultural lands or in other disturbed areas rather than in habitat. If temporary habitat disturbance is unavoidable, then restoration of, and/or mitigation for, the disturbed area after project completion will be required.

4. Construction and maintenance activities in wildlife corridors must avoid significant disruption of corridor usage. Environmental documents and mitigation monitoring and reporting programs covering such development must clearly specify how this will be achieved, and construction plans must contain all the pertinent information and be readily available to crews in the field. Training of construction crews and field workers must be conducted to ensure that all conditions are met. A responsible party must be specified.

5. Roads in the MHPA will be limited to those identified in Community Plan Circulation Elements, collector streets essential for area circulation, and necessary maintenance/emergency access roads. Local streets should not cross the MHPA except where needed to access isolated development areas.

6. Development of roads in canyon bottoms should be avoided whenever feasible. If an alternative location outside the MHPA is not feasible, then the road must be designed to cross the shortest length possible of the MHPA in order to minimize impacts and fragmentation of sensitive species and habitat. If roads cross the MHPA, they should provide for fully-functional wildlife movement capability. Bridges are the preferred method of providing for movement, although culverts in selected locations may be acceptable. Fencing, grading and plant cover should be provided where needed to protect and shield animals, and guide them away from roads to appropriate crossings.

7. Where possible, roads within the MHPA should be narrowed from existing design standards to minimize habitat fragmentation and disruption of wildlife movement and breeding areas. Roads must be located in lower quality habitat or disturbed areas to the extent possible.

8. For the most part, existing roads and utility lines are considered a compatible use within the MHPA and therefore will be maintained. Exceptions may occur where underutilized or duplicative road systems are determined not to be necessary as identified in the Framework Management **Section 1.5**.

Fencing, Lighting, and Signage

1. Fencing or other barriers will be used where it is determined to be the best method to achieve conservation goals and adjacent to land uses incompatible with the MHPA. For example, use chain link or cattle wire to direct wildlife to appropriate corridor crossings, natural rocks/boulders or split rail fencing to direct public access to appropriate locations, and chain link to provide added protection of certain sensitive species or habitats (e.g., vernal pools).

2. Lighting shall be designed to avoid intrusion into the MHPA and effects on wildlife. Lighting in areas of wildlife crossings should be of low-sodium or similar lighting. Signage will be limited to access and litter control and educational purposes.

Materials Storage

Prohibit storage of materials (e.g., hazardous or toxic, chemicals, equipment, etc.) within the MHPA and ensure appropriate storage per applicable regulations in any areas that may impact the MHPA, especially due to potential leakage.

Mining, Extraction, and Processing Facilities

1. Mining operations include mineral extraction, processing and other related mining activities (e.g., asphaltic processing). Currently permitted mining operations that have approved restoration plans may continue operating in the MHPA. New or expanded mining operations on lands conserved as part of the MHPA are incompatible with MSCP preserve goals for covered species and their habitats unless otherwise agreed to by the wildlife agencies at the time the parcel is conserved. New operations are permitted in the MHPA if: 1) impacts have been assessed and conditions incorporated to mitigate biological impacts and restore mined areas; 2) adverse impacts to covered species in the MHPA have been mitigated consistent with the Subarea Plan; and 3) requirements of other City land

use policies and regulations (e.g., Adjacency Guidelines, Conditional Use Permit) have been satisfied. Existing and any newly permitted operations adjacent to or within the MHPA shall meet noise, air quality and water quality regulation requirements, as identified in the conditions of any existing or new permit, in order to adequately protect adjacent preserved areas and covered species. Such facilities shall also be appropriately restored upon cessation of mining activities.

2. All mining and other related activities must be consistent with the objectives, guidelines, and recommendations in the MSCP plan, the City of San Diego's Environmentally Sensitive Lands Ordinance, all relevant long-range plans, as well as with the State Surface Mining and Reclamation Act (SMARA) of 1975.

3. Any sand removal activities should be monitored for noise impacts to surrounding sensitive habitats, and all new sediment removal or mining operations proposed in proximity to the MHPA, or changes in existing operations, must include noise reduction methods that take into consideration the breeding and nesting seasons of sensitive bird species.

4. All existing and future mined lands adjacent to or within the MHPA shall be reclaimed pursuant to SMARA. Ponds are considered compatible uses where they provide native wildlife and wetland habitats and do not conflict with conservation goals of the MSCP and Subarea Plan.

5. Any permitted mining activity including reclamation of sand must consider changes and impacts to water quality, water table level, fluvial hydrology, flooding, and wetlands and habitats upstream and downstream, and provide adequate mitigation.

Flood Control

1. Flood control should generally be limited to existing agreements with resource agencies unless demonstrated to be needed based on a cost benefit analysis and pursuant to a restoration plan. Floodplains within the MHPA, and upstream from the MHPA if feasible, should remain in a natural condition and configuration in order to allow for the ecological, geological, hydrological, and other natural processes to remain or be restored.

2. No berming, channelization, or man-made constraints or barriers to creek, tributary, or river flows should be allowed in any floodplain within the MHPA unless reviewed by all appropriate agencies, and adequately mitigated. Review must include impacts to upstream and downstream habitats, flood flow volumes, velocities and configurations, water availability, and changes to the water table level.

3. No riprap, concrete, or other unnatural material shall be used to stabilize river, creek, tributary, and channel banks within the MHPA. River, stream, and channel banks shall be natural, and stabilized where necessary with willows and other appropriate native plantings. Rock gabions may be used where necessary to dissipate flows and should incorporate design features to ensure wildlife movement.

1.4.3 Land Use Adjacency Guidelines

Land uses planned or existing adjacent to the MHPA include single and multiple family residential, active recreation, commercial, industrial, agricultural, landfills, and extractive uses. Land uses adjacent to the MHPA will be managed to ensure minimal impacts to the MHPA. Consideration will be given to good planning principles in relation to adjacent land uses as described below. The following are adjacency guidelines that will be addressed, on a project-by-project basis, during either the planning (new development) or management (new and existing development) stages to minimize impacts and maintain the function of the MHPA. Implementation of these guidelines is addressed further in **Section 1.5**, Framework Management Plan. Many of these issues will be identified and addressed through the CEQA Process.

Drainage

1. All new and proposed parking lots and developed areas in and adjacent to the preserve must not drain directly into the MHPA. All developed and paved areas must prevent the release of toxins, chemicals, petroleum products, exotic plant materials and other elements that might degrade or harm the natural environment or ecosystem processes within the MHPA. This can be accomplished using a variety of methods including natural detention basins, grass swales or mechanical trapping devices. These systems should be maintained approximately once a year, or as often as needed, to ensure proper functioning. Maintenance should include dredging out sediments if needed, removing exotic plant materials, and adding chemical-neutralizing compounds (e.g., clay compounds) when necessary and appropriate.

Toxics

2. Land uses, such as recreation and agriculture, that use chemicals or generate by-products such as manure, that are potentially toxic or impactive to wildlife, sensitive species, habitat, or water quality need to incorporate measures to reduce impacts caused by the application and/or drainage of such materials into the MHPA. Such measures should include drainage/detention basins, swales, or holding areas with non-invasive grasses or wetland-type native vegetation to filter out the toxic materials. Regular maintenance should be provided. Where applicable, this requirement should be incorporated into leases on publicly owned property as leases come up for renewal.

Lighting

3. Lighting of all developed areas adjacent to the MHPA should be directed away from the MHPA. Where necessary, development should provide adequate shielding with non-invasive plant materials (preferably native), berming, and/or other methods to protect the MHPA and sensitive species from night lighting.

Noise

4. Uses in or adjacent to the MHPA should be designed to minimize noise impacts. Berms or walls should be constructed adjacent to commercial areas, recreational areas, and any other use that may introduce noises that could impact or interfere with wildlife utilization of the MHPA. Excessively noisy uses or activities adjacent to breeding areas must incorporate noise reduction measures and be curtailed during the breeding season of sensitive species. Adequate noise reduction measures should also be incorporated for the remainder of the year.

Barriers

5. New development adjacent to the MHPA may be required to provide barriers (e.g., non-invasive vegetation, rocks/boulders, fences, walls, and/or signage) along the MHPA boundaries to direct public access to appropriate locations and reduce domestic animal predation.

Invasives

6. No invasive non-native plant species shall be introduced into areas adjacent to the MHPA.

Brush Management

7. New residential development located adjacent to and topographically above the MHPA (e.g., along canyon edges) must be set back from slope edges to incorporate Zone 1 brush management areas on the development pad and outside of the MHPA. Zones 2 and 3 will be combined into one zone (Zone 2) and may be located in the MHPA upon granting of an easement to the City (or other acceptable agency) except where narrow wildlife corridors require it to be located outside of the MHPA. Zone 2 will be increased by 30 feet, except in areas with a low fire hazard severity rating where no Zone 2 would be required. Brush management zones will not be greater in size that is currently required by the City's regulations. The amount of woody vegetation clearing shall not exceed 50 percent of the vegetation existing when the initial clearing is done. Vegetation clearing shall be done consistent with City standards and shall avoid/minimize impacts to covered species to the maximum extent possible. For all new development, regardless of the ownership, the brush management in the Zone 2 area will be the responsibility of a homeowners association or other private party.

For existing project and approved projects, the brush management zones, standards and locations, and clearing techniques will not change from those required under existing regulations.

Grading/Land Development

8. Manufactured slopes associated with site development shall be included within the development footprint for projects within or adjacent to the MHPA.

1.5 FRAMEWORK MANAGEMENT PLAN

1.5.1 Management Goals and Objectives

The habitat management aspect of the City of San Diego's MHPA is an important component of the MSCP, related to the goal of the Program. The overarching MSCP goal is to maintain and enhance biological diversity in the region and conserve viable populations of endangered, threatened, and key sensitive species and their habitats, thereby preventing local extirpation and ultimate extinction, and minimizing the need for future listings, while enabling economic growth in the region.

Where land is preserved as part of the MSCP through acquisition, regulation, mitigation or other means, management is necessary to continue to ensure that the biological values are maintained over time, and that the species and habitats that have been set aside are adequately protected and remain viable.

The City will be responsible for and will continue the management and maintenance of its existing public lands (including those with conservation easement), at current levels. The City will also manage and maintain lands obtained as mitigation where those lands have been dedicated to the City in fee title or easement, and land acquired with regional funds within the City's MHPA boundaries. Likewise, the federal and state agencies will manage, maintain and monitor their present land holdings, as well as those they acquire on behalf of the MSCP, consistent with the MSCP. Lands in the MHPA which are set aside as open space through the development process but are not dedicated in fee to the City, or other acceptable entity, will be managed by the landowner consistent with approved mitigation, monitoring and reporting programs or permit conditions. Private owners of land within the MHPA, who are not third party beneficiaries, will have no additional obligations for the management or maintenance of their land.

In order to assure that the goal of the MHPA is attained and fulfilled, management objectives for the City of San Diego MHPA are as follows:

1. To ensure the long-term viability and sustainability of native ecosystem function and natural processes throughout the MHPA.

2. To protect the existing and restored biological resources from intense or disturbing activities within and adjacent to the MHPA while accommodating compatible public recreational uses.

3. To enhance and restore, where feasible, the full range of native plant associations in strategic locations and functional wildlife connections to adjoining habitat in order to provide viable wildlife and sensitive species habitat.

4. To facilitate monitoring of selected target species, habitats, and linkages in order to ensure long-term persistence of viable populations of priority plant and animal species and to ensure functional habitats and linkages.

5. To provide for flexible management of the preserve that can adapt to changing circumstances to achieve the above objectives.

This section lists general management guidelines relevant to the entire City MHPA system, followed by specific guidelines and recommendations for each planned area of the MHPA, including the Otay Mesa area, the Otay River Valley, the Tijuana River Valley, the Eastern Area, Urban Areas, the Northern Area, Lake Hodges and the San Pasqual Valley, and the other Cornerstone Lands. Each area is unique in terms of its existing conditions, MHPA configuration, public or private ownership of land, the existence and location of sensitive species, and management needs.

Based on the above management objectives, the recommended management directives that follow have been identified in order of priority. It is recognized that many of these directives cannot be implemented on approval of the Subarea Plan, but will instead occur over the life of the Subarea Plan. The ability to implement many of the management directives will be directly related to the availability of funding. In addition, some of the management directives may be implemented as part of mitigation requirements for development projects both within and adjacent to the MHPA. Some of the tasks are also expected to be implemented as research efforts by the scientific and academic community at large.

The management directives are organized by priority into the following two categories. The priorities are intended to assist in the decisions on where to spend limited funds and direct mitigation efforts:

Priority 1: Directives that protect the resources in the MHPA, including management actions that are necessary to ensure that the Covered Species are adequately protected. Refer to Appendix A “Species Evaluated for Coverage under the MSCP.”

Priority 2: Directives other than those required for covered species status and other long-term items that may be implemented during the life of the Subarea Plan as funding becomes available.

The management directives listed in this section are a preliminary view of the management requirements of the MHPA within the City of San Diego. It is expected that modifications will be needed over time, based on realities encountered in the field as the MHPA is assembled. Monitoring of selected target species and other sensitive or constrained areas within the MHPA will occur as described in the MSCP Biological Monitoring Plan (under separate cover) with a general description of the monitoring plan provided in **Section 1.5.13**. The monitoring plan will inform MHPA (preserve) managers and staff of the general trends of wildlife use and species preservation, as well as indicate areas where special management focus is needed. Cooperation between the field managers, MSCP habitat management technical committee, and the wildlife agencies, is expected to occur to review and discuss existing and new management issues and to respond with practical, case-sensitive solutions. These solutions should be documented, and this management plan should be revised as needed to reflect new information.

An integral part of the management component is the previous section on Land Use Considerations that lists compatible land uses and states policies and guidelines related to the development of land uses within and adjacent to the MHPA. These policies and guidelines should be incorporated into projects during the land development review process. It should be noted that some of the management directives listed in the following sections may already be included as conditions of approved projects within or adjacent to the MHPA and are therefore considered part of this Subarea Plan.

1.5.2 General Management Directives

The following general management directives apply to all areas of the City of San Diego's MSCP Subarea Plan, as appropriate.

Mitigation

Mitigation, when required as part of project approvals, shall be performed in accordance with the City of San Diego Environmentally Sensitive Lands Ordinance and Biology Guidelines.

Restoration

Restoration or revegetation undertaken in the MHPA shall be performed in a manner acceptable to the City. Where covered species status identifies the need for reintroduction and/or increasing the population, the covered species will be included in restoration/revegetation plans, as appropriate. Restoration or revegetation proposals will be required to prepare a plan that includes elements addressing financial responsibility, site preparation, planting specifications, maintenance, monitoring and success criteria, and remediation and contingency measures. Wetland restoration/revegetation proposals are subject to permit authorization by federal and state agencies.

Public Access, Trails, and Recreation

Priority 1:

1. 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.

2. Locate trails, view overlooks, 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.

3. In general, avoid paving trails unless management and monitoring evidence shows otherwise. Clearly demarcate 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.

4. 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 in the San Pasqual Valley where other agreements have been made, in Mission Trails Regional Park, where appropriate, and in other areas where 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.

5. 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.

6. 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.

7. Limit recreational uses to passive uses such as birdwatching, 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.

8. Remove homeless and itinerant worker camps in habitat areas as soon as found pursuant to existing enforcement procedures.

9. 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.

Litter/Trash and Materials Storage

Priority 1:

1. Remove litter and trash on a regular basis. Post signage to prevent and report littering in trail and road access areas. Provide and maintain trash cans and bins at trail access points.

2. Impose penalties for littering and dumping. Fines should be sufficient to prevent recurrence and also cover reimbursement of costs to remove and dispose of debris, restore the area if needed, and to pay for enforcement staff time.

3. Prohibit permanent storage of materials (e.g., hazardous and toxic chemicals, equipment, etc.) within the MHPA and ensure appropriate storage per applicable regulations in any areas that may impact the MHPA, due to potential leakage.

4. Keep wildlife corridor undercrossings free of debris, trash, homeless encampments, and all other obstructions to wildlife movement.

Priority 2:

1. Evaluate areas where dumping recurs for the need for barriers. Provide additional monitoring as needed (possibly by local and recreational groups on a “Neighborhood Watch” type program), and/or enforcement.

Adjacency Management Issues

The following management directives are in addition to those outlined in **Section 1.4.3**, and refer more specifically to management and monitoring requirements.

Priority 1:

1. Enforce, prevent and remove illegal intrusions into the MHPA (e.g., orchards, decks, etc.) on an annual basis, in addition to complaint basis.

2. Disseminate educational information to residents adjacent to and inside the MHPA to heighten environmental awareness, and inform residents of access, appropriate plantings, construction or disturbance within MHPA boundaries, pet intrusion, fire management, and other adjacency issues.

3. Install barriers (fencing, rocks/boulders, vegetation) and/or signage where necessary to direct public access to appropriate locations.

Invasive Exotics Control and Removal

Priority 1:

1. Do not introduce invasive non-native species into the MHPA. Provide information on invasive plants and animals harmful to the MHPA, and prevention methods, to visitors and adjacent residents. Encourage residents to voluntarily remove invasive exotics from their landscaping.

2. Remove giant reed, tamarisk, pampas grass, castor bean, artichoke thistle, and other exotic invasive species from creek and river systems, canyons and slopes, and elsewhere within the MHPA as funding or other assistance becomes available. If possible, it is recommended that removal begin upstream and/or upwind and move downstream/downwind to control re-invasion. Priorities for removal should be based on invasive species' biology (time of flowering, reproductive capacity, etc.), the immediate need of a specific area, and where removal could increase the habitat available for use by covered species such as the least Bell's vireo. Avoid removal activities during the reproductive seasons of sensitive species and avoid/ minimize impacts to sensitive species or native habitats. Monitor the areas and provide additional removal and apply herbicides if necessary. If herbicides are necessary, all safety and environmental regulations must be observed. The use of heavy equipment, and any other potentially harmful or impact-causing methodologies, to remove the plants may require some level of environmental or biological review and/or supervision to ensure against impacts to sensitive species.

Priority 2:

1. If funding permits, initiate a baseline survey with regular follow-up monitoring to assess invasion or re-invasion by exotics, and to schedule removal. Utilize trained volunteers to monitor and remove exotic species as part of a neighborhood, community, school, or other organization's activities program (such as Friends of Peñasquitos Preserve has done). If

done on a volunteer basis, prepare and provide information on methods and timing of removal to staff and the public if requested. For giant reed removal, the Riverside County multi-jurisdictional management effort and experience should be investigated and relevant techniques used. Similarly, tamarisk removal should use the Nature Conservancy's experience in the Southern California desert regions, while artichoke thistle removal should reference the Nature Conservancy's experience in Irvine. Other relevant knowledge and experience is available from the California Exotic Pest Plant Council and the Friends of Los Peñasquitos Canyon Preserve.

2. Conduct an assessment of the need for cowbird trapping in each area of the MHPA where cattle, horses, or other animals are kept, as recommended by the habitat management technical committee in coordination with the wildlife agencies.

3. If eucalyptus trees die or are removed from the MHPA area, replace with appropriate native species. Ensure that eucalyptus trees do not spread into new areas, nor increase substantially in numbers over the years. Eventual replacement by native species is preferred.

4. On a case by case basis some limited trapping of non-native predators may be necessary at strategic locations, and where determined feasible to protect ground and shrub-nesting birds, lizards, and other sensitive species from excessive predation. This management directive may be considered a Priority 1 if necessary to meet the conditions for species coverage. If implemented, the program would only be on a temporary basis and where a significant problem has been identified and therefore needed to maintain balance of wildlife in the MHPA. The program would be operated in a humane manner, providing adequate shade and water, and checking all traps twice daily. A domestic animals release component would be incorporated into the program. Provide signage at access points and noticing of adjacent residents to inform people that trapping occurs, and how to retrieve and contain their pets.

Flood Control

The following management directives are in addition to the general planning policies and guidelines outlined in **Section 1.4.2**.

Priority 1:

1. Perform standard maintenance, such as clearing and dredging of existing flood channels, during the non-breeding or nesting season of sensitive bird or wildlife species utilizing the riparian habitat. For the least Bell's vireo, the non-breeding season generally includes mid-September through mid-March.

Priority 2:

1. Review existing flood control channels within the MHPA periodically (every five to ten years) to determine the need for their retention and maintenance, and to assess alternatives, such as restoration of natural rivers and floodplains.

1.5.3 Specific Management Policies and Directives for the Otay Mesa Area

Background

Goals and Objectives

The Otay Mesa area consists primarily of a large mesa, with slopes and deep canyons draining into the Otay River Valley or towards Mexico. One linkage connects habitat areas south to north across Otay Mesa Road. In spite of and due to the constraints on this land, the optimum future condition envisioned for the Otay Mesa area is a network of open and relatively undisturbed canyons containing a full ensemble of native species which provide functional wildlife habitat and movement capability. Integrated into the canyon network will be recreational trails and border patrol access roads. A complete description of Otay Mesa is contained in **Section 1.2.1**.

Covered Species

Covered species in this area include:

Plants	**Animals**
California orcutt grass	Burrowing owl
Coast barrel cactus	California gnatcatcher
Otay Mesa mint	Cactus wren
Otay tarplant	Cooper's hawk
Orcutt's bird's beak	Golden eagle
Orcutt's brodiaea	Northern harrier
Prostrate navarretia	Orange-throated whiptail
San Diego goldenstar	Peregrine falcon
San Diego thorn-mint	Riverside fairy shrimp
Small-leaved rose	San Diego fairy shrimp
Snake cholla	San Diego horned lizard
Variegated dudleya	
San Diego button-celery	

Major Issues

The major issues that require consideration for management in the Otay Mesa area are the following, in order of priority:

1. Intense land uses and activities adjacent to and in covered species habitat and linkages.

2. Off-road vehicle activity.

3. Dumping, litter and vandalism.

4. Enhancement and restoration needs.

5. Exotic (non-native), invasive plants and animals.

6. Illegal immigration and border patrol activities.

7. Utility, facility and road repair, construction and maintenance activities.

Overall Management Policies and Directives for Otay Mesa

The following general management directives apply to the Otay Mesa area as a whole; long-range policy documents pertinent to the area have been reviewed and incorporated by reference.

Otay Mesa Community Plan

The Otay Mesa Community Plan (1984) contains lists and maps of vernal pools and sensitive species, as well as descriptions of native vegetation, wildlife, and the ecological significance of the Otay Mesa area. The MHPA boundaries closely follow the open space designation in the adopted plan for the area south of Otay Mesa Road, but have made modifications in the north area by adding substantial areas for preservation. The Open Space Element provides some guidance for the preservation of natural resources.

Other General Policies

Priority 1:

No unauthorized motorized vehicles except border patrol, MHPA (preserve) managers, maintenance personnel or emergency vehicles will be allowed on any trails or off-trail in the MHPA. The border patrol should restrict vehicle use to the existing access roads as much as feasible, to avoid disturbance of habitat.

1. Remove all trash, hazardous materials, and vehicles from the MHPA prior to transfer from private into public ownership and/or management. If hazardous materials remain, these areas should be signed to indicate their locations and made off-limits to people.

2. Inventory vernal pool areas within the Otay Mesa area for sensitive and target species where not previously or recently done, and assess for enhancement/restoration needs or opportunities, general status, and potential threats.

Priority 2:

1. Assess vernal pool areas proposed for development (e.g., approved development projects or proposed regional transportation facilities such as State Routes 905 and 125) for transplantation of sensitive plants and soils containing seedbanks of sensitive flora and fauna. Include in mitigation programs arrangements for proper timing of soil and plant removal, proper storage if necessary, and appropriate timing of enhancement/restoration efforts, including transplantation.

Specific Management Directives for Otay Mesa (Figure 11 - Priority 1 only)

Northwest Otay Mesa

Priority 1:

1. Protect the area with concentrations of Ferocactus, Dudleya, and succulents on the ridge located in the northeast corner of the California Terraces from trampling and poaching of plants. Provide barriers to this area that accommodate wildlife movement.

2. Regular enforcement patrols may be necessary in Dennery Canyon and its tributaries to prevent vandalism, poaching, and off-road vehicle activity.

3. The wildlife crossings under Otay Mesa Road and SR-905 are the only link from south to north Otay Mesa. These crossings must be kept free of debris, and illegal encampments. Provide screening of this area along both sides from residential and other adjacent development, and provide limited cover for wildlife within the crossing area that is compatible with border patrol activities. Restrict night lighting near this crossing.

Priority 2:

1. Evaluate the mesa north of Brown Field for potential research opportunities in studying natural regeneration. If regeneration is not possible, pursue restoration of disturbed habitats in this area.

Southern Otay Mesa

Priority 1:

1. Continuous coordination with the border patrol will be necessary to ensure continued awareness of the MHPA and cooperation in maintenance. The presence of the border patrol in this area should help to make the MHPA safer for visitors. If possible, improve coordination with the border patrol to aid in the identification and prevention of vandalism, off-road vehicle use, dumping, and other disturbances to habitat.

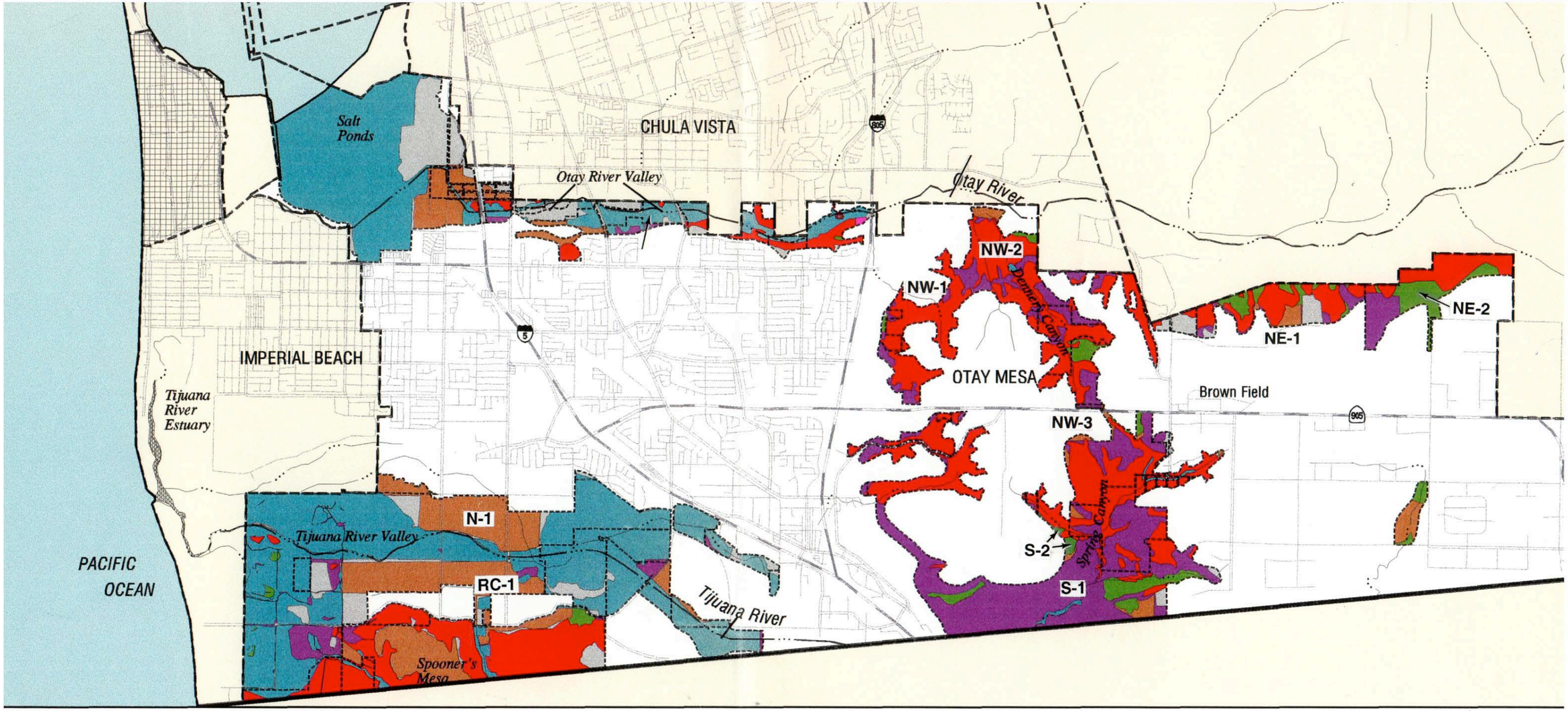
2. Install barriers and signage along Spring Canyon where agriculture or development abuts the MHPA.

Priority 2:

1. Provide educational materials and training on the MSCP and on native wildlife to border patrol agents and other public agency personnel working in the Otay Mesa border area to encourage sensitive behavior towards wildlife and its habitat, and to discourage unnecessary off-road vehicle use in sensitive areas.

2. Ensure that the night lighting along the border intrudes as little as possible on lands in the interior of the MHPA.

3. Assess and prioritize the Spring Canyon area for restoration of disturbed areas. Include existing roads and those determined not to be needed for border patrol activities in the restoration assessment. Burned areas should not need restoration, but off-road use and other disturbed areas should either be restored or other steps taken to encourage regeneration. This could offer potential research opportunities.



Preserve Management: Specific Management Recommendations, Priority 1, City of San Diego MHPA - Southern Area

MSCP Subarea Plan **11** FIGURE

1.5.4 Specific Management Policies and Directives for the Otay River Valley

Background

Goals and Objectives

The optimum future condition for the Otay River Valley would be a fairly unrestricted floodplain containing natural riparian and wetland habitats interspersed with both active and passive recreational areas, and edged by both natural slopes and adjacent developed areas. Although the valley is narrow and defined, all future uses within the area would strive to maintain and enhance healthy natural processes and provide continuous native habitats for wildlife movement and sensitive species conservation, while providing recreational opportunities and an improved quality of life and environment for local residents. A complete description of the Otay River Valley is contained in **Section 1.2.1**.

Covered Species

Covered species in the Otay River Valley include:

Plants	**Animals**
Orcutt's birds' beak	Belding's savannah sparrow
Otay tarplant	California gnatcatcher
San Diego barrel cactus	California least tern
Salt marsh bird's-beak	Large-billed savannah sparrow
Variegated dudleya	Least Bell's vereo
	Light-footed clapper rail
	Western snowy plover

In addition, various raptors, including the northern harrier, use the valley for foraging and nesting.

Major Issues

The major issues that require consideration for management in the Otay River Valley, based on the existing conditions as described in **Section 1.2**, are the following, in order of priority:

1. Intense land uses and activities adjacent to and in covered species habitat.
2. Dumping, litter, and vandalism.
3. Itinerant living quarters.
4. Mining, excavation, and related processing activities.
5. Exotic (non-native), invasive plants and animals.
6. Enhancement and restoration needs.

7. Water quality.

8. Utility, facility and road repair, construction, and maintenance activities.

Overall Management Policies and Directives for the Otay River Valley

The following general management directives apply to the Otay River Valley; long-range policy documents relevant to the area have been reviewed and are incorporated by reference.

Otay Mesa-Nestor Community Plan and Update

The community plan (1978) covering this area designates the entire Otay River Valley as open space. The western portion of the river valley is designated for agriculture (consistent with General Plan open space designations). Goals within the plan include conserving the Otay River Valley and floodplain as open space and protecting sensitive habitat areas from disruption. Land Use Sector 6, on pp. 72-73 of the community plan includes safeguards to protect habitat.

The May 1997 Community Plan update continues to recognize the Otay River Valley as an asset to open space, and modifies the open space element of the current plan slightly to match the Otay River Valley Regional Park Progress/Concept Plan proposal. Goals and strategies in the update call for conservation of the valley and its associated floodplain, and elimination of industrial and commercial uses. The plan also calls for provision of a continuous east-west wildlife corridor and contiguous natural habitat throughout the valley.

Other General Policies

Priority 1:

1. Coordinate an invasive non-native plant removal program with the city of Chula Vista or in conjunction with a regional MSCP management program in order for effective, long-term management of this problem. In areas with least Bell's vireos, the removal program should be limited to the period between mid-September and mid-March of each year.

Specific Management Directives for the Otay River Valley (Figure 11 - Priority 1 only)

West of I-5, Otay River Mouth Area

Priority 2:

1. In the long term, should salt production operations cease, restore the tidelands leased for salt mining to baylands by breaching the levees in several locations, if determined appropriate by the MSCP habitat management technical committee in consultation with the wildlife agencies.

2. Convert the agricultural area/tilled lands west of I-5 to sustainable agriculture (e.g., grain crops), or restore to native habitats to provide foraging areas for wildlife. Although appropriate habitats for this area appear to include wetlands (e.g., saltmarsh and and riparian habitat) and grasslands, research into historic and possibly pre-historic land uses and habitat types in this area should be conducted to help guide restoration efforts if pursued.

I-5 to I-805

Priority 1:

1. The City Park and Recreation Department has organized volunteer efforts in conjunction with the Police Department to remove exotics and and underbrush in the valley. Illegal encampments and criminal activities in and adjacent to the valley have spurred this effort in an attempt to control crime, improve public safety and enhance the recreational and public uses of the valley. These stewardship activities should continue, along with continued police enforcement; monitoring/enforcement against poaching and vandalism should also occur. Remove brush during the non-breeding/nesting season, by selective pruning if possible rather than mechanical removal, leaving various amounts of native plant understory in areas that are more visually accessible.

Priority 2:

1. Review for adequate maintenance the approximately seven-acre wetland restoration site required by the California Department of Fish and Game in 1993 of Fenton Materials as mitigation for impacts from their industrial/extraction processing site.

2. While the asphaltic and concrete processing and related industrial uses in the valley remain, monitoring and enforcing against the release of toxic or extraneous materials that pollute or otherwise detrimentally affect the ecology of sensitive species and habitats in the valley should continue.

3. In the long term, allow the riparian and wetland habitats in the valley to regenerate, except where active restoration is specified as a result of monitoring or for mitigation purposes. In the future, assess the riparian areas for management changes and needs which could offer future research opportunities.

1.5.5 Specific Management Policies and Directives for the Tijuana River Valley

Background

Goals and Objectives

The optimum future condition for the Tijuana River Valley is a broad natural

floodplain containing riparian and wetland habitats, and bounded by high mesas and deep canyons with chaparral, sage scrub, and grasslands. The natural habitat would be intermixed with compatible agricultural, recreational, and water quality improvement activities, all functioning in concert to maintain and enhance natural ecosystems and processes, water quality, and the full range of native species, and to generally improve the local quality of life and the environment. A complete description of the Tijuana River Valley is contained in Section 1.2.1.

Covered Species

Covered species in the Tijuana River Valley include:

Plants	**Animals**
Orcutt's bird's-beak	California gnatcatcher
San Diego barrel cactus	Cooper's hawk
Shaw's agave	Least Bell's vereo
Wart-stemmed ceanothus	Northern harrier

Major Issues

The major issues that require consideration for management in the Tijuana River Valley, based on the existing conditions as described in Section 1.2 above, are the following, in order of priority:

1. Intense land uses and activities adjacent to and in covered species habitat.
2. Water quality, including sewage, agriculture and urban runoff, and erosion and sedimentation.
3. Dumping, litter, and vandalism.
4. Non-sustainable agriculture and associated activities such as chemical applications and storage.
5. Exotic (non-native), invasive plants and animals.
6. Illegal immigration and border patrol activities.
7. Enhancement and restoration needs.
8. Mining and excavation activities.
9. Flood control.
10. Utility, facility and road repair, construction, and maintenance activities.

Overall Management Policies and Directives for the Tijuana River Valley

The following general management directives apply to the Tijuana River Valley area; relevant long-range policy documents have been reviewed and are incorporated by reference.

Tijuana River Valley Plan and Local Coastal Program

The adopted community plan (1979) covering this area includes objectives and policy proposals for the park and estuary, agriculture, flood control, and in the Local Coastal Program that are generally consistent with MSCP management goals and objectives. In addition, a plan amendment in 1990 recognized the National Estuarine Sanctuary (Research Reserve) and the County's Tijuana River Regional Park.

Tijuana River National Estuarine Sanctuary Management Plan

The Tijuana River National Research Reserve is managed according to the Tijuana River NES Management Plan, which ensures that all activities and uses within the reserve contribute to preservation, enhancement, research, and interpretation of the natural resources. It established the State Department of Parks and Recreation as the lead in day-to-day operations, and the Tijuana River National Estuarine Research Reserve Management Authority (a multi-jurisdictional, multi-agency, and citizens board) as the policymaker. The Action Plan in Section 3 of the NES Management Plan (pp. 39-88) contains policies and actions for management of the reserve.

A Framework Management for the Tijuana River Valley

The framework management document contains the conceptual framework for design and management of the County Park and Recreation Department's Regional Park in the Tijuana River Valley. Management recommendations are found in the Management Issues and Opportunities Section (pp. 50-53), and Framework Management Section (pp. 54-62.) Specific design options offer additional recommendations on pp. 66-73.

Other General Policies

<u>Priority 1</u>:

1. Contain active recreational uses planned for the valley in areas determined appropriate for such activities by the County's Regional Park plan. Avoid locating active recreational uses within core habitat or in areas containing covered species. Do not use invasive non-native species to landscape recreational or other areas of the Regional Park. Restrict lighting at night of recreational areas within the Tijuana River Valley area, or if this is infeasible due to vandalism, then shield natural habitat areas from lighting.

2. Prohibit off-road vehicle activity in the valley and on the mesas in order to avoid further destruction of sensitive habitats and to reduce the effects of noise, dust and sedimentation on sensitive species, wetlands, and adjacent residents.

3. Require lessees to properly, and in a timely manner, dispose of all litter located on each leasehold, whether self-generated or not, unless other arrangements with the County or other public landowners have been made.

4. Prevent dumping of construction debris, trash and other materials and actively enforce with a joint City/County/other agencies enforcement program. Institute the program in concert with local users of the valley reporting in a "Neighborhood Watch" type program.

5. Restrict sand mining on the valley floor to removal in the existing pilot channel if determined necessary for flood control, and in the future for potential water treatment ponding systems in the far eastern portion of the valley if they do not interfere with sensitive species habitat.

6. Flood control in the Tijuana River Valley is limited to existing agreements with resources agencies that allow clearing or sand removal within existing low-flow or pilot channel(s), and any flood control projects resulting from the 1994 BSI Consultants "Tijuana River Valley Flood Control and Infrastructure Study." Any flood control facility must be consistent with City, state, and FEMA regulations and be designed and constructed to maintain riparian and wetland ecosystems within the channel and the valley.

7. Organize clean up crews for the maintenance of equestrian trails with the lead taken by the County Parks and Recreation Department, in conjunction with horse rental stables and local equestrians and clubs.

8. Remove invasive non-native plants pursuant to general management directive.

Specific Management Directives for the Tijuana River Valley - (Figure 11-Priority 1 only)

River Corridor

Priority 1:

1. Ensure that adequate amounts of appropriate habitats are maintained for covered species (e.g., the Northern harrier and Mountain plover) dependent on the valley's habitat types including grasslands and agricultural fields.

Priority 2:

1. Retain existing berms in the floodplain only where it has been determined that they do not exacerbate flood velocities or levels, or increase flood-related management problems for the estuarine reserve, the MHPA or uses located in the river corridor. Remove all other berms in the floodplain over the long term in order to restore the natural floodplain and ecosystem processes consistent with health and safety considerations for the residents of that area.

2. Pursuant to the County's Framework Management Plan, evaluate existing agricultural areas for their impacts to flooding, natural ecological processes (e.g., sedimentation, water table levels, water quality), sensitive species and habitats. Recommend to either retain the site as it is, to modify the location or the type of agriculture, or to eliminate the use from an area. Identify timing of any change or elimination of uses and any future restoration, if needed. Where agriculture remains in the valley, pursuant to leases approved by decision makers, consider sustainable and organic agriculture over traditional forms of farming as being less harmful to the health of the overall ecosystem.

3. Restore areas no longer farmed in the valley floor to riparian and grasslands habitats or allow to naturally regenerate over time to widen the river corridor. Establish the ultimate width of the riparian corridor based generally on the County Parks Department's Framework Management for the Tijuana River Valley and as further determined by the MSCP habitat management technical committee in conjunction with the County. Restore areas outside of the riparian/river corridor to native grasslands wherever possible, as historic evidence shows that the majority of the valley floor was grasslands. Actively manage for grasslands by mowing or other methods.

4. In the future, assess the riparian areas for management needs. Allow the riparian and wetland habitats in the valley to naturally regenerate, except where active restoration has been specified or to remove exotic invasive species. Proposed management changes may offer research opportunities for the future.

5. Establish, widen and/or enhance per the County's Framework Management Plan continuous riparian (and possibly upland) wildlife connections from the river corridor to the mesas and canyon areas. The most suitable locations are where the canyons drain into and through the valley, such as the Silva drain area, Smuggler's Gulch, Goat Canyon, and also along the divisions between agricultural fields across from the mesas. Establish native plant cover up to the road wherever possible. Wildlife crossings of Monument Road will be at grade, since vehicle traffic is expected to remain minimal.

6. Residences and other structures in the floodplain should be removed over the long term where recommended by the 1994 BSI "Tijuana River Valley Flood Control and Infrastructure Study." Restore the areas to native habitat or place in agricultural lease or recreation, if determined appropriate by the MSCP habitat management technical committee in conjunction with County Parks and Recreation Department.

Mesa Areas

Priority 2:

1. Spooner's Mesa currently contains agriculture on the mesa top. The center of the area presents long-term opportunities for limited development. If it is developed with active uses, landscape developed areas adjacent to the MHPA with local native species only. Restore the disturbed edges of Spooner's Mesa to the appropriate native habitats (maritime succulent scrub, coastal sage, grasslands, some chaparral). Restoration should be determined by a biologist familiar with the local habitats and consideration should be given to providing native grasslands on large portions of the mesa top.

2. Restore disturbed areas on the Border Highlands area to the east of Spooner's Mesa to coastal sage, maritime succulent scrub, possibly some grasslands and/or chaparral. Restoration opportunities should be determined by a biologist familiar with the habitats in this area. The border patrol should be involved in exploring limiting vehicle access to well-defined roads through the area.

3. In the long term, when or if the residences become publicly owned, evaluate the houses in the mesa areas (primarily along Border Highlands) for removal. If removed, restore the properties to native habitats and remove exotic species. Consider the use of one or more of the existing residences for regional park management offices or other compatible uses in this area.

4. Over the long term, restore areas of the mesas that have been mined and excavated. Restoration should include reconfiguration to the natural landform, with the surrounding natural areas as reference. Restoration of these areas may present research opportunities if not already required as part of existing CUPs.

Northern edge of valley

Priority 1:

1. The MHPA lands adjacent to the residential areas on the northern side of the valley provide a transition to the more sensitive central portions of the valley from lighting, urban runoff, noise and other potential disturbance. Place naturalized detention basins where urban runoff drains into the MHPA. Locate fencing or alternative barriers along the northern edge to control access and pet predation of sensitive species.

Priority 2:

1. Consider areas along the northern edge of the floodplain which are not in current agriculture use for coastal sage scrub and native grassland restoration, consistent with historic evidence.

1.5.6 Specific Management Policies and Directives for the Eastern Area

East Elliott and Mission Trails Regional Park

Background

Goals and Objectives

The optimum condition for the East Elliott and Mission Trails Regional Park would be a mosaic of native habitats and compatible recreational activities, with restoration and transplantation of existing populations of endangered, threatened, and/or sensitive species where necessary. A complete description of the Eastern area is contained in **Section 1.2.2**.

Covered Species

Covered Species in the Eastern Area include:

Plants	**Animals**
Encinitas baccharis	Burrowing owl
Orcutt's brodiaea	California gnatcatcher
Palmer's ericameria	California rofous-crowned sparrow
San Diego ambrosia	Cooper's hawk
San Diego barrel cactus	Least Bell's vereo
San Diego goldenstar	Mule deer
San Diego thornmint	Orange-throated whiptail
Slender-pod jewelflower	San Diego horned lizard
Variegated dudleya	Tricolored blackbird
Willowy monardella	Western bluebird

Major Issues

The major issues that will require consideration for management in the Mission Trails/East Elliott area, in order of priority, are:

1. Intense land uses and activities adjacent to and in covered species habitat and linkages.
2. Potential associated impacts related to siting a future landfill in East Elliott.
3. Erosion, urban runoff and overuse of recreational areas adjacent to sensitive drainage areas.
4. Off-road vehicle activity.
5. Exotic (non-native), invasive plants and animals.
6. Encroachment from existing development.
7. Utility, facility and road repair, construction, and maintenance activities.

Overall Management Policies and Directives for the Eastern Area

The following general management directives apply to the eastern area; relevant long-range policy documents have been reviewed and are incorporated by reference.

Mission Trails Regional Park Master Plan

The Mission Trails Regional Park Master Plan identifies all existing and future uses as envisioned by park planners when the master plan was adopted in 1985. Since that time, many uses anticipated in the plan have been built while others remain undeveloped. Areas within and surrounding the park have since taken on more significance as a core area for the region's sensitive biological resources. Some uses originally anticipated in the master plan have been evaluated for compatibility with the MSCP and, for the most part, the passive recreational uses envisioned by the park plan are considered compatible. Where future park uses were considered to be potentially incompatible with the MHPA, alternative locations have been identified to accommodate those uses in less sensitive areas, or the MHPA has been redesigned so that those uses occur outside the MHPA boundaries. The large developed group camping site which was envisioned in the center of the park would be deleted due to its possible negative effects. Where potential inconsistencies between the Mission Trails Regional Park Master Plan and the MSCP occur, resolution will be made by the existing park decision-making bodies after consultation with MSCP planners.

Chapters IV-IX of the master plan contain specific park implementation mitigation measures which were identified in the environmental impact report prepared for the park plan. A comprehensive Natural Resource Management Plan is anticipated to be developed by the City’s Park and Recreation Department which will provide further recommendations and guidelines to successfully preserve and protect the park's natural resources while providing for recreational use and master plan implementation. Development of the Mission Trails Regional Park Natural Resource Management Plan will include consultation with MSCP planners to ensure compatibility of the Plan’s overall goal, policies, and programs with those of the MSCP.

Elliott Community Plan

The Elliott Community Plan was adopted in 1971 and briefly describes the open space system of the community as envisioned in 1971. The western portion of the community has been developed under the Master Planned Community of Tierrasanta. Also since the original adoption of the plan and subsequent to site-specific biological surveys in the area, the East Elliott portion of the Elliott Community Plan has taken on increased importance in the region due to the presence of significant biological resources.

Specific Management Directives for the Eastern Area (Figure 12 - Priority 1 only)

Mission Trails Regional Park

Priority 1:

A Natural Resource Management Plan (NRMP) will be prepared for the park to preserve and protect natural resources while encouraging public use and implementation of the Master Development Plan. Coordinate the preparation of the NRMP with MSCP planners.

1. Maintain and clearly demarcate trails around the visitors center and other areas of high public use to minimize habitat destruction.
2. Limit future equestrian trails to specified trails which minimize trail edge disturbances and are no greater than 25 percent gradient.
3. Seasonally restrict, if necessary, areas along the San Diego River, including riparian restoration areas (except along established trails) to prevent disturbance of breeding areas.
4. As envisioned by the Master Development Plan, revegetate areas with erosion or denuded slopes.
5. Incorporate adequate setbacks into future plans to develop an equestrian center near the San Diego River to minimize impacts associated with cowbird parasitism. Establish a cowbird trapping program to minimize effects on the least Bell’s vireo and other songbirds.
6. Minimize lighting for the campground and collect garbage frequently to reduce nuisance wildlife (raccoons, opossums, skunks).
7. Establish signs to direct access and provide educational information at the periphery of sensitive resource areas and at points of access. Post signs to prohibit campfires, pets, firearms and camping (except where allowed). Also post road signs to identify wildlife corridors to help reduce road kills.

Priority 2:

1. Reclaim active and abandoned mineral extraction areas as required by the State's Surface Mining and Reclamation Act of 1975.

East Elliott

Priority 1:

Protect the remaining populations of San Diego ambrosia in the private property area immediately to the east of the Kumeyaay Lake campground. Explore methods to protect and enhance the San Diego ambrosia population in the area such as transplanting to more remote areas, or the use of split rail fencing and signage.

2. If the eastern area develops with urban uses, implement programs to educate future adjacent landowners pursuant to the general adjacency management guidelines in **Section 1.5.2**.

1.5.7 Specific Management Policies and Directives for Urban Habitat Lands

Background

Goals and Objectives

The optimum future condition for the urban habitat lands scattered throughout the City of San Diego is a system of canyons that provide habitat for native species remaining in urban areas, "stepping stones" for migrating birds and those establishing new territories, and environmental educational opportunities for urban dwellers of all ages. The system of urban habitat canyons and natural open space throughout the City provide important areas for people to enjoy and learn about the natural world and local environment. These areas also afford visual enjoyment and psychological relief from urbanization, while supporting habitat for the maintenance of both common and rare species. This habitat, surrounded by development and modified through time, presents unique opportunities for research into fragmentation, edge effects, and urban wildlife ecology. A more complete description of these lands is provided in **Section 1.2.3**.

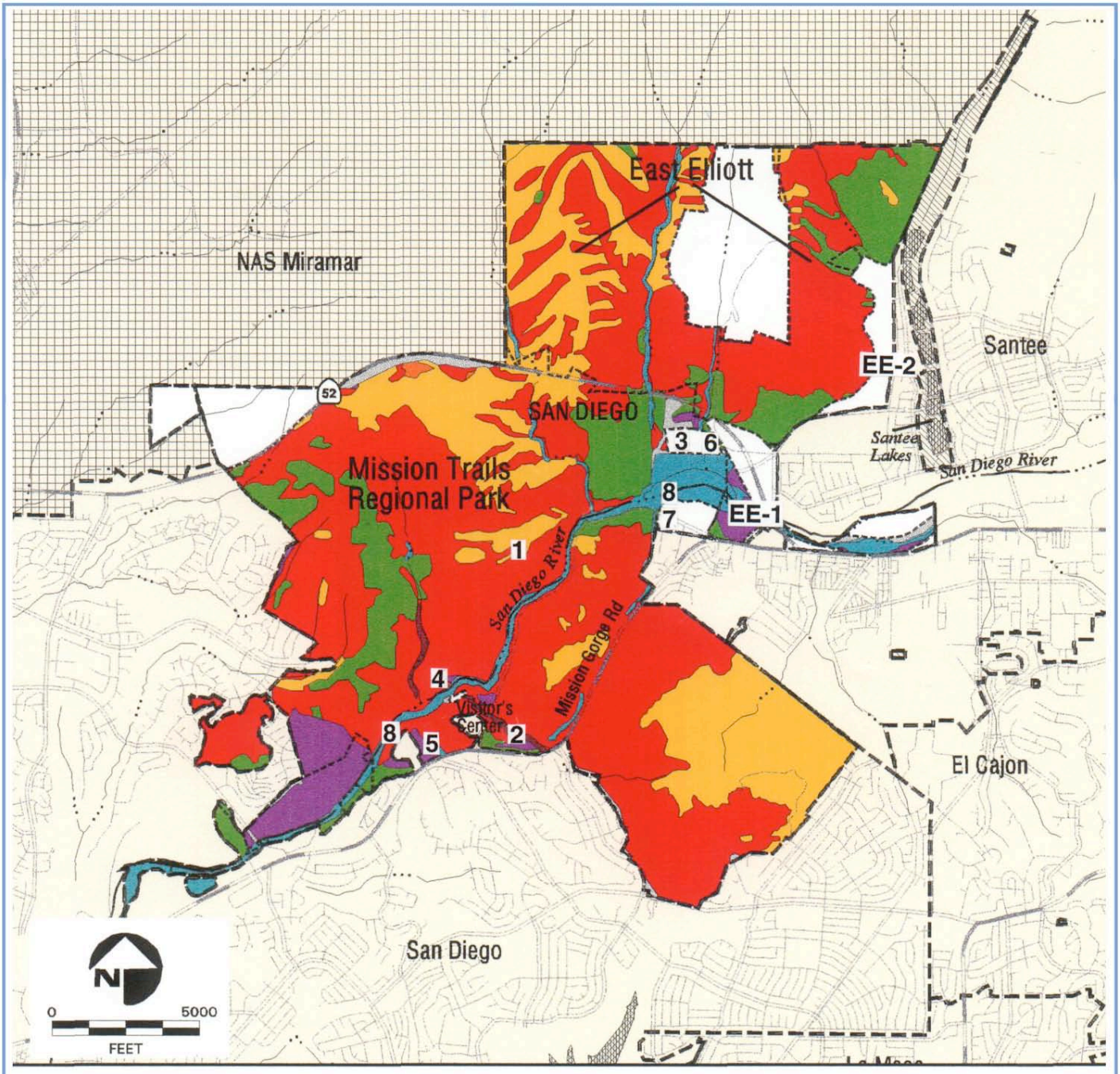
Covered Species

Covered species found in the urban habitat lands include:

Plants	**Animals**
Orcut's brodiaea	Belding's savannah sparrow
San Diego barrel cactus	California gnatcatcher
San Diego button-celery	California least tern
San Diego goldenstar	Coastal cactus wren
Short-leaved dudleya	Least Bell's vereo
Snake cholla	Light-footed clapper rail
Wart-stemmed ceanothus	Mule deer
Willowy monardella	Orange-throated whiptail
	Western snowy plover

Major Issues:

1. Intense land uses and activities adjacent to and in covered species habitat.
2. Dumping, litter, and vandalism.
3. Itinerant living quarters.
4. Utility, facility and road repair, construction, and maintenance activities.
5. Exotic (non-native) and invasive plants and animals.
6. Urban runoff, and water quality.



Vegetation Communities

- Coastal Sage Scrub
- Chaparral
- Coastal Sage Scrub/ Chaparral
- Grassland
- Riparian/Wetlands
- Oak Woodland
- Coniferous Forest
- Beach/Foredunes
- Eucalyptus Woodland
- Disturbed Habitat
- Shallow Bay
- Developed
- Agriculture

Number indicates reference in text.

- Subarea Boundary
- MHPA Boundary
- Water District Subarea
- Military Lands

Base Map Features

- MSCP Boundary
- U.S. - Mexico Border
- Freeway
- Major Road
- Minor Road
- Major Stream
- Minor Stream
- Lake/Lagoon

Preserve Management: Specific Management Recommendations, Priority 1
City of San Diego MHPA - Eastern Area
MSCP Subarea Plan

12 FIGURE

Overall Management Policies and Directives

Where the MHPA's urban habitats are part of a natural resource park, the City Park and Recreation Department has prepared or is preparing a Natural Resource Management Plan for adoption by City Council to govern management of those lands. In addition, some public open space lands are managed pursuant to Landscape Maintenance Districts or conditions of permit approval. All other urban lands included within the MHPA should be managed, to the extent possible, according to the general management policies and directives. If in the future special management needs or issues for specific areas arise, these should be resolved by the MHPA (preserve) managers according to the adaptive management strategy, and through coordination with the MSCP habitat management technical committee. All management actions resolved in this manner should be documented, and all follow up actions, including monitoring, should also be documented in order to determine trends, and gain knowledge and feedback useful for continued management of these lands. The following Natural Resource Management Plans have been completed for various urban habitat lands: Marian Bear Memorial Park Natural Resource Management Plan, and Mission Bay Park Natural Resource Management Plan. First San Diego River Improvement Project, and Los Peñasquitos Canyon Preserve Natural Resource Management Plan are currently under development.

1.5.8 Specific Management Policies and Directives for the Northern Area

Including the North City Future Urbanizing Area (NCFUA), Carmel Valley, Rancho Penasquitos, Beeler Canyon, Scripps Ranch, Los Peñasquitos Canyon and Lagoon, Torrey Pines State Park, Sorrento Hills, and portions of the University and Mira Mesa communities.

Background

Goals and Objectives

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 Penasquitos 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. A complete description is provided in Section 1.2.4.

Covered Species

Covered species in the northern area include:

Plants	Animals
Del Mar manzanita	Belding's savannah sparrow
Encinictas 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 rofous-crowned sparrow
San Diego mesa mint	Canada goose
San Diego thorn-mint	Coastal cactus wren
Shaw's agave	Cooper's hawk
Short-leaved dudleya	Golden eagle
Torrey pine	Mountain lion
Variegated dudleya	Mule deer
Wart-stemmed ceanothus	Northern harrier
Willowy monardella	Orange-throated whiptail
	Riverside fairy shrimp
	San Diego horned lizard
	Western snowy plover
	White-faced ibis

Major Issues

The major issues for management in the northern area based on existing conditions as described in **Section 1.2**, are the following, in order of priority:

1. Intense land uses and activities adjacent to and in covered species habitat and linkages.

2. Itinerant living quarters.

3. Enhancement and restoration needs.

4. Exotic (non-native), invasive plants and animals.

5. Water drainage issues, including water quality, urban runoff, erosion, sedimentation, and flood control.

6. Utility, facility and road repair, construction, and maintenance activities.

Overall Management Policies and Directives

The following general management directives apply to the northern area as a whole; long-range policy documents relevant to the area have been reviewed and are incorporated by reference.

The North City Future Urbanizing Area (NCFUA) Framework Plan

The NCFUA Framework Plan designates an open space system known as the environmental tier that was adopted as a General Plan amendment on October 1, 1992, and approved in the Coastal Zone on November 25, 1993. It is similar in both intent and area to the MHPA boundary for that area. The framework plan document contains implementing principles applicable to the environmental tier that have been incorporated into this plan. In particular, **Sections 5.4** and **5.5** of the framework plan address management concerns.

San Dieguito River Park Concept Plan

The adopted concept plan for the San Dieguito River Park contains both general and specific policies, design considerations, and park proposals that should be considered in conjunction with the Framework Management Plan. In the northern area, the Park Concept Plan encompasses the San Dieguito River Valley Lagoon Restoration area and several tributary canyons such as Gonzales Canyon, La Zanja Canyon, and the La Jolla Valley/ Lusardi Creek area. Management of the lagoon and river area will be performed according to the concept plan and any management plan specifically prepared for Southern California Edison's mitigation area and the overall lagoon enhancement project. It is not anticipated that conflicts will occur with the MSCP implementation due to the sensitivity of the concept plan to the natural habitats and character of the entire river valley.

Torrey Pines State Park and Los Peñasquitos Lagoon

Torrey Pines State Park and Los Peñasquitos Lagoon are both managed by state park rangers and ecologists according to their general plans and management plans.

Mira Mesa Community Plan

This plan contains open space and sensitive resource policies for protection of open space and habitat areas.

Torrey Pines Community Plan

The Torrey Pines Community Plan contains policies for protection, restoration, and management of open space and sensitive areas.

Los Peñasquitos Canyon Preserve Master Plan, and Management Plan

Los Peñasquitos Canyon Preserve will be managed according to its master plan and the Natural Resource Management Plan currently under preparation by the City Park and Recreation Department. The master plan contains some general policies and guidelines on access, trails, usage, and sensitive species. Specific management guidelines for natural, cultural and historical resources for the Los Peñasquitos Canyon Preserve will be contained in the Preserve's Natural Resource Management Plan.

Specific Management Directives for the Northern Area (Figure 13 - Priority 1 only)

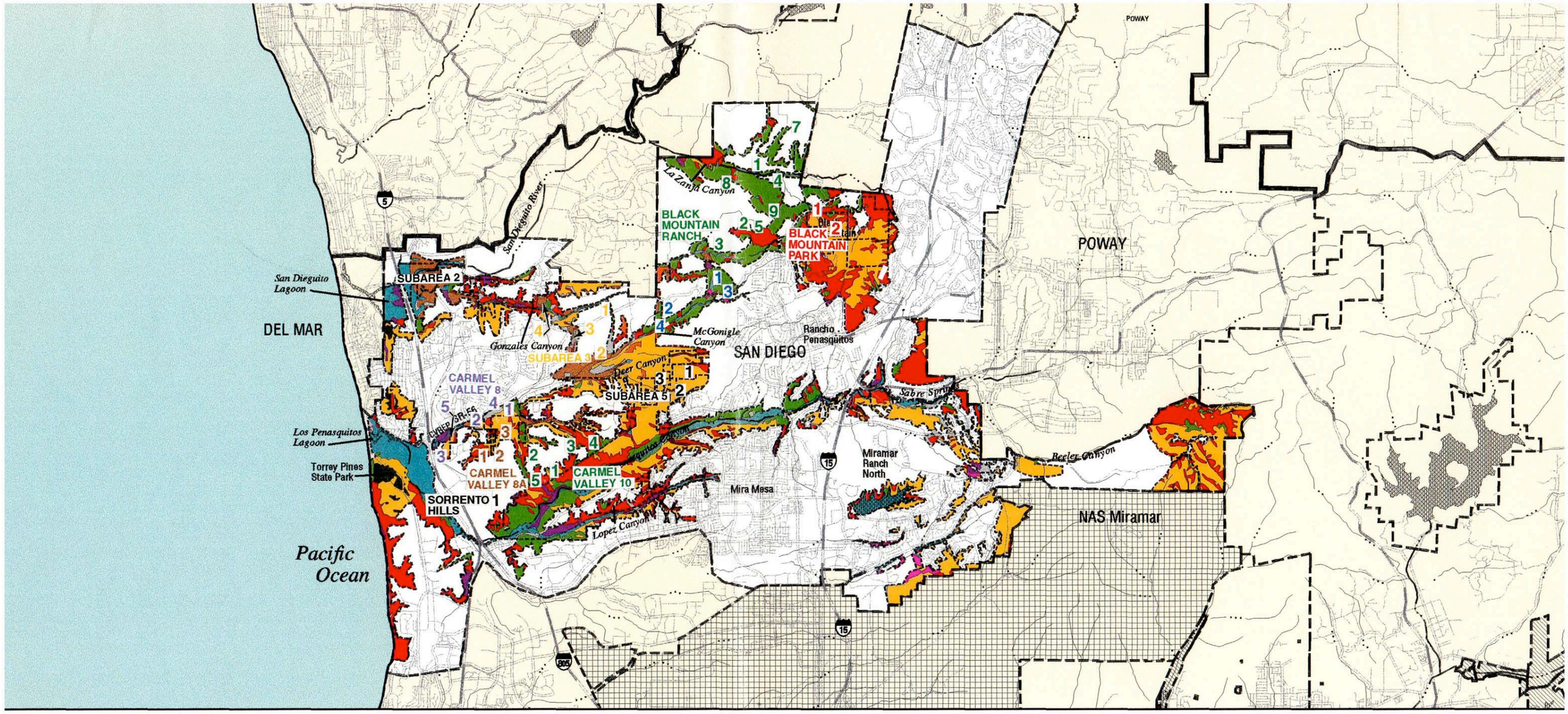
The following policies and directives for the northern area are described in the following text, generally from north to south and east to west.

North City Future Urbanizing Area:

Black Mountain Ranch/NCFUA Subarea 1

Priority 1:

1. As part of the Black Mountain Ranch project, the La Jolla Valley (Lusardi Creek) area will be restored into a fully-functional native riparian ecosystem, and maintained at a minimum 400-foot-width along its entire length through the golf course. Limit access to this important regional wildlife corridor to clearly defined and crossings of the corridor (for golfers and carts). These crossings will need monitoring for litter and other disturbances to the natural habitat.
2. Where golf courses lie adjacent to open space, care will be taken to prevent public observers of golf tournaments from intruding into the MHPA and sensitive habitat areas. As part of the Black Mountain Ranch project, golf course areas will be separated from sensitive habitat with native vegetation discouraging to human access (e.g., brambles, cactus, yuccas) as shown on the approved landscape concept plan.
3. As part of the Black Mountain Ranch project, access into the coastal sage scrub area in the south central area and the corridor and drainage area in the southwestern corner of Black Mountain Ranch bounded by residential and golf course uses will be limited with fencing or natural barriers, and signage to direct local residents to appropriate locations and approved trails and to prevent public overflow from golf course tournaments.
3. Provide periodic oversight of the golf course best management practices to control chemical overflows and urban runoff into the natural open space system.
4. Provide fencing and/or barrier plantings along the edge of the middle school site in the south to deter unlimited access to this regional wildlife corridor. Informational signage, and environmental education programs including monitored restoration projects involving the students should be implemented to heighten awareness of the MHPA's goals, purpose, and needs in this area.
5. Monitor areas with a previous history of invasive species, such as artichoke thistles, tamarisk, and giant reed for re-invasion, and remove as soon as possible.
6. In Phase 2 of the Black Mountain Ranch project, provide fencing and/or barrier plantings between new residential areas and the MHPA to direct public access and restrict pet access to the MHPA.



Vegetation Communities

- Coastal Sage Scrub
- Chaparral
- Coastal Sage Scrub/ Chaparral
- Grassland
- Riparian/Wetlands
- Oak Woodland
- Coniferous Forest
- Beach/Foredunes
- Eucalyptus Woodland
- Disturbed Habitat
- Shallow Bay
- Developed
- Agriculture

Number indicates reference in text.

- Subarea Boundary
- MHPA Boundary
- Water District
- Subarea
- Military Lands

Base Map Features

- MSCP Boundary
- U.S. - Mexico Border
- Freeway
- Major Road
- Minor Road
- Major Stream
- Minor Stream
- Lake/Lagoon

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Preserve Management: Specific Management Recommendations, Priority 1, City of San Diego MHPA - Northern Area

MSCP Subarea Plan **13** FIGURE

7. Establish trails in the MHPA in number and extent consistent with those approved as part of the Black Mountain Ranch project, and monitor over the long term.

8. The northern fork of La Zanja Canyon that will terminate at proposed Camino Ruiz will be fenced near the road (either at the top or bottom of the fill slope) to direct wildlife movement when the Black Mountain Ranch development is constructed. Maintain the fencing over the long term.

Priority 2:

1. Ultimately restore the floodplain in the northeastern corner of Black Mountain Ranch (as part of Phase 2 of Black Mountain Ranch if feasible) with appropriate local native wetland, riparian scrub and woodland species to enhance its values as habitat and potential wildlife corridor.

2. Restore the 400-foot easement along the utility corridor leading from the north central area of Black Mountain Ranch to coastal sage scrub and grasslands (as part of Phase 2 development if feasible). Evaluate the need for undercrossings with future roads.

3. Maintain the northern fork of La Zanja Canyon free of obstructions and restore degradation to sensitive habitats over the long term.

Black Mountain Park Area

Priority 1:

1. Provide clearly marked access areas and well-demarcated trails and post signage to prevent off-trail access and use. Where sensitive or covered species are present, close trails during the breeding and nesting seasons if necessary.

2. Regularly assess overuse of open space areas in and surrounding the park (as determined by the Park and Recreation Department). Repair trails, and restore off-trail use areas and areas affected by erosion as soon as feasible.

NCFUA Subarea 4

Priority 1:

1. Avoid placing trails along the bottom and in habitat areas of the major north-south wildlife corridor/canyon on Fairbanks Highlands, but clearly marked trails may cross the corridor to access the school and other sites from developed areas. The recommended location for a trail along the canyon is in the area adjacent to the proposed development. Provide appropriate trail signage. Monitoring of this constrained regional corridor is recommended.

2. In McGonigle Canyon, a trail on the north side of the corridor is recommended for bicycles and active use rather than in the bottom of the canyon. A single unpaved trail for pedestrians (and equestrians if needed) can occur inside the canyon. Locate the trail in the least sensitive areas of the canyon. Allowance will be made for a single utilities access road designed to a minimum width and maintained to prevent erosion and sedimentation, where needed in McGonigle Canyon. This road should double as the trail wherever it occurs.

3. Retain the large area of non-native grasslands to the east of the corridor and on both sides of Camino Ruiz as grassland habitat to continue to provide foraging for raptors. This area should not be restored to coastal sage scrub. Enhance or restore disturbed areas with native grassland species. Provide a non-invasive (preferably native) landscape barrier or fencing along the length of Camino Ruiz to protect this area from unlimited access, off-road vehicle use (including bicycles) and other degrading impacts. Signage on the fence and/or barrier is recommended. Clearly demarcate any trails placed through this area, and restore disturbance as soon as feasible.

4. Monitor the edge between development and open space at the boundary between NCFUA Subareas 4 and 5 bordering the Del Mar Mesa open space area. Correct adverse edge conditions (lighting, drainage, etc.), habitat degradation, and encroachments as soon as feasible.

Priority 2:

1. Monitor the major north-south wildlife corridor east of the proposed development area on Fairbanks Highlands for adequate cover for wildlife movement. If the eucalyptus trees die or are removed from this area, replace with riparian and chaparral species. Ensure that the eucalyptus trees do not spread into new areas, nor increase substantially in numbers over the years. Eventual replacement by native species is preferred.

2. Restore disturbed areas in McGonigle Canyon to the appropriate habitat, to be determined by biologists familiar with the local environment. Other than the minimum necessary utilities access road(s), abandon and restore the remainder of the roads in the canyon. In general, coastal sage scrub should be restored on the south-facing slopes of the canyon, mixed chaparral on the north-facing slopes, and riparian habitat in the bottom of the canyon. Remove the eucalyptus trees in this area over the long term, and replace with native riparian trees such as cottonwoods, sycamores, and possibly coast live oaks.

3. Undertake monitoring of the McGonigle Canyon corridor to ensure that wildlife movement is being facilitated, habitat is regenerating or being restored, and overuse is not occurring. Provide enforcement and reparation where necessary.

4. Retain the wetland and drainage areas east of the McGonigle Canyon corridor in an unchannelized, natural state. Remove non-native invasive species from this area to prevent downstream invasion and habitat degradation.

5. Due to the sensitivity of Deer Canyon, limit access to this area. Maintain fencing and signage between development and the canyon as the area develops. Restore degraded areas and prevent off-trail use.

NCFUA Subarea 5

Priority 1:

1. Clearly demarcate all trails through the Del Mar Mesa area 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 existing habitat. Assess existing dirt and disturbed roads and trails for restoration over the long term.

2. Develop an equestrian use plan for the Del Mar Mesa area that avoids the vernal pool habitat and their associated watershed areas. If possible, the Del Mar Mesa area should be managed as a single unit rather than split into separate entities according to ownership (County, various City departments, easements).

3. Protect sensitive areas of Del Mar Mesa area from impacts from adjacent development. Use signage to inform people of the sensitivity of the vernal pools and the Del Mar Mesa area in general, and restrict off-road vehicle use of the area.

Priority 2:

1. Monitor the corridor from Shaw Valley through the bougainvillea golf course development to the Walden Pond area occasionally for usage by wildlife (including mesopredators such as opossums, skunks, and raccoons), as well as feral animals and invasive plant species.

NCFUA Subarea 3

Priority 1:

1. Establish primary trail connections for equestrian and bicycle uses between Gonzales Canyon and Carmel Valley/McGonigle Canyon through or adjacent to the more active, narrow linkage referred to as “Urban/Natural Amenity” in the framework plan.

2. Limit trails to the north side of the floodplain, adjacent to existing and proposed development in McGonigle Canyon, due to the physical constraints of the canyon for wildlife movement. Native plantings at the edges of the trail are desirable to shield the trail from both the development and the wildlife corridor area.

3. A trail on one side (only) of the north south trending canyon that connects Carmel Valley to Gonzales Canyon adjacent to development is preferred to a trail in the bottom of the canyon so that it does not obstruct animal movement. If a trail is placed inside this canyon, it should be limited to day use by pedestrians.
4. Monitor the coastal sage scrub areas in Gonzales Canyon for degradation and take necessary steps to halt and restore degrading areas. Design detention basins planned or constructed for development projects along Gonzales Canyon as natural basins. Clearly demarcate equestrian trails through this area.

Priority 2:

1. Within the Carmel Creek area, and McGonigle and Deer Canyons, restore disturbed areas to the appropriate native habitat over the long term, with riparian woodland species in the canyon bottoms, coastal sage scrub on south and west facing slopes, and chaparral on north facing slopes.
2. Where feasible, remove eucalyptus trees and other invasive non-native species from the MHPA over the long term, and replace with native riparian tree species.
3. Where McGonigle Canyon narrows due to the existing Rancho Glens Estates development, restoration of riparian trees and shrubs is needed to provide cover in the canyon bottom to facilitate wildlife movement.
4. Restore the Gonzales Canyon area to riparian, coastal sage scrub, and maritime chaparral habitats, as appropriate. The north-south trending canyon that connects Carmel Valley to Gonzales Canyon also needs to be restored to coastal sage scrub and maritime chaparral.
5. While the existing equestrian facilities remain at the western end of Gonzales Canyon, the MHPA (preserve) managers should explore the possibility of voluntary restoration of portions of the floodplain to riparian woodland through these properties to facilitate wildlife movement, flood flows, equestrian and pedestrian trails, and generally improve the visual and habitat quality. Natural detention basins are also necessary in this area to remove the pollutants from the riparian system and floodplain area. In the long term, the floodplain should be restored to natural habitats where feasible.

NCFUA Subarea 2: San Dieguito River Mouth and Lagoon Area

Priority 2:

1. Clear the mouth of Gonzales Canyon between the new and old El Camino Real Roads of obstructions in the floodplain and low-lying areas. New development should occur in the least sensitive portions of this area, and adjacent to other developed areas, considering existing onsite or adjacent habitat, wildlife movement, and water flow.

Carmel Valley: Carmel Valley Neighborhood 10

Priority 1:

1. The southern edge of Neighborhood 10 adjacent to Penasquitos Canyon Preserve contains high-value coastal sage scrub and gnatcatcher habitat. Monitor this area for degradation, encroachments, non-native invasive plants, and sensitive brush management. Brush management is to be performed according to the agreements with U.S. Fish and Wildlife, with a biologist on duty, and with reports submitted to the City Development Services Department, and the wildlife agencies, per the negotiated 4(d) take authorization.

2. Monitor the corridor system in Neighborhood 10 for functionality and use by native wildlife species, in addition to species potentially harmful to wildlife. Enhance the corridor's usefulness to wildlife where necessary through restoration, provision of fencing or barriers, or other measures.

3. Provide fencing or barriers along school and park uses and other development adjacent to the MHPA where necessary to direct public access and prevent degradation.

4. Avoid locating trails in the eastern corridor and monitor for degradation. Provide fencing adjacent to the culvert and along the road to direct wildlife movement to the undercrossing in that area.

5. Locate a single trail (pedestrian, bicycle and equestrian trail, combined) in the western corridor. This trail should occur on the existing road through the canyon, and should be the minimum width necessary to accommodate the uses. Where there is currently no road, demarcate the trail alignment clearly and narrow the trail if possible. Monitor use of the southwestern undercrossing and provide fencing at strategic locations if necessary to direct wildlife through the bridge undercrossing.

Priority 2:

1. Assess the entire corridor system in Neighborhood 10 for restoration opportunities. Ultimately remove all non-native, invasive plants (including eucalyptus and castor bean) and replace with native chaparral and coastal sage scrub species. Riparian and native grassland species, in addition to some coastal sage scrub species are appropriate for the Shaw Valley area, especially at the junction of the east and west corridors, out to the Carmel Valley Restoration and Enhancement Project (CVREP) area.

2. In the long term, redesign or remove the concrete detention basin at the mouth of Shaw Valley into the CVREP area. If a detention/sedimentation basin is determined to be needed for Shaw Valley, it should be designed so that it does not obstruct wildlife movement, be relatively shallow and large, and contain natural banks and bottom, with no riprap, concrete, or

other man-made materials. This basin should be planted with riparian scrub and woodland species, and possibly freshwater marsh species if appropriate. It should be designed so as to not constrain the wildlife corridors from functioning at any time of year.

Carmel Valley Neighborhood 8 and CVREP Area

Priority 1:

1. The City-owned land at the eastern end of CVREP should be left as undisturbed as possible outside of CVREP and the boundaries of the historic site (structures and fields).

2. Existing development in the Neighborhood 8/CVREP area will remain. Incorporate measures to reduce impacts associated with lighting, noise, or uncontrolled access.

3. Monitor and maintain the sedimentation basin in the CVREP area yearly to prevent sedimentation of the Los Peñasquitos Lagoon.

4. Monitor for off-trail use through the CVREP and Neighborhood 8 area.

5. Implement cowbird trapping throughout the Neighborhood 8 area to prevent and control parasitism of sensitive songbird nests (least Bell's vireo and gnatcatchers).

Priority 2:

1. Selectively thin thickets of riparian scrub that are determined to cause impediments to wildlife movement or dangerous increases in flood flows, during the non-breeding/nesting season of sensitive wildlife, once every four to five years.

Carmel Valley Neighborhood 8A

Priority 1:

1. Redirect human access from vernal pools and dudleya populations through signage and fencing as necessary to delineate and protect the sensitive areas.

2. Develop an equestrian use plan including a trail system so as to avoid as much as possible wetlands and other highly sensitive areas.

3. Monitor this sensitive area for off-road and off-trail use, and take necessary measures to prevent such use, and repair damage (at minimum, closure of areas) as soon as feasible. Also assess for invasive plant species and remove as soon as possible.

Priority 2:

1. Use some of the existing dirt roads for trails, and 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.

Sorrento Hills

Priority 1:

1. Determine appropriate access points along the edge of Sorrento Hills adjacent to the MHPA.

Torrey Pines Community

Priority 2:

1. In the long term, remove and regularly control the giant reed, castor bean, pampas grass and other invasive non-natives throughout the Sorrento Valley area and Los Peñasquitos Lagoon.

2. Over the long term, monitor for natural regeneration of coastal sage scrub and chaparral on the slopes adjacent to Sorrento Valley. If regeneration does not occur, restoration of limited disturbed areas may be necessary. If possible, involve the industrial park areas on the mesas above Sorrento Valley in removal of non-native invasive species from landscaped and buffer areas, and keep them informed of adjacency issues to the MHPA.

3. Assess the need for a large detention/sedimentation basin at the mouth of Soledad and Los Peñasquitos Creeks in the Los Peñasquitos Lagoon. The purpose would be to capture sediments, pollutants, non-native invasive plant species, and excessive fresh water flows that might affect the estuarine system.

4. Assess Crest Canyon for the need for protection from overuse. Take necessary measures to protect sensitive species within the canyon, to clearly demarcate trails and control off trail use through this area. Consider the use of signage, fencing or other barriers, both within and at the edges of the canyon.

5. In the long term, if funding becomes available, replace the concrete and riprap channels within the Sorrento Valley area with natural bank and bottom flood channels (of adequate width to contain a 50 to 100-year flood if possible). This includes the channel leading from Los Peasquitos Canyon into the Sorrento Valley. Such channels should be two-tiered, with a deeper low-flow channel area, and a narrow terrace along one bank to allow for wildlife movement.

Plant the banks and bottoms with native riparian and wetland species, and plant the terraces with grassland components. The channel bottoms may need occasional maintenance to prevent obstruction of flood flows. Maintenance should consist of selective thinning of variably aged thickets of riparian vegetation, during the non-breeding/nesting season of sensitive bird species.

6. Within the Crest Canyon area, restore disturbed areas with maritime chaparral and remove all non-native species (including the Atriplex lentiformis).

Mira Mesa Community, at the edges of Los Penasquitos Canyon and Lopez Canyon and University City south of Lopez Canyon.

Priority 2:

1. Develop a trail system, including appropriate signage and barriers, to direct/redirect human access into the MHPA. Close unapproved trails and access points and provide barriers or signage where necessary.

Beeler Canyon and Adjacent Areas

Priority 2:

1. Provide educational and awareness programs where existing or proposed residential and industrial uses abut the MHPA pursuant to the general adjacency management guidelines in **Section 1.5.2**.

2. Maintain existing open space areas within the Miramar Ranch North and Sabre Spring communities under existing open space agreements.

3. The area immediately to the north of the boundary of NAS Miramar includes approximately 2,100 acres of the MHPA. This area is predominately characterized by steep terrain and includes existing military/defense uses associated with the General Dynamics facility. Revegetate disturbed areas within the MHPA with the appropriate native seed mix.

1.5.9 Specific Management Policies and Directives for Lake Hodges and the San Pasqual Valley

Background

Goals and Objectives

The optimum future condition for the Lake Hodges/San Pasqual Valley area would be a mosaic of native habitats and compatible farming and recreational activities that act to preserve and rejuvenate healthy natural ecosystems and processes, water quality, and the full range of native species. A complete description of this area is provided in **Section 1.2.5**.

Covered Species

Covered species found in the Lake Hodges/San Pasqual Valley area include:

Plants	**Animals**
Encinitas baccharis	Coastal cactus wren
San Diego barrel cactus	California gnatcatcher
Wart-stemmed ceanothus	Cooper's hawk
	Ferruginous hawk
	Golden eagle
	Least Bell's vireo
	Orange-throated whiptail
	Mountain lion
	Mule deer
	Rufous-crowned sparrow
	San Diego horned lizard
	Western bluebird
	White-faced ibis

Major Issues

The major issues that require consideration for management in the San Pasqual Valley, based on the existing conditions as described in **Section 1.2**, are the following in order of priority:

1. Intense land uses and activities adjacent to and in covered species habitat and linkages.

2. Non-sustainable agriculture, including dairy and grazing operations, and associated activities such as chemical applications and storage.

3. Water quality, including erosion, sedimentation, and agricultural or urban runoff.

4. Flood control needs for leaseholders, including any potential sand removal activities.

5. Utility, facility and road repair, construction, and maintenance activities.

6. Exotic (non-native), invasive plants and animals.

7. Enhancement and restoration needs.

Overall Management Policies and Directives

The following general management policies and directives apply to the Hodges Reservoir/San Pasqual Valley area as a whole; relevant long-range plans and documents that contain existing policies for the area have been reviewed and are incorporated by reference.

San Pasqual Valley Plan Policies

The San Pasqual Valley Plan contains general open space policies in the Sensitive Biological Resources and Open Space Element. These policies pertain to biological resources targeted for preservation and provide general objectives for habitat protection, restoration, flood control, and exotic plant and cowbird removal. These policies serve as focal points to help direct management efforts in the valley. These recommendations on the following pages are either taken from the San Pasqual Valley Plan, or have been carefully formulated to not conflict with plan policies. However, where conflicts occur, resolution should be accomplished consistent with the implementing agreement.

San Dieguito River Park Concept Plan

The San Dieguito River Park Concept Plan contains both general and specific policies, design considerations, park proposals, and additional criteria in Appendices C and D that should be considered in conjunction with the MSCP Framework Management Plan. It is not anticipated that conflicts will occur between the concept plan and MSCP implementation. However, where conflicts occur, resolution should be accomplished consistent with the implementing agreement.

Other General Policies

Priority 1:

1. Avoid crossing areas of the Lake Hodges reservoir that are below the high water line or disturbing previously undisturbed areas with proposed and new utility lines. As much as feasible, the lines should follow previously existing easements and rights of way or use the I-15 corridor to cross Lake Hodges and the San Pasqual Valley.

2. Contain active recreational uses in areas determined appropriate for such activities, as determined by the San Dieguito River Park Concept Plan and the City of San Diego.

3. Implement flood control related measures must be consistent with the goals, policies and specific proposals in the San Pasqual Valley Plan.

4. Monitor the MHPA lands within the Lake Hodges and San Pasqual Valley area for itinerant worker camps; remove these pursuant to existing enforcement procedures as soon as possible.

Priority 2:

1. Organize volunteer recruits from existing horse stables and clubs to clean up horse manure.

Specific Management Directives for Lake Hodges and San Pasqual (Figure 14 Priority 1 only)

West of I-15

Priority 1:

1. Due to the topography and sensitivity of the south side of Lake Hodges, restrict public use of the steep slopes. Any trail system developed on the south side of the lake should use the existing utility road and minimize impacts on sensitive resources. Provide signage identifying appropriate trails and take necessary measures to protect habitat and direct access to approved use areas.

2. Direct public access to identified trails through the coastal sage scrub and habitat areas within the Bernardo Bay and Piedras Pintadas area of the Rancho Bernardo community, located west of the Rancho Bernardo Community Park and Water Department facility and north of the Westwood Community. Provide signage in several locations to interpret the importance of this area for the gnatcatcher and other covered species (in addition to the cultural resources interpretation), and to deter off-trail use. Clearly mark all trails and keep well maintained to discourage off-trail use and to control erosion. Trail fencing or other aesthetic barriers should be installed when security and/or protection of sensitive resources is required. A patrol of the area may be necessary to monitor off-trail use and illegal dumping.

3. Manage public use of mitigation lands on the slopes north of the reservoir in a manner consistent with the habitat function and mitigation requirements. Split rail or wire fencing may be constructed adjacent to the roadside and public areas to accommodate wildlife movement.

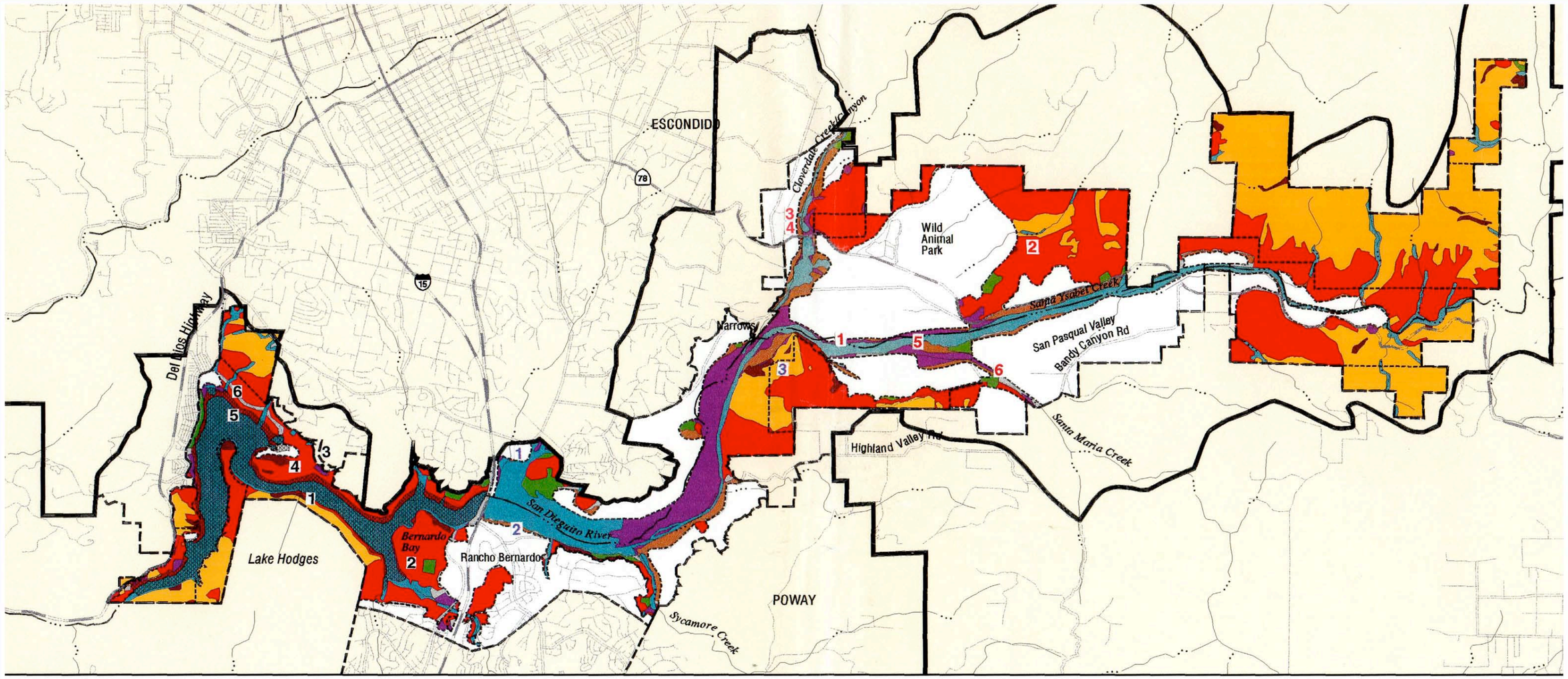
4. Direct public access to authorized trails with signage and barriers.

5. Regularly monitor and maintain the shores and uplands of Lake Hodges for litter and exotic invasive plant species, and off-trail use including motorized vehicle activity. Remove and dispose of the litter and invasive plants as soon as possible.

6. Utilize the existing fire maintenance road along the north shore of the reservoir as the trail system, and avoid cutting new trails through native habitats, especially between the marina area and I-15.

Priority 2:

1. Use non-impactive erosion control methods (e.g., mulching with non-invasive plant materials) as necessary to repair areas experiencing erosion. Reseed and restore these areas as soon as feasible.



Preserve Management: Specific Management Recommendations, Priority 1, City of San Diego MHPA Hodges Cornerstone Lands and San Pasqual Valley

MSCP Subarea Plan **14** FIGURE

2. Over the long term, replace non-native trees and shrubbery along the access road leading from Del Dios to the marina on the north side of Lake Hodges with native vegetation, including coastal sage scrub, native grasslands, and riparian and oak woodlands, in order to provide habitat and encourage wildlife movement between the slopes north of the road and the reservoir.

East of I-15 to Narrows

Priority 1:

1. Due to the sensitivity of the wetlands and presence of least Bell's vireos on the north side of the reservoir and adjacent to I-15, install fencing or other aesthetic barriers at the MHPA boundary if development of this site occurs in the future. Trails should occur on the open space side of the fence/ barrier within an adequately sized wetland buffer area (100-200 feet). Provide regular maintenance of this site for development impacts, litter and debris.

2. If the Pinery Tree Farm lease area redevelops on the south side of the floodplain near I-15, install chain link or equivalent type fencing along the development side of an adequate wetland buffer (100-200 feet). This will protect the least Bell's vireo and other sensitive species from potential impacts from the Pinery lease, preserve and protect the existing riparian, wetland, and native vegetation, and help prevent invasion by non-native species. Mounding may be used to help accomplish the wetland buffer objectives. Use only native species for landscaping or revegetation within this area, and remove existing invasive non-native species prior to fencing. Provide regular maintenance of this site for development impacts, litter, and debris.

3. Retain the large expanse of native habitats on the slopes southeast of the Narrows area in an undisturbed condition. If development occurs on the property, place fencing or other aesthetic barriers along the MHPA boundaries to direct access.

Priority 2:

1. On the south side of Highland Valley Road adjacent to the water reclamation plant, protect the hill covered with coastal sage scrub from further encroachment.

2. The area referred to as the "truck scales," on the northwest side of Highland Valley Road where the road bends eastward, is an area that the MHPA boundary splits. This area is part of a mitigation settlement with U.S. Environmental Protection Agency to execute removal of fill in the floodplain and to remove exotic plants. The banks will be stabilized with native riparian scrub. Plan and monitor the portion of the site outside the MHPA boundary and mitigation area to minimize disturbance (including lights and noise) to the riparian corridor or to the coastal sage scrub

covered slopes. Assess this area for the need to remove exotic invasive species that may threaten native habitat, and perform timely removal.

3. Demarcate the boundaries between agricultural lands and the hill east of the winery to reduce disturbance.

4. The 100-acre area on the north side of the floodplain just east of Mule Hill identified as the squash farming lease, should be considered for phased restoration to coastal sage scrub in the upland portions. This will provide critical upland habitat adjacent to the floodplain and riparian areas as well as establish a wildlife connection between the riparian habitat and coastal sage scrub habitat to the north in Escondido. The location, amount (acreage) and timing of restoration will be evaluated and may identify opportunities to restore bottomland portions of this lease to grassland and riparian habitat depending on further biological assessment. Restoration could occur in phases moving from west to east, through mitigation, volunteer activities, and/or lease negotiations. However, acquisition of privately owned coastal sage scrub habitat elsewhere in the valley should be of a higher priority for use of environmental mitigation funds.

5. In order to strengthen the wildlife connection along Sycamore Creek to the Blue Sky Ranch, remove non-native trees and shrubs and replace with native riparian species. In the long term, the flood channel should be modified to improve the corridor width and provide a more natural channel bank with a shallow slope ratio and to provide flood control for agricultural uses to the east.

Narrows to eastern end of Valley

Priority 1:

1. The boundaries of the MHPA and the agricultural or other leases must be clearly defined for the involved City departments (e.g., Water Department, Real Estate Assets) by documentation in the leases and demarcation (stakes or other methods) in the field as needed. Hold lessees responsible for encroachments/impacts or disturbance to MHPA lands through their contracts with the City. Periodic monitoring and enforcement of compliance must be ensured by the appropriate department.

2. Protection of coastal sage scrub and other upland habitats from disturbance throughout this portion of the valley (e.g., Wild Animal Park area, other slopes on both the north and south sides) will require periodic monitoring to ensure no disturbance is occurring. If disturbance occurs, consider protective measures.

3. Any proposed equestrian operations should generally occur where those uses already occur or be placed approximately 300-500 feet away from coastal sage scrub or riparian habitats. Cowbird trapping on each leasehold will be necessary and should be included in all new or renewed lease contracts.

4. Fence the Cloverdale Canyon riparian corridor to keep livestock from entering habitat/corridor areas and disturbing the creek or its banks. Because the lease occupies both sides of the creek, allow fenced livestock crossing areas as needed.

5. Preserve the existing wildlife corridor width of approximately 800 feet along the San Dieguito River and Santa Ysabel Creek as a connection between the floodplain and areas with upland habitat to ensure maintenance of the corridor's width through agreements with the Water Department and City lessees. The San Pasqual Valley Plan recommends a minimum 300-500-foot width through Cloverdale Canyon, a tributary to the main riparian corridor in the valley.

6. Establish a riparian corridor and provide fencing along the length of Santa Maria Creek adjacent to the dairy lease to exclude livestock from entering and disturbing habitat areas.

Priority 2:

1. Generally in most areas of the valley floor and tributaries, riparian vegetation will naturally regenerate and active restoration will not be needed except for locations where determined necessary by future MHPA (preserve) managers. Where enhancement is considered, use only local native species.

2. Restore the area of Santa Maria Creek that lies northeast of the intersection of Bandy Canyon Road and Ysabel Creek Road to strengthen the wildlife connection. When/if the uses in this area change, recognize and incorporate both the constraints of the floodplain and the wildlife corridor into any future lease.

3. Where the river corridor and jurisdictional boundary narrows near the eastern end of the valley, provide periodic monitoring to ensure maintenance of a continuous regional wildlife corridor with connections made to offsite open space lands wherever possible. If the land uses in this area south of the river constrain the corridor width, then agreements or negotiations may be necessary to assure adequate width, or other options may need to be considered.

4. In the far eastern portions of the valley, through the tree groves, the riparian connection is extremely narrow. Where the river cuts through the groves, limit efforts to control the natural ecological processes. Maintain the groves without fencing and allow unrestricted wildlife movement through the groves. Preserve the existing riparian corridor along Santa Ysabel Creek for use as a wildlife connection to Pamo Valley and evaluate a widening if there is a change in agricultural use that further constrains the corridor.

1.5.10 Specific Management Policies and Directives for the Other Cornerstone Lands

The Water Department (WD) currently manages their lands in response to complaints of dumping, illegal camping, vandalism, etc., and responds to correct the problems on an as needed basis. Where land is leased, the lessee is responsible for maintenance/management of the land. The WD also performs some routine maintenance of brush surrounding existing recreational facilities at each of the reservoirs. At present the maintenance program does not include the removal of exotics. The WD expects to continue the existing maintenance program until the lands are "set aside" through their proposed Cornerstone Lands Conservation Bank Agreement. Maintenance and management will then be required to be consistent with the MSCP plan.

The following are normal activities within reservoir watersheds. Each of the Cornerstone Lands has different maintenance requirements which may include all or a portion of the activities listed below:

1. Patrolling for debris and dump sites with removal to landfills or on site disposal/storage.

2. Patrolling for pollution/nuisance type activities and for public protection.

3. Brush management for fire protection of Water Department facilities, private property, road, trail and parking lot maintenance.

4. Water quality sampling and analyses for surface and well water.

5. Maintenance of weather monitoring stations.

6. Access for watershed surveys, management and monitoring.

7. Field reviews for construction plan checks of other agencies and developers on properties adjacent to City property.

8. Maintenance around reservoir keepers' residences, water wells and waste disposal facilities.

9. Maintenance of leach fields servicing water treatment plants, public parks and recreational facilities.

10. Maintenance of public pedestrian access, hiking, and bicycling paths, horse trails, fishing, and hunting as permitted by the City.

11. Maintenance and operation of groundwater recharge, extraction, and conveyance facilities.

12. Maintenance and operation of flood control and surface water conservation facilities.

13. Maintenance and monitoring of siltation and erosion control facilities, water quality control basins, diversion ditches and other facilities.

14. Operation and maintenance of existing water and sewer pipeline and pump station facilities across reservoir properties.

15. Maintenance of utility access roads.

16. Access for land management of easements and leases of Water Department owned properties.

17. Vegetation control immediately around dams for dam safety.

1.5.11 Vernal Pool Management Guidelines

The City of San Diego has developed a Vernal Pool Management Plan which covers proposed management recommendations for vernal pools on 25 sites throughout the City, including City-owned sites and vernal pool sites within open space easements. The plan describes a coordinated program for management of the vernal pools, lists tasks associated with each pool site, and summarizes the tasks in a table/matrix. Where appropriate refer to specific tasks identified in the Vernal Pool Management Plan.

1.5.12 Fire Management Guidelines

Background

Fire management in the City of San Diego primarily focuses on fuel or brush management, and is regulated by the Landscape Ordinance and Landscape Technical Manual, in conjunction with the Fire Department. The typical mesa-canyon topography and fire-adapted native vegetation of the coastal region has led to the common condition of development occurring on mesa tops surrounded by canyon slopes of highly-flammable chaparral and other natural open space. This typical occurrence has justifiably raised public safety concerns which have been addressed by the City's Landscape Ordinance and Landscape Technical Manual. The formation of an open space system to protect biological resources and 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:

1. Fire hazard reduction methods, including brush management, for public safety purposes may impact sensitive species.

2. Fire hazard reduction may involve methods that increase other management concerns (e.g., exotic species invasion, erosion).

3. Native vegetation communities subjected to fire suppression over long periods of time often become woody and senescent, contributing to severe fire hazard for development in and adjacent to the MHPA.

4. Senescent native vegetation no longer supports the diversity of species of areas allowed to rejuvenate through periodic non-catastrophic fire.

5. Catastrophic fires can destroy soil structure, seed banks, root burls and other natural regeneration components, and act to convert native plant communities to non-native landscapes.

6. Fire management needs for particular fire-adopted species such as Del Mar manzanita and Shaw's agave.

1.5.13 Monitoring Plan

The monitoring component of the management plan is under separate cover, and is incorporated into this document by reference. Its preparation is pursuant to the wildlife agencies requirements. The document contains the monitoring program for the entire MSCP Preserve system, identifying both specific areas within the City of San Diego and recommended categories to target future monitoring locations. The monitoring plan identifies basic monitoring requirements for the various native habitats, covered species, and corridors, and also includes monitoring and reporting requirements, a remediation section and highlights research opportunities.

Biological monitoring will be the joint responsibility of the City and the wildlife agencies for all lands within the City's boundaries. Proper management of the MHPA will require ongoing and detailed analysis of the data collected through monitoring activities. To ensure uniformity in the gathering and treatment of this data, the wildlife agencies will assume primary responsibility for coordinating the monitoring programs, analyzing data, and providing information and technical assistance to the jurisdictions. No additional fees will be charged to landowners for biological monitoring.

1.5.14 Research Opportunities for the Academic and Professional

The MHPA presents a rich array of research opportunities for the academic and professional communities, primarily in disciplines related to biology, ecology, and natural resources management, but also ranging to environmental design, sociology, and park use and administration. The City of San Diego encourages research within the MHPA in order to gain valuable information unavailable through other means. There are a multitude of unanswered questions posed by the development of a multiple species and habitat system where little literature or previous research exists on the majority of species inhabiting the region. In addition, research on vegetation associations and habitats, natural regeneration, restoration, fragmentation,

edge effects, genetics, viability, predation, wildlife movement, wildlife use of culverts and other undercrossings, and much more, would be useful to provide information on the health and dynamics of an urbanized open space system as well as how to improve conditions. The MSCP Biological Monitoring Plan makes recommendations for further research to supplement the required monitoring program.

Some specific requirements for researchers are needed in order to obtain a mutual benefits for the City, the MSCP program, wildlife agencies and researchers. These include:

1. Coordination with City staff to discuss projects, potential locations, guidelines for access, and oversight responsibility.

2. Application to do research should occur through a letter sent to City staff, with a copy to the MSCP habitat management technical committee. The application should describe the participants, the precise location where the work is to be done, the tasks and methodologies that would take place on preserve lands, the dates and approximate length of time for the research, and any known or expected disturbances. The letter will need to present proof of insurance or indemnify all participants in the research effort to work at their own risk.

2. Applicants must agree to provide the data or the results of the research to City staff, and to the wildlife agencies within a reasonable timeframe after the completion of the project. If working on a grant or similar funding arrangement, a letter from the grantor acknowledging and accepting this arrangement must be submitted.

3. If working in state or federally listed species habitat or wetlands, any necessary permits from the appropriate agencies must be obtained prior to commencement of research, with a copy provided to the City or MSCP management entity.

4. The researchers will be held responsible for any damage or disturbance to native plants, animals, hydrology, or any other aspect of the natural ecosystem, and will need to provide restoration or other reparation if necessary.

1.6 PROTECTION OF RESOURCES

1.6.1 Interim Protection

The City of San Diego currently provides protection to sensitive biological resources through policies and regulations. The Open Space and Conservation Elements of the General Plan and community plans identify, in varying level of detail, important areas to be protected for open space, including for biological purposes.

The City has the following existing regulations which provide protection to sensitive environmental resources: the Resource Protection Ordinance (RPO) and Guidelines; the Sensitive Coastal Resource Overlay Zone (SCR); and the Hillside Review (HR) Ordinance and Guidelines. RPO is designed to protect sensitive biological resources and hillsides through limitation of encroachment into these lands to a maximum of 20 percent of the parcel, plus 15 percent in certain limited circumstances (provision of major public facilities). Development is directed to the least sensitive portions of the site with the remainder of the property left in open space. For the most part, premature clearing and grubbing of habitat is restricted except as exempted under RPO.

Additionally, the City implements the California Environmental Quality Act and Guidelines through the Environmental Quality Ordinance, and requires protection of significant biological resources as mitigation for project impacts.

The City has revised, updated and consolidated existing environmental regulations into new draft Environmentally Sensitive Lands (ESL) regulations. One goal was to create regulations that can better serve as implementing tools for the City's MHPA. Specifically in the September 1995 draft of the ESL:

- RPO, SCR and HR have been combined to be applied citywide.

- Development on private lands in the MHPA will be limited to 25 percent of the parcel, with the remainder left in open space.

- Several open space zones have been created for use in implementing the MHPA and other open space, including OC (open space-conservation); OF (open space-floodplain); and OR (open space-residential). The OR-1-2 Zone would be applied to parcels within the City's MHPA, and would contain the 25 percent development area regulations.

1.6.2 Permanent Protection

The long-term biological integrity of the MHPA will be ensured as follows:

1. Lands set aside in the MHPA as mitigation for development occurring outside the MHPA and lands acquired for the MHPA with public funds will be protected with open space easements or, at the landowners option, dedicated in fee to the City, or other governmental or non-profit agency which will take over management responsibilities and liability.

2. Public lands (federal, state and local) committed to the MHPA will be protected with open space easements, dedications, zoning, general plan designations or other protective measures to ensure that such lands are managed and preserved consistent with the MSCP and this Subarea Plan.

3. Private development within the MHPA will be regulated through the Environmentally Sensitive Lands (ESL) permit process and any CEQA review required to allow development to occur on the premises. Development will be directed toward the least biologically sensitive portion of the site by the Environmentally Sensitive Lands ordinance. The permit implementing the Environmentally Sensitive Lands regulations will be recorded with the county recorder and will run with the land. The indirect impacts of the development will be addressed in the ESL permit to ensure protection of the sensitive resources remaining on the premises outside of the development area.

1.6.3 Mitigation Plan

Mitigation for sensitive biological resources involves "compensating" for impacts through off-site acquisition, on-site preservation, habitat restoration, or in limited cases, monetary compensation. The mitigation plan for any proposed project must include provisions for protection or preservation and management (including responsibility) of the mitigation areas. Mitigation is one method by which lands within the MHPA are proposed to be acquired.

For impacts occurring outside of the MHPA, compensating mitigation may be required for significant impacts to sensitive habitats. This mitigation would be based on the habitat type, and the location of the mitigation site, as set forth in the City's biology guidelines. Mitigation occurring within the MHPA would generally occur at a lower ratio due to the critical nature and high biological value of the preserve. Any areas proposed as mitigation areas outside of the MHPA would be required to demonstrate that the area can retain long-term viability, and is part of a large, connected open space system.

For impacts occurring within the MHPA necessary to achieve the allowable 25 percent development area of the proposed underlying OR-1-2 zone, no mitigation would be required for impacts to sensitive upland resources. The remaining 75 percent area outside of the allowable development area would be left undeveloped. If the property owner elects not to dedicate the undeveloped area in fee to the City, a covenant of easement must be recorded against the property which incorporates any conditions applying to the undeveloped area, including limitation on uses and provisions for long-term management. Active habitat management may not occur if the landowner retains fee title, though grading and clearing can be prohibited.

For those projects within the City that received approval prior to the effective date of the City's Subarea Plan and implementing agreement, and are considered vested under California law, or have been determined by the City and wildlife agencies to have appropriately satisfied mitigation requirements, no additional mitigation will be sought except to the extent required by the federal and state Endangered Species Acts for currently listed species.

1.6.4 Conservation Estimates

Lands within the City of San Diego MHPA are proposed to be conserved by one of the following five methods: 1) conservation of existing public lands; 2) land use restrictions of property within the MHPA through zoning regulations; 3) open space exactions directed toward building the MHPA imposed on new development outside the MHPA; 4) open space previously set aside on private lands for conservation as part of the development process; 5) public acquisition of private lands.

The City of San Diego's Subarea Plan proposes 90 percent conservation of 56,831 acres within the MHPA for a total of 52,012 acres. Public lands, including Cornerstone Lands, within the City's MHPA total 38,880 acres, of which 94 percent, or 36,697 acres, is expected to be preserved in perpetuity. The total public lands include 5,806 acres owned by federal and state government, and 33,074 owned by the City of San Diego and other local jurisdictions. Negotiated open space on private lands (100 percent conserved) in the City's MHPA totals 5,012 acres. Through future application of the Environmentally Sensitive Lands Ordinance and open space zone, approximately 7,903 acres could be conserved. Acquisition will be required in a number of areas that are critical to MHPA configuration and viability and where development as allowed under the resource regulations would impair or preclude it's function. Acquisition could be accomplished with either public funds or from mitigation requirements for private and/or public development impacts outside the MHPA. It is estimated that at a minimum, approximately 2,400 acres of private land would need to be acquired.

It is important to realize that the numbers included above are not additive, since the amount, timing and location of land conservation through regulation, mitigation and public acquisition is not known. The amount, timing and location of conservation by any one method will affect the same factors for the other methods.

For the majority of covered species, it is accepted that conserving habitat within the MHPA at the above conservation goals will not appreciably reduce the likelihood of the survival and recovery of these species in the wild. While this is true for species with wide geographic distributions, species with very limited geographic ranges (narrow endemic species) would require additional conservation measures to assure their long-term survival.

For wetlands, including vernal pools in naturally occurring complexes, and narrow endemic species, inside the MHPA, impacts will be avoided. Outside the MHPA, narrow endemic species will be protected through the following measures, as deemed appropriate: 1) avoidance; 2) management; 3) enhancement; and/or 4) transplantation to areas identified for preservation. Unavoidable impacts associated with reasonable use or essential public facilities would need to be minimized and mitigated. In addition, state and/or federal permits may be required for impacts to wetland habitat. The following is a list of narrow endemic species:

Narrow Endemic Species

Acanthomintha ilicifolia	San Diego thornmint
Agave shawii	Shaw's agave
Ambrosia pumila	San Diego ambrosia
Aphanisma blitoides	Aphanisma
Astragulus tener var titi	Coastal dunes milk vetch
Dudleya blochmaniae ssp. Brevifolia	Short-leaved dudleya
Dudleya variegata	Variegated dudleya
Hemizonia conjugens	Otay tarplant
Navarretia fossalis	Prostrate navarretia
Opuntia parryi var. serpentine	Snake cholla
Orcuttia california	California Orutt grass
Pogogyne abramsii	San Diego mesa mint
Pogogyne nudiuscula	Otay Mesa mint

1.6.5 Take Estimates

Habitat loss or "take" within the MHPA will be avoided or minimized to a maximum of 25 percent on parcels within the MHPA. Take of habitat for covered species outside of the MHPA will not be restricted by the City's MSCP Subarea Plan except as necessary for narrow endemic species. **Table 2** reflects an estimate of habitat take inside and outside the MHPA. This estimate of take assumes that wetland impacts inside and outside the MHPA will be avoided or mitigated under federal and state regulations to achieve a "no-net-loss of function and value." This estimate of loss represents a worst-case analysis; actual loss outside the MHPA may be lower due to avoidance of habitat impacts on steep slopes.

1.7 MSCP IMPLEMENTATION FUNDING

The MSCP plan contains estimates for the costs of habitat acquisition, maintenance and monitoring, based on Subarea Plans submitted by the local jurisdictions. Based on new information from the jurisdictions, the targeted number of acres which will need to be acquired is estimated to be 27,000 acres. The regional (local) share of habitat acquisition will be one-half of approximately 13,500 acres. As described above, the City of San Diego's total acquisition need is estimated to be 2,400 acres, with approximately 1,000 acres of that expected to be provided from project mitigation.

The MSCP plan will also contain a long-term strategy in the form of several options for funding the needed acquisition, maintenance and monitoring. Local funding sources, including a parcel tax/benefit assessment, community facilities district/ "Mello-Roos," general obligation bonds - Ad Valorem tax and a sales tax, are analyzed in the final MSCP plan. Local funding sources will be voter approved. If public funding sources do not become available, the City will not increase private development contributions beyond what is committed to in the MSCP plan and implementing agreement.

Short-term Funding Needs. The San Diego Dialogue has been exploring methods to finance the local share of program costs for acquisition and maintenance, particularly funding of the short-term need prior to voter approval of long-term regional financing. The San Diego Dialogue is seeking short term financing of $39 to $53 million for initial purchase of up to 4,000 acres in the MSCP study area in the first three years of program implementation. This is intended to be matched by a similar expenditure by the federal and state governments, for a total initial purchase of up to 8,000 acres. The City will participate with other jurisdictions and agencies in assisting with the short-term financing need.

Regional Funding Obligation. The City of San Diego, participating with other jurisdictions in the MSCP, will be jointly responsible for acquiring half of the lands required for public acquisition, and for funding management, monitoring and administrative costs of those lands acquired by the jurisdictions respectively. The funding of the local share will be carried out on a regional basis. The City agrees to participate in pursuing regional sources of funding, but this requirement will not preclude the City from initially pursuing alternative funding sources. Lands acquired through mitigation for public and private projects or through land use regulation will not be credited against the acquisition obligations of the parties. The MSCP plan reflects the commitment of the City and other jurisdictions to secure adequate funding to carry out the program, and identifies the funding strategies the jurisdictions intend to pursue. The plan also sets out a time table under which the City and the other participating jurisdictions will begin a process to procure funding within 18 months of federal and state approvals of the first Subarea Plan(s), and will have a funding source(s) in place within an additional 18 months. The wildlife agencies are willing to adjust this schedule if the jurisdictions demonstrate that their good faith efforts require additional time. Within this time frame, the participating jurisdictions will create a structure through which regionally generated funds will be allocated.

The parties recognize that achieving the goal of a regional funding program may be compromised if any of the current participants opt out of the MSCP or fail to complete a Subarea Plan. If such circumstances arise before a source(s) of funds is to be in place, the wildlife agencies and the remaining participants will jointly reassess the feasibility of a regional approach to funding. If the wildlife agencies and the jurisdictions conclude that a regional funding strategy is no longer feasible, the jurisdictions will decide on and implement alternative strategies for funding the local share of the MSCP.

In the event that adequate funding for the MSCP is not provided, the wildlife agencies will assess the impact of the funding deficiency on the scope and validity of the permits. The wildlife agencies and the jurisdictions will meet and confer to develop a strategy to address the funding shortfall, and will undertake all practicable efforts to maintain the level of coverage afforded by the permits issued under the program until the situation can be remedied.

TABLE 2
ESTIMATED HABITAT LOSS ("TAKE") ACRES
WITHIN CITY OF SAN DIEGO SUBAREA

Vegetation Community	Estimated Take Outside MHPA	Estimated Take Inside MHPA	Total
Beach	383	0	383
Saltpan	0	0	0
Southern Foredunes	2	1	3
Southern Coastal Bluff Scrub	10	9	19
Coastal Sage Scrub	5,731	2,234	7,965
Chaparral	3,952	1,228	5,180
Southern Maritime Chaparral	355	129	484
Maritime Succulent Scrub	112	41	453
Coastal Sage/Chaparral	32	23	55
Grassland	6,184	445	6,629
Southern Coastal Salt Marsh	0	0	0
Freshwater Marsh	0	0	0
Riparian Woodland	0	0	0
Riparian Scrub	0	0	0
Oak Woodland	59	33	92
Torrey Pine Forest	5	9	14
Tecate Cypress	0	0	0
Eucalyptus Woodland	453	19	472
Open Water	0	0	0
Disturbed Wetlands	0	0	0
Natural Flood Channel	0	0	0
Shallow Bays	0	0	0
Other Habitat	153	37	190
SUBTOTAL (Habitat)	**17,731**	**4,207**	**21,938**
Disturbed	6,605	316	6,921
Agriculture	7,580	294	7,874
TOTAL	**31,916**	**4,817**	**36,733**

[1] It is assumed that all wetlands would be mitigated to achieve a no-let loss of function and value. Therefore, the City's MSCP Subarea Plan does not assume any take of wetland habitat. It should also be noted that this estimate reflects a worst-case analysis.

Appendix A

Species evaluated for coverage under the MSCP

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Plants					
Acanthomintha ilicifolia	85% of 8 major populations	15% of major populations	Site-specific preserve design and special measures/ management	Monitoring Plan – Site Specific (4 populations) and Management Plan/Directives	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because all major populations are within the MHPA and each of the eight major populations will be conserved from 80-100 percent, with 85 percent conserved overall. This species is on the list of narrow endemics[1] which requires jurisdictions to specify and implement measures in their Subarea Plans to avoid or minimize impacts to all populations (including Asphalt, Inc., Sky Mesa, El Capitan sites) during project design. **Notes:** This species occurs on clay and gabbro soils which will be conserved at 28+ percent and 43+ percent respectively **Conditions:** Area specific management directives and the SPA for the Otay Lakes Resort area must include specific measures to protect against detrimental edge effects from the surrounding development.					
Agave shawii Shaw's agave none	100% of major populations	No major populations	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because all known extant populations are within protected public land (Torrey Pines State Preserve and Border Field State Park). This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional specific conservation measures[1] for the species. **Notes:** Additional important populations are found on military lands (Pt. Loma) which are not part of the MSCP. Populations at Pt. Loma aer not part of the MSCP, but will be conserved at a minimum of 91 percent in the Pt. Loma Ecological Reserve Area. **Conditions:** Area specific management directives must include specific measures to protect against detrimental edge effects.					
Ambrosia pumila San Diego ambrosia none	90% of the only major population	10% of the only major population	Site-specific preserve design and special measures/management	Monitoring Plan – Site Specific (major population) and Management Plans/Directives	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered because 90 percent of the only major population in the MSCP will be conserved and the adjoining population at the radio tower site will be 100 percent conserved. This major population occurs on public lands in the Mission Trails Regional Park. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional specific conservation measures[1] for species. **Notes:** The conservation level of this species has changed due to new information. Occurrences in the Spring Canyon, Otay Mesa (East of Otay Lakes), Otay Valley (along the Otay River), and Hidden Trails were misidentified and are now known to be a common species of *Ambrosia.* The small population within the Sna Diego National Wildlife Refuge (Rancho San Diego) will also be conserved and managed by the USFWS. **Conditions:** If more than 10 percent of the populations at the Mission Trails Regional Park is impacted, this species will no longer be a covered species. Area specific management directives must include monitoring of`transplanted populations, and specific measures to protect against detrimental edge effects.					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Aphanisma blitoides Aphanisma None	90% of potential habitat (261± acres) – 92% of southern foredunes (123± acres), 88% of southern coastal bluff scrub (138± acres)	10% of potential habitat (28+ acres) – 8% of southern foredunes (9± acres), 12% of southern coastal bluff scrub (17± acres)	Preserve design/landscape level with site-specific conservations(s)/management	Monitoring Plan – Habitat Based and Incidental	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 90 percent of its potential habitat will be conserved. **Notes:** Additional potential habitat occurs on military lands (Silver Strand, Imperial Beach) which are not a part of the MSCP. There are no known populations of this species.					
Arctostaphylos glandulosa var. *crassifolia* Del Mar manzanita FE/	91% of major populations and 67% of southern maritime chaparral habitat	9% of major populations	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Site Specific	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Astragalus deanei Dean's milk vetch None	Unknown conservation level and therefore not covered by the plan.				NO
Astrogalus tener var. *titi* Coastal dunes milk vetch PE/CE	92% of southern foredunes (123± acres)	8% of southern foredunes (11± acres)	Preserve design/landscape level	Monitoring Plan – Habitat Based and Incidental	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 92 percent of the vegetative community that is potential habitat for this species will be conserved.

Notes: This species is not known to occur within the MSCP.

Conditions: Area specific management directives must provide for reintroduction opportunities, identify potential reintroduction sites, and include measures to prevent non-native species introductions. Any newly found populations shall be evaluated for inclusion in the preserve strategy through acquisition, like exchange, etc.

Baccharis vanessae Encinitas baccharis FT/CE	92% of major populations	8% of major populations	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Site Specific (1 population) and Management Plans/Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 92 percent of the major populations will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional specific conservation measures[1] for the species. **Conditions:** Based on BMPs, area specific management directives must include specific management measures to address the autecology and natural history of the species and to reduce the risk of catastrophic fire; and appropriate male/female plant ratios. Management measures to accomplish this may include prescribed fire.					
Berberis nevinii Nevin's barberry none	100% of populations (occurrences are all persisting cultivars)	No natural populations present	Site-specific preserve design and special measures/management	Monitoring Plan – Habitat Based	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED. This species will be covered by the MSCP because persisting cultivars occurring in Spring Valley and Torrey Pines State Reserve will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional specific conservation measures[1] for the species. **Notes:** Since no known natural populations occur within the plan area, development covered by the plan will not impact the species. Persistence of naturally occurring populations in the San Diego County is dependent on conservation efforts outside the MSCP area.					
Brodiaea filifolia Thread-leaved brodiaea PT/CE	88% of vernal pool habitat, 38% of grassland	12% of vernal pool habitat may be impacted, but his habitat is subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat based	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 88 percent of the vernal pool habitat and 38 percent of grassland habitat that are potential habitat for this species will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional specific conservation measures[1] for the species if a population is identified in the future. **Notes:** This species is not known to occur within the MSCP area.					
Brodiaea orcuttii Orcutt's brodiaea None	All major populations in the MSCP area, 88% of vernal pool habitat, 38% of grassland	12% of vernal pool habitat may be impacted, but this habitat is subject to no net loss of function and value and 404(b)1 guidelines.	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Site Specific (4 populations) and Management Plans/Directives	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because all of the major populations in the MSCP plan area (4 populations) will be conserved. This is Group A species in the County's proposed BMO[2]. **Notes:** Three major populations occur on Miramar military lands which are not part of the MSCP. Participating jurisdiction's guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. **Conditions:** The San Vincente population is identified as a critical population in the County's Subarea Plan and must be 100 percent conserved. Area specific management directives must include specific measures to protect against detrimental edge effects.					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Calamagrostis densa Dense reed grass	91% of major populations	9% of major populations	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 91% of major populations will be conserved.

Notes: Taxonomic reclassification has combined this taxon in a more common taxon, (*Calamagrostis koeleriodes) which is widespread.*

Conditions: Trail maintenance/placement to avoid human impacts must be addressed in area specific management directives. Enhancement opportunities using prescribed fire should be evaluated in the management plans. Area specific management directives must include specific management measures to address the autecology and natural history of the species and to reduce the risk of catastrophic fire.

Calochortus dunnii Dunn's mariposa lily */CR	100% of major populations	No major populations	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Photo Plot and Management Plans/Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 100 percent of the major populations will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional specific conservation measures[1] for the species if a population is identified in the future. **Notes:** Fifty-two percent of one of the three major populations occurs within a major amendment area in the Otay Mountain area. (Take authorization amendments will be subject to public review through CEWZ and NEPA processes and require approval by CDFG and USFWS.) This species occurs on gabbro and metavolcanic soils and 43+ percent of the gabbro soils in the MSCP plan area are within the MHPA.					
Caulanthus stenocarpus Slender-pod jewelflower /CR	75% of major populations	25% of major populations	Site-specific preserve design and special measures/management	Monitoring Plan – Habitat Based and Incidental and Management/Directives.	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 3 or 4 (75 percent) of the major populations and 89 percent of occurrences will be conserved. The Wildcat Canyon, Poway/Sanrex, and Fortuna Mountain populations are identified as critical and will be 100 percent protected (San Diego County Subarea Plan requirement). **Note:** This tax has been combined with the more widespread and common *Caulanthus heterophyllus* var. *heterophyllus.* **Conditions:** Area specific management directives must include specific management measures to address the autecology and natural history of the species and to reduce the risk of catastrophic fire. Management measures to accomplish this may include prescribed fire.					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Ceanothus cyaneus Lakeside ceanothus none	75% of major populations	25% of major populations	Site-specific preserve design and special measures/management	Monitoring Plan – Habitat Based and Photo Plot	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSP because 3 of 4 (75 percent) of the major populations will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional specific measures[1] for the species if a population is identified in the future. This is a Group A species in the County's proposed BMO[2].

Conditions: Area specific management directives must include specific management measures to address the autecology and natural history of the species and to reduce the risk of catastrophic fire. Management measures to accomplish this may include prescribed fire.

Ceanothus verrucosus Wart-stemmed ceanothus none	67% of major populations, and 64% of known localities	33% of major populations, and 36% of known localities	Site-specific preserve design and special measures/management	Monitoring Plan – Habitat Based and Photo Plot and Management Plan/s Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 67 percent of the major populations will be conserved, and special management actions will increase populations. This is a Group B species in the County's proposed BMO[2]. **Notes:** Additional important populations (30 percent of known populations) are found on military lands (Pt. Loma, Miramar) which are not part of the MSCP. **Conditions:** Revegetation efforts within appropriate habitats must include restoration of this species. 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 autecology and natural history of the species and to reduce the risk of catastrophic fire. Management measures to accomplish this may include prescribed fire. Any newly found populations should be evaluated for inclusion in the preserve strategy through acquisition, like exchange, etc.					
Chorizanthe orcuttiana Orcutt's spineflower	Unknown conservation level and therefore not covered by the plan.				NO
Cordylanthus maritimus ssp. *maritimus* Salt marsh bird's-beak FE/CE	100% of major populations	No major populations	Site-specific preserve design and special measures/management	Monitoring Plan – Site Specific (3 populations)	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 100 percent of major populations within the MSCP plan area will be conserved. **Note:** Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional protection. One population of this species also occurs on military lands (Naval Radar Receiving Facility) which are not part of the MSCP. **Conditions:** Area specific management directives must 1) include measures to reduce threats and stabilize populations (e.g., relocation of footpaths, establishment of buffer areas, etc.), 2) address opportunities for reintroduction, and 3) include measures to enhance existing populations (e.g., protect and improve upland habitat for pollinators). There is a federal recovery plan for this species and management activities should to the extent possible help achieve the specified goals. Any newly found populations shall be evaluated for inclusion in the preserve strategy through acquisition, like exchange, etc.					
Cordylanthus orcuttianus Orcutt's bird's-beak None	75% of major populations	25% of major populations	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Site Specific (4 populations) and Management Plans/ Directives	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 3 of 4 (75 percent) major populations will be conserved. A portion of the Otay River Valley population lies outside of the MHPA but will be subject to the County's Biological Mitigation Ordinance (80-100 percent conservation). The Otay Ranch population (southeast of Lower Otay Lake) is considered conserved subject to landowner and agency agreement. **Condition:** AT the time permit amendments are proposed, strategies to provide protection for this species within the amendment area must be included. (Take authorization amendments are subject to public review through CEWX and NEPA processes and require approval by CDFG and USFWS.)					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Corethrogyne filaginifolia var. *linifolia* Del Mar Mesa sand aster none	48% of major populations, 57% of known localities and 67% of southern maritime chaparral	52% of major populations, 43% of known localities and 33% of southern maritime chaparral	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Site Specific	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 48 percent of major populations and 67 percent of its potential habitat (southern maritime chaparral) will be conserved. This is a Group A species in the County's proposed BMO[2].

Notes: This taxon has been merged with two other *Corethrogyne filaginifolia* varieties, and has been determined not to meet the taxonomic standards for listing.

Conditions: Area specific management directives for the protected populations must include specific measures to protect against detrimental edge effects to this species. Area specific management directives must include specific management measures to address the autecology and natural history of the species and to reduce the risk of catastrophic fire. Management measures to accomplish this may include prescribed fire.

Cupressus forbessi Tecate cypress none	98% Tecate cypress forest	2% Tecate cypress forest	Preserve design/landscape level	Monitoring Plan – Habitat Based and Photo Plot	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 98 percent of major populations will be conserved, primarily on lands administered by BLM. **Conditions:** Area specific management directives for the protected populations will include specific measures to maintain or increase populations. Area specific management directives must include specific management measures to address the autecology and natural history of the species and to reduce the risk of catastrophic fire. Management measures to accomplish this may include prescribed fire.					
Dudleya blochmaniae ssp. *brevifolia* Short-leaved dudleya PE/CE	100% of major populations	No major populations	Site-specific preserve design and special measures/management	Monitoring Plan –Site Specific (3 populations) and Management Plans/Directives	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 100 percent of major populations will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional conservation measures[1] for the species. **Notes:** The populations on Del Mar Mesa, Carmel Mountain, and Crestview Canyon are subject to considerable edge effects. The wildlife agencies will work with the University of California, San Diego to protect and manage the University of California property adjacent to Skeleton Canyon for this species. **Conditions:** Area specific management directives must include 1) specific measures to protect against detrimental edge effects to this species, 2) species-specific monitoring and 3) maintenance of surrounding habitat for pollinators.					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Dudleya variegata Variegated dudleya none	56% of major populations, 75% of known localities	44% of major populations, 25% of known localities	Site-specific preserve design and special measures/management	Monitoring Plan – Site Specific (5 populations) and Management Plans/Directives	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 56 percent of major populations and 75 percent of known localities will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional conservation measures[1] for the species.

Conditions: Area specific management directives must include species-specific monitoring and specific measures to protect against detrimental edge effects to this species, including effects caused by recreational activities. Some populations now occur within a major amendment area (Otay Mountain) and at the time permit amendments aer proposed, strategies to provide protection for this species within the amendment area must be included. (Proposed take authorization amendments will have public review through CEWX and NEPA processes and require approval by CDFG and USFWS.)

Dudleya viscida Sticky dudleya none	100% of major population	No major populations	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 100 percent of the only major population within the MSCP will be conserved.

Notes: Persistence of this species in San Diego County depends largely on conservation efforts in the MHCP and Camp Pendleton areas.

Conditions: Area specific management directives must address specific measures to protect against detrimental edge effects.

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Ericameria palmeri ssp. *palmeri* Palmer's ericameria None	66% of major populations	34% of major populations	Site-specific preserve design and special measures/management	Monitoring Plan – Habitat based and Photo Plot and Management Plans/Directives	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 66 percent of major populations will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional conservation measures[1] for the species.

Notes: Impacts from these projects will be fully mitigated through avoidance, minimization and compensation. Two of the six major populations are subject to potential impacts from proposed road widening projects (Jamacha Blvd., Highways 54/94).

Eryngium aristulatum var. *parishii* San Diego button-celery FE/CE	82% of major populations, 88% of vernal pool habitat	18% of major populations may be impacted, but vernal pool habitat is subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level with site-specific consideration(s)/management	Area Specific Management Directives (wetlands)	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 82 percent of major populations and 8 percent of vernal pool habitat will be conserved. **Notes:** Additional important populations are found on military lands (Miramar) which are not part of the MSCP. Four populations (Proctor Valley, Otay River Valley, Del Mar Mesa, Spring Canyon) are likely to be subject to edge effects. This species has been added to the City of San Diego's list of narrow endemic species. Vernal pools which become part of the National Wildlife Refuge would be managed for the recovery of this species. **Conditions:** Area specific management directives must include specific measures to protect against detrimental edge effects.					
Erysimum ammophilum Coast wallflower none	92% of southern foredunes, 67^ of southern maritime chaparral	8% of southern foredunes, 33% of southern maritime chaparral	Preserve design/landscape level	Monitoring Plan – Habitat Based and Incidental	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 92 percent of southern foredunes and 67 percent of southern maritime chaparral vegetation communities (that are potential habitat for this species) will be conserved. **Notes:** Populations from San Diego County aer now being treated as *Erysimum capitatum*, a common species of wallflower.					
Ferocactus viridescens San Diego barrel cactus none	81% of major populations	19% of major populations	Preserve design/landscape level	Monitoring Plan – Habitat Based and Photo Plot	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 81 percent of major populations will be conserved. This is a Group B species in the County's proposed BMO[2]. **Notes:** This is an abundant species that will be protected at varying levels in several subareas: Carmel Mountain, 64 percent; East Elliot, 75 percent; Marron Valley, 90 percent; Mission Trails Regional Park, 94 percent; Otay Mesa, 70 percent; Otay River Valley, 100 percent; Sweetwater Reservoir, 100 percent; Sycamore Canyon-Fanita Ranch, 50 percent. **Conditions:** Area specific management directives must include measures to protect this species from edge effects, unauthorized collection, and include appropriate fire management/control practices to protect against a too frequent fire cycle.					
Fremontodendron mexicanum Mexican flannel bush PE/CR	Insufficient distribution data and unknown conservation level; therefore, the species is not covered by the plan.				NO
Githopsis diffusa ssp. *filicaulis* Mission Canyon bluecup none	Unknown conservation level and therefore not covered by the plan.				NO
Hemizonia conjugens Otay tarplant PE/CE	66% of major populations	34% of major populations	Site-specific preserve design and special measures/management	Monitoring Plan – Site Specific (5 populations) and Management Plans/Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 66 percent of major populations will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional conservation measures[1] for the species. **Conditions:** MSCP coverage of this species requires avoidance of populations in the Otay River Valley through sensitive design and development of the active recreations areas as described in the Otay Ranch RMP and GDP. One of the seven major populations occurs within an amendment area (Proctor Valley). AT the time permit amendments are proposed, strategies to provide protection for this species within the amendment area must be include (proposed take authorization amendments will be subject to public review through CEWA and NEPA processes and take authorization amendments require approval by CDFG and USFWS). Area specific management directives must include specific measures for monitoring of populations and adaptive management of preserves (taking into consideration the extreme population fluctuations from year to year), and specific measures to protect against detrimental edge effects to this species.					
Hemizonia floribunda Tecate tarplant none	Unknown conservation levels and therefore not covered by the plan.				NO
Lepechinia cardiophylla Heart-leaved pitcher sage none	85% of major populations	15% of major populations	Preserve design/landscape level	Monitoring Plan – Habitat Based and Photo Plot	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 85 percent of major populations will be conserved. The Iron Mountain population falls within a 100 percent conservation area. The other three major populations fall within the County's area of undetermined development status and will receive 80-100 percent conservation based on the County's proposed BMO[2] (Group A species). **Conditions:** Area specific management directives must include: 1) specific measures to protect against detrimental edge effects; 2) specific measures to promote increase of populations; and 3) specific management measures to address the autecology and natural history of the species and to reduce the risk of catastrophic fire (management measures to accomplish this may include prescribed fire).					
Lepechinia ganderi Gander's pitcher sage none	All known locations	No known locations	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Photo Plot and Management Plans/Directives	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 100 percent of the known locations will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional conservation measures[1] for the species. **Conditions:** Area specific management directives must include: 1) specific measures to protect against detrimental edge effects and uncontrolled access; 2) measures to promote the increase of populations; and 3) specific management measures to address the autecology and natural history of the species and to reduce the risk of catastrophic fire (management measures to accomplish this may include prescribed fire). One of the five major populations occurs within a major amendment (Otay Mountain). At the time permit amendments are proposed, strategies to provide protection for this species within the amendment area must be included (proposed take authorization amendments are subject to public review through CEWX and NEPA processes and require approval by CDFG and USFWS).					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Lotus nuttallianus Nuttal's lotus none	80-100% of major populations; 92% of southern foredune habitat	0-20% of major populations; 8% of southern foredune habitat	Preserve design/landscape level	Monitoring Plan – Site Specific (1 population)	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 80-100 percent of the major populations will be conserved and 92 percent of the habitat (southern foredunes) will be conserved.

Notes: Additional important populations are found on military lands (Imperial Beach, Silver Strand) which are not part of the MSCP . The USFWS is currently working with the Navy to provide protection for this species on Silver Strand.

Conditions: Area specific management directives must include specific measures to protect against detrimental edge effects.

Monardella hypoleuca ssp. *lanata* Felt-leaved monardella none	89% of major populations	11% of major populations	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Photo Plot and Management Plans/Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 89 percent of major populations will be conserved. The Sequan Peak and Iron Mountain populations are identified as critical populations which will be 100 percent protected (San Diego County Subarea Plan). This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional specific conservation measures[1] for this species. This is a Group A species in the County's proposed BMO[2]. **Notes:** Persistence of this species in San Diego County depends, in part, on conservation effects outside the MSCP area. **Conditions:** Area specific management directives must also include measures to protect against detrimental edge effects and uncontrolled access.					
Monardella linoides ssp. *viminea* Willowy monardella PE/CE	100% of major populations	No major populations	Preserve design/landscape level	Monitoring Plan – Site Specific (2 populations) and Management Plans/Directives	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 100 percent of major populations will be conserved. Additional important populations are found on military lands (Miramar) which are not included as part of the MSCP. This species occurs in drainages and would receive protected based on Fish and Game Code 1600 agreements and federal wetlands permitting. This is a Group A species in the County's proposed BMO[2]. **Conditions**: Area specific management directives must include specific measures to protect against detrimental edge effects.					
Muilla clevelandii San Diego goldenstar none	73% of major populations and 38% of grasslands	27% of major populations	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Site Specific (4 populations)	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 8 of 11 major populations, 125 of 144 occurrences, and 38 percent of the grassland vegetation community will be conserved. The City of San Diego will avoid populations within its 25 percent encroachment area. The 4S Ranch population will be transplanted into an appropriate preserve area. This is a Group A species in the County's proposed BMO[2]. **Conditions:** Area specific management directives must include monitoring of the transplanted population(s), and specific measures to protect against detrimental edge effects to this species.					
Myosurus minimus ssp. *apus* Little mousetail none	The MSCP preserve does not include adequate habitat to conserve the species.				NO
Navarretia fossalis Prostrate navarretia PT/	63% of only major population, 88% of vernal pool habitat	37% of only major population, 12% of vernal pool habitat may be impacted, but this habitat is subject to no net loss of function and value and 404(b)1 guidelines	Site-specific preserve design and special measures/management	Area Specific Management Directives (wetlands)	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 63 percent of the one major population and 88 percent of vernal pool habitat will be conserved. Federal wetland regulations will provide additional protection for vernal pool habitats. This is a Group A species in the County's proposed BMO[2]. **Notes:** State and federal transportation agencies will need to avoid or adequately mitigate the impacts to this species from the extension of State Route125. An additional small population is found on military lands (Miramar) and is not included as part of the MSCP. Vernal pools incorporated into the National Wildlife Refuge System would be managed for the recovery of this species. **Conditions:** Area specific management directives must include specific measures to protect against detrimental edge effects to this species, and must incorporate measures to conserve and maintain surrounding habitat for 1) pollinators and 2) as part of the hydrological system for the vernal pools.					
Nolina interrata Dehesa bear-grass PT/CE	90-100% of major populations	<10% of major populations	Preserve design/landscape level	Monitoring Plan – Habitat Based and Photo Plot and Management Plans/Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because: 100 percent of the McGinty Mountain population will be conserved; half of the Sequan Peak population is under protected ownership and 80-100 percent of the other half will be conserved; and 80-100 percent of the Dehesa Peak population will be conserved under the County's proposed BMO (Group A species)[2]. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional specific conservation measures[1] for this species. **Notes:** Acquisition of the remaining portions of the population on Sequan Peak is important and efforts are underway by CDFG. **Conditions:** Area specific management directives must include specific measures to protect against detrimental edge effects and management measures to maintain surrounding habitats for pollinators.					
Opuntia parryi var. *serpentina* Snake cholla none	75% of major populations and 67% of southern maritime chaparral	25% of major populations and 33% of southern maritime chaparral	Preserve design/landscape level with site-specific consideration(s)/management	Area Specific Management Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 75 percent of major populations and 67 percent of the southern maritime chaparral vegetation community will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional specific conservation measures[1] for this species. **Notes:** Additional important populations are found on military lands (Pt. Loma) which are not part of the MSCP. **Conditions:** Area specific management directives must include specific measures to protect against detrimental edge effects to this species, and promote translocation opportunity where appropriate. The Otay Ranch project GDP and RMP require protection of 80 percent of existing occurrences, and transplantation of any impacted occurrences to restored areas of comparable size.					
Orcuttia californica California Orcutt grass FE/CE	86% of only major population, 88% of vernal pool habitat	14% of only major population may be impacted, but vernal pool habitat is subject to no net loss of function of value and 404(b)1 guidelines	Preserve design/landscape level with site-specific consideration(s)/management	Area Specific Management Directives (wetlands)	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 86 percent of the one major population will be conserved. This species is on the MSCP's list of narrow endemics and therefore participating jurisdictions must specify in their Subarea Plans additional specific conservation measures[1] for this species. **Notes:** A population outside of the MHPA (J-13N pool complex) is conserved with dedicated open space as mitigation for the Ramona K-mart. The USFWS will work with the border patrol to minimize impacts to this species. An additional small population is found on military lands (Miramar) and is not part of the MSCP. **Conditions:** Area specific management directives must include specific measures to protect against detrimental edge effects to this species and measures to maintain surrounding habitats for pollinators.					
Pinus torreyana Torrey pine none	100% of native population	No major populations	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because the single naturally occurring population at Torrey Pines State Reserve will be conserved and appropriately managed.					
Pogogyne abramsii San Diego mesa mint FE/CE	88% of vernal pool habitat	12% of vernal pool habitat may be impacted, but this habitat is subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level with site-specific consideration(s)/management	Area Specific Management Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 88 percent of its potential habitat (vernal pool habitat) will be conserved. Federal wetland regulations will provide additional protection for vernal pool habitats. **Notes:** The three major populations in the county occur on military lands (Miramar) which are not part of the MSCP. The City of San Diego has added this species to its narrow endemics list. The population at Montgomery Field was mistakenly omitted from the original mapping and now has been included. This population will be conserved and managed by the City of San Diego. Vernal pools included in the National Wildlife Refuge would be managed for recovery of this species. **Conditions:** Preserve management plan must include measures to: 1) protect against detrimental effects; 2) maintain surrounding habitat for pollinators; and 3) maintain pool watershed areas.					
Pogogyne nudiuscula Otay Mesa mint FE/CE	91% of the major population, 88% of vernal pool habitat	0% of the major population may be impacted, and this habitat is subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level with site-specific consideration(s)/management	Area Specific Management Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 91 percent of the one major population will be conserved, and federal wetland regulations will provide additional protection for vernal pool habitats. **Notes:** Twenty-six percent of the stockpan soils will be conserved, which will provide for enhancement opportunities for this species. The City of San Diego has added this species to their narrow endemics list. Vernal pools included in the National Wildlife Refuge would be managed for recovery of this species. The RMP for the Otay Ranch project includes protection for vernal pools with sensitive species. **Conditions:** Preserve management plan must include measures to: protect against detrimental edge effects; maintain surrounding habitat for pollinators; and maintain pool watershed areas.					
Rosa minutifolia Small-leaved rose /CE	Only known MSCP occurrence transplanted into preserve, propagation and restoration in appropriate habitat		Site-specific preserve design and special measures/management	Area Specific Management Directives (1 population)	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERD

There is only one known occurrence of this species in the MSCP on Otay Mesa near Dennery Canyon. The occurrence may be a single clone, and some evidence suggests it may be a cultivar. This species will be covered by the MSCP because the only known occurrence will be conserved through the California Terraces project.

The following conditions for small-leaved rose conservation are required in the CDFG 2081 as part of the California Terraces project:

1. The rose population shall be salvaged, propagated, and transplanted to a new location that will support a healthy, reproducing population in perpetuity. This goal shall be achieved through a five year program that includes site improvement, propagation, transplantation, and monitoring. (a) The rose population shall be transplanted to a suitable open space preserve location on the Otay Mesa or to an alternative location subject to Department approval. Criteria in site selection shall include similar habitat, slope, aspect, soils, and hydrology as present on the existing rose site. (b) Propagation and transplanting of the rose population shall be implemented by a qualified native plant nursery/habitat restoration contractor (hereinafter Restoration Contractor), acceptable to the department, and under supervision of a qualified botanist. The rose propagation shall take place over a two year period. Rose plants to be extirpated shall be salvaged through: (i) seed collection; (ii) preparation of cuttings from rose canes; and (iii) salvage of underground parts and transplantation. (d) Transplantation of the rose clone shall commence during the period of October-December 1997. The remaining rose clone shall be cut into a minimum of 200 clumps. Each clump possessing roots and de-caned stems shall be planted on the HM lands as prescribed by a qualified botanist.

2. No removal of the rose population for a two (2) year period commencing from the date of planting propagated rose plants at the approved locations.

3. The progress of the rose mitigation effort shall be assessed through measurements and observations for a period of at least five (5) years following implementation of rose transplantation commencing in December 1997 and ending in July 2002. Factors to be monitored shall include growth, survival and/or establishment rate of the species, presence of introduced weeds, erosion, effects of herbivores, and any other factors important to the success of the mitigation effort. Community structure and species diversity at the mitigation site shall also be assessed. (a) Transplant success criteria over a five (5) year period shall include: (i) measurable annual growth on a minimum of 50 percent of the rose plants; and (ii) flowering of 50 percent of the rose plants during a minimum of one flowering season. In the event that success criteria are not met, the project applicant shall implement remedial measures subject to department approval.

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Santureja chandleri San Miguel savory none	80-100% of future identified occurrences	0-20%	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Photo Plot	YES
DETAILS OF RATIONALE FOR IDENTIFY SPECIES AS COVERED This species will be covered by the MSCP because it will be conserved at the 80+ percent level. The County will add this species to Group A or B of the County's proposed BMO[2]. **Conditions:** Area specific management directives must include specific management measures to address the autecology and natural history of the species and to reduce the risk of catastrophic fire. Management measures to accomplish this may include prescribed fire. This species will be conserved at the 80+ percent level.					
Senecio ganderi Gander's butterweed */CR	90-100% of major populations	<10% of major populations	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Photo Plot	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 90-100 percent of known major populations would be conserved. Half of the Sequan Peak population is under protected ownership and 80-100 percent of the other half will be conserved, and 90-100 percent of the McGinty Mountain populations will be conserved. The El Cajon Mountain (between El Capitan and San Vicente Reservoir) population is identified as critical which requires 100 percent protection based on the San Diego County Subarea Plan. Occurrences in the County's areas of undetermined development status will receive 80-100 percent protection under the County's proposed BMO[2] (Group A species). **Notes:** This species is often associated with gabbro soils which will be conserved at the 43+ percent level. Acquisition of the remaining portions of the population on Sequan Peak is important and efforts are underway by CDFG. **Conditions:** Area specific management directives must include: 1) specific measures to protect against detrimental edge effects to this species; and 2) measures to address the autecology and natural history of the species.					
Solanum tenuilobatum Narrow-leaved nightshade none	90% of major populations	10% of major populations	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Photo Plot and Management Plans/Directives	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 90 percent of major populations will be conserved. Two smaller populations, Silverwood and Fernbrook, are identified as critical and will be 100 percent protected in the San Diego County Subarea Plan. **Notes:** This species is now taxonomically included in *Solanum xanti.*					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

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Tetracoccus dioicus Parry's tetracoccus none	80-100% of major populations	0-20% of major populations	Preserve design/landscape level	Monitoring Plan – Habitat Based and Photo Plot	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 80-100 percent of major populations will be conserved.

Notes: Fourteen of 33 (43 percent) small populations are already under protected ownership. The Dehesa population is identified as critical and will be 100 percent protected in the San Diego County Subarea Plan. Occurrences in the County's areas of undetermined development status will receive 80-100 percent protection under the County's proposed BMO[2] (Group A species). Acquisition of the remaining portions of the population on Sequan Peak is important and efforts are underway by CDFG. This species is often associated with gabbro soils and 43+ percent of the gabbro soils are within the MHPA.

Conditions: Area specific management directives must include specific measures to protect against detrimental edge effects to this species.

ANIMALS		
Invertebrates		
Euphydryas editha quino Quino checkerspot butterfly PE/	Unknown conservation level and lack of assurances that plan will protect preferred habitat (mesa tops/grassland) and connection to known sources populations. Therefore, not covered by the plan.	NO
Euphyes vestries harbisoni Harbison's dun skipper none	Unknown conservation level and therefore not covered by the plan based on insufficient distribution and life history data.	NO

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

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Lycaena thornei Hermes copper butterfly none	Unknown conservation level and therefore not covered by the plan based on insufficient distribution and life history data.				NO
Mitoura thronei Thorne's hairstreak butterfly none	98% of Tecate cypress forest (larval host plant)	2% of Tecate cypress forest	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Habitat Based	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 98 percent of the major populations of its larval host plant, Tecate cypress, will be conserved. Most of the Tecate cypress forest occurs on BLM lands.

Conditions: Area specific management directives must manage for the host species (Tecate cypress). Management measures to accomplish this may include prescribed fire.

Panoquina errans Salt marsh skipper none	93% of salt marsh habitat (1,700± acres)	7% of salt marsh habitat (120± acres) may be impacted, but is subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 93 percent of its potential habitat will be conserved. **Conditions:** Area specific management directives must include measures to: control exotic weeds and invertebrate predators (where appropriate), and control access to saltmarsh habitat.					
Branchinecta sandiegoensis San Diego fairy shrimp PE/	88% of vernal pool habitat	12% of vernal pool habitat may be impacted, but this habitat is subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Area Specific Management Directives	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 88 percent of its potential habitat (vernal pool habitat) will be conserved. Federal and local wetland regulations will provide additional protection for vernal pool habitats. The Otay Ranch project RMP and GDP require protection for vernal pools with sensitive species. **Notes:** Additional important habitat for this species occurs on military lands (Miramar) and is not part of the MSCP. **Conditions:** Area specific management directives must include specific measures to protect against detrimental edge effects to this species.					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Streptocephalus woottonii Riverside fairy shrimp FE/	88% of vernal pool habitat	12% of vernal pool habitat may be impacted, but this habitat is subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Area Specific Management Directives	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 88 percent of its potential habitat (vernal pool habitat) will be conserved. Federal and local wetland regulations will provide additional protection for vernal pool habitats. The Otay Ranch project RMP and GDP require protection for vernal pools with sensitive species.

Notes: Additional important habitat for this species occurs on military lands (Miramar) and is not part of the MSCP.

Conditions: Area specific management directives must include specific measures to protect against detrimental edge effects to this species.

Reptiles and Amphibians

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Bufo microscaphus californicus Arroyo southwestern toad FE/SSC	All known locations (Cottonwood Creek in Marron Valley, San Vicente Creek and Santa Ysabel Creek in San Pasqual Valley, Sweetwater River, and Otay River), 78% riparian wetland areas in suitable habitat	Upland habitats adjacent to riparian wetlands (potential habitat) in undetermined status areas in Sloan Canyon – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Site Specific (7 locations) and Management Plans/Directives	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because the MHPA preserves all known locations, and 90-95 percent of the upland habitats within the Marron Valley area will be conserved. Impacts to upland habitats within 1 km of riparian corridors within the MHPA will be minimized during project review by CDFG and USFWS. Take authorization holders must minimize impacts to upland habitats which provide habitat for this species which are: within the MHPA and are within 1 km of riparian habitat which supports or is likely to support Arroyo toad. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting no net loss of wetlands.

Notes: Important habitat areas include the San Diego River below El Capitan Reservoir, San Vicente Creek between Sweetwater Reservoir and Loveland Reservoir, Dulzura Creek, San Pasqual Valley from Lake Hodges to Boden Canyon, Otay River, Jamul Creek, Cedar Creek and Sycamore Creek.

Conditions: Area specific management directives must address the maintenance of Arroyo toad through control of non-native predators, protection and maintenance of sufficient suitable low gradient sandy stream habitat (including appropriate water quality) to meet breeding requirements, and preservation of sheltering and foraging habitat within 1 km of occupied breeding habitat within preserved lands. Area specific management directives must include measures to control human impacts to the species within the preserve (e.g., public education, patrol, etc.).

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Rana aurora draytoni California red0-legged frog FT/SSC	72% of riparian habitats and fresh water marsh (9,500± acres	28% of riparian habitats and fresh water marsh (3,800± acres) -) wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species is believed to be extirpated from the County. Although unlikely, additional survey effort may detect red-legged frog. Therefore, this species will be covered by the MSCP because 70 percent of its potential habitat will be conserved. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands.

Conditions: Area specific management directives must provide for management of any new discovered populations within the preserve.

Clemmys marmorata pallida Southwestern pond turtle /SSC	72% of riparian habitats and fresh water marsh (9,501 acres)	28% of riparian habitats and fresh water marsh (3,800± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Management Plans/Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 72 percent of its potential habitat will be conserved. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. **Conditions:** Maintain and manage a 1500 foot area around known locations within preserve lands for the species. Within this impact avoidance area, human impacts will be minimized, non-native species detrimental to pond turtles controlled/removed and habitat restoration/enhancement measures implemented.					
Cnemidophorus hyperythrus beldingi Orange-throated whiptail /SSC	59% of potential habitat (129,600± acres) – 38% of known point occurrences	41% of potential habitat (89,800± acres) – 38% of known point occurrences	Preserve design/landscape level	Monitoring Plan – Site Specific (pit traps at 12 locations)	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 59 percent of its potential habitat and 62 percent of known point occurrences will be conserved. Habitat linkages between large blocks of protected lands are conserved in a functional manner. Monitoring of populations and adaptive management of preserves will occur as a result of plan implementation. **Notes:** This species also occurs extensively on military lands. **Conditions:** Area specific management directives must address edge effects.					
Phrynosoma coronatum blainvillei San Diego horned lizard /SSC	60% of potential habitat (132,000± acres) – 64% of coastal sage scrub, 54% of chaparral, 44% of coastal sage/chapparal, 80% of riparian scrub – 63% of known point occurrences	40% of potential habitat (89,700± acres) – 37% of known point occurrences	Preserve design/landscape level	Monitoring Plan – Site Specific (pit traps at 12 locations)	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 60 percent of its potential habitat and 63 percent of known point occurrences will be conserved. Habitat linkages between large blocks of protected lands are conserved in a functional manner. Monitoring of populations and adaptive management of preserves will occur as a result of plan implementation. **Conditions:** Area specific management directives must include specific measures to maintain native ant species, discourage the Argentine ant, and protect against detrimental edge effects to this species.					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Birds					
Pelecanus occidentalis californicus California brown pelican FE/CE	91% of roosting and foraging habitat (2,800± acres) – 93% of southern coastal saltmarsh, 88% of natural flood channel, 90-95% of beach outside of intensively used recreational beaches	9% of roosting and foraging habitat (270± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 91 percent of roosting and foraging habitat within the plan area will be conserved. No new development of beaches is authorized which will result in 90-95 percent protection of beach habitat that is outside of intensively used beach areas.

Notes: Most of the important roosting and foraging habitat occurs on military lands and waters under Port Authority jurisdiction which are not included as part of the MSCP. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. This species is a common to very common non-breeding visitor which uses mud flats, piers, jetties, etc., to roost and forages primarily in coastal ocean waters and San Diego.

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

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Egretta rufescens Reddish egret none	92% of potential habitat (2,700± acres) – 93% of southern coastal saltmarsh, 99% of salt pan, 88% of natural flood channel	8% of potential habitat (230± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 90 percent of its potential habitat will be conserved.

Notes: Additional important habitat occurs in waters under Port Authority and military jurisdiction which are not included as part of the MSCP. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. This species forages is shallow lagoons, mud flats, tidal channels and salt marsh. This species is a rare visitor in fall and winter and a casual visitor in spring and summer, but does not nest in San Diego County.

Plegadis chihi white-faced ibis */SSC	78% of potential habitat (1,200± acres) – 68% of freshwater marsh, 88% of natural flood channel, additionally 1,800± acres of potentially habitat agricultural land will be conserved	26% of potential habitat (300± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

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DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 78 percent of its potential habitat will be conserved. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. The preserve management plan for the City of San Diego cornerstone lands must include protection and management of potential nesting habitat at Lake Hodges. **Conditions:** Area specific management directives must include specific measures to protect against detrimental edge effects to this species.					
Branta canadensis Canada goose none	8,200± acres of potencial habitat	1,100± acres of potential habitat – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED Although not considered sensitive, this species has aesthetic and intrinsic values, and is a regulated game species thereby being an important species to protect. This species will be covered by the MSCP because 8,200± acres of its potential habitat will be conserved, including open water areas for loafing. Participating jurisdiction's guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands.					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

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Haliaeetus leucocephalus Bald eagle FT/CE	89% of potential foraging habitat (wetlands) (5,719± acres), 68% of freshwater marsh, 92% of open water. In addition, foraging opportunities (carrion, etc.) on 100,000+ acres will be conserved.	11% of potential foraging habitat (wetlands) (692± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 89 percent of its potential foraging habitat (open water and freshwater marsh) will be conserved. Bald eagles are a rare winter visitor which require perching and roosting sites adjacent to open water and marshes. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands.					
Circus cyaneus Northern harrier /SSC	42% of potential nesting habitat (12,000± acres) – 93% of saltmarsh, 68% of freshwater marsh and 38% of grasslands, - 85,000± acres of potential foraging habitat	48% of potential nesting habitat (16,300± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Management Plans/Directives (nest sites)	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species is an uncommon migrant and winter visitor, and rare summer resident/breeder. This species will be covered by the MSCP because 42 percent of its potential nesting habitat, and 85,000± acres of its potential foraging habitat will be conserved. The plan will not adversely affect the species' long-term survival.

Notes: Harriers tolerate patchiness in their habitat, exhibit nest area fidelity, and forage within four miles of their nests. Additional conservation of grassland habitats should be a priority and one of the primary factors in the design of preserves in the major amendment areas. Participating jurisdiction's guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. Active nesting areas include:

Tijuana River Valley – The City of San Diego Subarea Plan includes conservation of two known nesting sites in the Tijuana River Valley, and maintenance of some agricultural lands (available for foraging harriers) within the Tijuana River Valley Regional Park. The Tijuana National Estuarine Sanctuary will continue to enhance marshlands and manage for nesting harriers. Some existing grasslands and agricultural lands at the outer limits of the foraging distance for nesting harriers will be developed. With the addition of over 4,000 acres of agricultural and disturbed lands to the City of San Diego's preserve (in comparison with the March 1995 preserve design), adequate foraging areas within this area are conserved. Food production for harriers on preserve lands can be enhanced.

South San Diego Bay/Sweetwater Marsh – The City of San Diego Subarea Plan includes conservation of one known nesting site in the Sweetwater Marsh area. All nesting and foraging habitat within four miles of the known nesting site will be preserved. Upland habitat enhancement exist at the D Street fill area.

Proctor Valley – Proctor Valley includes an historical nesting location (1970s). Over 80 percent of the Proctor Valley area will be conserved with most of the development occurring in the upper portion of the valley, away from the more likely nesting areas.

Conditions: Area specific management directives must: manage agricultural and disturbed lands (which become part of the preserve) within four miles of nesting habitat to provide foraging habitat; include an impact avoidance area (900 foot or maximum possible within the preserve) around active nests; and include measures of maintaining winter foraging habitat in preserve areas in Proctor Valley, around Sweetwater Reservoir, San Miguel Ranch, Otay Ranch east of Wueste Road, Lake Hodges, and San Pasqual Valley. The preserve management coordination group shall coordinate efforts to manage for wintering northern harriers' foraging habitat within the MSCP preserves.

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Accipiter cooperii Cooper's hawk /SSC	59% of potential foraging habitat (133,400± acres) (47% of oak woodland, 58% of oak riparian, 64% of coastal sage scrub, 54% of chapparal, 44% of coastal sage scrub/chaparral – 57% of known localities) and 52% (5,705± acres) of potential nesting habitat (58% of oak riparian and 47% of oak woodland)	41% of potential foraging (93,900± acres) and 48% of potential nesting habitat (5,200± acres)	Preserve design/landscape level with the site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Management Plans/Directives (site specific nest territories)	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 59 percent of potential foraging and 52 percent of potential nesting habitat and 92 percent of known occurrences will be conserved.

Conditions: In the design of future projects within the Metro-Lakeside-Jamul segment, design of preserve areas shall conserve patches of oak woodland and oak riparian forest of adequate size for nesting and foraging habitat. Area specific management directives must include 300-foot impact avoidance areas around the active nests, and minimization of disturbance in oak woodlands and oak riparian forests.

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Buteo swainsoni Swainson's hawk /CT	22% of foraging habitat (11,600± acres) – 38% of grassland, 6% of agricultural fields	78% of foraging habitat (42,000± acres)	Preserve design/landscape level	Monitoring Plan – Habitat Based (10 grassland locations)	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species is an extremely rare visitor during migration which forages in grasslands and agricultural fields. This species will be covered by the MSCP because more than 11,000 acres of potential foraging habitat will be conserved.

Notes: The plan will not adversely affect the species' long-term survival. Additional conservation of grassland habitats should be a priority and one of the primary factors in the design of preserves in the major amendment areas. This species is a rare migrant through the area.

Buteo regalis Ferruginous hawk */SSC	22% of foraging habitat (11,600± acres) – 38% of grassland, 6% of agricultural fields	78% of foraging habitat (42,000± acres)	Preserve design/landscape level	Monitoring Plan – Habitat Based (10 grassland locations)	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered because 11,600± acres of potential foraging habitat will be conserved. This species is an uncommon winter visitor which forages in grasslands and agricultural fields.

Notes: The plan will not adversely affect the species' long-term survival. Additional conservation of grassland habitats should be a priority and one of the primary factors in the design of preserves in the major amendment areas. This species is not known to nest within the MSCP study area.

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Aquila chrysaetos Golden eagle BEPA/SSC	53% of potential foraging/nesting habitat (coastal sage scrub, chaparral, grassland and oak woodland) 139,000± acres) – large blocks of habitat conserved in the eastern portion of the plan area where active nesting territories exist. Of the 11 active nesting territories (based on information from the Golden Eagle Survey Project, San Diego) which are fully or partially within the MSCP plan area, 7 nesting territories should remain viable.	Viability of 4 of the 11 active nesting territories (partially or fully within the plan area)	Preserve design/landscape level with the site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Management Plans/Directives (site specific nest territories)	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 53 percent of potential foraging and nesting habitat will be conserved. Local populations are not critical to, and the plan will not adversely affect the species' long-term survival.

Notes: Fourteen active nesting territories occur primarily outside of the MSCP area (east and northeast of the plan area). Plans developed for these areas should include measures to conserve adequate habitat to maintain their viability. The following is an analysis of the plan's effects on each nesting territory.

1. Rancho San Diego – development under the plan will result in <10 percent loss of habitat in the nesting territory, nesting territory should remain viable;
2. East Otay Mountain – development under the plan will result in <5 percent loss of habitat in the nesting territory, nesting territory should remain viable;
3. Sequan Peak – between 30 percent and 40 percent of the habitat in the nesting territory could be developed, the nesting territory may not remain viable, but the steepness of the areas which could be developed may preclude enough development to keep the territory viable;
4. Loveland Reservoir – development of under the plan will result in >20 percent loss of habitat in the nesting territory, nesting territory should remain viable;
5. Lake Jennings – between 40 percent and 60 percent of the habitat in the nesting territory could be developed under the plan, the nesting territory may not remain viable;
6. El Capitan territory – development under the plan will result in <15 percent loss of habitat within the nesting territory, the territory should remain viable;
7. San Vicente Reservoir – development under the plan will result in <30 percent of the high quality golden eagle habitat being developed, although low quality habitat (steep chaparral) could be developed resulting in greater habitat loss within the nesting territory (although high density development is not likely to occur because of the steep sloes), the nesting territory is may not be viable;

8 and 9. San Pasqual (two nesting territories) – development under the plan will result in <20 percent loss of habitat in the nesting territory and both nesting territories should remain viable:

10. Santee – development under the plan could result in 30 percent-40 percent loss of habitat in the nesting territory and the nesting territory may not remain viable, although a significant amount of foraging habitat (Miramar and Mission Trails) occurs just outside of the territory and within normal foraging distances; and
11. Lake Hodges – development under the plan will result in <20 percent loss of habitat in the nesting territory, the nesting territory should remain viable.

Conditions: Area specific management directives for areas with nest sites must include measures to avoid human disturbance while the nest is active, including establishing a 4,000 foot disturbance avoidance area within preserve lands. Area specific management directives must also include monitoring of nest sites to determine use/success.

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Falco peregrinus anatum American peregrine falcon FE/CE	61% of historic nesting sites – 58% of foraging habitat (89,400± acres) – 93% southern coastal saltmarsh, 99% of saltpan, 68% of freshwater marsh, 91% of open water, 88% of natural flood channel, 64% of coastal sage scrub, 38% of grassland	39% of foraging habitat (57,000± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because more than 89,000 acres of potential foraging habitat will be conserved.

Notes: This species has very low population numbers in the County, being primarily a rare fall and winter visitor. All three nest sites occur outside of the MHPA: one on Coronado Bridge, one on a crane in Port Authority jurisdiction, and one on Pt. Loma federal lands. Participating jurisdictions; guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands.

Rallus longirostris levipes Light-footed clapper rail FE/CE	93% of potential habitat (1,700± acres of southern coastal saltmarsh)	7% of potential habitat (120± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Site-specific preserve design and special measures/management	Management Plans/Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 93 percent of its habitat will be conserved. **Notes:** Additional important habitat is found on military lands (Silver Strand) which are not included as part of the MSCP. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. **Conditions:** Area specific management directives must include active management of wetlands to ensure a healthy tidal saltmarsh environment, and specific measures to protect against detrimental edge effects to this species.					
Charadrius alexandrinus nivosus Western snowy plover FT/SSC	93% of potential habitat (650± acres) 99% of saltpan, 90-95% of beach outside of intensively used recreational beaches	7% of potential habitat (467% of potential habitat (46± acres) –wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level with site-specific consideration(s)/management	Area Specific Management Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 93 percent of its potential habitat will be conserved. All breeding activity of western snowy plovers in the County occurs in saltpan habitat. No new development of beaches is authorized which will result in 90-95 percent conservation of beach habitat that is outside of intensively used beach areas. **Notes:** Additional important habitat is found on military lands (Silver Strand) which are not part of the MSCP. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. **Conditions:** Area specific management directives must include protection of nesting sites from human disturbance during the reproductive season, and specific measures to protect against detrimental edge effects to this species. Incidental take (during the breeding season) associated with maintenance/removal of levees/dikes is not authorized except as specifically approved on a case-by-case basis by the wildlife agencies.					
Charadrius montanus Mountain plover C/SSC	22% of potential foraging habitat (11,600± acres) – 38% of grassland, 6% of agricultural fields	78% of potential foraging habitat (41,100± acres)	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because over 11,000 acres of potential foraging habitat will be conserved. The plan will not adversely affect the species' long-term survival. **Notes:** This species is an uncommon winter visitor (primarily in the Tijuana River Valley) which forages in grasslands and agricultural fields. The MSCP conservation requirement for the Tijuana River Valley area is primarily 94 percent with a small area identified as 75 percent. **Conditions:** Management Plans for the Tijuana River Valley should specifically address the habitat requirements for this species.					
Numenius americanus Long-billed curlew */SSC	24% of potential foraging habitat (13,500± acres) – 93% of southern coastal saltmarsh, 99% of salt pan, 38% of grassland, 6% of agricultural fields	77% of potential foraging habitat (42,800± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species is a fairly common migrant and winter visitor. **Notes:** This species will be covered by the MSCP because more than 13,500 acres of potential foraging habitat will be conserved. The plan will not adversely affect the species' long-term survival. Additional conservation of grassland habitats should be a priority and one of the primary factors in the design of preserves in the major amendment areas. Additional habitat occurs on military lands (Silver Strand, San Diego Bay) which are not part of the MSCP. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands.					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Sterna elegans Elegant tern */SSC	93% of potential habitat (650± acres) 99% of saltpan, 90-95% of beach outside of intensively used recreational beaches	10% of potential habitat (46± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level with site-specific consideration(s)/management	Area Specific Management Directives	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 93 percent of its potential habitat will be conserved.

Notes: All breeding activity of elegant terns in the County occurs in saltpan habitat. No new development of beaches is authorized which will result in 90-95 percent protection of beach habitat that is outside of intensively used beach areas. Additional important foraging habitat (bay waters) is under the jurisdiction of the Port Authority and military, and are not part of the MSCP. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands.

Conditions: Area specific management directives must include protection of nesting sites from human disturbance during reproductive season, and specific measures to protect against detrimental edge effects to this species. Incidental take (during the breeding season) associated with maintenance/removal of levees/dikes is not authorized except as specifically approved on a case-by-case basis by the wildlife agencies.

Sterna antillarum browni California least tern FE/CE	93% of potential habitat (650± acres) 99% of saltpan, 90-90% of beach outside of intensively used recreational beaches	7% of potential habitat (46± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Area Specific Management Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 93 percent of its potential habitat will be conserved. **Notes:** No new development of beaches is authorized which will result in 90-95 percent conservation of beach habitat that is outside of intensively used beach areas. Additional important breeding habitat occurs on military lands (North Beach, Silver Strand, Naval Training Center) and are not part of the MSCP. Additional important foraging habitat (bay waters) is under the jurisdiction of the Port Authority and the military, and are not part of the MSCP. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. **Conditions:** Area specific management directives must include protection of nesting sites from human disturbance during reproductive season, predator control, and specific measures to protect against detrimental edge effects to this species. Incidental take (during the breeding season) associated with maintenance/removal of dikes/levees, beach maintenance/enhancement is not authorized except as specifically approved on a case-by-caser basis by the wildlife agencies.					
Speotyto cunicularia hypugaea Burrowing owl */SSC	4 known locations (Spring Canyon, northeast of Brown Field, Lake Hodges), 8 known locations within major amendment area (south County segment), 4,000± acres of known habitat	8 known locations (Otay Ranch, San Pasqual Valley and South County at border), 5,000± of known habitat	Site-specific preserve design and special measures/management	Monitoring Plan – (10 grassland locations) and Area Specific Management Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 5,770± acres of potential and 4,000± acres of known suitable habitat (grassland vegetation community) will be conserved, including portions of Spring Canyon, San Pasqual Valley, Lake Hodges, Otay Mesa northeast of Brown Field, Otay Ranch, Otay River Valley, and Future Urbanizing Area 4.

Notes: Habitat enhancement opportunities for the species occur in the Spring Canyon, San Pasqual Valley, Lake Hodges, Otay Mesa northeast of Brown Field, Otay Ranch, Otay River Valley and Future Urbanizing Area 4. The wildlife agencies will enhance and manage lands within their ownership to allow for relocation of burrowing owls, particularly in conjunction with burrowing owl removal programs in areas where their presence conflicts with nesting of California least terns. The wildlife agencies will attempt to achieve additional conservation of occupied burrowing owl habitat or habitat suitable for restoration using state and federal acquisition resources. Persistence of the species in San Diego County is also dependent on adequate conservation of known concentrations in the San Maria Valley in the vicinity of Ramona.

Conditions: During the environmental analysis of proposed projects, burrowing owl surveys (using appropriate protocols) must be conducted in suitable habitat to determine if this species is present and the location of active burrows. If burrowing owls are detected, the following mitigation measures must be implemented: within the MSHPA, impacts must be avoided; outside of the MHPA, impacts to the species must be avoided to the maximum extent practicable; any impacted individuals must be relocated out of the impact area using passive or active methodologies approved by the wildlife agencies; mitigation for impacts to occupied habitat (at the Subarea Plan specified ratio) must be through the conservation of occupied burrowing owl habitat or conservation of lands appropriate for restoration, management and enhancement of burrowing owl nesting and foraging requirements.

Management plans/directives must include: enhancement of known, historical and potential burrowing owl habitat; and management for ground squirrels (the primary excavator of burrowing owl burrows). Enhancement measures may include creation of artificial burrows and vegetation management to enhance foraging habitat. Management plans must also include: monitoring of burrowing owl nest sites to determine use and nesting success; predator control; establishing a 300 foot-wide impact avoidance area (within the preserve) around occupied burrows.

Eight known burrowing owl location occur within major amendment areas of the South County Segment of the County Subarea Plan and the conservation of occupied burrowing owl habitat must be one of the primary factors preserve design during the permit amendment process.

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Empidonax traillii extimus Southwestern willow flycatcher FE/CE	76% of potential habitat (4,900± acres) – 90% of riparian woodland, 80% of riparian scrub – 88% of known localities	24% of potential habitat (1,400± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Area – Specific Management Directives	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 4,900± acres (76 percent) of potential habitat will be conserved.

Conditions: Jurisdictions must require surveys (using appropriate protocols) during the CEQA review process in suitable habitat proposed to be impacted and incorporate mitigation measures consistent with the 404(b)1 guidelines into the project. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. For new developments adjacent to preserve areas that create conditions attractive to brown-headed cowbirds, jurisdictions must require monitoring and control of cowbirds. Area specific management directives must include measures to provide appropriate successional habitat, upland buffers for all known populations, cowbird control, and specific measures to protect against detrimental edge effects to this species. Any clearing of occupied habitat must occur between September 1 and May 1 (i.e., outside of the nesting period).

Camphylorhynchus brunneicapillus couesi Coastal cactus wren */SSC	60% of maritime succulent scrub habitat in large contiguous blocks (850)± acres)	40% of maritime succulent scrub habitat in small isolated blocks (580± acres)	Site-specific preserve design and special measures/management	Monitoring Plan – Site Specific (31 locations) and Management Plans/Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species is covered because four of five major populations are conserved, including populations at Lake Hodges/San Pasqual Valley, Lake Jennings, South Sweetwater Reservoir/San Miguel Ranch and Salt Creek/Otay Mesa and 60 percent (850± acres) will be conserved allowing for expansion of the populations with management. **Notes:** This species also uses other habitat types (coastal sage scrub and chaparral) containing cactus patches. Small clusters of birds at Black Mountain and Spring Valley will also be conserved. Conservation of the Salt Creek population is critical to the persistence of the species in San Diego County and it would only be conserved under the city of Chula Vista's "Modified GDP B" alternative. The existing distribution of cactus wrens in the MSCP plan area has been greatly reduced and restoration of suitable cactus wren habitat and its management are important components of the MSCP plan. Significant opportunities for restoration within the MHPA occur on Otay Ranch, Spring Canyon (and adjacent areas), Dennery Canyon, San Miguel Ranch, Lake Hodges/San Pasqual Valley, Otay River Valley and Santee/Lake Jennings. The participating jurisdictions should seek OHV funds for restoration since much of these areas have been heavily impacted by OHVs. The City of San Diego has already acquired habitat in Spring Canyon as mitigation. The City of San Diego and the wildlife agencies have agreed to make restoration maritime succulent scrub in Spring Canyon a high priority. The USFWS will also make restoration of maritime succulent scrub a high priority on any lands it acquires in Spring Canyon. **Conditions:** The restoration of maritime succulent scrub habitat as specified in the Otay Ranch RMP and GDP must occur at the specified 1:1 ratio. Area specific management directives must include restoration of maritime succulent scrub habitat, including propagation of cactus patches, active/adaptive management of cactus wren habitat, monitoring of populations within preserves and specific measures to reduce or eliminate detrimental edge effects. No clearing of occupied habitat may occur from the period February 15 through August 15.					
Polioptila californica californica California gnatcatcher FT/SSC	73,300± acres of coastal sage scrub and interdigitated habitats in an interconnected network of preserves	67,300± acres of coastal sage scrub and interdigitated habitats	Preserve design/landscape level	Area Specific Management Directives (31 locations)	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because: over 73,300 acres of existing and potential gnatcatcher habitat will be conserved and linked together; over 81 percent of the core areas where the species occurs (Otay, San Miguel, Mission Trails, Santee, Kearny Mesa, Poway, San Pasqual and Lake Hodges) will be conserved; and 65 percent (1,819 of 2,814) of the known locations will be conserved. **Notes:** Sixty-eight percent (57,874 acres) of habitat supporting core gnatcatcher populations and 70 percent (30,273 acres) of very high value and 62 percent high value (4,609 acres) gnatcatcher coastal sage scrub habitat would be conserved. Critical habitat linkages between core areas conserved in a function manner with a minimum of 75 percent of the habitat within identified linkages conserved. Populations of this species also occur on military lands which are not part of the MSCP. **Conditions:** Area specific management directives must include measures to reduce edge effects and minimize disturbance during the nesting period, fire protection measures to reduce the potential for habitat degradation due to unplanned fire, and management measures to maintain or improve habitat quality including vegetation structure. No cleaning of occupied habitat within the cities' MHPAs and within the County's Biological Resource Core Areas may occur between March 1 and August 15.					
Sialia mexicana Western bluebird none	59% of potential habitat (15,500± acres) – 57% of oak riparian forest, 47% of oak woodland, 34% of grassland	41% of potential habitat (12,100± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because over 15,000 acres of habitat will be conserved. **Notes:** Persistence of this species in San Diego County depends largely on conservation of existing large populations on public lands east of the plan area.					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Vireo bellii pusillus Least Bell's vireo FE/CE	81% of potential habitat (1,700± acres) – 93% of riparian woodland, 58% of oak riparian forest – 82-100% of major populations	19% of potential habitat (400± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level with site-specific consideration(s)/management	Monitoring Plan – Habitat Based and Management Plans/Directives	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 1,700± acres (81 percent) of potential habitat will be conserved.

Conditions: Jurisdictions will require surveys (using appropriate protocols) during the CEQA review process in suitable habitat proposed to be impacted and incorporate mitigation measures consistent with the 404(b)1 guidelines into the project. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. Jurisdictions must require new developments adjacent to preserve areas that create conditions attractive to brown-headed cowbirds to monitor and control cowbirds. Area specific management directives must include measures to provide appropriate successional habitat, upland buffers for all known populations, cowbird control, and specific measures to protect against detrimental edge effects to this species. Any clearing of occupied habitat must occur between September 15 and March 15 (i.e., outside of the nesting period).

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Aimophilia ruficeps canescens California rufous-crowned sparrow */SSC	61% of potential habitat (73,600± acres) – 64% of coastal sage scrub, 60% of maritime succulent scrub, 44% of coastal sage/chaparral – 71% of mapped localities	39% of potential habitat (46,600± acres) – 29% of mapped localities	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 61 percent (73,600± acres) of potential habitat (including 71 percent of mapped localities) will be conserved.

Notes: This species is tolerant of edge effects, small habitat patches, low shrub volume, and short-term habitat disturbance.

Conditions: Area specific management directives must include maintenance of dynamic processes, such as fire, to perpetuate some open phases of coastal sage scrub with herbaceous components.

Passerculus sandwichensis beldingi Belding's savannah sparrow */CE	93% of potential habitat (1,700± acres of southern coastal saltmarsh) – 71% of mapped localities	7% of potential habitat (120± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based and Management Plans/Directives	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 93 percent (1,700± acres) of potential habitat (including 71 percent of mapped localities) will be conserved and the remaining acres (120±) are subject to no net loss of value and function. **Notes:** Additional important habitat is found on military lands (Silver Strand, North Island, etc.) which are not part of the MSCP. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. **Conditions:** Area specific management directives must include specific measures to protect against detrimental edge effects to this species.					
Passerculus sandwichensis rostratus Large-billed savannah sparrow */SSC	93% of potential habitat (1,700± acres of southern coastal saltmarsh) – 50% of mapped localities	7% of potential habitat (120± acres) – wetlands are subject to no net loss of function and value and 404(b)1 guidelines	Preserve design/landscape level	Monitoring Plan – Habitat Based and Management Plans/Directives	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 93 percent (1,700± acres) of potential habitat (including 50 percent of mapped localities) will be conserved and the remaining acres (120±) are subject to no net loss of value and function. **Notes:** Additional important habitat is found on military lands (Silver Strand, North Island, etc.) which are not part of the MSCP. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands. **Conditions:** Area specific management directives must include specific measures to protect against detrimental edge effects to this species.					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Ammodramus savannarum Grasshopper sparrow none	This species will not be covered by the MSCP because insufficient information is available to determine if adequate habitat is conserved.				NO
Agelaius tricolor Tricolored blackbird */SSC	77% of breeding habitat (4,800± acres) – 61% of freshwater marsh, 80% of riparian scrub – 59% of known localities	23% of breeding habitat (1,400± acres)	Preserve design/landscape level	Management Plans/Directives	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 77 percent of potential habitat (including 59 percent of mapped localities) will be conserved. Breeding colonies move from season to season, and with a goal of no net loss of wetlands, most of the suitable breeding sites will continue to be available. This species forages in grasslands and agricultural fields near its breeding habitat. Foraging habitat near the known nesting colonies will be conserved at 70-100 percent. Additionally, foraging opportunities will continue to be provided and created in turfed areas such as golf courses and cemeteries. Jurisdictions will require surveys during the CEQA review process in suitable breeding habitat proposed to be impacted. Participating jurisdictions' guidelines and ordinances, and state and federal wetland regulations will provide additional habitat protection resulting in no net loss of wetlands.

Conditions: Project approvals must require avoidance of active nesting areas during the breeding season. Area specific management directives must include measures to avoid impacts to breeding colonies, and specific measures to protect against detrimental edge effects to this species.

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Plecotus townsendii Townsend's western big-eared bat */SSC	Unknown/Insufficient data on distribution and life history.				NO
Eumops perotis californicus California mastiff bat */SSC	Unknown/Insufficient data on distribution and life history.				
Perognathus longimembris pacificus Pacific pocket mouse FE/SSC	Unknown/Only 3 to 4 known populations in Southern California. Insufficient data on distribution and life history.				NO
Taxidea taxus American badger /SSC	58% of potential habitat (82,500± acres) – 38% of grassland, 64% of coastal sage scrub, 44% of coastal sage/chaparral	42% of potential habitat (58,300± acres)	Preserve design/landscape level	Monitoring Plan – Habitat Based	YES

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 82,000± acres (58 percent) of its potential habitat will be conserved. **Notes:** This species has a wide range, and the plan will not adversely affect the species' long-term survival. Additional conservation of grassland habitats should be a priority and one of the primary factors in the design of preserves in the major amendment areas. **Conditions:** Area specific management directives must include measures to avoid direct human impacts to this species if it is present or likely to be present.					
Felis concolor Mountain lion/protected	81% of core areas 5, 6, 7, 8, 9, 11, and 12 (105,000± acres) – connected by linkages C, D, N	19% of core areas (24,000± acres)	Preserve design/landscape level	Monitoring Plan – Habitat Based and Corridor Sites	YES
DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED This species will be covered by the MSCP because 81 percent of the core areas (105,000± acres) which support its habitat will be conserved. **Notes:** Although not considered sensitive, this species has aesthetic and intrinsic values, thereby being an important species to protect. This species has a wide range, and the plan will not adversely affect the species' long-term survival. The criteria used to define core and linkage areas involves maintaining ecosystem function and processes, including large animal movement. Each core area is connected to other core areas or to habitat areas outside of the MSCP either through common boundaries or through linkages. Core areas have multiple connections to help ensure that the balance in the ecosystem will be maintained. An extensive monitoring program will also be implemented by the wildlife agencies to detect unanticipated changes in ecosystem function and allow for adaptive management of the preserve system. Specific design criteria for linkages, road crossings/undercrossings are included in Subarea Plans.					

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

Scientific Name Common Name Status	Conserved[3] (Based on the MSCP Plan)	Potentially Impacted/Developed (Based on the MSCP Plan)	General Basis for Analysis of Coverage	Monitoring Method(s) (Monitoring Plan and/or Management Plans/Directives)	Meets State and Federal Authorization Standards
Odocoileus hemionus fuliginata Southern mule deer none	81% of core areas 5, 6, 7, 8, 9, 11, and 12 (105,000± acres) – connected by linkages C, D, N	19% of core areas (24,000± acres)	Preserve design/landscape level	Monitoring Plan – Habitat Based and Corridor Sites	YES

DETAILS OF RATIONALE FOR IDENTIFYING SPECIES AS COVERED

This species will be covered by the MSCP because 81 percent of the core areas (105,000± acres) which support its habitat will be conserved.

Notes: Although not considered sensitive, this broadly distributed species has aesthetic and intrinsic values, and is the only large native herbivore in the plan area thereby making it an important species to protect. The criteria used to define core and linkage areas involves maintaining ecosystem function and processes, including large animal movement. Each core area is connected to other core areas or to habitat areas outside of the MSCP either through common boundaries or through linkages. Core areas have multiple connections to help ensure that the balance in the ecosystem will be maintained. An extensive monitoring program will also be implemented by the wildlife agencies to delete unanticipated changes in ecosystem function and allow for adaptive management of the preserve system. Specific design criteria for linkages, road crossings/undercrossings are included in the Subarea Plans.

SPECIES EVALUATED FOR COVERAGE UNDER THE MSCP

[1]Measures to conserve population of species on the MSCP plan's narrow endemic list must be incorporated into the Subarea Plans which do not have preserve/development areas specifically delineated based on site specific surveys. The City of San Diego's and the County of San Diego's Subarea Plan areas are primarily where this requirement is applicable and both Subarea Plans specify how MSCP narrow endemic species conservation measures.

Within the City of San Diego's MHPA, populations of MSCP narrow endemic species will be avoided.

The County will conserve MSCP narrow endemic species using a process which: first, requires avoidance to the maximum extent possible (avoidance); second, allows for a maximum 20 percent encroachment into a population if total avoidance is not possible (minimize); and third, requires mitigation at 1:1 to 3:1 ratio (in-kind) for impacts if avoidance and minimization of impacts would result in no reasonable use of the property. The County requirements for avoidance, minimization and mitigation are specifically described in the County's proposed BMO.

[2]The County's proposed BMO includes a list of sensitive plant species (Groups A and B) which require special consideration in project design. The County will conserve Group A and B species using a process which: first, requires avoidance to the maximum extent possible (avoidance); second, allows for a maximum 20 percent encroachment into a population if total avoidance is not possible (minimize); and third, requires mitigation at 1:1 to 3:1 ration (in-kind) for impacts if avoidance and minimization of impacts would result in no reasonable use of the property.

[3]This column indicates the conservation level of the species. Not all major populations are in the GIS database, i.e., if specific locality data are lacking. In these cases, the percentage of major populations preserved is determined or estimated from the percentage of associated habitat in the MHPA.

Status Federal/State

FE = Federally endangered

PE = Proposed for federal listing as endangered

FT = Federally threatened

PT = Proposed for federal listing as threatened

C = Candidate for federal listing

BEPA = Bald Eagle Protection Act

CE = State endangered

CR = State rare

CT = State threatened

SSC = State Species of Special Concern

*= Formerly Category 2 or Category 3 candidate for federal listing; no current federal status.

Protected = moratorium on hunting

None = no federal or state status

Shading indicates priority species (federally and state listed species, species proposed for listing, Category 1 candidate species, and NCCP target species).

Findings Definitions

Note: Area specific management directives for preserve areas will include specific guidelines for managing and monitoring covered species and their habitats, including following best management practices. Edge effects may include (but are not limited to) trampling, dumping, vehicular traffic, competition with invasive species, parasitism by cowbirds, predation by domestic animals, noise, collecting, recreational activities, and other human intrusion.
Source: 1996 MSCP GIS database. Military lands excluded from analysis.

ATTACHMENT G

Source: Kari Coler, pers comm in e-mail 7-7-10

Description of Recent and Pending NMCSD Improvement Projects

Project Name	Project Description	WO No.	Status
ELEVATORS IN BLDGS 4, 5, & 14.	RFP developed will include the passenger Traction and Hydraulic elevator systems and all recommendations from the engineering study, elevator inspection report and assessment completed June 2005. Included in the packages should be, ADA phones, door packages, fixture, and Emergency Power Systems Control Signals.	544630	Construction Complete
FIRE PROTECTION ALARM SYSTEMS FOR BLDG 4, 5, & 9	RFP developed will include the special life safety interface elements and special extinguishing system monitoring requirements.	544629	Construction Complete
AIR VENTILATION SYSTEM, NEPMU-5 BLDG 3235 - REPAIR HVAC	Building tenant is asking that the heat source be changed from a boiler type system to a more compact system (perhaps a Natural Gas system). New system must meet energy efficiency guidance.	541145	Construction Complete
REPAIR ELEVATOR & FIRE ALARM SYS BLDG 6LC	Repair Elevators and Fire Alarm System in Building 6, included in the package should be ADA Phones, Door Packages, Fixtures and Emergency Power Systems Control Signals.	565995	Construction Complete
Roofing Modifications, Bldg 5, NMCSD	Re-roof Bldg 5	533445	Construction Complete
Repair Galley Flooring, Bldg. 1H	Repair Galley Flooring	570626	Construction Complete
Construct Eagle Tribute, NMCSD	The Tribute will be comprised of a bronze wildlife sculpture, individual bronze eggs inscribed with the names of sailors who have died in OEF/OIF, installation of a large boulder, signage development and installation, planting of an oak tree (and possible construction of a retaining wall).	529733	In Process
B-10, Install HVAC System for Fire Dept, NMC	Install HVAC System for the Fire Department in B10. Planned FY07 construction award	573256	Construction Complete
Renovate Mental Health Nursing Tower, B1, NMC	Renovations to Building #1: First Level, Mental Health Nursing Tower (locked unit), West Wing at Naval Medical Center, San Diego are intended to ensure the safety of the patients and the military medical staff	574111	Construction Complete
B41 Repair Fire Alarm, NMC	The existing fire alarm system is obsolete and in need of repair. FY07 execution required.	573259	In Process
B601, Repair Fire Protection System, NORIS	Repair Fire Protection System in B601.	573260	In Process

B3230 Repair Fire Protection System, NBSD	Repair the Fire Protection System in the clinic, B3230. Planned FY07 construction execution.	573261	In Process
B27, Repair Emergency Generator	Repair Emergency Generator located at B27. Generator also serves B26.	573258	In Process
Renovate Orthopedic Department, B1, NMCSD	Renovate Orthopedic Department, B1,	574776	In Process
B26, ADA Rms 5th Flr & Elevators, NMCSD	Building 26, the Bachelor Enlisted Quarters (BEQ) constructed in 1956 is a six story building with three lower basement floors. Convert open bay berthing and storage space in BEQ, Bldg. 26, 5th to ADA compliant berthing suites and rooms with dedicated bath, and kitchen, laundry rooms and corridors. Mission is to provide amputee and war casualities the highest level of fitness.	571194	In Process
NMCSD Neonatal ICU Renovation	Neonatal ICU. Renovation. This is a NMCSD FY06 Special project list add.	539457	In Process
INTERIOR DESIGN SERVICES FOR NMCSD, BLDG 26 LOBBIES	INTERIOR DESIGN SERVICES FOR NMCSD BUILDING 26, LOBBIES.	568162	Construction Complete
INTERIOR DESIGN SERVICES FOR EMERGENCY ROOM TRIAGE AREA REMODEL AT NMCSD	Emergency Room. Triage area, scope entails, drawing layout, built-in mill package and interior finishes.	564014	Construction Complete
Repair Stairwell B1, NMCSD	Design/Engineering Documents (e.g., development of Plans & Specifications and Design Build RFPs, cost engineering, project management)	800694	Construction Complete
Remodel Bronchoscopy Suite, NMCSD	Interface with the Facilities Management Department and the Pulmonary Department to develop and award a project to expand and remodel the Bronchoscopy suite.	797857	In Process
Restore Bachelor Enlisted Quarters B26, PH I, NMCSD	Sequence One shall include repair and upgrades of utilities support from floors 1 through B3. Sequence Two through Four shall include repair and restoration work to the three basement levels.	800127	In Process
REPLACE ROOF BLDG 6LC	REPLACE ROOF BLDG 6LC	804654	Construction Complete
REPLACE ROOF BLDG 3N	REPLACE ROOF BLDG 3N	804351	Construction Complete
REPLACE ROOF BLDG 1	REPLACE ROOF BLDG 1	804349	Construction Complete
B7 Fire Pump Flow Evaluation, NMC	Engineering Study to identify the cause, recommend solution, and develop the documents necessary to award a contract to remediate the problems and bring the NMCSD Fire Sprinkler Pump System back into full compliance with Life Safety Code.	807618	Construction Complete
B1, Replace Domestic Water Isolation Valves.	NMCSD requests an Engineering Study to develop a project to replace key domestic hot and cold water isolation gate valves with ball valves in Bldg. 1	808703	Hold

B3, Replace Domestic Water Isolation Valves	NMCSD requests an Engineering Study to develop a project to replace key domestic hot and cold water isolation gate valves with ball valves in Bldg. 3	808705	Construction Complete
B2, Replace Domestic Water Isolation Valves, NMCSD	NMCSD requests an Engineering Study to develop a project to replace key domestic hot and cold water isolation gate valves with ball valves in Bldg. 2	808706	Construction Complete
Restore Operating Room HVAC	Restoration of the NMCSD Operating Room HVAC system in B1H.	808740	Construction Complete
HVAC NEGATIVE PRESSURE ON THE 5TH DECK, NMCSD	Modify the systems to make the 5th deck wards into isolation wards. It would require adding exhaust fans, ducting, and modifications to the HVAC for the 5th floor. Part of our plan is to make the 5th deck an isolation area if were faced with a pandemic with an airborne organism.	542801	Construction Complete
ARRA - Restore Mycology Clinical Spaces	Expand & remodel the Mycology Lab, and create a BSL 3 (ATS level II) negative pressure lab and ante room.	807620	In Process
NTC B624 Replace HVAC System and Controls	Test and evaluate the existing system and based on the test and evaluation I would like to then ask that they design a replacement to the existing DDC System at NTC B-624.	796974	In Process
ARRA - Restore Aged and Deteriorated Cooling Towers	REPLACE THREE BUILDING 2 COMPUTER ROOM COOLING TOWERS WITH NEW STAINLESS STEEL TOWERS, REPLACE DUPLEX RECEPTACLES WITH GFCI TYPE DEVICES, REPLACE TOGGLE SWITCHES, FLASHING AT MECHANICAL EQUIPMENT CURBS AND BASES TO BE REMOVED AND REPLACES, REPAIR AND REPAINT EXISTING REMAINING STEEL PIPING, REPAINT EXISTING EXPOSED COOLING TOWER ENCLOSURE STRUCTURAL STEEL FRAMING, and ABATE ANY ASBESTOS CONTAINING MATERIAL IN THE ROOF MASTIC.	855655	In Process
ATFP ACCESS CONTROL IMPROVEMENTS, NMCSD	Main Gate improvements at Naval Medical Center San Diego, which should consider Counter Terrorism Force Protection requirements. Traffic improvements, and additional barriers and signage etc.	808005	In Process

B47 FISHER HOUSE II FIRE CODE COMPLIANCE	Provide and install (1) complete smoke exhaust system for the elevator shaft. Remove existing and install (1 pair) 1-hour fire rated doors with automatic closing devices on the 2nd floor hallway linen closet. Remove existing and install (25) 1-hour fire-rated doors with automatic closing devises on all openings that open into the exit enclosure on the first and second floors. Remove existing fire alarm horn and replace with combination fire alarm "visual strobe and audio horn appliances in the guest sleeping rooms and the 2nd floor spaces to comply with NFPA 72 "National Fire Alarm Code", Uniform Federal Accessibility Standard (UFAS) and ADA. Provide and install (2) complete residential range top cooking extinguishing systems in accordance with UFC 3-600-01, Section 6-3.2, and have this specialized extinguishing system monitored by the building fire alarm system.	860224	In Process
Water Conservation Design for Domestic and Landscape Water Use	Develop a working design with the development of working drawings for construction to incorporate water conservation details and construction working drawings with Xref files, equipment schedules, details actual system configuration and site limitations for working base wide on all water conservation measures.	574609	Award of Contract on Hold
ARRA - Restore Interior Spaces for Mental Health Clinic and Deployment Health Center	Restore Interior Spaces for Mental Health Clinic and Deployment Health Center	837714	In Process
Renovate B1 Emergency Dept., NMCSD	Restore Emergency Room HVAC System and Interior Architecture.	573034	In Process
RESTORE MENTAL HEALTH WARD NURSING TOWERS NORTH WING, BLDG. 1	RESTORATION OF MENTAL HEALTH WARD NURSING TOWER 1 NORTH. WORK IS TO INCLUDE: REPLACEMENT OF FLOORING, FINISHES, CRASH RAILS, WINDOWS, PADDING, WALL FINISHES, HARD LID CEILING SYSTEMS, DOORS, NURSING STATION WITH ENCLOSURE, LIGHTING CONTROL SYSTEMS, NURSE CALL DEVICES AND ACCESS CONTROL SYSTEMS; RESTORE ALL RESTROOMS, ACCESSORIES AND FIXTURES INCLUDING BUILD OUT OF ONE (1) ADA COMPLIANT RESTROOM; CONSTRUCTION OF AN ENCLOSED CONCRETE PAD PATIO WITH APPROPRIATE SECURITY MEASURES.	860820	In Process
B26 Renovation, PH II, NMCSD	Floor 1 Repair and Restoration, Floor 2/3 Electrical/HVAC/Finishes/ADA Rooms, Public Access Areas	833420	In Process
WASTE DRAIN PIPING REPAIR AT NMCSD	REPAIR DETERIORATED WASTE DRAIN PIPING THROUGHOUT HOSPITAL COMPLEX.	870500	In Process

Repair Fire Pump - Bldg 7	Repair the fire pump at Bldg 7.	856144	Awaiting Funds
Outdoor Energy Efficient Lighting at NMCSD	Provide analysis and recommendations for the replacement of existing NMCSD outdoor lighting to a greater energy efficient system.	855507	Awaiting Funds
MOR Corridor Paint and Flooring Bldg 1 at NMCSD	Prepare RFP and cost estimate for painting and replacing flooring in the MOR corridor of Bldg 1 at NMCSD.	855531	Awaiting Funds
SURGICAL TRAINING LAB EXPANSION	THE PROPOSED PROJECT CONSISTS OF CONSOLIDATING SEVERAL LABORATORY AND STORAGE ROOMS INTO ONE SURGICAL TRAINING LABORATORY (APPROXIMATELY 2,000 SF). PROPOSED LAB IS LOCATED ON THE GROUND LEVEL OF G BLOCK OF BUILDING 1.	943499	Expect Award of Contract Soon
REQUEST DESIGN LAYOUT FOR PERMANENT SPACE IN BLDG. 26 3A SOUTH FOR DHB	INTERIOR DESIGN SERVICES FOR THE PERMANENT MOVE OF DHB INTO BLDG. 26, 3A TO ACCOMMODATE 99 - 129 STAFF. NMCSD IS REQUESTING BLOCK DIAGRAM TO BE USED FOR SPACE RE-UTILIZATION OF RESTORED & MODERNIZED SPACE IN BLDG. 26, 3A SOUTH END TO INCLUDE VACANT SPACE, LABORATORY STORAGE, AND STOREROOMS.	871710	Completed
REQUEST DESIGN LAYOUT FOR TEMP SPACE IN BLDG. 26 3B FOR DHB	INTERIOR DESIGN SERVICES FOR THE TEMPORARY MOVE OF DHB INTO BLDG. 26, 3B TO ACCOMMODATE 63 STAFF.	871574	Completed
REPLACE FIRE ALARM INSPECTION INVESTIGATION AND COST FOR UPGRADE NMCSD	All new smoke detectors, pull stations, horns, etc need to be replaced in Building 14.	976195	IEL in Process
HUMIDITY CONTROL FOR ANIMAL CARE ROOMS BLDG 9 NMCSD	Provide a design build Request for Proposal (RFP) package for Humidity Control for Animal Care Rooms-Bldg 9 and award a design build project by Sept 30, 2010.	1026885	IEL in Process
RESTORE ELECTRICAL DISTRIBUTION PANEL BOARDS, BUILDING 3N (NORTH CLINIC)	RESTORE ELECTRICAL DISTRIBUTION PANEL BOARDS, BUILDING 3N (NORTH CLINIC). THIS PROJECT UPGRADES 22 BRANCH CIRCUIT DISTRIBUTION PANELS WITH A VOLTAGE RATING 208Y/120V. REPLACE EXISTING PANELS WITH NEW PANELS ALLOWING MORE BRANCH CIRCUIT SPACES. RELOCATE EXISTING MULTIPLE TERMINATIONS TO INDIVIDUAL SPARE CIRCUIT BREAKERS, AND REPLACE EXISTING CONDUITS AND WIRES.	943429	Expect Award of Contract Soon

RESTORE ELECTRICAL DISTRIBUTION PANEL BOARDS, BUILDING 2S (SOUTH CLINIC)	RESTORE ELECTRICAL DISTRIBUTION PANELBOARDS, BUILDING 2S (SOUTH CLINIC). THIS PROJECT UPGRADES 25 BRANCH CIRCUIT DISTRIBUTION PANELS WITH A VOLTAGE RATING 208Y/120V. REPLACE EXISTING PANELS WITH NEW PANELS ALLOWING MORE BRANCH CIRCUIT SPACES. RELOCATE EXISTING MULTIPLE TERMINATIONS TO INDIVIDUAL SPARE CIRCUIT BREAKERS, AND REPLACE EXISTING CONDUITS AND WIRES.	943450	Expect Award of Contract Soon
RESTORE ELECTRICAL DISTRIBUTION PANELBOARDS, BUILDING 1H (HOSPITAL)	RESTORE ELECTRICAL DISTRIBUTION PANELBOARDS, BUILDING 1H (HOSPITAL). THIS PROJECT UPGRADES 173 BRANCH CIRCUIT DISTRIBUTION PANELS WITH A VOLTAGE RATING 208Y/120V. REPLACE EXISTING PANELS WITH NEW PANELS ALLOWING MORE BRANCH CIRCUIT SPACES. RELOCATE EXISTING MULTIPLE TERMINATIONS TO INDIVIDUAL SPARE CIRCUIT BREAKERS, AND REPLACE EXISTING CONDUITS AND WIRES.	943468	Expect Award of Contract Soon
RESTORE OPHTHALMOLOGY CLINIC BUILDING 2 CONCEPT DESIGN	PROVIDE A/E STUDY TO DEVELOP PROJECT WORK PLAN AND CONCEPT DESIGN FOR THE RENOVATION OF THE OPHTHALMOLOGY CLINIC IN BUILDING 2, 2ND DECK.	946182	In Process, Awaiting Funds
STUDY - RESTORE GENERAL SURGERY	PROVIDE A/E STUDY TO DEVELOP PROJECT WORK PLAN AND CONCEPT DESIGN FOR THE RENOVATION OF THE GENERAL SURGERY CLINIC, BUILDING 3, 4TH DECK.	946324	In Process, Awaiting Funds
Repair Cracks in Pool - Bldg 12	Existing cracks in the pool are growing. A study was prepared last year.	855502	Awaiting Funds
NMCSD Seismic Construction Phasing Documents for Bldgs 1 thru 7	Approximately .219 Fluid Viscous dampers will be installed in the NMCSD main hospital in building #1, Clinics, bldgs #2, #3 and Bldg #7 Cogen plant during the seismic restoration for FY12-FY15.	1082064	Awaiting Aproval
INSTALL 139 KWAC SOLAR PV RENEWABLE ENERGY SYSTEM	INSTALL 139 KWAC SOLAR PV RENEWABLE ENERGY SYSTEM	1105800	Awaiting Aproval
Seismic Retrofit/Upgrade Design for B1, 2, 3, and 7, NMCSD	The proposed seismic retrofit would include the addition of seismic dampers to improve the seismic performance of the Hospital and allow the essential facility to remain operational in the event of an earthquake.	573121	In Process

ATTACHMENT H

THE CITY OF SAN DIEGO

Public Utilities Department
Water Operations Branch
Public Information Office
2797 Caminito Chollas, MS 43
San Diego, CA 92105-5097

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2009 Annual Drinking Water Quality Report

Chinese
此份有關你的食水報告，內有重要資料和訊息，請找
他人為你翻譯及解釋清楚。

Korean
이 안내는 매우 중요합니다.
본인을 위해 번역인을 사용하십시요.

Arabic
.(ريرقتلا اذه يف ةدراولا تامولعملا) ةمهم تامولعم ىلع يوتحي اذه ريرقتلا
.ةمجرتلا وأ هريسفتل صخشب لصتا

Vietnamese
Chi tiết này thật quan trọng.
Xin nhờ người dịch cho quý vị.

NO TIME TO WASTE
NO WATER TO WASTE

City of San Diego
PUBLIC UTILITIES
Water & Wastewater

Tagalog
Mahalaga ang impormasyong ito. Mangyaring
ipasalin ito.

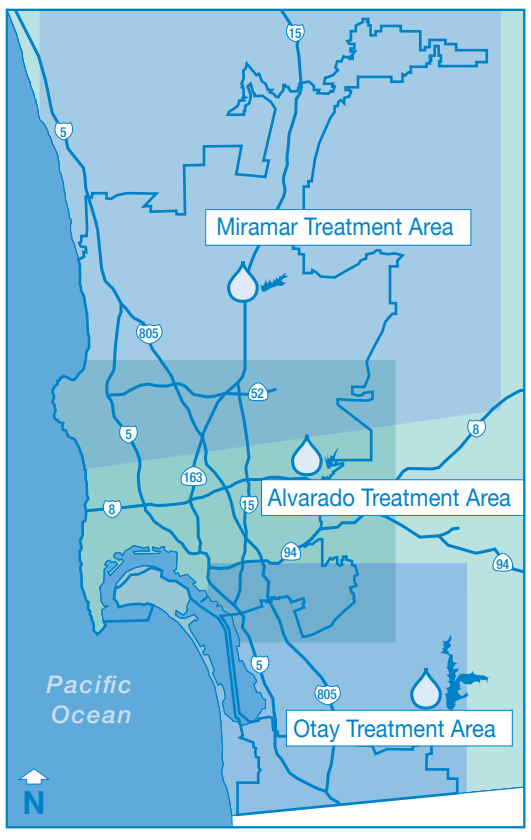
Af-Somali
Riboottkani wuxuu xanbaar sanyahay warbixino muhiim
ah oo ku saabsan biyaha aad cabtaan. Hadii aadan
fahmeynin, Fadlan ribootka hala turjumo ama kala
hadal ruux ku fahansiiya.

Spanish
Este reporte contiene información importante sobre
la calidad del agua en su comunidad. Copias en
español de este reporte están disponibles si llama al
(619) 515-3500. También encontrará este reporte por
medio del internet en www.sandiego.gov/water.

This report contains important information about your
drinking water. If the report is not available in your
native language, we encourage you to identify someone
who understands it and can translate for you.

The City of San Diego's
Drinking Water Quality Report

includes details about our water sources, what they contain, and other important information about the water we provide to our customers. The drinking water provided by the City of San Diego is safe and meets all federal and state water health standards (primary standards for treating and monitoring water). The City imports approximately 85-90% of its water from the Metropolitan Water District of Southern California via the San Diego County Water Authority. Our water is a blend from the Colorado River, State Water Project, and local sources.



Contaminants
The sources of drinking water (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, agricultural application, and septic systems.
- Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

To ensure tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the California Department of Public Health prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. State regulations also establish limits for contaminants in bottled water that must provide the same protection to public health.

Fluoridation
Approximately 10% of the water imported to San Diego is fluoridated treated water. Because this is only a small portion of the City water supply, not all areas of the City currently receive fluoridated water. Due to seasonal demands and operational changes, fluoride levels will vary throughout the system over time. In 2008, the City Council accepted an offer of funding from the First 5 Commission of San Diego County for the purpose of fluoridating the City's public water supply. The Commission's offer of up to $3,927,016 is for full funding of the capital costs and up to two years of operating and maintenance expenses necessary to implement fluoridation at each of the City's three water treatment plants. As a result of state law and the availability of funding, the City is required to begin fluoridating its public water supply by late 2010. For more information, visit www.sandiego.gov/water/quality/fluoridation.shtml.

Important Health Information
Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised people, such as those with cancer who are undergoing chemotherapy, people who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, and some elderly and infants can be particularly at risk. These people and/or their caregivers should seek advice from their health care providers about drinking water. The EPA guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium*, *Giardia* and other microbial contaminants are available from the EPA's Safe Drinking Water Hotline at 800-426-4791. During calendar year 2009, the water supply to each of the City's water treatment plants was monitored for *Cryptosporidium* and *Giardia*, and neither was detected.

Mandatory Water Conservation
San Diego is continuing to experience water supply restrictions. Environmental stresses stemming from multiple years of drought to court-ordered pumping restrictions continue to reduce the amount of water that can be delivered to our region. Since San Diego imports 85 – 90% of its water, these conditions put considerable stress on the City's water system. Because of this, and the threat of further limitations on our water supplies, the City of San Diego has declared a Level 2-Drought Alert. All customers have restrictions on how they can use water. For more information, visit the City's Water Conservation web page at www.sandiego.gov/water/conservation or call 619-515-3500.

How to Contact Us		Information Web Sites	
Emergency Hotline	619-515-3525	City of San Diego	www.sandiego.gov
General Information	619-515-3500	County Water Authority	www.sdcwa.org
Water Quality Lab	619-668-3232	Metropolitan Water District	www.mwdh20.org
Capital Improvements Projects	619-533-4679	State Public Health	www.cdph.ca.gov
City Lakes Recreation	619-465-3474	Think Blue	www.thinkblue.org
Speakers Bureau	619-533-6638	U.S. EPA	www.epa.gov/safewater
Storm Water Pollution Prevention	619-235-1000	Water Emergency	www.sandiego.gov/wateremergency
Water-Use Violations	619-515-3500	Watering Calculator	http://apps.sandiego.gov/landcalc
Department email	water@sandiego.gov	Be Water Wise (MWD)	www.bewaterwise.com

6/10 Printed on recycled paper containing 30% post-consumer waste. This information is available in alternative formats upon request.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. For more information regarding contaminants and potential health effects, call the U.S. Environmental Protection Agency's (USEPA) Safe Drinking Water Hotline at 800-426-4791 or visit the agency's web site at www.epa.gov/safewater/hfacts.html for information regarding contaminants and potential health effects. For a list of action levels, visit the CDPH web site at www.cdph.ca.gov.

How to Read the Tables

The tables below list contaminants which 1) The California Department of Public Health (CDPH) requires the City to monitor, 2) CDPH regulates with associated primary [health] or secondary [aesthetic], or no established standards. During 2009, these contaminants were detected at or above the CDPH's Detection Limits for Reporting.

These tables summarize monitoring from January – December 2009 with two exceptions (see table footnotes). CDPH mandates monitoring radioactive contaminants every nine years. Monitoring based on the Lead and Copper Rule was conducted in 2008, and is performed every three years. The levels of these contaminants are not expected to vary significantly from year to year.

Definition of Terms

Action Level (AL): The concentration of a contaminant that, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL (maximum contaminant level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs or MCLGs as is economically or technologically feasible. Secondary MCLs are set to protect the odor, taste and appearance of drinking water.

MCL G (MCL goal): The level of a contaminant in drinking water, below which there is no known or expected health risk. MCLs are set by the EPA.

MRDL (maximum residual disinfectant level): The level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap.

MRDLG (maximum residual disinfectant level goal): The level of a disinfectant added for water treatment below, which there is no known or expected health risk. MRDLGs are set by the U.S. EPA.

PHG (public health goal): The level of a contaminant in drinking water below, which there is no known or expected health risk. PHGs are set by the California EPA.

Primary Drinking Water Standard (PDWS): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

Abbreviations

A: absent
CA SMCL: California secondary maximum contaminant level
CDPH: California Department of Public Health
CSD MDL (City of San Diego Water Quality Lab method detection limit): lowest quantifiable concentration of a measured analyte detectable by the lab
CU: color units
DLR: detection limit for reporting
gr/Gal: grains per gallon
MCL: Maximum contaminant level
ml: milliliter
n/a: not applicable
ND: not detected
NTU: nephelonmetric turbidity units
OU: odor units
pCi/L: picocuries per liter (a measure of radiation)
ppb: parts per billion or micrograms per liter (µg/L) – [1 ppb = 0.001 ppm]
ppm: parts per million or milligrams per liter (mg/L) – [1 ppm = 1,000 ppb]
ppt: parts per trillion or nanograms per liter (ng/L) – [1 ppt = 0.001 ppb]
TT (treatment technique): a required process intended to reduce the level of a contaminant in drinking water
µS/CM: micro-siemens/cm
< less than
> greater than

TABLE 1 – DETECTED REGULATED CCR CONTAMINANTS WITH PRIMARY MCLs

Primary Standards (Mandatory Health Related Standards) – CHEMICAL CONTAMINANTS

					TREATMENT PLANT EFFLUENT CONCENTRATION								
					ALVARADO		MIRAMAR		OTAY		MWD Skinner		
CONTAMINANT	UNITS	MCL	PHG (MCLG)	CDPH DLR	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE	TYPICAL SOURCE OF CONTAMINANTS
Barium	ppm	1	2	0.1	ND	ND – 0.10	0.11	0.11 – 0.12	ND	ND – ND	ND	ND – 0.11	Erosion of natural deposits
Fluoride naturally occurring	ppm	2	1	0.1	0.22	0.18 – 0.26	0.23	0.19 – 0.28	0.24	0.19 – 0.30	NA	NA	Erosion of natural deposits
Fluoride Treatment Related	ppm	2.0	1.0	0.1	Not added	Not added	Not added	Not added	Not added	Not added	0.8	0.7 – 1.3	MWD added Fluoride in 2008.

Note: Fluoride service map by address located at: http://www.sandiego.gov/water/quality/fluoridation.shtml

Primary Standards (Mandatory Health Related Standards) – RADIOACTIVE CONTAMINANTS

					TREATMENT PLANT EFFLUENT CONCENTRATION								
					ALVARADO		MIRAMAR		OTAY		MWD Skinner		
CONTAMINANT	UNITS	MCL	PHG (MCLG)	CDPH DLR	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE	TYPICAL SOURCE OF CONTAMINANTS
Gross Beta Particle Activity	pCi/L	50	0	4	ND	ND	ND	ND	ND	ND	ND	ND – 8.8	Decay of natural and manmade deposits
Uranium	pCi/L	20	0.43	1	2.41	2.41	1.6	1.6	2.12	2.12	2.5	2.3 – 2.7	Erosion of natural deposits

Note: Monitoring required every three years. Most recent monitoring: 2009 for Alvarado, Miramar, Otay: and 2008 for MWD Skinner.

Primary Standards (Mandatory Health Related Standards) - MICROBIOLOGICAL CONTAMINANTS

					DISTRIBUTION SYSTEM		MWD Skinner		
CONTAMINANT	UNITS	MCL	PHG (MCLG)	CDPH DLR	AVERAGE	RANGE	AVERAGE	RANGE	TYPICAL SOURCE OF CONTAMINANTS
Total Coliform Bacteria	/100ml	< 5% Positive	0	A	0.12%	0 – 0.40%	0.00%	0.0 – 0.2%	Human and animal waste

SODIUM, TOTAL HARDNESS, AND TURBIDITY

					DISTRIBUTION SYSTEM						MWD Skinner		
CONTAMINANT	UNITS	MCL	PHG (MCLG)	CSD MDL	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE	TYPICAL SOURCE OF CONTAMINANTS
Sodium	ppm	na	na	5	90.1	84 – 99.4	91.5	85.3 – 98.4	99	86.9 – 111	93	78 – 100	Naturally present in the environment
Total Hardness	ppm	na	na	2	257	229 – 298	269	234 – 325	264	251 – 276	270	190 – 300	Naturally present in the environment
Total Hardness	gr/Gal	na	na	0.12	15	13.4 – 17.4	15.7	13.7 – 19.0	15.4	14.7 – 16.1	15.8	11.1 – 17.5	Naturally present in the environment
Turbidity	NTU		na		% < 0.3 NTU		% < 0.3 NTU		% < 0.3 NTU		% < 0.3 NTU		Soil runoff
	TT = 95% of samples <0.3NTU				100%		100%		100%		100%		

Primary Standards (Mandatory Health Related Standards) – AT THE TAP CONTAMINANTS – LEAD AND COPPER RULE

					SAMPLES TAKEN AT THE TAP				
						NUMBER			
CONTAMINANT	UNITS	ACTION LEVEL	PHG (MCLG)	CDPH DLR	90th PERCENTILE CONCENTRATION	SAMPLING SITES	EXCEEDING AL		TYPICAL SOURCE OF CONTAMINANTS
Copper	ppm	1.3	0.17	0.050	0.444	57	0		Internal corrosion of household plumbing systems
Lead	ppb	15	2	5	9.0	57	2		Internal corrosion of household plumbing systems

Note: Monitoring mandated every three years. Most recent monitoring conducted in 2008.

TABLE 2 – DETECTED REGULATED CCR CONTAMINANTS WITH SECONDARY MCLs

				TREATMENT PLANT CONCENTRATION								
				ALVARADO		MIRAMAR		OTAY		MWD SKINNER		
CONTAMINANT	UNITS	CA SMCL	CSD MDL	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE	TYPICAL SOURCE OF CONTAMINANTS
Chloride	ppm	500	0.5	102	95.7 – 108	99.7	95.8 – 107	126	113 – 150	97	93 – 100	Runoff/leaching from natural deposits; seawater influence
Color	CU	15	1	ND	ND – 2	ND	ND – 1	ND	ND – 1	2	1 – 2	Naturally-occuring organic materials.
Odor-Threshold	OU	3	1	1	ND – 1	ND	ND – 1.4	1	ND – 1.4	18	12 – 24	Naturally-occuring organic materials
Specific Conductance	µS/cm	1,600	n/a	912	823 – 1,050	902	657 – 1,090	958	866 – 1,060	960	760 – 1,100	Substances that form ions when in water; seawater influence.
Sulfate	ppm	500	0.5	182	151 – 227	210	185 – 235	184	153 – 206	220	130 – 250	Runoff/leaching from natural deposits; seawater influence
Total Dissolved Solids	ppm	1,000	10	562	506 – 632	596	510 – 757	597	539 – 644	580	440 – 640	Runoff/leaching from natural deposits

Odor-Threshold note for MWD Skinner - MWD utilizes a flavor-profile analysis (FPA) method and found the FPA samples from this location acceptable.

TABLE 3 – DETECTED UNREGULATED CCR CONTAMINANTS REQUIRING MONITORING

				TREATMENT PLANT CONCENTRATION							
				ALVARADO		MIRAMAR		OTAY		MWD SKINNER	
CONTAMINANT	UNITS	ACTION LEVEL	CDPH DLR	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE
Boron	ppb	1,000	100	131	107 – 143	137	129 – 148	151	141 – 164	140	130 – 140
N-nitrosodimethylamine [NDMA]	ppt	n/a	2	ND	ND – 2	ND	ND – ND	ND	ND – ND	ND	ND – 2

*Boron averages are based on the Highest Running Annual Average.

TABLE 4 – DETECTED DISINFECTION BY-PRODUCTS, DISINFECTANT RESIDUAL AND DISINFECTION BY-PRODUCT PRECURSORS

Treatment Plant Effluent

					TREATMENT PLANT CONCENTRATION								
					ALVARADO		MIRAMAR		OTAY		MWD SKINNER		
CONTAMINANT	UNITS	MCL MRDL	MCLG MRDLG	CDPH DLR	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE	TYPICAL SOURCE OF CONTAMINANTS
Total Organic Carbon [TOC]	ppm	n/a	n/a	0.3	2.97	2.15 – 4.62	2.50	2.27 – 2.76	3.74	2.26 – 5.08	2.2	1.8 – 2.3	Various natural and manmade sources

Distribution System Results

Disinfectant Residual [Chloramines]	ppm	4	4	----	Distribution system average = 2.16	RANGE **	2.03 – 2.32		Drinking water disinfectant added for treatment
Haloacetic acids [HAA5]	ppb	60*	n/a	----	* Highest running average = 16.8	RANGE **	6.12 – 32.6		By-product of drinking water disinfection
Total Trihalomethanes [TTHMs]	ppb	80*	n/a	----	* Highest running average = 67.3	RANGE **	26.5 – 82.8		By-product of drinking water chlorination

NOTES: * Total Trihalomethane and HAA5 compliance is based on system wide Running Annual Average.

** Ranges are based upon single sample results.

ATTACHMENT I

ATTACHMENT I
VEGETATION COMMUNITIES*

There are five vegetation communities on NMCSD, as defined by the Holland classification system. The site is dominated by ornamental landscaping, but also contains Diegan coastal sage scrub, southern willow scrub, disturbed areas, and developed areas (RECON 2005, updated by Agri Chem 2009). Table1 provides acreage for each vegetation community and descriptions of each community are provided below.

TABLE 1
HOLLAND VEGETATION CLASSIFICATION ACREAGE

Holland Vegetation Classifications	Acreage
1. Diegan coastal sage scrub	5.34
2. Southern willow scrub	0.62
3. Ornamental landscape	10.18
4. Ornamental landscape – eucalyptus dominated	3.73
5. Ornamental landscape – acacia dominated	1.50
6. Disturbed habitat	0.54
7. Urban/Developed	53.26
Total	75.17

Diegan Coastal Sage Scrub

Diegan Coastal Sage Scrub Diegan coastal sage scrub is a low-growing plant community comprised of aromatic, drought-deciduous shrubs and sub-shrubs. Often found on clay slopes this plant community can survive with little soil moisture through the summer months. Diegan coastal sage scrub on NMCSD is dominated by *Artemisia californica* (California sagebrush), *Eriogonum fasciculatum* (California buckwheat), *Baccharis sarathroides* (broom baccharis), and *Salvia mellifera* (black sage).

Diegan coastal sage scrub is considered a sensitive habitat by the City and County of San Diego and is given the highest inventory priority by the CNDDB. Coastal sage scrub was listed as the third most extensive vegetation community in the county over 25 years ago (CDFG 1965); however, Oberbauer (1979) suggested that up to 70 percent of the county's original sage scrub habitat had been destroyed or modified, and this loss has continued throughout the last decade, primarily due to urban expansion. Additional evidence of the decline of this once common habitat is the growing number of declining

* Source: Draft Vegetation Management Plan Navy Medical Center San Diego (December 2009) prepared by Agri Chemical and Supply Inc.

plant and animal species dependent upon it, including the California gnatcatcher, which is present on site.

Southern Willow Scrub

Southern willow scrub is found on loose, sandy, or fine gravelly alluvium deposited near stream channels during floods, and most stands are too dense to allow much understory to develop (Holland 1986). This habitat can be a dense broad-leaved, winter-deciduous association dominated by willow species to a mule-fat dominated scrub. Understory is often composed of weedy species or in dense stands not present at all. Southern willow scrub habitat on NMCSD is dominated by Salix gooddingii. Salix lasiolepis and Baccharis salicifolia.

Ornamental

NMCSD is dominated by a variety of non-native ornamental landscape including eucalyptus-dominated slopes and acacia dominated hedges. Much of the native habitat on NMCSD is adjacent to non-native landscaping, some of which is drought tolerant and has the potential to move into native habitat. Many of the eucalyptus-dominated areas are dense enough to exclude native habitat.

Disturbed

Disturbed habitat is any land on which the native vegetation has been significantly altered by agriculture, construction, or other land-clearing activities, and the species composition and site conditions are not characteristic of the disturbed phase of one of the plant associations within the study region. Most disturbed habitat on NMCSD is located in the northeast corner of the site (RECON 2005). Typical plant species include crown daisy (*Chrysanthemum coronarium*), mustard (*Brassica spp*.), mustard, lamb's quarters (Chenopodium album), fountain grass (*Pennisetum setaceum*), and castor bean (*Ricinus communis*), among others. Nonnative trees, such as eucalyptus, pepper trees, and acacia also occur in this association.

Developed

Developed areas are defined as areas that do not generally support native vegetation and may be additionally characterized by the presence of man-made structures such as buildings or roads. The level of soil disturbance is such that only the most ruderal plant species would be expected.

ATTACHMENT J

ATTACHMENT J
PLANT SPECIES OBSERVED*

Scientific Name	Common Name	Native (N) Introduced (I)
Acacia longifolia	Sydney golden	I
Acacia redolens	Acacia	I
Acer macrophyllum	Big-leaf maple	N
Achillea millefolium	Yarrow, milfoil	N
Agapanthus africanus	Lily of the Nile	I
Agave americana	Century plant	I
Agrostis exarata	Spike redtop	N
Allium sp.	Onion	N
Alnus rhombifolia	White alder	N
Ambrosia psilostachya	Western ragweed	N
Amorpha fruticosa	False indigo	N
Anagallis arvensis	Scarlet pimpernel, poor-man's weatherglass	I
Anemopsis californica	Yerba mansa	N
Apium graveolens	Celery	I
Aptenia cordifolia	Baby sun rose	I
Archontophoenix cunninghamiana	King palm	I
Arctotis sp.	African daisy	I
Arecastrum romanzoffianum	Queen palm	I
Artemisia californica	California sagebrush	N
Arundo donax	Giant reed	I
Asparagus densiflorus	Asparagus fern	I
Asparagus officinalis ssp. *officinalis*	Garden asparagus	I
Asphodelus fistulosus	Hollow-stem asphodel	I
Aspidistra elatior	Cast iron plant	I
Atriplex canescens	Fourwing saltbush, shad-scale	N
Atriplex lentiformis ssp. *lentiformis*	Big saltbush	N
Atriplex semibaccata	Australian saltbush	I
Avena sp.	Wild oats	N
Azalea sp.	Azalea	I
Baccharis salicifolia	Mule fat, seep-willow	N
Baccharis sarothroides	Broom baccharis	N
Bauhinia blakeana	Hong Kong orchid tree	I
Bougainvillea sp.	Bougainvillea	I
Brachychiton acerifolius	Flame tree	I
Brachychiton populneus	Kurrajong	I
Brassica nigra	Black mustard	I
Brassica rapa	Field mustard	I
Bromus madritensis . ssp. *rubens*	Foxtail chess	I
Callistemon citrinus	Bottlebrush	I
Calystegia macrostegia ssp. *intermedia*	Chaparral morning-glory	N
Camellia japonica	Common camellia	I
Camissonia sp.	Sun cup	N
Carpobrotus chilensis	Sea fig	N

Source: Draft Vegetation Management Plan Navy Medical Center San Diego (December 2009) prepared by Agri Chemical and Supply Inc.

ATTACHMENT J
PLANT SPECIES OBSERVED* (CONT.)

Scientific Name	Common Name	Native (N) Introduced (I)
Carpobrotus edulis	Hottentot fig	I
Carissa grandiflora	Natal plum	I
Cassia excelsa	Crown of gold	I
Ceanothus sp.	Ceanothus	I
Centaurea melitensis	Tocolote, star-thistle	I
Ceratonia silique	Carob tree	I
Chamaesyce sp.	Prostrate spurge	I
Chamomilla suaveolens	Pineapple weed, rayless chamomile	N
Chenopodium sp.	Goosefoot	I
Chenopodium album	Lamb's quarters, pigweed	I
Chrysanthemum coronarium	Garland, crown daisy	I
Cistis creticus	Rock-rose	I
Citrus sp.	Citrus	I
Conyza canadensis	Horseweed	N
Coprosma repens	Mirror plant	I
Cortaderia jubata	Pampas grass	I
Cotoneaster sp.	Cotoneaster	I
Crassula argentea	Jade plant	I
Cupaniopsis anacardioides	Carrot wood	I
Cuphea hyssopifolia	False heather	I
Cycas revoluta	Sago palm	I
Cynara cardunculus	Cardoon	I
Cynodon dactylon	Bermuda grass	I
Cyperus sp.	Nutsedge	N
Cyperus alternifolius	Umbrella-plant	I
Delosperma alba	Ice plant	I
Dietes vegeta	African iris	I
Distichlis spicata	Saltgrass	N
Distictis sp.	Trumpet vine	I
Dracaena draco	Dragon tree	I
Drosanthemum floribundum	Rosea ice plant	I
Echium plantagineum	Viper's bugloss	I
Eleocharis macrostachya	Pale spikerush	N
Encelia californica	Common encelia	N
Eriobotrya japonica	Loquat	I
Eriogonum fasciculatum var *foliolosum*	California buckwheat	N
Eriophyllum confertiflorum var. *confertiflorum*	Golden-yarrow	N
Erodium sp.	Filaree, storksbill	I
Erythrina sp.	Coral tree	I
Escallonia laevis	Pink escallonia	I
Eschscholzia californica	California poppy	N
Eucalyptus globulus	Eucalyptus	I
Eucalyptus spp.	Eucalyptus	I
Euphorbia peplus	Petty spurge	I

Source: Draft Vegetation Management Plan Navy Medical Center San Diego (December 2009) prepared by Agri Chemical and Supply Inc.

ATTACHMENT J
PLANT SPECIES OBSERVED* (CONT.)

Scientific Name	Common Name	Native (N) Introduced (I)
Ficus carica	Edible fig	I
Ficus pumila	Creeping fig	I
Filago sp.	Herba impia	N
Foeniculum vulgare	Fennel	I
Fraxinus sp.	Ash	I
Gardenia sp.	Gardenia	I
Gazania sp.	African daisy	I
Gelsemium sempervirens	Carolina jessamine	I
Gnaphalium sp.	Cudweed, everlasting	N
Hebe buxifolia	Boxleaf hebe	I
Hedera helix	English ivy	I
Heliotropium curassavicum	Chinese pusley	N
Hemizonia fasciculata	Golden tarplant	N
Hemerocallis sp.	Daylily	I
Heteromeles arbutifolia	Toyon, christmas berry	N
Heterotheca grandiflora	Telegraph weed	N
Hibiscus sp.	Hibiscus	I
Hordeum jubatum	Foxtail barley	N
Impatiens balsamina	Impatiens	I
Ipomoea purpurea	Common morning-glory	I
Isocoma menziesii	Coast goldenbush	N
Jacaranda mimosifolia	Jacaranda	I
Juniperus sp.	Juniper	I
Lactuca serriola	Prickly lettuce	I
Lamarckia aurea	Goldentop	I
Lantana montevidensis	Trailing lantana	I
Lathyrus splendens	Pride of California, campo pea	N
Laurus nobilis	Sweet bay	I
Lepidium nitidum var. *nitidum*	Shining peppergrass	N
Lessingia filaginifolia var. *filaginifolia*	California-aster	N
Ligustrum japonicum	Wax-leaf privet	I
Limonium perezii	Perez rosemary	I
Liquidambar styraciflua	Sweet gum	I
Liriope muscari	Big Blue lily turf	I
Lonicera japonica	Japanese honeysuckle	I
Lotus sp.	Trefoil	N
Lotus scoparius var. *scoparius*	California broom	N
Malephora crocea	Croceum ice plant	I
Malosma laurina	Laurel sumac	N
Malva parviflora	Cheeseweed, little mallow	I
Marah macrocarpus	Wild cucumber	N
Marrubium vulgare	Horehound	I
Medicago polymorpha	California bur clover	I
Melaleuca nesophylla	Western tea myrtle	I

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ATTACHMENT J
PLANT SPECIES OBSERVED* (CONT.)

Scientific Name	Common Name	Native (N) Introduced (I)
Melilotus alba	White sweet clover	I
Melilotus indica	Sourclover	I
Mesembryanthemum crystallinum	Crystalline ice plant	I
Mesembryanthemum nodiflorum	Slender-leaved ice plant	I
Metrosideros excelsus	New Zealand christmas tree	I
Mimulus aurantiacus	Bush monkeyflower	N
Mirabilis californica	Wishbone bush	N
Myoporum laetum	Ngaio	I
Myoporum parvifolium	Myoporum ground cover	I
Nandina domestica	Heavenly bamboo	I
Nassella sp.	Needlegrass	N
Nephrolepis exaltata	Sword fern	I
Nerium oleander	Oleander	I
Nicotiana glauca	Tree tobacco	I
Olea europeae .	Common olive	I
Opuntia ficus-indica	Indian fig	I
Opuntia littoralis	Shore cactus	N
Opuntia prolifera	Cholla	N
Oxalis sp.	Wood-sorrel	N
Paspalum dilatatum	Dallis grass	I
Pennisetum setaceum	Fountain grass	I
Phoenix canariensis	Canary Island date palm	I
Phoenix roebelenii	Date palm	I
Phormium tenax	New Zealand flax	I
Photinia glabra	Japanese photinia	I
Picris echioides	Bristly ox-tongue	I
Pinus sp.	Pine	I
Pinus thunbergiana	Japanese black pine	I
Piptatherum miliaceum	Smilo grass	I
Pittosporum tobira	Pittosporum	I
Plantago sp.	Plantain	N
Platanus racemosa	Western sycamore	N
Plumbago auriculata	Cape leadwort	I
Plumeria sp.	Plumeria	I
Podocarpus sp.	Yew pine	I
Prunus sp.	Prune tree	I
Pyracantha sp.	Firethorn	I
Pyrus kawakamii	Evergreen pear	I
Quercus agrifolia	Coast live oak, encina	N
Raphanus sativus	Radish	I
Raphiolepis indica	Indian hawthorn	I
Rhus integrifolia	Lemonadeberry	N
Ricinus communis	Castor bean	I
Rorippa nasturtium-aquaticum	Water cress	I

Source: Draft Vegetation Management Plan Navy Medical Center San Diego (December 2009) prepared by Agri Chemical and Supply Inc.

ATTACHMENT J
PLANT SPECIES OBSERVED* (CONT.)

Scientific Name	Common Name	Native (N) Introduced (I)
Rumex crispus	Curly dock	I
Salix gooddingii	Goodding's black willow	N
Salix lasiolepis	Arroyo willow	N
Salsola tragus	Russian thistle, tumbleweed	I
Salvia mellifera	Black sage	N
Sambucus mexicana	Blue elderberry	N
Schinus molle	Peruvian pepper tree	I
Schinus terebinthifolius	Brazilian pepper tree	I
Senna covesii	Coue's cassia	N
Sisymbrium irio	London rocket	I
Solanum douglasii	Douglas nightshade	N
Sonchus oleraceus	Common sow thistle	I
Spergularia macrotheca	Large-flowered sand spurrey	N
Stephanomeria virgata ssp. *virgata*	Slender stephanomeria	N
Sterlitzia nicolai	Large Bird of paradise	I
Tamarix sp.	Tamarisk	I
Tecomaria capensis	Cape honeysuckle	I
Trachelospermum jasminoides	Star jasmine	I
Trifolium sp.	Clover	N
Typha latifolia	Broad-leaved cattail	N
Ulmus parvifolia	Chinese elm	I
Urtica dioica ssp. *holosericea*	Hoary nettle	N
Vinca major	Greater periwinkle	I
Vitis girdiana	Desert wild grape	N
Washingtonia robusta	Washington palm	I
Xanthium strumarium	Cocklebur	N
Zantedeschia aethiopica	Common calla lily	I

Source: Draft Vegetation Management Plan Navy Medical Center San Diego (December 2009) prepared by Agri Chemical and Supply Inc.