CITY OF SAN DIEGO MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

CONCEPTUAL WETLAND RESTORATION PLAN
Project No. 42891

June 2009

Prepared for:

CITY OF SAN DIEGO
STORM WATER DEPARTMENT
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City of San Diego Master Storm Water System Maintenance Program
Conceptual Wetland Restoration Plan

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I. INTRODUCTION

This report presents a conceptual wetland compensation plan (plan) to guide future wetland compensation to offset impacts related to maintenance activities associated with the City of San Diego's (City's) Master Storm Water System Maintenance Program (MSWSMP). Under the MSWSMP, specific storm water system facilities (e.g. drainage channels, detention basins and outfalls) would be cleaned on an annual basis to remove vegetation and sediment impeding the ability of these facilities to effectively convey floodwaters. In the course of this maintenance, wetland vegetation is expected be removed; however, the underlying condition of the facilities (e.g. concrete or earthen substrate) would be unchanged. Wetland compensation pursuant to this plan would provide mitigation for impacts to U.S. Army Corps of Engineers (Corps) jurisdictional areas under Section 404 of the federal Clean Water Act, California Department of Fish and Game (CDFG) jurisdictional areas under Section 1602 of the California Fish and Game Code, and areas considered wetlands by the Regional Water Quality Control Board (RWQCB) and City. The proposed wetland compensation would also implement the goals and objectives of the City's Multiple Species Conservation Program (MSCP) Subarea Plan (City 1997a) by enhancing and restoring wetland habitat in numerous watersheds within the City.

Two forms of wetland compensation are addressed in this plan: enhancement and restoration. Enhancement would focus on the removal of invasive plants (e.g. giant reed [*Arundo donax*], pampas grass [*Cortaderia* sp.], castor-bean [*Ricinus communis*], Mexican fan palm [*Washingtonia robusta*], Canary Island date palm [*Phoenix canariensis*], Brazilian pepper tree [*Schinus terebinthifolius*], and tamarisk [*Tamarix* sp.]) followed by a proactive maintenance program to control invasive plants for a period of two years after the initial removal.

Restoration would involve the rehabilitation of highly degraded wetlands (i.e., areas infested with exotics such as giant reed) with the goal of repairing natural or historic function of a degraded wetland. Activities would include removal of invasive plants, minor grading to remove accumulated sediment and restore appropriate surface conditions, and installing native wetland plants as seed and/or container stock. Installation of cuttings, container stock, and seed would begin following removal of any exotic species. Irrigation may be provided, depending on the type and location of the habitat to be restored. The initial restoration effort would be followed by a five-year maintenance and monitoring program that would be focused on achieving specified success criteria. Compensation in the form of enhancement would be limited to impacts occurring less frequently than every 3 years (low frequency maintenance), while compensation in the form of restoration would be required for impacts occurring more frequently than every 3 years (high frequency maintenance).

Detailed planting and maintenance plans would be prepared on an annual basis to compensate for the impacts associated with the maintenance proposed for the coming year. Restoration and/or enhancement would occur in various locations depending on the type and location of impact within each storm water facility. The mitigation will occur within the same watershed as the impact to the greatest degree possible. The initial mitigation efforts will focus at the upstream of ends of watersheds and drainages as much as possible in order to reduce the spread of exotic plant seeds and propagules downstream.

II. PROJECT DESCRIPTION

A. PROJECT LOCATION

The storm water facilities included in the MSWSMP are situated throughout the San Diego metropolitan area (Figure 1). The majority of the facilities are storm water channels, with only a handful of basins and/or outfall structures. The major channels consist of named creeks, some of which have been channelized and/or lined with concrete and/or riprap along portions of their lengths. Minor channels include unnamed tributaries, which also may include channelized and/or concrete or riprap-lined segments.

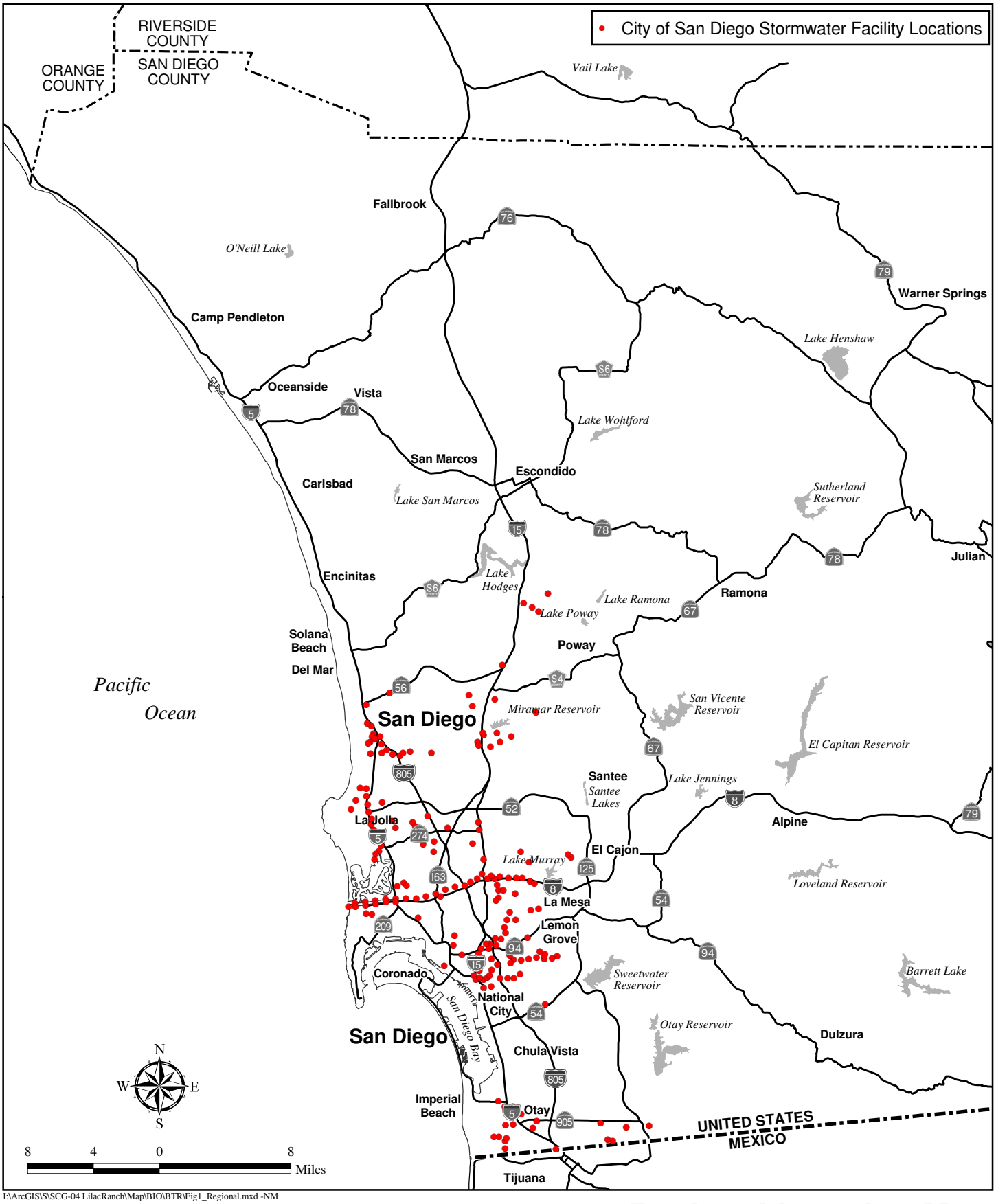
The storm water facilities mapped for the MSWSMP are associated with 7 Hydrologic Units (HUs [watersheds]), as defined in the San Diego Regional Water Quality Control Board (RWQCB) Water Quality Control Plan for the San Diego Basin. The facilities that are included in the City's MSWSMP occur within the following HUs (from north to south): San Dieguito, Peñasquitos, San Diego, Pueblo San Diego, Sweetwater, Otay, and Tijuana (Figure 2). Map numbers shown on Figure 2 correspond to Appendix B of the Biological Technical Report (HELIX 2008a) for the project, which provides detailed mapping of vegetation communities and jurisdictional areas. It is noted that not all of the areas shown on Figures 1 and 2 are proposed for storm water facility maintenance, but were included in the study area because of their potential as mitigation sites (e.g. the San Diego River).

B. PROJECT SUMMARY

Recognizing the need for, and importance of, continuing the periodic inspection, cleaning, and maintenance of storm water facilities in the future, the City has proposed the MSWSMP, the focus of which is to identify the long-term maintenance and access needs for storm water facilities within the City. The MSWSMP describes the maintenance techniques to be employed as well as the protocols to be followed to minimize the impact of maintenance activities to environmental resources.

Maintenance would be done by hand or with mechanized equipment. Hand clearing would be done by City maintenance personnel using hand tools, such as trimmers and shovels. Cleared material would be manually brought out of the facility and loaded by hand onto a dump truck for offsite disposal. Mechanized equipment clearing would be utilized whenever possible to reduce cost. Depending on the conditions associated with each facility, different types of equipment would be utilized. The types of equipment would include, but not be limited to, skid-steers, backhoes, Gradalls, excavators, loaders, dump trucks, and bulldozers. Maintenance equipment would utilize existing access roads, whenever possible. In some cases, the maintenance activity would require creating access pathways.

The frequency of storm water facility maintenance would be based upon routine inspections and past maintenance history. Maintenance frequencies typically occur at three-year intervals. Facilities that have a known history of flooding and/or accumulation of soil, debris, and vegetation, and have the potential to impact adjacent properties and increase the risk to life and property, would be placed on a priority maintenance list which would require maintenance annually or bi-annually.



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Regional Location Map

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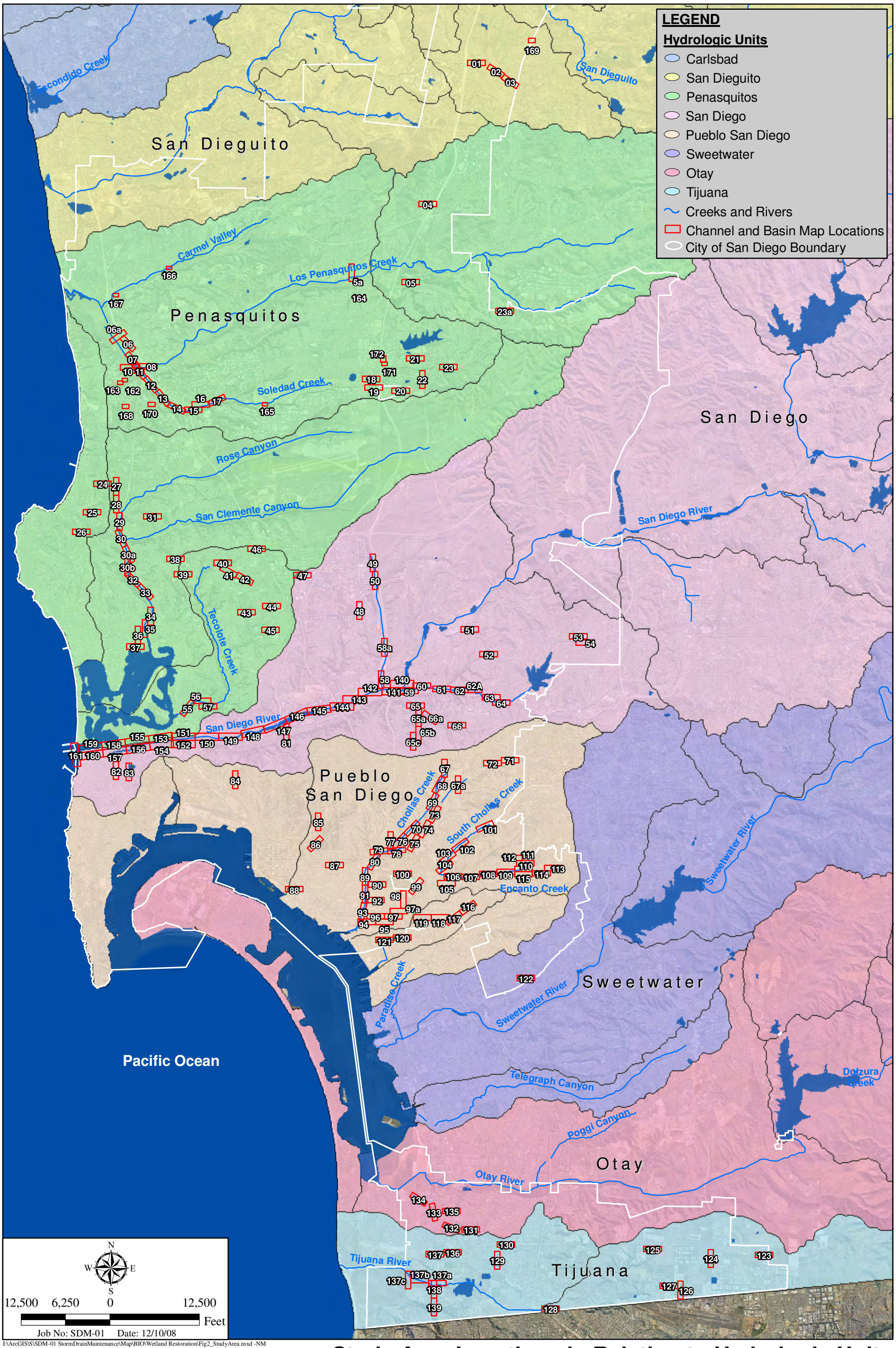
Figure 1



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Study Area Locations in Relation to Hydrologic Units

CITY OF SAN DIEGO MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

HELIX

Figure 2

Prior to each fiscal year, the City will determine which facilities need to be maintained in the coming year. Under the Substantial Conformance Review (SCR) process described in the MSWSMP, the City would conduct site-specific biological assessments of each facility proposed for maintenance to determine the extent and composition of wetland habitat that would be impacted. The biological assessment would also determine the compensation required to offset these wetland impacts. Based on these compensation requirements, one or more wetland compensation plans would be prepared pursuant to this conceptual plan. Prior to beginning maintenance, the City would submit the maintenance plans, biological assessments and wetland compensation plans to local, state and federal agencies with jurisdiction over the maintenance areas. Maintenance would not proceed until the applicable local, state and federal agencies have authorized the maintenance pursuant to master permits issued to the MSWSMP.

C. FUNCTIONS AND SERVICES OF IMPACTED AREAS

The storm water facilities within the MSWSMP are diverse in terms of size, vegetative cover, substrate, hydrology, and environmental setting. The smallest storm water facilities are only a few feet wide, while segments of the largest are over 100 feet wide. Vegetative cover ranges from mature riparian forest to marsh habitat to unvegetated surfaces, with substrates including loams, sands, cobbles, rock and concrete. Hydrology varies from permanently flowing creeks to ephemeral streambeds that flow only following rainfall or in response to urban runoff. Some storm water facilities are in highly urbanized settings and present little opportunity for wildlife utilization due to their location and individual characteristics, while others traverse open space areas and/or function as important wildlife corridors within the City's Multi-Habitat Planning Area (MHPA).

The storm water facilities provide varying degrees of storm water conveyance and flood abatement, pollutant uptake, ground water recharge, wildlife habitat, and corridors for wildlife movement. Factors affecting the degree to which each of these functions occurs within a specified storm water facility include its width, substrate condition, habitat type and vegetative cover (if any), and proximity to urban development.

A total of 13 sensitive plant and animal species were observed within the project study area (which includes all storm water facilities and adjacent uplands) during the mapping effort: single-whorl burrobush (*Ambrosia monogyra*), San Diego marsh-elder (*Iva hayesiana*), southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*), Nuttall's scrub oak (*Quercus dumosa*), San Diego sunflower (*Viguiera laciniata*), Cooper's hawk (*Accipiter cooperii*), northern harrier (*Circus cyaneus*), yellow warbler (*Dendroica petechia brewsteri*), double-crested cormorant (*Phalacrocorax auritus*), western bluebird (*Sialia mexicana*), little blue heron (*Egretta caerulea*), the federally listed threatened coastal California gnatcatcher (*Polioptila californica californica*), and federally and state listed endangered California brown pelican (*Pelecanus occidentalis californicus*). Although not detected during the biological surveys, the federal- and state-listed least Bell's vireo (*Vireo bellii pusillus*) is among the high interest animal species with potential to occur in portions of the MSWSMP study area. Several other plant and animal species also have potential to occur within or adjacent to some of the storm water facilities.

D. MITIGATION REQUIREMENTS

The Corps, CDFG, RWQCB, and City require mitigation for impacts to wetland habitat. Although the actual amount of wetland habitat impacted by maintenance in accordance with the MSWSMP will vary with the extent of maintenance ultimately required to achieve the desired levels of flood control, the Program EIR prepared for the MSWSMP estimates that up to approximately 71 acres of vegetated wetland habitat and 25 acres of unvegetated streambed/natural flood channel could be impacted. In addition, the City expects to use this plan to mitigate for 2.84 acres of wetland impacts that have occurred as a result of previous emergency maintenance activities that the City's Storm Water Department (SWD) has carried out over the last 4 years. Impacts to unvegetated streambed/natural flood channel do not require mitigation as the channel would remain in place and would only be affected by sediment removal and/or bank support/reconstruction in the case of excessive erosion.

E. TIMING OF IMPACTS AND MITIGATION

Mitigation for impacts associated with the MSWSMP outlined in this plan will be initiated within 12 months of impacts or as stipulated in the permits.

III. MITIGATION SITE DESCRIPTION

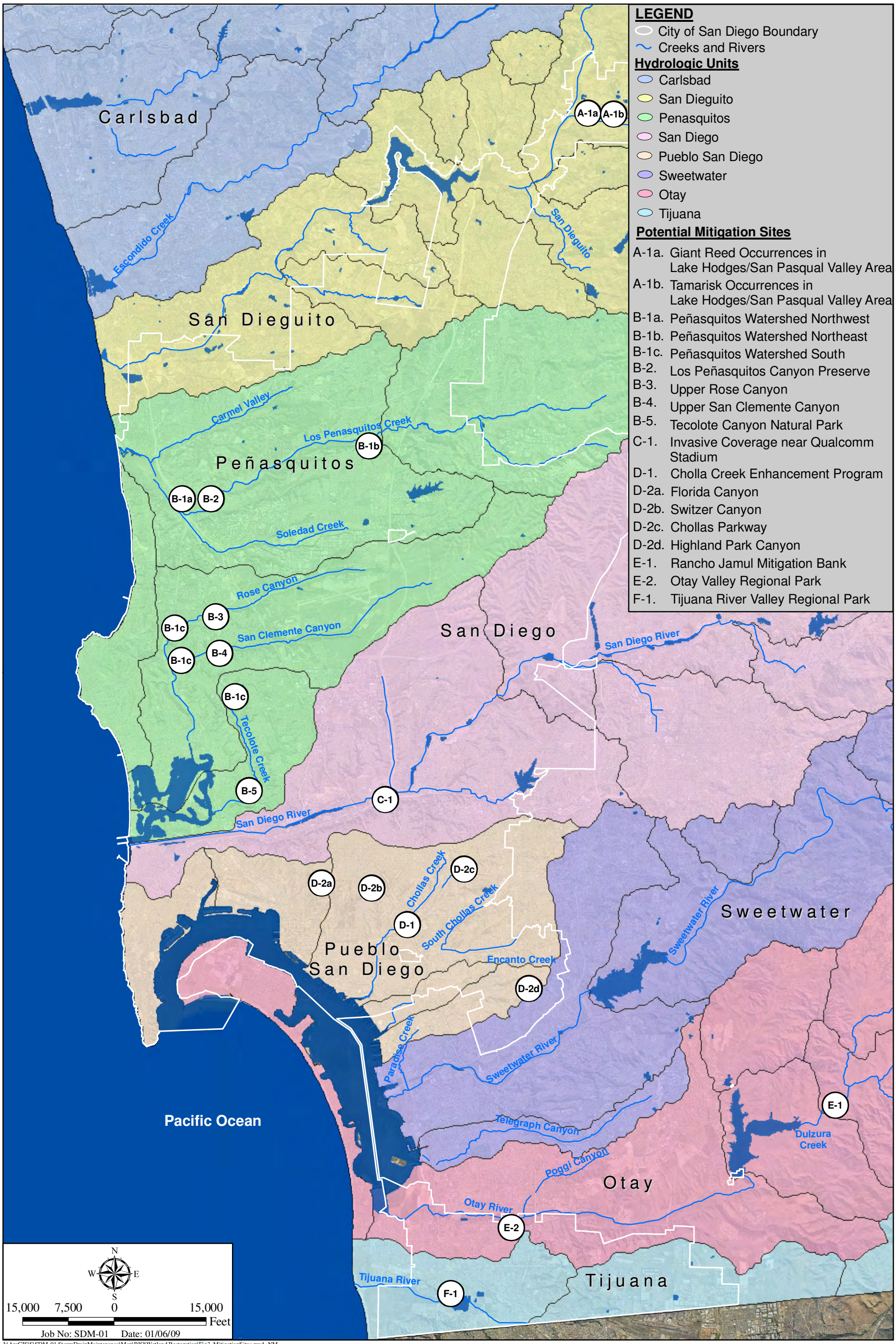
A. SITE SELECTION PROCESS

An initial search for wetland compensation sites revealed a number of potential sites which could accommodate the initial years of maintenance pursuant to the MSWSMP. Subsequent sites will be identified, as required, to meet demand for wetland compensation which cannot be accommodated by the initial sites. Potential mitigation sites were selected through research and coordination with the City as well as organizations involved in wetland/riparian area conservation (e.g., San Diego River Conservancy), in addition to review of documents prepared by others in support of other potential mitigation locations in the City (i.e., Merkel 2004a-b and KTU&A 2005).

Specific acreages and locations of mitigation required for projected impacts will be determined on a yearly basis. Each year, the City will compile a list of facilities to be maintained during that year and individual maintenance plans will be developed to determine the extent of impacts. Individual biological assessments will then be conducted in the field for each facility in order to determine the type and acreage of habitat(s) to be impacted and the required mitigation. Specific mitigation site(s) will then be selected based on the type, size, and location of impact(s). Because the MSWSMP will be implemented in several watersheds throughout the City of San Diego, creeks and river systems that are moderately to highly disturbed were selected so that mitigation could take place over relatively large areas, rather than in a piece-meal fashion.

B. POTENTIAL SITES

To the greatest extent practicable, mitigation for impacts will be located within the same watershed in which the impact(s) occurred. Potential mitigation sites for impacts within the various watersheds have been identified (Table 1; Figure 3). More specific information on the location and mitigation potential can be found in the referenced attachments contained in the appendices to this wetland compensation program. A brief discussion of compensation opportunities within each watershed follows.



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Potential Mitigation Site Locations

CITY OF SAN DIEGO MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

HELIX

Figure 3

Table 1 MITIGATION SITE LOCATIONS	
Attachment No.*	**Attachment Name**
SAN DIEGUITO HU	
A-1	Lake Hodges/San Pasqual Valley Area
A-1a	Giant Reed Occurrences in the Lake Hodges/ San Pasqual Valley Area
A-1b	Tamarisk Occurrences in the Lake Hodges/ San Pasqual Valley Area
PEÑASQUITOS HU	
B-1	Peñasquitos Watershed Overview
B-1a	Peñasquitos Watershed Northwest
B-1b	Peñasquitos Watershed Northeast
B-1c	Peñasquitos Watershed South
B-2	Los Peñasquitos Canyon Preserve
B-3	Upper Rose Canyon
B-4	Upper San Clemente Canyon
B-5	Tecolote Canyon Natural Park
SAN DIEGO HU	
C-1	Invasive Coverage Near Qualcomm Stadium
PUEBLO SAN DIEGO HU	
D-1	Chollas Creek Enhancement Program
D-2	Pueblo Watershed Enhancement
D-2a	Florida Canyon
D-2b	Switzer Canyon
D-2c	Chollas Parkway
D-2d	Highland Park Canyon
OTAY HU	
E-1	Rancho Jamul Mitigation Bank
E-2	Otay Valley Regional Park
SWEETWATER HU	
E-1	Rancho Jamul Mitigation Bank
TIJUANA HU	
F-1	Tijuana River Valley

*Refers to attachments at the back of this report.

1. San Dieguito HU

Impacts within the San Dieguito HU may be mitigated through giant reed removal (enhancement) and/or restoration using native wetland species restoration/enhancement of City-owned parcels in the San Dieguito River floodplain, which may include mitigation on City-owned lands in the San Pasqual Valley (Figure 3). As the impacts projected to occur within this HU are minimal, minimal amounts of compensation would be required in this watershed.

San Pasqual Valley

The Lake Hodges/San Pasqual Valley open space is owned by the City of San Diego and serves as a major core resource area of the MSCP preserve system. The City-owned lands in this portion of the San Dieguito River watershed are surrounded by other publicly owned lands, other conserved lands, and lands in other jurisdictions that are the subject of ongoing Natural Community Conservation Planning efforts (Conservation Biology Institute [CBI] 2003). The Lake Hodges/San Pasqual Valley open space is approximately 9,036 acres in size and is located in the northernmost portion of the City. Lake Hodges is located approximately 10 miles from the coast, and the associated open space extends about 15 miles upstream along the San Dieguito River and Santa Ysabel Creek. The City-owned land around Lake Hodges and in the San Dieguito River Valley upstream to the "Narrows" (approximately 3,400 acres) is part of the Lake Hodges Cornerstone Lands Segment Area (CBI 2003). Cornerstone Lands are City Water Department-owned lands that were used as primary building blocks for creating the MSCP preserve system (City 1997a). Per the Cornerstone Lands Mitigation Bank Agreement (City 1997b), the City's Cornerstone Lands serve as mitigation banks, with conservation easements conveyed for each Cornerstone Segment Area when the credits for that Segment Area of the Cornerstone Lands Mitigation Bank are converted for sale.

Potential restoration areas within the Lake Hodges/San Pasqual Valley open space have been identified (Attachment A-1), along with specific mapping of the extent of giant reed and tamarisk infestations (Attachments A-1a and A-1b). The source for this mapping is CBI's Habitat Management Plan for the open space (2003).

2. Peñasquitos HU

Potential mitigation sites within the Peñasquitos HU include: Los Peñasquitos Canyon Preserve, and areas identified in the Rose Creek Watershed Opportunities Assessment (KTU&A 2005), as well as Tecolote Canyon Natural Park. Merkel & Associates, Inc. (2004a) also conducted a wetland mitigation site investigation for the Peñasquitos HU and identified multiple potential sites, many of which overlap with those discussed in the 2005 Rose Creek study.

Peñasquitos Watershed Overview

Eighteen potential wetland mitigation sites on City-owned land in the Peñasquitos watershed were identified by Merkel & Associates (2004a; Attachments B-1 and B-1a-c).

Los Peñasquitos Canyon Preserve

Los Peñasquitos Canyon Preserve lies south of State Route 56, between the communities of Rancho Peñasquitos and Sorrento Hills to the north and Mira Mesa to the south. Stretching approximately 7 miles from the merge of Interstate 5 (I-5) and Interstate 805 to just east of Interstate 15; it encompasses approximately 4,000 acres of both Peñasquitos and Lopez Canyons (Attachment B-2). The preserve is jointly owned and administered by the City and County of San Diego. A number of wetland mitigation sites (El Cuervo, El Cuervo Norte, etc.) have already been established in the Los Peñasquitos Canyon Preserve, and additional mitigation opportunities likely exist. The City's Park Rangers provide management for the preserve.

Upper Rose Canyon and Upper San Clemente Canyon

Upper Rose Canyon is located east of I-5 and north of SR 52 in the University City area of San Diego. Upper San Clemente Canyon is located east of I-5 and south of SR 52 in the Clairemont area of San Diego. The Rose Creek Watershed Opportunities Assessment (KTU&A 2005) identified 21 potential wetland creation sites and numerous areas dominated by exotic vegetation within upper Rose Canyon and upper San Clemente Canyon (Attachments B-3 and B-4), many of which are on land owned and managed by the City's Park and Recreation Department. Several of the 21 sites have been used as mitigation by the City's Metropolitan Wastewater Department (MWWD), though Sites 7-11, 13-15, and 17-21 remain available at this time. Potential wetland mitigation sites identified by Merkel & Associates (2004b) are in the central portion of Rose Canyon, occurring in the area from Genesee Avenue west to Regents Road. These sites overlap with those presented in the Rose Creek Watershed Opportunities Assessment.

Tecolote Canyon Natural Park

Tecolote Canyon Natural Park is an open space area located within a narrow coastal valley in the City, approximately 0.5 mile east of I-5 and 0.8 mile east of the Pacific Ocean (Attachment B-5). The roughly 950-acre park is approximately 5 miles long and up to 0.5 mile wide. The majority of the park (approximately 926 acres) is owned by the City, with the remaining acreage owned by San Diego Gas & Electric (HELIX 2006).

Tecolote Canyon is one of the few remaining relatively natural coastal canyons in the City. This situation allows a high level of diversity for plant and animal species, which contribute to the unique richness of the park in urban San Diego. The park is traversed by Tecolote Creek, a roughly north to south flowing perennial stream. The riparian corridor along Tecolote Creek supports varying amounts of exotic plant species cover, which could be enhanced and/or restored for mitigation credit. There is also potential for creation of riparian habitat in non-native grassland or disturbed habitat areas adjacent to the corridor. Portions of the riparian corridor between Balboa Avenue and Mount Acadia Boulevard have been identified as riparian restoration/enhancement mitigation for the City's Metropolitan Waste Water Department (HELIX 2008b), but other mitigation opportunities exist along the corridor.

3. San Diego HU

The focus of mitigation efforts within the San Diego HU will be on City-owned parcels within and adjacent to the San Diego River, with specific emphasis on wetlands in the vicinity of Qualcomm Stadium (Attachment C-1). The San Diego River flows in a southwesterly direction through the eastern portion of the City, east of I-15. Shortly before crossing under I-15, the river turns more or less to the west, paralleling the north side of I-8 until the river outfalls at the Pacific Ocean. Qualcomm Stadium is located at the intersection of I-8 and I-15. The San Diego HU presents abundant opportunities for removal of invasive exotics, particularly giant reed, followed by restoration with native species. Restoration efforts along the San Diego River would be coordinated with the San Diego River Conservancy.

4. Pueblo San Diego HU

Impacts within the Pueblo San Diego HU may be mitigated through implementation of restoration proposals identified in the Chollas Creek Enhancement Program (City 2002; Attachment D-1) and

potentially carried out in cooperation with the non-profit Groundwork organization or other non-profit organization, or through purchase of mitigation credits from the Rancho Jamul Mitigation Bank (further discussed in Section III.B.6 below). The Chollas Creek Enhancement Program encompasses the central and southern portions of the Pueblo HU and includes portions of Chollas Creek, South Chollas Creek, Encanto Creek, and Auburn Creek. These areas occur both along I-15 from San Diego Bay north to I-805 and east of I-15 and I-805. Merkel and Associates (2006; Attachment D-2) also identified 2.69 acres of land with wetland enhancement potential along portions of Florida Canyon (0.12 acre; Attachment D-1a), Switzer Canyon (0.21 acre; Attachment D-1b), Chollas Parkway (1.65 acres; Attachment D-1c), and Highland Park Canyon (0.71 acre; Attachment D-1d).

5. Sweetwater HU

Impacts within the Sweetwater HU (which are very minimal) will be mitigated through the purchase of mitigation credits from the Rancho Jamul Mitigation Bank (discussed in Section III.B.6 below).

6. Otay HU

Impacts within the Otay HU may be mitigated through the purchase of mitigation credits from the Rancho Jamul Mitigation Bank and/or through mitigation in the Otay Valley Regional Park (Figure 3; Attachments E-1 and E-2).

Rancho Jamul Mitigation Bank

The Rancho Jamul Mitigation Bank (Bank), an important biological resource area, consists of approximately 150 acres of riparian and wetland habitat on a 3,700-acre preserve located in southern San Diego County, just upstream of the Lower Otay Reservoir and southwest of SR 94 (Attachment E-1). Restoration activities within the Bank consist of restoration and enhancement of wetlands, floodplain riparian habitat, and tributaries associated with Dulzura and Jamul Creeks (Corps 2001). Another major goal of the Bank is to establish nesting habitat for the least Bell's vireo. Projects eligible for purchasing mitigation credits from the Bank include those located within watersheds that drain to San Diego Bay or Mission Bay, as follows:

- In-kind mitigation for projects located in areas draining into San Diego Bay, including the Otay River, Sweetwater River, and Chollas Creek watersheds.

- For projects located in areas draining to Mission Bay, including the San Diego River, Rose Creek, San Clemente Creek, and Tecolote Creek watersheds, the first 1:1 of any mitigation requirement for impacts to freshwater wetland or intermittent waters, or 2:1 for impacts to riparian habitat must occur in the same watershed as the impact site. The balance of the functional loss can be mitigated through purchase of credits at the Bank.

Otay Valley Regional Park

Otay Valley Regional Park (OVRP) is a multi-jurisdictional planning effort by the County of San Diego and the cities of San Diego and Chula Vista. The planning area for OVRP is located in the southern portion of San Diego County, 4 miles north of the U.S./Mexico International Border. The

regional park will extend approximately 11 miles inland from the southeastern edge of the salt ponds at the mouth of the Otay River, upstream through the Otay River Valley, to the land surrounding both Lower and Upper Otay Lakes (County et al. 1997). A map of the concept plan for the OVRP is presented as Attachment E-2. Upon completion, the OVRP will represent one of the major open space areas within the southern area of San Diego County, linking south San Diego Bay with lower Otay Lake. Any mitigation proposed within the OVRP would occur along the Otay River or within or adjacent to existing ponds near the river.

7. Tijuana HU

Mitigation sites for impacts to wetlands within the Tijuana HU have not been located at this time. The City owns very little land within this southernmost HU, with most of the land owned by the County of San Diego (County). The County has historically allowed other agencies to mitigate on County-owned land, and, if mitigation on City-owned parcels is not possible, mitigating on County-owned land will be attempted. If an agreement between the City and County cannot be reached, mitigation will likely have to occur outside of the Tijuana HU. However, every attempt will be made to mitigate for impacts within the Tijuana HU on City-owned parcels and/or on County-owned parklands within the Tijuana HU, and may include land along the Tijuana River (Attachment F-1) or Smuggler's Gulch.

C. MITIGATION SUMMARY

Tables 2-4 provide a breakdown of estimated Corps, CDFG, and City wetland impacts and mitigation by HU. The estimates are based on the maximum assumed impact within each facility and do not take into account site specific measures that would be taken to reduce impacts to the greatest extent practicable. The actual amount of impacts and resulting mitigation required each year would be determined by completing an individual maintenance plan and individual biological assessment for each facility to be impacted in a given year. Table 5 identifies wetland impacts which have occurred as a result of previous emergency maintenance activities that the SWD has carried out over the last 4 years, and the resulting mitigation required.

Table 2
SUMMARY OF IMPACTS AND MITIGATION BASED ON HIGH FREQUENCY MAINTENANCE ASSUMED IN ALL CORPS WETLANDS (acre[s])*

HU	Estimated Wetland Impacts†											
	SRF	SRW	RW	SWS	MFS	RS	FWM	CAM	CSM	CBM	DW	Total Wetland Impacts‡
San Dieguito	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Peñasquitos	0.88	0.00	0.00	3.99	0.00	0.00	5.29	0.00	0.94	0.26	0.09	**11.45**
San Diego	0.27	0.00	0.00	2.97	0.00	0.00	2.54	0.00	0.00	0.00	0.11	**5.89**
Pueblo San Diego	0.00	0.00	0.00	1.10	0.32	0.22	5.17	0.00	0.45	0.00	3.76	**11.02**
Sweetwater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Otay	0.00	0.00	0.00	0.52	0.00	0.00	1.97	0.00	0.00	0.00	0.04	**2.53**
Tijuana	0.00	0.00	0.00	0.99	0.15	0.00	1.52	0.00	0.00	0.00	1.11	**3.77**
Total Impacts	**1.15**	**0.00**	**0.00**	**9.57**	**0.47**	**0.22**	**16.49**	**0.00**	**1.39**	**0.26**	**5.11**	**34.66**
Mitigation	**Estimated Mitigation**											**Total Estimated Wetland Mitigation**
Enhancement/ Restoration Ratio	3:1	3:1	3:1	2:1	2:1	2:1	1:1	3:1	3:1	3:1	1:1	--
Acre(s)	3.45	0.00	0.00	19.14	0.94	0.44	16.49	0.00	4.17	0.78	5.11	**50.52**
Mitigation Credit Ratio/Advance Mitigation	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1	0.5:1	--
Acre(s)	1.15	0.00	0.00	9.57	0.47	0.22	16.49	0.00	1.39	0.26	2.56	**32.11**

*Totals reflect rounding

†Habitat acronyms: CAM=cismontane alkali marsh, CBM=coastal brackish marsh, CSM=coastal salt marsh, DW=disturbed wetland, FWM=freshwater marsh, MFS=mule fat scrub, RS=riparian scrub, RW=riparian woodland, SRF=southern riparian forest, SRW=southern sycamore riparian woodland, SWS=southern willow scrub

‡Does not include impacts from maintenance conducted in non-wetland WUS, as no mitigation is anticipated

Table 3
SUMMARY OF IMPACTS AND MITIGATION BASED ON HIGH FREQUENCY MAINTENANCE ASSUMED IN ALL CDFG WETLANDS (acre[s])*

HU	Estimated Wetland Impacts†												
	SRF	SRW	RW	SWS	MFS	RS	FWM	CAM	CSM	CBM	DW	CLOW	Total Estimated Riparian Impacts‡
San Dieguito	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01	0.00	0.26
Peñasquitos	4.96	0.00	0.18	15.56	0.50	0.00	7.00	0.00	0.94	0.38	0.98	0.21	30.71
San Diego	1.10	0.17	0.00	6.04	0.00	0.00	3.46	0.01	0.00	0.00	1.72	0.05	12.55
Pueblo San Diego	0.00	0.00	0.00	2.89	2.60	0.34	5.23	0.00	0.45	0.00	5.98	0.00	17.49
Sweetwater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
Otay	0.00	0.00	0.00	0.57	0.00	0.00	2.34	0.00	0.00	0.00	0.06	0.00	2.98
Tijuana	0.00	0.00	0.00	2.30	0.98	0.00	1.72	0.00	0.00	0.00	1.63	0.00	6.63
Total Impacts	**6.08**	**0.17**	**0.18**	**27.36**	**4.08**	**0.34**	**20.00**	**0.01**	**1.39**	**0.38**	**10.41**	**0.26**	70.66
Mitigation	**Estimated Mitigation**												**Total Estimated Riparian Habitat Mitigation**
Enhancement/ Restoration Ratio	3:1	3:1	3:1	2:1	2:1	2:1	1:1	3:1	3:1	3:1	1:1	3:1	--
Acre(s)	18.24	0.34	0.54	54.72	8.16	0.68	20.00	0.03	4.17	1.14	10.41	0.78	119.21
Mitigation Credit Ratio/Advance Mitigation	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1	0.5:1	1:1	--
Acre(s)	6.08	0.17	0.18	27.36	4.08	0.34	20.00	0.01	1.39	0.38	5.21	0.26	65.46

*Totals reflect rounding

†Habitat acronyms: CAM=cismontane alkali marsh, CBM=coastal brackish marsh, CLOW=coast live oak woodland, CSM=coastal salt marsh, DW=disturbed wetland, FWM=freshwater marsh, MFS=mule fat scrub, RS=riparian scrub, RW=riparian woodland, SRF=southern riparian forest, SRW=southern sycamore riparian woodland, SWS=southern willow scrub

‡Does not include impacts from maintenance conducted in unvegetated streambeds, as no mitigation is anticipated

Table 4
SUMMARY OF IMPACTS AND MITIGATION BASED ON HIGH FREQUENCY MAINTENANCE ASSUMED IN ALL CITY JURISDICTIONAL AREAS (acre[s])*

HU	Estimated Wetland Impacts†											Total Wetland Impacts‡
	SRF	SRW	RW	SWS	MFS	RS	FWM	CAM	CSM	CBM	DW	
San Dieguito	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.01	0.26
Peñasquitos	4.96	0.00	0.18	15.56	0.50	0.00	7.00	0.00	0.94	0.38	0.98	30.50
San Diego	1.10	0.17	0.00	6.04	0.00	0.00	3.46	0.01	0.00	0.00	1.72	12.50
Pueblo San Diego	0.00	0.00	0.00	2.89	2.60	0.34	5.23	0.00	0.45	0.00	5.98	17.49
Sweetwater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
Otay	0.00	0.00	0.00	0.57	0.00	0.00	2.34	0.00	0.00	0.00	0.06	2.98
Tijuana	0.00	0.00	0.00	2.30	0.98	0.00	1.72	0.00	0.00	0.00	1.63	6.63
Total Impacts	**6.08**	**0.17**	**0.18**	27.36	4.08	**0.34**	**20.00**	**0.01**	**1.39**	**0.38**	10.41	70.40
Mitigation	**Estimated Mitigation**											**Total Estimated Wetland Mitigation**
Enhancement/ Restoration Ratio	3:1	3:1	3:1	2:1	2:1	2:1	1:1	3:1	3:1	3:1	1:1	--
Acre(s)	18.24	0.34	0.54	54.72	8.16	0.68	20.00	0.03	4.17	1.14	10.41	118.43
Mitigation Credit Ratio/Advance Mitigation	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1	0.5:1	--
Acre(s)	**6.08**	**0.17**	**0.18**	27.36	4.08	**0.34**	**20.00**	**0.01**	**1.39**	**0.38**	5.21	65.20

*Totals reflect rounding

†Habitat acronyms: CAM=cismontane alkali marsh, CBM=coastal brackish marsh, CSM=coastal salt marsh, DW=disturbed wetland, FWM=freshwater marsh, MFS=mule fat scrub, RS=riparian scrub, RW=riparian woodland, SRF=southern riparian forest, SRW=southern sycamore riparian woodland, SWS=southern willow scrub

‡Does not include impacts from maintenance conducted in unvegetated natural flood channels, as no mitigation is anticipated

Table 5 IMPACTS FROM PAST EMERGENCY MAINTENANCE ACTIVITIES					
	Wetland Impact By Watershed (acres)				
Date of Activity	San Diego	Tijuana	Pueblo	Peñasquitos	Total
October-December 2004	0.99	0.0	0.01	0.0	1.00
January – March 2005	0.82	0.77	0.0	0.0	1.59
June 2005	0.0	0.0	0.0	0.12	0.12
October-November 2005	0.0	0.0	0.0	0.13	0.13
March 2006	0.0	0.0	0.0	0.0	0.0
Total Impacts	**1.81**	**0.77**	**0.01**	**0.25**	**2.84**
Mitigation by Watershed (acres)					
Restoration/Enhancement Ratio	3:1	3:1	3:1	3:1	**Total**
Total Mitigation	**5.43**	**2.31**	**0.03**	**0.75**	**8.52**

Wetland mitigation often consists of a combination of creation, enhancement, or restoration to satisfy local, state, and federal mitigation requirements. Typically, creation at a ratio of 1:1 is required as a component of the mitigation. However, in the case of mitigating for storm water facility maintenance activities conducted in channels, enhancement and restoration without the traditional creation component are considered appropriate for three primary reasons. First, the channel itself would remain after maintenance and would continue to function for wildlife movement and, in the case of earthen bottom facilities, would continue to filter out urban runoff pollutants. Second, wetland vegetation has historically returned to these channels between maintenance events. Third, maintenance, in most cases, occurs in urban channels where repeated maintenance activities have already occurred for many years.

Impacts to wetland vegetation have been placed into two categories: (1) high frequency clearing, or permanent clearing, which is defined as occurring more often than every three years, and (2) low frequency clearing, or temporary clearing, which is defined as occurring less often than every three years. The form of mitigation is dependent on the frequency of maintenance due to the fact that wetland vegetation can typically re-establish with a longer period between maintenance events.

1. <u>Mitigation for High Frequency Clearing (Permanent Impacts)</u>

Where maintenance would occur more frequently than every three years, wetland vegetation would have less opportunity to re-establish. Mitigation for high frequency maintenance impacts to wetlands may take one or a combination of the following three actions: (1) restoration, (2) purchase of mitigation credits, or (3) creation. These actions would occur on a one-time basis pursuant to the ratios shown in Table 6. However, if the mitigation were carried out and successfully established before the impact were to occur, the mitigation ratio would be 1:1 for that particular impact since no temporal loss would occur.

Table 6 WETLAND MITIGATION RATIOS	
WETLAND TYPE	**MITIGATION RATIO[1]**
Southern riparian forest	3:1
Southern sycamore riparian woodland	3:1
Riparian woodland	3:1
Coastal saltmarsh	3:1
Coastal brackish marsh	3:1
Southern willow scrub	2:1
Mule fat scrub	2:1
Riparian scrub	2:1
Freshwater marsh	1:1
Cismontane alkali marsh	1:1
Disturbed wetland	1:1
Streambed/natural flood channel	--

[1]Mitigation done in advance or through purchase of mitigation credits would be at a 1:1 ratio.

Restoration

Restoration would involve the rehabilitation of highly degraded wetlands (i.e., areas infested with exotics such as giant reed) with the goal of repairing natural or historic function of a degraded wetland. Activities would include removal of invasive plants in addition to installing native wetland plants as seed and/or container stock. Installation of cuttings, container stock, and seed would begin following removal of any exotic species. Irrigation may be provided, depending on the type and location of the habitat to be restored.

For the restoration to achieve the highest wildlife and water quality value, these activities would occur in large, continuous areas (e.g., San Diego River and Rose Creek). In addition, wherever possible, the restoration would occur at the uppermost region of a drainage course or watershed to minimize the likelihood of invasive plants being transported downstream. Also, whenever possible, mitigation would occur within the same watershed as the impact.

Mitigation ratios are proportional to the habitat type and quality, and are typically higher for wetland habitat types that have a higher function and diversity and typically take longer to establish. Restoration activities would be considered "permanent" mitigation and, assuming the initial mitigation continues to thrive, would allow storm channel maintenance to occur at the impacted area without additional mitigation for future clearing events.

Purchase of Mitigation Credits

In place of restoration, the City could choose to purchase mitigation credits. Mitigation ratios would be 1:1 for all wetland habitat impacts when the native habitat associated with mitigation credits is fully established in advance of the impact. In some cases, mitigation credits would have a higher value than the impacted habitat.

Creation

Although opportunities for creation have not been specifically identified, the City may opt to create wetland habitat as part of the mitigation process should suitable locations arise and be economically feasible.

2. Mitigation for Low Frequency Clearing (Temporary Impacts)

Mitigation for low frequency maintenance (occurring less frequently than every three years) would be accomplished solely through wetland enhancement in the form of invasive species removal because wetland vegetation in these areas would be likely to re-establish between maintenance events. Normally, wetland vegetation re-establishes if the maintenance occurs at intervals greater than three years. Typically, cattails and other emergent vegetation re-establish and attain a height of approximately 1 foot within six months of maintenance. Willows and other woody plants such as mule fat would likely establish along the edge of the cattails within the first year, provided the root base of on-site wetland plants is partially retained after maintenance and/or there is adequate seed stock on site or upstream. Provided these factors are met, willows would be expected to attain a height of between 5-10 feet within three years of a maintenance event.

Enhancement

Wetland enhancement would involve initial removal of invasive species (e.g., giant reed, pampas grass, castor-bean, Mexican fan palm, Canary Island date palm, Brazilian pepper tree, and tamarisk). However, unlike restoration, enhancement would not include installation of new plant material.

The initial removal would be followed by a proactive maintenance program that would assure that invasive species would not re-establish for a period of two years after the removal has occurred. During this two-year period, maintenance would include cutting all large woody exotics as well as large grasses such as giant reed and pampas grass to ground level with all above-ground portions either (1) removed from the site and disposed of in a licensed landfill or (2) mowed or chipped into small pieces and left on site (further discussed in Section V.F.5). Maintenance events targeting resprouts of invasive species would occur every 2 months. Herbicides approved for use in wetland areas would be used as necessary to prevent re-growth. The mitigation ratios for low frequency clearing activities would be the same as shown in Table 6.

D. MITIGATION SITE SUITABILITY

To meet Corps, CDFG, RWQCB, and City mitigation requirements, this plan recommends measures to increase the amount of native habitat (restoration) and improve the quality of existing habitat (enhancement). The target riparian restoration and enhancement areas are considered suitable because they occur within and alongside natural creeks, which support soil conditions and hydrological regimes conducive to the establishment and persistence of native wetland/riparian vegetation.

E. OWNERSHIP STATUS

The majority of mitigation lands that are outside of established mitigation banks are expected to be on land owned by the City, with some potential areas owned by the County of San Diego (County).

F. EXISTING CONDITIONS

Proposed restoration/enhancement areas are currently dominated by non-native plants, which are sometimes intermixed with sparse native vegetation. Invasive and non-native plants that may occur in the restoration/enhancement areas include: giant reed, Mexican fan palm, tamarisk, Canary Island date palm, Brazilian pepper tree, pampas grass, fennel (*Foeniculum vulgare*), bristly ox-tongue (*Picris echioides*), umbrella sedge (*Cyperus involucratus*), annual beard grass (*Polypogon monspeliensis*), hottentot fig (*Carpobrotus edulis*), and castor bean, among others.

Areas where creation might occur are dominated by non-native upland species such as mustard (*Brassica* sp.), star-thistle (*Centaurea melitensis*), filaree (*Erodium* sp.), artichoke thistle (*Cynara cardunculus*), or non-native grasses such as red brome (*Bromus madritensis* ssp. *rubens*), soft chess (*Bromus hordaceus*), oat (*Avena* sp.), Bermuda grass (*Cynodon dactylon*), and ryegrass (*Lolium* sp.).

G. EXISTING FUNCTIONS AND SERVICES

The areas proposed for restoration and enhancement are dominated by non-native vegetation. Existing functions and services include storm water conveyance and flood abatement, pollutant uptake, ground water recharge, wildlife habitat, and corridors for wildlife movement. However, fewer wildlife species can use these areas than native habitat, and native cover is either not present or only present as a few scattered individuals. Restoration and enhancement of these areas will greatly increase the value of these areas to native flora and fauna, and also reduce the spread of non-native species to downstream areas within the watershed.

H. TARGET FUNCTIONS AND SERVICES

The goal of wetland restoration/enhancement for the project is to establish habitat that can perform the same functions and services (storm water conveyance and flood abatement, pollutant uptake, ground water recharge, wildlife habitat, and corridors for wildlife movement) that are performed by the areas proposed for impact. At the end of 5 years of maintenance and monitoring, the restored habitats are still expected to be in relatively early stages of habitat development. However, all restored habitat is expected to support sufficient native vegetation and be on the trajectory toward developing into the target vegetation type.

Recent Corps documents (Regulatory Guidance Letter published by the Corps on December 24, 2002, and Special Public Notices published by the Los Angeles District on January 27, 2003 and April 19, 2004) emphasize the importance of maximizing the functions provided by compensatory mitigation, and encourage the use of functional assessments (such as the Corps' Hydrogeomorphic Methodology [HGM]) for evaluating impacted aquatic resources, determining appropriate mitigation ratios and success criteria, and assessing the compensatory mitigation following implementation.

In accordance with the Corps' HGM approach, target hydrological, biochemical, and biological functions related to habitat are included as goals for the restoration plan and are discussed below (Brinson et. al. 1995; Smith et. al. 1995).

1. Hydrological

Typical hydrological criteria used in functional assessments such as the HGM (Brinson et al. 1995; Smith et. al. 1995) include characteristics of flood prone areas and micro- and macro-topographic complexity that result in short-term and long-term storage of surface and sub-surface water, and dissipation of energy. The proposed compensation areas are located in areas with varied hydrologic regimes. As such, the hydrological criteria for these areas could include one or more of the following: (1) evidence of sediment movement through the site; (2) evidence of moist soil in the top 18 inches of soil within Corps jurisdictional areas 2 weeks after a major rain event; and (3) evidence of one or more of the following field indicators of dynamic hydrogeomorphic processes: (a) topographic complexity from sediment scour and deposition resulting in meander scroll and pools, small surface channels, or hummocks; (b) redistribution of detritus such as debris jams or drift lines; (c) overbank or overland flooding indicated by high-water marks or silt layers on vegetation; or (d) presence of surface deposition from microbial processing such as humus layer or woody debris.

2. Biochemical

Biochemical functions include the cycling of nutrients, removal of imported elements and compounds from the system, retention of particulates, and export of organic carbon. Nutrient cycling includes 2 variables: aerial net primary productivity (ANPP) and annual turnover of detritus. The ANPP of a wetland typically corresponds to the total leaf area, which in turn is a measure of what the biomass produces, and is balanced with the detrital turnover of the system. Because direct measurements of ANPP are impractical, measurements of nutrient cycling will rely on vegetative cover tracked over time relative to the amount of cover following initial enhancement and restoration activities (removal of invasive species and installing native wetland/riparian species). The goal for native vegetation cover will vary by target habitat type and are outlined in Section VIII.B.2 of this report.

Removal of elements and compounds shall be measured by evidence of flooding, as observed by the presence of any of the following: water marks, silt lines, drift and/or wrack lines, sediment scour, or deposition. Export of organic carbon also includes evidence of flooding, as well as visual estimates of litter and course woody debris.

3. Biological

Target biological functions and services include increased cover by native vegetation and increased use by a variety of wildlife. Biological monitoring will consist of technical monitoring outlined in Section VII.D, as well as documentation of wildlife usage. Although focused surveys for specific wildlife species will not be conducted, any species observed or detected in the restoration areas during monitoring events will be noted.

I. MSCP LAND USE CONSISTENCY

Maintenance activities would be consistent with relevant policies and guidelines of the City's MSCP (refer to Table 13 of the Biological Technical Report [HELIX 2008a]). Many of the storm water facilities and proposed mitigation areas are located within the City's MHPA. Disturbed lands within the MHPA can be enhanced or restored to improve the functions and services of the MHPA.

IV. PROJECT RESPONSIBILITY

A. PROJECT PROPONENT

Proponent: City of San Diego, Storm Water Department
Contact: Daniel Lottermoser
Address: 2781 Caminito Chollas
San Diego, CA 92105
Phone: 619-527-5423
Email: dlottermoser@sandiego.gov

B. RESTORATION SPECIALIST

Overall supervision of the installation, maintenance, and monitoring of this restoration/enhancement project will be the responsibility of a restoration specialist experienced with wetland habitat restoration. The restoration specialist will oversee the efforts of the installation and maintenance contractor(s) for the life of the project. Specific tasks of the restoration specialist include educating all participants with regard to mitigation goals and requirements, directly overseeing fencing, planting, seeding, weeding, and other maintenance activities, and conducting annual assessments of the restoration/enhancement effort. The restoration specialist will explain to the contractor(s) how to avoid impacts to existing sensitive habitat and sensitive species. The restoration specialist will prepare an annual report which will be submitted to the Corps, CDFG, RWQCB, and City Development Services Department [DSD] and SWD.

C. LANDSCAPE ARCHITECT

If a creation or restoration component is included in the implementation of the mitigation plan, a licensed landscape architect will prepare the necessary construction documents; including grading (if necessary), irrigation and planting plans. This person will inspect the irrigation system prior to seeding and planting.

D. INSTALLATION/MAINTENANCE CONTRACTOR(S)

The installation and maintenance contractor(s) will have experience in wetland habitat restoration and be under the direction of the restoration specialist, who will assist the contractor(s) with the installation and maintenance of the target vegetation types.

The installation contractor will be responsible for removal of targeted invasive plants within the restoration and enhancement areas, irrigation installation (as needed), pre-planting weed control, installation of cuttings, container plants and seed, and maintenance of all restoration/enhancement areas during the 120-day installation period. The restoration specialist must recommend sign off, and

the SWD must approve and sign off on all of these criteria, to end the installation period, at which point the 5-year monitoring period would begin.

After the installation contract is completed, the SWD will hire a maintenance contractor for the duration of the five-year monitoring period. The maintenance contractor and the installation contractor may be the same entity. The SWD may change contractors at its discretion. The maintenance contractor should be knowledgeable as to the maintenance of native plant habitat and the difference between native and non-native plants. The maintenance contractor will service the restoration and enhancement areas once per month, or as needed. Service will include but not be limited to weed control, irrigation maintenance, trash removal, watering, dead plant replacement, and re-seeding. All activities conducted will be seasonally appropriate and approved by the restoration specialist. The maintenance contractor will meet the restoration specialist at the site when requested and will perform all checklist items in a timely manner as directed.

V. IMPLEMENTATION PLAN

A. RATIONALE FOR EXPECTING IMPLEMENTATION SUCCESS

Restoration and enhancement of wetland habitat within the designated mitigation areas is anticipated to be successful because the proposed areas are: (1) located within or adjacent to existing wetland habitats, and (2) located in areas containing the same slope, aspect, soils, and hydrology as adjacent native habitat. Habitat restoration and enhancement would increase the value of existing habitat by creating larger, contiguous blocks of native habitat.

The areas to be designated for enhancement may support substantial native habitats, with patches of non-native, invasive vegetation, or they may be almost completed dominated by invasive species. In either case, enhancement of these areas would involve removing trash, debris, and noxious, invasive weed species, thereby improving the overall quality of the habitat. The removal of invasive plants within the enhancement areas is expected to provide an overall benefit to the City's MHPA by decreasing the seed bank of these aggressive colonizers.

B. SENSITIVE HABITAT AND SENSITIVE SPECIES

As a result of the mitigation areas being located adjacent to sensitive habitat, including wetlands, all areas will be staked by a restoration specialist and all access routes will be identified in advance of starting restoration/enhancement work. Due to the potential presence of sensitive animal species such as least Bell's vireo and southwestern willow flycatcher (*Epidonax taillii extimus*), non-native plant removal should not occur during the reproductive seasons of sensitive species in areas where such species may be present (between March 15 and September 15 in riparian forest or scrub habitats). In addition, mechanized or intensive removal activities should not occur within 300 feet of potentially occupied habitat during the same periods, or within 500 feet of an active nest of a tree-nesting raptor or 800 feet of an active nest of a ground-nesting raptor (typically present between February 1 and July 15). If removal of invasive non-native plants needs to occur between February 1 and July 15, a pre-impact survey for nesting raptors will be required. Likewise, if this removal needs to occur between March 15 and September 15, protocol surveys for least Bell's vireo and southwestern willow flycatcher will need to be conducted prior to impacts.

Manual non-native plant removal or control (including use of herbicides) may be conducted in the mitigation areas at any time of year during the maintenance and monitoring periods.

C. IMPLEMENTATION SCHEDULE

Wetland mitigation activities will begin immediately after all applicable permits are secured, as weather allows, and should be completed within 2 months or as quickly as practicable.

Restoration as well as creation would occur in the fall (after September 15) to ensure that planting and seeding coincide with the beginning of the rainy season. If grading and clearing must occur during the least Bell's vireo breeding season (March 15 through September 15), pre-construction vireo protocol surveys will be conducted in suitable habitat prior to any construction (grading or clearing) activity to determine their presence/absence in areas to be directly impact by clearing or grading or indirectly impacted by noise. No grading or clearing will occur within 300 feet of occupied habitat during the vireo breeding season.

Enhancement activities (e.g., invasive plant removal and/or trash removal) may occur at any time provided they do not involve use of equipment which could result in noise-related direct or indirect impacts to the least Bell's vireo or other sensitive bird species. As with restoration, if heavy equipment must be used during the least Bell's vireo breeding season (March 15 through September 15), pre-construction vireo protocol surveys will be conducted in suitable habitat prior to any construction (grading or clearing) activity to determine their presence/absence in areas to be directly impacted by clearing or grading or indirectly impacted by noise. No grading or clearing will occur within 300 feet of occupied habitat during the vireo breeding season. Oversight by the restoration specialist would also ensure that impacts from maintenance activities would be avoided.

1. Restoration Areas (Invasive Species Removal and Planting of Native Species)

Monitoring of the restoration effort will begin with its installation. The monitoring program will continue for a 5-year period (or until all success criteria have been met) following completion of the installation. Regular monitoring visits will be conducted during the monitoring period with an annual report distributed by the end of each year. The results of the annual reports will be used to determine both the success of the restoration effort and any necessary remedial actions. Specific monitoring measures are addressed in Section VII.

2. Enhancement Areas (Invasive Species Removal Only – No Planting)

The maintenance and monitoring for enhancement areas (mitigation for low-frequency clearing) will continue for a two-year period after the removal of exotics has occurred. Regular monitoring visits will be conducted during the two-year period, with an annual memo distributed by the end of each year.

D. RESTORATION

1. Site Preparation

Pre-construction Meeting

Prior to initiation of restoration activities, an on-site meeting will be held with the installation contractor and the restoration specialist to identify sensitive areas and devise a strategy for avoidance.

Site Access

Vehicle access may be required for tree removal within the restoration areas as well as chipping or mowing of exotics, such as giant reed. Vehicles would access the mitigation sites for restoration activities along existing access paths, where present. Site access for each mitigation site would be determined on a case-by-case basis, depending on the location and surrounding habitat as well as presence of existing access paths. Temporary construction areas and roads, staging areas, or permanent access roads would not disturb existing habitats unless determined to be unavoidable. All such activities would occur on existing disturbed areas rather than in habitat. If temporary habitat disturbance is unavoidable, then restoration of and/or mitigation for the disturbed areas after project completion will be required. Some equipment (e.g., irrigation materials or container plantings) may be temporarily stored directly inside of delineated restoration areas.

Fencing

Prior to any restoration activities, each work area will be staked and roped off, or fenced with silt fencing or orange construction fencing to restrict access and ensure that personnel do not undertake activities outside the authorized areas. Project boundaries will be marked by a surveyor, and fencing will be installed by the installation contractor. Straw wattles or silt fencing will be installed on down slope portions of restoration areas, as needed, to restrict sediment movement off site. This fencing would be removed after sufficient vegetation has established to control erosion.

Temporary Signage

Temporary signs will provide an explanation of the project and a contact number for any public inquiries. Signs will be installed at all entrances to the project area.

Documenting Pre-mitigation Conditions

At least 2 photographic documentation locations shall be identified prior to non-native plant removal for each restoration area. These photos will be used for comparison with post-installation photos to document the mitigation effort.

Non-native Plant and Debris Removal

All non-native, invasive plant species as well as debris will be removed from the restoration areas. All large woody exotics will be cut to ground level with all above-ground portions removed from the site. Remaining stumps will be treated with herbicide, as necessary. Trash and other debris removed from the project area will be disposed of in a licensed landfill. Plant material may be mulched and left on site or may be hauled away and disposed of in a licensed landfill. Giant reed is anticipated to be one of the primary invasive plants removed from the mitigation areas. As such, two potential giant reed removal techniques, as outlined on the Santa Margarita–San Luis Rey Weed Management Area (SMSLRWMA) program website (SMSLRWMA 2008) are provided below. The suggested timing for these methods is presented in Table 7.

(1) Foliar Spray Herbicide Method. This method involves spraying herbicide on the stems and leaves of giant reed without any cutting. The herbicide that has been found to be most effective is a glyphosate. If treatment is in or adjacent to water, Rodeo® or other herbicide approved by the U.S. Environmental Protection Agency (EPA) for use in aquatic systems must be used. Although the manufacturer's recommendations for Rodeo® use on giant

reed are to use 2% solution, field tests have indicated that a low rate of kill is achieved with 2% foliar application. A much higher kill rate (up to 95% with one treatment) has been achieved when using a higher percentage (5% to 6%). The leaves and stems need to be thoroughly sprayed - in some cases this is difficult due to the height of the vegetation and the presence of non-target vegetation nearby. Pressurized sprayers (mounted on an all-terrain vehicle) and the use of ladders are helpful where the giant reed is tall. The giant reed can be 'prepped' prior to spraying by pulling the stem away from non-target vegetation and pushing it down to the ground. Because the giant reed rhizome mass remains in the ground, if a sub-lethal dose of herbicide is applied, resprouting will occur. While some resprouting usually does occur, it is generally composed of very scattered, small giant reed sprouts. This method can also be followed by mowing and/or cutting.

(2) Cut and Spray Herbicide Method. This method involves cutting the giant reed stems and then applying herbicide to the cut stem surface. Herbicide may either be sprayed on (generally with a backpack sprayer using 100% glyphosate) or for smaller projects herbicide may be applied using a hand pump sprayer or a sponge dauber. If treatment is in or adjacent to water then Rodeo® or other herbicide approved by the U.S. EPA for use in aquatic systems must be used. There are varying success rates for this method, ranging from about 50% to 90% kill in the first year. The difference in success rate may be due to factors such as: size and age of the giant reed clump(s), proximity to water, herbicide concentration, time between cutting and herbicide application, etc. Whatever the success rate, there is always some resprouting. It is hypothesized that the action of cutting the stem triggers the resprouting response, causing the production of new stems from the rhizomes. This method always requires follow-up treatment. Follow-up treatment of resprouts can either be the foliar spray method or the cut or spray method again. The foliar spray method works fairly well because the sprouts are much smaller, so it is easy to target them with little overspray. Depending on the situation, the cut giant reed stems may be left on site (but not in a moist area where they may sprout or in a flood-prone area) or the giant reed biomass can be disposed of in a licensed landfill.

Table 7
METHODS AND TIMING OF GIANT REED REMOVAL

METHOD	TIMING		
	October-November	February-March	April-August
Foliar Spray	Spray herbicide	Mow/cut stems, as necessary	NA
Cut and Spray	Cut stems and spray herbicide	Spray resprouts	Spray resprouts unless it poses a threat to nesting of sensitive bird species

Because removal of the dead giant reed biomass from the mitigation sites can be very expensive, alternative methods of dealing with the biomass have been used by the SMSLRWMA program and are discussed below. In some cases, the biomass can be left on site to decompose naturally over time,

however, this could be a concern due to potential flood or fire hazard, aesthetics, or the biomass may need to be removed for native re-planting. The main methods of dealing with giant reed stems that require removal that are used by the SMSLRWMA program are: (1) chipping, and (2) mowing. The following descriptions are taken from the SMSLRWMA website.

(1) Chipping. High-powered drum chippers are recommended because the material is finely chipped and the machine feeds itself, creating a much safer environment for workers and chipping at a faster rate than regular chippers. Although high powered drum chippers are more expensive to rent than regular chippers, crews can work faster. Furthermore, the green giant reed stems are chipped so fine that there is almost no resprouting.

(2) Mowing. Mowing is carried out in place using a hammer-flail mowing attachment that is mounted on the front of a rubber-tired tractor. Alternatively, slope mowers, hydroax, and other mowing devices can be used (not all are rubber tired). Mowing is generally best suited to dense giant reed stands. However, if the stands are very old it may be hard to maneuver through them and there may be hidden obstacles or unexpected drops. Mowing is advantageous because no giant reed material has to be moved by hand or moved off-site. The limitations to mowing include site access, terrain, amount of native vegetation, and noise issues.

Irrigation

Following non-native removal, the installation contractor will install irrigation according to the project plans for specific mitigation sites. Irrigation may or may not be installed depending on the type and location of the mitigation area(s). Sources of irrigation water may include (1) water pumped from creeks/rivers adjacent to the mitigation area, (2) water brought in by a water truck, or (3) hook-up to a nearby water source.

2. Planting

Once a restoration area has been weeded and irrigation installation is complete (as appropriate), cuttings, plantings, and/or seed will be installed. All seed and plant material will be collected or propagated from local plant populations occurring in coastal San Diego County within 25 miles of the coast. Substitutions, other donor sites, or use of commercial material may be allowed if materials are unavailable, at the discretion of the restoration specialist and Park and Recreation Department (for mitigation occurring on land owned or managed by the Park and Recreation Department). All seed and container stock must be inspected and approved by the restoration specialist prior to installation. Container stock would be installed in holes that are at least 1.5 times larger than the container. Holes will be dug with mechanical augers where possible and by hand elsewhere. Plant protectors may be used, at the restoration specialist's direction. Initial container stock orders should include 10 to 15 percent more plants than specified in the plans to help ensure adequate establishment success. Extra container stock may be installed at the time of initial planting, or be held in a nursery to be used to replace plants that die during the establishment period, at the contractor's discretion. Seed would be hand-spread following planting and raked in.

Southern Riparian Forest/Woodland

Appropriate cuttings, container stock, plugs, and/or seed will be installed. The goal is to create native riparian habitat that supports a riparian tree canopy, a relatively open understory, and a diverse low shrub/herbaceous component. Shrubby willows are excluded from the plant palette because of their potential to impede the flow of water, thereby increasing flood potential in surrounding urban areas. In addition, shrubby willows act as visual barriers and therefore increase the likelihood of transient encampments becoming established, which is an issue of high concern in many of the surrounding neighborhoods and businesses. A general plant palette for southern riparian forest/woodland restoration is presented in Table 8. Species may be added or deleted from the palette depending on the desired outcome as well as plant availability and cost at the time of implementation. Southern riparian forest and riparian woodland naturally may contain openings that are dominated by native grasses and herbs with scattered shrubs. To help re-create this mosaic, the restoration effort will group tree plantings and will also target the establishment of native understory herb and shrub species, thereby increasing habitat diversity and allowing for natural succession to occur. Southern riparian forest/riparian woodland will be the target habitat type for: (1) mitigating for in-kind impacts as well as (2) mitigating for riparian scrub impacts (including southern willow scrub and mule fat scrub), where the resulting mitigation would occur in close proximity to residential communities or commercial areas.

Table 8
SOUTHERN RIPARIAN FOREST/WOODLAND PLANT PALETTE

SCIENTIFIC NAME	COMMON NAME	SPACING ON CENTER (feet)†	GROUP-ING SIZE†	NUMBER OR POUNDS PER ACRE
CONTAINER STOCK*				
Trees				
Platanus racemosa	Western sycamore	12-20	3-7	30-60
Populus fremontii	Western cottonwood	12-20	3-8	30-75
Quercus agrifolia	Coast live oak	15	3-5	40
Salix gooddingii	Black willow	15	6-7	65
Salix laevigata	Red willow	15	6-7	65
Sambucus mexicana	Blue elderberry	12	4	40
Shrubs/Herbs				
Artemisia palmeri	Palmer's sagewort	5	22	220
Baccharis salicifolia	Mule fat	8	3-5	175
Distichlis spicata	Saltgrass	2	100	350
Iva hayesiana	San Diego marsh elder	5	5-7	220
Leymus triticoides	Creeping wild rye	2	50	350
Rubus ursinus	California blackberry	4	15	150
Vitis girdiana	Desert wild grape	4	15	150

Table 8 (cont.) SOUTHERN RIPARIAN FOREST/WOODLAND PLANT PALETTE				
SCIENTIFIC NAME	COMMON NAME	SPACING ON CENTER (feet)†	GROUP-ING SIZE†	NUMBER OR POUNDS PER ACRE
SEED MIX				
Ambrosia psilostachya	Western ragweed	--	--	3
Anemopsis californica	Yerba mansa	--	--	1
Artemisia douglasiana	Douglas mugwort	--	--	2
Juncus acutus ssp. *leopoldii*	Southwestern spiny rush	--	--	1
Juncus arcticus var. *mexicana*	Wire rush	--	--	2
Leymus condensatus	Giant wild rye	--	--	2
Muhlenbergia rigens	Deergrass	--	--	2
Isocoma menziesii	Coastal goldenbush	--	--	3
Urtica dioica ssp. *holoserica*	Stinging nettle	--	--	1

*Container stock may be cuttings, plugs, or one gallon size, depending on species and availability.
†Grouping size and spacing may vary depending on the desired density of tree and shrub canopy.

Southern Riparian Scrub

Southern riparian scrub will be the target habitat type for mitigating for in-kind impacts (including impacts to southern willow scrub and mule fat scrub) where the resulting mitigation would occur in areas further away from residential communities and commercial areas, where flood hazard risks are lower and where potential transient encampments pose less of a safety concern. A general plant palette for southern riparian scrub restoration is presented in Table 9. Species may be added or deleted from the palette depending on the desired outcome as well as plant availability and cost at the time of implementation.

Freshwater Marsh/Emergent Wetland

Freshwater marsh/emergent wetland restoration would occur for: (1) in-kind impacts to these habitats, or (2) impacts to disturbed wetlands. A general plant palette for freshwater marsh/emergent wetland restoration is presented in Table 10. Species may be added or deleted from the palette depending on the desired outcome as well as plant availability and cost at the time of implementation.

Table 9
SOUTHERN RIPARIAN SCRUB PLANT PALETTE

SCIENTIFIC NAME	COMMON NAME	SPACING ON CENTER (FEET)†	GROUPING SIZE†	NUMBER OR POUNDS PER ACRE
CONTAINER STOCK*				
Trees				
Sambucus mexicana	Blue elderberry	10	4-6	50
Shrubs/Herbs				
Baccharis salicifolia	Mule fat	6	30-40	400
Distichlis spicata	Saltgrass	2	100	350
Iva hayesiana	San Diego marsh elder	5	5-7	220
Salix exigua	Sandbar willow	10	25-30	300
Salix lasiolepis	Arroyo willow	10	25-30	300
SEED MIX				
Ambrosia psilostachya	Western ragweed	--	--	2
Artemisia douglasii	Douglas mugwort	--	--	2
Baccharis sarothroides	Broom baccharis	--	--	1
Isocoma menziesii	Coastal goldenbush	--	--	2

*Container stock may be cuttings, plugs, or one gallon size, depending on species and availability.
†Grouping size and spacing may vary depending on the desired density of tree and shrub canopy.

Table 10
FRESHWATER MARSH/EMERGENT WETLAND
PLANT PALETTE (seed mixture)

Scientific Name	Common Name	Pounds Per Acre
Cyperus eragrostis	Tall flatsedge	1
Eleocharis macrostachya	Spike rush	1
Pluchea odorata	Salt marsh fleabane	1
Scirpus acutus var. *occidentalis*	Viscid bulrush	2
Schoenoplectus californicus (*Scirpus californicus*)	California bulrush	2
Scirpus maritimus	Bulrush	2
Sesuvium verrucosum	Western sea-purslane	1
Typha latifolia	Broad-leaved cattail	2

Coastal Salt Marsh/Brackish Marsh/Cismontane Alkali Marsh

Coastal salt marsh/brackish marsh/cismontane alkali marsh restoration may occur for: (1) in-kind impacts to these habitats, or (2) impacts to disturbed wetlands in areas suitable for marsh restoration. General plant palettes these habitats are presented in Tables 11 to 13. Species may be added or deleted from the palettes depending on the desired outcome as well as plant availability and cost at the time of implementation.

Table 11
COASTAL SALT MARSH PLANT PALETTE

SCIENTIFIC NAME	COMMON NAME	SPACING ON CENTER (feet)†	GROUP -ING SIZE†	NUMBER OR POUNDS PER ACRE
CONTAINER STOCK*				
Below Mean High Water				
Spartina foliosa	Cordgrass	4	NA	3,450
Low Marsh or Marsh Plain				
Spartina foliosa	Cordgrass	4	70	700
Batis maritima	Saltwort	2	100	1,000
Jaumea carnosa	Jaumea	5	22	220
Mid-Marsh				
Distichlis spicata	Saltgrass	2	140	1,400
Frankenia salina	Alkali heath	2	200	2000
Limonium californicum	Marsh rosemary	2	70	700
Monathochloe littoralis	Shoregrass	2	150	1,500
Sarcocornia pacifica (Salicornia virginica)	Common pickleweed	6	95	950
High Marsh				
Arthrocnemum subterminale (Salicornia subterminalis)	Glasswort	6	45-50	465
Atriplex watsonii	Watson's saltbush	4.5	14	140
Distichlis spicata	Saltgrass	2	70	700
Frankenia salina	Alkali heath	2	70	700
Limonium californicum	Marsh rosemary	2	35	350
Monathochloe littoralis	Shoregrass	2	35	350
Sarcocornia pacifica (Salicornia virginica)	Common pickleweed	6	45-50	465
Suaeda tasifolia (californica)	Sea-blight	3	50	500
SEED MIX				
Low Marsh or Marsh Plain				
Salicornia bigelovii	Annual pickleweed	--	--	3
High Marsh				
Heliotropium curassavicum	Salt heliotope	--	--	1
Cressa truxillensis	Alkali weed	--	--	2

*Container stock may be cuttings, plugs, or one gallon size, depending on species and availability.
†Grouping size and spacing may vary depending on the desired plant density and composition.

Table 12
BRACKISH MARSH PLANT PALETTE

SCIENTIFIC NAME	COMMON NAME	SPACING ON CENTER (feet) †	GROUP -ING SIZE†	NUMBER OR POUNDS PER ACRE
CONTAINER STOCK*				
Bolboschoenus maritimus	Prairie bulrush	4	100	700
Distichlis spicata	Saltgrass	2	100	400
Sarcocornia pacifica (Salicornia virginica)	Common pickleweed	6	92	150
Juncus acutus ssp. *leopoldii*	Southwestern spiny rush	4.5	55	550
Schoenoplectus californicus (Scirpus californicus)	California bulrush	4	100	700
SEED MIX				
Typha latifolia	Broad-leaved cattail	--	--	2
Pluchea odorata	Salt marsh fleabane	--	--	2

*Container stock may be cuttings, plugs, or one gallon size, depending on species and availability.
†Grouping size and spacing may vary depending on the desired plant density and composition.

Table 13
CISMONTANE ALKALI MARSH PLANT PALETTE

SCIENTIFIC NAME	COMMON NAME	SPACING ON CENTER (feet) †	GROUP -ING SIZE†	NUMBER OR POUNDS PER ACRE
CONTAINER STOCK*				
Anemopsis californica	Yerba mansa	5	30	300
Distichlis spicata	Saltgrass	2	100	1,400
Juncus arcticus var. *mexicana*	Wire rush	2	70	700
Juncus acutus ssp. *leopoldii*	Southwestern spiny rush	4.5	110	1,100
Sarcocornia pacifica (Salicornia virginica)	Common pickleweed	6	92	30
SEED MIX				
Pluchea odorata	Salt marsh fleabane	--	--	2
Typha domingensis	Southern cattail	--	--	2

*Container stock may be cuttings, plugs, or one gallon size, depending on species and availability.
†Grouping size and spacing may vary depending on the desired plant density and composition.

3. Irrigation

An irrigation system may be used to help the native seed and container stock in the wetland areas become established. After the initial plant establishment period, water will be applied infrequently and only as needed to prevent the mortality of plants and seedlings. The irrigation schedule will promote deep root growth with evenly spaced, infrequent, deep applications of water. To obtain deep penetration of water, the irrigation system may be activated several times in one 24-hour period. Irrigation will be minimized following natural rainfall events.

Once the plant material is established and no longer requires supplemental irrigation, the system will be deactivated. The above-ground portions of the system will be removed at project sign-off.

4. As-built Documentation

The restoration specialist shall submit a brief letter report to the appropriate regulatory agencies (Corps, CDFG, RWQCB, and City), including an as-built graphic, within six weeks of completion of restoration installation. This letter will describe site preparation, installation methods, and the as-built status of the overall mitigation project. Pre- and post-installation photographs taken from identified photo stations shall be included as part of the as-built report.

E. ENHANCEMENT

Areas targeted for enhancement only (mitigation for low frequency clearing) will include removal of target invasive species such as tamarisk, Mexican fan palm, Canary island date palm, pampas grass, castor-bean, Brazilian pepper tree, and giant reed. No plant, seed, or cutting installation is required for these areas; however, the restoration specialist may direct such activities if they are deemed necessary for erosion control in some areas and in order to help native species recolonize areas where exotics have been removed.

1. Site Preparation

Pre-construction Meeting

Prior to initiation of enhancement activities, an on-site meeting will be held with the contractor and the restoration specialist to identify sensitive areas and devise a strategy for avoidance.

Site Access

Vehicle access may be required for removal as well as chipping or mowing of exotics, such as giant reed. Vehicles would access the mitigation sites for enhancement activities along existing access paths, where present. Site access for each mitigation site would be determined on a case-by-case basis, depending on the location and surrounding habitat as well as presence of existing access paths. Temporary construction areas and roads, staging areas, or permanent access roads would not disturb existing habitats unless determined to be unavoidable. All such activities would occur on existing disturbed areas rather than in habitat. If temporary habitat disturbance is unavoidable, then restoration of and/or mitigation for the disturbed areas after project completion will be required.

Fencing

Prior to any enhancement activities, each work area will be staked and roped off, or fenced with silt fencing or orange construction fencing to restrict access and ensure that personnel do not undertake activities outside the authorized areas. Project boundaries will be marked by a surveyor, and fencing will be installed by the installation contractor.

Documenting Pre-mitigation Conditions

At least 2 photographic documentation locations shall be identified prior to non-native plant removal for each enhancement area. These photos will be used for comparison with post-clearing photos to document the mitigation effort.

Non-native Plant and Debris Removal

All non-native, invasive plant species as well as debris will be removed. All large woody exotics will be cut to ground level with all above-ground portions removed from the site. Remaining stumps will be treated with herbicide, as necessary. Trash and other debris removed from the project area will be disposed of in a licensed landfill. Plant material may be mulched and left on site or may be hauled away and disposed of in a licensed landfill. Giant reed is anticipated to be one of the primary invasive plants removed from the enhancement areas and potential removal techniques and timing are discussed previously in Section V.D.1.

2. As-built Documentation

The restoration specialist shall submit a brief letter report to the appropriate regulatory agencies (Corps, CDFG, RWQCB, and City) within six weeks of completion of initial enhancement activities. This letter will describe the invasive species removal process and will include a graphic depicting the areas of invasive species removal. Pre- and post-installation photographs taken from identified photo stations shall be included as part of the as-built report.

VI. MAINTENANCE PLAN

A. RESTORATION

A 5-year maintenance program is proposed to ensure the successful establishment and persistence of wetland habitat restored as mitigation for permanent impacts. The maintenance program will involve removal of non-native species and trash, irrigation maintenance, and any remedial measures deemed necessary for the success of the mitigation program (e.g., re-seeding and re-planting). Maintenance activities will be directed by the restoration specialist and implemented by the maintenance contractor.

1. General Maintenance

The maintenance guidelines are tailored to native plant establishment. Maintenance personnel will be informed of the goals of the restoration effort and the maintenance requirements. A professional with experience and knowledge in native habitat restoration maintenance will supervise all maintenance. It

is the maintenance contractor's responsibility to keep all seeded and planted areas free of debris, and to monitor irrigation function and scheduling, plant material condition and health, removal of non-native species, and erosion control. The maintenance contractor will also be responsible for replacing any dead or terminally diseased plants, at the direction of the restoration specialist. Damage to plants, irrigation systems, and other facilities occurring as a result of unusual weather or vandalism will be repaired as directed by the restoration specialist. The cost of such repairs will be paid for as extra work. The contractor will be responsible for damage caused by the contractor's inadequate maintenance or operation of irrigation facilities, as determined by the restoration specialist.

2. Non-native Plant Control

Within the restoration areas, targeted non-native species will be removed to ground level. For the duration of the maintenance period, there will be a very low tolerance for non-native species, and eradication will be conducted as necessary to minimize competition that could prevent the establishment of native species. To help decrease the potential for re-infestation by non-native species, all restoration/enhancement areas will also have a buffer zone that will be maintained free of non-native vegetation. As non-native species become evident, they should be removed by hand or controlled with appropriate herbicides (e.g., only herbicides approved for aquatic use should be applied, following manufacturer's guidelines, and used only as necessary). The restoration specialist will oversee non-native plant removal by the maintenance contractor; however, maintenance personnel must be knowledgeable in distinguishing non-native species from desirable native vegetation.

3. Invasive Plant Control

Within the restoration areas, certain highly invasive plant species will be targeted for complete eradication: tamarisk, Mexican fan palm, Canary island date palm, pampas grass, castor-bean, Brazilian pepper tree, and giant reed. These species are rated as either High or Moderate in the California Invasive Plant Inventory prepared by the California Invasive Plant Council (Cal-IPC 2006), which includes highly invasive pest plants that have been documented as aggressive invaders that displace natives and disrupt natural habitats. Additional species may be added to this list if found to be a threat to the long-term success of the restoration and enhancement effort.

4. Other Pests

Insects, vertebrate pests, and diseases will be monitored. Generally speaking, pests will be tolerated unless they pose a significant threat to project success. If deemed necessary, a licensed pest control adviser will make specific pest control recommendations. All applicable federal and state laws and regulations will be closely followed. The restoration specialist will be consulted on any pest control matters.

5. Fertilizer Application

Fertilizer will not be applied except in extraordinary circumstances and only at the written direction of the restoration specialist.

6. Pruning

No post-installation pruning is necessary unless otherwise directed by the restoration specialist.

7. Sensitive Species Issues

Following removal of targeted non-native species within the restoration areas, which will be conducted per the specifications outlined in Section V.B (above), maintenance activities will not include use of heavy equipment or vehicles and, as such, are not anticipated to have adverse effects on sensitive species.

8. Schedule

Maintenance will be conducted at least once per month, or as needed, throughout the five-year monitoring plans following implementation of the mitigation program. The installation/maintenance contractor(s) will complete maintenance requests from the restoration specialist within 14 days of any written request or monitoring report. The installation contractor will conduct maintenance during the 120-day establishment period until the restoration specialist recommends and the SWD approves sign off in writing. To complete the installation period, all irrigation (if installed) must be functional, container plantings must have 100 percent survivorship, and all invasive non-native species listed in Section VI.A.3 must be removed from the restoration areas. Any replacement plantings added to attain the survivorship criterion must be installed for at least 30 days prior to sign off. The maintenance contractor will be responsible for all maintenance activities during the remainder of the five-year maintenance periods.

B. ENHANCEMENT

A two-year maintenance program is proposed to ensure the successful persistence of wetland habitat enhanced as mitigation for temporary, low-frequency impacts. The maintenance program will involve continued removal of non-native species and trash. Maintenance activities will be directed by the restoration specialist and implemented by the maintenance contractor.

1. General Maintenance

Maintenance personnel will be informed of the goals of the enhancement effort and the maintenance requirements. A professional with experience and knowledge in native habitat enhancement will supervise all maintenance. The contractor will be responsible for damage caused by the contractor's inadequate maintenance, as determined by the restoration specialist.

2. Non-native Plant Control

Within the enhancement areas, targeted non-native species will be removed to ground level. For the duration of the maintenance period, there will be a very low tolerance for non-native species, and eradication will be conducted as necessary to minimize competition that could prevent the natural re-establishment of native species. As non-native species become evident, they would be removed by hand or controlled with appropriate herbicides (e.g., only herbicides approved for aquatic use should be applied, following manufacturer's guidelines, and used only as necessary). The restoration specialist will oversee non-native plant removal by the maintenance contractor; however, maintenance personnel must be knowledgeable in distinguishing non-native species from desirable native vegetation.

3. Invasive Plant Control

Within the enhancement areas, certain highly invasive plant species will be targeted for complete eradication: tamarisk, Mexican fan palm, Canary island date palm, pampas grass, castor-bean, Brazilian pepper tree, and giant reed. Additional species may be added to this list if found to be a threat to the long-term success of the enhancement effort.

4. Sensitive Species Issues

Following removal of targeted non-native species within the enhancement areas, which will be conducted per the specifications outlined in Section V.B (above), maintenance activities will not include use of heavy equipment or vehicles and, as such, are not anticipated to have adverse effects on sensitive species.

5. Schedule

Maintenance will be conducted at least once per month, or as needed, throughout the two-year maintenance program. The maintenance contractor(s) will complete maintenance requests from the restoration specialist within 14 days of any written request or monitoring report.

C. RESPONSIBLE PARTY

The SWD will be responsible for ensuring implementation of the two- and five-year maintenance programs.

VII. MONITORING PLAN

A. RESTORATION

The restoration specialist will monitor habitat restoration activities, including site fencing, removal of non-native species, installation of irrigation, pre-planting, planting, and seeding. Specifically, the restoration specialist will:

- Document pre-construction site status at designated photo locations;
- Attend one pre-construction meeting with the maintenance contractor for each mitigation site;
- Ensure that installation personnel understand the project requirements and limitations;
- Stake the perimeters of all restoration areas;
- Monitor all target non-native plant removal within existing riparian habitat;
- Check that all fencing and signs are properly installed prior to initiating restoration activities;
- Regularly monitor all restoration installation;
- Inspect plant and seed material prior to installation;
- Monitor the manner in which the plant and seed material is installed; and
- Prepare a letter for submittal to the appropriate regulatory agencies (e.g., Corps, CDFG, RWQCB, and City) stating that the installation is complete.

The five-year maintenance and monitoring periods will begin for each restoration area after the City SWD Project Manager has field verified that all planting has been installed and the site has met conditions for completion of the 120-day establishment period.

1. Pre-construction Monitoring

The restoration specialist will attend one pre-construction meeting for each restoration site to review project goals, site access, and maintenance restrictions (e.g., timing for use of mechanized equipment for non-native plant control) with the installation contractor. In addition, the restoration specialist will mark all restoration areas with staking or flagging and monitor fence and sign installation by the installation contractor. Pre-installation photos will also be taken from designated photo documentation stations. This information will later be used to track the changes in vegetation as a result of site restoration.

2. Installation Monitoring

A restoration specialist will monitor all phases of the installation process, including initial non-native plant removal, irrigation installation, and installation of plants and seed (Table 14). The restoration specialist must inspect and authorize each phase of work before the next phase may begin.

Table 14
MAINTENANCE MONITORING SCHEDULE

PHASE	SCHEDULE
Installation Monitoring	
Site preparation and installation	Daily
120-day establishment period	Monthly (4 visits)
Maintenance Monitoring	
Year 1	Monthly (12 visits)
Year 2	
February to July	Monthly (6 visits)
August to January	2 visits
Years 3 to 5 (restoration areas)	6 visits

3. Maintenance Monitoring

Following installation, a restoration specialist will monitor maintenance activities conducted by the installation contractor during the 120-day establishment period and by the maintenance contractor during the applicable maintenance and monitoring period (in accordance with the schedule outlined in Table 14). Monitoring visits will be conducted monthly during Year 1. In Year 2, eight visits will be conducted - monthly from February through July (to cover the peak establishment period of both spring and summer germinating species) and twice in the remainder of the year. During Years 3 through 5, monitoring will be conducted six times per year. This monitoring schedule is the minimum; more frequent inspections may be necessary if there are problems with contractor performance or habitat development. Monitoring memos noting any issues with plant establishment, irrigation, sediment control, etc., will be provided as necessary to the installation/maintenance contractor(s) and SWD.

4. Technical Monitoring

In addition to maintenance monitoring visits, the restoration specialist will conduct annual monitoring of restoration areas, preferably in May of each year, during the five-year maintenance and monitoring period. The visits are scheduled for May to coincide with the peak of the growing season for most native herbs and shrubs; however the exact timing of the visits will depend on site and weather conditions.

Annual monitoring will include both qualitative (visual assessment) and quantitative (transect data collection; Elzinga et al. 1998) sampling within the restoration areas. This sampling will include assessments of cover (native and non-native), observations of plant recruitment, and lists of wildlife and plant species observed on site each year. A functional assessment (including hydrological and biogeochemical assessments) of the restoration areas will be conducted according to the criteria discussed in Section III.H, above. In Years 1 and 2, monitoring will only be qualitative and be based on a visual survey of all mitigation areas. In Years 3 through 5, quantitative transect monitoring will be conducted in the restoration areas, while the enhancement areas will continue to be monitored qualitatively. Success criteria milestones are provided in Section VIII.A, below.

Vegetation

Fifty-meter transects will be used to collect data for the annual monitoring of restoration areas during Years 3 through 5. The number of transects will vary depending on the size, type, and location of the individual restoration areas. Transects will be randomly located during the first quantitative sampling event (to occur in Year 3), and permanently marked with rebar to facilitate their use in subsequent years. Vegetative data will be collected along each transect using the point intercept line transect sampling methods described in the California Native Plant Society's Field Sampling Protocol (Sawyer and Keeler-Wolf 1995). Species cover data will be collected by recording all of the species intercepted at each 0.5-meter interval along the length of each transect. Vegetation will be recorded separately for herb (0 to 0.6 meter), shrub (0.6 to 2 meters), and tree (greater than 2 meters) layers. Species richness data will be collected by noting all species occurring within a 5-meter belt transect centered on each line transect.

Animal Diversity

Wildlife use of the corridor will be noted incidentally during each annual assessment by hearing species-specific vocalizations or by observing the species, or their tracks, scat, or dens. No focused wildlife surveys will be conducted.

Photo Documentation

In addition to the qualitative and quantitative monitoring, several permanent stations for photo documentation will be established prior to installation. Photos will be taken as part of all five annual monitoring events and will be included in the respective year's annual report.

Annual Reports

An annual report will be prepared each year during the five-year monitoring period and submitted to the Corps, CDFG, RWQCB, and City (SWD and Development Services Department Mitigation Monitoring Coordination Section [MMC]).

B. ENHANCEMENT

The restoration specialist will monitor habitat enhancement activities. Specifically, the restoration specialist will:

- Document pre-construction site status at designated photo locations;
- Attend one pre-construction meeting with the maintenance contractor for each mitigation site;
- Ensure that installation personnel understand the project requirements and limitations;
- Stake the perimeters of all enhancement areas;
- Monitor all target non-native plant removal within existing riparian habitat;
- Check that all fencing and signs are properly installed prior to initiating enhancement activities; and
- Prepare a letter for submittal to the appropriate regulatory agencies (e.g., Corps, CDFG, RWQCB, and City) stating that the enhancement has been completed.

The 2-year maintenance and monitoring period will begin for each enhancement area after the City SWD Project Manager has verified that the initial invasive species removal has been completed.

1. Pre-construction Monitoring

The restoration specialist will attend one pre-construction meeting for each enhancement site to review project goals, site access, and maintenance restrictions (e.g., timing for use of mechanized equipment for non-native plant control) with the maintenance contractor. In addition, the restoration specialist will mark all enhancement areas with staking or flagging and monitor fence and sign installation by the maintenance contractor. Pre-clearing photos will also be taken from designated photo documentation stations. This information will later be used to track the changes in vegetation as a result of site enhancement.

2. Post Clearing Monitoring

Following initial invasives removal, a restoration specialist will monitor each enhanced area. Monitoring visits will be conducted on a monthly basis throughout the two-year maintenance period. Monitoring memos noting any issues with invasive plant re-establishment will be provided, as necessary, to the maintenance contractor(s) and SWD.

3. Annual Reports

An annual report will be prepared each year during the 2-year monitoring period and submitted to the Corps, CDFG, RWQCB, and City (SWD and Development Services Department Mitigation Monitoring Coordination Section [MMC]).

VIII. FINAL SUCCESS CRITERIA

The following sections provide standards to determine the successful completion of the mitigation effort as well as measurement methods for success criteria. Attainment of these standards indicates that the mitigation area is progressing toward, and has the habitat function and services specified by, this plan.

A. RESTORATION

1. 120-Day Establishment Period

Success at the end of the 120-day establishment period will be met if all targeted non-native species located within the project area have been eradicated (by removing to ground level and killing any remaining stumps to prevent resprouting), there is 100 percent survivorship of container stock within planting areas, seed has been installed, any installed irrigation provides adequate cover and application rates, and there are no erosion-related issues. Container stock shall be in the ground for at least 30 days prior to the end of the 120-day establishment period.

2. Five-Year Maintenance Period

Species Richness

Species richness is the number of native species present in a given area. Species richness will be determined by visual assessment during the Year 1 and 2 annual monitoring events. While no species richness success criteria have been established for Years 1 or 2, there should be an indication that sufficient species are present to meet Years 3 through 5 goals. In Years 3 through 5, species richness within the restoration areas will be determined within the belt transects centered on the sampled line transects (see Section VII.A.4, above, for more details on transect sampling). The annual success criterion for native plant species richness varies by year and habitat type (Table 15). If the species richness goal for a given year is not met, corrective measures (e.g., reseeding, planting, etc.) will be taken to ensure eventual achievement of the five-year goal.

Table 15
SPECIES RICHNESS SUCCESS CRITERIA FOR RESTORATION AREAS*
(number of species)

HABITAT	YEAR 3	YEAR 4	YEAR 5
Southern riparian forest/riparian woodland	5	6	6
Southern riparian scrub	3	4	5
Freshwater marsh/emergent wetland	2	2	3
Southern coastal salt marsh/brackish marsh/ cismontane alkali marsh	2	2	3

*No success criteria for Years 1 and 2

3. Native Cover

Annual performance goals for native cover track the progress of the mitigation effort. No specific cover criteria have been established for Years 1 or 2; however, sufficient cover should be observed to indicate that the restoration effort is on track to meet final success criteria. For Years 3, 4, and 5, plant cover will be determined along the sampled line transects (Tables 16 to 19). If the annual goals for native cover are not met, additional measures (e.g., reseeding, planting, weeding, etc.) will be taken as necessary to ensure final success.

Table 16
VEGETATIVE COVER SUCCESS CRITERIA
FOR SOUTHERN RIPARIAN FOREST/RIPARIAN WOODLAND
RESTORATION AREAS
(percent)

VEGETATION TYPE	YEAR 3	YEAR 4	YEAR 5
Native cover	40/35	50/45	60
Non-native cover	10	10	10
Target (noxious) weed cover*	0	0	0

*Invasive non-native plants targeted for complete eradication are listed in Section VI.A.3

Table 17
VEGETATIVE COVER SUCCESS CRITERIA
FOR SOUTHERN RIPARIAN SCRUB RESTORATION AREAS
(percent)

VEGETATION TYPE	YEAR 3	YEAR 4	YEAR 5
Native cover	50	60	75
Non-native cover	10	10	10
Target (noxious) weed cover*	0	0	0

*Invasive non-native plants targeted for complete eradication are listed in Section VI.A.3

Table 18
VEGETATIVE COVER SUCCESS CRITERIA
FOR FRESHWATER MARSH/EMERGENT WETLAND
RESTORATION AREAS
(percent)

VEGETATION TYPE	YEAR 3	YEAR 4	YEAR 5
Native cover	50	65	80
Non-native cover	10	10	10
Target (noxious) weed cover*	0	0	0

*Invasive non-native plants targeted for complete eradication are listed in Section VI.A.3

Table 19
VEGETATIVE COVER SUCCESS CRITERIA
FOR SOUTHERN COASTAL SALT MARSH/BRACKISH
MARSH/CISMONTANE ALKALI MARSH RESTORATION AREAS
(percent)

VEGETATION TYPE	YEAR 3	YEAR 4	YEAR 5
Native cover	40	50	60
Non-native cover	10	10	10
Target (noxious) weed cover*	0	0	0

*Invasive non-native plants targeted for complete eradication are listed in Section VI.A.3

Non-native Plant Cover

Cover by non-native species in the restoration areas should not exceed 10 percent in any year of monitoring, including Years 1 and 2, while target weed species should be completely eradicated each year (listed in Section VI.A.3).

Invasive Plant Cover

At least 7 species are targeted for eradication within all restoration areas, including: giant reed, pampas grass, castor-bean, Mexican fan palm, Canary Island date palm, tamarisk, and Brazilian pepper tree. These species include the Cal-IPC High- or Moderate-rated species that have been observed, or have potential to occur, within the mitigation sites. Each year of the maintenance and monitoring period, the acceptable cover value for each of the targeted weed species will be zero. Additional species may be added to this list if found to be a threat to the long-term success of the mitigation effort.

Irrigation

To provide evidence that vegetation is self-sufficient, direct irrigation of the restoration areas must be shut off at least 2 years prior to the end of the maintenance/monitoring period.

B. ENHANCEMENT

There is no native cover success criterion for the enhancement areas since plantings are not required. In addition, there is no success criterion for non-native cover within the enhancement areas. However, with diligent maintenance efforts, non-native species cover should decrease to an acceptable level. Certain noxious weeds are targeted for complete eradication within the enhancement areas, including: giant reed, pampas grass, castor-bean, Mexican fan palm, Canary Island date palm, tamarisk, and Brazilian pepper tree. At the end of the 2-year maintenance and monitoring period, the acceptable cover value for each of the targeted (noxious) weed species will be zero. Additional species may be added to this list if found to be a threat to the long-term success of the mitigation effort.

IX. COMPLETION OF MITIGATION

A. NOTIFICATION OF COMPLETION

1. Restoration Areas

The Corps, CDFG, RWQCB, and City (SWD and MMC) will be notified of completion of the restoration effort through submittal of a final (Year 5) monitoring report.

2. Enhancement Areas

The Corps, CDFG, RWQCB, and City (SWD and MMC) will be notified of completion of the enhancement effort through submittal of a final (Year 2) monitoring report.

B. CONFIRMATION

If the restoration (5-year) or enhancement (2-year) mitigation effort meets all success standards at the end of the monitoring period or sooner, then the mitigation will be considered a success; if not, the maintenance and monitoring program will be extended until the standards are met. Specific remedial measures (approved by the Corps, CDFG, RWQCB, and City) will be used during any extension. Monitoring extensions will be done only for areas that fail to meet final success criteria. This process will continue until all standards are attained or until the Corps, CDFG, RWQCB, and City determine that other mitigation measures are appropriate. Should the mitigation effort meet all goals prior to the end of the monitoring period, the Corps, CDFG, RWQCB, and City, at their discretion, may terminate the monitoring effort. If requested, a site visit may be conducted with the Corps, CDFG, RWQCB, and City to verify site conditions.

X. CONTINGENCY MEASURES

A. INITIATING PROCEDURES

If the mitigation effort is not meeting success standards for the project, the SWD shall notify the Corps, CDFG, RWQCB, and City (SWD and MMC) and propose corrective measures.

B. ALTERNATIVE LOCATIONS FOR CONTINGENCY MITIGATION

Sufficient contingency mitigation areas may be present in some areas where mitigation is to occur. If the success criteria are not being met on site, the Corps, CDFG, RWQCB, and City will work together to reach an alternative mutually acceptable solution.

XI. LONG-TERM MANAGEMENT

This plan assumes that mitigation credits associated with restoration areas will remain valid so long as the mitigation site is properly revegetated with native species and is adequately maintained for the "life" of the mitigation credit that is being sought. Long-term management for restoration areas would be carried out by the City of San Diego under contract to a non-profit land conservancy.

XII. CERTIFICATION/QUALIFICATION

The following individuals contributed to the fieldwork and/or preparation of this report:

Tom Huffman	M.P.A., San Diego State University, 1994 B.S., Ecology, University of Arizona, 1978
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W. Larry Sward	M.S., Biology, San Diego State University, 1979 B.S., Biology, San Diego State University, 1975
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Sally Trnka	M.S., Biology, San Diego State University, 1998 B.S., Biological Sciences, University of California-Davis, 1992

*Primary report author

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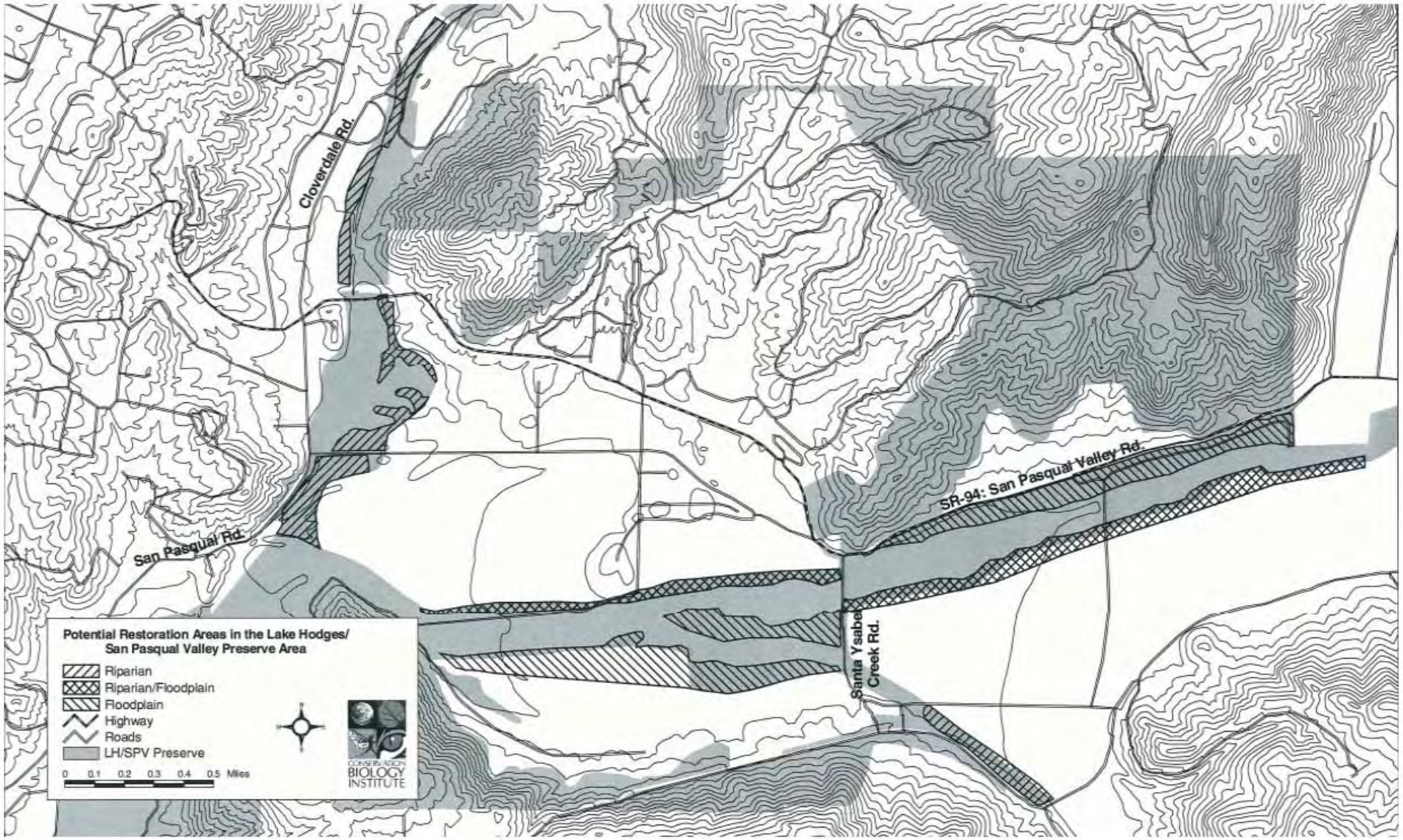
ATTACHMENTS



Source: Conservation Biology Institute (2003)

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Potential Restoration Areas in the Lake Hodges/San Pasqual Valley Area - San Dieguito HU

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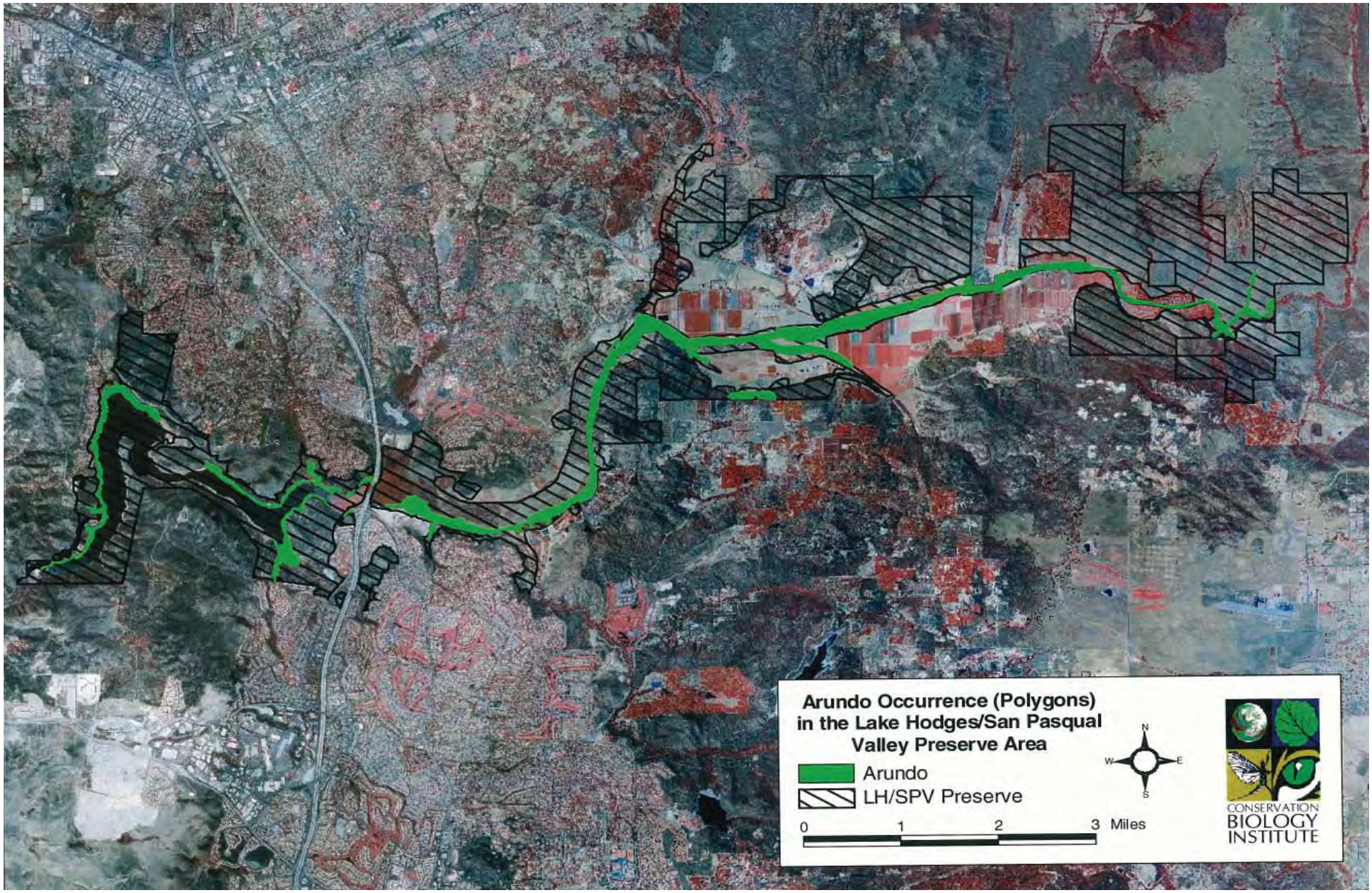
Attachment A1



Source: Conservation Biology Institute (2003)

I:\ArcGIS\S\SDM-01 StormDrainMaintenance\Map\BIO\Wetland Restoration\A1a_GiantReedLakeHodges.indd -NM

Giant Reed Occurrences in the Lake Hodges/San Pasqual Valley Area

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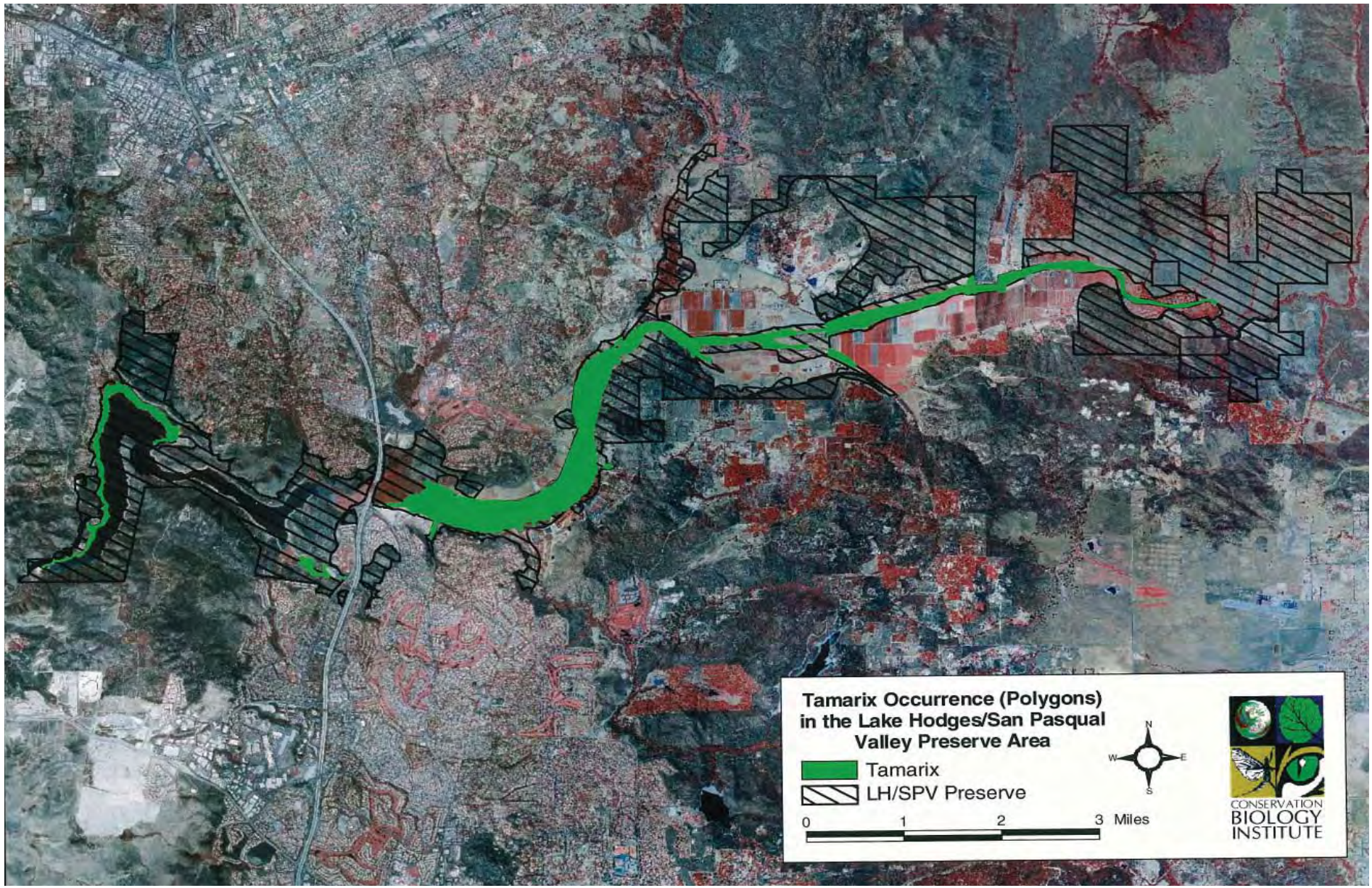
Attachment A-1a



Source: Conservation Biology Institute (2003)

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Tamarisk Occurrences in the Lake Hodges/San Pasqual Valley Area

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Attachment A-1b

Source: Merkel & Associates, Inc. (2004a)

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Peñasquitos Watershed Overview

CITY OF SAN DIEGO MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

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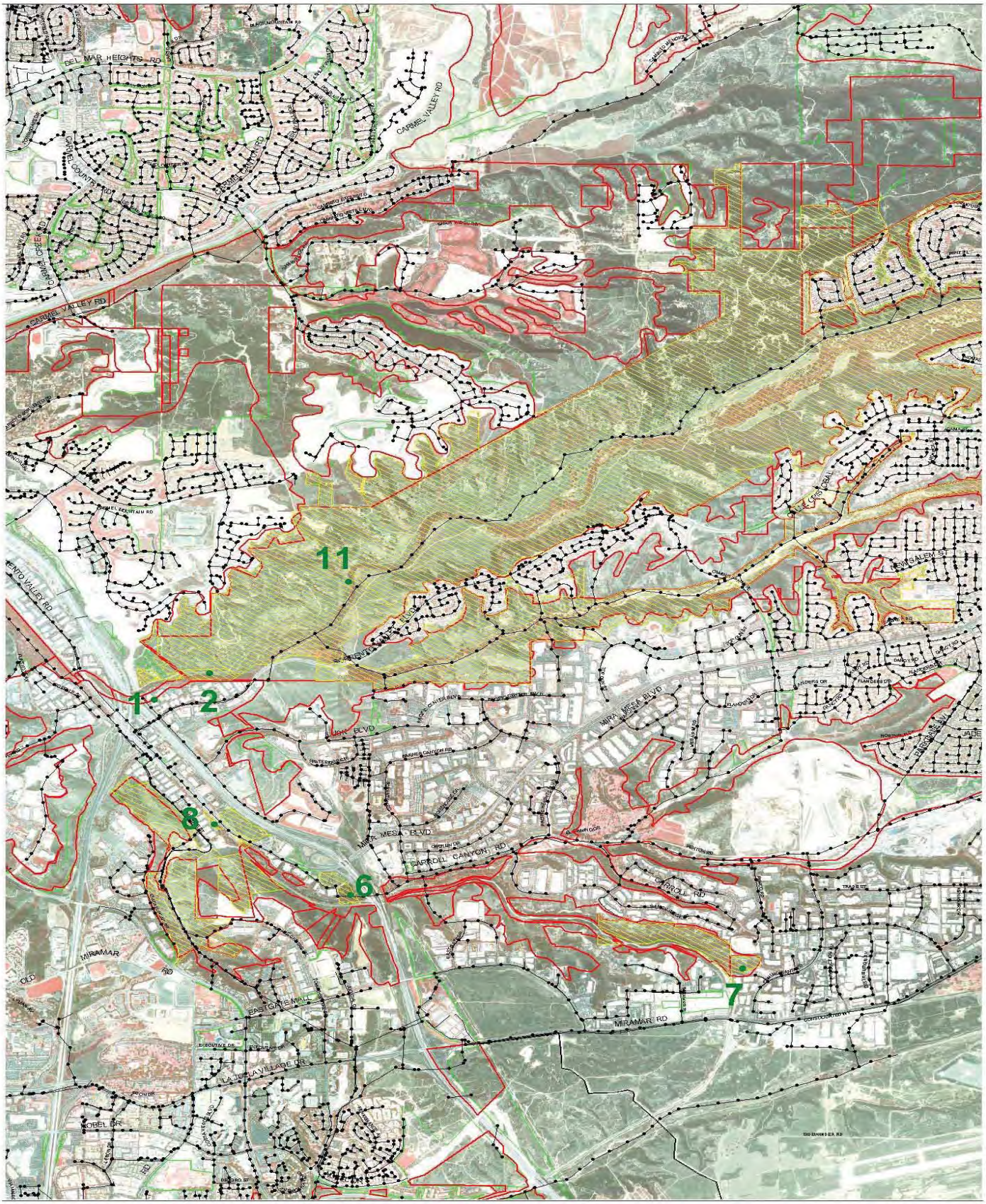
Attachment B-1



Source: Merkel & Associates, Inc. (2004a)

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Peñasquitos Watershed Northwest

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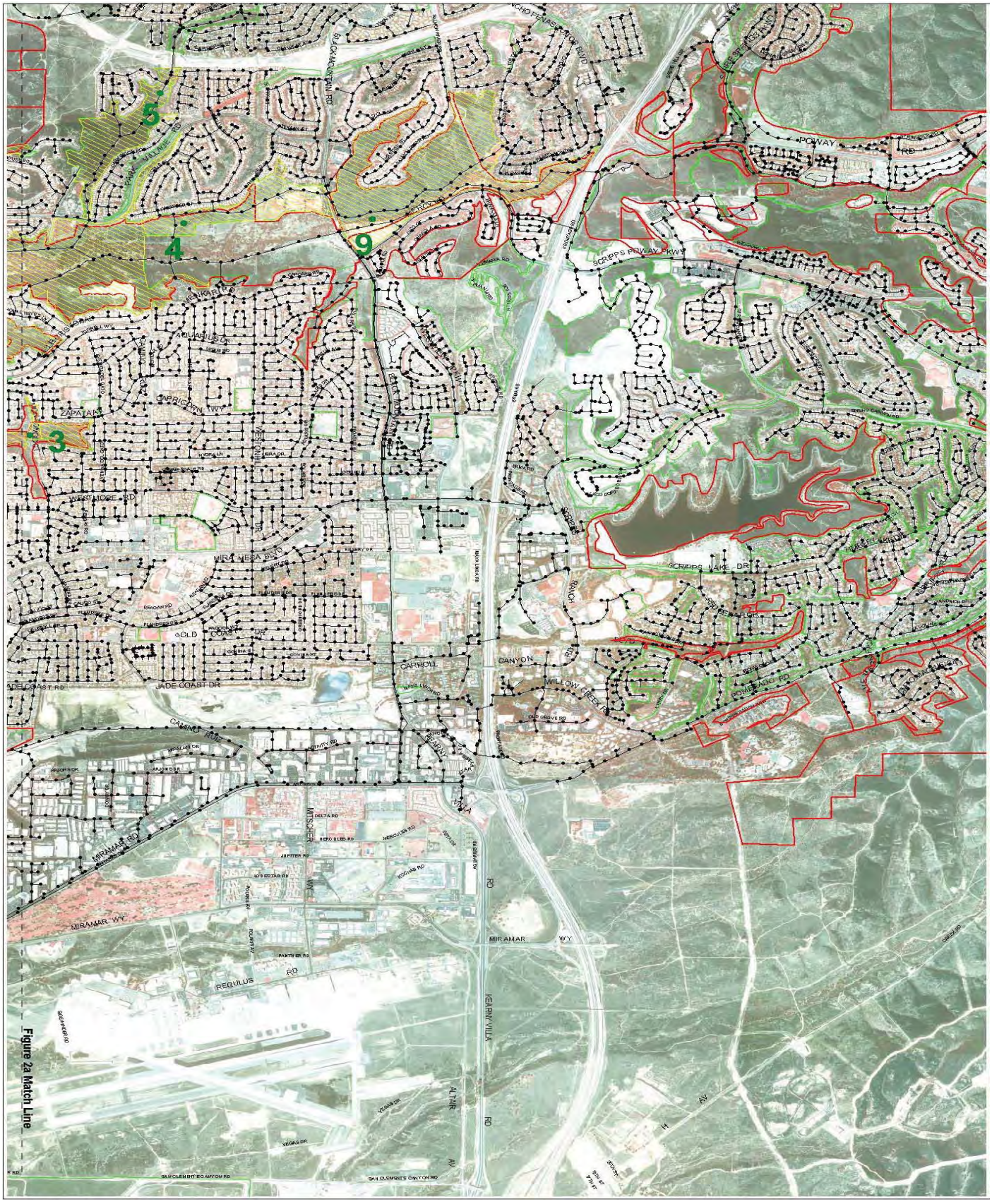
Attachment B-1a



Source: Merkel & Associates, Inc. (2004a)

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Peñasquitos Watershed Northeast

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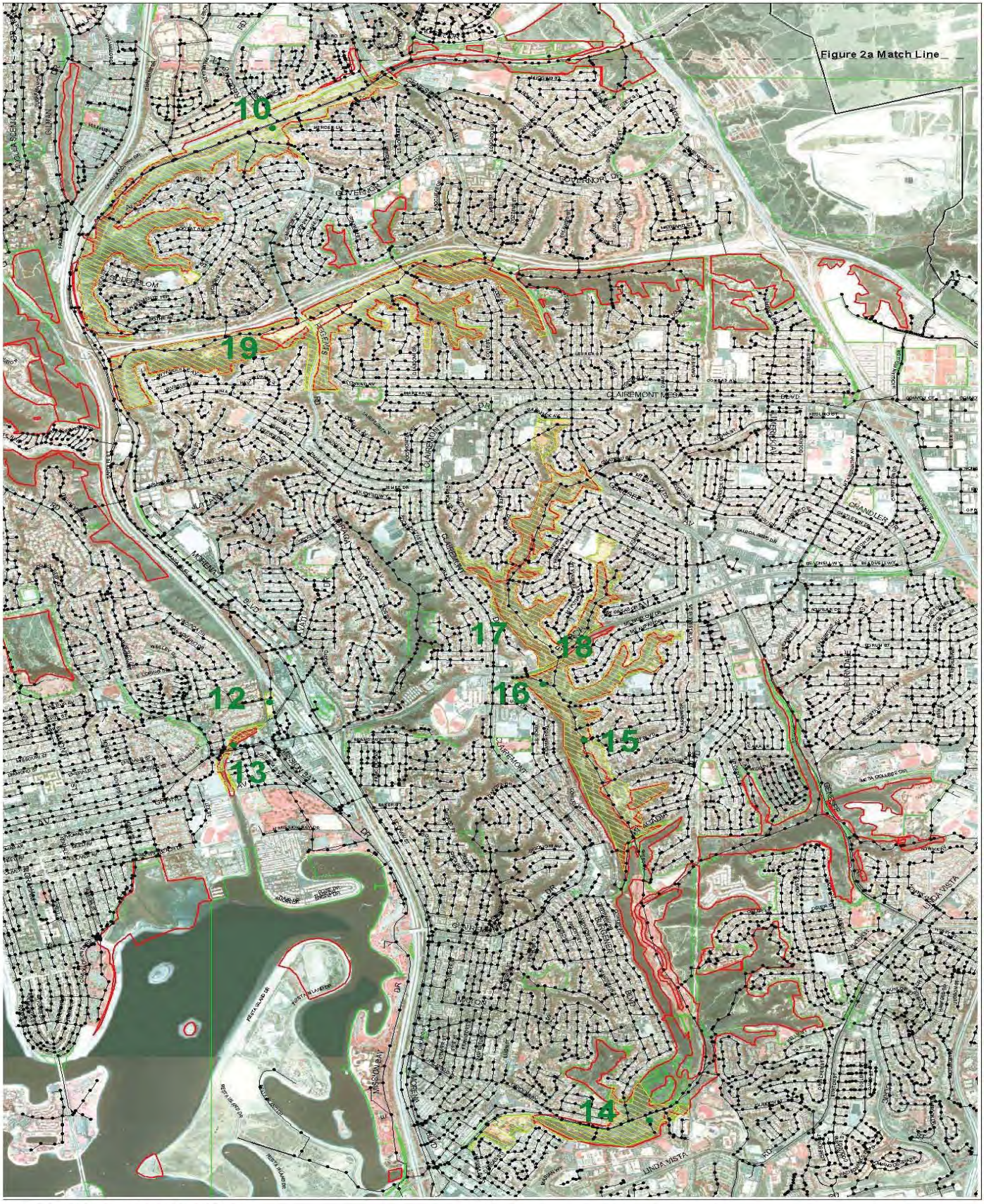
Attachment B-1b



Source: Merkel & Associates, Inc. (2004a)

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Peñasquitos Watershed South

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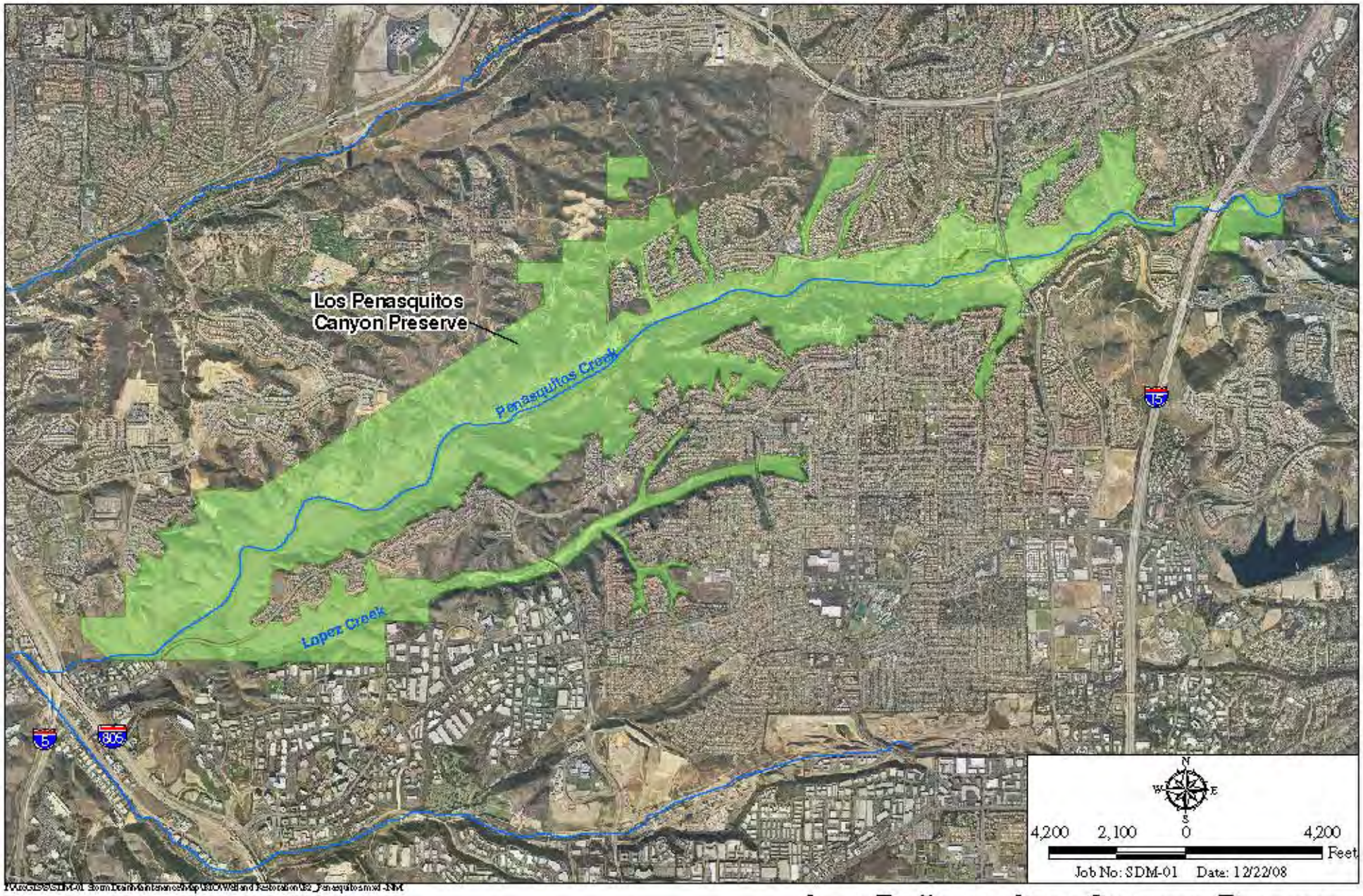
Attachment B-1c



Los Peñasquitos Canyon Preserve

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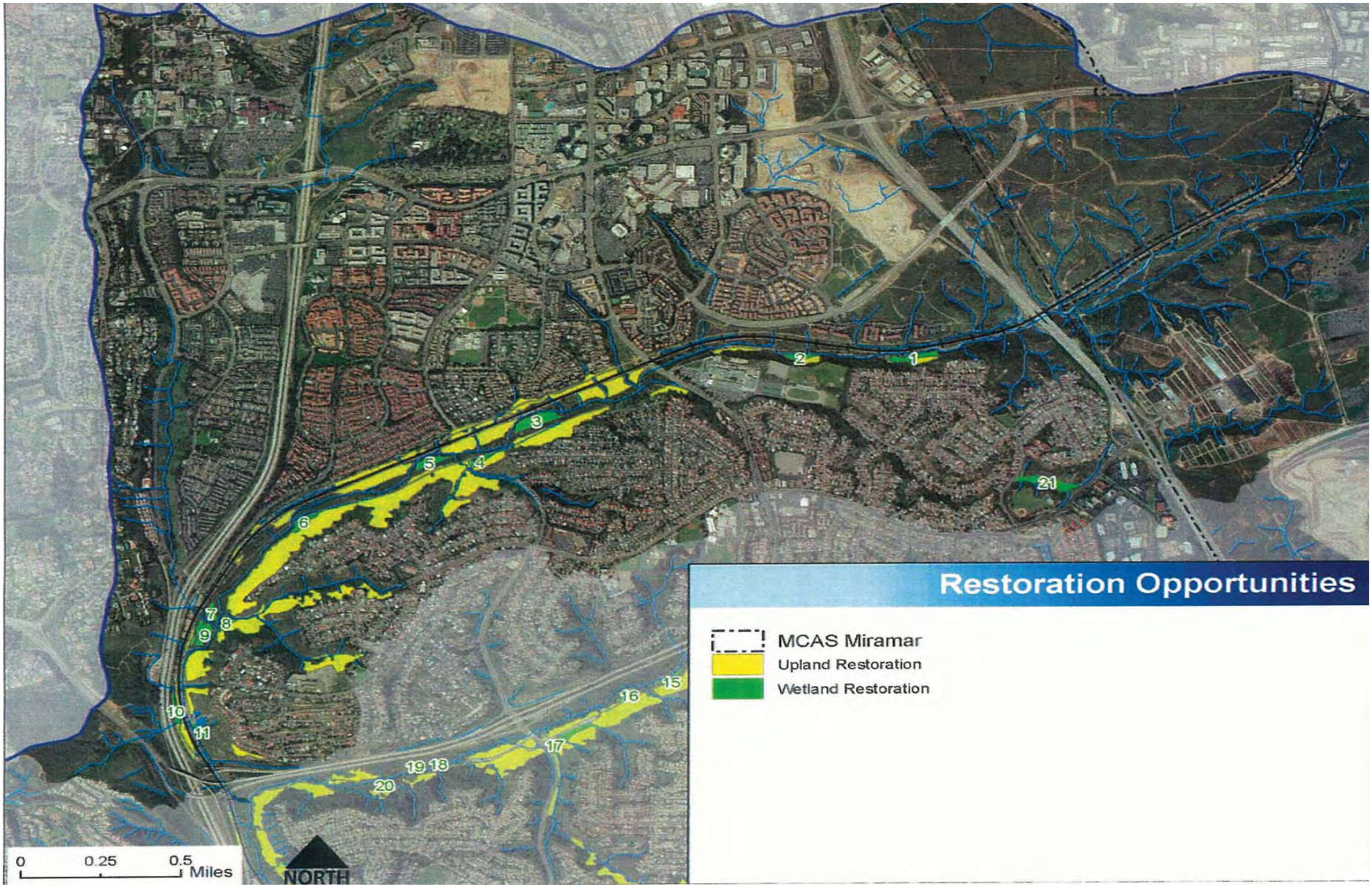
Attachment B-2



Source: KTU+A (2005)

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Upper Rose Canyon - Peñasquitos HU

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Attachment B-3

Source: KTU+A (2005)

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Upper San Clemente Canyon - Peñasquitos HU

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Attachment B-4

Tecolote Canyon Natural Park - Peñasquitos HU

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Attachment B-5

Source: San Diego River Conservancy (2008)

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Invasive Coverage Near Qualcomm Stadium - San Diego HU

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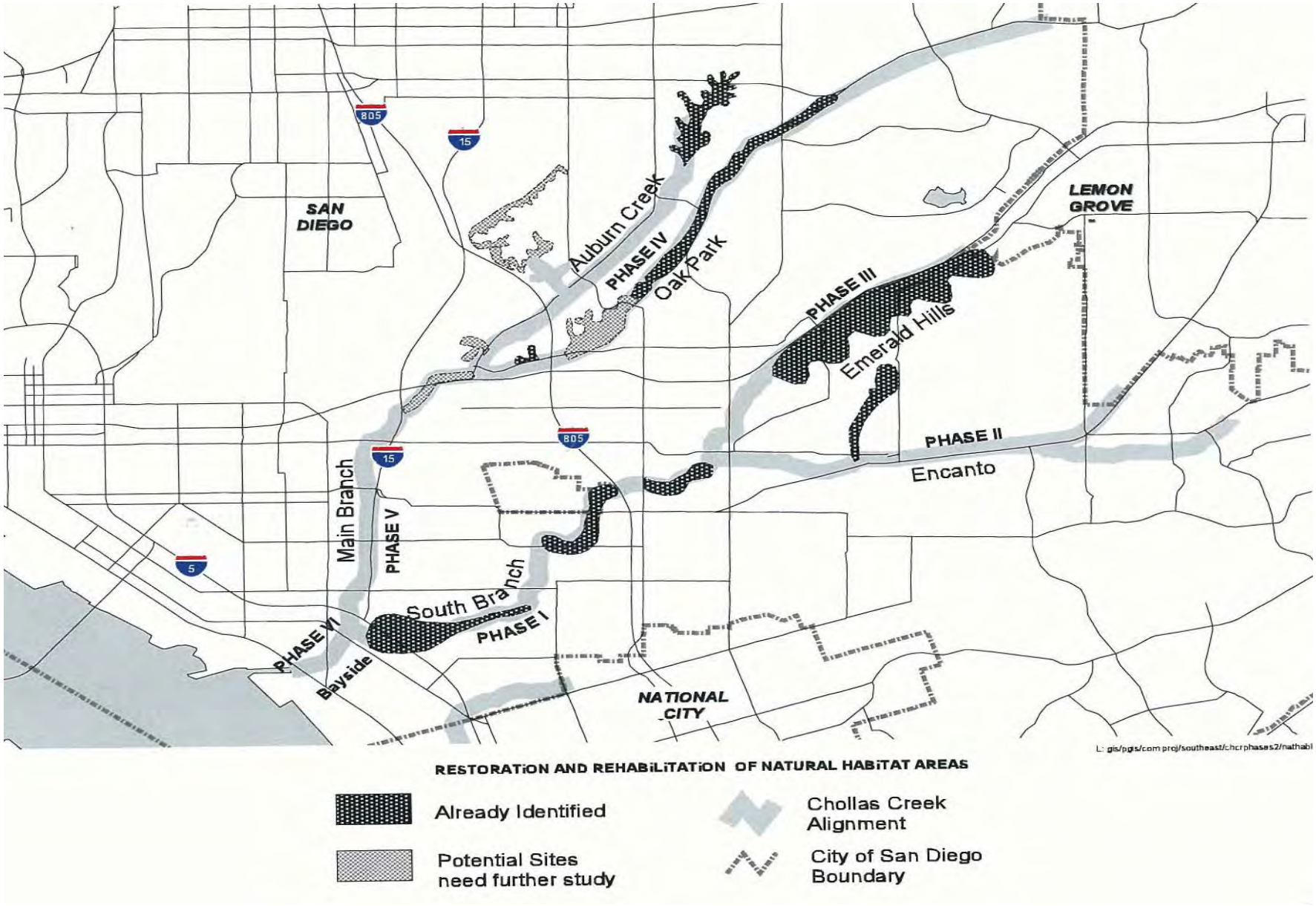
Attachment C-1



Source: City of San Diego (2002)

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Chollas Creek Enhancement Program - Pueblo HU

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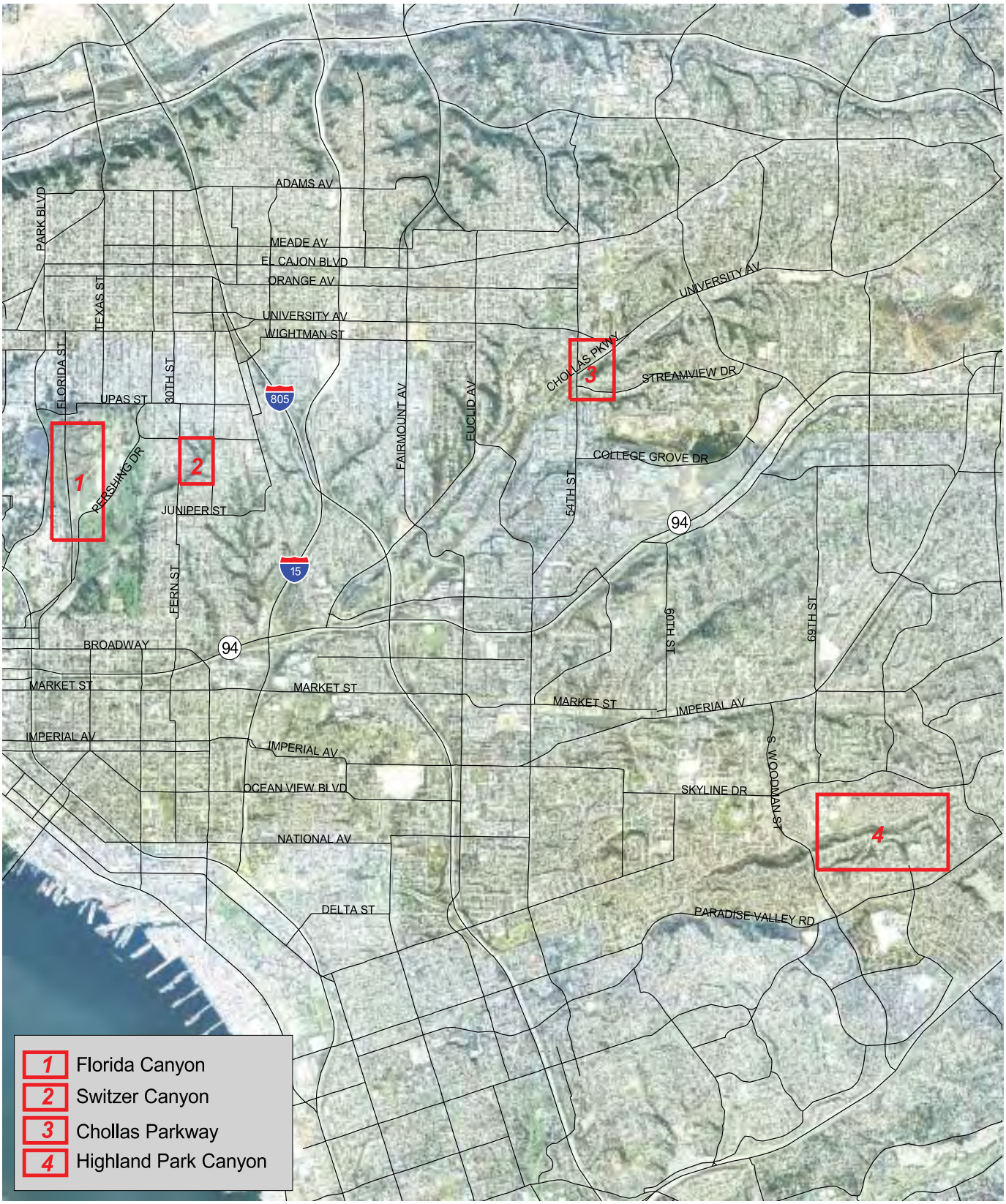
Attachment D-1



Source: Merkel & Associates, Inc. (2003)

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Pueblo Watershed Enhancement

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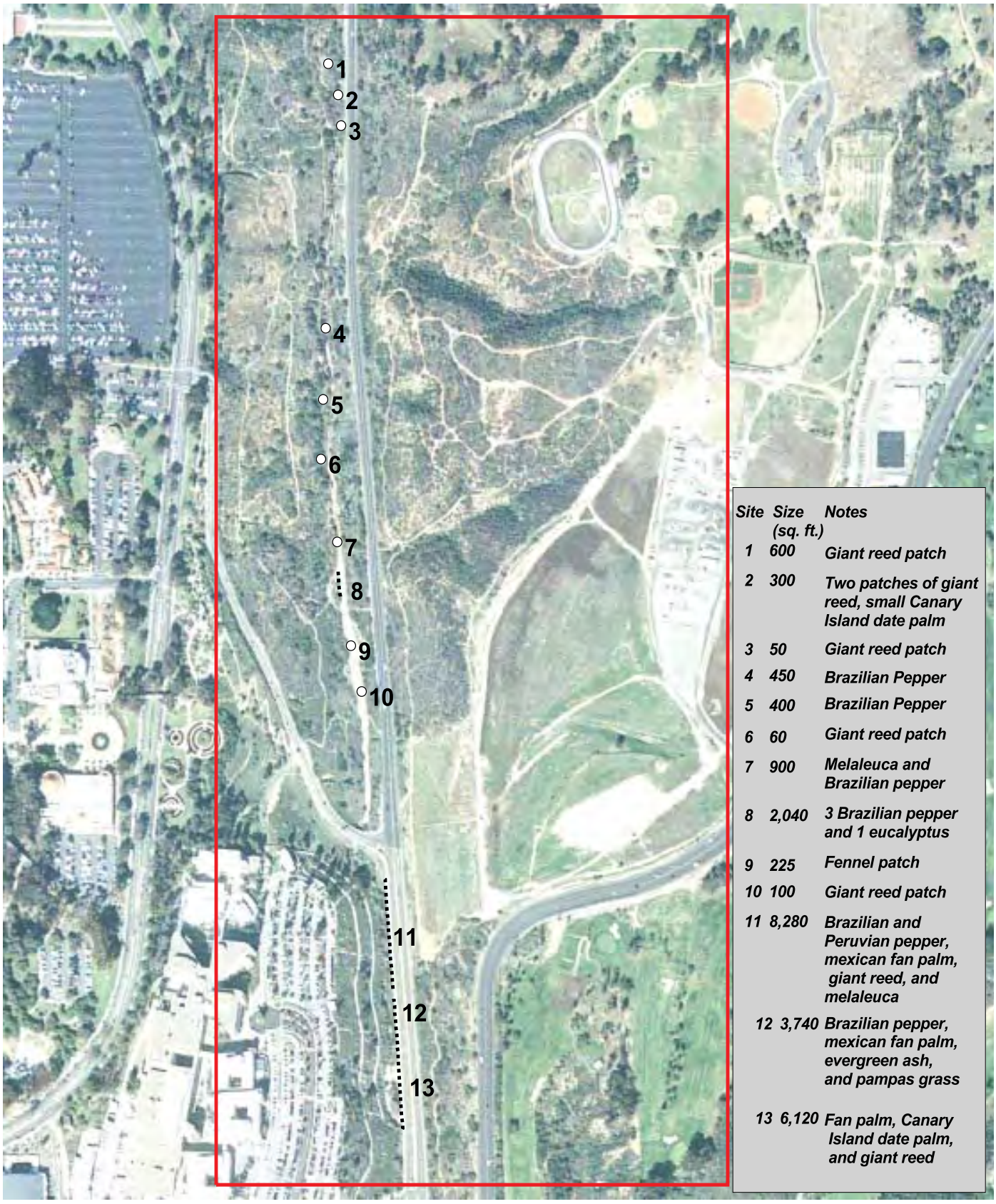
Attachment D-2



Site	Size (sq. ft.)	Notes
1	600	Giant reed patch
2	300	Two patches of giant reed, small Canary Island date palm
3	50	Giant reed patch
4	450	Brazilian Pepper
5	400	Brazilian Pepper
6	60	Giant reed patch
7	900	Melaleuca and Brazilian pepper
8	2,040	3 Brazilian pepper and 1 eucalyptus
9	225	Fennel patch
10	100	Giant reed patch
11	8,280	Brazilian and Peruvian pepper, mexican fan palm, giant reed, and melaleuca
12	3,740	Brazilian pepper, mexican fan palm, evergreen ash, and pampas grass
13	6,120	Fan palm, Canary Island date palm, and giant reed

Source: Merkel & Associates, Inc. (2003)

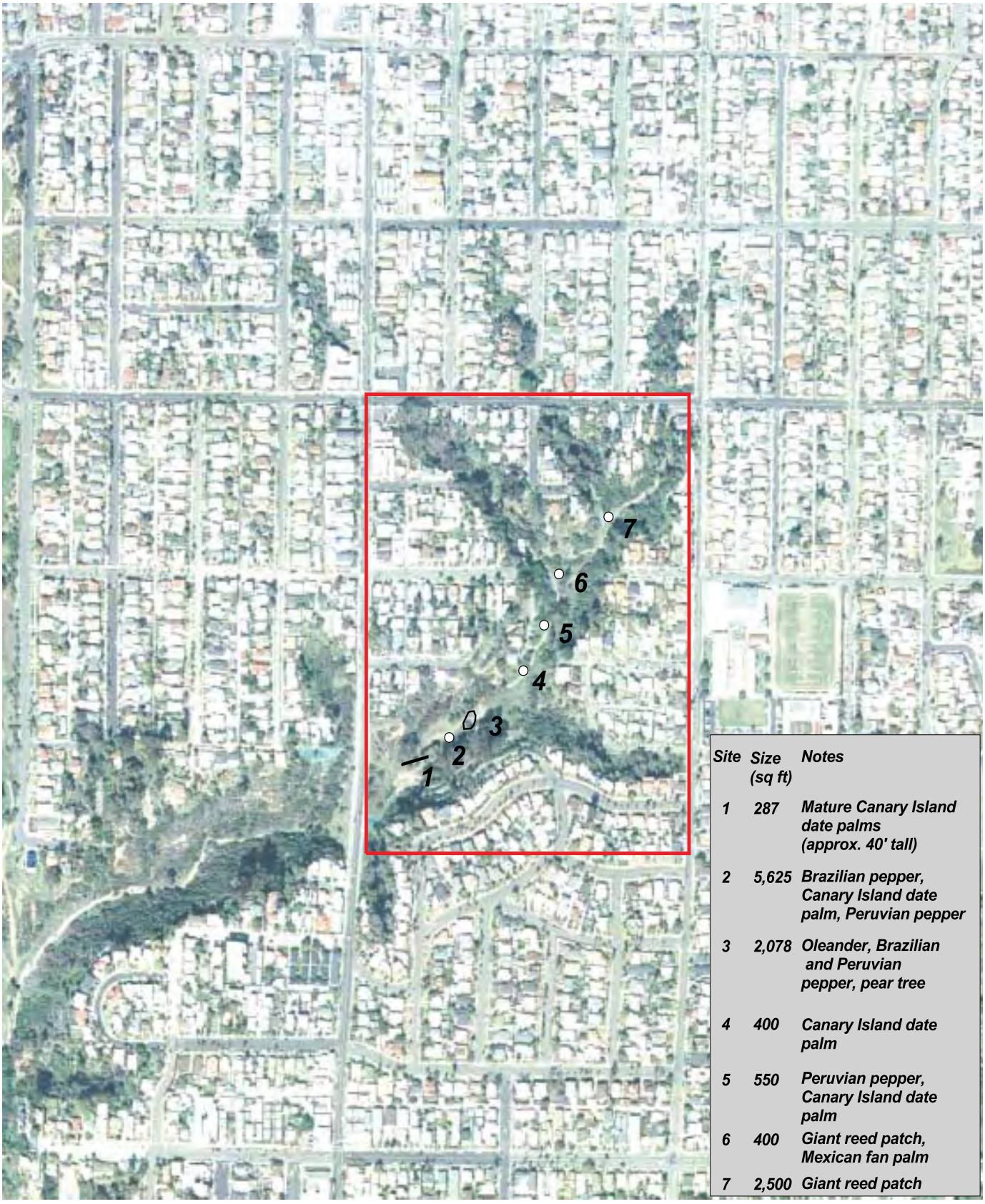
I:\ArcGIS\S\SDM-01 StormDrainMaintenance\Map\BIO\Wetland Restoration\D2a_FloridaCyn.indd -NM

Florida Canyon-Pueblo HU

CITY OF SAN DIEGO MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

HELIX

Attachment D-2a



Site	Size (sq ft)	Notes
1	287	Mature Canary Island date palms (approx. 40' tall)
2	5,625	Brazilian pepper, Canary Island date palm, Peruvian pepper
3	2,078	Oleander, Brazilian and Peruvian pepper, pear tree
4	400	Canary Island date palm
5	550	Peruvian pepper, Canary Island date palm
6	400	Giant reed patch, Mexican fan palm
7	2,500	Giant reed patch

Source: Merkel & Associates, Inc. (2003)

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Switzer Canyon-Pueblo HU

CITY OF SAN DIEGO MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

HELIX

Attachment D-2b

Site	Size (sq. ft.)	Notes
1	72,085	Brazilian and Peruvian pepper, Canary Island date palm, Mexican fan palm

Source: Merkel & Associates, Inc. (2003)

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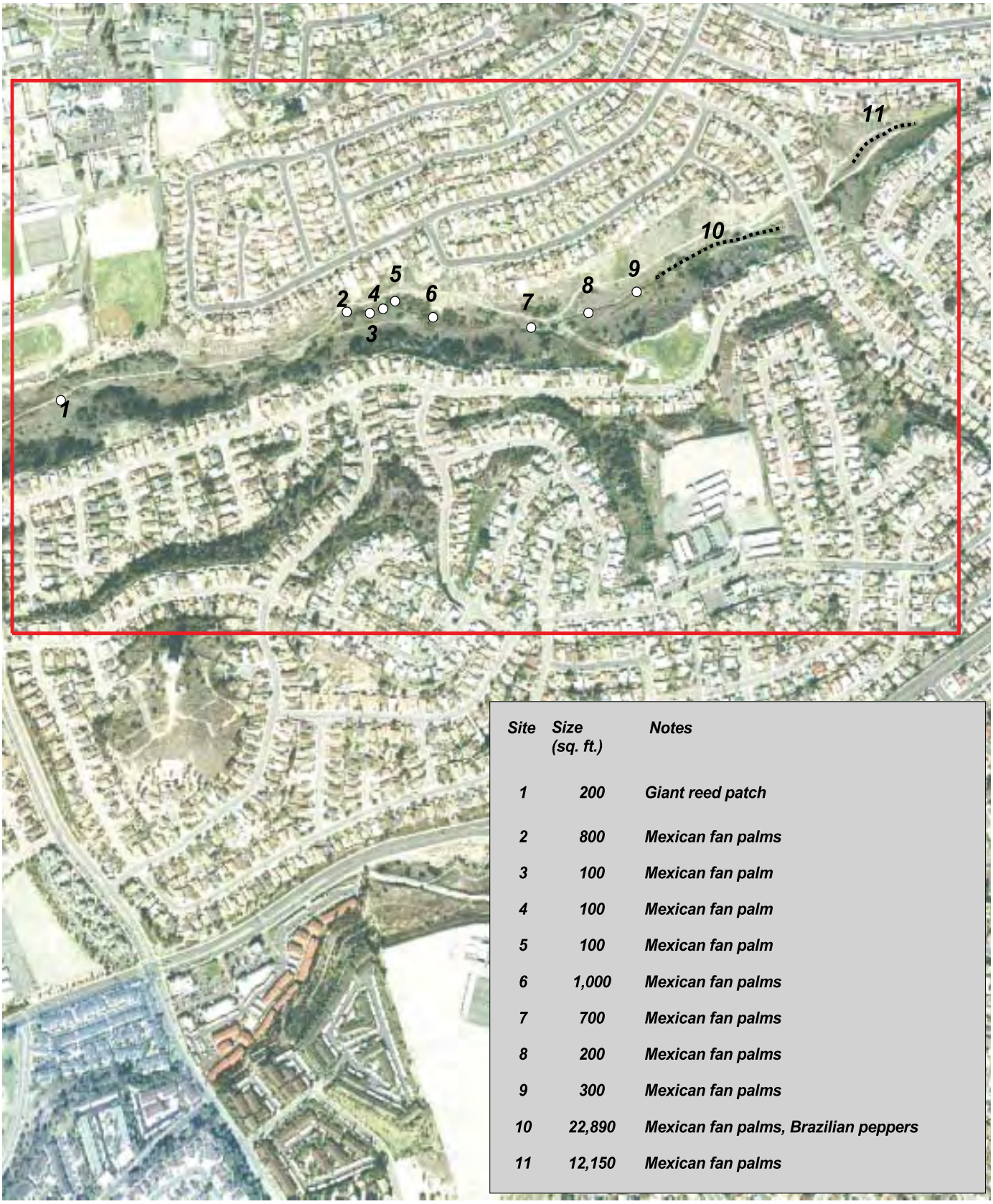
Chollas Parkway-Pueblo HU

CITY OF SAN DIEGO MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

HELIX

Attachment D-2c



Site	Size (sq. ft.)	Notes
1	200	Giant reed patch
2	800	Mexican fan palms
3	100	Mexican fan palm
4	100	Mexican fan palm
5	100	Mexican fan palm
6	1,000	Mexican fan palms
7	700	Mexican fan palms
8	200	Mexican fan palms
9	300	Mexican fan palms
10	22,890	Mexican fan palms, Brazilian peppers
11	12,150	Mexican fan palms

Source: Merkel & Associates, Inc. (2003)

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Highland Park Canyon-Pueblo HU

CITY OF SAN DIEGO MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

HELIX

Attachment D-2d

Mitigation for all In-Kind Impacts

All In-Kind Mitigation beyond In-Watershed Replacement*

*In-Watershed Replacement is:
2:1 for Riparian Habitat
1:1 for other In-Kind Habitats

TYPES OF MITIGATION:
Corps Jurisdictional Freshwater Wetlands/Waters of the U.S.
Corps Jurisdictional Riparian Habitat
Corps Jurisdictional Ephemeral/Intermittent Wetlands/Waters
Corps Jursidictional Enhancement Credits (for temporary impacts)
Non-Corps Jurisdictional Oak/Riparian Habitat
Least Bell's Vireo Habitat

N
W E
S

5 0 5 Miles

Rancho Jamul Mitigation Bank Restoration and Management Plan

Wildlands, Inc.

Source: Wildlands, Inc.

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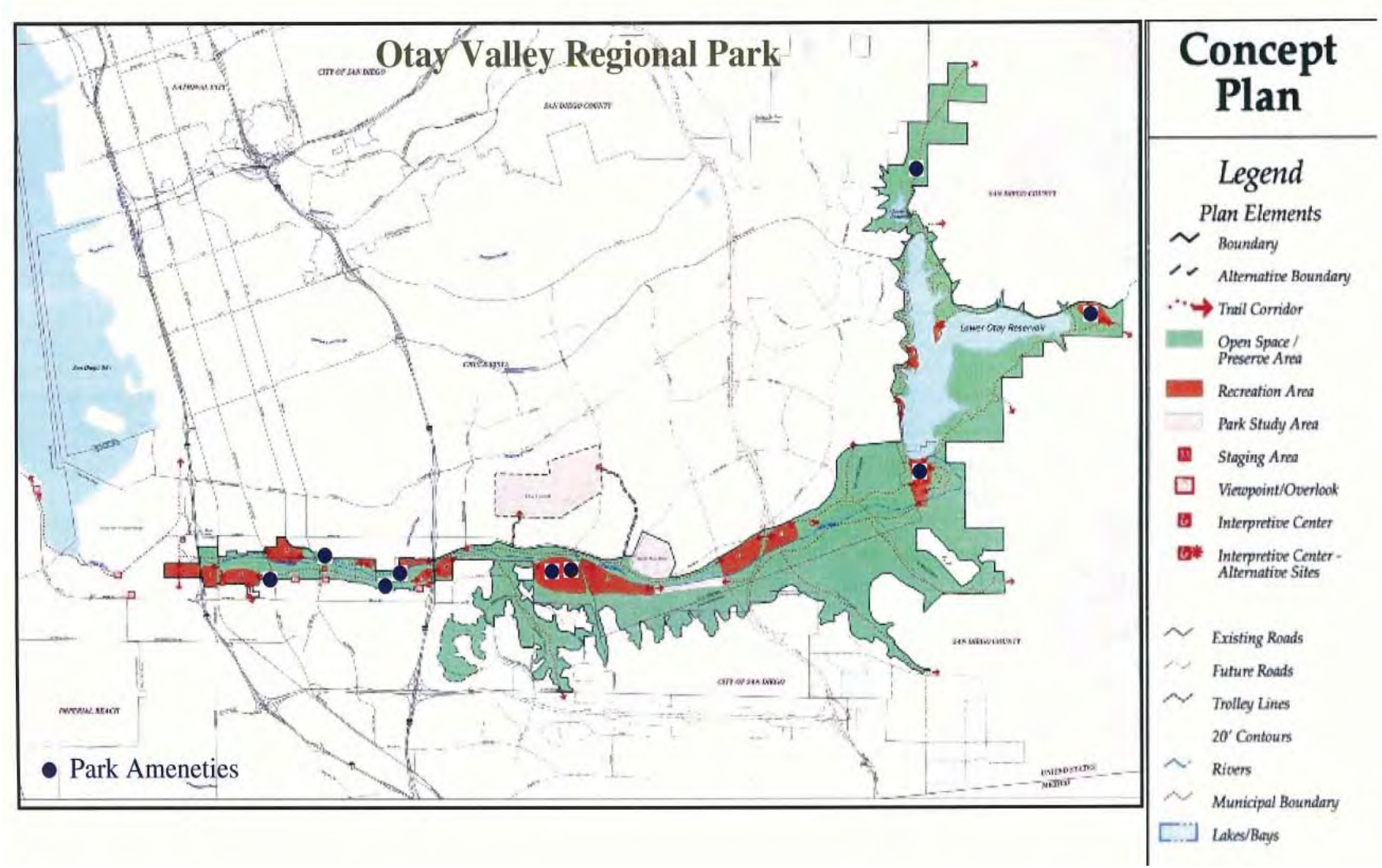
Rancho Jamul Mitigation Bank - Otay HU

CITY OF SAN DIEGO MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

HELIX

Figure E-1



Source: City of San Diego (1999)

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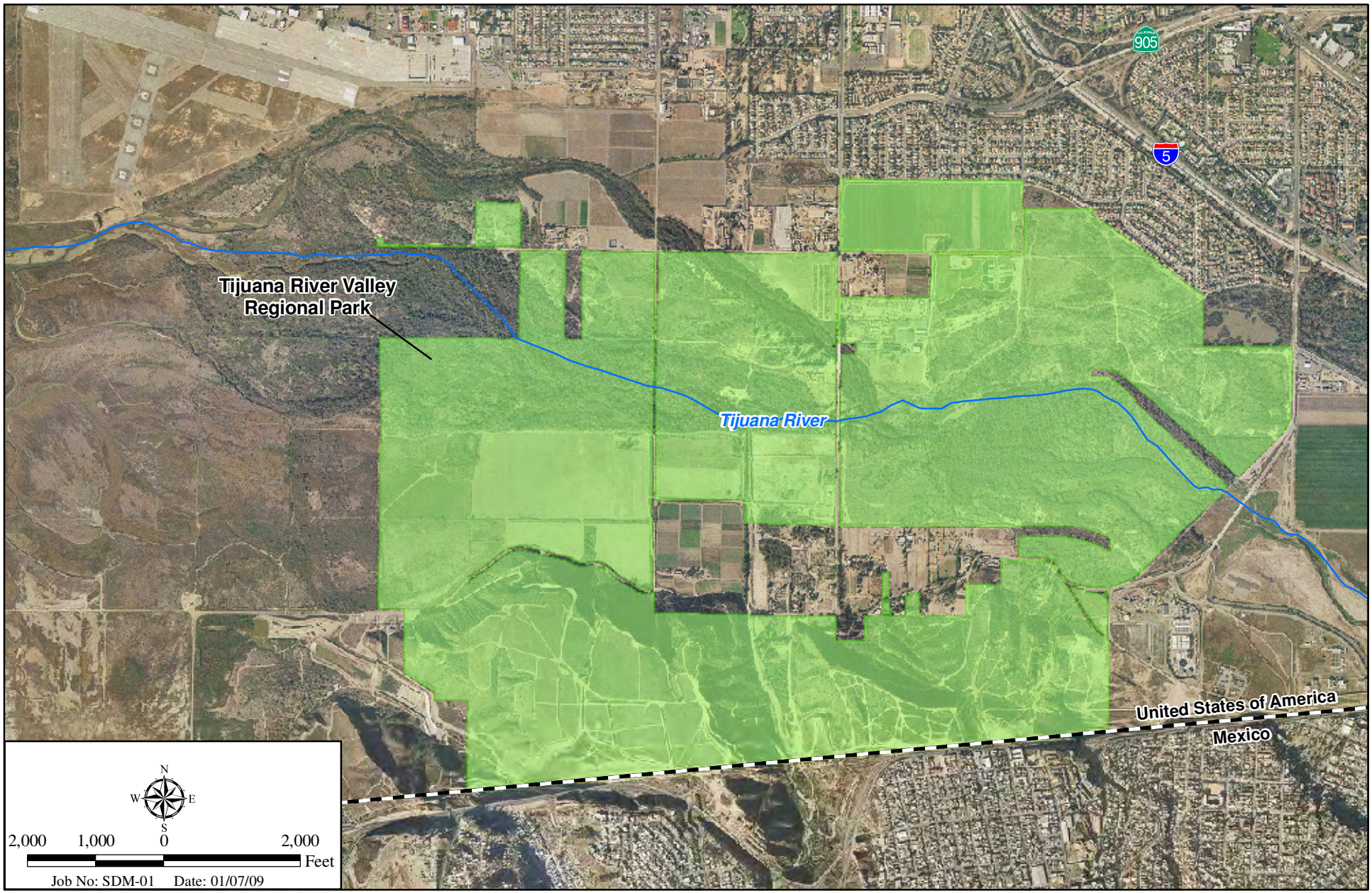
Otay Valley Regional Park - Otay HU

CITY OF SAN DIEGO MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

HELIX

Attachment E-2



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Tijuana River Valley Regional Park

CITY OF SAN DIEGO MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

HELIX

Attachment F-1