Otay River Restoration Project Final Habitat Mitigation and Monitoring Plan (HMMP)

U.S. Army Corps of Engineers Permit File Numbers:
Proposed Permittee Responsible Mitigation for Pending Villages:

- **Village 3: SPL-2012-00181-MBS**
- **Village 8W: SPL-2013-00495-SAS**

Proposed Advanced Permittee Responsible Mitigation For:

- **Villages 2, 8 East, 9 and 10**
- **Otay River Valley Regional Park**
- **City of Chula Vista University Project**

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Acronyms and Abbreviations

AA	Assessment Area
BMPs	best management practices
Cal-IPC	California Invasive Plant Council
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
cfs	cubic feet per second
City	City of Chula Vista
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRAM	California Rapid Assessment Method
GIS	geographic information systems
GPS	Global Positioning System
Guide	*Interagency Regulatory Guide for Advance Permittee-Responsible Mitigation*
HEC-HMS	Hydrologic Engineering Center-Hydrologic Modeling System
HMMP	Habitat Mitigation and Monitoring Plan
ICF	ICF International
MBTA	Migratory Bird Treaty Act
MRZ	Mineral Resource Zone
NWP	Nationwide Permit
OHWM	ordinary high water mark
OLC	Otay Land Company
ORWMP	Otay River Watershed Management Plan
OVRP	Otay Valley Regional Park
OWD	Otay Water District
PAR	Property Analysis Record
PEP	plant establishment period
plan	Habitat Mitigation and Monitoring Plan
PLS	pure live seed
POM	Preserve Owner/Manager
Quino	Quino checkerspot butterfly
RMP	Otay Ranch Resource Management Plan
RWQCB	Regional Water Quality Control Board
SAMP	Special Area Management Plan
SANDAG	San Diego Association of Governments
SDG&E	San Diego Gas and Electric
SPD	South Pacific Division
SWPPP	Storm Water Pollution Prevention Plan
University	City of Chula Vista University project
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
Village 8	Otay Ranch Village 8 West

Village 9	Ranch Village 9
WMP	Watershed Management Plan

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Chapter 1
Project Description

1.1 Guidelines

The document has been prepared to be consistent with the following regulatory and local guidelines:

- EPA and USACE Compensatory Mitigation for Losses of Aquatic Resources ("Mitigation Rule")[1] (April 2008). The Mitigation Rule establishes regulations governing compensatory mitigation for activities authorized by permits issued by the Department of the Army. The rule improves the level of planning, implementation and management of compensatory mitigation sites and provides guidance on site identification (use of the watershed approach), ecological performance standards, monitoring and monitoring periods. ***ICF has designed the Otay River Restoration Project to meet and exceed these standards by choosing a location as far up in the lower Otay watershed as possible and including further protection by conducting invasive species management in the reaches upstream and owned by other local jurisdictions. In addition, the site is within dedicated open space, but has been historically disturbed and is subsequently lacking high quality resources, including limited jurisdictional waters and wetlands. The site is ideal for re-establishment of aquatic and upland resources and is expected to quickly support sensitive flora and fauna that occur in other areas of the watershed that are more intact.***

- *Interagency Regulatory Guide for Advance Permittee-Responsible Mitigation* by the USACE Seattle District[2] (Guide) (Appendix A; USACE 2012). The Guide is intended to provide assistance to applicants proposing to establish mitigation in advance of permitted impacts pursuant to Section 404 of the Clean Water Act. Otay Land Company is requesting that USACE utilize this guidance to authorize this Habitat Mitigation and Monitoring Plan (HMMP) to address compensatory mitigation for unavoidable impacts on jurisdictional waters and wetlands associated with the Otay Ranch University Villages (Villages 2, 3, 4, 8 East, 8 West, 9, and 10), the Otay River Valley Regional Park, and the City of Chula Vista University Project. ***Currently, specific permittee-responsible compensatory mitigation for Villages 3 and 8 West has been identified in this HMMP as Phase 1 and 2 of the overall mitigation program. It is anticipated that after the remaining villages have demonstrated avoidance and minimization of waters and wetlands, that this site would also provide advanced compensatory mitigation in subsequent phases for unavoidable impacts when authorized by project-specific permits.***

[1] *The Compensatory Mitigation for Losses of Aquatic Resources*, Federal Register Department of Defense 33 CFR Parts 325 and 332 and Environmental Protection Agency 40 CFR Part 230, April 2008

[2] *Interagency Regulatory Guide Advance Permittee-Responsible Mitigation*, U.S. Army Corps of Engineers, Washington State Department of Ecology, and Washington State Department of Fish and Wildlife, December 2012, Ecology Publication No. 12-06-015.

- Regional Compensatory Mitigation and Monitoring Guidelines for South Pacific Division (SPD; 2015)[3]. These guidelines help to implement the Mitigation Rule for the region by reiterating the important sections, definitions, and requirements of the Mitigation Rule. Further, the guidelines describe local requirements and tools, provide a higher level of detail on design parameters such as hydrologic analysis and soils, and provides other recommendations for meeting the requirements in the Mitigation Rule through successful implementation, monitoring, and adaptive management planning.

- 12505-SPD Regulatory Program Uniform Performance Standards for Compensatory Mitigation Requirements (USACE 2014), which outlines the procedure for use of uniform performance standards associated with permittee-responsible compensatory mitigation requirements as required for processing of Department of the Army permits under Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act.

- Over the past decade, two key documents have been created for the Otay River Watershed: the *Otay River Watershed Management Plan* (WMP) and the *Special Area Management Plan* (SAMP) (Jones and Stokes 2006), which ran out of funding before completion (Aspen 2007). The County of San Diego, with partial funding from a Proposition 13 grant, prepared the WMP in collaboration with the U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife (CDFW), City of Chula Vista, the City of Imperial Beach, and the Port of San Diego, and it was adopted in 2006. Together these two documents provide a framework program that is consistent with the local General Plans (County and City), the San Diego RWQCB National Pollutant Discharge Elimination System Permit, and the County of San Diego Multi-Species Conservation Plan (MSCP). They also represent a proactive watershed planning and permitting approach that identified the areas within the watershed of "low value" that are more suitable for development and areas of "high value" that should be protected. The WMP includes implementation strategy to ensure the protection of existing beneficial uses and natural resources, including methods to monitor, maintain, and/or enhance existing water quality levels using non-structural and structural best management practices (BMPs). In addition, recommendations for appropriate aquatic resource enhancement and monitoring programs are provided.

  SAMPs are intended to strike a balance between aquatic resources and reasonable economic development and uses in the watershed or region in which they are developed. The County of San Diego, Department of Planning and Land Use, was working with USACE (federal sponsoring agency) and the CDFW to prepare the SAMP and provide a comprehensive planning instrument to serve as a basis for development of a programmatic permitting mechanism for unavoidable impacts within the watershed. USACE lost funding for this program in 2008, but was anticipated to restart in 2015.

- In 1997 the Otay Valley Regional Park (OVRP) Concept Plan was released. The OVRP Concept Plan was the result of a multi-jurisdictional planning effort in the Otay River Valley by the County of San Diego and the cities of Chula Vista and San Diego. The Concept Plan proposed a boundary for the OVRP that includes this restoration plan boundary. The OVRP Concept Plan

[3] Final 2015 Regional Compensatory Mitigation and Monitoring Guidelines for South Pacific Division (2015). http://www.spd.usace.army.mil/Missions/Regulatory/PublicNoticesandReferences/tabid/10390/Article/558934/final-regional-compensatory-mitigation-and-monitoring-guidelines.aspx

also included recommendations for open space/core preserve areas, recreation areas, trail corridors, staging areas, viewpoint and overlook areas, and interpretive centers. Although this restoration project was not designed to specifically include components of the OVRP Concept Plan, it does not preclude any of these elements. The restoration project has identified trail corridors in compliance with the OVRP Concept Plan and would implement trail improvements to a portion of the existing dirt roads and existing unofficial trails within the City parcel both through and adjacent to the restoration project area. These improvements include installing wood split-rail fencing, trail signage, and educational kiosks, which all serve to designate the roads and trails and to protect the restoration site from existing uses. Two existing road crossings through the restoration project area running north-to-south have been identified as necessary for property access by U.S. Border Patrol, San Diego Gas and Electric (SDG&E), Otay Water District (OWD), and the City of Chula Vista. These crossings also overlap with OVRP trail corridors. These road and trail crossings have been designed as part of the restoration project to be at-grade and will be protected using native rock to minimize erosion and maintenance while allowing for unobstructed hydrology and sediment transport. Any other improvements to the roads and trails or other OVRP recreational facilities planned in the river valley would be evaluated under separate regulatory processes including subsequent environmental review and resource permitting if necessary.

The proposed project would be consistent with OVRP goals and policies to site and develop park features and facilities consistent with the requirements and guidelines of the MSCP and all federal, state, and local policies; encourage recreational uses as buffers between the Open Space/Core Preserve Area and new private development; and encourage development standards for roads across the Otay River to minimize impacts on habitat and wildlife movement as well as trail connectivity. The proposed project would also comply with the OVRP Trail Guidelines for education, design and layout, erosion control, signage, fencing, and educational kiosks. The intent of the restoration project is to ensure the OVRP Concept Plan is accommodated, including additional recreational facilities outside of the restoration project area, but on the city of Chula Vista property. This restoration project is not intended to restrict trail development or use as long as it's done to minimize (to the extent practicable) impacts on aquatic resources and other protected habitats.

- The City of Chula Vista Greenbelt Master Plan provides guidance and continuity for planning open space and constructing and maintaining trails that encircle the City of Chula Vista. The plan's primary purpose is to provide goals and policies, trail design standards, and implementation tools that guide the creation of the Greenbelt system. The Greenbelt system is composed of a series of open space segments connected by a multi-use trail extending through each segment; from the channelized Sweetwater River, along golf courses and banks of the Otay Lakes, following the Otay River valley to the Chula Vista Bayfront. The restoration project would implement minor improvements to a portion of the existing dirt road/trail identified within the Otay Valley Regional Park East/Otay Ranch Village Greenway Segments. The proposed project would be consistent with goals and policies to provide connected open space areas around the City of Chula Vista to enhance and protect native biological and sensitive habitats as well as establish a greenbelt system that ensures public access utilizing existing fire roads, access roads, and/or utility easements for the trail system when possible and limit the use of multi-use trails to non-motorized uses except for motorized wheelchairs, and utility, maintenance, and emergency vehicles. The restoration project would also comply with greenbelt design standards for trail signage, educational kiosks, and wood split-rail fencing. The intent of the restoration

project is to ensure the Greenbelt trail is accommodated by identification of a realistic corridor, installation of trail signage, split-rail fencing, and educational kiosks while avoiding any sensitive resources. The existing roads and trails will be moved or modified as needed to avoid road ponds, protect the San Diego fairy shrimp, and the restoration area. The restoration project does not preclude the future implementation of new or upgraded trail facilities identified in the City of Chula Vista Greenbelt Master Plan on the property. Additional trail amenities, if needed, would be evaluated and approved through a subsequent environmental review, if necessary, and associated permitting process if needed.

1.2 Project Summary

This Habitat Mitigation and Monitoring Plan (HMMP or plan) provides direction for implementing a program to restore hydrologic and sediment transport processes and native habitats in the Otay River Valley on the City of Chula Vista parcel. This HMMP was prepared by ICF International (ICF) staff serving as consultants to the Otay Land Company (OLC), a subsidiary of HomeFed Corporation. The representative contacts at ICF are Michelle Mattson, Southern California Natural Resources Team Manager and Lindsay Teunis, Restoration Team Manager. The HMMP is intended for use as compensatory mitigation for unavoidable impacts on jurisdictional waters of the U.S., waters of the State, and associated habitats due to the implementation of the Otay Ranch University Villages. At this time, two projects for mixed-use private developments are under review by the regulatory agencies (Otay Ranch Village 3 and Otay Ranch Village 8 West). In addition, this HMMP has been designed to comprehensively cover the unavoidable impacts associated with Villages 2, 8 East, 9, and 10, as well as Otay River Valley Regional Park and the City of Chula Vista University Project pending future site-specific authorizations by the regulatory agencies.

All proposed projects and the mitigation site proposed in this HMMP are in the City of Chula Vista (City) and within the Otay River Watershed (Figure 1-1). A geographic service area (Figure 1-2) of the lower Otay River sub-basin that incorporates the areas of future projects will be used to determine a project's eligibility to mitigate at the proposed mitigation site

The Otay Ranch Village 3 and 8 West project sites are on the U.S. Geological Survey (USGS) 7.5' series Otay Mesa Quadrangle and are within the southeast quadrant of the Otay Ranch neighborhood in the City of Chula Vista. The Village 8 West site occupies approximately 300.3 acres. Surrounding land uses include private residence developments and agricultural lands to the north, State Route 125 and agricultural lands to the west, and the Otay River Valley to the south. Village 3 site is approximately 436 acres and surrounding land uses include the Otay landfill to the north, Wolf Canyon to the east, existing industrial uses to the west, and Otay River Valley and Otay Valley Regional Park to the south.

The Village 8 West development consists of the Village 8 West Sectional Planning Area plan and Tentative Map, and offsite sewer and storm drain conveyance alignment with a paved access road and trail facilities. The Village 3 land plan includes a mixed-use village core with commercial/retail uses surrounded by multi-family attached and detached neighborhoods, an elementary school, neighborhood park site, small recreation sites, and Community Purpose Facility. Both Village 3 and 8 West sites include small first- and second-order ephemeral drainages. Although both projects include some avoidance of these features as well as larger streams, there would be direct impacts

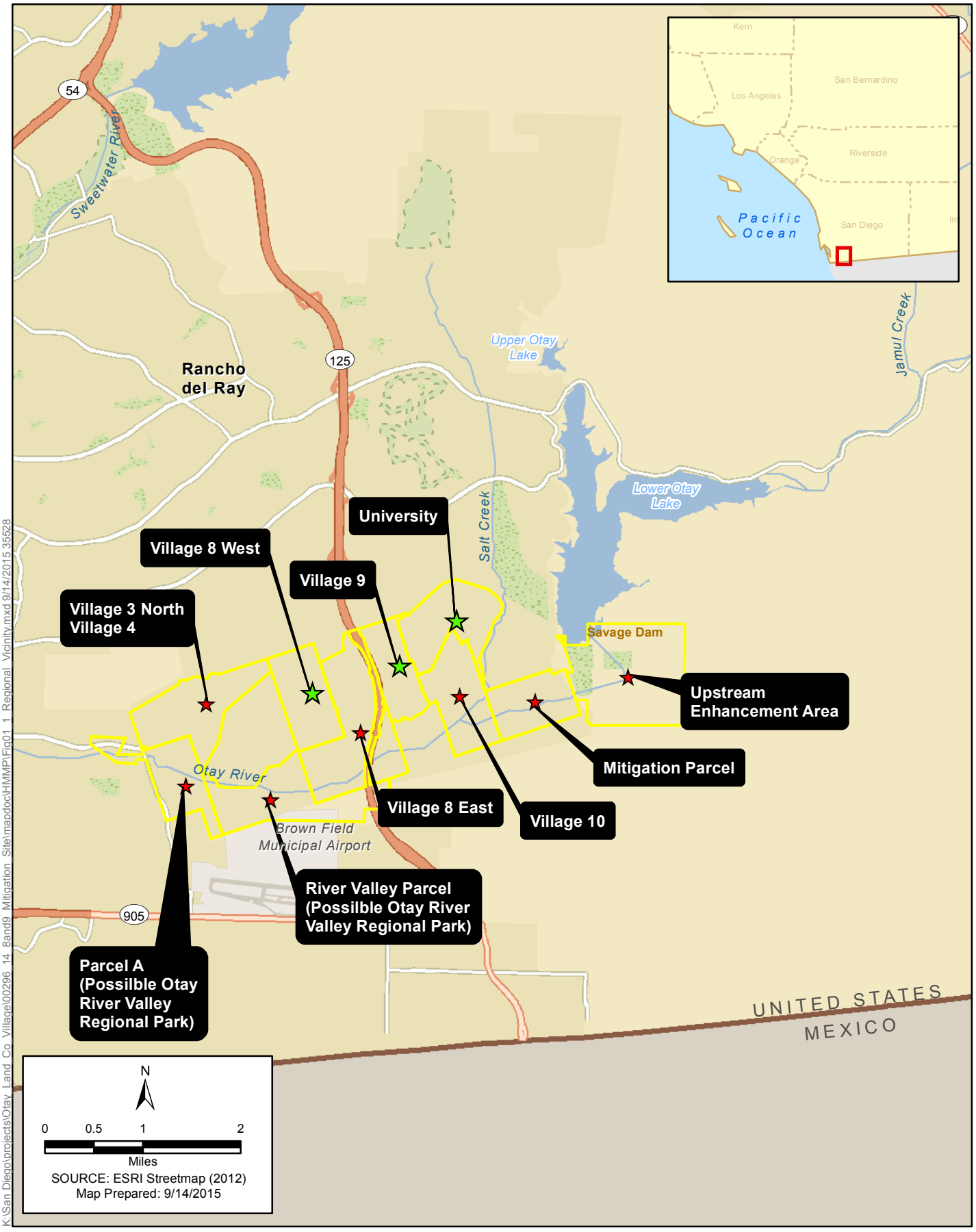

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Figure 1-1
Regional Vicinity
Otay River Restoration Project

Figure 1-2
Mitigation Parcel Service Area
Otay River Restoration Project

associated with the projects, thereby requiring compensatory mitigation to offset unavoidable loss of stream acreage and function.

Compensatory mitigation is proposed within the nearby Otay River Valley, specifically within the Otay River mainstem approximately 1 mile below Savage Dam (Figure 1-3). This plan represents the uppermost reach of the Lower Otay River Watershed and provides an ideal opportunity for restoration. This plan includes the design for approximately 100-acres of channel, floodplain, and buffer reestablishment within the approximately 300-acre City of Chula Vista parcel (Assessor's Parcel Number 6440900400), as well as enhancement (removal of invasive species). This plan is in line with the restoration recommendations described in the Otay River Watershed Management Plan (ORWMP) (Aspen 2007), which was completed in partnership with the County of San Diego, City of Chula Vista, City of San Diego, USACE, RWQCB, CDFW and community stakeholders. The ORWMP provides an evaluation of the baseline conditions of the Upper and Lower Otay River Watershed and recommendations for BMPs and restoration opportunities based on five key goals identified by the ORWMP stakeholders.

The ORWMP provides 17 strategies that are intended to protect, enhance, restore, and/or manage watershed resources in consideration of expected natural and anthropogenic stressors. Each strategy is focused on achieving one or more of the stakeholder-identified ORWMP goals. Specifically, this HMMP addresses one of the key strategies identified in the ORWMP: "Restore the Lower Otay River Floodplain to Enhance the Quality of Water Entering San Diego Bay." The strategy is ranked as a HIGH priority along with 8 other strategies based on their expected large benefits to the watershed and their capacity to build upon other efforts being planned or underway (Aspen 2007).

The mainstem and floodplain within the Mitigation parcel were highly disturbed by a record flood event in 1916, which resulted in the failure of the original Savage Dam (an earthen and steel structure) and left a substantial amount of sediment and debris in the broad floodplain. The dam was reconstructed in 1918 and has remained intact since. The deposited flood material was subsequently mined for sand and gravel over several decades, continuing until approximately the mid-1980s. The flood of 1916, deposition and intensive harvesting of alluvium material, as well as the presence of the dam itself have substantially altered the natural topography and hydrologic and sediment transport functions of the Otay River within the plan area. In particular, the mainstem was filled and manipulated to the point of being nonexistent, with surface flows dissipating and water flowing down-gradient from east to west as shallow groundwater through much of the plan area. Similarly the floodplain has been manipulated, with much of the area characterized by artificial mounding from the mine tailings. The disturbed hydrology and topography of the site are further exacerbated by the presence of dense stands of an invasive nonnative tree, tamarisk or salt cedar (*Tamarix* spp.) and other invasive species such as arundo (*Arundo donax*) and Peruvian Pepper tree (*Schinus molle*). These species provide a significant nonnative seed source to downstream habitats.

As mentioned above, the approximately 100-acre restoration site and the larger 300-acre mitigation parcel are owned by the City of Chula Vista. A portion of the parcel is within the City of Chula Vista Greenbelt Master Plan boundaries and entirely within the OVRP Concept Plan boundaries. Both of these plans identify future multi-use trails where the existing dirt roads and unofficial trails are currently located. These existing dirt roads are used for a variety of purposes by the U.S. Border Patrol, SDG&E, City of San Diego, and OWD, as well as by hikers, cyclists, and equestrians. To prevent the restoration site from being disturbed by existing and future users, wood split-rail fencing would be installed at key locations. The fencing, along with signage indicating the general sensitivity of the

restoration site and providing wayfinding, would help to minimize trespassing from trail users who would otherwise be unaware of the sensitivity of the habitat restoration area. The existing roads and trails may be moved slightly to accommodate the 14-foot-wide pathway (required width for SDG&E access) and installation of the fencing and signage while also avoiding road ponds that support the San Diego fairy shrimp. Only disturbed areas would be used to designate the narrow trail corridor or pathway. In addition, educational kiosks would be installed at key viewing locations within the disturbed areas to help inform the readers of the importance of the restoration site.

Altogether, the proposed project would (1) improve approximately 12,800 linear feet of existing dirt roadways with fencing, signs, and kiosks; (2) improve approximately 1,600 linear feet of road crossings in the active floodplain; and (3) close approximately 4,500 linear feet of existing dirt roads. Additional improvements that are not part of the proposed project and that may occur at a future date under the OVRP Concept Plan and Greenbelt Master Plan could be developed with subsequent environmental review, if necessary, and would not be precluded as a result of implementation of the proposed restoration project.

The restoration project is divided into two discrete work areas, the Mitigation Parcel (City of Chula Vista) and the Upstream Enhancement Area. The primary restoration project will be occurring in the Mitigation Parcel while a singular treatment season of invasive plant species will occur in the Upstream Enhancement Area. The project is also divided into three distinct components Phase 1, Phase 2, and future phases. Phase 1 includes the singular treatment of the Upstream Enhancement area as well as the initial treatment of the Phase 2 work area within the Mitigation Parcel. Phase 2 takes place solely in the Mitigation Parcel and focuses on the compensatory mitigation for Village 8 and Village 3. Future phases will address the needs of additional Otay Villages as well as other projects requiring compensatory mitigation. These components and the objectives of each are described further below.

1.3 Mitigation Obligation

As described above, this HMMP is intended to meet the compensatory mitigation needs for two projects under permit review now and several future projects including the City of Chula Vista University Project. Table 1-1 outlines the potential estimated mitigation obligations for each of the projects using a conservative ratio of 5:1 to ensure sufficient coverage. These numbers are subject to change because the permit application process is ongoing for Villages 3 and 8 West and has not begun for the other future projects. In addition, impact acreages for future projects are estimates based on preliminary project footprints and are subject to change as a result to project refinements. ***Through each permit process, each project will demonstrate they have met the Clean Water Act requirements to avoid and minimize to the maximum extent practicable in light of cost, logistics, and technology and finally mitigate for authorized unavoidable impacts. Therefore, this HMMP does not dictate actual mitigation ratios and the ratios provided are for planning purposes only.***

Figure 1-3
Restoration Plan Overview
Otay River Restoration Project

Table 1-1. Summary of Estimated Mitigation Obligations for Each Village Project

Project	Streams Length (linear feet)	Avg Stream Width (feet)	Stacked Impact Linear Feet*Width	USACE/ RWQCB (acres)	CDFW (acres)[1]	USACE/ RWQCB Mitigation Ratio[2]	USACE/ RWQCB Mitigation Acreage	Linear Feet Mitigation Ratio[2]
Village 2	4,500	3	13,500	0.31	0.31	5:1	1.55	1:1
Village 3	4,424	3	13,272	0.213[3]	0.253	5:1	1.065	1:1
Village 3 - Takashima	685	5	3,425	0.07	0.09	5:1	0.35	1:1
Village 8 West	7,169	3	21,507	1.3	5.26	5:1	6.5	1:1
Village 8 East	5,500	4	22,000	0.59	0.59	5:1	2.95	1:1
Village 9	6,244	3	18,732	0.37	0.78	5:1	1.85	1:1
Village 10	3,670	5	18,350	0.57	0.99	5:1	2.85	1:1
University[4]	8,900	6	53,400	0.38	0.46	5:1	1.9	1:1
Otay River VRP	-	-	-	0.10	0.10	5:1	1.0	-
Total	**41,092**		**164,186**	**3.90**	**8.81**	**-**	**20.01**	**-**

[1] Total includes acres of USACE/RWQCB jurisdiction plus additional acres of exclusive CDFW jurisdiction (i.e., extending outside of the ordinary high water mark [OHWM] and to the top of bank).

[2] For the purpose of planning and evaluating mitigation available this plan assumes a 1:1 mitigation ratio for linear feet of streams and 5:1 for all aquatic acreage.

[3]Acreage includes 0.003 acre of disturbed vernal pools/seasonal depression. It is anticipated that mitigation can be provided in the seasonal ponds of the Otay River Restoration Project if vernal pools cannot be avoided on site.

[4] A formal jurisdiction delineation has not yet been completed for the University Project Site or the Otay River Valley Regional Park sites. The estimated values are based on aerial and topographic interpretation using an estimated average 5-foot-wide OHWM and 10-foot-wide CDFW bank to bank. In addition, these numbers do not account for potential avoidance.

1.4 Compensatory Mitigation Credits Available

The compensatory mitigation acreage and linear feet quantities available onsite are shown in Tables 1-2 and Table 1-3, respectively. These are further depicted in Chapter 4 (Mitigation Design). The design includes an upland buffer component in an effort to maximize the long term success of the site and the habitat function. The credit associated with the buffer acreage was based on the projected functional lift associated with quality buffer habitat, in which the CRAM scores would increase (compared to current buffer conditions) by at least 10%. As such, 10% of the total buffer acreage was estimated for credit.

As shown in Table 1-3, the restoration site is anticipated to re-establish up to 9,555 linear feet of stream channel. As shown in Table 1-1 impacts on linear feet for all of the projects total approximately 41,000 feet. A use of straight linear feet to compare the impacted streams to the restored stream does not adequately illustrate the difference. It is more appropriate to used stacked linear feet, which accounts for the streambank width and the active low floodplain (10-years flood). While the average width of the impacted streams ranges between 3 and 6 feet, the restored primary drainage and active low floodplain averages 100 feet at its broadest and 25 feet at its narrowest, similarly the secondary channels average at least 8 feet wide. Table 1-3 presents both the straight linear feet and stacked linear feet of the mitigation site. The mitigation site will restore over 424,000

stacked linear feet while the proposed projects are expected to impact approximately 164,000 stacked linear feet, as shown in Table 1-1.

Table 1-2. Compensatory Mitigation Acreage Quantities by Restoration Type for Entire Plan

Restoration Type	Habitat	Acreage	WoUS Credit	CDFW Credit[1]	Buffer Credit[2]
Re-establishment	Primary Channel	5.27	5.27	5.27	-
	Secondary Channels	2.22	2.22	2.22	-
	Active Low Floodplain (10 year flood)	24.2	24.2	24.2	-
	High Floodplain (25 year flood)	21.8	-	21.8	2.18
Establishment	Seasonal Ponds (created)	1.34	1.34	1.34	-
Rehabilitation[3]	Primary Channel	0.75	0.75	0.75	-
	Seasonal Ponds (existing)	0.38	0.38	0.38	-
	Active Low Floodplain (10 year flood)	0.16	0.16	0.16	
	Transitional Uplands	47.15	-	-	4.72
Total WoUS Credit			34.32		
Total CDFW Credit				56.12	
Total Upland Credits					6.9

[1] Acreage includes WoUS Credit and is not additive.

[2] Functional increase based on projected CRAM scores, %10 change. Buffer credit can be applied to WoUS and CDFW credit as the total acreage available has been reduced from the full acres of high floodplain rehabilitation (21.8 to 2.18 acres) and transitional uplands (47.15 to 4.72 acres) based on the functional increase.

[3] Use of Rehabilitation credits are not as valuable as re-establishment and establishment in the USACE mitigation ratio checklist, as such, the mitigation ratio will be higher when using this credit type.

Table 1-3. Compensatory Mitigation Linear Feet Quantities for Entire Plan

Channel Length		Linear Feet	Jurisdictional Width	Stacked Width (Linear Feet * Width)
Straight Linear Feet	All Channels	10,170	-	-
Stacked Linear Feet	Secondary Channel (North)	1,000	10	10,000
	Secondary Channel (South)	2.220	22	48,840
	Primary Channel	5,170	50	258,500

Tributaries	1,780	23	40,940
	Total Stacked Linear Feet		**358,280**

1.4.1 Village 3 Mitigation

Table 1-4 summarizes the jurisdictional impacts for Village 3 as well as the proposed mitigation for Village 3. As shown below, Village 3 is expected to directly impact 0.29 acres of jurisdictional features in the form of ephemeral streams and a depressional basin. Mitigation will occur in Phase 2 of the Otay River Restoration Project at a minimum 5:1 ratio including 1.91 acres of jurisdictional habitat and an additional 1.05 acres of high floodplain/transitional habitat.

Table 1-4. Summary of Village 3 Impacts and Proposed Mitigation for Village 3 Development

Habitat Type Impacted	Stacked Linear Impact[1]	USACE/ RWQCB Impacts (acres)	USACE/ RWQCB Mitigation Ratio	USACE/ RWQCB Minimum Required Mitigation Acreage
Ephemeral Stream	5,109	0.28	5:1	1.4
Depressional Basin	-	0.003	5:1	0.02
Total	**5,109**	**0.29**	**-**	**1.42**
Proposed Mitigation for Village 3 by Mitigation Type and Habitat Type				
Mitigation Type	**Mitigation Habitat**			**Acres**
Mitigation Type	**Mitigation Habitat**			**Acres**
Establishment	Seasonal Ponds			0.31
Re-Establishment	Primary Channel			0.14
Re-Establishment	Active Low Floodplain (10-yr)			1.19
Re-Establishment	High Floodplain/Transitional (non-jurisdictional)			0.24
Re-Habilitation	Primary Channel			0.10
Re-Habilitation	Active Low Floodplain (10-yr)			0.01
	Total Mitigation Proposed (Jurisdictional/Non-Jurisdictional)			**2.00 (1.76/0.24)**

[1] Stacked linear feet are calculated by multiplying the total stream length by the stream width. The details are shown in Table 1-1

1.4.2 Village 8 West Mitigation

Table 1-5 summarizes the jurisdictional impacts for Village 8 West as well as the proposed mitigation for Village 8 West. As shown below, Village 8 West is expected to directly impact 1.30 acres of jurisdictional features in the form of ephemeral streams and wetlands. Mitigation will occur in Phase 2 of the Otay River Restoration Project at a minimum 5:1 ratio including 6.10 acres of jurisdictional habitat and an additional 8.87 acres of high floodplain and upland buffer habitat.

Table 1-5. Summary of Village 8 West Impacts and the Proposed Mitigation for Village 8W Development

Habitat Type Impacted	Stacked Linear Impact[1]	USACE/ RWQCB Impacts (acres)	USACE/ RWQCB Mitigation Ratio	USACE/ RWQCB Minimum Required Mitigation Acreage
Ephemeral Stream/ Wetlands	7,169	1.30	5:1	6.5
Total	**7,169**	**1.30**	**-**	**6.5**
Proposed Mitigation for Village 8 West by Mitigation Type and Habitat Type				
Mitigation Type	**Mitigation Habitat**			**Acres**
Re-Establishment	Primary Channel			1.67
Re-Establishment	Active Low Floodplain (10-yr)			4.04
Re-Establishment	High Floodplain/Transitional (non-jurisdictional)			3.06 (0.31 credit) [2]
Re-Habilitation	Primary Channel			0.65
Re-Habilitation	Upland (non-jurisdictional)			8.11 (0.81 credit) [2]
Re-Habilitation	Active Low Floodplain (10-yr)			0.16
Total Mitigation Proposed (Jurisdictional/Non-Jurisdictional)				**17.70 (6.52/11.18)**

[1] Stacked linear feet are calculated by multiplying the total stream length by the stream width. The details are shown in Table 1-1

[2] Credit determined by functional increase based on projected CRAM scores, resulting in a %10 change to overall wetland condition with improved buffer. Buffer credit can be applied to WoUS and CDFW credit as the total credit available has been reduced to 10% of the restored acreage based on the functional increase.

1.5 Responsible Parties, Roles, and Responsibilities

Ultimately, the OLC and its contractors are responsible for installation, maintenance, and monitoring in accordance with this HMMP to successfully complete the mitigation program. Their roles and responsibilities, as well as those of other involved parties, are summarized below. Additional details for each role are discussed throughout the document, where applicable.

Owner/Responsible Party: OLC will be the party financially responsible for (1) all negotiations and costs associated with the mitigation implementation, (2) the 5-year maintenance and monitoring of the mitigation area, and (3) the costs associated with the perpetual monitoring and management of the mitigation property as defined in this HMMP. At this time the individual representative for OLC is Curt Smith.

The OLC will be responsible for contracting a qualified habitat restoration ecologist and a licensed landscape contractor(s) for installation, maintenance, and monitoring to carry out the provisions of this HMMP. The OLC may select separate contractors for the installation and maintenance phases. Both contractors will meet the minimum requirements described below. The OLC will establish contractual mechanisms to ensure the completion of installation, maintenance, and monitoring activities delineated in this HMMP. The OLC may, with sole discretion, replace any of these parties.

The OLC or the contracted consultant will obtain all required permits, which may include the following.

- City of Chula Vista Initial Study/Mitigated Negative Declaration (IS/MND) and Grading Permit
- CDFW 1600 Lake and Streambed Alteration Agreement
- San Diego RWQCB 401 Certification
- USACE Nationwide Permit (NWP) 27 for Aquatic Habitat Restoration, Establishment, and Enhancement Activities

Restoration Ecologist: The restoration ecologist will be an individual or team of individuals with a degree in botany, ecology, or related field, and a minimum of 10 years of experience in Southern California with successful wetland restoration (preferably riverine). The lead restoration ecologist must have knowledge of the riverine and upland vegetation associations proposed for the restoration effort as well as the nonnative species of concern. The restoration ecologist, in coordination with the contractor, will oversee protection of existing biological resources, nonnative plant removal, contour grading; site preparation, planting and seeding, maintenance and monitoring, as well as reporting.

The restoration ecologist will be responsible for the following.

- Supervision of all phases of restoration installation, including contractor education, site protection, site preparation, planting installation, seeding, and final installation inspection and approvals as delineated in this HMMP.
- Halting work by the installation contractor at any point where the provisions of this HMMP are not being adhered to until such times as the inconsistency is resolved with the OLC.

After installation, the restoration ecologist will be responsible for monitoring and making remedial recommendations (regarding weeding, irrigation frequency, erosion control, etc.) for ongoing maintenance activities performed by the maintenance contractor after HMMP installation, as specified herein.

The restoration ecologist will be responsible for carrying out the biological monitoring and reporting program described in this HMMP. The program will include the following tasks: agency notification (as needed), qualitative and quantitative data collection as required to measure success progress, photo documentation, post-installation monitoring reports documenting progress, and a final assessment of success at the end of the 5-year maintenance and monitoring program.

Installation Contractor: The installation and maintenance contractor will be a qualified firm (or more than one firm) with successful experience in Southern California and direct experience installing and maintaining native habitat mitigation projects. The installation contractor will be responsible for design of a temporary irrigation system (if needed) for the high marsh and upland transitional habitats in consultation with the restoration ecologist. Currently, this HMMP does not include an automated temporary irrigation system, and assumes that irrigation will primarily include supplemental hand watering and/or truck watering. Subsequently, the installation contractor will be responsible for site protection, grading, contouring, and installation of all vegetation in accordance with the provisions of this plan and as approved by the restoration ecologist. In addition, the installation contractor will prepare a Storm Water Pollution Prevention Plan (SWPPP) and any other requirements of the permits to avoid impacts on adjacent resources

and water quality. The responsibilities of the installation contractor will end with the completion of the requirements for the 120-day plant establishment period.

The installation contractor will verify in writing to the OLC prior to starting work the following minimal qualifications: a C-27 California Landscape Contractor's license, certification as a California Pest Control Applicator, previous successful experience with at least three prior native habitat restoration project installations of similar size and scope, and knowledge of local flora and fauna.

Maintenance Contractor: After the 120-day plant establishment period, a separate maintenance contractor may be hired by OLC to maintain the restoration site for the remaining balance of the 5 years according to the provisions of this HMMP. The OLC may choose to use the same contractor for both installation and post-installation maintenance if the contractor meets both sets of qualifications. Prior to starting work, the maintenance contractor will demonstrate the same qualifications as the installation contractor, including demonstrating past maintenance experience with habitat restoration projects, previous successful experience maintaining at least three native restoration projects, and knowledge of local flora and fauna.

Trail/Road Maintenance: During the 5 years of maintenance and monitoring for the restoration project, the Maintenance Contractor would conduct minor repairs on all fencing, signs, and educational kiosks installed as part of the project improvements. This includes reposting loose signs and fence posts, removing graffiti, and conducting road repair to avoid new ruts or ponds from being artificially created. The maintenance contractor will replace up to two signs per year and one educational kiosk over a 5 year period. If excessive vandalism occurs, Homefed would coordinate with the City of Chula Vista and the County of San Diego to support upkeep through the existing Preserve Owner/Manager (POM) funded by the existing Community Facilities District. After the project has completed the 5 years of maintenance and monitoring and the regulatory agencies have signed off on the mitigation site, San Diego County would maintain OVRP trails and trail improvements per the OVRP Joint Exercise of Powers Agreement (JEPA).

1.6 Regulatory Requirements and Compliance

This HMMP has been prepared in accordance with the guidelines recommended in the *Final 2015 Regional Compensatory Mitigation and Monitoring Guidelines for South Pacific Division U.S. Army Corps of Engineers* (USACE 2015) and addresses waters of the U.S. and wetland impacts regulated by the federal Clean Water Act, the California Fish and Wildlife Code, and California's Porter-Cologne Water Quality Control Act. This plan will support applications for issuance of a USACE 404 permit, a CDFW 1602 streambed alteration agreement, and an RWQCB 401 water quality certification. The plan will additionally outline the mitigation strategies designed to fulfill the regulatory requirements of the federal Clean Water Act and the California Fish and Game Code. USACE, RWQCB, and CDFW will be involved with the plan throughout the review and permitting phases and the installation and 5-year monitoring of each phase of the project, if phased.

1.7 Mitigation Site Location

The mitigation site is located within the Otay Mesa USGS 7.5-minute quadrangle map (Figure 1-4), in the Otay River Valley in southwestern San Diego County, California (Figure 1-2). The mitigation site

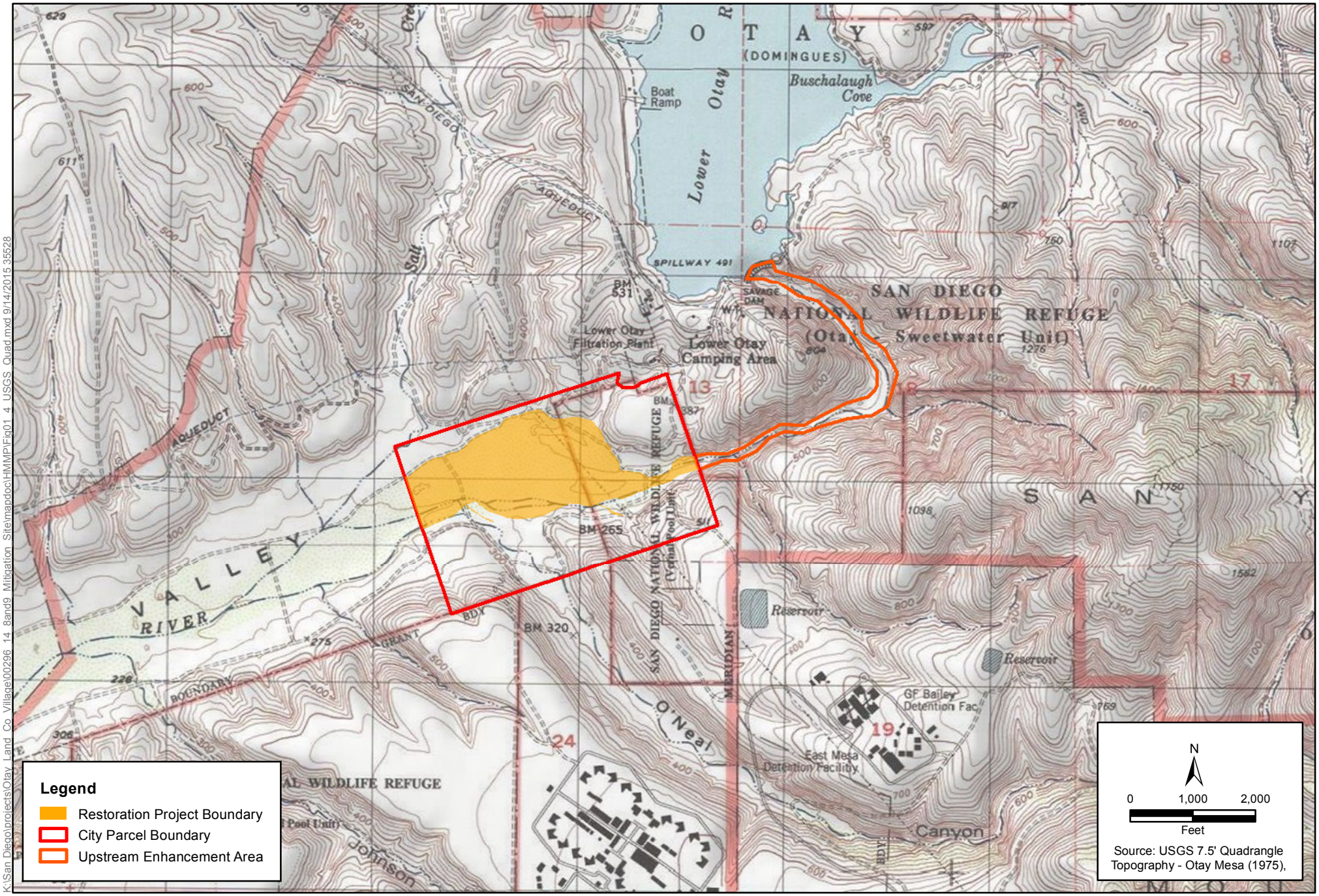

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Figure 1-4
USGS Otay Mesa Quad Map
Otay River Restoration Project

occurs within the upper portion of the Lower Otay River Watershed, approximately 1 mile downstream of Savage Dam. As described above, the restoration project is divided into two discrete areas, the Mitigation Parcel (City of Chula Vista) and the Upstream Enhancement Area. The primary restoration project will be occurring in the Mitigation Parcel while a singular treatment season of invasive plant species will occur in the Upstream Enhancement Area.

1.8 Mitigation Area Ownership Status

The mitigation area consists of nine parcels owned by four entities; the City of Chula Vista owns one parcel that contains the floodplain area, while the Otay River channel below the dam is owned by the County of San Diego (two parcels), the United States of America Public Domain (one parcel), and the City of San Diego (four parcels) (Figure 1-5 and Table 1-6).

Table 1-6. Mitigation Area Ownership Parcels

Parcel Number	Owner	Project Components
64409004	City of Chula Vista (Mitigation Parcel)	Phase 1 (Habitat Enhancement), Phase 2 (River Restoration), Future Phases
64713003	City of Chula Vista	Phase 1 Upstream Enhancement
644100019	County of San Diego	Phase 1 Upstream Enhancement
64713001	City of San Diego	Phase 1 Upstream Enhancement
64713002	City of San Diego	Phase 1 Upstream Enhancement
64713010	City of San Diego	Phase 1 Upstream Enhancement
64713012	United States of America Public Domain	Phase 1 Upstream Enhancement
64713008	County of San Diego	Phase 1 Upstream Enhancement
64713007	City of San Diego	Phase 1 Upstream Enhancement

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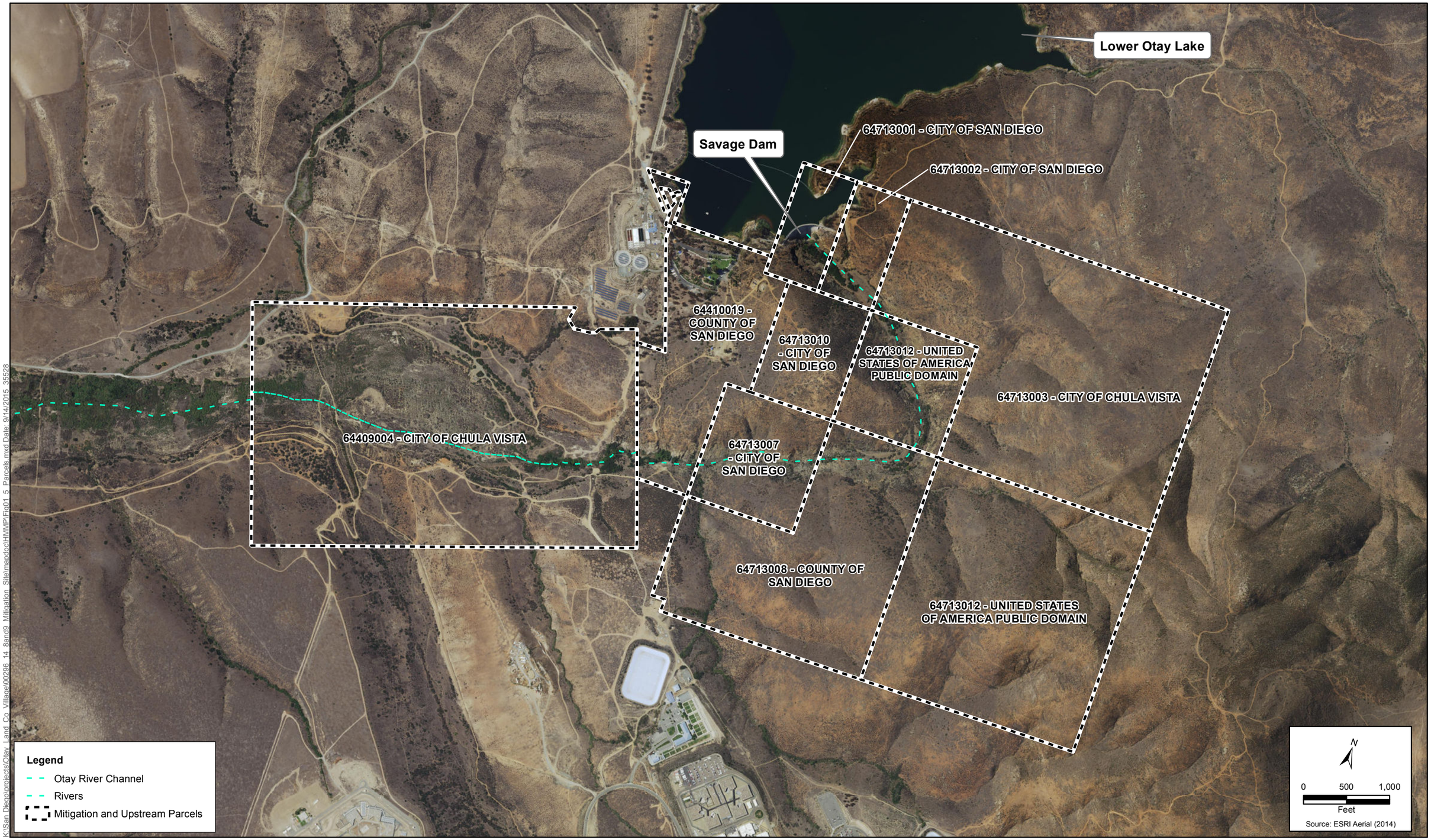

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Figure 1-5
Parcel Map
Otay River Restoration Project

Chapter 2
Mitigation Goals and Objectives

2.1 Goals

The overall goal of this plan is to fulfill the mitigation requirements for Village 8 West and Village 3 and to provide advance permittee responsible mitigation for the additional Otay Village Projects, the University Project, and the Otay Valley Regional Park. The primary goal for the restoration itself is to create an ecologically functional, self-sustaining wetland that is resilient to a range of natural disturbances (drought, flood, etc.). The following are the specific goals of the restoration project.

- Restore proper hydrology based on existing conditions and create complex channel morphology including primary and secondary channels.
- Tie the recreated channel into the existing channel upstream and downstream of the City of Chula Vista parcel.
- Upgrade the two identified north-to-south road/trail crossings through the Otay River to better provide quality access while limiting disruptions in hydrology due to artificial deepening and berming from vehicular traffic.
- Recreate a floodplain with low and high terraces capable of conveying various flood events.
- Create a series of seasonal ponds in the northern high floodplain capable of providing refugia into the dry season.
- Maximize buffer condition by restoring and enhancing the adjacent upland habitat.
- Maximize sustainability of the recreated site by removing the nonnative seed sources occurring in the 1 mile of channel upstream of the Mitigation parcel, below Savage Dam.
- Create and maximize habitat diversity and structural complexity.
- Maximize wildlife use opportunities including local listed species.

2.2 Objectives

Mitigation for the projects' impacts will occur within the Otay River mainstem and floodplain (Figures 1-1 and 1-3) immediately below and downstream from the Savage Dam. This area was targeted for enhancement and rehabilitation due to its location at the upstream origination point of the Otay River at Savage Dam. This mitigation location is the appropriate first step in the overall restoration of the lower Otay River sub-basins that exist below the Savage Dam. The removal of nonnative invasive trees and the establishment of native vegetation will be crucial to the success of future downstream restoration efforts due to the presence of a significant upstream nonnative seed source within the restoration project boundary. The re-creation of the river channel and adjacent floodplains within the Mitigation parcel will improve the biological functions of the existing resources and support native flora and fauna. Although the restoration can be installed in one phase it has been designed into at least two distinct self-sustaining phases to correspond to the potential timing of each permitted project requiring mitigation with Phase 1 and 2 mitigating for Village 8

West and Village 3. The consecutive phases are described below and shown in Figure 2-1. In addition to the phases, a series of "optional" enhancement areas have been identified in the buffer habitat.

Phase 1 Objectives (Invasive Species Removal/Enhancement):

City of San Diego and County of San Diego Parcels - Upstream Enhancement Area

- Enhance 6,000 feet of existing channel upstream of the main mitigation parcel, by treating approximately **2.74** acres of riparian habitat in the upstream Otay River mainstem immediately below the Savage Dam (Figure 1-4 and 2-1). The proposed enhancement areas are disturbed riparian areas whose natural habitat functions and services have been compromised and degraded due to the abundance of invasive trees and plants and the presence of Savage Dam. The proposed enhancement areas generally contain areas heavily infested and/or disturbed by tamarisk, giant reed (*Arundo donax*), pepper trees (*Schinus* spp.), eucalyptus (*Eucalyptus* spp.) and Canary Island date palms (*Phoenix canariensis*), as well as several other non-native species. Invasive species in the upstream area will be treated for up to 5 years following the initial treatment or until the initial right-of-entry permits expire (whichever comes first). No success standards or monitoring is associated with the Upstream Enhancement Area as this effort to protect the restoration project downstream from nonnative seed sources and does not correspond to any mitigation credit.

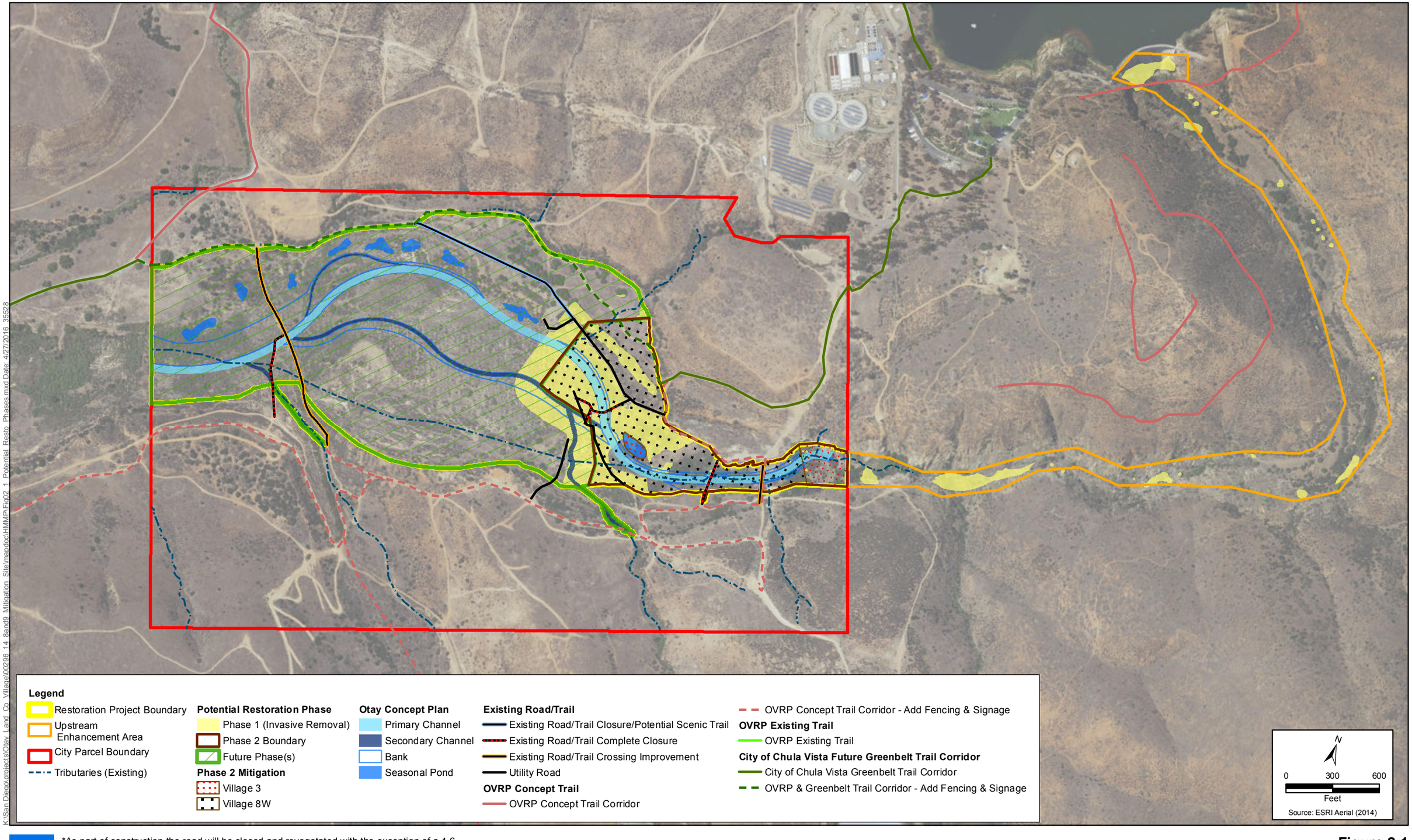
City of Chula Vista Parcel - Mitigation Parcel

- Complete initial removal of invasive species within the Phase 2 boundary (approximately 14 acres) and a 150-footbuffer within the mitigation parcel with a focus on dense stands of tamarisk.
- Complete treatment of all large woody trees within the mitigation parcel including eucalyptus, Brazilian pepper trees (*Schinus terebinthifolia*), as well as date and fan palms. Leave on site to degrade and be incorporated as organic material and structure in future grading.

Phase 2 Objectives (Restoration/Re-Establishment of Otay River Mainstem For V3 and V8W):

City of Chula Vista Parcel - Mitigation Parcel

- Re-establish approximately 2,300 linear feet of the intermittent Otay River mainstem at the upstream portion of the mitigation parcel that was not returned to natural conditions following the departure of sand-mining operations. The grading will remove flow obstructions including berms, rows of cobble piles, and sediment and spoil piles, and will recreate the contours of the Otay River mainstem and the east tributary connection, connect existing low-lying pooling areas, and create floodplains. These actions will improve flow conditions during rain events and hydrological conditions for native plants and will include an upland Diegan Coastal Sage Scrub buffer of approximately 100 feet.
- Re-habilitate and enhance 2.56 acres surrounding the re-established primary channel with a focus on removal of invasive species such as tamarisk and arundo.
- Re-establish approximately 5.7 acres of floodplain habitat including the mainstem by removing structures such as berms, rows of cobble piles and sediment and spoil piles that impede flow, and by removing and managing invasive species. This area within the plan boundary currently supports a large, nearly monotypic stand of tamarisk. The tamarisk and other non-native vegetation will be removed, the natural floodplain contours that were corrupted by mining



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*As part of construction the road will be closed and revegetated with the exception of a 4-6 foot swath for potential future trail creation. The trail is not included as part of this HMMP.

Figure 2-1
Potential Restoration Phases
Otay River Restoration Project

activities will be recreated, and native plants will be installed following invasive plant removal and regrading.

- Re-establish a river and floodplain cross section at the 1 identified upstream crossings to allow for adequate vehicular and foot traffic for U.S. Border Patrol, SDG&E, OWD, and future trail users that minimizes artificial deepening and maintenance and avoids the creation of berms that impound water upstream.
- Establish the easternmost seasonal pond in the north high floodplain totaling approximately 0.3 acre. The remaining ponds will be created in future phases. These ponds will create a unique niche habitat and increase the overall complexity of the site and the ecological services available.
- Protect existing and proposed native riparian habitat by focusing users (i.e., Border Patrol) to key access roads and closing others permanently. One permanent at-grade channel crossing will be created using rock and other natural hard material at the upstream end of the project. Fencing, trail signage, and educational kiosks will be installed at key locations.
- Rehabilitate approximately 8.1 acres of upland transitional habitat in the northern portion of the site through recontouring, revegetation, and removal of non-native species. This habitat serves as a buffer to the restored riverine system and provides foraging and breeding habitat for many species and refugia for riparian species during high flood events.
- Establish OVRP Concept Plan and City of Chula Vista Greenbelt Master Plan trail corridors to minimize the potential impacts on the restoration area from existing and potential future uses. These trail corridors will be identified and approximate road/trail alignments established within the existing disturbed roads or other adjacent disturbed habitat to avoid impacts on all road ponds that support San Diego fairy shrimp. Split-rail fencing, trail signage, and educational kiosks will be installed to keep users on the trails and outside of the restoration area.

Future Phase(s) Objectives:

City of Chula Vista Parcel - Mitigation Parcel

- Re-establish approximately 3,000 linear feet of the intermittent Otay River mainstem connecting the upstream portion of the mitigation parcel and the existing channel downstream. The grading will remove flow obstructions including berms, rows of cobble piles, and sediment and spoil piles, and will recreate the contours of the Otay River mainstem, connect existing low-lying pooling areas, and create floodplains. These actions will improve flow conditions during rain events and hydrological conditions for native plants and will include an upland Diegan Coastal Sage Scrub buffer of approximately 100 feet.
- Enhance and establish the remaining seasonal ponds in the north high floodplain totaling approximately 1.4 acres. Three existing ponds would be recontoured and up to five new ponds created to form a wetland resource that is available well into the dry season, as it is dependent on groundwater elevations. These ponds create a unique niche habitat and increase the overall complexity of the site and the ecological services available.
- Re-establish a small 1,500 linear feet (1.4 acres) of secondary ephemeral channel along the northern high floodplain. This will improve flow conditions during rain events and create hydrologic flow complexity, as well as habitat complexity.

- Re-establish approximately 2,900 linear feet (2.6 acres) of an ephemeral secondary channel within the southern portion of the floodplain. This will improve flow conditions during rain events and create hydrologic flow complexity, as well as habitat complexity.
- Re-establish approximately 800 linear feet of the west tributary to connect with the re-established floodplain and secondary channels. This tributary currently is cut off by access roads and filled.
- Re-establish approximately 970 linear feet of the east tributary with the re-established floodplain and secondary channels. This tributary currently is cut off by access roads and filled.
- Re-establish approximately 28 acres of outer floodplain in the northern and southern portion of the site that, under current hydrologic conditions, function as alluvial fan habitat. The plan will remove berms, spoil piles, and numerous non-native trees including pepper trees, eucalyptus, and tamarisk. The recontoured outer floodplain will improve hydrological flow and hydrological conditions. This rehabilitation will also include regrading the outer floodplain that was not returned to natural conditions following the departure of sand-mining operations. Rehabilitation of this area will include installation of native riparian plants following invasive plant removal and regrading.
- Rehabilitate approximately 31 acres of upland transitional habitat in the northern and southern portion of the site through recontouring, revegetation, and removal of non-native species. This habitat serves as a buffer to the restored riverine system and provides foraging and breeding habitat for many species and refugia for riparian species during high flood events.
- Upgrade one permanent at-grade channel crossing at the downstream end of the project using rock and other natural hard material and protect the existing SDG&E gas transmission line.

Chapter 3

Proposed Mitigation Site Baseline Information

3.1 Mitigation Site Location and Background Information

The mitigation site is generally located south and west of the Lower Otay Reservoir, north of the George F. Bailey Detention Facility, and north of the Otay Water District Roll Reservoir. Parcels are located on land owned by the City of Chula Vista, the City of San Diego and the County of San Diego. It is located immediately south of the Savage Dam, which impounds the Otay River waters within the Lower Otay Reservoir, and includes the mainstem of the Otay River that initially runs southeast through a deep canyon and around a large hill and then runs generally westerly where it broadens into a large floodplain.

The mitigation area is included within the City of Chula Vista General Plan, the Otay Ranch General Development and Resource Management Plan, the County of San Diego Multiple Species Conservation Program Subarea Plan, and the Otay River Watershed Special Area Management Plan. It occurs within designated critical habitat for Quino checkerspot butterfly (*Euphydryas editha quino*; Quino) as well as within the recommended survey area for Quino (USFWS 2014). Surrounding lands to the east and west support undeveloped lands with mostly native habitat. Nearby developed areas include the City of San Diego's Otay Treatment Plant, Otay Valley Regional Park, and the Otay Water District Roll Reservoir and associated pump stations.

3.2 Climate

Climate in the mitigation area is characterized as Mediterranean, with generally warm dry summers (June through September) and mild, wet winters (October through May) (Major 1977). The Mediterranean climate results in relatively long periods of low-flow dry conditions, with minimal runoff into the Otay River. These dry conditions are punctuated by brief, seasonal episodes of heavy rainfall and higher volume runoff. Monthly average extreme temperatures generally range between a mean low of 48°F in December through January and a mean high of 75°F in July through September (Western Regional Climate Center 2014). Mean annual rainfall in the mitigation area is 11.3 inches/year (National Weather Service – Lower Otay Reservoir Weather Station 2013).

The Otay River Watershed occurs within a naturally fire-prone landscape. Data from the U.S. Forest Service Database indicates that the mainstem region immediately below the Savage Dam of the mitigation area has burned four times since 1994, most recently during the 2007 Harris Fire, while the downstream river portion and floodplain has burned once during that period in the 1994 Otay Fire. Many species in the Southern California region produce seeds capable of germinating only as a result of exposure to fire or smoke from a fire; however, a too-frequent fire regime may burn areas before native vegetation has time to reach maturity and the ability to produce seed. The frequent fires in the upstream region may have had negative effects on the watershed by affecting the hydrological processes indirectly by altering the physical and chemical properties of soil and

converting plant cover to soluble ash, thereby increasing soil runoff, erosion, and sedimentation in the channel.

3.3 Hydrologic Conditions

3.3.1 Watershed

The mitigation area is part of the approximately 145-square-mile (92,920-acre) Otay River Watershed, which is situated between the Sweetwater River Watershed to the north and the Tijuana River Watershed to the south; the latter extends over the international border with Mexico. The 25-mile-long Otay River originates at San Miguel Mountain, flows through the Upper and Lower Otay Reservoirs, continues west, and empties into San Diego Bay (Aspen 2007). The mitigation area is situated approximately in the middle of the Otay River Watershed and contains a floodplain and the Otay River main channel up to the Savage Dam and Lower Otay Reservoir. The area exists in a post-disturbance state; the floodplain was mined for sand/gravel in the 1980s, and a portion near the Savage Dam was most recently burned in 2003.

3.3.2 Historic Hydrological Conditions

Historically, the mitigation area was part of a large watershed that drained into San Diego Bay at the river's western terminus. The Upper and Lower Otay Dams currently impound flow from the Otay River. The Upper Otay Dam was built in 1901; it forms the Upper Otay Reservoir, which serves as a municipal water supply. The Lower Otay Dam, which represents the northern border of the mitigation area, was originally built in 1897 as rock- and earth-fill based on massive masonry with a riveted steel plate diaphragm. It was erected by the Southern California Mountain Water Company to provide water storage. Information about the Otay River Watershed before the construction of the original dam is extremely limited (Aspen 2007). The original Lower Otay Dam failed catastrophically during a high rain event in 1916. The 1916 dam failure drained the Lower Otay Reservoir in 2.5 hours and sent a wall of water initially 100 feet high down through the canyon and river valley, destroying buildings, bridges, and farms, and killing 11 people. The canyon immediately downstream of the dam was completely scoured of vegetation and boulders (McGlashan and Ebert 1918).

The Lower Otay Reservoir dam was replaced in 1919 after the flood of 1916 with a concrete gravity-arch structure known as the Savage Dam, which still stands today. The Savage Dam forms the approximately 49,510 acre-foot Lower Otay Reservoir and supplies drinking water to parts of Southern California. The Lower Otay Reservoir was designed primarily to provide a water supply for the local community; it impounds approximately 60% of the Otay River's tributary watershed along with its sediment supply and has limited flood control capacity (Aspen 2007). However, both the Upper and Lower Otay Reservoirs effectively handle increased flow from small rain events in the upper watershed and have mostly eliminated major flood events along the Otay River; dam spills are infrequent and minor.

3.3.3 Existing Hydrological Conditions

Existing conditions for the plan area are primarily defined by the construction of Savage Dam in 1919 as development in the immediate watershed has remained minimal. The dam has experienced

spillovers resulting in water entry to the Otay River a total of 27 times since 1919. As such, the Otay River immediately downstream of the dam does not receive water from the upper watershed except during rain events and infrequent minor over-spills. The dam and reservoir have distorted the sediment equilibrium of the Otay River by retaining all of the upstream sediment, causing a sediment deficit and channel degradation for the portion of the mainstem below the Savage Dam. The 1916 dam failure had temporary effects on the shape of the river, and channel-forming events have not occurred since the flood of 1916; therefore, the planform of the Otay River below the Savage Dam has remained largely stable during the twentieth century. The Lower Otay River currently has a low degree of sinuosity and consists of braided streams with multiple bars and islands. However, sand and gravel extraction activities have affected the topography of the Otay River mainstem and make braiding patterns difficult to evaluate (Aspen 2007).

Three creeks flow into the mitigation area: two are un-named drainages that meet the Otay River from the south (Features 2 and 4); the third is O'Neal Canyon Creek, which meets the Otay River toward the downstream end of the restoration project (Feature 5) on the southern edge of the mitigation area and originates in the Otay Mountain Wilderness near Otay Mountain (see Section 3.9 and Figure 3-3 for further information). None of the drainages are gaged, and no readily available flow information exists to better describe the current flow conditions of these creeks. O'Neal Canyon Creek runs primarily through undeveloped land with the exception of the R.J. Donovan Correctional Facility. The creek flows through a culvert and through a significant embankment supporting the access road connecting the East and West Mesa portions of the facility. This culvert acts as a significant flood management facility as the slopes are very steep and the high road embankment is greater than 20 feet. Upstream of the culvert and detention facility, O'Neal Creek flows through undeveloped land that is inaccessible by automobile (Aspen 2007). The occurrence of plant material introduced via O'Neal Canyon into the Otay River Valley is significant as this confluence facilitates the introduction into the floodplain of rare plant species originating from Otay Mountain. Salt Creek runs through the extreme northwest portion of the project site but does not drain into the floodplain.

The impounding of river waters by the installation of the Savage Dam has changed the hydrological functions of the Otay River mainstem, and sand and gravel extraction activities and migration of foreign materials into the area have changed the original sediment distribution on the Otay River (Aspen 2007). In-stream mining typically degrades and destabilizes streambeds by causing a reduction of downstream sediment supply and also dilutes and removes soil organic matter, nutrients, and native seed banks. Disruption of the soil profile leads to leaching of nutrients and soil moisture loss (Aspen 2007).

Similarly, because the mitigation site is situated immediately below the Savage Dam it no longer receives perennial water. It is therefore no longer fully functional as a river and river floodplain and primarily provides hydrologic, biogeochemical, and habitat functions associated with intermittent/ephemeral streambeds and dry alluvial fans, although several scattered areas persist that support riparian habitat. The river channel immediately south of the dam runs through a deep canyon and contains scattered areas of riparian habitat which support native trees such as willows; however, due to dry conditions it also supports Diegan coastal sage scrub species such as laurel sumac (*Malosma laurina*). The river channel contains abundant nonnative species such as eucalyptus, pepper tree, palm trees (*Arecaceae* spp.), and tamarisk.

The downstream floodplain area that was mined for sand was not restored to natural conditions. The departure of Nelson and Sloan Materials from the river valley potentially preceded laws

requiring reclamation after site abandonment, and site conditions indicate that the company removed its equipment and left the floodplain in a highly disturbed condition. Literature indicates that at least the top 15 feet of soil was removed from the site; conditions on site indicate that at least the top 20 feet of soil was removed from some areas, thereby reducing the elevation of possibly a majority of the floodplain area and removing topsoil along with associated native seedbank, microorganisms, and nutrients. Sediment and gravel piles appear in abundance throughout the floodplain, and several deep pits and large berms remain. In addition, dozens of smaller, roughly parallel gravel "berms" exist in the floodplain that run in a north–south direction, opposite to that of flow, and are easily seen in aerial photographs.

Previous studies of the Otay River Watershed have concluded that it is not a major source of groundwater. Groundwater within the watershed occurs within unconsolidated alluvium, semi-consolidated sedimentary bedrock and bedrock surrounding the alluvium, and the flow generally mimics surface topography. Most of the groundwater in the watershed occurs west and downstream of the mitigation area. Significant changes to the hydrologic and sediment regimes of the Otay River mainstem have occurred as a result of the curtailment of channel discharge and sediment deposit due to the installation of the Savage Dam; because of these changes, it is expected that over time the Otay River will experience flattening of slopes and downcuts in the upper reaches and aggrade in the lower reaches. The San Diego Association of Governments (SANDAG 1985) characterizes the Otay Groundwater basin to be in hydrologic equilibrium, such that recharge and discharge are approximately equal. The portion of mitigation site that is directly within the river floodplain provides minimal short- and long-term storage of surface water in scattered areas within the mainstem and within the floodplain (watershed management).

3.4 Water Quality

Water quality monitoring data are not available for the mitigation area. Groundwater quality downstream of the mitigation area is rated as marginal to inferior for domestic and irrigation purposes because of high total dissolved solids and high chloride concentrations, respectively (Aspen 2007). Groundwater upstream of the mitigation area generally meets safe drinking standards; however, some sampling locations have high iron, manganese, chloride, nitrate, and/or total dissolved solids concentrations (Aspen 2007).

3.5 Topography

The mitigation site is completely contained within the existing Otay River Valley. At the upstream end of the site the valley is narrow (approximately 100–200 feet) for several hundred feet before widening noticeably to approximately 1,000–1,500 feet. Most of the site resides in this wide section of the valley floor. The proposed channel alignment meanders through the wide valley before tying back into the existing channel near the downstream end of the site where the valley walls close back in to approximately 500 feet. The valley floor itself is mostly flat, but does feature several topographic features: on both the north and south sides of the proposed channel alignment there are dozens of mine tailing mounds (approximately 8–10 feet tall), which were left behind as a result of instream sand and gravel mining in the twentieth century. Several ponds are present north of the proposed channel alignment, with an average depth of approximately 5–8 feet relative to adjacent ground. Elevations of the valley floor itself range from approximately 228 feet at the downstream

end to 252 feet at the upstream end; typically the valley floor is 10–20 feet below the adjacent ground of the surrounding foothills.

3.6 Formerly Used Defense Site (FUDS)

The mitigation site is located within the Brown Field Formerly Used Defense Site (FUDS) (Figure 3-1). The Brown Field Bombing Range (also known as the Otay Mesa Bombing Range, the Otay Bombing Target, or Otay Mesa Bombing Target #32) was used by the Navy as a dive-bombing practice range, and later as an aerial rocket range. The property was used by the Navy between 1942 and 1960. By mid-1961, the bombing range and the easement had been determined to be surplus and assigned to the General Services Administration for disposal. The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) to address DoD sites suspected of containing munitions and explosives of concern (MEC) or munitions constituents (MC). Under the MMRP, the USACE is conducting environmental response activities at FUDS for the Army, DoD's Executive Agent for the FUDS program. A MMRP Site Inspection (SI) report was prepared for the Brown Field FUDS boundary (Parsons 2007).

The primary objective of the MMRP SI is to determine whether a FUDS project warrants further response action under Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) or not. The SI collects the minimum amount of information necessary to make this determination. Additionally, it (i) determines the potential need for a removal action (ii) collects or develops additional data, as appropriate, for Hazard Ranking System (HRS) scoring by the U.S. Environmental Protection Agency (USEPA); and (iii) collects data, as appropriate, to characterize the release for effective and rapid initiation of the Remedial Investigation and Feasibility Study (RI/FS), if warranted. An additional objective of the MMRP SI is to collect the additional data necessary to complete the Munitions Response Site Prioritization Protocol (MRSPP). The SI for the Brown Field Bombing Range evaluated potential MEC and MC presence within the Munitions Response Site (MRS) designated within the FUDS eligible property boundary.

Although sand mining activities occurred for more than two decades after range activities ceased, there is still a potential to unearth unexploded ordinances (UXO). As such implementation of restoration activities will include safety measures as described in Chapter 5.

3.7 Soil Characteristics

It is important to note when describing soils within the Mitigation parcel that Nelson and Sloane Materials operated several sand pits in the Otay River Valley. In 1982 they had permits to mine in three locations within the river valley and two locations along terrace deposits adjacent to the river valley, and the floodplain area of the mitigation area was mined for sand by this company (Kohler and Miller 1982). Its operations ended in approximately 1985 because Nelson and Sloan was unable to complete new permitting processes required for in-stream mining (Miller 1996).

Soils in the Otay East sub-basin are predominantly clay, with some loam pockets in O'Neal Canyon. The riparian areas and previously active floodplains of the Otay River lack distinct layers and are generally well drained and poorly developed (Aspen 2007). Soils in the floodplain area are characterized as having a high infiltration rate when thoroughly wetted, comprising primarily deep

well-drained sand and gravel. The water transmission rate is high, while runoff potential is low. The California Division of Mines and Geology has classified lands according to the presence or absence of significant sand and gravel deposits and crushed rock source areas in the form of Mineral Resource Zones (MRZs). The Otay River Valley in the mitigation area is classified as MRZ-2, which are Quaternary river channel and floodplain deposits, Tertiary and Quaternary conglomerate and alluvial fans, Cretaceous granitic rocks, and Jurassic meta-volcanic rocks (California Department of Conservation 1982).

The mitigation area ranges in elevation from 230 feet above mean sea level at its lowest point in the floodplain area of the Otay River to 370 feet above mean sea level at its highest point just below the Savage Dam. Otay River well logs indicate that the depth of sand and gravel is approximately 90 feet; however, mining did not occur much below 15 feet due to a clay layer that was reported by mining companies to occur at approximately that depth. Sand to gravel ratio was reported to be 50/50 (California Department of Conservation 1982). Five soil types, as defined by the U.S. Department of Agriculture (USDA), are mapped within the mitigation site (Bowman 1973; NRCS 2014). These include Olivenhain-cobbly loam, Huerhuero loam, Visalia gravely sandy loam, Riverwash, San Miguel-Exchequer rocky silt loams, and Terrace escarpments.

- **Olivenhain cobbly loam** soils are well-drained, moderately deep to deep, cobbly loams with a cobbly clay subsoil and form in old gravelly or cobbly alluvium. They occur on gentle to strong slopes on dissected marine terraces at elevations of 100 to 600 feet. They are generally well-drained with slow or medium runoff and very slow permeability.
- **Huerhuero loam soils** are moderately well-drained loams with a clay subsoil that have developed in sandy marine sediments at elevations of 10 to 400 feet and slopes of 2 to 30%.
- **Visalia gravely sandy loam** soils consist of moderately well-drained, very deep sandy loams that occur on alluvial fans and floodplains and are derived from granitic alluvium. They occur on slopes of 0 to 15% at elevations of 100 to 2,000 feet.
- **San Miguel-Exchequer rocky silt loam** is about 50% San Miguel silt loam and 40% Exchequer silt loam. Soils in the San Miguel series consist of well-drained shallow to moderately deep silt loams that have a clay subsoil. Soils in the Exchequer series consist of shallow and very shallow, well-drained silt loams. This soil type occurs throughout the upstream area of the mitigation site.
- **Riverwash** typically occurs in intermittent stream channels. The material is typically sandy, gravelly, or cobbly and is well-drained and rapidly permeable. Shrubs and forbs occur in patches and many areas are bare. This soil type is often mined for sand and gravel.
- **Terrace escarpments** consist of steep to very steep escarpments and escarpment-like landscapes. The terrace escarpments typically occur on the nearly even fronts of terraces or alluvial fans between narrow flood plains and adjoin uplands, often with 4 to 10 inches of loamy or gravelly soil over soft marine sandstone, shale, or gravelly sediments. They occur typically on the coastal plain and small areas in foothills.

3.8 Vegetation Communities and Habitat Types

The southern portion of the floodplain has self-vegetated primarily with plants consistent with Diegan coastal sage scrub and alluvial fan communities; these plants include buckwheat (*Eriogonum*

Figure ES.1

General Site Overview
Former Brown Field Bombing Range
FUDS Project # J09CA113001

San Diego County, California

Mitigation Area

Bombing Target

State Correctional Facility

Legend

- Munition Debris Field Observation Location
- Other Field Observation Location
- Soil Sample Location
- Aerial Rocket Range Boundary
- Bomb Target Boundary
- Approximate Barbed Wire Fence
- Qualitative Reconnaissance Track
- Approximate Property Boundary
- Approximate FUDS-eligible Property Boundary

CALIF

Site Location in California

Image: 1998 Orthophotos
Projection: UTMZone 11 NAD83, Units in Meters

1,000 500 0 1,000 Feet

N

Legend

- City Parcel Boundary
- Restoration Project Boundary

0 500 1,000 Feet

N

Source: Final Site Inspection Report
Former Brown Field Bombing Range

PARSONS	U.S. ARMY SOUTH PACIFIC DIVISION RANGE SUPPORT CENTER
DESIGNED BY: BT	General Site Overview
DRAWN BY: BT	
CHECKED BY: IN	SCALE: As Shown; PROJECT NUMBER: 744653.29000
SUBMITTED BY: DS	DATE: December 2007; PAGE NUMBER: ES-4

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Figure 3-1
FUDS & Mitigation Site Overlay
Otay River Restoration Project

fasciculatum), laurel sumac, California sagebrush (*Artemisia californica*), toyon (*Heteromeles arbutifolia*), and broom baccharis (*Baccharis sarothroides*), although the area also contains numerous nonnative invasive species such as pepper tree and tamarisk. The southwestern side of the floodplain, where O'Neal Canyon merges with the Otay River Valley, supports a large expanse of Tecate cypress (*Hesperocyparis forbesii*). The northern portion of the floodplain is a near monotypic stand of tamarisk, which is a species that lowers the water table and salinizes the soil in areas that it has invaded (Busch and Smith 1995). The downstream floodplain also contains scattered areas of riparian habitat containing native trees such as willows, as well as several areas of freshwater marsh; however, these areas also contain abundant individuals of eucalyptus, pepper tree, palm tree, and tamarisk. In addition, a large eucalyptus woodland has established on the western portion of the floodplain, which also contains numerous individuals of pepper trees and tamarisk.

In November 2013, ICF biologists conducted a vegetation mapping exercise of the entire project area including the Mitigation parcel and the upstream drainage up to Savage Dam. Vegetation communities were categorized using the standard classifications of Oberbauer et al. (2008). A list of all plant species opportunistically detected in the mitigation areas are provided in Appendix B. A total of 11 vegetation communities and land cover types were mapped within the mitigation area and upstream enhancement area and include Diegan coastal sage scrub, southern willow scrub, southern cottonwood-willow riparian forest, freshwater marsh, disturbed habitat, urban/developed, chamise chaparral, southern interior Cypress forest, nonnative grassland, eucalyptus woodland, and nonnative vegetation. (Table 3-1, Figures 3-2 and 3-3).

Table 3-1. Vegetation Communities in the Mitigation Parcel and Upstream Enhancement Area

Vegetation Classification Category[1]	Vegetation Community and Land Cover Types	Mitigation Parcel (Acreage)	Upstream Enhancement Area (Acreage)
65100	Arundo-Dominated Riparian	0.016	-
37200	Chamise Chaparral	6.151	-
32500	Diegan Coastal Sage Scrub	73.967	23.503
	Diegan Coastal Sage Scrub – *Disturbed*[2]	82.352	-
11300	Disturbed Habitat	20.216	0.014
79100	Eucalyptus Woodland	6.6.184	0.005
64140	Fresh Water (Open Water)	0.172	0.044
52400	Freshwater Marsh	0.255	0.008
63310	Mule Fat Scrub	0.0.506	-
42200	Non-Native Grassland	12.025	-
11000	Non-Native Vegetation	4.504	1.303
44320	San Diego Mesa Vernal Pool Complex	13.183	-
61330	Southern Cottonwood - Willow Riparian Forest	1.885	-
	Southern Cottonwood - Willow Riparian Forest – *Disturbed*[2]	1.1.809	-
83200	Southern Interior Cypress Forest	2.82	-
37120	Southern Mixed Chaparral	1.498	4.225
63300	Southern Riparian Scrub	-	0.790
63320	Southern Willow Scrub	0.010	-
	Southern Willow Scrub Disturbed	0.976	-

Vegetation Classification Category[1]	Vegetation Community and Land Cover Types	Mitigation Parcel (Acreage)	Upstream Enhancement Area (Acreage)
63810	Tamarisk Scrub	54.995	1.318
12000	Urban/Developed	0.014	0.396
42000	Valley and Foothill Grassland	2.078	0.370
	Grand Total	**285.061**	**31.976**

[1] Based on Oberbauer et al. 2008.

[2] The use of the modifier "disturbed" is used to denote a degraded state in the mapped habitat but does not conform to the use of the term in Oberbauer et al.

3.8.1 Arundo-Dominated Riparian

These areas are densely vegetated riparian thickets dominated almost exclusively by giant reed. This designation should only be used where Arundo accounts for greater than 50% of the total vegetative cover within a mapping unit. This species is a problem throughout Southern California and is extensive along most of the major rivers. In San Diego County, this vegetation community is common in major river channels such as Otay River, Sweetwater River, San Diego River, San Dieguito River, and San Luis Rey River.

3.8.2 Chamise Chaparral

This community is dominated by chamise (*Adenostoma fasciculatum*) and exists in the southeastern portion of the mitigation site. This habitat is an important community for a variety of small native animals such as rodents, rabbits, and lizards as well as their predators such as the California species of special concern red diamond rattlesnake (*Crotalus ruber*).

3.8.3 Diegan Coastal Sage Scrub

Diegan coastal sage scrub is considered to be a sensitive habitat by USFWS, CDFW, and many local jurisdictions and is thought to be one of the most endangered vegetation types in California (Atwood 1993); it is characterized by low-growing, woody, drought-deciduous aromatic shrubs and typically occurs on hotter, south-facing slopes. Diegan coastal sage scrub was the dominant habitat type on the coastal plains of San Diego County; its occurrence has been greatly reduced by development. Because of prior significant disturbance within the mitigation area, Diegan coastal sage scrub exists in tracts of varying quality and species composition. This habitat exists in the mitigation area along roadsides and hillsides; this community is often dominated by California buckwheat, deerweed (*Acmispon glaber*), and white sage (*Salvia apiana*) with scattered individuals of lemonade berry (*Rhus integrifolia*) and California sagebrush that are suffering severely from current drought conditions. Other areas along roads and streambeds are heavily dominated by broom baccharis. The Diegan coastal sage scrub community within the floodplain is dominated by California buckwheat, laurel sumac, toyon, and lemonade berry while low-lying areas with more moisture contain abundant San Diego marsh-elder (*Iva hayesiana*; California Rare Plant Rank 2.2). A few drought-affected individuals of San Diego barrel cactus (*Ferocactus viridescens*) occur within the mitigation area. This community provides nesting habitat for a variety of avian species including those protected by the Migratory Bird Treaty Act (MBTA) and it has the potential to support state- and/or federally listed species protected by the Endangered Species Act, including federally listed as

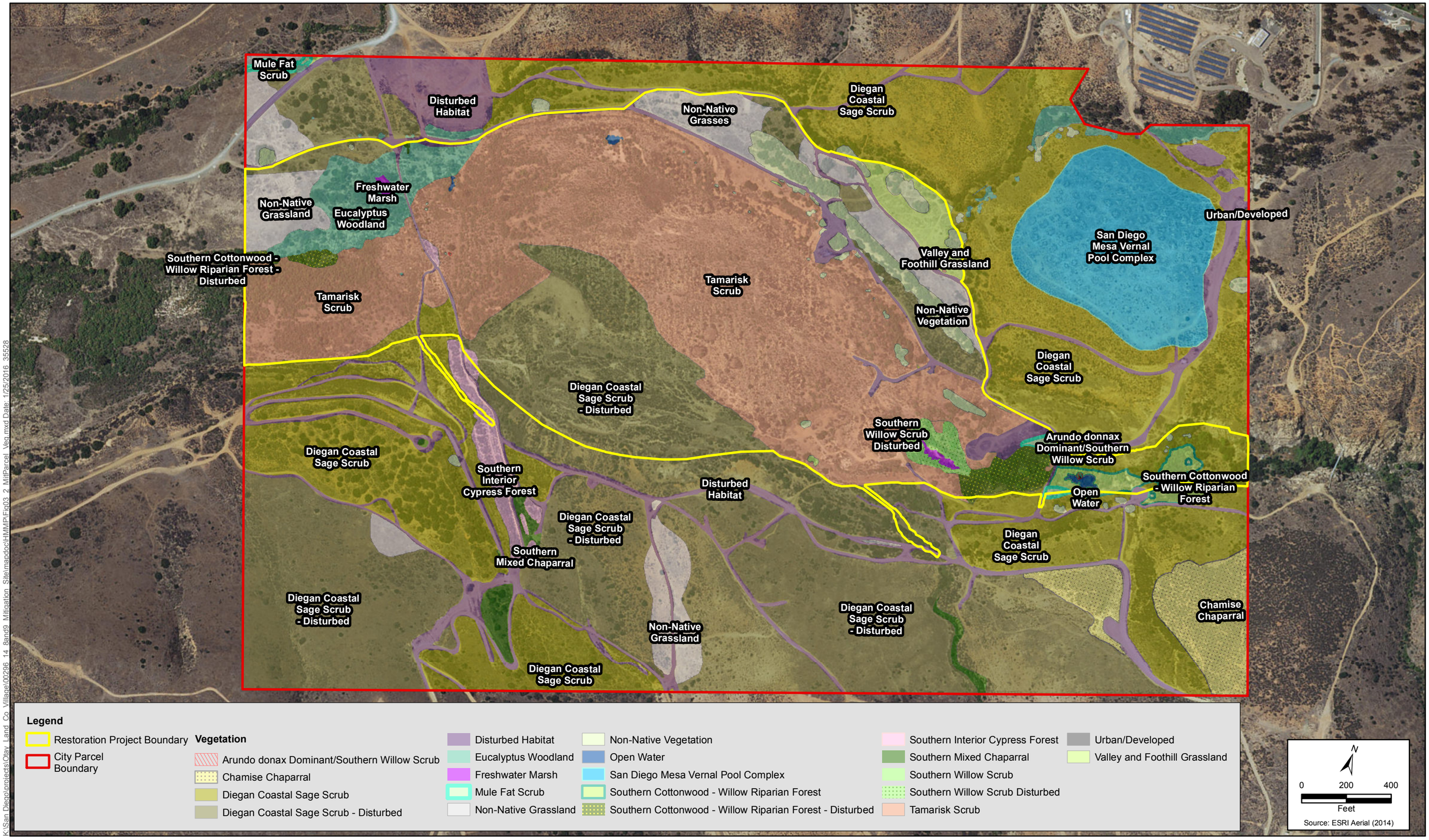

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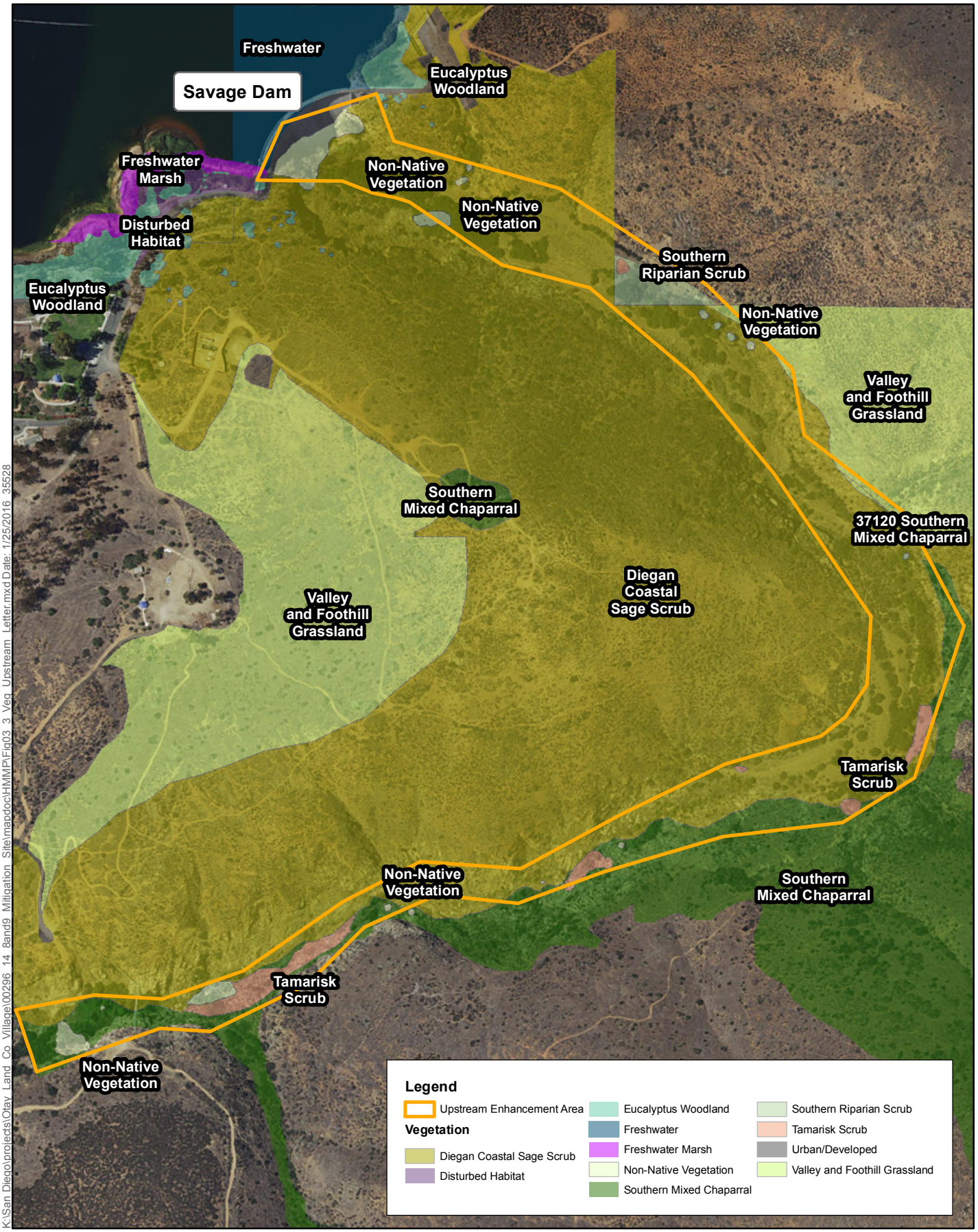
Figure 3-2
Mitigation Parcel Vegetation Map
Otay River Restoration Project



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N

0 200 400

Feet

Figure 3-3
Upstream Enhancement Area
Otay River Restoration Project

threatened and California species of special concern coastal California gnatcatcher (*Polioptila californica californica*) and the federally listed as endangered Quino.

3.8.4 Disturbed Habitat

Disturbed habitat consists of areas that have experienced persistent mechanical disturbance that has resulted in severely limited native plant growth; these areas may be depauperate or may support sparsely distributed nonnative and/or native vegetation. Disturbed areas exist within the floodplain area as dirt roads and as areas that experience heavy use by off-road vehicles.

3.8.5 Eucalyptus Woodland

This habitat often consists of monotypic stands of introduced eucalyptus trees. The understory is typically depauperate or sparse due to allelopathic properties of the eucalyptus leaf litter. While not described in Holland (1986) as a distinct vegetation community, it is assigned a category in the Draft Vegetation Communities of San Diego County (Oberbauer et al. 2008); it is widespread throughout San Diego County, often occupying large tracts of land and displacing native plant communities. Eucalyptus trees are found as individuals or in small populations throughout both the Otay River channel and the Otay River floodplain. A large eucalyptus woodland exists in the northwestern portion of the site that also contains tamarisk and pepper trees. Eucalyptus woodlands provide habitat and foraging value for many native animals, and are utilized by raptors for nesting and roosting sites and may therefore be considered a resource for those species.

3.8.6 Fresh Water (Open Water)

Fresh water areas are composed of year-round bodies of fresh water (extremely low salinity) in the form of lakes, streams, ponds, or rivers. This includes those portions of water bodies that are usually covered by water and contain less than 10% vegetative cover. Within the Mitigation parcel these areas are predominantly located in the seasonal ponds, which are deep enough to hit groundwater on the northern side of the floodplain as well as upstream of the eastern channel crossing where water ponds. In this dry intermittent/ephemeral setting, these year-round fresh water sources are a unique habitat.

3.8.7 Freshwater Marsh

This community occurs in areas where water tends to accumulate and supports emergent plant species such as cattail (*Typha* sp.) and bulrush (*Scirpus* sp.). Freshwater marsh occurs in scattered locations within the Otay River channel and the floodplain. This community provides nesting habitat for the red-winged blackbird (*Agelaius phoeniceus*) and marsh wren (*Cistothorus palustris*), and provides foraging habitat for numerous avian species.

3.8.8 Mule Fat Scrub

A depauperate, tall, herbaceous riparian scrub strongly dominated by mule fat (*Baccharis salicifolia*) and commonly found in intermittent stream channels with fairly coarse substrate. This early seral community is maintained by frequent flooding. Absent the frequent disturbance, most stands would succeed to cottonwood (*Populus fremontii*) or sycamore (*Platanus racemosa*) dominated riparian

forests or woodlands. This habitat is heavily used for both nesting and foraging by birds including coastal California gnatcatcher and least Bell's vireo (*Vireo bellii pusillus*).

3.8.9 Nonnative Grassland (or Annual Grassland)

Nonnative grassland is a dense to sparse cover of annual grasses with flowering culms less than 1 meter high. The vegetation community often occurs where native habitats such as native grassland and coastal sage scrub habitat have been disturbed or removed. It is often associated with numerous species of showy-flowered, native annual forbs ("wildflowers"), especially in years of favorable rainfall. In San Diego County the presence of black mustard (*Brassica nigra*), slender wild oats (*Avena barbata*), a variety of brome grasses (*Bromus* sp.), and red-stem filaree (*Erodium cicutarium*) are common indicators. In some areas, depending on past disturbance and annual rainfall, annual forbs may be the dominant species; however, it is presumed that grasses will soon dominate. Germination occurs with the onset of the late fall rains; growth, flowering, and seed-set occur from winter through spring. With a few exceptions, the plants are dead through the summer–fall dry season, persisting as seeds. Remnant native species are variable.

Nonnative grasslands are considered sensitive habitat by CDFW and some local jurisdictions because they may serve as habitat linkages and may support raptor foraging and sensitive plant species. Nonnative grassland occurs in scattered locations within the mitigation area including along roadsides and upon hillsides containing species such as black mustard, slender wild oats, a variety of brome grasses, horehound (*Marrubium vulgare*), prickly lettuce (*Lactuca serriola*), and tocalote (*Centaurea melitensis*). Some isolated individual native shrub species persist in some of these areas. This habitat supports a variety of small native mammals, such as Botta's pocket-gophers (*Thomomys bottae*) and native reptiles such as the Southern Pacific rattlesnake (*Crotalus oreganus helleri*), and is often of value to raptors as foraging areas.

3.8.10 Nonnative Vegetation

Nonnative vegetation communities are dominated by plant species that do not naturally and historically occur in this region. Some nonnative species may be characterized as invasive due to their ability to out-compete and displace native species. Nonnative vegetation within the mitigation area includes pepper tree, eucalyptus, pampas grass (*Cortaderia selloana*), and tamarisk. Although this community may provide some support of native animal species in the form of shelter, foraging habitat, and roosting or nesting habitat, it is generally understood to degrade natural conditions, and may result in the exclusion of certain native animal species that are dependent upon natural plant species and habitats for their survival.

3.8.11 San Diego Mesa Vernal Pool

This habitat is characterized by small depressions in flat-topped marine terraces where Fe-Si cemented hardpan prevents downward drainage of rainwater. Soils often are stonier than Northern Hardpan Vernal Pools, and are always coarser and redder than San Diego Mesa Claypan Vernal Pools. San Diego Mesa Vernal Pool is very similar in aspect to Northern Hardpan Vernal Pools, but with different species composition. This is a low, amphibious, herbaceous community dominated by annual herbs and grasses. Germination and growth begin with winter rains, often continuing even when inundated. Rising spring temperatures evaporate the pools, leaving concentric banks of vegetation that colorfully encircle the drying pool. Surrounding high ground is often mantled with

chamise chaparral. In addition to often supporting a suite of unique wildlife including fairy shrimp and various amphibians, these pools also host a variety of unique flora. This includes San Diego button-celery (*Eryngium aristulatum* var. *parishii*), tiny mousetail (*Myosurus minimus*), spreading navarretia (*Navarretia fossalis*), and Otay Mesa mint (*Pogogyne nudiuscula*).

3.8.12 Southern Cottonwood – Willow Riparian Forest

This habitat is composed primarily of tall tree species such as willows, cottonwood and sycamore that are adapted to wet conditions, and are found in streambeds and other wet areas. They support high avian diversity and abundance, and provide nesting habitat for species such as yellow warbler (*Setophaga petechia*), Cooper's hawk (*Accipiter cooperii*), and willow flycatcher (*Empidonax traillii*).

3.8.13 Southern Interior Cypress Forest

This community is considered a sensitive natural community by the California Natural Diversity Database (CNDDB) and applicable local jurisdictions. It is typically a dense, fire-maintained, low forest of even-aged stands of Tecate cypress, often surrounded by chaparral. The mitigation area contains stands of Tecate cypress, a tree found only in four isolated groves in Orange County and San Diego County, and in Baja California, Mexico. In San Diego County, groves occur on Guatay Mountain, Otay Mountain, and Tecate Peak. The majority of the Otay Mountain population burned during the Otay Fire in 2003, and most of the Tecate Peak population burned during the Harris Fire of 2007. The rare Thorne's hairstreak butterfly (*Callophrys* [*Mitoura*] *gryneus thornei*) is completely dependent upon this species for its survival; this butterfly lays eggs only upon this species of cypress.

3.8.14 Southern Mixed Chaparral

Southern mixed chaparral occurs in the coastal foothills of San Diego County and northern Baja California, usually below 3,000 feet (910 meters). It is composed of broad-leaved sclerophyll shrubs ranging in height from 1.5 to 3 meters tall. It is a dense habitat but occasionally occurs with patches of bare soil or with Venturan Coastal Sage Scrub (32300) or Riversidean Sage Scrub (32700) forming a mosaic. In San Diego County, it is dominated by blue-colored lilacs, especially Ramona lilac (*Ceanothus tomentosus* var. *olivaceus*) as well as *C. leucodermis* and *C. oliganthus*; other *Ceanothus* spp. generally indicate other chaparral types.

3.8.15 Southern Riparian Scrub

This vegetation community occurs throughout San Diego County and is characterized by riparian zones dominated by small trees or shrubs, lacking taller riparian trees. At times it can be found encroaching into some Coastal Saltmarsh habitats. It is often associated with river systems where scour events occur, minimizing the opportunity for large trees to form. This habitat is characterized by arroyo willow (*Salix lasiolepis*) and other willow species (*Salix* spp.). As with other riparian habitats, it often supports a diverse assemblage of birds including the federally listed least Bell's vireo.

3.8.16 Southern Willow Scrub

Southern willow scrub communities are riparian thickets dominated by several willow species, mule fat, and occasionally western cottonwood. Many stands are too dense to allow much understory development. Within the mitigation area this community included Goodding's black willow (*Salix gooddingii*), cattail, Mexican fan palm (*Washingtonia robusta*), giant reed, Canary Island date palm, and Peruvian pepper tree. Southern willow scrub in the mitigation area supports the federally and state-listed as endangered least Bell's vireo and provides suitable nesting habitat for a variety of bird species protected by the federal MBTA.

3.8.17 Tamarisk Scrub

This community comprises a weedy, virtual monoculture of tamarisk species. These stands often occur as a result of major disturbance. Tamarisk outcompetes native species due to its extensive lateral root system that can draw down the water table, and it develops very deep roots. Its leaves secrete salt crystals that when introduced into the soil can prevent native plants from establishing. Tamarisk is also prolific seeder, and has replaced riparian habitat within the floodplain that was disturbed as a result of sand-mining activities.

3.8.18 Urban/Developed

Urban/developed land cover is characterized by areas that have been constructed upon or otherwise physically altered to an extent that native vegetation is no longer supported. Developed land is characterized by permanent or semi-permanent structures, pavement or hardscape, and landscaped areas that often require irrigation. Areas where no natural land is evident due to a large amount of debris or other materials being placed upon it may also be considered Urban/Developed (e.g., car recycling plant, quarry). Little to no vegetation occurs in these areas other than ruderal, disturbance-loving species and a variety of ornamental (usually nonnative) plants.

3.8.19 Valleys and Foothill Grassland

Valleys and Foothill Grassland are a low-growing (less than 2 feet) grassland habitat dominated by perennial, tussock-forming purple needlegrass (*Stipa* [previously *Nasella*] *pulchra*). Native and introduced annuals occur between the perennials, often actually exceeding the bunchgrasses in cover. In San Diego County, native perennial herbs such as sanicles (*Sanicula* spp.), checkerbloom (*Sidalcea* spp.), blue-eyed grass (*Sisirynchium bellum*), California poppy (*Eschscholzia californica*), or goldfields (*Lasthenia* spp.) are present. Nonnative grasses occurring include those described in the nonnative grassland vegetation community above. The percentage cover of native species at any one time may be quite low, but is considered native grassland if 20% aerial cover of native species is present.

3.9 Sensitive Species

No formal plant or wildlife surveys have been conducted within the restoration sites. At this time, wildlife species within the restoration sites are limited due to the lack of native habitat and the disturbed nature of the sites. Prior to conducting fieldwork, the CNDDB (CDFW 2015) was reviewed for the most recent distribution information for special-status plant and wildlife species within the

Otay Lakes USGS quadrangles. Table 3-2 depicts the approximate locations of these observations within a 1-mile radius of the project area.

Special-status species are those that meet any of the following criteria.

- Listed as endangered, threatened, or proposed for listing as endangered by USFWS.
- Listed as endangered, threatened, or rare by CDFW.
- Considered special vascular plants, bryopytes, or lichens by CDFW.
- Listed on the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants of California.
- Considered "special animals" by CDFW.

A search of the CNDDB revealed 41 species of plants and wildlife that were recorded within 1 mile of the restoration site (Appendices C and D). An additional 19 wildlife species with no CNDDB records within 1 mile of the restoration site were also determined to have potential to occur in the plan area based on species range and habitat requirements. These species are also included in Appendix D. Federally and/or state-listed plant and wildlife species that are known to occur in the mitigation site are presented in Table 3-2. A brief discussion of these species follows.

Table 3-2. Federally and/or State-Listed Species with CNDDB Records Within 1-Mile Radius of the Restoration Areas

Scientific Name	Common Name	Status	Nearest Distance (feet)
Plants			
Deinandra conjugens	Otay tarplant	FT, SE	Found on site
Eryngium aristulatum var. *parishii*	San Diego button-celery	FE, SE	180
Navarretia fossalis	spreading navarretia	FT	Found on site
Pogogyne nudiuscula	Otay Mesa mint	FE, SE	1,982
Wildlife			
Branchinecta sandiegonensis	San Diego fairy shrimp	FE	Found on site
Streptocephalus woottoni	Riverside fairy shrimp	FE	423
Euphydryas editha quino	Quino checkerspot butterfly	FE	660
Vireo bellii pusillus	least Bell's vireo	FE, SE	Found on site
Polioptila californica californica	coastal California gnatcatcher	FT	Found on site
Coccyzus americanus occidentalis	western yellow-billed cuckoo	FT, SE	4

Federal
FE = listed as endangered under the federal Endangered Species Act.
FT = listed as threatened under the federal Endangered Species Act.
State
SE = listed as endangered under the California Endangered Species Act.

3.9.1 San Diego Fairy Shrimp (*Branchinecta sandiegoensis*) – Federally Listed as Endangered

San Diego fairy shrimp are small freshwater crustaceans that are found in shallow vernal pools and other ephemeral basin (USFWS 2002). San Diego fairy shrimp is found in southwestern coastal California and extreme northwestern Baja California, Mexico, with all known localities below 2,300 feet and within 40 miles of the Pacific Ocean, from Santa Barbara County south to northwestern Baja California (USFWS 1997, 1998a, 2002). These species can also occur in road ruts and ditches that provide suitable conditions for the species. Water temperature is an important factor for this fairy shrimp. The water must not get too hot (above 86°F) or too cold (below 41°F) for this species to occur (USFWS 2002). San Diego fairy shrimp were historically prevalent in vernal pool complexes across Otay Mesa (USFWS 2008).

3.9.2 Riverside Fairy Shrimp (*Streptocephalus woottoni*) – Federally Listed as Endangered

Riverside fairy shrimp are limited to a small number of vernal pools, all in Riverside, San Diego, or coastal Orange counties or Baja California. This small (less than an inch long) shrimp spends late spring and summer as an encysted embryo, lying in the soil left behind when the pools dry up. After the rains of winter arrive, filling the pools again, the larvae emerge and mature into adults, filter feeding on detritus and zooplankton. This process may require as much as 2 months to complete, depending on water temperature. Because of this relatively long development period, *S. woottoni* tends to be found only in deeper, more dependable pools. Survival of this species is further challenged by its inability to tolerate muddy, salty, or alkaline conditions. Listed as endangered on August 2, 1993, major threats include habitat loss due to urban and agricultural development, off-road vehicles, trampling, and other human-initiated disturbance

3.9.3 Quino Checkerspot Butterfly (*Euphydrayas editha quino*) – Federally Listed as Endangered

Quino checkerspot butterfly is a subspecies of Edith's checkerspot (*E. editha*) and is a member of the Nymphalidae family, and the Melitaeinae subfamily, checkerspots and fritillaries. Primary host plants for the Quino are dot-seed plantain (*Plantago erecta*), thread-leaved bird's beak (*Cordylanthus rigidus*), and white snapdragon (*Antirrhinum coulterianum*). Larval Quino may also use other species of plantain (Plantago spp.) and annuals owl's clover (*Castilleja exerta*) as primary or secondary host plants and will diapauses in or near the base of native shrubs, such as California buckwheat. Quino are generally found in open areas and ecotone situations that may occur in a number of plant communities, and optimal habitat appears to contain little or no invasive exotic vegetation, and densely vegetated areas are not known to support Quino (Mattoni et al. 1997). Habitat patch suitability is determined primarily by larval host plant density, topographic diversity, nectar resource availability, and climatic conditions (USFWS 2003).

The life cycle of Quino begins with adult Quino during flight season between late February and May, when adult butterflies move about to search for nectar sources and mates. Eggs hatch in about 10 days, and larvae begin to feed immediately and migrate in search of additional plants to consume (USFWS 2003). When plants dry out, and the larvae are in their third or fourth instar of development, they enter an obligatory diapause. Diapause is a low-metabolic resting state that may

last a year or more depending on conditions, and enables larvae to survive seasonal climatic extremes and times of extended adverse conditions, such as drought. The time between diapause termination and pupation can range from 2 weeks to 3 months. Sufficient rainfall is required to break diapause, which normally occurs during November or December. After diapause, larvae become active and feed until they enter their pupal stage. Within 2 to 6 weeks they transform into adults and emerge as butterflies. Adults live for approximately 10 to 14 days.

3.9.4 Least Bell's Vireo (*Vireo bellii pusillus*) – Federally Listed as Endangered; State-Listed as Endangered

The least Bell's vireo is a small, grayish songbird whose breeding distribution extends northwest to from San Diego County north to Santa Barbara County (rarely to Monterey County and formerly to the northern Sacramento Valley), northeast to Inyo County, south into northern Baja California, Mexico, and east into the edges of the deserts at a few points such as at the Mohave River (USFWS 1998). Nesting elevation ranges from below sea level to at least 4,100 feet. The subspecies winters in southern Baja California (Howell and Webb 1995). Least Bell's vireo numbers are currently increasing, with a 400 to 500% increase estimated between 1986 and 1996. However, they remain imperiled in the long term, primarily by brown-headed cowbird (*Molothrus ater*) nest parasitism and threats to the quantity and quality of remaining potential habitat (USFWS 1998b).

Least Bell's vireos select dense vegetation low in riparian zones for nesting. As discussed in Franzreb (1989), among 126 locations of California nests recorded in the literature and in museum records, 71 (56%) were in willows and 14 (11%) were in wild rose (Rosa spp.). The remaining nests were distributed among 20 other species of vines, shrubs, herbs and trees. At least locally, least Bell's vireos will also fairly commonly use non-riparian habitats such as chaparral for foraging and even nest location when more typical habitat is adjacent (Kus and Miner 1989).

Willows often dominate the canopy layer in the species' territories, with a mean canopy height of about 26 feet (Salata 1983). Salata believed that a dense, shrubby layer near the ground was a critical component in the breeding habitat. Goldwasser (1981) found that the most critical structural component is a dense shrub layer from 2 to 10 feet from the ground, which agrees with findings of both Salata (1983) and Gray and Greaves (1984). Vegetation preferences are well-summarized in the study by Goldwasser: "Willows are chosen most frequently as nest sites, although nearly all other common riparian shrub species are used. The frequency with which a given plant is chosen seems to be consistent with the relative abundance of shrubs growing in riparian woodlands. There is no obvious preference for any of the uncommon shrubs as nest sites and no apparent avoidance of the abundant species such as willows."

As determined from field data for Southern California (RECON 1990) vireo nest sites are most frequently located in riparian stands between 5 and 10 years old. Even though mature trees are present at many of the sites, the average age of willow vegetation in the immediate vicinity of most nests was between 4 and 7 years. When mature riparian woodland is selected, vireos nest in areas with a substantial robust understory of willows as well as other plant species (Goldwasser 1981). Based on rigorous statistical analysis of vireo habitat structure and composition (RECON 1990), vireos appear to select sites with large amounts of both shrub and tree cover, a large degree of vertical stratification, and small amounts of aquatic and herbaceous cover.

3.9.5 Coastal California Gnatcatcher (*Polioptila californica californica*) – Federally Listed as Threatened

The coastal California gnatcatcher is a small, gray, insect-gleaning bird. It is the only subspecies of the California gnatcatcher occurring in the United States. It is a year-round resident of sage scrub of several subtypes and is currently listed by USFWS as a threatened species (USFWS 1993, 1995). Within California it is found from the Mexican border north to extreme eastern and southern Los Angeles County with several small, disjunct populations known north to the Moorpark area of Ventura County. It extends east into western San Bernardino County and well across cismontane Riverside County. Habitat losses, degradation, and fragmentation due to land alteration and development are considered the major threats (Atwood 1990, 1993).

3.9.6 Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) – Federally Listed as Threatened; State-Listed as Endangered

This neotropical migrant is a relative of the roadrunner and an inhabitant of extensive riparian forests. It formerly occurred from southwestern British Columbia south to the highlands of northern Mexico and the Yucatan Peninsula, wintering in South America. It has declined from a fairly common, local breeder in much of California 60 years ago, to virtual extirpation, with only a handful of tiny populations remaining in all of California today. Losses are tied to obvious loss of nearly all suitable habitat, but other factors may also be involved. Relatively broad, well-shaded riparian forests are utilized, although it tolerates some disturbance. A specialist to some degree on tent caterpillars, young develop remarkably quickly covering only 18–21 days from incubation to fledging.

3.10 Jurisdictional Delineation

A jurisdictional delineation was performed by ICF biologists within the mitigation site on November 12 and 13, 2014. Prior to beginning the field delineation aerial photography, USGS topographic maps and National Wetland Inventory maps were analyzed to determine the locations of potential areas of USACE, RWQCB, and CDFW jurisdiction. Based on the pre-field analysis it was determined that both wetland and non-wetland features had the potential to occur within the plan area.

Potential jurisdictional features were evaluated for the presence of a definable channel and/or wetland vegetation, soils, and hydrology. The plan area was analyzed for potential wetlands using the methodology set forth in the 1987 *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the 2008 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008a). Lateral limits of non-wetland waters were identified using field indicators (e.g., ordinary high water mark [OHWM]) (USACE 2008b). While in the field, potential jurisdictional features were recorded onto a 100-foot-scale color aerial photograph using visible landmarks and mapped using a Trimble hand-held Global Positioning System (GPS) unit with sub-meter accuracy. Vascular plants were identified using *The Jepson Manual: Vascular Plants of California* (Baldwin et al. 2012) and *The National Wetland Plant List* (Lichvar et al. 2014).

A total of 13 features were delineated on site, including the Otay River, 9 ephemeral/intermittent tributaries, and 3 depressional wetlands/open water areas located farther in the floodplain. Table 3-3 presents the acreage and linear feet for each feature delineated. Figure 3-4 shows the location and extent of USACE/RWQCB and CDFW jurisdiction. Below is a brief description of each feature delineated.

Feature 1 is the Otay River, which enters the site from the east (flowing west) and supports wetland habitat within its defined OHWM for approximately 1,306 feet until it sheetflows within a board floodplain across the remainder of the property.

Feature 2 is an ephemeral drainage, flowing in a northern direction for approximately 1,093 linear feet before entering the Otay River.

Feature 3 is an ephemeral drainage, flowing west along a hillside. Indicators of OHWM and a defined bed and bank end at an access road, and the feature appears to sheetflow toward the bottom of the valley.

Feature 4 supports OHWM and wetland habitat and flows in a northern direction within the survey area. The upstream portion of Feature 4 supports wetland habitat, supporting both shallow groundwater and a dominance of San Diego marsh-elder, a facultative wetland species. However, the downstream portion of the feature does not support wetland habitat or shallow groundwater contributions and is more characteristic of an ephemeral drainage, dominated by upland coastal sage scrub species. Indicators of OHWM and a defined bed and bank end at an access road, and the feature appears to sheetflow toward the bottom of the valley.

Feature 5, also known as O'Neal Canyon Creek, is an intermittent drainage that flows in a northwestern direction within the survey area. This feature supports OHWM and is characteristic of a desert wash; until it hits the valley floor a defined channel no longer exists and the channel sheetflows west along with the Otay River.

Feature 6 is an ephemeral drainage that flows in a southwestern direction. OHWM was observed throughout the length of the feature. The feature flows outside of the mitigation site survey area, eventually flowing along the valley bottom.

Feature 7 is an ephemeral drainage, flowing in a southern direction before flowing directly within the Otay River.

Feature 8 is an ephemeral drainage that flows in a northwest direction for approximately 321 linear feet before dissipating. Indicators of OHWM and a defined bed and bank end once the feature reaches a flat and broad open space, and appears to only sheetflow toward the bottom of the valley.

Feature 9 is an ephemeral drainage, flowing south along a hillside before turning west, paralleling an access road. The feature eventually peters out and sheetflows along the road no longer supporting a defined OHWM or bed and bank.

Feature 10 is also known as Salt Creek. Only a short segment (307 linear feet) occurs within the mitigation site. This feature supports both OHWM and wetland habitat, dominated by mule fat and southern cattail (*Typha domingensis*).

Features 11 and 12 are human-made depressional wetlands that are primarily unvegetated open water habitat with a freshwater marsh fringe. These features support both a defined OHWM and wetland habitat.

Feature 13 is a human-made depressional wetland supporting freshwater marsh habitat. This feature supports both a defined OHWM and wetland habitat.

Table 3-3. Existing Mitigation Area Wetlands and Waters

		USACE/RWQCB		CDFW	
Feature #	Stream Length (linear feet)	Non-Wetland (acres)[1]	Wetland (acres)[1]	Streambed (acres)[1]	Riparian (acres)[1]
1 (Otay River)	1,306		0.98		1.94
2	1,093	0.17		0.30	
3	678	0.05		0.07	
4	704	0.08	0.32	0.15	0.32
5 (O'Neal Canyon Creek)	2,096	0.91		1.51	
6	891	0.07		0.13	
7	206	0.01		0.02	
8	321	0.02		0.04	
9	588	0.03		0.06	
10 (Salt Creek)	307		0.12		0.28
11	N/A		0.05		
12	N/A		0.02		
13	N/A		0.12		
Total	**8,191**	**1.34**	**1.62**	**2.28**	**2.54**

[1]Total acreage may not add up to the total shown; total is reflective of rounding geographic information system (GIS) raw data in each category.
USACE = U.S. Army Corps of Engineers
RWQCB = Regional Water Quality Control Board
CDFW = California Department of Fish and Wildlife
N/A = not applicable

3.11 Existing Functions and Values

Although the site is degraded and the wetlands within the Mitigation parcel are limited as a result of past activities, there are still various functions provided by the existing wetlands and the adjacent upland areas (Figure 3-3). These functions may include but are not limited to groundwater recharge due to the extensive alluvium soils on site, wildlife movement opportunities due to the connectivity to adjacent open space and preserve land, and nesting and foraging habitat associated with the existing vegetation. The area provides foraging and limited water sources for a variety of mammal, avian, reptile and amphibian species, including sensitive species. Coastal California gnatcatcher is present within coastal sage scrub communities on site, and the area has potential to support the federally listed as endangered Quino checkerspot butterfly. Southern willow scrub in the area supports the federally and state-listed as endangered least Bell's vireo and provides suitable nesting habitat for a variety of bird species protected by the MBTA. The dry conditions in the floodplain have allowed for the establishment of several groves of the Tecate cypress. A major population of this species was severely affected by the Otay Fire of 2003; this floodplain population may be an important source for seed for restoration on Otay Mountain and other areas.

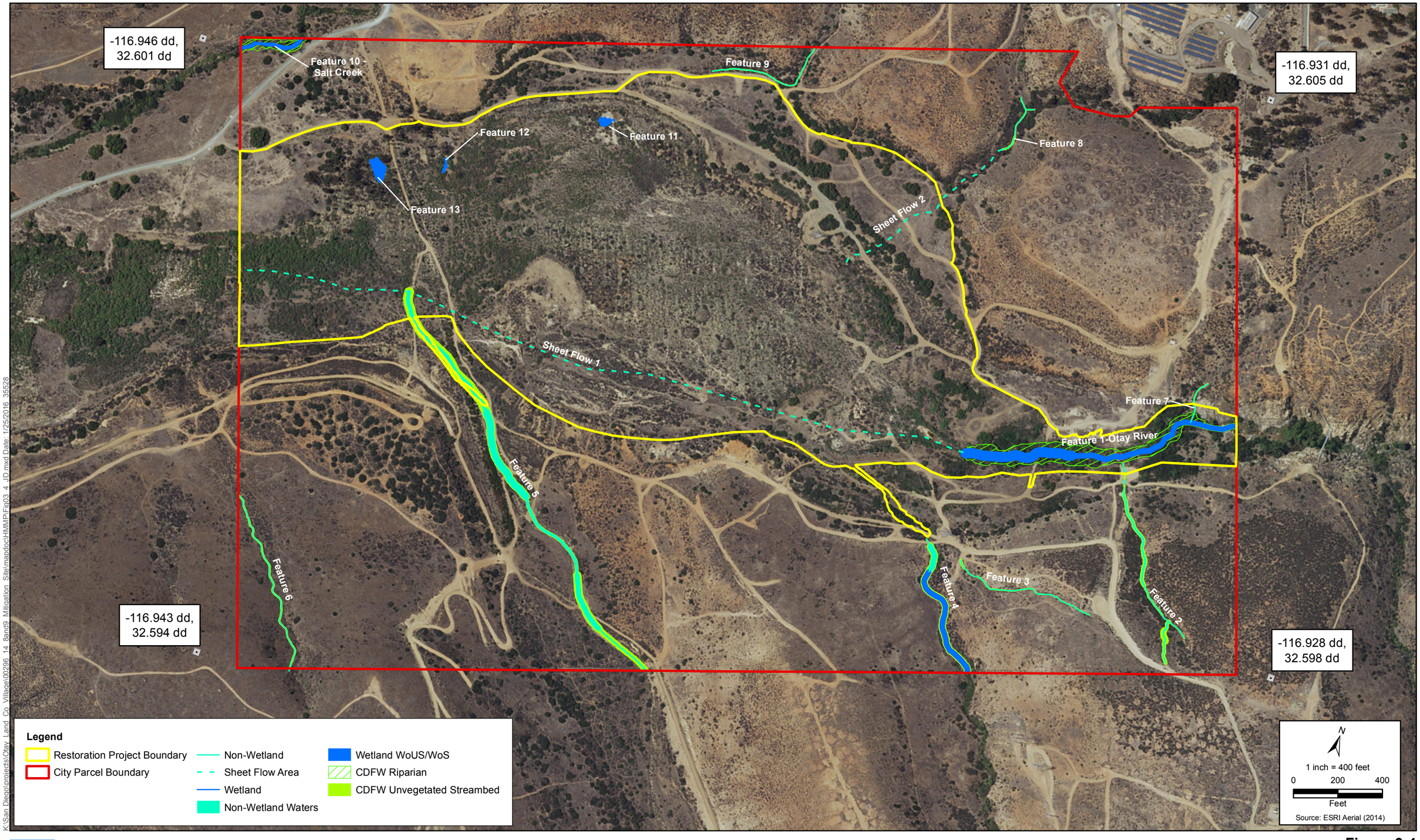

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Figure 3-4
Jurisdictional Delineation
Otay River Restoration Project

Current wetland conditions were assessed using the California Rapid Assessment Method (CRAM). CRAM was conducted on the upstream channel at the eastern side of the parcel and within one of the three onsite seasonal pools. This information will be used with the restoration design to project the expected "lift" to wetland condition following restoration. CRAM measures ambient conditions of a wetland and has been in development over the last 10 years in collaboration with resource agencies and scientists throughout California. The overall goal of CRAM is to "provide rapid, scientifically defensible, standardized, cost-effective assessments of the status and trends in the condition of wetlands and related policies, programs and projects throughout California" (CWMW 2013).

The final CRAM score for each Assessment Area (AA) is composed of four main attribute scores (buffer and landscape context, hydrology, physical structure, and biotic structure), which are based on the metric and submetric scores (a measurable component of an attribute) (Table 3-4). The anticipated relationships between the CRAM attributes and metrics, and various ecological services expected from conceptual models of wetland form and function, are presented in Table 3-5. The CRAM practitioners assign a letter rating (A–D) for each metric/submetric based on a defined set of condition brackets ranging from an "A" as the theoretical best case achievable for the wetland class across California to a "D," the worst case achievable. Each metric condition level (A–D) has a fixed numerical value (A=12, B=9, C=6, D=3), which, when combined with the other metrics, results in a score for each attribute. Each metric/submetric condition level (letter rating) has a fixed numerical value, which, when combined with the other metrics, results in a raw score for each attribute. That number is then converted to a percentage of the maximum score achievable for each attribute and represents the final attribute score ranging from 25 to 100%. The final overall CRAM score is the sum of the four final attribute scores, ranging from 25 to 100%.

Table 3-4. CRAM Attributes and Metrics

Attributes		Metrics and Submetrics
Buffer and Landscape Context		Aquatic Area Abundance Buffer: Percentage of Assessment Area with Buffer Average Buffer Width Buffer Condition
Hydrology		Water Source Hydroperiod Hydrologic Connectivity
Structure	Physical	Structural Patch Richness Topographic Complexity
	Biotic	Plant Community Composition: Number of Plant Layers Number of Codominant Species Percentage Invasion Horizontal Interspersion and Zonation Vertical Biotic Structure

Table 3-5. Expected Relationship among CRAM Attributes, Metrics, and Key Services

Attributes		Buffer and Landscape Context	Hydrology			Physical Structure		Biotic Structure				
Metrics or Submetrics		Buffer and Landscape Connectivity Metrics	Water Source	Hydroperiod	Hydrologic Connectivity	Structural Patch Richness	Topographic Complexity	Number of Plant Layers	Number of Codominant Species	Percentage Invasion	Horizontal Interspersion	Vertical Biotic Structure
Key Services	Short- or long-term surface water storage	√		√	√	√	√				√	√
	Subsurface water storage		√	√	√		√					
	Moderation of groundwater flow or discharge	√	√									
	Dissipation of energy					√	√	√			√	√
	Cycling of nutrients	√		√	√	√	√	√	√	√		√
	Removal of elements and compounds	√		√	√		√	√			√	
	Retention of particulates			√	√	√	√	√	√		√	
	Export of organic carbon			√	√			√		√	√	√
	Maintenance of plant and animal communities	√		√	√	√	√	√	√	√	√	√

A summary of the attribute scores for each of the CRAM assessment areas is provided in Table 3-6. For metric scores and worksheets, refer to Appendix E. The overall CRAM score for the upstream segment of the Otay River (Feature 1) was 74% and the depressional wetland (Feature 13) was 57%. A discussion of the scoring factors is provided below.

Table 3-6. Summary of CRAM Attribute Scores for Existing Wetland Features

Assessment Area (AA)	AA Size	Buffer and Landscape Context Score	Hydrology	Physical Structure	Biotic Structure	Overall CRAM Score
#1 (Riverine; Feature 1)	130 meters	93%	92%	37.5%	72%	74%
#2 (Depressional; Feature 13)	0.2 acre	48%	83%	38%	61%	57%

It is important to note that these CRAM scores are only applicable to the minimal wetlands documented on site. Because the remaining site is not currently classified as a wetland, the CRAM score for those areas is considered 0 at this point.

Attribute 1, Buffer and Landscape Context: Full 250-meter buffers were present throughout the AAs; however, they were primarily vegetated with nonnative grasses and/or disturbed coastal sage scrub and subject to minor soil disturbance. The Aquatic Area Abundance score (proximity to other aquatic resources) for the Depressional AA was low due to the minimum amount of adjacent aquatic features, which affected the overall attribute score.

Attribute 2, Hydrology: Due to the construction of the reservoir upstream, the watershed that drains to the AAs has diminished significantly. Since this has been the existing condition for the past century, the remaining existing watershed (i.e., excluding all areas upstream of the dam) was determined to be the appropriate watershed for this assessment. Water source throughout the site was primarily natural, with some runoff potentially occurring from the small amount of development surrounding the site. Some aggradation was observed within the Riverine AA, reducing its score to a B, while the Depressional AA received a reduced score in hydrologic connectivity due to its steep banks along approximately 60% of the AA.

Attribute 3, Physical Structure: Topographic Complexity and Structural Patch Richness scored low for both AAs. The AAs did not support benches and were generally flat along the channel bottom.

Attribute 4, Biotic Structure: Both AAs supported 2–3 plant layers with low species richness (three codominant species); the overall attribute scored low. However, invasive species were low within these areas, only accounting for 33% or less of the biotic structure.

3.12 Present and Proposed Uses of Mitigation Site and Adjacent Areas

The mitigation area is currently undeveloped. Open space bounds the western, eastern and southern boundaries of the mitigation area as well as large portions of the northern boundary. Various dirt roads and unofficial trails traverse the parcel. These roads are used for a variety of purposes including for National Security by the U.S. Border Patrol and for utility maintenance by SDG&E, OWD, the City of San Diego, and the City of Chula Vista. The roads also act as unofficial trails and are heavily used by hikers, cyclists, and equestrians (Figure 3-5). SDG&E accesses the site on a monthly basis to monitor the conditions of their electric poles and buried gas line. OWD manages a critical pipeline at the upstream end of the project as well as supporting infrastructure throughout their right-of-way. Both the City of San Diego and U.S. Border Patrol use the site for general access as it applies to their mission on this and adjacent properties.

Many of these roads are identified as future multi-use trails as part of the OVRP Concept Plan and the City Greenbelt Master Plan (Figures 3-5 and 3-6). Altogether there is approximately 6,500 linear feet of the future Greenbelt Master Plan trail and approximately 10,200 linear feet of OVRP trails that occur on the property. This area is a travel route for migrants entering the U.S. from Mexico; there is regular immigrant foot traffic through the river valley and a corresponding significant use of the area by Border Patrol agents using off-road vehicles. The persistent use by these large vehicles has resulted in large berms perpendicular to the flow of water at the upstream crossings, which

impound surface water, creating ponds upstream and forcing the limited surface water supply to go subsurface.

Large portions of the floodplain area are fenced along the south side at the road edge, and there are several signs denoting this area as a sensitive habitat. The upland roads experience regular use by bicyclists, and the floodplain area experiences heavy use by equestrians, despite the sensitive habitat signs posted along the fence. The equestrians additionally appear to be grazing their horses within the upland and floodplain habitats; several large areas of grazing by horses were noted as evident by hoof prints and horse droppings. Adjacent land uses include the OVRP and City of Chula Vista Water Treatment Plant north of the floodplain, and the Richard J. Donovan and George Bailey Correctional Facilities to the south. Nearby planned land uses include light industry in the agricultural areas of upper Johnson Canyon and low-density residential housing north of O'Neal Canyon. Although the Project has attempted to focus users (i.e., Border Patrol and recreationalists) to key access roads and trails while closing some permanently, it has not been designed to preclude future trail development and use.

As road and trail uses are expected to persist and potentially increase with the future construction of the Otay Villages, it is critical to protect the restoration site while simultaneously educating the public and maintaining utility access. To prevent the restoration site from being disturbed by future users, wooden split-rail fencing would be installed at key locations along these existing road and trail corridors (Figures 3-5 and 3-6). The fencing, along with signage indicating the general sensitivity of the restoration site and providing wayfinding, would help to minimize trespassing from trail users who would otherwise be unaware of the sensitivity of the habitat restoration area. In addition, educational kiosks would be installed at key viewing locations within the disturbed areas near the existing dirt roadways to help inform the readers of the importance of the restoration site.

Figures 3-5 and 3-6 identify the designated Greenbelt Master Plan (Master Plan) trail and the OVRP trails, and indicate where these corridors are located within the project site. The figures also indicate which trails (i.e., existing roads) would receive trail improvements such as split-rail fencing, signage, and educational kiosks and which trails would be closed. Improvements associated with the portion of the trail identified within the City of Chula Vista's Greenbelt Master Plan would be consistent with the guidelines of that plan and would be installed on existing roads or disturbed habitat that cross and meander in and out of and along the restoration site's northern boundary. Per the Master Plan as well as SDG&E Right of Way Guidelines, the restoration project would identify a 14-foot-wide trail location for the Greenbelt Trail to accommodate multiple uses. Improvements associated with trails identified under the OVRP Concept Plan would be consistent with the guidelines of that plan and would be installed on existing roads that cut through the restoration site and also meander south and east across the property. The restoration project would allow for trail corridors consistent with Type A, B, and C that range between 4 and 8 feet in width. All road and trail improvements would avoid existing road ponds that support San Diego fairy shrimp by moving the alignment as needed, and the adjacent upland area would be restored with native species.

The proposed restoration project would armor two at-grade road crossings through the active floodplain to provide access to the user community while protecting the restored hydrology on site. The western (downstream) crossing corresponds to the 40 foot wide SDG&E right-of-way corridor for a 36 inch gas transmission line. Any improvements to this crossing with be done in accordance with the SDG&E gas pipeline cover standards. The draft 60% plans will be provided to SDG&E Electric and Gas Transmission department for review and comments.

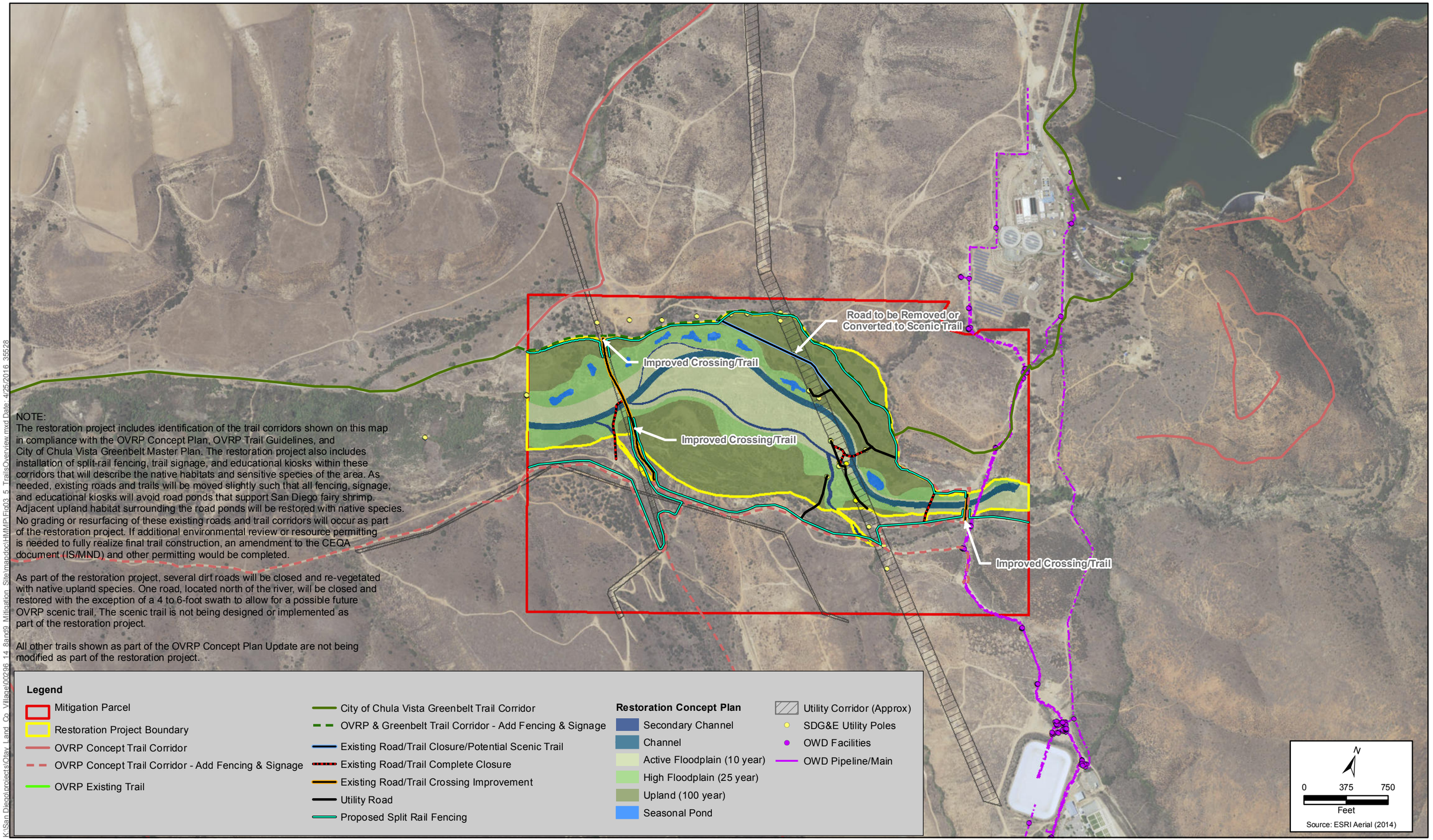

Figure 3-5
Existing Infrastructure, OVRP Concept Plan Trails, and Other Constraints
Otay River Restoration Project

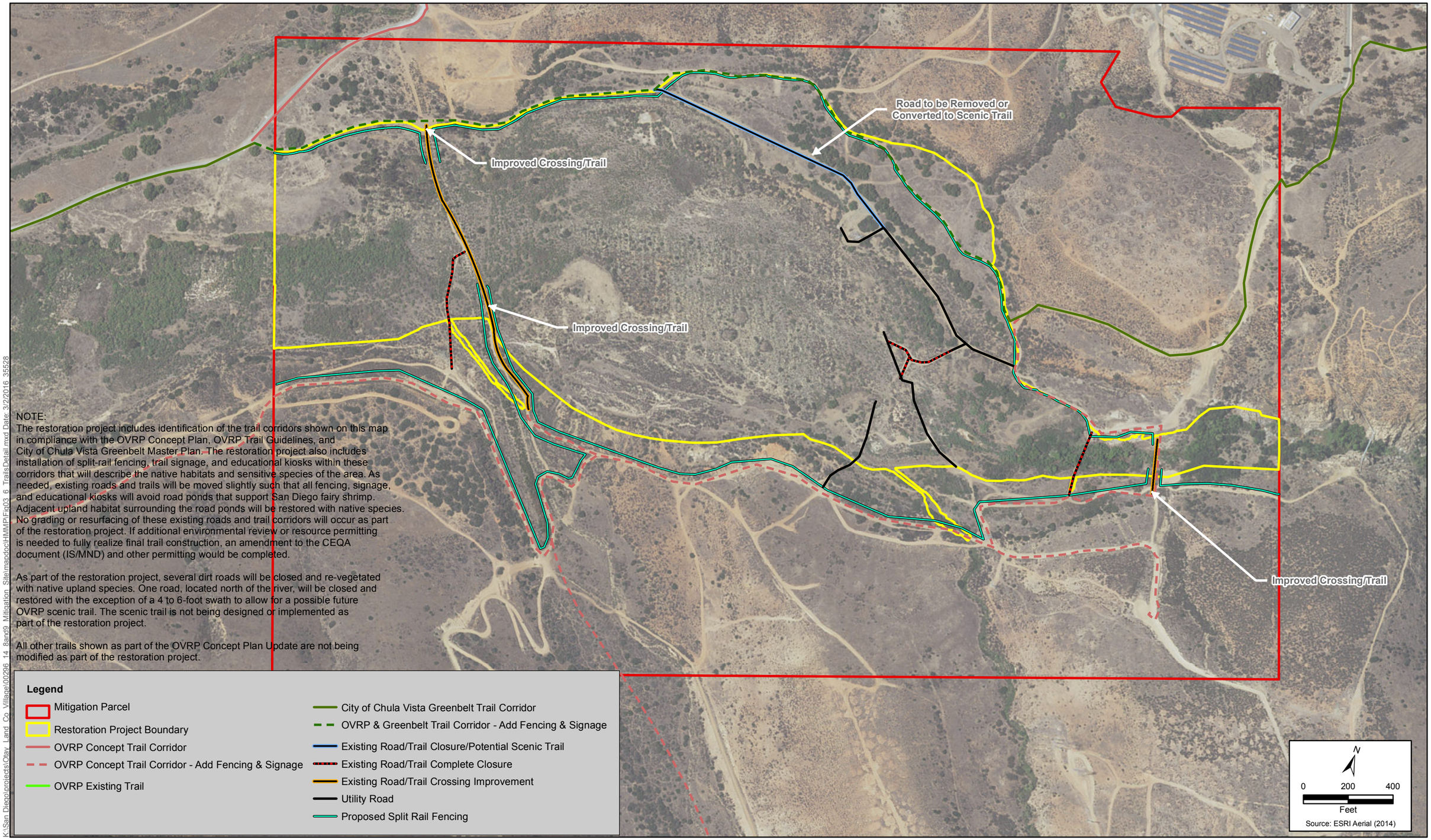

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Figure 3-6
Mitigation Parcel Trails
Otay River Restoration Project

Proposed general improvements to each crossing would include over-excavation, underlain by native large rock, and reformed to match the stream profile as much as possible for safe crossing and utility protection. The armoring would be provided to prevent the washing away of the crossings during flood events and eliminate the current berming resulting from consistent vehicle use during wet conditions. These artificial berms currently impound water upstream and force the limited surface hydrology subsurface. In addition, the restoration project proposes four road closures that would be revegetated per the HMMP as these are either redundant or relocated as discussed with U.S. Border Patrol, SDG&E, and OWD. ICF and the City of Chula Vista have been in communication with these entities on these road closures, and all are in agreement that they would not limit their ability to achieve their missions. Border Patrol has asked to install reflectors along trail fencing at road intersections, trail closures, and at the river crossings at specific locations. The exact location of these reflectors will be coordinated with the Border Patrol to ensure safe passage.

3.13 Reference Site

Due to the degraded nature of the mitigation site and the uniqueness (broad and sandy) relative to the surrounding areas, no reference site has been identified. Upstream of the mitigation site is narrow, drier, and dominated by upland scrub species while the downstream portion is degraded and dominated by nonnative tamarisk scrub. The restoration ecologist will use their best professional judgement and experience in similar systems to discuss the trajectory of the site and potential reference conditions.

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Chapter 4
Mitigation Design

4.1 Site Selection Process

This specific mitigation location was selected after reviewing compensatory mitigation opportunities near the development projects as well as the watershed planning documents including the Otay WMP and the draft SAMP. The Otay River Valley lies in proximity to the mitigation sites and is an important historic waterway that has existed in a highly disturbed state for decades. This area was targeted for enhancement and rehabilitation due to its location at the upstream terminal point of the Otay River at Savage Dam and represents the upper portion of the Lower Otay River Watershed (Figure 4-1). This location is the crucial first step in the overall restoration of the lower Otay River sub-basins that exist below the Savage Dam and will be crucial to the success of future downstream restoration efforts by removing significant upstream invasive seed sources as well as improving hydrology and wetland functions.

4.2 Mitigation Design

This HMMP is designed to enhance, rehabilitate, and re-establish hydrological processes, vegetation communities, and wildlife habitats associated with the Lower Otay River Watershed that will be self-sustaining and can adjust to dynamic natural processes. The plan will re-establish primary and secondary flow channels, low and high floodplains, and native transitional habitat as well as remove nonnative invasive species and restore native vegetation. This will serve to improve hydrological conditions, reduce the significant upstream invasive species seed source, preserve connectivity between adjacent areas of preserved land and natural habitats, and preserve wildlife movement corridors, and will result in a net gain in functions and services following restoration activities.

The restoration design could be installed in a single effort, but has also been designed in multiple self-functioning phases permitting the different projects (Village 3 and Village 8 West) requires phasing of activities (see Section 2.2, *Objectives*). The restoration in the Otay River Valley, will begin with the enhancement of the upstream areas of the Otay River by removing and managing nonnative invasive species. This will be followed by the re-establishment of the Otay River mainstem and the creation of a secondary channel by re-contouring the disturbed floodplain and connecting existing pools in the northern plan area. An additional secondary channel and floodplain terrace will be re-established in the southern plan area to maximize the hydrologic function of the overall floodplain. Finally the transitional areas and upland habitat buffering the site will be rehabilitated by re-contouring appropriate slopes, removing invasive species, and planting appropriate native species.

As shown in Figure 4-2, the site will include a series of restoration types as defined by the 2008 USACE mitigation rule including re-establishment, establishment, rehabilitation, and enhancement (EPA and USACE 2008). The following sections describe each of these restoration types and the specifics for this mitigation plan.

4.2.1 Re-establishment

As defined in the 2008 Mitigation Rule, re-establishment means "the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource." Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions. Because the site historically comprised a braided river channel and associated floodplain, most of the planned active restoration falls under re-establishment. This will be accomplished in the northern portion of the floodplain by re-creating a sinuous Otay River mainstem and in the southern portion of the floodplain by creating a secondary channel. The created channels will connect to the up- and downstream existing mainstem and will include a low and high terrace along with sandy bar complexes and will be designed to accommodate flood events. In particular the active low floodplain is intended to accommodate a 10-year flood event, while the high floodplain will likely correspond to a 25-year event. At larger events the entire valley floor will be inundated, and the water will rise into the upland areas as needed.

4.2.2 Establishment

As defined in the 2008 Mitigation Rule, establishment (creation) means "the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions." As described above, the site was historically a braided system with floodplain. Hydrology at this site is permanently changed as a result of Savage Dam. As such, what was once an intermittent—perhaps even perennial—system, now functions as an ephemeral system or limited intermittent system. Currently three seasonal ponds exist on the northern plan boundary. These features provide emergent habitat and water in an otherwise dry system. The restoration project has been designed with an additional series of seasonal ponds, all in the northern high floodplain so that their proximity to the other ponds creates a complex for wildlife movement and plant propagules. Because these seasonal features are not known to have been on site historically, they are considered establishment. The new seasonal ponds will only be engaged at extreme high flood events but will persist throughout most of the year as a result of their depth and shallow groundwater.

4.2.3 Rehabilitation

As defined in the 2008 Mitigation Rule, rehabilitation means "the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource." Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area. Rehabilitation activities will include removing flow-impeding features left behind by the mining operation, including existing berms, cobble rows, and sediment piles, and recontouring the transitional upland area to mirror adjacent natural slopes and accommodate rising floodwaters. This area will also be aggressively treated for nonnative species and revegetated with native species such as sage scrub and cactus scrub. Similarly, the current channel in the upstream portion of the site will be rehabilitated and will include access road improvements for the Border Patrol crossing, which is currently prohibiting flow as well as recontouring the channel and adjacent floodplain. These improvements to the vegetative cover are expected to result in improved hydrology and flood capacity, bio-filtration, and sediment and toxicant trapping.

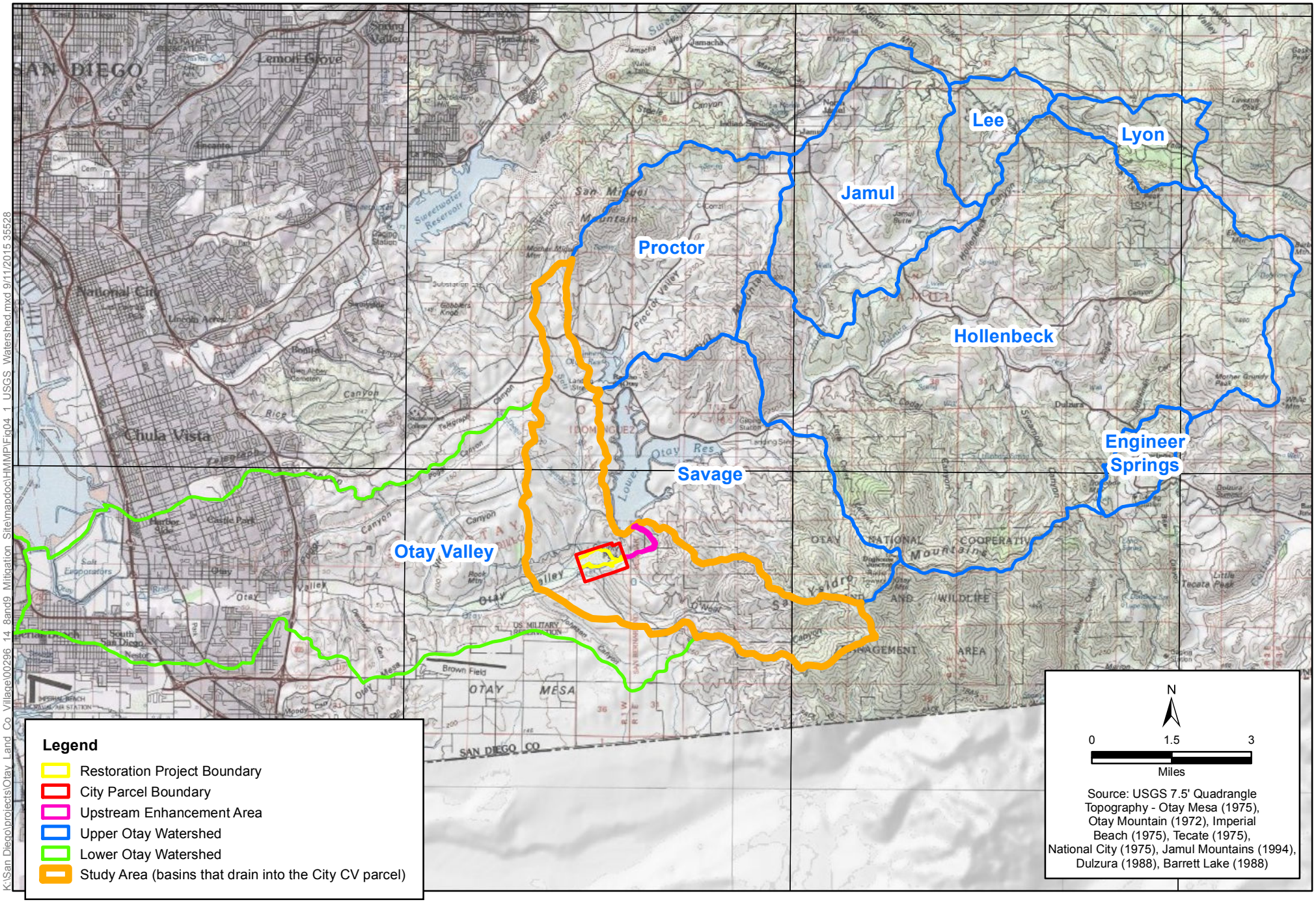

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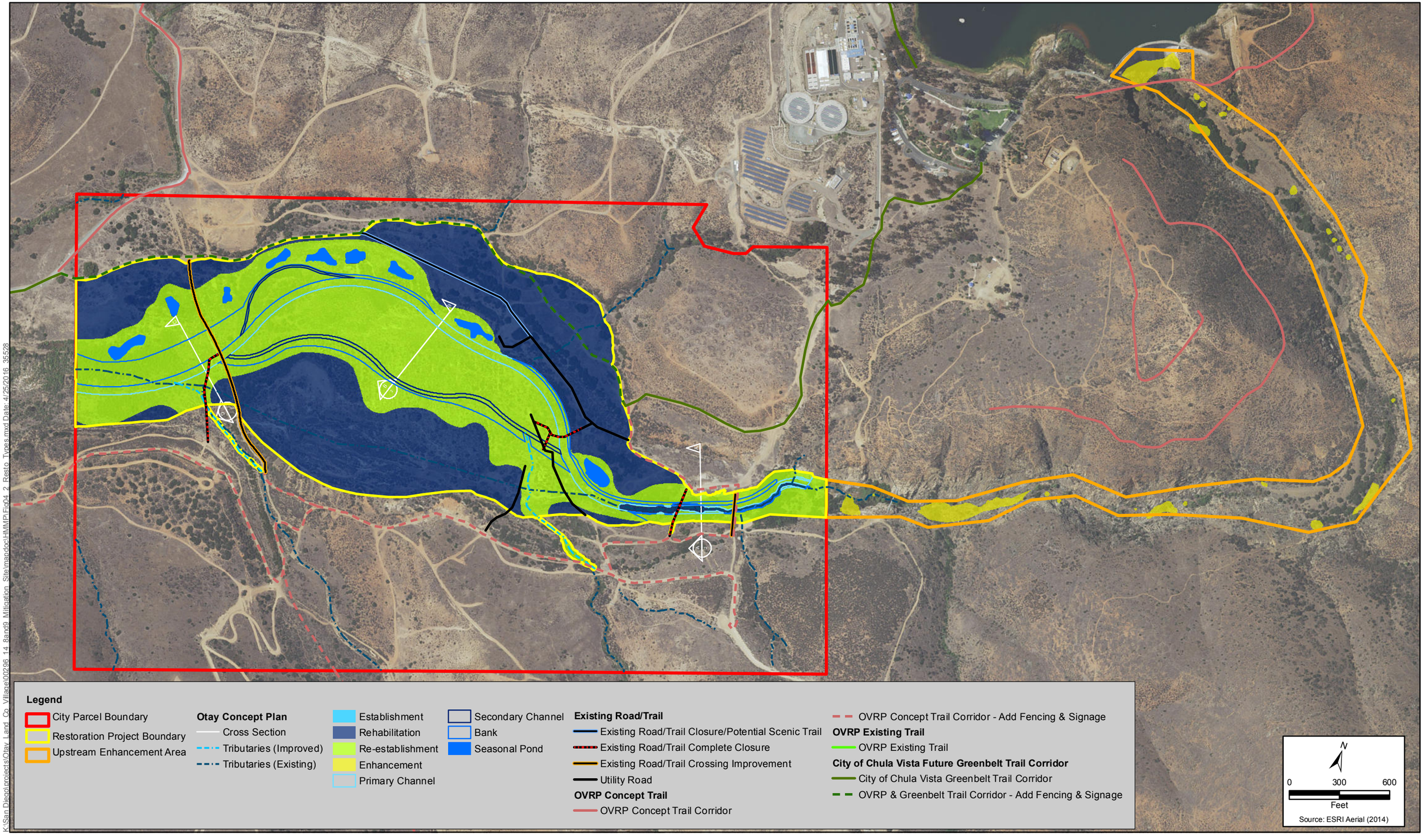
Figure 4-1
Upper and Lower Otay River Watersheds
Otay River Restoration Project



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*As part of construction the road will be closed and revegetated with the exception of a 4-6 foot swath for potential future trail creation. The trail is not included as part of this HMMP.

Figure 4-2
Potential Restoration Types
Otay River Restoration Project

4.2.4 Enhancement

As defined in the 2008 Mitigation Rule, enhancement means "the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s)." Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area. Enhancement activities would include removing and managing nonnative invasive species in several locations throughout the upstream enhancement area. This includes removal of arundo, tamarisk, palms, and eucalyptus. Removal of nonnative invasive plant species will help lower the overall distribution of nonnative seed and propagules within the watershed area and protect the primary restoration site within the Mitigation parcel. In addition, a series of "optional" enhancement areas have been identified in the buffer habitat (Figure 4-2). At this time these areas are not included in the restoration plan because the mitigation needs of the two projects (Village 3 and Village 8 West,) will be fulfilled by the other activities on site. However, this upland enhancement presents an ideal opportunity to further improve buffer habitat for the restoration site should another mitigation need arise.

4.3 Rationale for Expecting Implementation Success

The Otay River mainstem and floodplain exist in a highly degraded state due to the upstream impounding of the Otay River, years of sediment removal by mining activities, and the invasion of nonnative noxious plant species. Hydrology is generally considered the most important variable driving wetland and aquatic resource development (Mitsch and Gosselink 2000). The site has historically supported an intermittent braided stream and floodplain; however, the conditions that formed this system originally are now changed and the watershed reduced. As such, understanding the current hydrologic and hydraulic conditions of the site with the presence of Savage Dam is key to success. With a proper understanding of the current conditions, in particular hydrology and soils, restoration ecologists and the design team have developed a plan with appropriate elevations. This, coupled with the correct selection of local drought-tolerant riparian, transitional, and upland species, results in the high probability of successful re-establishment of a functional channel and floodplain system.

The mitigation is also expected to be successful because of the location of the site within an open space preserve under the management of the City of Chula Vista and its proximity to other open space areas. The adjacent open space and other potential future restoration and mitigation efforts (that may occur in this area as a result of separate projects) will contribute to improved native habitat connectivity and wildlife habitat within the lower Otay River. In addition, the site's likelihood of success will be furthered by a robust monitoring and maintenance program during the 5 years following installation combined with a comprehensive long-term management plan.

The surface hydrology and groundwater conditions currently support riparian (mostly invasive) vegetation; therefore, appropriate conditions exist to support wetlands species once grading activities and invasive tree eradication is conducted. Grading and contouring will improve conditions for water and sediment flow during rain events and improve elevations, which will allow for potential expansion of the riparian habitat. Species compositions for the mitigation area plant palettes were determined using surrounding native habitat as a reference and species observed in the area. Invasive nonnative species that have displaced native species within the plan area,

including the upstream channel up to Savage Dam, will be removed, and an upland buffer area will protect the site from further invasion.

Groundwater wells will be established in appropriate areas prior to final construction grading plans and plan implementation to determine depth to groundwater. Although Savage Dam impounds the Otay River waters upstream, hydrological flow occurs in the channel as a result of seasonal rain events, and input via secondary flow channels and overland flows also occurs. Groundwater elevations are believed to be shallow, as evident by the series of seasonal ponds in the northern section of the site. This information will be utilized to establish final plant palettes and final elevations as necessary to allow for successful establishment of container plantings and seed.

4.3.1 Design Hydrology

Development of an appropriate mitigation design to meet the goals and objectives for stream corridor re-establishment and associated riparian and floodplain enhancement requires an understanding of expected hydrologic conditions in the plan area proposed downstream of Savage Dam.

The dam itself can serve as a source of surface water flows, but has only spilled 27 times in 11 water years since its reconstruction in 1919. Although it cannot be a reliable source of surface water, the mitigation design should recognize the design size of the spillway and its capacity to pass the required probable maximum flood of 170,600 cubic feet per second (cfs). This design flow would result when 15.5 feet of water depth crests the spillway. Such a flow event will inundate any proposed design with several feet of flow depth in the plan area and has the potential to cause substantial channel migration, erosion, and floodplain disturbance.

A more reliable and frequent source of surface water will come from the local topography, which directs tributary flow toward the plan area in the watershed located upstream of the proposed mitigation site and downstream of the dam. Approximately, 14.3 square miles of watershed drain to the downstream point of the proposed mitigation site (Figure 4-3). The land use varies from open space in the south to urban in the north. To determine the approximate magnitude of expected surface water flows from these areas, ICF developed a hydrologic model. Using USACE's Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) and the design guidance and modeling methodology presented in the *San Diego County Hydrology Manual* (County of San Diego 2003), ICF estimated peak storm runoff values for the upstream and downstream ends of the proposed plan area (Table 4-1).

Table 4-1. HEC-HMS Estimated Peak Flows

Frequency	Upstream End of Plan Area (cfs)	Downstream End of Plan Area (cfs)
2-year	730	2,310
5-year	1,200	3,190
10-year	2,560	5,500
25-year	2,800	6,300
50-year	3,760	7,980
100-year	4,420	8,930

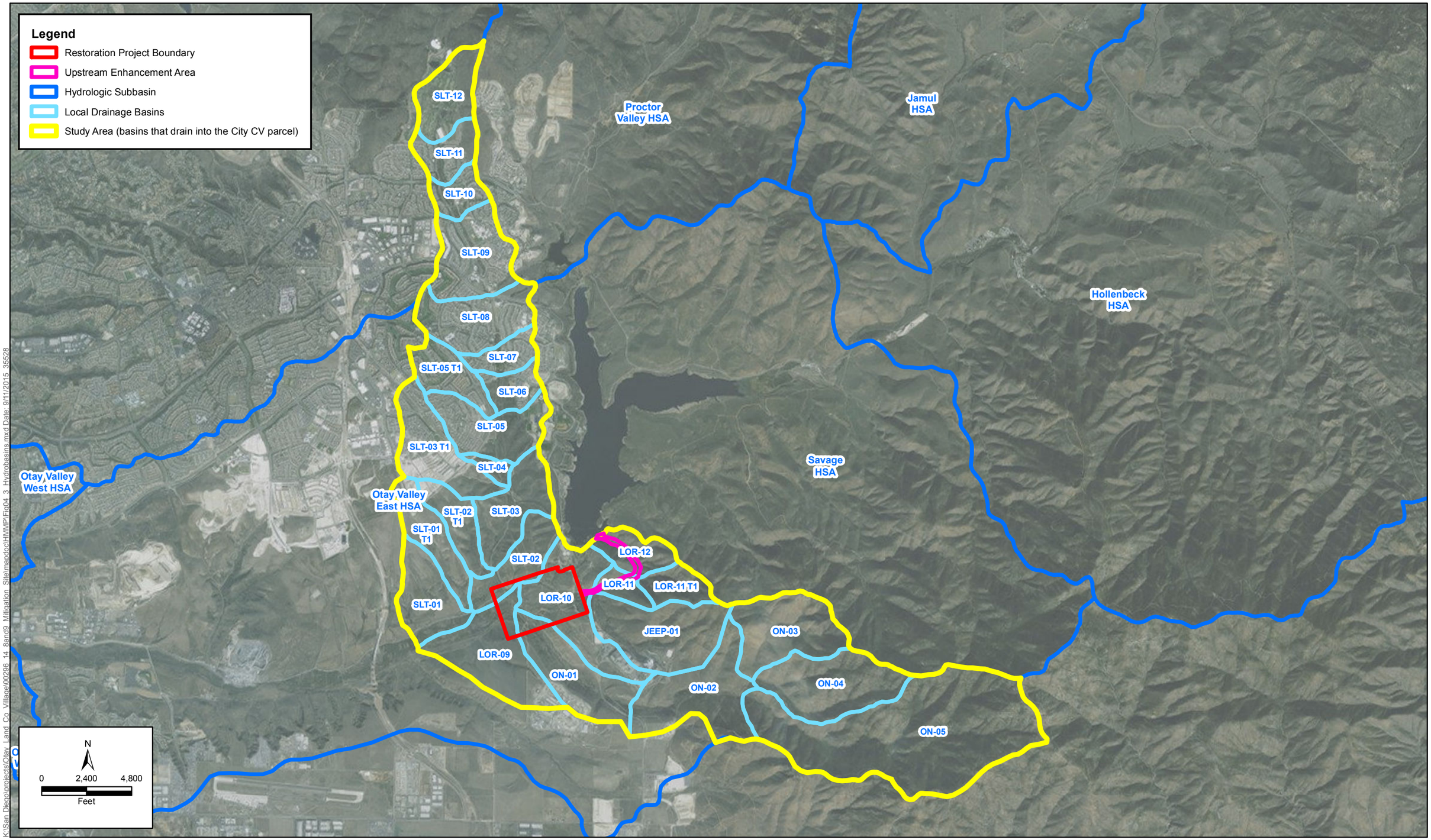

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Figure 4-3
Restoration Area Watershed
Otay River Restoration Project

As Table 4-1 shows, the flow peaks at the downstream end of the plan site are typically 2 times greater than those at the upstream end. This is due to increased runoff expected from the urban development. While these flows will generally pass downstream of the proposed plan area, their contribution to the stream can create a backwater effect and increase depths and retention times of flows passing through the plan area. This is an expected benefit given the goals and objectives of the HMMP, especially where additional floodplain activation will further enhance the plan's performance.

Finally, the mitigation design will rely on available groundwater. During site visits, remnant excavations from mining operations offered evidence that shallow (e.g., within 10 feet of the ground surface) groundwater was present in the plan area. The proposed design will include channel alignments and excavation depths to intercept available sources and improve the restoration performance to the extent possible.

Building on the assessment of the surface water hydrology modeling, ICF is in the process of developing a hydraulic model to determine the expected water surface elevations during a variety of potential storm flow events. Using USACE's Hydrologic Engineering Center's River Analysis System, the mitigation design cross-sections will be paired with the expected storm flows. The resultant channel flow characteristics—including depth and velocity—will allow for refinement to the proposed grading design and plant palette/distribution. This information will be included in the Final HMMP.

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Chapter 5
Implementation Plan

5.1 Schedule

The compensatory mitigation program, which provides mitigation for permanent and temporary impacts, is contingent upon the approval of this conceptual mitigation plan by the resource agencies and local jurisdictions and the acquisition of the related permits. Upon appropriate approvals, implementation of the mitigation program could begin in the summer/fall of 2016.

Table 5-1. Implementation Schedule

Implementation Tasks	Schedule
Contract growing agreement with native plant nursery	Nine months prior to planting
UXO Surface Sweep	Prior to site work
Remove invasive species (Phase 1)	Winter/spring of implementation year, following breeding season completion
Grade site (Phase 2)	Fall of implementation year
Install temporary irrigation system (as needed)	Promptly following site preparation
Plant container stock	Following irrigation system installation and weed abatement (where needed).
Apply hydroseed	Immediately following container planting
Install fencing and signage	Immediately following planting and seeding

5.2 Phased Installation

If the agencies agree to the advanced permittee responsible mitigation for the development projects, then the HMMP will be implemented at one time. A single installation is both more cost effective and ecologically preferred. However, the restoration plan has been designed with the option of being installed in multiple distinct self-functioning phases if this approach is needed as a result of permitting and timing for the different projects. The first two phases would provide compensatory mitigation for Village 8 West and Village 3 with subsequent phases defined as projects move forward into permitting (see Figure 2-1 and Section 2.2, *Objectives*). Phase 1 will begin with the enhancement of the upstream areas of the Otay River by removing and managing nonnative invasive species from the Mitigation parcel up to Savage Dam. Phase 1 will also include initial treatment of tamarisk within the Phase 2 footprint and treatment of large perennial woody invasive species within the entire mitigation parcel include the large trees (eucalyptus, palms, and Brazilian peppertree). Phase 2 will initiate the re-establishment of the Otay River mainstem at the upstream portion of the Mitigation parcel and will include a portion of the adjacent floodplain, a seasonal pool, and upland buffer habitat. Subsequent phases will include completing connection between the new mainstem channel and the downstream channel, the creation of secondary channels, and the remaining seasonal pools. Subsequent phases will rehabilitate the transitional areas and upland

habitat buffering the site to the south by re-contouring appropriate slopes, removing invasive species, and planting appropriate native species. Table 5-2 shows the habitats and corresponding acreages that will be installed with each phase.

Table 5-2. Compensatory Mitigation Quantities

Phase	Habitat	Amount (acres)
Phase 1		
Enhancement	Upstream Enhancement	2.74
	Onsite Enhancement (Phase 2 footprint and trees throughout Mitigation parcel)	14.00
Phase 1 Total		**16.74**
Phase 2		
Village 3		
Establishment	Seasonal Ponds	0.31
Re-Establishment	Primary Channel	0.14
Re-Establishment	Active Low Floodplain (10-yr)	1.19
Re-Establishment	High Floodplain/Transitional (non-jurisdictional)	0.24
Re-Habilitation	Primary Channel	0.10
Re-Habilitation	Active Low Floodplain (10-yr)	0.01
Village 8W		
Re-Establishment	Primary Channel	1.67
Re-Establishment	Active Low Floodplain (10-yr)	4.04
Re-Establishment	High Floodplain/Transitional (non-jurisdictional)	3.06 (0.31 credit) [1]
Re-Habilitation	Primary Channel	0.65
Re-Habilitation	Upland (non-jurisdictional)	8.11 (0.81 credit) [1]
Re-Habilitation	Active Low Floodplain (10-yr)	0.16
	Phase 2 Total	**19.70**
Future Phase(s)		
Establishment	Seasonal Ponds	1.03
Re-Establishment	Primary Channel	3.45
Re-Establishment	Active Low Floodplain	18.97
Re-Establishment	High Floodplain (non-jurisdictional)	18.46 (1.85 credit)
Re-Establishment	Secondary Channel	2.22
Re-Habilitation	Seasonal Ponds	0.38
Re-Habilitation	Upland (non-jurisdictional)	39.04
	Future Phase Total	**83.56**
Optional	Upland Enhancement	63.89

5.3 FUDS Safety Measures

Phase 1, Invasive Species Removal

Prior to initiating invasive species removal or any onsite grading activities, a surface clearance will be conducted on the Mitigation parcel where the property intersects the FUDS boundary and along any access roads and staging areas to identify all munitions and explosives of concern (MEC) and Munitions Debris (MD). A qualified survey company would be contracted and a team of experienced UXO staff would include a Senior UXO Supervisor (SUXOS) and a dual-hatted UXO Safety Officer (UXOSO)/Quality Control Specialist (UXOQCS). The team would be comprised UXO technicians that will be overseen by a UXO Technician team leader and will be equipped with hand-held metal detectors and GPS units. The UXO technicians will form a line and walk in parallel lines spaced approximately 10 feet apart, depending on vegetation and terrain. As the team progresses the Team Leader will place flags at the outside edge of the sweep line. The sweep team will return to the starting point using the flags as their guide to ensure complete coverage of the sweep area. The metal detectors will help the UXO technicians identify metallic items that may be obscured by vegetation or surface debris. The GPS units will track the paths of the UXO technicians. The data will be downloaded to a computer and used to ensure that the entire site has been covered and to generate site maps for reporting purposes. All munitions debris will be evaluated to determine if any explosive residue remains. If it is determined that there is the potential for an explosive hazard the SUXOS will contact local law enforcement to respond to the item and dispose it appropriately. All MD determined to no longer contain explosive residue will be inspected by the SUXOS and UXOSO and containerized in lockable 55-gaJJon drums for later disposal by an approved recycler. The SUXOS will prepare a MEC Daily Operational Journal for submittal to the Project Manager. The MEC Daily Operational Journal will detail the daily MEC operations, areas swept, items recovered, and the depth, orientation, and a Global Positioning System (GPS) location (latitude/longitude) of each MEC item identified. Upon completion of MEC construction support services, a Summary Report to include overall details from the Daily Operational Journals.

Phase 2 and Future Phase(s)

During all ground disturbing activities, the construction contractor will be accompanies by 1-2 qualified UXO technicians. The technicians will work directly with all earth moving equipment and will evaluate the excavated material as work progresses. The construction support team will use handheld magnetometers to detect all ferrous and non-ferrous anomalies in the soil that is being excavated or removed. Each of these anomalies will be evaluated to ensure that they do not pose a MEC hazard to the work crew. If no MEC items are identified excavations may be advanced to the depth of detection (not to exceed two feet).

5.4 Grading Site Preparation

The project will comply with all avoidance and minimization measures identified in the Biological Technical Report (ICF 2016) and the Initial Study/Mitigated Negative Declaration (IS/MND). This includes all pre-construction measures and construction measures.

Initial site preparation activities will include the following.

- Defining and staking the limits of the work area, including temporary access roads, staging areas, and stockpile areas.
- Installing staking or fencing around Environmentally Sensitive Areas.
- Adding temporary signage notifying the public of activities.

The site preparation effort necessary to prepare the wetland mitigation areas for native planting will include the removal of all invasive nonnative tree, shrub, and herbaceous species followed by grading of the channel and floodplain areas to remove spoil piles, berms, and pits to restore the area to the desired functions. Areas that contain tamarisk will require additional measures beyond removal of existing trees because this species will have created a copious seed bank in the soil that will result in sprouts that will need to be repeatedly treated for adequate management.

5.5 Contractor Education

Before beginning any installation activities, the installation landscape contractor and the lead field foreman will meet at the site with the restoration ecologist to review all installation, scheduling, and resource protection measures specified in this HMMP. The restoration ecologist will review all aspects of this HMMP, including site protection, inspections, landscape installation procedures, and guarantees. It will be made clear at that time that the restoration ecologist will have final say over review and acceptance of field installation.

Prior to initiating any installation activities (including construction equipment placement or other non-ground-breaking activities), the restoration ecologist will develop and implement environmental training for the contractor and all subcontractor personnel, explaining the sensitive resources within the work area and adjacent areas. The environmental training will include information on the following.

- Project regulatory and permit requirements.
- Environmental compliance procedures and protocols.
- Water quality requirements and proper construction BMPs.
- Environmentally Sensitive Areas and no-access areas.
- Sensitive species and nesting birds.
- Consequences of noncompliance.
- Emergency response protocols.

The installation contractor will notify the restoration ecologist when new crew personnel will be on site, and an additional environmental training will be scheduled before they are allowed to work.

5.6 Access and Staging

Prior to commencement of installation activities, the area limits of the restoration site will be surveyed and marked in the field. These limits will be checked and confirmed by the restoration ecologist and OLC before the contractor begins the installation phase. All access points, storage, and staging areas will be located in a manner that has the least impact on vehicular and pedestrian

traffic as well as natural resources. The access and staging areas are still being identified but will be provided in the Final HMMP.

To protect against contaminant leakages during access and staging, the contractor will be responsible for taking measures to prevent chemicals, fuels, oils, and other hazardous materials from entering public water, air, and/or soils. Disposal of any materials, waste, effluent trash, garbage, oil, grease, and chemicals will be done in accordance with state and federal regulations. These protection measures will be detailed in the contractor's SWPPP, which will be required under the RWQCB 401 permit.

5.7 Grading

This HMMP presents the current conceptual plan (Figure 5-1), which combined with the digital terrain model, hydrology model, and hydraulic model currently under development will be used to generate 60% grading plans and specs suitable for construction—with the understanding that the ideal construction approach will be design/build. This construction/installation strategy allows for maximum flexibility in the final restoration contours and provides opportunities for the restoration ecologists to direct the installation contractor throughout the plan's implementation, embracing the existing natural conditions and modifying the design at a fine-scale resolution that cannot be depicted in plans and specs. These fine-scale modifications may include, for example, such features as channel bars, tertiary channels, swales, cobble pools, and small islands in the floodplain.

As part of the conceptual design, ICF utilized currently available and newly flown (2015) topographic data to create a digital terrain model of the plan area. The data was useful for the development of conceptual design cross-sections, plan views, and initial cost estimates based on the amount of material that will need to be moved/excavated. The ICF design team created a single proposed channel alignment and three representative "valley-wide" cross-sections to convey the conceptual design intent (Figure 5-2). Channel layout considers the anticipated geomorphology of the mitigation area and the potential staging and construction phasing to allow an efficient earthwork operation to achieve the conceptual plan grading.

ICF is developing cut-and-fill quantities required to achieve the conceptual design grading to 30% and 60%. All attempts will be made to balance the cut-and-fill on site. Based on a preliminary site visit, it is evident that spoils areas may be needed. The final 60% plans will identify upland rehabilitation areas within the plan boundaries for excess spoils placement. Depending on the desired vegetation establishment, topsoil may need to be imported to assist in achieving required health and vigor. At this time no soil import is anticipated.

Following initial design of the restoration project, the grading limits have been further restricted to avoid high quality riparian habitat known to support the federally and state listed least Bell's vireo and other nesting birds. The project will avoid most significant stands of riparian habitat in the project site as shown in Figure 5-1. Prior to installation the grading plans will also be updated to reflect this avoidance area. Within these avoidance areas, project activities will be limited to enhancement (non-native treatment), which will be conducted through the use of hand tools to drill and poison nonnative trees that will be left in place.

Following agency review of the draft HMMP and conceptual drawing, final grading plans will be prepared by the plan's civil engineer in coordination with the plan biologist. Grading activities will focus on removing berms, spoil piles, and pits left behind by the sand extraction operation and

achieving the appropriate contouring such that a natural hydrological regime may be restored. Site grading plans for the mitigation areas shall be incorporated into the final grading plans.

5.8 Soils Analysis

No soil nutrient testing or amendments are proposed because the long term success of species should be based on existing conditions. However, due to the historic sand mining operations finer sand and silts are expected to be limited on site, and, as such, import of smaller grain materials may be warranted. This decision will be made during grading by the restoration ecologist because the overall current composition of soil on site is highly disturbed.

5.9 Nonnative Tree Removal

All vegetation remnants from tamarisk and other invasive species (excluding arundo) will be treated and felled onsite to allow for additional organic material to be incorporated onsite. The restoration biologist will work closely with a local native maintenance contractor to determine the specific approach for each species and area. The following are general recommendations that may be modified as appropriate.

For trees with large woody trunks, the restoration ecologist can elect to kill on site and leave standing if the tree is not highly visible to the public or does not represent a safety hazard as these trees provide nesting opportunity and structure for many species. If tree removal is necessary during the migratory bird nesting season (i.e., March 15–August 31), a focused avian nesting survey will be performed by a qualified wildlife biologist 2 days prior to tree removal to comply with the MBTA. Results will be documented and forwarded to the permitting agencies. If nesting birds are detected, the nest location will be protected until fledging has occurred.

The following sections summarize the removal techniques for the larger invasive trees on site. Methods may be modified by the installation contractor with approval from the restoration ecologist.

5.9.1 Upstream Enhancement Area

For trees that occur within the primary channel upstream of the restoration project (upstream enhancement area), the primary method will use the drill and kill technique, in which large holes are drilled into the base of the trees trunk(s) and filled with a high concentration herbicide. This will result in the tree dying on site. Although the area is relatively remote, there is the potential for trees to create both an eye sore and a hazard if in proximity to the public, each tree will be evaluated by the restoration ecologist and maintenance contractor to determine if it can be left in place. If a tree cannot die in place then trees in the upstream canyon will be felled and hauled out either manually or via helicopter following preparation by ground crews. A mesa-top staging area will be prepared to accommodate the helicopter trailer and associated support vehicles and to accommodate debris bins and haul trucks. If removal is proposed, preparation of trees by ground crews will include cutting the trees into pieces that are manageable by the helicopter and preparing them for lift by applying lift chains. Follow-up treatments of the remaining stumps will be required; as such, all

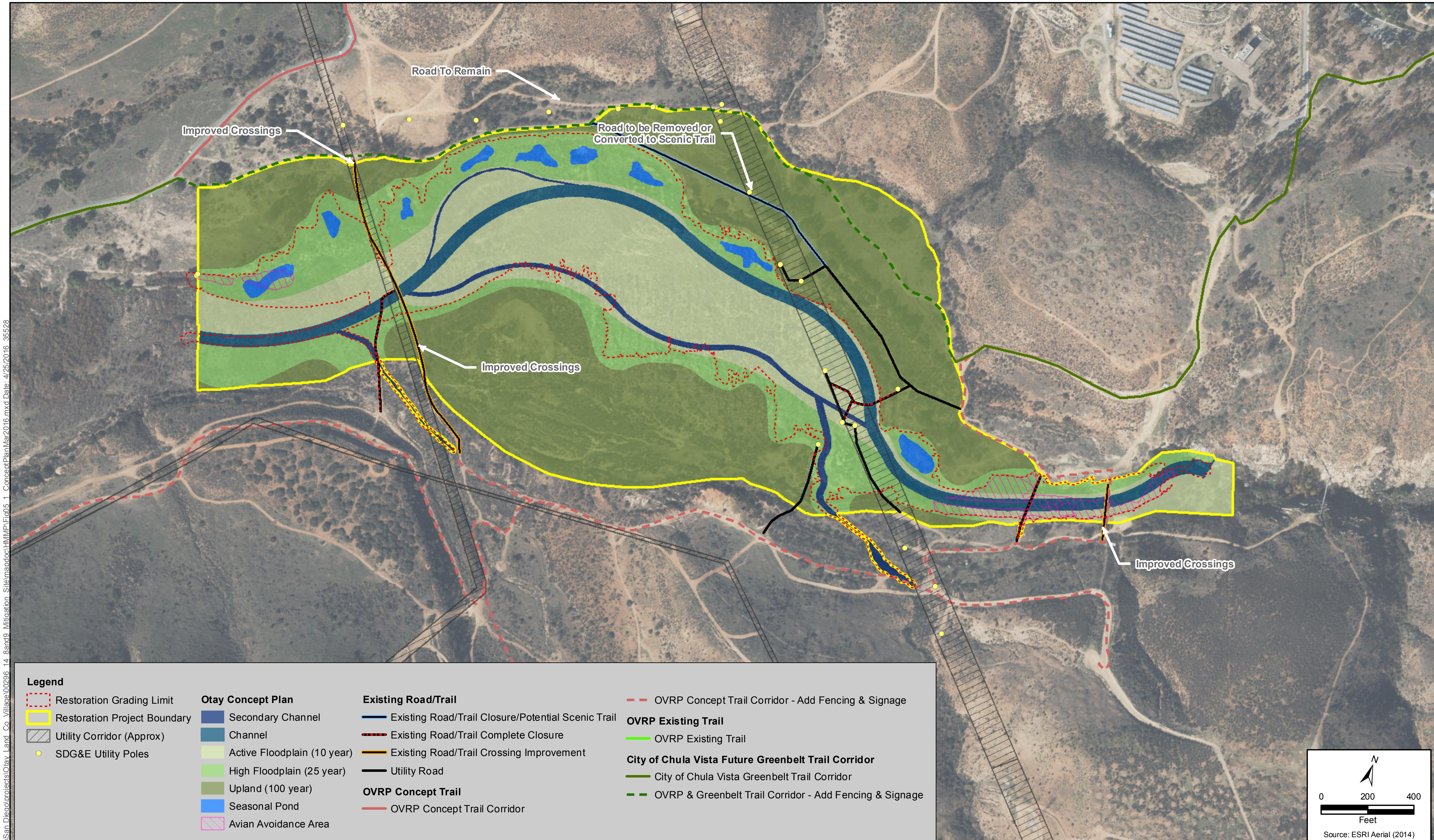

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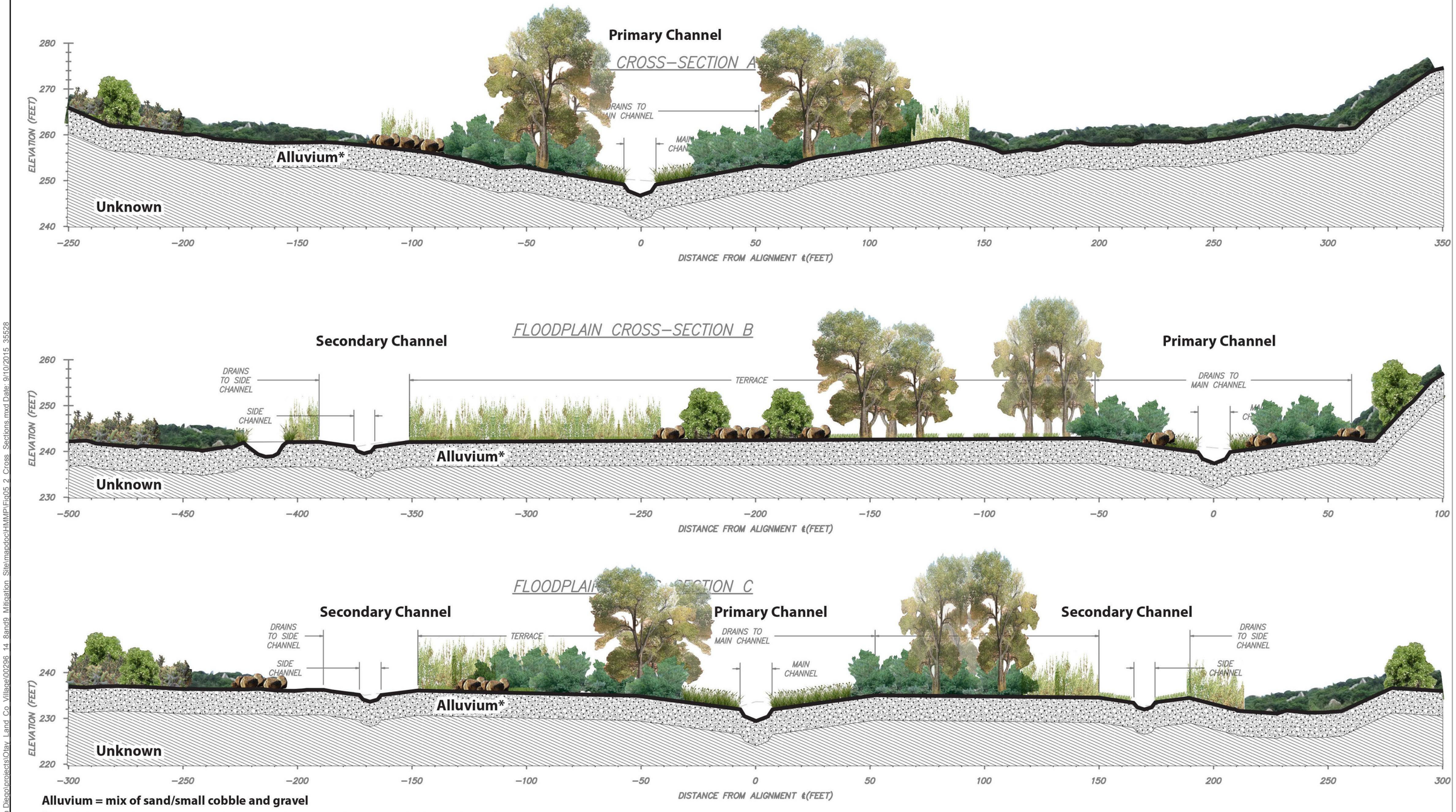
Figure 5-1
Mitigation Parcel Concept Plan Map
Otay River Restoration Project



Alluvium = mix of sand/small cobble and gravel

* Specific grain sizes and approximate distributions will be updated in the final plan

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Figure 5-2
Floodplain Cross-Sections
Otay River Restoration Project

trees will be marked using geographic information systems (GIS), and crews will revisit and retreat trees twice at least 6 weeks apart or as required for the specific species.

Herbicide application will be in accordance with BMPs, manufacturers' recommendations, and agency regulations and must be applied by a licensed or certified Pest Control Applicator. Any herbicide application within close proximity to water will be approved for aquatic use by the United States Environmental Protection Agency (EPA) as having been reviewed and considered compatible with the aquatic environment when used according to label directions.

5.9.2 Restoration Site

Large Woody Trees: Trees with large woody trunks (excluding tamarisk and arundo) within the primary restoration site—including pepper trees and eucalyptus—can be removed via truck or helicopter following preparation by ground crews. Because active restoration will be occurring throughout the property and proximity to future trails is likely, no large dead eucalyptus trees are to remain upright in the primary restoration site. Palm trees, including date and fan palm may be drilled and left upright. If close to access roads or trails, the foliage may be topped.

Tamarisk trees: Tamarisk trees within the tamarisk scrub stand in the primary restoration site will be removed by one of the following methods.

- Prescribed burning followed by repeated herbicidal application to resprouts. This method will require permissions by several entities including but not limited to the City of Chula Vista, USACE, and the Chula Vista Fire Department.
- For dense stands cut stump may be used whereby the trunks are cut and herbicide is immediately applied to the fresh cut. For sparse stands foliar spray may be more appropriate and efficient. For both methods, follow-up foliar spray will be required.
- Mechanical removal using heavy equipment followed by repeated herbicidal application to resprouts. Entire trees can be easily removed using a track hoe with a thumb bucket. Alternatively, the trees can be removed with a root-plow pulled by a bulldozer; this method has become standard in tamarisk control and is described as providing good to excellent control. This method is most effective when the soil is relatively dry, and must be combined with a program of scheduled follow-up sprout treatments such as hand-pulling and/or herbicidal application. The trees can also be removed by using a skid steer or site preparation tractor equipped with a forestry mulching attachment such as a hydro-ax, which mows or chips living and dead tamarisk at a reported 1 acre per hour on level terrain. (DiTamoso et al. 2013)

All methods will require a valley staging area to accommodate heavy equipment and associated support vehicles and to accommodate debris bins and haul trucks. Herbicidal application to resprouts may be accomplished by allowing the plants to grow to an appropriate size to allow for herbicide to be suitably assimilated by the plant. This procedure must be repeated to fully ensure the adequate control of weeds from the mitigation areas.

Giant reed: All giant reed will be physically marked by the biological monitor, mapped using GIS, and treated twice, once in fall before going dormant using Glycophosate and again in spring using Imazapyr. Any cut material will be removed from the site. Remaining canes will be treated with an herbicide to help control resprouts. Any giant reed clumps that are intertwined within existing native vegetation will be cut to grade and carefully treated with an appropriate systemic herbicide as specified by a Licensed Pest Control Advisor. The contractor will conduct follow-up treatments to

check for resprouts on a monthly basis through grading and the 120-day plant establishment period and then bi-annually through the 5-year maintenance period. Resprouts will be treated with foliar spray.

5.10 Planting and Seeding Plan

A container plant palette and seed mix were developed for the restoration site. The specification for seeding and planting are described below. Three distinct plant palettes were developed for the aquatic restoration area including riparian, floodplain, and seasonal ponds as shown in Table 5-3. A separate plant palette was developed for the upland as shown in Table 5-4. Although it is anticipated that within each of these areas more distinct vegetation communities will develop, these broad plant palettes are appropriate for the broader area, allowing plants to fill-in where conditions suit them best. The seed mix prepared for the floodplain and upland transitional habitats is provided in Table 5-5. Because many of the species are expected to occur in both areas, one master list has been developed. A modified (shorter) list for the upland area will be included in the 30% and 60% plans and specifications currently being prepared. The species selections are based on native plant species observed or known to occur within the plan area and adjacent upland habitat, and in the vicinity of the site. The spacing on center is given for calculation purposes only and as an indication of the appropriate spacing between similar species. Species will not be evenly distributed throughout the site; rather, the restoration ecologist will lay out the species and will provide appropriate composition layouts within different ecological settings. Container plants will be installed in a manner that mimics natural plant distribution (e.g., random and/or aggregate distributions rather than uniform rows).

Table 5-3. Proposed Container Plant Palette for Restored Aquatic Resources

Species[1,2,3]	Common Name	Container Size	Spacing on Center (feet) [4]	# per Acre
Riparian Corridor and Active Low Floodplain				
Anemopsis californica	yerba mansa	4-inch	3	75
Baccharis salicifolia	mule fat	1-gallon	6	75
Carex spissa	San Diego sedge	1-gallon	6	50
Eleocharis macrostachya	pale spike rush	1-gallon	3	75
Iva hayesiana	San Diego marsh elder	1-gallon	4	60
Juncus acutus ssp. *leopoldii*	southwestern spiny rush	1-gallon	5	60
Juncus mexicanus	Mexican wire rush	1-gallon	3	75
Leymus triticoides	beardless wild ryegrass	1-gallon	3	75
Platanus racemosa	western sycamore	5-gallon	30	15
Populus fremontii	Fremont cottonwood	1-gallon	30	15
Rosa californica	California wild rose	1-gallon	6	75
Rubus ursinus	California blackberry	1-gallon	5	75
Salix exigua	sandbar willow	1-gal/cutting	8	100
Salix gooddingii	black willow	1-gal/cutting	15	50
Salix laevigata	red willow	1-gal/cutting	12	75
Salix lasiolepis	arroyo willow	1-gal/cutting	12	75

Species[1,2,3]	Common Name	Container Size	Spacing on Center (feet) [4]	# per Acre
High Floodplain				
Artemisia californica	California sagebrush	1-gallon	6	60
Baccharis salicifolia	mule fat	1-gallon	10	40
Eriogonum fasciculatum	California buckwheat	1-gallon	6	60
Heliotrope curvassicum	salt heliotrope	1-gallon	10	50
Iva hayesiana	San Diego marsh elder	1-gallon	6	50
Juncus acutus ssp. *leopoldii*	southwestern spiny rush	1-gallon	10	45
Leymus condensatus	giant wild rye	1-gallon	6	45
Muhlenbergia rigens	deergrass	1-gallon	10	50
Sambucus mexicanus	Mexican elderberry	1-gallon	12	25
Seasonal Ponds/Main Channel Bank				
Anemopsis californica	yerba mansa	4-inch	2	170
Bolboschoenus robustus	prairie bulrush	1-gallon	2	170
Cyperus eragrostis	tall flatsedge	1-gallon	4	100
Eleocharis microstachys	pale spike sedge	4-inch	2	150
Juncus mexicanus	Mexican juncus	1-gallon	3	150
Juncus xiphioides	iris leaf juncus	1-gallon	4	75
Leymus condensatus	giant wild rye	1-gallon	6	50
Pluchea odorata	salt marsh fleabane	1-gallon	3	150
Pluchea sericea	arrowweed	1-gallon	6	67
Schoenoplectus americanus	Olney's bulrush	1-gallon	3	100

[1] Any potential substitutions or changes to quantity must be approved by the restoration ecologist.

[2] Plants should be propagated on site or from material from the watershed or within 10 miles of the mitigation site. Plants that cannot be provided from the immediate vicinity will be provided from the closest commercially available sources.

[3] Plants will be certified as free of exotic pests (e.g., Argentine ants) prior to delivery on site.

[4] The spacing on center is given for calculation purposes only and as an indication of the appropriate spacing between similar species. Species will not be evenly distributed throughout the site; rather, the restoration ecologist will lay out the species and will provide appropriate composition layouts within different ecological settings. Container plants will be installed in a manner that mimics natural plant distribution (e.g., random and/or aggregate distributions rather than uniform rows).

Table 5-4. Proposed Container Plant Palette for Upland Transitional Habitat

Species[1,2,3]	Common Name	Container Size	Spacing on Center[4] (feet)	# per Acre
Adenostoma fasciculatum var. *fasciculatum*	chamise	1-gallon	6	25
Artemisia californica	coastal sage scrub	1-gallon	5	50
Baccharis pilularis	coyote bush	1-gallon	6	40
Baccharis sarothroides	broom baccharis	1-gallon	6	15
Cylindropuntia prolifera	coast cholla	1-gallon	4	40
Dudleya edulis	lady fingers	1-gallon	3	5

Species[1,2,3]	Common Name	Container Size	Spacing on Center[4] (feet)	# per Acre
Dudleya pulverulenta	chalk dudleya	1-gallon	3	5
Eriogonum fasciculatum	California buckwheat	1-gallon	5	40
Ferocactus viridescens	San Diego barrel cactus	1-gallon	4	20
Heteromeles arbutifolia	toyon	1-gallon	8	15
Isocoma menziesii	coast goldenbush	1-gallon	5	50
Lycium californicum	boxthorn	1-gallon	6	15
Malosma laurina	laurel sumac	1-gallon	8	15
Opuntia littoralis	coast prickly-pear	1-gallon	4	20
Peritoma arborea	bladderpod	1-gallon	6	15
Rhus integrifolia	lemonade berry	1-gallon	8	15
Saliva apiana	white sage	1-gallon	6	25
Salvia mellifera	black sage	1-gallon	6	40
Sambucus mexicanus	elderberry	1-gallon	12	15
Yucca whipplei	our Lord's candle	1-gallon	12	12

[1] Any potential substitutions or changes to quantity must be approved by the restoration ecologist.

[2] Plants should be propagated on site or from material from the watershed or within 10 miles of the mitigation site. Plants that cannot be provided from the immediate vicinity will be provided from the closest commercially available sources.

[3] Plants will be certified as free of exotic pests (e.g., Argentine ants) prior to delivery on site.

[4] The spacing on center is given for calculation purposes only and as an indication of the appropriate spacing between similar species. Species will not be evenly distributed throughout the site; rather, the restoration ecologist will lay out the species and will provide appropriate composition layouts within different ecological settings. Container plants will be installed in a manner that mimics natural plant distribution (e.g., random and/or aggregate distributions rather than uniform rows).

Table 5-5. Proposed Container Seed Palette for Floodplain and Upland Transitional Habitat[1,2,3]

Species	Common Name	Pounds of Bulk Seed per Acre	Minimum Percentage Purity/ Germination	Pounds of Pure Live Seed (PLS) per Acre[4,5]
Acmispon glaber (formerly *Lotus scoparius*)	deerweed	4	95/80	3.0
Ambrosia psilostachya	western ragweed	2	45/45	0.50
Amsinckia menziesii	fiddleneck	0.5	35/65	0.15
Artemisia douglasiana	mugwort	2	15/40	0.10
Artemisia dracunculus	tarragon	2	10/50	0.10
Artemisia palmeri	San Diego sagewort	2	20/50	0.20
Asclepias californica	California milkweed		data unavailable	
Camissonia bistorta	California suncup	0.5	90/80	0.25
Croton californicus	California croton	1	90/40	0.40
Deinandra fasciculata	fasciculated tarweed	3	25-65	0.50
Encelia californica	California bush sunflower	2	30/45	0.50
Eriogonum fasciculatum	California buckwheat	4	55/20	0.50
Eriophyllum confertiflorum	golden yarrow	2	36/62	0.50

Species	Common Name	Pounds of Bulk Seed per Acre	Minimum Percentage Purity/ Germination	Pounds of Pure Live Seed (PLS) per Acre[4,5]
Heliotropium curassavicum	salt heliotrope	1	15/50	0.10
Isocoma menziesii	coastal goldenbush	3	18/40	0.25
Iva hayesiana	San Diego marsh elder	0.5	30/30	0.05
Lasthenia glabrata ssp. *coulteri*	Coulter's salt-marsh daisy		data unavailable	
Lessingia filaginifolia	common sandaster	0.5	8/30	0.05
Leymus condensatus	giant wildrye	1	70/76	0.50
Leymus triticoides	creeping wild rye	2	90/80	1.50
Lupinus bicolor	pygmy-leaved lupine	2	98/85	1.50
Lupinus succulentus	arroyo lupine	3	98/85	2.50
Lupinus truncates	collared annual lupine	2	98/85	1.50
Muhlenbergia rigens	deergrass	0.5	70/45	0.15
Phacelia cicutaria	caterpillar phacelia	0.5	98-90	0.45
Pluchea odorata	marsh fleabane	0.5	30/40	0.20
Salvia columbariae	chia	1	93/79	0.75
Stipa pulchra	purple needlegrass	3	90/75	2.25

[1] Seed will be applied by hydroseeding with standard amendments (i.e., cellulose fiber mulch and organic soil stabilizer).

[2] Seeds will be collected within the watershed or within a 10-mile radius of the site to the extent feasible. Seeds that cannot be collected from the immediate vicinity will be provided from the closest available sources.

[3] Any potential substitutions or quantity adjustments must be approved by the restoration ecologist.

[4] The pounds per acre of pure live seed (PLS) in this table have been rounded. The pounds per acre of seed will be adjusted to achieve the specified pounds per acre of PLS when actual percentage purity and germination rates are calculated.

Quantities in this table are presented on a per-acre basis.

5.10.1 Container Plant Specifications

When possible, cuttings will be harvested from adjacent riparian habitat or from within the restoration area footprints. Unique plants such as cactus should be salvaged prior to contour grading; the restoration ecologist will identify and mark all specimens to be salvaged prior to grading and will work with the contractor on appropriate collection methods. All other plantings will be obtained from nursery sources. Plants will be provided from source material from Otay Mesa, San Diego, or alternative sources (closest commercially available sources) approved by the restoration ecologist. If container plant material is not available from these areas, at minimum, stock will be obtained from within the watershed or within 10 miles of the mitigation site. Plants that cannot be provided from the immediate vicinity will be provided from the closest commercially available sources, subject to the approval of the restoration ecologist. Source locations should be as close to the restoration site as possible. Plants must be certified by the supplier (nursery) to be free of exotic pests (e.g., Argentine ants) prior to delivery on site.

The restoration ecologist will confirm that plants are delivered to the site in a healthy and vigorous condition before they are installed. Plants will not be installed that are root-bound, stunted, pest-

infested, diseased, or unacceptable for other reasons. The restoration ecologist and contractor will coordinate the layout for plant material in ecologically appropriate locations and natural groupings. The restoration ecologist will direct all planting, and may place flags, directly place containers, or direct the contractor on the placement of plants. In general, container plants will be installed in a manner that mimics natural plant distribution (e.g., random and/or aggregate distributions rather than uniform rows).

No substitutions of specified plants will be allowed, and container sizes will not be changed unless approved in advance by the restoration ecologist. If the installation contractor is unable to obtain the specified size or species at the time of planting, commencement of the 120-day plant and hydrology establishment period will be delayed until all specified plants are installed or until a suitable substitution is determined by the restoration ecologist. The specific planting areas and corresponding plant palettes will be included in the 30% and subsequent 60% plans and specifications currently being developed.

5.10.2 Container Plant Installation Steps

Prior to planting, the contractor will ensure the site is wet from rainfall or adequately watered so that the first few inches of soil are saturated. The contractor will install container plants using standard horticultural practice, as follows.

- Thoroughly water all plants in their containers before planting.
- Dig a hole twice as deep and three times as wide as the container. Break up soil clods and roughen the side of the hole to avoid a smooth-sided "bathtub" effect. Fill the planting hole with water and allow water to drain completely into the soil; repeat twice.
- Partially backfill the hole with native soil to allow planting at the proper depth. The backfill mix will contain only native soil with no rocks larger than 3/4-inch diameter. Moisten and gently tamp the backfill into place. Remove the plant from its container and place on top of the moistened backfill so that the plant collar is approximately 1 inch above finish grade. Backfill the remaining hole with native soil.
- For plantings 1 gallon or larger, create a planting basin berm roughly 2 feet in diameter around the plant and apply 1 to 2 inches of coarse, organic, weed-free mulch inside the berm.
- No mulching or berms will be used around container plantings within the primary channel.
- Thoroughly water and allow the basin to drain.

5.10.3 Container Plant Guarantee

All plants determined by the restoration ecologist to be dead or diseased will be replaced by the installation contractor before the end of the 120-day plant and hydrology establishment period and as required by the maintenance program. Unless the restoration ecologist approves changes, the replacement plants will be of the same size and species as originally planted.

5.10.4 Seed Specifications

Seed will be applied throughout the restoration site. Seed will be from Otay Mesa, San Diego, or alternative sources (closest commercially available sources) approved by the restoration ecologist. If seed is not available from these areas, at minimum, seed will be obtained from within the

watershed or within 10 miles of the mitigation site. Seed that cannot be provided from the immediate vicinity will be provided from the closest commercially available sources, subject to the approval of the restoration ecologist. Seed will be delivered to the site in sealed and labeled packaging, along with a California State Agricultural Code seed certification that includes the supplier's name, geographic location, and collection date, and the tested purity and germination percentage rates. The seeds will be ordered and delivered in separate, original containers by species, and inspected by the restoration ecologist. Seed will be labeled with the species, purity, germination, percentage live seed, and quantity of seed in pounds. The seed mix will be applied by hydroseeding with a hydroseed slurry containing seed, natural fiber mulch, and organic tackifier. Although hydroseed mulch with seed can be carried and moved by flowing water, the mulch will help more of the seed stay in place and germinate compared to hand seeding. The specific seeding areas and corresponding seed mixes will be included in the 60% Submittal, Restoration Plans currently being developed.

5.10.5 Seed Application Steps

The contractor will install seed in the upland transitional areas using standard hydroseed practice, as follows.

- Seed application rates provided in Table 5-5 are to be followed. If the delivered seed differs from specified purity and germination rates, the total pounds-per-acre rates will be adjusted accordingly to achieve the specified pounds of pure live seed.
- Seed will be applied by hydroseed application. Application steps include the following.
    - Create a slurry of seed (at specified rates per acre), 2,000 pounds per acre of organic fiber mulch, and 150 pounds per acre of organic tackifier.
    - Evenly apply; spray hydroseed from at least two directions to help interlock mulch fibers.

5.10.6 Planting and Seeding Timing

There is an ideal window for planting native plants in Southern California, which occurs in winter generally between November and February. The contractor will need to coordinate installation efforts with any rain events to ensure that work is not being conducted on the site during periods of inundation.

5.11 Irrigation Plan

The ultimate goal of the wetlands mitigation program is to create a functioning riparian system capable of maintaining and supporting itself in perpetuity. Temporary irrigation may be required to enhance the survivorship of newly installed native plants and seed when they have been grown in nursery conditions, when they are planted under initially dry or drought conditions, or when planting does not occur within an ideal seasonal planting time frame. If deemed necessary a temporary irrigation system may be installed to supply supplemental water for newly installed plants and applied seed. Although supplemental irrigation may be required to establish habitat, an automated temporary irrigation system is not proposed due to cost, potential damage to an irrigation system from periodic flows and vandalism, and potential damage to native plants from removal of an irrigation system. Although an irrigation system is not considered to be critical for

meeting the success criteria of this plan, the following are options that may be considered by the installation contractor and restoration ecologist. It is likely that a combination of the following will be used based on site conditions, seasonal constraints, efficacy, and cost.

- A well (new or existing) fitted with a pump powered by a diesel generator or municipal electricity (if available). The well and pump could feed a drip irrigation system or an overhead spray system, both of which would have on-grade hard pipe that will be easier to remove after the establishment period.
- Instead of a pump, a large plastic tank could be set up above the project site and gravity fed to a drip irrigation system. The tank could be refilled with a water truck as needed.
- Truck watering is another possibility, but the use of hoses can impact plants farther from the trucks location.
- Dri-water (semi-solid polymer-like product) may be used for select plantings such as larger trees and shrubs. This product can be used to temporarily provide water to the root mass of larger plantings. It is also possible to replace the polymer as a means of more long-term water supply.

Any system installed will be designed for temporary use for at least 3 years and discontinued once plant establishment is meeting plan goals. Ideally, the irrigation system should be shut-off by the end of the third year of the 5-year maintenance and monitoring period. Irrigation system components will be removed from the site entirely at the end of the maintenance and monitoring period after approval is granted by the resource agencies. Regardless of long-term irrigation solutions, prior to planting and seeding, the soil on site should be moist from watering by the contractor or rainfall. All attempts will be made to coordinate seeding with rain events.

5.12 Erosion Control

Erosion control for the mitigation areas will be specified within the mitigation SWPPP and on the erosion control plans as prepared by the installation contractor. Implementation of such erosion control measures will prevent sediment from leaving the mitigation site. Consultation with local jurisdictions regarding local erosion control requirements should precede mitigation implementation. These requirements may include specific erosion control BMPs.

5.13 Fencing and Signage

As mentioned above, the mitigation parcel currently supports numerous trails and dirt roads that are used by a variety of groups including the U.S. Border Patrol, SDG&E, City of San Diego, and OWD, as well as by hikers, cyclists, and equestrians. In addition, the mitigation parcel is within a portion of the City of Chula Vista Greenbelt Master Plan boundary and is entirely within the OVRP Concept Plan boundaries. These uses present both an opportunity to educate the public and also a risk to the restored habitat. As such, the project will use both temporary and permanent fencing and signage, including educational kiosks, to educate the public about the sensitivity of the habitat on the property. The fencing will aid in excluding human activity that may result in plant and habitat trampling, the introduction of nonnative plant seed, harm to native animals by domestic pets, and harm to native plants by the grazing of horses.

Figures 3-5 and 3-6 show the location of all existing and future trails as well as the various locations for project improvements. All improvements associated with the portion of the trail identified within the City of Chula Vista's Greenbelt Master Plan or the OVRP Concept Plan would be consistent with the guidelines of that plan and would be installed on existing roads that that cross and meander in and out of and along the restoration site.

The 60% construction drawings will include fencing specifications. Temporary fencing will be installed to protect the work site from vandalism and accidental damage to restoration plantings and irrigation systems. In addition to the split-rail fence proposed along the trails to the north and south of the restoration area, select permanent fencing/rocks/logs may be installed in sensitive areas to maintain the integrity of the area. Fencing determinations should be done by a biologist and take into consideration the sensitive resources on site (i.e., rare flora and fauna) and the extensive use of the roads and general area by Border Patrol agents as well as SDG&E and OWD. Signage will be installed throughout the site and is considered essential for this mitigation area due to the extensive use of this area by equestrians, bicyclists, and Border Patrol agents. Signage should indicate the site is a sensitive native restoration site and that unauthorized personnel should not enter. Reflective material will also be installed along the fencing at strategic locations to aid in Border Patrol agents navigating the site at night. The final locations of reflective material will be made in coordination with the Border Patrol.

At least four interpretive signs (e.g., educational kiosks) will be placed throughout the restoration site at key user locations such as major entry points or look outs. The signs will be designed to promote a conservation ethic through the preservation of native habitats and the communities of plants and animals they support. Specifically, the information on a sign may focus on the historical aspects of rivers and wetlands in Southern California, the process of restoration, identification of native plants and wildlife that will use the restoration area, ecological benefits of wetlands and buffer habitat, current threats to natural areas, and ways to minimize human impacts on the remaining natural areas (planting native species, keeping dogs on a leash, not wasting water).

5.14 Final Landscape/Mitigation Construction Plans

A final set of mitigation area construction documents, including grading and site preparation plans, planting plans, irrigation plans, fencing plans, signage plans, installation details, and specifications (installation and maintenance) acceptable for bidding will be prepared in order to implement the conceptual guidelines for the mitigation program outlined in this document. The proposed final elevations of the wetland rehabilitation areas will be shown on construction grading plans. The final elevations of the wetland rehabilitation areas will be similar to existing wetlands and based upon the results of groundwater monitoring well data. The grading plans will include sections for each wetland rehabilitation area and show the proposed finished grades in relation to both the spring and winter season average groundwater table elevation. Construction drawings should take into consideration the extensive use of the dirt roads and general area by Border Patrol agents, and plan for use of the area by the agents to avoid damage to the mitigation effort. Grading plans and associated sections will be submitted to USACE for review and approval prior to initiating wetland impacts.

Implementation of the mitigation program must be coordinated among the appropriate jurisdictions, the biologist/habitat restoration specialist, the landscape architect, the landscape contractor, and the plant material supplier(s). The contracting nursery and seed collectors should be

given the maximum possible lead time (i.e., no less than 9 months prior to actual planting installation) to complete special collections and prepare plant material in order to assure availability at planting time and to minimize cost. Field coordination will be provided by the biological monitor/landscape architect during all phases of the mitigation area implementation.

Species to be planted in the mitigation areas are listed in the plant palette (see Tables 5-3, 5-4, and 5-5). Plant materials will include container stock plantings and seed applications.

The nursery contracted to provide plant materials should be contacted immediately following approval of the plan to provide them with sufficient time to grow material prior to installation. An experienced and licensed native plant nursery should be contracted to collect propagules and seed and to supply the necessary container-grown plant material. Local native plant nurseries include Tree of Life Nursery in San Juan Capistrano, Moosa Creek Nursery in Valley Center, Las Pilitas Nursery in Escondido, and RECON Native Plants, Inc., in Chula Vista. A seed supplier specializing in native species, such as S&S Seeds in Carpinteria, California, should supply the necessary native seed. All plants and seeds should be inspected prior to installation to verify species accuracy and to ensure the material is free of weeds, disease, and pests.

The plant survival rates can be increased and the need for supplemental watering can be decreased by installing plant container stock and seed during the appropriate time of year. Optimal survival rates in Southern California may be achieved when planting activities take place between November and February. Planting activities that take place during the fall and early spring have the advantage of cooler weather, increased natural soil moisture, and reduced evapotranspiration. Because this area may be prone to seasonal flows, plant and seed installation should take place before the onset of the rainy season to ensure they have adequate time to establish before being subject to seasonal stream flows. Hydroseeding should be timed to take advantage of seasonal rainfall patterns and should be applied in early fall or mid spring, if possible.

5.15 As-built Conditions

The applicant will submit a letter report to USACE, RWQCB, and CDFW upon completion of site preparation, planting, and the initial 120-day plant establishment period describing the completion of the installation phase and the as-built status of the mitigation project.

Per the Draft 2013 *Regional Compensatory Mitigation and Monitoring Guidelines for South Pacific Division* (SPD Mitigation Guidelines), the letter report will include the following.

- Date(s) that all compensatory mitigation construction activities were completed.
- A schedule of future mitigation monitoring, implementation, and reporting activities pursuant to final USACE-approved mitigation plan.
- A summary of compliance status with each special condition of the associated USACE permit or verification (including any noncompliance previously having occurred or currently occurring and corrective actions taken to achieve compliance).
- Photographs documenting the site conditions prior to mitigation activities and at the completion of the monitoring period, as well as the final site conditions.

The report will include a reduced set of revegetation construction drawings in accordance with USACE SPD Map and Drawing Standards (USACE 2013) presenting the final as-built locations of the below itemized components.

- Extent of re-established, rehabilitated, and enhanced areas in plan view.
- Extent of both cut and fill.
- Spot elevations to accurately characterize the finished surfaces, including high and low points.
- As-built cross-sections.
- Location of any permanent markers (e.g., identification stakes, photo-documentation stations).
- Seeded and planted areas.
- Irrigation system point(s) of connection and components.
- Other pertinent features.

Any changes from the original construction drawings will be indicated in indelible red ink. The as-built drawings will be submitted to the appropriate public resource agencies within 6 weeks of construction completion.

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Chapter 6
Site Maintenance

The goal of the mitigation plan is to create a natural, self-sustaining wetlands system requiring minimal follow-up maintenance. The maintenance program will begin when construction and installation have been completed and will be concentrated on the first few seasons of growth to control weeds and assist and promote native plant and seed establishment. The maintenance activities described in this Chapter are also applicable to the upstream enhancement area. The installation contractor will be responsible for maintenance during the 120-day plant establishment period (PEP), and the maintenance contractor will be responsible for the remainder of the scheduled 5-year maintenance and monitoring period, which will begin after the 120-day PEP is complete. As a guideline, the contractor is expected to perform maintenance approximately once a month during the first 4 months (i.e., 120-day PEP). The contractor is also expected to perform maintenance approximately monthly during Year 1; every 2 months during Year 2; and quarterly during Years 3, 4, and 5. Maintenance may be needed more frequently to perform remedial measures (e.g., replanting, erosion control). The contractor will coordinate with the restoration ecologist on a regular basis to determine priority maintenance activities during different periods of the plan. The primary maintenance obligations are reviewed below.

6.1 Maintenance Duration

Short-term maintenance will take place for 5 years following completion of construction activities and the 120-day plant establishment period. If success standards are not being met, the maintenance period may be extended. Following signoff by the agencies, the site will enter a long-term maintenance period.

6.2 Responsible Parties

Short-term maintenance (through the 5 years) will be the responsibility of OLC or its designee. Long-term maintenance will be the responsibility of the City of Chula Vista under their Otay Ranch Resource Management Plan (RMP) and the POM.

6.3 120-Day Plant Establishment Period

After installation work is completed, a 120-day (4-month) PEP will begin. At the completion of installation planting, the installation contractor will request a pre-maintenance inspection by the restoration ecologist. The restoration ecologist will prepare a “punchlist” of correction items for completion by the contractor. After punchlist items are corrected, the restoration ecologist will recommend to OLC that the landscape installation phase is complete and that the 120-day PEP has begun. During the PEP, the installation contractor will provide regular maintenance of the restoration area, including trash removal, supplemental irrigation, erosion control, and nonnative treatment.

The installation contractor will perform maintenance visits and activities in accordance with the goals presented in this HMMP. The number of maintenance visits will vary depending on the amount of work necessary for the mitigation area to meet its success standards on schedule. As a guideline, the contractor is expected to perform maintenance approximately twice a month during the 120-day PEP. Weed control during the PEP will focus on the restoration area. Treatment will include all species listed in Table 6-1 and any additional problematic species identified by the restoration ecologist. Herbicide application will be in accordance with BMPs, manufacturers' recommendations, and agency regulations. At the end of the 120-day PEP, the restoration ecologist will flag all dead and diseased plant materials requiring replacement and prepare a final maintenance punchlist of correction items. After the installation contractor has satisfactorily completed the punchlist, the restoration ecologist will recommend acceptance of the 120-day PEP to OLC.

6.4 Irrigation

Any irrigation system used for the mitigation areas will be temporary and will be used to ease the establishment of native seeds and nursery-grown container plantings. It is expected that supplemental irrigation will be used for only the first 2 years. Upon completion and approval of the plan, the irrigation system will be removed. The biological monitor will determine the timing for the termination of irrigation.

6.5 Weed Control

Nonnative weed control will consist of controlling populations of invasive weeds within the mitigation site by the following methods: (1) hand removal, (2) cutting or mowing, (3) chemical herbicide application, and (4) light exclusion.

Hand removal of weeds is the most effective method of control and will be used around individual container plantings. Other herbaceous weeds should be removed by hand before setting seed. Weed control activities will take place monthly for the first 6 months and quarterly thereafter.

Weed species should be controlled before they set seed and before they shade and out-compete native plantings. With prior consent of the biologist, string trimmers may be used in certain instances. Chemical control will be used for control of perennial weed species. The contractor will coordinate with the plan's biologist to identify specific areas where chemical herbicides may be used. Any herbicide treatment must be applied by a licensed or certified Pest Control Applicator. Any herbicide application within close proximity to water will be approved for aquatic use by the United States Environmental Protection Agency (EPA) as having been reviewed and considered compatible with the aquatic environment when used according to label directions. Light-exclusion measures may include organic mulch, which is useful around individual container plantings to reduce weed growth. Mulch should be 3 to 4 inches deep, and cover a 24-inch diameter around container plants. A 5% total cover of weed species will be tolerated at the end of the 5-year maintenance period. Thus, 95% of the revegetation site will be weed free.

Table 6-1. Nonnative Invasive Species Detected or Potentially Occurring in the Restoration Area[1]

Family	Scientific Name	Common Name	Invasive Level[2]
Angiosperms			

Family	Scientific Name	Common Name	Invasive Level[2]
Eudicots			
Aizoaceae			
	Carpobrotus edulis	Hottentot-fig	High
Amaranthaceae			
	Atriplex lindleyi	Lindley's saltbush	N/A
	Salsola tragus	tumbleweed	Limited
Anacardiaceae			
	Schinus molle	Peruvian pepper tree	Moderate
	Schinus terebinthifolius	Brazilian pepper tree	Moderate
Apiaceae			
	Apium graveolens	celery	N/A
	Foeniculum vulgare	Fennel	High
Arecaceae			
	Washingtonia robusta	Mexican fan palm	High
Asteraceae			
	Carduus pycnocephalus ssp. pycnocephalus	Italian thistle	Moderate
	Centaurea melitensis	tocalote	Moderate
	Cynara cardunculus	globe thistle	Moderate
	Glebionis coronarium	crown daisy	N/A
	Lactuca serriola	prickly lettuce	N/A
	Sonchus asper	prickly sow-thistle	N/A
	Sonchus oleraceus	common sow-thistle	N/A
Brassicaceae			
	Brassica nigra	black mustard	Moderate
	Hirschfeldia incana	short-pod mustard	Moderate
	Raphanus sativus	wild radish	Limited
Chenopodiaceae			
	Atriplex semibaccata	Australian saltbush	Moderate
	Chenopodium album	lamb's quarters	Limited
	Salsola tragus	prickly Russian thislte	High
Euphorbiaceae			
	Euphorbia peplus	petty spurge	N/A
	Ricinus communis	castor-bean	Limited
Fabaceae			
	Melilotus spp.	sweet clover	N/A
Geraniaceae			
	Erodium cicutarium	red-stem filaree	Limited
Malvaceae			
	Malva parviflora	cheeseweed	N/A
Oxalidaceae			
	Oxalis pes-caprae	Bermuda buttercup	Moderate

Family	Scientific Name	Common Name	Invasive Level[2]
Poaceae			
	Arundo donax	giant reed	High
	Avena barbata	wild oats	Moderate
	Bromus hordeaceus	soft brome	Moderate
	Bromus madritensis ssp. rubens	foxtail chess	High
	Bromus diandrus	ripgut brome	Moderate
	Cortaderia jubata	pampas grass	High
	Cortaderia selloana	pampas grass	High
	Cynodon dactylon	Bermuda grass	Moderate
	Festuca myuros	rattail fescue	Low
	Hordeum murinum ssp. glaucum	Smooth barley	Moderate
	Melinis repens ssp. repens	natal grass	Low
Solanaceae			
	Nicotiana glauca	tree tobacco	Moderate
Tamaricaceae			
	Tamarix parviflora	tamarisk	High
Urticaceae			
	Urtica urens	dwarf nettle	N/A

[1] The installation and maintenance contractor(s) is responsible for eradication/removal of additional exotics that may be identified by the restoration ecologist in the restoration area. Any exotics recognized by the California Invasive Plant Council (Cal-IPC) and/or the University of California Statewide Integrated Pest Management Project that are identified on site must be removed wherever they occur in the restoration areas. Additionally, less problematic nonnative species that may be identified on site will be controlled when it is determined by the restoration ecologist that they are inhibiting the establishment and development of native plant species.
[2] Cal-IPC 2010 rating: Threat to California Wildlands: N/A = not listed

6.6 Supplemental Planting

If planted and seeded vegetation does not readily colonize the restoration areas, the contractor will provide supplemental planting and seeding for the first 2 years of maintenance. All dead container plant materials and cuttings above the allowable tolerance levels will be replaced with the same species and in the same size containers as originally specified. Vegetation will be monitored monthly for the first 6 months and quarterly thereafter for 5 years.

6.7 Clearing and Trash Removal

Leaf litter and deadwood of native trees and shrubs will not be removed from the mitigation areas. The decomposition of deadwood and leaf litter is essential for the replenishment of soil nutrients and minerals, and deadwood and snags provide valuable habitat for invertebrates, reptiles, small mammals, and birds. Human-made trash and debris will be removed from the mitigation areas by hand monthly for the first 6 months and quarterly thereafter for 5 years.

6.8 Fence Inspection and Repair

Fencing will be inspected by the maintenance contractor monthly for the first 6 months and quarterly thereafter for 5 years.

6.9 Schedule of Maintenance

Weed removal and irrigation inspection will be conducted by the maintenance contractor monthly for the first 6 months and quarterly thereafter. Thereafter, the biological monitor will conduct maintenance inspections on a quarterly basis during Years 1 through 5. Recommendations for maintenance efforts will be based upon the biological monitor's site inspections, which will occur monthly for the first 6 months and quarterly thereafter.

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Chapter 7
Site Monitoring

This chapter outlines the monitoring program from installation to completion including *qualitative* and *quantitative* monitoring. In addition, primary and secondary success standards are proposed.

7.1 Implementation Monitoring

The restoration ecologist will coordinate with the installation contractor and OLC to monitor the project's implementation, as described in Chapter 5, *Implementation Plan*—including initial grading, contouring, and native planting and seeding—and the 120-day PEP, to ensure that installation is performed in accordance with this HMMP. During this period, the restoration ecologist will prepare a brief weekly memorandum that reviews implementation progress, which will be submitted to OLC. The installation contractor will be responsible for the 120-day PEP after the grading, erosion control, and native plant installation are complete to ensure that the site meets defined success criteria and is established in a desirable manner prior to the start of the 5-year maintenance and monitoring program. The installation contractor will receive approval from the restoration ecologist and OLC, indicating a successful implementation and 120-day PEP before the start of the 5-year maintenance and monitoring program. In addition, the installation process will require the restoration ecologist to inspect and approve progress at the following times.

- During and after environmental protection fencing installation.
- During demarcation of the restoration area boundaries.
- During contouring of the channel and the floodplain.
- At the end of grading and contouring.
- After completion of grubbing and soil ripping for decompaction before the start of planting.
- At the time of container plant delivery when container plant materials will be inspected by the restoration ecologist to confirm the receipt of the correct species and that the plants are healthy, disease free, and of proper size prior to planting.
- During final container plant layout to ensure correct ecological positioning.
- When the contractor requests inspection to determine if installation is complete.
- At completion of the 120-day plant and hydrology establishment period.

7.2 Horticultural (Qualitative) Monitoring

A restoration ecologist with the qualifications outlined previously will direct the plan's horticultural (qualitative) monitoring program. The goal of this monitoring is to proactively assess site conditions to address issues before they become a problem. Horticultural monitoring will include design review of the contractor-designed irrigation system (if needed), performing pre-installation environmental education, and performing all required installation inspections described above. An important feature of the horticultural monitoring is effective coordination with the installation and

maintenance contractor(s) to exchange information, provide feedback, and agree on priority maintenance items and potential remedial measures as needed. The restoration ecologist will perform qualitative horticultural monitoring throughout the installation period and the 5-year maintenance and monitoring program. Each horticultural visit will focus on soil conditions (e.g., moisture and fertility), container plant health and growth, seed germination rates, presence of native and nonnative plant species, any significant disease or pest problems, and any erosion problems.

During installation, the restoration ecologist will inspect progress on a weekly basis and then at least once a month during the 120-day plant and hydrology establishment period. The restoration ecologist will monitor the restoration areas monthly during the first 2 years of the 5-year maintenance and monitoring program and then quarterly during Years 3, 4, and 5. During each horticultural site visit, the restoration ecologist will conduct a site overview of the restoration areas to evaluate the following.

- Overall site conditions.
- General condition of plants, including plant health/vigor and mortality.
- Seed germination rates.
- Native plant recruitment.
- Presence and type of terrestrial fauna using the mitigation site.
- Potential issues, including hydrology, irrigation problems (too much or too little), invasive nonnative species of concern (e.g., tamarisk, pampas grass, and Brazilian pepper tree), vandalism, and other problems that need to be addressed by the installation or maintenance contractor.

It is unrealistic to require a formal plant count, as plant installation will include large quantities of 1-gallon and small rose pot (liner) plantings. As such, the restoration ecologist will be responsible for a visual estimate of plant survival and condition during horticultural visits. During each annual July/August site visit, the restoration ecologist will assess the need for potential remedial planting during the winter. Recommendations will be included in the October monthly/quarterly memoranda. Recommendations may include container planting and broadcast seeding.

7.2.1 Reporting

Following each horticultural site visit, the restoration ecologist will prepare a short memorandum. These memoranda will focus on issues such as replacements of dead or diseased plants, weeding, irrigation scheduling, trash removal, and pest control. In addition, the restoration ecologist will coordinate with the installation or maintenance contractor for the following.

- Schedule upcoming maintenance based on the maintenance needs and priorities at each of the restoration areas.
- Walk the restoration areas to identify any problem issues, including erosion issues, irrigation damage, occurrence of invasive nonnative species, and potential human impacts such as dirt bike usage and vandalism.
- Provide support to field maintenance crew in the identification of common native and nonnative species.

- Determine an irrigation schedule (for a given period of the plan) based on seasonal and annual variation in rainfall, native plant water requirements, and site-specific conditions (e.g., soil condition and slope).

7.3 Botanical (Quantitative) Monitoring

A restoration ecologist with the qualifications specified previously will supervise all botanical (quantitative) monitoring. This will allow for adaptive management (Section 7.6) decisions to be made, as well as allow site progress to be tracked. At a minimum, quantitative botanical monitoring will consist of point-intercept transects, diversity belt transects, a condition-based rapid assessment for each restoration area, as well as cross-sections for channel morphology and topography.

7.3.1 Quantitative Monitoring

Photo-Documentation

Permanent stations for photo-documentation will be established during the implementation period using a GPS unit. At this time, 10 photo stations have been identified; however, others may be added post implementation to maximize capturing the changes on site (Figure 7-1). These locations and directions will be mapped in the annual monitoring report. The photos will be used to document the installation process in addition to the vegetation establishment. Permanent stations will ensure photographs will be taken from the same photo-point, at the same time of year, and in the same compass direction each year. Following the 120-day PEP, photos will be taken twice a year (June and December) at these 10 fixed locations and catalogued to be included in the annual reports. Photographs will reflect material discussed in the annual monitoring report, and will document the progress of the site.

Vegetation

The vegetation community will be quantitatively measured using semi-permanent 50-meter transects that will be established randomly throughout the restoration area (Figure 7-2). Transects will be run perpendicular to the primary channel, and a photo station will be established at the end farthest from the channel. These transects will be used to determine native and nonnative cover across each of the restoration areas during the 5-year maintenance and monitoring program. The use of permanent transects as a sampling design allows for the removal of spatial variability and increases the ability to detect annual changes in the site. This improves the ability to detect positive or negative trends in the restoration area and allows the project biologist and OLC to make prompt adaptive management decisions. Specifically, 25 semi-permanent transects will be established within the restored aquatic area including the channels and floodplains. In addition 10 semi-permanent transects will be established in the upland areas, 5 in the north area and 5 in the south area. This will result in 35 transects total.

During Year 1, each transect will be marked with a 4-foot-tall metal rebar post. All posts will also be flagged with neon whiskers for visibility. The location of all transects will be marked using a GPS unit and displayed on a site map in the annual report. Data will be collected each year during late spring/early summer (May to July), and sampling times will be consistent from year to year to minimize variation in the data.

For each transect the "point-intercept method" will be used to record the species. The sampling method is based on a 50-meter-long point-intercept transect centered on a 50 by 5 meter belt transect plot. At each 50-centimeter interval along the transect (beginning at the 50-centimeter mark and ending at the 50-meter mark), a point is projected vertically into the vegetation. Each species intercepted by a point is recorded, providing a tally of hits for each species in the herb, shrub, and tree canopies. The measuring tape will be stretched taught to maintain a consistent sampling area. Absolute cover for each species according to vegetation layer can be calculated from these data (CNPS 1999). To conduct the measurement, a 50–meter-long tape is laid along the center of the pot and secured at both ends. The observer uses a 1-meter dowel to sight along a vertical line at every 0.5-meter interval. Each species intercepted by the vertical line is tallied by vegetation layer. A total of 100 points along the transect is thus sampled. Species were categorized as herbaceous layer (vegetation shorter than 60 centimeters), shrub layer (60 centimeters to 3 meters), or trees (woody material taller than 3 meters). To measure vegetation change, the native vegetation cover in each layer is calculated as follows.

Cover = number of points covered by a species / total number of points x 100%

The cover of all nonnative and invasive plants, as defined by Cal-IPC's Invasive Plant Inventory of Priority Species (Cal-IPC 2014), will be calculated for each transect. Values for each re-established or rehabilitated wetland unit will be compared to the reference site. In addition to cover, native species richness will be measured for each belt transect. For each belt transect (centered on the point-intercept transect) all species present will be recorded, and a count of all native species will be presented. Only plants rooted within the belt will be counted. The native species richness of each belt transect will be compared to the reference site. In addition, a complete list of additional species occurring within each restoration area will be recorded to measure total species richness. Separate lists will be generated for the aquatic and upland habitat because each has distinct success criteria.

Wetland Condition

A CRAM analysis will be used to provide an evaluation of the ambient conditions of the re-established, rehabilitated, and enhanced wetlands within the restoration area with a focus on the primary channel. The assessment will follow the protocols found in the latest version of the *California Rapid Assessment Method for Wetlands Riverine Wetlands Field Book* at the time of the Year 1 assessment. In addition, the *CRAM Depressional Field Book* will be used to assess the seasonal ponds. The same version will be used for the 5-year maintenance and monitoring period. Representative AAs will be established within the primary channel and at least 3 of the seasonal ponds to measure the change in ecosystem functions and services over the course of the monitoring program. At this time five CRAM Riverine AAs have been identified within the restoration site and three Depressional AAs (Figure 7-2). Because the site is expected to be wadable at all times, two-sided AAs are planned for the riverine assessments. If the Episodic Streams CRAM module (currently under development) is available for use then both the Riverine and Episodic module will be used during Year 1, and the restoration ecologist will evaluate which module is most appropriate for the site.

A sample size analysis of CRAM assessment areas will be conducted in Years 1–3 as described in the CRAM user's manual with the intent of determining adequate sample size for the project. One of the five AAs will be randomly selected. If the overall CRAM score for that AA differs from the average score of the other four AAs by more than 15%, another AA would need to be added. If the randomly chosen AA does not differ by more than 15%, then no more AAs are needed.

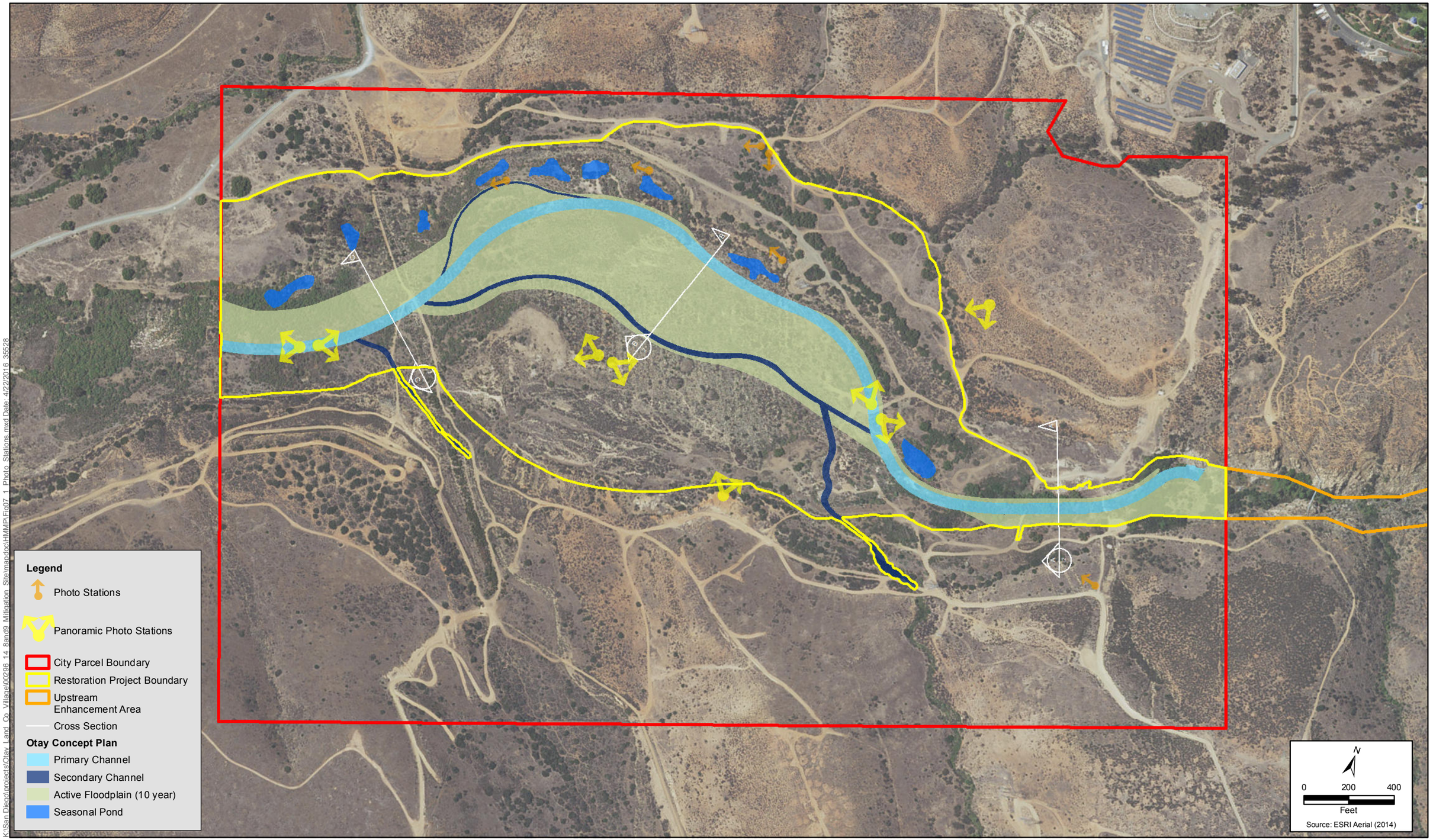

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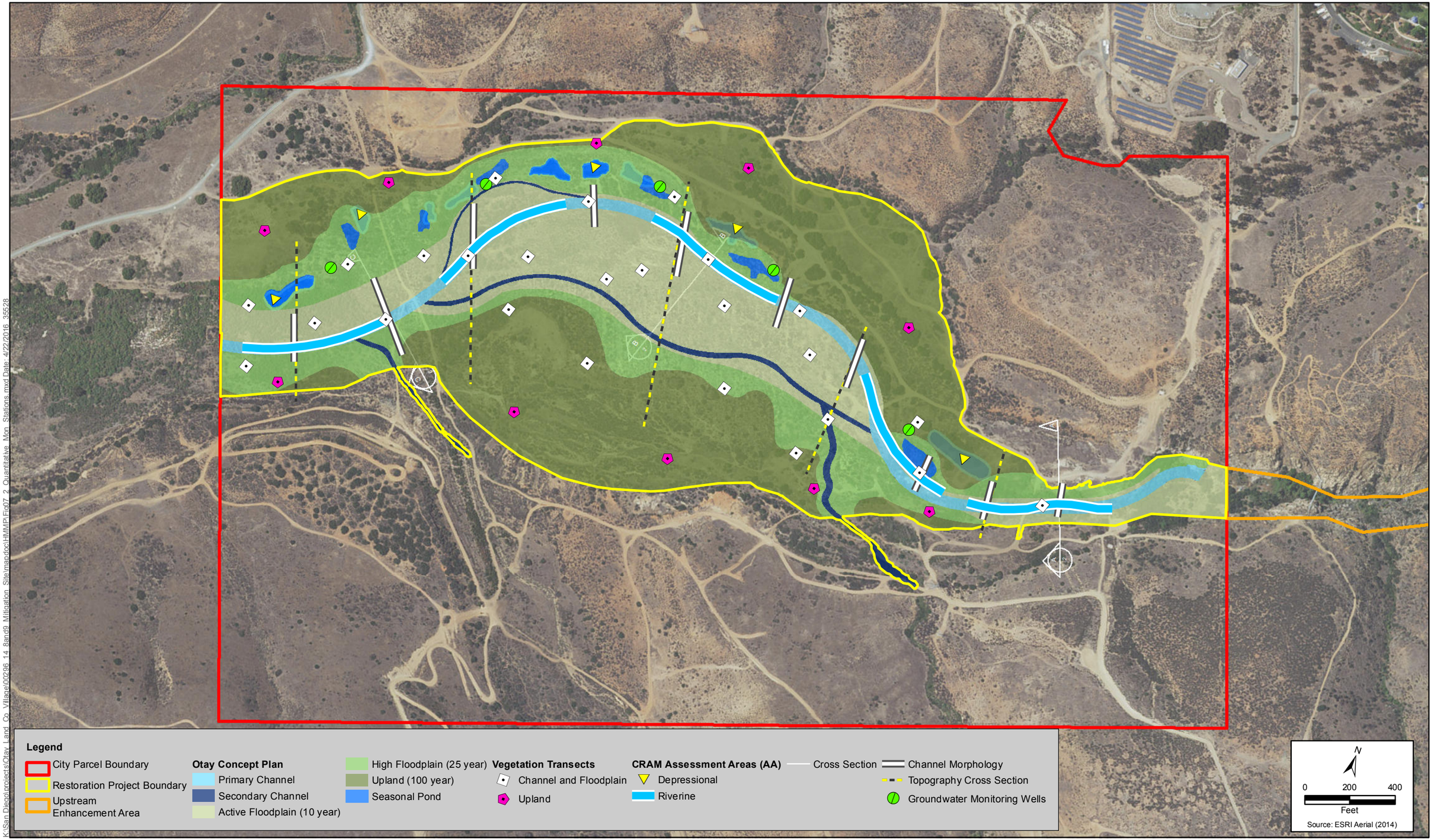
Figure 7-1
Photo Documentation Stations
Otay River Restoration Project



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*As part of construction the road will be closed and revegetated with the exception of a 4-6 foot swath for potential future trail creation. The trail is not included as part of this HMMP.

Figure 7-2
Quantitative Monitoring Locations
Otay River Restoration Project

Because there are no viable wetlands onsite now, there will be an immediate increase in wetland condition following recontouring. However, once the mainstem channel and floodplain has been established, both the Landscape and Hydrology Attributes are expected to change very little if any over time. As such the primary wetland condition success standards are based on the Biotic and Physical Attribute scores. Table 7-1 shows the projected CRAM wetland condition scores for the riverine AAs post installation (Year 3 and Year 5) as well as the maximum score anticipated at site maturity, which may take 10 to 20 years to achieve and as such is not tied to the project's success. Scores are based on best professional judgement using experience in other intermittent/ephemeral systems. Please note that the scores shown would be the average for the site and as such may vary within each AA.

Table 7-1. Projected CRAM Scores for Year 3 and Year 5 Post Installation and the Maximum Score

CRAM Attributes	CRAM Metric and Submetrics	Year 3	Year 5	Maximum
Buffer and Landscape Connectivity	**Attribute Score**	85%	93%	93%
	Stream Corridor Continuity	12	12	12
	Buffer Submetrics (below)	8.5	10.4	10.4
	% of AA with Buffer	12	12	12
	Average Buffer Width	12	12	12
	Buffer Condition	6	9	9
Hydrology	**Attribute Score**	83%	83%	92%
	Water Source	12	12	12
	Channel Stability	9	9	12
	Hydrologic Connectivity	9	9	9
Physical Structure	**Attribute Score**	50%	75%	75%
	Structural Patch Richness	6	9	9
	Topographic Complexity	6	9	9
Biotic Structure	**Attribute Score**	56%	67%	81%
	PC: No. of plant layers	6	9	12
	PC: No. of codominants	9	6	9
	PC: Percent Invasion	9	12	12
	Plant Community Submetric Score	8	9	11
	Interspersion	6	6	9
	Vertical Biotic Structure	6	9	9
	Overall AA Score	69%	80%	85%

Channel and Floodplain Morphology

Permanent transects will be established throughout the site perpendicular to the primary channel. These transects will be monitored annually to document changes to the primary channel morphology as well as the overall floodplain. In the primary channel, a topographic cross-section will be collected at 10 permanent locations throughout the site, occurring approximately every 100 meters (Figure 7-2). Each transect will be surveyed using ground-based surveying equipment to capture and track channel morphology; elevations along the cross-section will be collected at intervals close enough to capture changes in elevation along the channel sides and bottom. In addition to the channel morphology transects, an additional 5 transects have been established throughout the floodplain to monitor overall topographic changes over time, including changes to

the secondary channels and floodplain terraces. These five transects correspond to five of the channel morphology transects (Figure 7-2). The location of each cross-section will be permanently marked in the field using 4-foot-tall metal t-posts or other method. Transect endpoints will be documented using GPS units.

Hydrology and Groundwater Monitoring

Improvements to surface hydrology are anticipated throughout the site, including the primary and secondary channels as well as the floodplains. Evidence of improved surface hydrology will be evident by the appearance of an ordinary high water mark, surface flows, and overbank flows. Because the site will be freshly graded to create the new topographic landscape, it may take a few years and sufficient storm events to create surface hydrology indicators. With each annual monitoring event evidence of surface hydrology will be recorded and a summary of key indicators will be presented in the annual report.

Groundwater monitoring wells will be installed throughout the northern floodplain of the mitigation site. Five permanent groundwatering stations will be established prior to installation and tracked up until grading, at which point they will be removed (Figure 7-2). They will be reinstalled following mitigation installation and monitored throughout the 5-year period.

Shallow Groundwater Monitoring

Site visit observations have identified approximate groundwater levels at discrete locations in the plan area during a single drought year fall season. Additional observations can improve the understanding of seasonal variations of shallow groundwater tables and inform and improve conceptual designs to propose adequate depth of excavation to recreate a feasible river channel. ICF will work with a subcontractor to install five dig/drill shallow holes, and ICF staff will install five PVC piezometers fitted with water-level data loggers. The data loggers will remain deployed and retrieved as necessary to collect a complete year of recorded water levels leading up to implementation such that the design/build operation can be adapted as needed to achieve the desired habitat mosaic.

Updated Jurisdictional Delineation

An updated jurisdictional delineation will be performed within the mitigation site in Year 3 and Year 5. The mitigation site will be evaluated for the presence of a definable channel and/or wetland vegetation, soils, and hydrology. The study area will be analyzed for potential wetlands using the methodology set forth in the 1987 *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the 2008 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008a) or more current guidance. Lateral limits of non-wetland waters will be identified using field indicators (e.g., OHWM) (USACE 2008b). While in the field, potential jurisdictional features will be recorded onto a 100-foot-scale color aerial photograph using visible landmarks and mapped using a GPS unit with sub-meter accuracy. Vascular plants will identified using *The Jepson Manual: Vascular Plants of California* (Baldwin et al. 2012) and *The National Wetland Plant List* (Lichvar et al. 2014) or current references.

7.3.2 Sampling Design and Statistical Rigor

The monitoring program has been designed to maximize OLC's ability to characterize the site and detect change while minimizing costs. A statistical power analysis will be conducted to determine the appropriate number of sampling units needed to achieve 90% confidence with 15% precision around absolute native cover (Elzinga et al. 1998). Power, by definition, is the ability to find a statistically significant difference when the null hypothesis is in fact false; in other words, power is your ability to find a difference when a real difference exists (i.e., native cover is higher in Year 2 than Year 1). The power of a study is determined by three factors: the sample size, the alpha level, and the effect size. After Year 2, a power analysis using paired (permanent) data will be conducted to ensure 90% power is being achieved, alpha of 0.1, and a minimum detectable change of 15% native cover. If 90% power is not being achieved, additional transects may be added.

Additionally, 90% confidence intervals will be calculated each year around native and nonnative cover of the restoration areas. These confidence intervals will be compared to vegetation success standards calculated based on the reference site to determine if success is being achieved. For native cover, the entire confidence interval must be higher than the success standard for success to be achieved. For nonnative cover, the entire confidence interval must be less than the success standard for success to be achieved.

Using permanent sampling units allows for higher power with fewer samples because variability in space is removed, as the sampling units are in the same place year after year. Repeating the power analysis after Year 1 will ensure high power is still achieved with the most efficient sampling design possible.

A similar power analysis will be conducted for the CRAM assessment, as described above

7.4 Performance Standards

Success criteria have been established for the mitigation plan based on the qualitative and quantitative monitoring described above. These performance standards have been designed specifically for this HMMP as a means of monitoring the progress and performance of the physical, hydrological, and biological conditions of the mitigation activities. The success criteria include multiple measures of the plan's performance and final success, and include general site requirements, native and nonnative cover goals, and functional assessment target scores as shown in Table 7-2. Plan performance will be evaluated annually during regularly scheduled monitoring visits unless otherwise specified. If the plan at any time does not appear to be on a trajectory to meet final success standards, the biological monitor will recommend remedial actions (adaptive management) to ensure conformance to the HMMP's goals and schedule.

Table 7-2. Performance Standards

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Physical features or surfaces capable of supporting physical and biotic processes	N/A	N/A	>Year 1 in CRAM Physical Attribute	>Year 2 in CRAM Physical Attribute	>/=Year 3 in CRAM Physical Attribute	>/=Year 4 in CRAM Physical Attribute
Support features capable of storing surface water from upland sources and/or the main channel[1]	Primary/ secondary channels, and floodplains meet elevation specification per plans	Evidence of flow in primary channel and active low floodplain	Evidence of flow in primary channel and active low floodplain	Evidence of flow in primary channel and active low floodplain	Evidence of flow in primary channel and active low floodplain. Microtopography developing.	Evidence of flow in primary channel and active low floodplain. Microtopography developing.
Container plant survival[2]	100%	≈80	≈80	N/A	N/A	N/A
Percentage **relative** cover of native woody species[3]	N/A	>25%	>35%	>45%	>50%	>60%
Percentage **relative** cover of native herbaceous species	N/A	>10%	>15%	>20%	>25%	>30%
Percentage **absolute** cover of nonnative species	<10%	<20%	<20%	<10%	<10%	<5%
Percentage **absolute** cover of invasive species	<5%	<10%	<10%	<5%	<5%	<1%
Native flora species richness	N/A	N/A	>Year 1	>Year 2	>/=Year 3	>/=Year 4
Terrestrial fauna species presence and taxon richness[4]	N/A	Evidence of at least 3 primary taxa	Evidence of at least 3 primary taxa	Evidence of at least 3 primary taxa	Evidence of at least 4 primary taxa	Evidence of at least 4 primary taxa

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Native floral species reproduction and recruitment	N/A	Presence of seedlings and saplings	Presence of seedlings and saplings	Presence of seedlings and saplings	Presence of seedlings and saplings	Presence of seedlings and saplings
Wetland condition (CRAM)	N/A	N/A	>Year 1 in Biotic and Physical Attributes	>Year 2 in Biotic and Physical Attributes	>/=Year 3 in Biotic and Physical Attributes	>/=Year 4 in Biotic and Physical Attributes

[1] Assumes adequate storm event has occurred in previous rainy season.

[2] Based on qualitative ocular estimates.

[3] Relative cover will account for overlapping species and bare ground. The percentages expected are lower because the site is intended to be an intermittent channel and floodplain, which often supports large bare areas. Because this is ecologically appropriate, the success standard is attempting to account for that.

[4] Primary taxa include invertebrates, mammals, birds, reptiles, amphibians.

7.5 Annual Reports

Annual monitoring reports will be submitted to the appropriate resource agencies as specified by agency permits or by the end of each calendar year following the completion of that year's monitoring activities. Per the SPD Mitigation Guidelines, the annual report will include a short narrative letter report that includes a vicinity map, compensatory mitigation map, mitigation treatments, photograph, transect locations, and other monitoring locations; and will be accompanied by the SPD mitigation monitoring forms. Supporting data will be summarized by within the upland and floodplain area using relative cover. Mean absolute cover values for each species by will be included in an appendix.

7.6 Adaptive Management Plan

Pursuant to Code of Federal Regulations (CFR), Title 33, Section 332.7(c) of the 2008 Mitigation Rule (33 CFR 325 and 332, and 40 CFR 230), the plan must include an adaptive management strategy to account for unforeseen problems in the implementation, short-term development, and overall success of the mitigation program. Otay Land Company will ensure that an experienced restoration ecologist who is familiar with the mitigation design and goals is on site during each phase of the HMMP. The most critical time for adaptive management will be during implementation, which will include initial clearing and grubbing activities through grading and planting activities. Correcting problems at this early stage should reduce potential problems during site development. During implementation, the restoration ecologist will be responsible for early detection of problems with the proposed site elevations and contours and will adapt the plan as needed with engineers and construction crews. The restoration ecologist will be responsible for the specified native plants being installed in the proper location and densities and for adjusting those specifications as needed to accommodate site conditions or other issues such as a species being unavailable. The restoration ecologist will train the planting crews on the proper methodology to plant each container type correct problems as needed.

Interim performance standards are crucial to ensuring mitigation performance follows a trajectory to attain final mitigation success. Although not anticipated, if these interim performance standards are not achieved during annual monitoring, the restoration ecologist will work with the mitigation team and regulatory agencies if these problems require substantial action. A substantial action needing agency coordination could involve channel instability, large-scale infestation by invasive, nonnative plants and animals, a need to replant more than 20% of the site to improve species cover or diversity, supplemental soil amendments, or installation of new or replacement fencing and signage at new locations or with a new design. The team will prepare a recommendation and gain agency approval prior to implementation. Minor problems, such as trash, vandalism, isolated instances of plant mortality, or small-scale weed or pest infestations, will be rectified as they are discovered during routine site monitoring and maintenance and included in annual reporting.

In some cases when performance standards are not being met, a site may be viewed as performing correctly and performance standards may be determined to have been incorrectly estimated. In these cases, OLC may request performance standards to be modified in accordance with 33 CFR 332.7(c)(4).

If the mitigation site has not met the performance criteria, and the criteria are considered accurate and reasonable, the maintenance and monitoring obligations will continue until performance criteria are achieved or alternative contingency measures will be negotiated with regulatory agencies. Otay Land Company understands that failure of any significant portion of the mitigation site may result in a requirement to replace that portion of the site and/or extend the monitoring and maintenance period until all success standards are met.

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Chapter 8
Mitigation Cost and Financial Assurances

Pursuant to 33 CFR 332.3(n)(2) of the Mitigation Rule, OLC will provide financial assurances in the form of a performance bond, letter of credit, or escrow account providing USACE contingency funding in the event that the OLC Wetland Mitigation site cannot be obtained or the mitigation successfully implemented. OLC has proposed providing financial assurances in two phases (implementation and post-implementation) for each of the two projects (Village 3 and Village 8 West). Financial assurances for the future phase of restoration will be included in the development of the mitigation bank.

The first financial assurance is the estimated amount of acquiring replacement lands within the watershed or region in the event that the mitigation site cannot be successfully purchased. The second would be equal to the costs of planning, implementation, short-term monitoring (5-year monitoring period), and contingency funds for implementation of Phase 1 and Phase 2. The amount of the combined financial assurances provides sufficient funds to ensure that an alternative site can be acquired and a replacement compensatory mitigation plan can be implemented.

8.1 Total Estimated Mitigation Implementation Cost

The total cost for the compensatory mitigation, including the required short-term maintenance and monitoring and a 10% contingency, is estimated to be approximately $4.97 million. Cost estimates will be refined prior to executing the financial assurances and prior to implementation of the authorized impacts associated with the Village 3 and Village 8 West. Table 8-1 provides an itemized budget for successfully completing the Restoration Plan ICF staff used their best professional judgment and past experience with constructing similar projects to develop the line items and unit costs for the estimate. For convenience, the tasks have been categorized into property acquisition and protection, restoration planning and permitting, and implementation.

Table 8-1. Preliminary Cost Estimate for Entire Plan

Restoration Phase/Item	Total Cost	Assumptions
Site Acquisition and Protection		
Real Estate Costs	$0	Mitigation occurring on city and county owned properties
Developing and Recording Conservation Easement	$25,000	Develop conservation easement, attorney and recording fees
Long-Term Endowment	$170,955	Annual costs of $5,983.45
Restoration Planning and Permitting		
Design	$202,000	Includes concept design, detailed design, and hydraulic analysis
Mitigation and Monitoring Plan	$57,000	Includes baseline surveys, vegetation map, and jurisdictional delineation
Permitting	$68,000	Includes biological surveys, California Environmental Quality Act compliance,

Restoration Phase/Item	Total Cost	Assumptions
		NWP 27, 1602, 401 Certification, SWPPP
Implementation (by Phase)		
Phase 1 Invasive Species Treatment	$195,000	Initial treatment of Phase 2 footprint, treatment of all trees, treatment of upstream areas. Includes initial UXO sweep.
Phase 2 Construction	$720,000	Includes mobilization, demolition, grading, planting, and construction monitoring
Phase 2 Post-Construction Performance Monitoring and Maintenance	$395,000	5 years of post-construction performance monitoring and site maintenance
Future Phases Construction	$1,870,500	Includes mobilization, demolition, grading, planting, and construction monitoring
Future Phases Post-Construction Performance Monitoring and Maintenance Phase 2	$835,000	5 years of post-construction performance monitoring and site maintenance
Subtotal	**$4,538,000**	
10% Contingency	$436,650	
Total	**$4,974,650**	

8.2 Financial Assurances

The financial assurance will be provided in the format agreed to by OLC, USACE, other regulatory agencies, and the City of Chula Vista as necessary. Financial assurances will be provided to USACE in the amount estimated in Table 8-2 unless adjusted based on new site information and as approved by USACE. Financial assurances will be provided using USACE templates if available and posted using the present standards for financial guarantees to warrantee mitigation requirements pursuant to the Mitigation Rule. The first financial assurance would be released upon initiation of Phase 2 construction, while the second financial assurance would be released by USACE upon notice of completion of the minimum 5-year maintenance and monitoring program, final annual report documenting attainment of all ecological performance standards, and an agency compliance visit if requested (Section 9.4, *Management Plan Preparation Requirement*).

Financial assurances have been divided across two phases of the project. As illustrated in Table 8-2 there is a disproportionate cost associated with the planning and installation of this HMMP. This is not uncommon but does warrant a distinction between the plan's two phases. As such, a phased release schedule has been proposed corresponding to (1) the as-built at installation completion and (2) the 5-year maintenance and monitoring period and success achievement of all permit success standards for Phase 1 and Phase 2 (Village 3 and Village 8 West).

Table 8-2. Phased Financial Assurances

Financial Assurance Phase	Total Cost	Release Schedule
First Phase[1]	$717,955	Upon initiation of Phase 2 construction
Second Phase[2]	$1,115,000	Completion of 5 year maintenance and monitoring program
Total Financial Assurance	$1,832,955	

[1] Includes Site Acquisition and Protection, Restoration Planning and Permitting, and Phase 1 Invasive Species Treatment.

[2] Includes Installation of Phase 2, Post-Construction Performance Monitoring and Maintenance for Phase 2, and the 10% Contingency for the Phase 2 cost.

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Chapter 9

Compensatory Mitigation and Preservation Credits

9.1 Compensatory Mitigation Credits Available

The compensatory mitigation quantities (acreage and stacked linear feet) that will be restored at the mitigation site are shown in Tables 9-1 and 9-2.

Table 9-1. Compensatory Mitigation Acreage Quantities by Restoration Type for Entire Plan

Restoration Type	Habitat	Acreage	WoUS Credit	CDFW Credit[1]	Buffer Credit[2]
Re-establishment	Primary Channel	5.27	5.27	5.27	-
	Secondary Channels	2.22	2.22	2.22	-
	Active Low Floodplain (10 year flood)	24.2	24.2	24.2	-
	High Floodplain (25 year flood)	21.8	-	21.8	2.18
Establishment	Seasonal Ponds (created)	1.34	1.34	1.34	-
Rehabilitation[3]	Primary Channel	0.75	0.75	0.75	-
	Seasonal Ponds (existing)	0.38	0.38	0.38	-
	Active Low Floodplain (10 year flood)	0.16	0.16	0.16	
	Transitional Uplands	47.15	-	-	4.72
Total WoUS Credit			34.32		
Total CDFW Credit				56.12	
Total Upland Credits					6.9

[1] Acreage includes WoUS Credit and is not additive.

[2] Functional increase based on projected CRAM scores, %10 change. Buffer credit can be applied to WoUS and CDFW credit as the total acreage available has been reduced from the full 67 acres of rehabilitation to 6.7 acres based on the functional increase.

[3] Use of Rehabilitation credits are not as valuable as re-establishment and establishment in the USACE mitigation ratio checklist, as such, the mitigation ratio will be higher when using this credit type.

Table 9-2. Compensatory Mitigation Linear Feet Quantities for Entire Plan

Channel Length Mitigation		Linear Feet	Jurisdictional Width	Stacked Width (Linear Feet * Width)
Straight Linear Feet	All Channels	10,170	-	-
Stacked Linear Feet	Secondary Channel (North)	1,000	10	10,000
	Secondary Channel (South)	2.220	22	48,840
	Primary Channel	5,170	50	258,500
	Tributaries	1,780	23	40,940
	Total Stacked Linear Feet			**358,280**

9.2 Long-Term Management Plan

Pursuant to 33 CFR 332.7(a) of the Mitigation Rule, OLC will prepare a specific long-term management plan that will govern the management of the mitigation site in perpetuity after all performance standards have been met. Although one goal of the OLC mitigation program is to reestablish self-sustaining native riparian scrub habitat, some level of long-term management will be required to ensure that target functions and services are maintained. The purpose of the long-term management plan will be to maintain control over factors that could adversely affect the site, such as invasive species, trespassing, and urban encroachment. OLC will evaluate the potential factors that could adversely affect the mitigation site in light of the location, the condition of riparian/wetland areas surrounding the mitigation site, and the proposed mitigation program, including the ecological performance standards described previously. The long-term management plan will be a "living" document and will include a provision to be updated every 5 years so that changes in the physical or anthropogenic environments can be adequately addressed. The long-term management plan will be developed to be compatible with the OVRP JEPA and will distinguish between monitoring and maintenance requirements that are over and above those included in the JEPA for the OVRP. The long-term management plan will include identification of financing mechanism(s) for long-term management and identification of responsible party(ies), such as a third-party land manager. The draft long-term management plan will be submitted to the regulatory agencies for review and approval. A draft outline for the long-term management plan is provided in Appendix F and additional details are provided below.

9.3 Site Protection Mechanism

The mitigation site will be protected through recordation of a real estate instrument such as a conservation easement, deed restriction, or covenant that will run with the land and will obligate OLC or its successor or assigns to retain the site as natural open space in perpetuity. The site protection mechanism will be developed to be compatible with the OVRP JEPA. The protection mechanism will ensure that the site is protected for the primary purpose of maintaining natural aquatic resources functions and services as targeted through the ecological performance standards in Chapter 7, *Site Monitoring*. The protection mechanism will establish an appropriate third party to

hold the easement with the right to enforce site protections and provide the third party the financial resources necessary to monitor and enforce the site protections.

OLC will draft the long-term protection mechanism using USACE's approved template document, if available. The mechanism will identify a third-party easement holder and a third-party land manager. OLC is currently in discussions with various entities to be an easement holder and land manager. The conservation mechanism will preclude establishment of fuel modification zones, road crossings, paved public trails, maintained public trails, maintenance access roads, and future easements within USACE jurisdiction other than those identified in the existing restoration plans. These include the City of Chula Vista Greenbelt Master Plan and the OVRP trails as identified in the 1997 OVRP Concept Plan and currently under evaluation, with a projected OVRP Concept Plan Update in 2016. It is expected that within the restoration project boundary, that planned trails would follow existing roads and paths, be located outside of jurisdictional waters with the exception of existing river crossings, and be marked with fencing, signage, other necessary amenities and maintained to minimize indirect effects on habitat. The road crossings over the river have been identified to maximize overlap with utilities (including SDG&E and OWD) and Border Patrol crossings. Additional multi-uses can also be approved by USACE and other regulatory agencies as desired for these crossings.

9.4 Management Plan Preparation Requirement

OLC will prepare a specific long-term management plan utilizing the draft outline provided in Appendix F, which was based on the California templates for Mitigation Banks developed by San Francisco, Sacramento, and Los Angeles Districts of USACE and their respective Interagency Review Teams. The long-term management plan will govern the management of the mitigation site following successful implementation of the restoration program and achievement of the 5-year ecological performance standards. The long-term management plan will summarize the management goals and objectives, identify responsible parties, characterize the baseline conditions, and define management and monitoring tasks and schedules, reporting requirements, and contingencies for adaptive management. The long-term management program will be a "living program" that will be revisited at 5-year intervals and revised as needed to accommodate new management and monitoring strategies if necessary.

Following successful completion of the mitigation program (i.e., achievement of ecological performance standards) and written concurrence by USACE and other regulatory agencies as needed, management of the mitigation site will be transferred along with the long-term management plan to the third-party land manager. The land manager will be funded in perpetuity on an annual basis through the non-wasting endowment described below.

9.5 Funding Mechanisms/Schedule

OLC will fund the long-term management and monitoring of the mitigation site by establishing a financial instrument such as a non-wasting endowment or other mechanism approved by USACE for the purposes of fulfilling the long-term responsibilities described in the long-term management plan. The restoration project will be included in the City of Chula Vista POM as it is part of the reserve system. Under the POM minimal management activities are performed annually based on

the priorities identified in the annual work plan, which is prepared by the City's preserve managers (currently RECON). As these management actions are limited and not expected to meet the criteria described in the long-term management plan, OLC will financially supplement the POM via the non-wasting endowment or other approved financial mechanism to fund long term management of the restoration area in perpetuity to meet the long-term requirements for the restoration project. Following completion of the 5-year monitoring and maintenance period in which reporting will be done by OLC's restoration ecologist, the annual work plan prepared for the POM will include a small chapter specific to the restoration site.

OLC will work with the City to properly identify the financial instrument that meets the City's needs as well as USACE. The amount of the endowment will be based on a Property Analysis Record (PAR) or PAR-equivalent analysis accounting for all the required management responsibilities, including monitoring, reporting, and a contingency to account for unforeseen adaptive management needs. The PAR and PAR-like analysis relies upon assumptions regarding capitalization rate, market rate of labor, equipment, materials, monitoring, and maintenance requirements. OLC and its consultant will work collaboratively with USACE to ensure clear, consistent, and well-substantiated evaluation and accurate outputs of projected costs. The non-wasting endowment will be provided to an approved financial institution such as the National Fish and Wildlife Foundation. A legal agreement between OLC, USACE, and the endowment manager will be developed if necessary to govern how the endowment is managed and when monies will be released to the long-term land manager.

Chapter 10
Completion of Compensatory Mitigation

10.1 Notification of Completion

Upon achievement of the 5-year ecological performance standards and completion of the 5-year maintenance and monitoring period, OLC and its restoration ecologist will prepare a Final Monitoring Report and Notice of Completion. The final report will detail whether all the requirements of the mitigation program have been met and make any necessary recommendations for modifications to the long-term management plan or initial funding amount. An updated long-term management plan and PAR or PAR-equivalent analysis will be provided if required.

The final report will be submitted to the regulatory agencies for verification of successful completion and final acceptance, and OLC will extend an invitation for a final agency site visit. Pursuant to Section 7.6, *Adaptive Management Plan*, the restoration ecologist will consult with regulatory agencies annually if substantial remedial actions are needed to achieve performance standards. Should any of the restoration areas fail to meet the plan's final performance standards at the end of the 5-year maintenance and monitoring period, OLC will consult with the resource agencies to determine if any additional actions are needed to attain the 5-year ecological performance standards or if alternative mitigation options need to be pursued.

10.2 Agency Confirmation of Site Performance

Upon receipt of the final report the regulatory agencies will be requested to either confirm that the required performance standards have been met or to accept an invitation for a site visit. If regulatory agency personnel reject terminating the 5-year monitoring and maintenance program, reasons for the objection should be clearly stated so that corrective measures may be immediately scheduled. OLC will schedule a meeting to resolve agency concerns, which may include implementing additional adaptive management measures, arranging to extend the monitoring period. Upon acceptance of the termination of the 5-year monitoring and maintenance program, OLC will request a letter verifying the successful completion of the mitigation plan and transfer responsibilities to the long-term manager.

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Chapter 11
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Appendix A

Interagency Regulatory Guide for Advance Permittee-Responsible Mitigation by the USACE Seattle District

Interagency Regulatory Guide

Advance Permittee-Responsible Mitigation

U.S. Army Corps of Engineers
Washington State Department of Ecology
Washington State Department of Fish and Wildlife

US Army Corps
of Engineers
Seattle District

December 2012
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Publication and Contact Information

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This report is available on the Department of Ecology's website at https://fortress.wa.gov/ecy/publications/SummaryPages/120615.html.

This report and other mitigation resources can be found on the Department of Ecology's Mitigation That Works website at: http://www.ecy.wa.gov/mitigation.

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If you need this document in a format for the visually impaired, call the Shorelands and Environmental Assistance Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

US ARMY CORPS OF ENGINEERS AND WASHINGTON STATE DEPARTMENTS OF ECOLOGY AND FISH AND WILDLIFE INTERAGENCY REGULATORY GUIDE ON ADVANCE PERMITTEE-RESPONSIBLE MITIGATION
DECEMBER 2012

The U.S. Army Corps of Engineers and the Washington State Departments of Fish and Wildlife, Ecology and Transportation have developed the Interagency Regulatory Guide on Advance Permittee-Responsible Mitigation (Guide), dated December 2012, prepared to address questions raised by the Mitigation that Works Forum and their report, "Making Mitigation Work" (Ecology pub. #08-06-018). The report includes a recommendation to "expand appropriate use of advance mitigation". The Guide is intended to help applicants in developing advance mitigation proposals, and explain how advance mitigation sites may be used to mitigate for unavoidable impacts. This Guide works within existing regulatory authorities and is not intended to expand or restrict any existing regulatory authorities.

The regulatory agencies, in signing this document show their support for advance mitigation because it provides mitigation in advance of impacts so the temporal loss of functions common with concurrent mitigation is eliminated or reduced. The risk of mitigation sites not achieving the targeted improvement to wetlands, water quality, and/or fish and wildlife habitat are eliminated because advance mitigation sites will not generate credits until the targeted functions are achieved and the site is proposed for use by an applicant. This Guide provides information on how an advance site can be proposed for regulatory approval, and how a site can be used to provide aquatic resource mitigation. This Guide is intended to provide flexibility and emphasizes using a watershed approach in planning and designing sites, while operating within existing regulatory frameworks.

The U.S. Army Corps of Engineers and the Washington State Departments of Fish and Wildlife and Ecology will use this Guide to provide applicants with information on what is needed when proposing and using an advance mitigation site.

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US ARMY CORPS OF ENGINEERS AND WASHINGTON STATE DEPARTMENTS OF ECOLOGY AND FISH AND WILDLIFE INTERAGENCY REGULATORY GUIDE ON ADVANCE PERMITTEE-RESPONSIBLE MITIGATION DECEMBER 2012

Purpose

The purpose of this Interagency Regulatory Guide on Advance Permittee-Responsible Mitigation (Guide) is to identify the circumstances under which the Seattle District, U.S. Army Corps of Engineers (Corps) and the Washington State Departments of Ecology (Ecology) and Fish and Wildlife (WDFW) will consider advance permittee-responsible compensatory mitigation for unavoidable impacts to aquatic resources. Nothing in this Guide either diminishes or expands the regulatory authorities of these agencies. This Guide is meant to provide assistance to applicants proposing to establish an advance mitigation site and to explain how a site might be used as mitigation. This Guide supersedes the definitions for advance and excess mitigation found in "Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance," (2006 Joint Guidance) March 2006, pages 33 and 34, Chapter 4, section 4.1[1]. This Guide complements WDFW's mitigation policy (POL-M5002).

Definition of Permittee-Responsible Advance Mitigation

In the context of this Guide, advance mitigation is a form of permittee-responsible compensatory mitigation constructed in advance of a permitted impact. Permittee-responsible mitigation is defined by 33 CFR 332.2 as aquatic resource restoration, establishment, enhancement, and/or preservation, undertaken to provide compensatory mitigation, for which the permittee retains full responsibility.

Applicants conduct advance mitigation at their own risk. Even if compensatory mitigation activities are themselves authorized by a permit, establishing compensatory mitigation in advance of the impacts does not create any presumption or guarantee that a proposed future impact will be authorized, or that the advance compensatory mitigation will be considered adequate and/or suitable mitigation for any specific future project.

Mitigation credits may be generated on an "advance mitigation" basis by establishing an advance mitigation site designed to compensate for future expected impacts. Alternatively, advance mitigation can also be combined with concurrent mitigation required by a Federal, State, or local permit, where the concurrent mitigation site provides additional area beyond the immediate mitigation requirements, and/or the site provides additional functions in excess of what is required for the permitted impact. The excess mitigation generated at a site would be established in advance of, and would generate credits for use against, expected future impacts. In these cases, the area being set aside for advance mitigation must be clearly identified and documented to distinguish from the area being used as concurrent mitigation.

[1] The 2006 Joint Guidance can be found online at: http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/guidance/index.html.

Advance mitigation can be proposed by any applicant, but the advance compensatory mitigation credits generated by a mitigation effort in advance of impacts can only be used by that same applicant. If it is determined a mitigation effort and the generated advance credits are not needed by the permittee, they should coordinate possible options with the regulatory agencies. Once any credits have been utilized on an approved advance mitigation site, further credits generated by the advance mitigation effort on that site cannot be sold to another applicant. The restriction on sale of credits derives from the lack of regulatory authority, except in a mitigation banking or in-lieu fee program context, to transfer the obligation for mitigation success to any party other than the permittee of the impacting project.

The credit value of mitigation efforts at a site will generally increase over time because the temporal loss is eliminated or decreased if a mitigation effort is established and meeting performance standards prior to the use of the generated credits. The longer a site is functioning, the more credits it may generate for use until the site has reached its maximum potential of credits by meeting all of the listed performance standards (typically around year ten). The general policy of the regulatory agencies is that a site would not generate advance mitigation credit beyond the concurrent ratios recommended in the most current Joint Guidance for wetland mitigation, or in the WDFW mitigation policy POL-M5002 for fish habitat, until the site has been functioning and meeting the required performance standards for a minimum of two calendar years after earth work and planting have been completed. In cases where a permit applicant seeks to apply mitigation credits prior to this interval, it will usually be reviewed as concurrent mitigation. There may be circumstances where the site, or a portion of the site, may generate advance credit within the first two years (e.g., breaching dikes, removing fish passage barriers, preserving existing wetland or fish habitat, and in some cases wetland re-establishment or creation actions). These circumstances will be reviewed by the regulatory agencies on a case-by-case basis.

When applying for approval to establish an advance mitigation site, applicants will need to provide information similar to that required for a mitigation plan approval. Additional information pertinent to the review of the advance proposal will also be required as defined in the "Proposing Advance Mitigation" section on pages 5-6 of this document. The agencies also recommend submitting a proposed credit generation schedule demonstrating a reduced ratio as the site matures, and proposed credit value(s) the applicant is anticipating the advance site may generate. The geographic area proposed as the potential project use area for future impacts should also be proposed by the applicant based on a watershed approach. The regulatory agencies can review and finalize the credit generation schedule and the geographic use area during the permitting process as part of the approval for the mitigation plan. This will provide the applicant a conditional decision on the potential credits a site may generate if a site is meeting performance standards outlined in the mitigation plan as well as what geographic areas will be acceptable for use. If this information is not available at the time of application for the advance mitigation establishment, it will be required to be approved by the agencies prior to using any credits generated at the site.

At the time generated advance credits are proposed for use, the regulatory agencies with jurisdiction over the impacting proposal will decide if the advance compensatory mitigation project provides the appropriate type and extent of mitigation necessary to compensate for a project's impacts. The agencies will also consider how the mitigation site is functioning prior to determining how much of the advance credit is necessary to offset impacts (see "Use of the Advance Mitigation Site" section, pages 7-8 of this document). Credits can only be used once and upon their use as mitigation the mitigation effort reflected in these credits will not accumulate additional value over time. The

agencies with jurisdiction will require in the permit for the aquatic impact, the appropriate number of advance credits necessary for mitigation. If necessary, the agencies will also define specific areas of the advance mitigation site designed to address compensation for specific impacts to critical on-site functions or habitat type that might be required (e.g. a created stream channel may be required to mitigate for filling a stream). In some cases the agencies may require critical functions to be mitigated on-site at the impact location while other functions may be appropriately mitigated at the advance site ("decoupling"). Critical functions are those site specific functions the agencies have determined must be maintained on-site.

The agency-approved use as compensatory mitigation of all advance credits must be documented in a ledger managed by the advance mitigation permittee, and submitted to the appropriate regulatory agencies for each ledger transaction. The transaction must document the use of credits and in some cases specific areas on a map that will be deducted or shown as used if necessary to offset critical habitat or function impacts (i.e. a stream creation area to offset stream loss). Any generated credits will not be officially accepted or released by the agencies for compensatory use until the time an applicant proposes the use of credits as mitigation for a specific impacting project, and the regulatory agencies approve use of those credits as mitigation. However if a site has achieved performance standards as outlined in the advance mitigation plan but the advance site has not been approved by the regulatory agencies for use, , the opportunity for the permittee to use the advance mitigation site will not expire. The functional lift achieved by the site will be considered by the agencies when proposed for use by the permittee.

Pertinent Regulations

Federal

The Corps and the Environmental Protection Agency (EPA) published a rule on Compensatory Mitigation for Losses of Aquatic Resources (Mitigation Rule) (33 CFR Parts 325 and 332, 40 CFR Part 230), dated April 10, 2008[2]. The Mitigation Rule defines requirements of compensatory mitigation for unavoidable impacts to the nation's aquatic resources resulting from authorized activities. The Mitigation Rule is intended to enable the agencies to promote greater consistency, predictability and ecological success of mitigation projects under the Clean Water Act and Rivers and Harbors Act.

The Mitigation Rule defines three forms of compensatory mitigation: mitigation banks; in-lieu fee programs; and permittee-responsible mitigation. The Federal hierarchy of preferred forms of mitigation is

1. Mitigation banks
2. In-lieu fee programs
3. Permittee-responsible mitigation that is undertaken using a watershed approach, if appropriate and practicable
4. On-site and in-kind
5. Off-site and/or out-of-kind.

When proposing advance mitigation in a service area where a mitigation bank or in-lieu fee program has been approved, the applicant must demonstrate why the advance site is ecologically preferable to

[2] The Mitigation Rule can be found online at: http://water.epa.gov/lawsregs/guidance/wetlands/wetlandsmitigation_index.cfm.

other forms of mitigation. Also, in some cases it may be necessary to replace critical functions on-site. Appendix 1 sets forth a comparison of these various mitigation options and the responsibilities associated with each.

Although the Mitigation Rule does not specifically define or discuss advance mitigation as a compensatory mitigation strategy, advance mitigation fulfills several of the objectives that are cited in 33 CFR 332.3(a) as bases for concluding that mitigation banks and in-lieu fee programs are preferable forms of compensatory mitigation: reducing temporal losses of functions, and reducing uncertainty over mitigation project success. In addition, under the definition of "temporal loss" at 33 CFR 332.2, the Federal mitigation regulations provide: "Higher compensation ratios may be required to compensate for temporal loss," and 33 CFR 332.3(m) articulates a strong preference for advance compensatory mitigation, by requiring advance or concurrent mitigation "to the maximum extent practicable." By requiring additional mitigation to offset temporal losses, the Federal regulations implicitly authorize comparatively reduced mitigation requirements when mitigation is accomplished in advance. It is thus an acceptable form of permittee-responsible mitigation for the federal regulatory agencies provided it follows the procedures and constraints outlined in this Guide.

State

Ecology's authority rests with the state Water Pollution Control Act (Chapter 90.48 RCW) and associated water quality regulations (Chapter 173-201A WAC). Based on the anti-degradation policy (WAC 173-201A-300-330), adequate mitigation is required to effectively offset aquatic impacts. Per Section 401 of the Clean Water Act, Ecology must certify that projects comply with state water quality protection laws before the Department of the Army permit can be authorized.

WDFW is charged with implementing the state's Hydraulic Project Approval (HPA) authority (Chapter 77.55 RCW). Any entity conducting work affecting the bed or flow of state waters is required to obtain an HPA from WDFW. An HPA must contain all avoidance, minimization, and compensation measures necessary to ensure the proper protection of fish and their habitats. The rules implementing the Hydraulic Project Approval authority not only allow the use of advance mitigation, they state that a project proponent may be required to establish functional compensatory mitigation prior to the impact (WAC 220-110-020(66)).

For projects located on state owned aquatic lands, applicants must coordinate with the Department of Natural Resources. Local jurisdictions regulate critical areas including wetlands and streams. Projects affecting critical areas may need to obtain local permits for construction.

Agency Support

Federal and state regulations and guidance encourage implementation of mitigation in advance of the project impacts to reduce or eliminate temporal loss, and reduce the risk of unsuccessful mitigation. With advance mitigation, temporal loss is eliminated or reduced, therefore allowing for a reduced amount or ratio for compensation. In addition, the WDFW mitigation policy (POL-M5002) acknowledges the benefit of providing compensatory mitigation in advance of the impacting project. The risk of failed mitigation is reduced because mitigation credit will not be generated for use to offset aquatic impacts until the advance mitigation site demonstrates performance and functional lift. Applicants also may benefit from completing mitigation in advance. If a mitigation site is constructed and functioning prior to the impacts, the eventual compensatory mitigation decisions are likely to occur more quickly. This may result in a decrease in permit processing time because

regulatory agencies will have the certainty that a mitigation site is successfully functioning and will not have to review and approve a new site that has the risks associated with concurrent mitigation. The site's mitigation credit generally will increase over time as the site matures until it reaches the maximum credit potential when the mitigation goals, objectives and performance standards are met. Ratios required to offset impacts generally will be reduced over time due to the decrease in temporal loss and risk, making advance mitigation more cost effective.

Proposing Advance Mitigation

In order to qualify for the enhanced compensation ratios associated with advance mitigation, agency verification of baseline conditions is necessary, so pre-approval of a Mitigation Plan prior to commencing the mitigation effort is required. When proposing an advance mitigation site, applicants should consider the anticipated location of future projects that will require mitigation so an appropriate location near potential impacts can be selected. The mitigation should be designed to achieve a self-sustaining site where appropriate. The type of mitigation proposed should consider future needs so the mitigation type can offset expected functional losses of future aquatic impacts. In cases where WDFW mitigation is required, the site should benefit the same fish stocks impacted by the project. Fish stocks are defined as "a group of fish that return to spawn in a given area at the same time and are, for the most part, reproductively isolated from other such groups. A stock may include several local spawning populations."

The risk of advance mitigation is borne by the permittee planning to use the mitigation site. Establishing a mitigation effort generating advance credits provides no entitlement to, or guarantee of, use of those credits as compensation for any particular project causing impact to aquatic resources.

The following information is <u>required</u> for agency review and conditional approval when proposing an advance mitigation site:

1. Applicants shall submit a mitigation plan for agency review and approval. The plan shall be in accordance with 33 CFR 332.4(c) (see Appendix 2), and the current Joint Guidance, "Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans", March 2006 Interagency Guidance, Ecology Publication #06-06-011b, and WDFW POL-M5002 for fish habitat as applicable. The advance mitigation plan shall contain the requirements of a concurrent mitigation plan and the following additional information:
    a. Disclosure that the proposal is to construct a permittee-responsible advance mitigation site.
    b. The site location must be selected using a watershed approach. The watershed needs should be identified in the plan, and include an explanation of how the mitigation will improve the watershed.
    c. Detailed and adequate documentation of baseline conditions (e.g., wetland delineation and functional assessments, wetland category based on the Ecology rating form, condition of riparian or wetland buffers, and condition of stream and fish species if present), from which future ecological lift can be determined and adequate credit identified. The baseline must be thoroughly documented as it is the foundation for determining a site's potential for functional lift, and therefore the advance mitigation credits that may be generated.
    d. The size/acreage and type of mitigation proposed to be established, restored, rehabilitated, enhanced, and/or preserved.

e. As stated above, if fish habitat mitigation is being included, the mitigation site should benefit the same fish stocks impacted by the project proposing to use the site for future mitigation needs. This may be required by WDFW prior to using a site for mitigation. For all mitigation sites proposed to be used for any fish or fisheries habitat impacts, provide size/acreage details for mitigation proposals that include fish habitat creation, restoration, or enhancement, fish barrier removals, or other mitigation that is required to offset expected fish habitat or stream impacts. Also include information on the limiting factors of the watershed if available, and an explanation of how the mitigation will improve these limiting factors for the species and habitats that may benefit. It may be necessary to track fish habitat mitigation elements separately from wetland credits in order to document appropriate establishment and use of mitigation for fish habitat impacts.

The following information is recommended for agency review and approval when proposing an advance mitigation site. Submitting this additional information will facilitate agency approval earlier in the process on key mitigation decisions such as the anticipated credits that may be generated at a site if performance standards are met, and on the acceptable location (service area) that may apply to the proposed mitigation site. Getting agency approval on these elements prior to establishing the site should provide applicants with more assurance of how a site may be used on future actions. If an applicant decides not to provide this additional information prior to site establishment, they may have an increased risk that their anticipated use area and credit generating schedule may not be approved by the agencies at time of proposed use.

f. Propose a credit generating schedule or framework demonstrating how the credits will increase over time as the site matures and successfully reaches performance standards. This schedule should show how the advance credit may be generated as the site matures from construction (when concurrent mitigation ratios will apply) through year 10 and should include the performance standards guiding the credits that may be generated. The agencies can agree on the site's proposed or expected future (e.g., post-construction) environmental value, credit, and ecological lift if all performance standards are accomplished, but they cannot determine the appropriateness for the use of any credits until such time as it is proposed to be used as compensatory mitigation for a specific project.
g. Propose the boundary of the geographic area that is appropriate to be used for future impact locations.
h. Propose appropriate ratios for credit use based on impact type, and quality of and functions provided by the aquatic resources at the impact site. This will likely be general information based on standard ratios for impacts to wetland category and type outlined in the Joint Guidance. Exact impact areas and functions may not be known and adequacy of ratios proposed must be considered on a case by case basis.

In order to use the credits generated by an advance mitigation effort for compensatory mitigation, the permittee of the impacting project shall be responsible for the performance, sustainability, maintenance and monitoring (for both the establishment period of the advance mitigation site and the Long-term Monitoring and Maintenance period) of the advance mitigation site. This permittee can act through a third party agent to construct, maintain, and monitor the mitigation but the permittee is ultimately responsible for site performance.

The agencies strongly recommend applicants contact tribes and local governments involved in decisions for use of the site as mitigation (e.g., critical area or shoreline permits, sites affecting fish habitat, or Tribal 401 Certification) early in the permit review process. In some cases, local jurisdictions may not have regulations in place to allow mitigation in advance of impacts. If a project is located on state owned aquatic lands, applicants will also need to contact the Department of Natural Resources for approval.

Use of the Advance Mitigation Site

At the time that credits generated by the advance mitigation effort are proposed to be used as compensatory mitigation for a specific project, the permit applicant shall provide an Advance Mitigation Site Use Plan (Use Plan) to the regulatory agencies with jurisdiction over the action causing aquatic impacts.

The Use Plan should include the following information:

1. Reference the mitigation plan defined in the "Proposing Advance Mitigation" section listed above. This should include all of the elements listed in the required section. If the information listed in the recommended section was not included in the application stage, this information should be provided in the Use Plan.

2. All monitoring reports for the site, or a reference to the reports if they have been provided.

3. Demonstrate the advance mitigation's ecological lift beyond the approved baseline conditions, documented by meeting stated performance standards or demonstrated by a functional assessment and monitoring reports.

4. Describe the development project's impacts to aquatic resources requiring mitigation. Include type of aquatic impact, fish and wildlife species affected, acreage impacted, functions lost, and how impacts have been avoided and minimized.

5. Describe how the advance mitigation adequately compensates for the unavoidable impacts to waters of the U.S. and any impacts to fish life.

6. If the impact area is within the service area of an approved mitigation bank or in-lieu-fee program, demonstrate why the use of the advance mitigation site is ecologically preferable from a watershed perspective. Some critical functions may need to be mitigated on site.

7. Propose the amount of mitigation credit the applicant believes is necessary to offset lost functions from the proposed impacts. This should be based on the credit generating schedule if one was established during the application stage (see 1.f. above). If not established it should be based on the quality of the impacted area and functions lost, and the age and demonstrated success of the advance mitigation site. The final decision on the type, and amount of compensatory mitigation required for an impacting project is reserved to the exclusive discretion of the regulatory agencies with authority over that project.

8. The site must be protected in perpetuity prior to the use of the site as mitigation. Include information on what site protection mechanism has been established or is being proposed for

agency approval (restrictive covenant, deed restriction, conservation easement, etc.). Include financial assurances and/or long-term management and maintenance plan as required by the regulatory agencies.

9. Propose an adequate record-keeping method, ledgers to be used, and methods for tracking of the site's credits and area used. Once credits are approved for use by the regulatory agencies, a ledger will be required and will include the documentation of all projects using credits from the site to date and which agency(s) required the credit for mitigation, how much credit is used for each project (based on a specific geographic area and/or function), and date of use. Prior to authorizing the use of any advance compensatory mitigation, the Corps, Ecology, and WDFW if applicable, will be required to approve the mechanisms for tracking the credit use of the site. For tracking purposes, any time a site's credit is used, the permittee will be required to send a copy of an updated ledger within 30 days of the credit use to the assigned project manager for the Corps, Ecology and WDFW even if these agencies did not require the credit for a federal or state authorization.

At the time a credit is used and debited from the ledger, the regulatory agencies will identify if the mitigation requires a specific geographic area or function to be deducted from use on the site plan, or if just a general credit deduction is necessary. This will allow the expenditure of advance credits to be accurately tracked. It will also provide direct linkage between activities causing loss of aquatic resources and the corresponding specific compensatory mitigation, for compliance and enforcement purposes. If only a portion of the advance mitigation site is used as mitigation, adequate buffers will be required to protect the mitigation area from adjacent land uses.

As previously stated, once the first credits generated by the mitigation site are approved for use in accordance with a Use Plan, and once those credits are applied to an impacting project as compensatory credits, the released credits and the opportunity to generate any further credits from that site cannot be sold or otherwise transferred to another party. If it is determined the mitigation and the generated advance credits are not needed by the permittee, they should coordinate possible options with the regulatory agencies. There is no guarantee of any opportunity to transfer any released credits, either prior to or after use as compensatory mitigation for an impacting project, nor any guarantee that the right to use any potential credits, that may be generated by the mitigation site following the first use of credits, may be sold or transferred to another party. The permittee bears the risk of possible inability to utilize all the credits that could potentially be generated on a mitigation site. Regardless of any options for disposition of unused and unneeded potential credits, once credits generated by the advance mitigation have been authorized for use, the mitigation site constitutes permittee-responsible mitigation and the permittee of the impacting project retains legal responsibility for the success, sustainability, and monitoring of the advance mitigation site. The permittee is also responsible for funding and implementation of the site protection mechanism and any long-term management and maintenance plan as described in #8 above.

Appendices

Appendix 1. Comparison of Permittee-Responsible Advance Mitigation to Other Mitigation Options

Type	Who is Responsible for Site Development, Management, Performance & Protection	When Can the Site be Used	Is the Sale of Credits Allowed	Who Can use the Site as Mitigation
Mitigation Banking	Bank Sponsor – any private, tribal, or public entity	Credits must be generated and released prior to impacts; one major advantage of banking is that a limited number of credits become available when the banking instrument is approved, the site is protected, and financial assurances are posted.	Yes	As approved by the permitting agencies, an applicant with impacts in bank-service area
In-Lieu Fee	Program Sponsor – must be a governmental (including tribal) or non-profit natural resource entity	The fee must be applied to mitigation effort within 3 growing seasons from the first in-lieu fee payment within a designated service area.	Yes, in-lieu fee payment is applied toward the costs of establishing mitigation	As approved by the permitting agencies, any applicant with impacts in an approved service area that pays the in- lieu fee to an approved program
Permittee-Responsible Advance	Permittee of the Advance Site	The site can be used as concurrent mitigation within one year of impacts through the first two years after construction. If used two or more years after mitigation construction, the ratio for use will decrease as additional credits generated will be valued as advance credits which generally increase in value as the effort matures and the performance standards are met.	No, advance credits cannot be sold	The advance credits can only be used by the permittee that developed the advance site.
Permittee-Responsible Concurrent	Permittee	Mitigation effort must be implemented concurrently or within one year of impacts.	No	The permittee for the impact project

Appendix 2. Minimum requirements for a compensatory mitigation plan (33 CFR 332.4(c))

1. Objectives: A description of the resource type(s) and amount(s) that will be provided, the method of compensation, and the manner in which the resource functions of the project will address the needs of the watershed.
2. Site Selection: A description of the factors considered during the site selection process.
3. Site Protection Instrument: A description of the legal arrangements and instrument that will ensure the long-term protection of the project site.
4. Baseline Site Information: A description of the ecological characteristics of the proposed site.
5. Determination of Credits: A description of the number of credits to be provided, including a brief explanation of the rationale for this determination.
6. Mitigation Work Plan: Detailed written specifications and work descriptions for the project, including geographic boundaries; construction methods, timing, and sequence; source(s) of water, including connections to existing waters and uplands; methods for establishing the desired plant community; plans to control invasive plant species; the proposed grading plan; soil management; and erosion control measures.
7. Maintenance Plan: A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.
8. Performance Standards: Ecologically based standards that will be used to determine whether the compensatory mitigation project is achieving its objectives.
9. Monitoring Requirements*: A description of parameters to be monitored in order to determine if the compensatory mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting on monitoring results must also be included.
10. Long-term Management Plan*: A description of how the project will be managed after achievement of performance standards to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management.
11. Adaptive Management Plan*: A management strategy to address unforeseen changes in site conditions or other components of the project, including the party or parties responsible for implementing adaptive management measures. The adaptive management plan will guide decisions for revising mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect the project's success.
12. Financial Assurances*: A description of financial assurances that will be provided and how they are sufficient to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with its performance standards.
13. Other information as deemed necessary.

*These requirements may be deferred until submittal of the first Use Plan for the advance mitigation site. If technical advice is needed to address these requirements, please contact the Regulatory Agency(s).

Appendix B

Reconnaissance-Level List of Plant Species Observed at the Otay Land Company Wetland Mitigation Site

Plant Species Detected in the Survey Area

	Scientific Name	Common Name	Special Status
	LYCOPHYTES		
	Selaginellaceae - Spike-moss family		
	Selaginella bigelovii	Bushy spike-moss	
	FERNS		
	Pteridaceae - Brake family		
	Pentagramma triangularis	Goldback fern	
	GYMNOSPERMS		
	Cupressaceae - Cypress family		
	Hesperocyparis forbesii	Tecate cypress	CRPR 1B.1
	EUDICOTS		
	Anacardiaceae - Sumac Or Cashew family		
	Malosma laurina	Laurel sumac	
	Rhus integrifolia	Lemonade berry	
*	*Schinus molle*	Peruvian pepper tree	
*	*Schinus terebinthifolius*	Brazilian pepper tree	
	Apiaceae - Carrot family		
*	*Apium graveolens*	Celery	
*	*Foeniculum vulgare*	Fennel	
	Asteraceae - Sunflower family		
	Ambrosia monogyra	Singlewhorl burrobrush	CRPR 2B.2
	Artemisia californica	California sagebrush	
	Baccharis salicifolia ssp. salicifolia	Mule fat	
	Baccharis sarothroides	Broom baccharis	
	Bahiopsis laciniata	San Diego sunflower	CRPR 4.2
	Brickellia californica	California brickellbush	
*	*Carduus pycnocephalus ssp. pycnocephalus*	Italian thistle	
*	*Centaurea melitensis*	Tocalote	
	Deinandra fasciculata	Fascicled tarplant	
	Eriophyllum confertiflorum var. confertiflorum	Golden woolly sunflower	
	Holocarpha virgata ssp. elongata	Graceful tarplant	CRPR 4.2
	Isocoma menziesii	Coastal goldenbush	
	Iva hayesiana	San Diego marsh-elder	CRPR 2B.2
	Osmadenia tenella	Osmadenia	

	Scientific Name	Common Name	Special Status
	Boraginaceae - Borage family		
	Heliotropium curassavicum var. oculatum	Alkali heliotrope	
	Brassicaceae - Mustard family		
*	*Hirschfeldia incana*	Shortpod mustard	
	Cactaceae - Cactus family		
	Cylindropuntia prolifera	Coast cholla	
	Ferocactus viridescens	San Diego barrel cactus	CRPR 2B.1
	Mammillaria dioica	White fishhook cactus	
	Opuntia littoralis	Coastal prickly pear	
	Chenopodiaceae - Goosefoot family		
*	*Atriplex semibaccata*	Australian saltbush	
*	*Chenopodium album*	Lamb's quarters	
*	*Salsola tragus*	Prickly russian thistle	
	Cistaceae - Rock-rose family		
	Crocanthemum scoparium var. vulgare	Common peak rush-rose	
	Crassulaceae - Stonecrop family		
	Dudleya edulis	Ladies fingers	
	Dudleya pulverulenta	Chalk dudleya	
	Cucurbitaceae - Gourd family		
	Cucurbita foetidissima	Calabazilla	
	Ericaceae - Heath family		
	Arctostaphylos otayensis	Otay manzanita	CRPR 1B.2
	Euphorbiaceae - Spurge family		
	Croton setigerus	Doveweed	
	Euphorbia polycarpa	Many seed spurge	
	Fabaceae - Legume family		
	Acmispon glaber	Deerweed	
	Fagaceae - Oak family		
	Quercus dumosa	Nuttall's scrub oak	CRPR 1B.1
	Geraniaceae - Geranium family		
*	*Erodium cicutarium*	Redstem filaree	
	Grossulariaceae - Gooseberry family		
	Ribes speciosum	Fuchsia-flowered gooseberry	

	Scientific Name	Common Name	Special Status
	Lamiaceae - Mint family		
	Salvia apiana	White sage	
	Salvia mellifera	Black sage	
	Malvaceae - Mallow family		
	Sidalcea sparsifolia	Southern checkerbloom	
	Myrtaceae - Myrtle family		
	Eucalyptus sp.	Gum	
	Nyctaginaceae - Four O'clock family		
	Mirabilis laevis var. crassifolia	Coastal wishbone plant	
	Polygonaceae - Buckwheat family		
	Eriogonum fasciculatum	California buckwheat	
	Persicaria lapathifolia	Willow smartweed	
*	*Rumex crispus*	Curly dock	
	Ranunculaceae - Buttercup family		
	Clematis pauciflora	Few flowered virgin's bower	
	Rhamnaceae - Buckthorn family		
	Ceanothus otayensis	Otay Mountain ceanothus	CRPR 1B.2
	Rhamnus crocea	Spiny redberry	
	Rosaceae - Rose family		
	Adenostoma fasciculatum var. fasciculatum	Chamise	
	Cercocarpus minutiflorus	San Diego mountain mahogany	
	Heteromeles arbutifolia	Toyon	
	Prunus ilicifolia	Holly-leaf cherry	
	Salicaceae - Willow family		
	Populus fremontii ssp. fremontii	Fremont cottonwood	
	Salix gooddingii	Goodding's black willow	
	Salix lasiolepis	Arroyo willow	
	Simmondsiaceae - Jojoba family		
	Simmondsia chinensis	Jojoba	
	Tamaricaceae - Tamarisk family		
	Tamarix sp.	Tamarix	
	MONOCOTS		
	Arecaceae - Palm family		
*	*Phoenix canariensis*	Canary Island palm	

	Scientific Name	Common Name	Special Status
*	*Washingtonia robusta*	Mexican fan palm	
	Juncaceae - Rush family		
	Juncus acutus ssp. leopoldii	Southwestern spiny rush	CRPR 4.2
	Poaceae - Grass family		
	Aristida purpurea var. nealleyi	Nealley three-awn	
*	*Arundo donax*	Giant reed	
*	*Avena barbata*	Slender wild oat	
*	*Bromus diandrus*	Ripgut brome	
*	*Bromus hordeaceus*	Soft brome	
*	*Bromus madritensis ssp. rubens*	Red brome	
*	*Cortaderia jubata*	Purple pampas grass	
*	*Cynodon dactylon*	Bermuda grass	
	Distichlis spicata	Salt grass	
*	*Festuca myuros*	Rattail fescue	
*	*Hordeum murinum ssp. glaucum*	Smooth barley	
	Melica imperfecta	Coast range onion grass	
*	*Melinis repens ssp. repens*	Natal grass	
	Muhlenbergia microsperma	Littleseed muhly	
	Stipa pulchra	Purple needle grass	
	Typhaceae - Cattail family		
	Typha sp.	Cattail	

Scientific Name	Common Name	Special Status

Legend

*= Non-native or invasive species

Special Status:

CRPR – California Rare Plant Rank
1A. Presumed extinct in California and elsewhere
1B. Rare or Endangered in California and elsewhere
2A. Presumed extinct in California, more common elsewhere
2B. Rare or Endangered in California, more common elsewhere
3. Plants for which we need more information - Review list
4. Plants of limited distribution - Watch list

Threat Ranks
.1 - Seriously endangered in California
.2 – Fairly endangered in California

Appendix C

List of Potential Sensitive Plant Species within the Mitigation Site

Sensitive Plant Species With the Potential to Occur

Common Name (*Scientific Name*)	Sensitivity Code & Status	Habitat Preference/Requirements	Verified On Site[1] (Yes/No)
San Diego bur sage (*Ambrosia chenopodiifolia*)	2B.1, SDC List B	Perennial shrub. Coastal scrub; 55-155 m (178-508 ft). Blooming period: April - June	No
Singlewhorl burrobrush (*Ambrosia monogyra*)	2B.2	Perennial shrub. Sandy soils in chaparral, coastal sage scrub, Sonoran desert scrub, and washes; 10-500 m (328-1640 ft). Blooming period: August - November	Yes
South coast saltscale (*Atriplex pacifica*)	1B.2, SDC List A	Annual herb. Coastal bluff scrub, coastal dunes, coastal scrub, playas; 0-140 m (0-459 ft). Blooming period: March - October	Yes
Golden-spined cereus (*Beregerocactus emoryi*)	2B.2, SDC List B	Perennial stem succulent. Sandy soils in costal scrub, chaparral, and closed-cone coniferous forest, moist ocean breezes may be a key to its habitat requirements; 3-395 m (9-1295 ft). Blooming period: May - June	No
San Diego goldenaster (*Bloomeria clevelandii*)	1B.1, SDC List A	Perennial bulbiferous herb. Clay soils in chaparral, coastal sage scrub, valley grasslands, particularly near mima mound topography or the vicinity of vernal pools; 50 - 465 m (164-1526 ft). Blooming period : April - May	Yes
Orcutt's brodiaea (*Brodiaea orcuttii*)	1B.1, SDC List A	Bulbiferous herb. Found on mesic, clay, sometimes serpentinite soils in closed-cone coniferous forest, chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, and vernal pools ; 30-1692 m (98-5550 ft). Blooming period: May - July	No
Round-leaved filaree (*California macrophylla*)	1B.1, SDC List B	Annual herb. Clay soils in cismontane woodland and valley and foothill grassland; 15-1200 m (50-3936 ft). Blooming period: March - May	No
Snake cholla (*Cylindropuntia californica var. californica*)	1B.1, SDC List A, SDC NE, SD NE	Stem succulent. Chaparral and coastal scrub, typically on xeric hillsides; 30-150 m (98-492 ft). Blooming period: April - May	No
Otay tarplant (*Deinandra conjugens*)	FT, SE, 1B.1, SDC List A, SDC NE, SD NE	Annual herb. Clay soils in coastal sage scrub and valley and foothill grassland; 25-300 m (82-984 ft). Blooming period: May - June	Yes
Variegated dudley (*Dudleya variegata*)	1B.2, SDC List A, SDC NE, SD NE	Perennial herb. Clay soils in chaparral, cismontane woodland, coastal scrub, valley and foothill grassland, and vernal pools; 3-580 m (9-1903 ft). Blooming period: April - June	Yes
San Diego button celery (*Eryngium aristulatum var. parishii*)	FE, SE, 1B.1, SDC List A, SD NE	Annual/perennial herb. Mesic soils in coastal scrub, valley and foothill grassland, and vernal pools; 20-620 m (65-2034 ft). Blooming period: April - June	No

Common Name (*Scientific Name*)	Sensitivity Code & Status	Habitat Preference/Requirements	Verified On Site[1] (Yes/No)
San Diego barrel cactus (*Ferocactus viridescens*)	2B.1, SDC List B	Stem succulent. Sandy to rocky areas; chaparral, coastal scrub, valley and foothill grassland, vernal pools; 3-450 m (9-1476 ft). Blooming period: May - June	No
Palmer's grapplinghook (*Harpagonella palmeri*)	4.2, SDC List D	Annual herb. Clay soils in chaparral, grasslands, coastal sage scrub; 20-955 m (65 to 3132 ft). Blooming period: March - May	No
Tecate cypress (*Hesperocyparis forbesii*)	1B.1, SDC List A	Perennial evergreen tree. Clay, gabbroic, or metavolcanic soils within closed-cone coniferous forest and chaparral; 80-1500 m (262-4921 ft).	Yes
San Diego marsh-elder (*Iva hayesiana*)	2B.2, SDC List B	Perennial herb. Marshes and swamps, wetland areas, and playas; 10-500 m (32-1640 ft). Blooming period: April - October	No
Gander's pitcher sage (*Lepechinia ganderi*)	1B.3, SDC List A, SDC NE	Perennial shrub. Gabbroic or metavolcanic soils in closed-cone coniferous forest, chaparral, coastal scrub, and valley and foothill grassland; 305-1005 m (1000-3296 ft). Blooming period: June - July	No
Robinson's pepper grass (*Lepidium virginicum var. robinsonii*)	4.3, SDC List A	Annual herb. Openings in chaparral and sage scrub; below 885 m (2900 ft). Blooming Period: January - July	No
Little mousetail (*Myosurus minimus ssp. apus*)	3.1, SDC List C	Annual herb. Valley and foothill grassland, and alkaline vernal pools; 20-640 m (65-2100 ft). Blooming period: March - June	No
Spreading navarretia (*Navarretia fossalis*)	FT, 1B.1, SDC List A, SD NE	Annual herb. Chenopod scrub, assorted freshwater marshes and swamps, playas, and vernal pools; 30-655 m (98-2149 ft). Blooming period: April - June	Yes
Otay Mesa mint (*Pogogyne nudiuscula*)	FE, SE, 1B.1, SDC List A, SD NE	Annual herb. Vernal pools; 90-250 (295-820 ft.). Blooming period: May - July	No
Nuttall's scrub oak (*Quercus dumosa*)	1B.1, SDC List A	Perennial evergreen shrub. Sandy or clay loam in closed-cone coniferous forest, chaparral, and coastal scrub; 15-400 m (49-1312 ft.). Blooming period: February - August	Yes
Munz's sage (*Salvia munzii*)	2B.2, SDC List B	Evergreen shrub. Chaparral and coastal sage scrub; 120-1065 m (393-3493 ft). Blooming period: February - April	No
Chaparral ragwort (*Senecio aphanactis*)	2B.2, SDC List B	Annual herb. Chaparral, cismontane woodland, coastal scrub, and alkaline flats; 15-800 m (49-2624 ft.). Blooming period: January - April	No
Purple stemodia (*Stemodia durantifolia*)	2B.1, SDC List B	Perennial herb. Population wide, along minor creeks and seasonal drainages, often in mesic, sandy soils in Sonoran desert scrub. Within the coastal zone in streams and creeks, typically slow moving rocky streams; 180-300 m (590-984 ft). Blooming period: January - December	No

Common Name (*Scientific Name*)	Sensitivity Code & Status	Habitat Preference/Requirements	Verified On Site[1] (Yes/No)
Laguna Mountains jewelflower (*Streptanthus bernardinus*)	4.3, SDC List D	Perennial herb. Chaparral and lower montane coniferous forest; 670-2500 m (2198-8202 ft). Blooming period: May - August	Yes
Parry's tetracoccus (*Tetracoccus dioicus*)	1B.2, SDC List A	Deciduous shrub. Chaparral and coastal sage scrub; 165-1000 m (541-3280 ft). Blooming period: April - May	Yes

[1] Species "Verified on Site" were either documented during reconnaissance surveys by ICF biologists, recorded in the CNDDB database, or noted in previous biological surveys conducted by RECON Environmental as part of their preserve management efforts.

LEGEND:

Plant Status:

Federal

FE - listed as endangered under the federal Endangered Species Act.

FT - listed as threatened under the federal Endangered Species Act.

State

SE - listed as endangered under the California Endangered Species Act.

FPS – fully protected species in California.

CRPR Rank

1A. Presumed extinct in California and elsewhere

1B. Rare or Endangered in California and elsewhere

2A. Presumed extinct in California, more common elsewhere

2B. Rare or Endangered in California, more common elsewhere

3. Plants for which we need more information - Review list

4. Plants of limited distribution - Watch list

Threat Ranks

.1 – Seriously endangered in California

.2 – Fairly endangered in California

.3 – Not very endangered in California

San Diego County

SDC NE – San Diego County Narrow Endemic

A – Rare, threatened or endangered in California and elsewhere

B – Rare, threatened or endangered in California but more common elsewhere

C – Maybe quite rare, but more information is needed to determine their status

D – Limited distribution and are uncommon but not presently rare or endangered

City of San Diego

SD NE – City of San Diego Narrow Endemic

Appendix D

List of Potential Sensitive Wildlife Species within the Mitigation Site

Sensitive Wildlife Species With the Potential to Occur

Common Name (*Scientific Name*)	**Sensitivity Code & Status**	**Habitat |Preference/Requirements**	**Verified On Site[1] (Yes/No)**
San Diego fairy shrimp (*Branchinecta sandiegoensis*)	FE	Vernal pools. All known localities are below 701m (2,300 ft) and are within 64km (40 miles) of the Pacific Ocean.	Yes
Quino checkerspot butterfly (*Euphydryas editha quino*)	FE	Inhabits openings on clay soils within or in the vicinity of shrublands, grasslands, meadows, vernal pools, and lake margins. Closely tied to its larval host plant, dwarf plantain *(Plantago erecta)* or owl's clover (*Orthocarpus purpurescens).*	No
Riverside fairy shrimp (*Streptocephalus woottoni*)	FE	Vernal pools. It occurs from Los Angeles County to Baja California. In San Diego County, all populations are within 15 kilometers of the coast.	No
Arroyo toad (*Anaxyrus californicus*)	FE CSC	Exposed shallow pools with a sand or gravel base are used for breeding. Breeding pools must occur in the vicinity (ca. 10-100 m) of a braided sandy channel with shorelines or central bars made of stable, sandy terraces.	No
Western spadefoot (*Scaphiopus hammondii*)	CSC	Temporary rainpools with water temperatures between 9°C and < 30°C that last at least 3 weeks.	No
Southwestern pond turtle (*Emys (=Clemmys) marmorata pallida*)	CSC	Slack- or slow-water aquatic habitat with basking sites.	No
Orange-throated whiptail (*Cnemidophorus hyperythrus*)	CSC	The habitat characteristics are poorly understood, however historically it was found in floodplains or terraces along streams. Closely tied to coastal sage scrub plants and some chaparral plants.	No
Coronado skink (*Eumeces skiltonianus interparietalis*)	CSC	Found in a variety of habitats but is most common in early successional stages or open areas. Heavy brush and densely forested areas are generally avoided. Usually found in areas with leaf litter.	No
San Diego horned lizard (*Phrynosoma coronatum blainvillii*)	CSC	Grasslands, brushlands, woodlands, and open coniferous forest with sandy or loose soil; requires abundant ant colonies for foraging.	No
Red diamond rattlesnake (*Crotalus ruber ruber*)	CSC	Occurs from sea level to 914m (3000ft) in chaparral, woodland, and arid desert habitats with rocky areas and dense vegetation.	No
Coast patch-nosed snake (*Salvadora hexalepis virgultea*)	CSC	Inhabits semi-arid brushy areas and chaparral in canyons, rocky hillsides, and plains.	No

Common Name (*Scientific Name*)	**Sensitivity Code & Status**	**Habitat |Preference/Requirements**	**Verified On Site[1] (Yes/No)**
Two-striped garter snake (*Thamnophis hammondii*)	CSC	Inhabits perennial and intermittent streams with rocky beds and bordered by willow thickets or other dense vegetation.	No
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	FT SE	Inhabits relatively broad, well-shaded riparian forests. Only a few small populations still exist.	No
Burrowing owl (*Athene cunicularia*)	CSC	Prairies, grasslands, lowland scrub, agricultural lands, coastal dunes, desert floors, and some artificial, open areas. They require large open expanses of sparsely vegetated areas on gently rolling or level terrain with an abundance of active small mammal burrows. They use rodent or other burrows for roosting and nesting cover and also known to use pipes, culverts, and nest boxes where burrows are scarce.	No
Southwestern willow flycatcher (*Empidonax trailii extimus*)	FE SE	Breeds in riparian woodlands along rivers, streams, or other wetlands. They usually nest within close proximity of water or very saturated soil.	No
Loggerhead shrike (*Lanius ludovicianus*)	CSC	Found near grassland, open sage scrub and chaparral, and desert scrub. They nest in dense vegetation adjacent to their open foraging habitats.	No
Least Bell's vireo (*Vireo bellii pusillus*)	FE SE	Riparian thickets either near water or in dry portions of river bottoms; nests along margins of bushes and forages low to the ground; may also be found using mesquite and arrow weed in desert canyons.	Yes
San Diego cactus wren (*Campylorhynchus brunneicapillus sandiegensis*)	CSC	Cactus thickets	No
Coastal California gnatcatcher (*Polioptila californica californica*)	FT CSC	Prefer open scrubby habitats such as coastal sage scrub and some forms of chaparral.	Yes
Yellow warbler (*Dendroica petechia brewsteri*)	CSC	Mature riparian woodlands.	No
Yellow-breasted chat (*Ictera virens*)	CSC	Dense riparian woodland.	No

Common Name (*Scientific Name*)	**Sensitivity Code & Status**	**Habitat |Preference/Requirements**	**Verified On Site[1] (Yes/No)**
Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)	CSC	Sparse, low brush on grassy hill slopes; prefers steep slopes with sparsely located California sage	N o
Western red bat (*Lasiurus blossevillii*)	CSC	Usually among dense foliage, in forests and wooded areas, making long migrations from the northern latitudes to warmer climes for winter, sometimes hibernates in tree hollows or woodpecker holes.	No
Spotted bat (*Euderma maculatum*)	CSC	Mostly in foothills, mtns., & desert regions of So. Cal.; desert, grasslands, mixed conifer forest; Roosts – rock crevices, caves, cliffs.	No
Pallid bat (*Antrozous pallidus*)	CSC	Throughout So. Cal. from coast to mixed conifer forest; grasslands, shrublands, woodlands, & forest; most common in open, dry habitats w/ rocky areas for roosting; yearlong resident in most of range. Roosts in rock crevices, caves, mine shafts, under bridges, in buildings and tree hollows.	No
Western mastiff bat (*Eumops perotis californicus*)	CSC	Primarily a cliff-dwelling species for breeding. Found foraging in a variety of habitats, from dry desert washes, flood plains, chaparral, oak woodland, open ponderosa pine forest, grassland, montane meadows, and agricultural areas.	No
Pocketed free-tailed bat (*Nyctinomops femorosaccus*)	CSC	Lives in deserts and sage scrub, roosts in rocky crevices.	No
Big free-tailed bat (*Nyctinomops macrotis*)	CSC	Inhabits arid, rocky areas; roosts in crevices in cliffs. Has been recorded in urban locations in San Diego County (CDFG 2005).	No
San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)	CSC	Mostly found on the coastal side of our local mountains in open habitats, usually avoiding dense stands of chaparral or woodlands.	No
Dulzura pocket mouse (*Chaetodipus californicus femoralis*)	CSC	Coastal and montane regions on grassland, sage scrub, and chaparral slopes.	No
Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*)	CSC	Coastal sage scrub, sage scrub/grassland ecotones, and chaparral communities.	No
San Diego desert woodrat (*Neotoma lepida intermedia*)	CSC	Variety of shrub and desert habitats, primarily associated with rock outcroppings, boulders, cacti, or areas of dense undergrowth.	No

Common Name (*Scientific Name*)	**Sensitivity Code & Status**	**Habitat |Preference/Requirements**	**Verified On Site[1] (Yes/No)**
Southern grasshopper mouse (*Onychomys torridus ramona*)	CSC	Grasslands and sparse coastal sage scrub habitats.	No
American badger (*Taxidea taxus*)	CSC	Inhabit a diversity of habitats with principal requirements of sufficient food, friable soils, and relatively open, uncultivated ground. Grasslands, savannas, and mountain meadows near timberline are preferred.	No

[1] Species "Verified on Site" were either documented during reconnaissance surveys by ICF biologists, recorded in the CNDDB database, or noted in previous biological surveys conducted by RECON Environmental as part of their preserve management efforts.

LEGEND:
Wildlife Status:
Federal
FE - listed as endangered under the federal Endangered Species Act.
FT - listed as threatened under the federal Endangered Species Act.
State
SE - listed as endangered under the California Endangered Species Act.
CSC - species of special concern in California.

Appendix E

California Rapid Assessment Method (CRAM) Datasheets

Basic Information Sheet: Riverine Wetlands

Assessment Area Name: Riverine CRAM; AA-1	
Project Name: Otay Land Company Village 8 West and Village 9 Mitigation Site	
Assessment Area ID #:	
Project ID #:	**Date:** 11/25/2014
Assessment Team Members for This AA: Lanika Cervantes, Kristen Klienfelter	
Average Bankfull Width: 15 meters	
Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m)**:** 130 meters	
Upstream Point Latitude: 32.600408	**Longitude:** -116.932355
Downstream Point Latitude: 32.599948	**Longitude:** -116.933615

Wetland Sub-type:

☐ Confined ☑ Non-confined

AA Category:

☐ Restoration ☑ Mitigation ☐ Impacted ☐ Ambient ☐ Reference ☐ Training

☐ Other:

Did the river/stream have flowing water at the time of the assessment? ☐ yes ☑ no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. *Perennial* streams conduct water all year long, whereas *ephemeral* streams conduct water only during and immediately following precipitation events. *Intermittent* streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

☐ perennial ☐ intermittent ☑ ephemeral

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1	Upstream	32.600392	-116.932402	NAD83
2	2	Middle Left	32.600061	-116.932919	NAD83
3	3	Middle Right	32.600347	-116.932968	NAD83
4	4	Downstream	32.599959	-116.933553	NAD83
5					
6					
7					
8					
9					
10					

Site Location Description:

The AA is located within the most downstream edge of the Otay River that supports a defined channel. directly downstream of this AA, the Otay River sheetflows within a broad floodplain.

Comments:

Scoring Sheet: Riverine Wetlands

AA Name: Riverine CRAM; AA-1				**Date:**	
Attribute 1: Buffer and Landscape Context (pp. 11-19)				**Comments**	
Stream Corridor Continuity (D)		Alpha. A	Numeric 12	No non-buffers within 500m	
Buffer:					
Buffer submetric A: Percent of AA with Buffer	Alpha. A	Numeric 12		100% buffer	
Buffer submetric B: Average Buffer Width	A	12		Avg 250m buffer width	
Buffer submetric C: Buffer Condition	B	9		~35% invasives; undisturbed soils	
Raw Attribute Score = $D+[C \times (A \times B)^{1/2}]^{1/2}$			22	**Final Attribute Score = (Raw Score/24) x 100**	93.30%
Attribute 2: Hydrology (pp. 20-26)					
Water Source		Alpha. A	Numeric 12	no hydromidifications	
Channel Stability		B	9	some aggradation	
Hydrologic Connectivity		A	12	>2.2m entrenchment ratio	
Raw Attribute Score = sum of numeric scores			33	**Final Attribute Score = (Raw Score/36) x 100**	91.67%
Attribute 3: Physical Structure (pp. 27-33)					
Structural Patch Richness		Alpha. D	Numeric 3	3 patches	
Topographic Complexity		C	6	low topo complexity; 1 bench	
Raw Attribute Score = sum of numeric scores			9	**Final Attribute Score = (Raw Score/24) x 100**	37.50%
Attribute 4: Biotic Structure (pp. 34-41)					
Plant Community Composition (based on sub-metrics A-C)					
Plant Community submetric A: Number of plant layers	Alpha. B	Numeric 9		3 plant layers	
Plant Community submetric B: Number of Co-dominant species	D	3		3 Co-dominates	
Plant Community submetric C: Percent Invasion	A	12		0% invasion	
Plant Community Composition Metric *(numeric average of submetrics A-C)*			8		
Horizontal Interspersion		B	9	Moderate interspersion	
Vertical Biotic Structure		B	9	2 layers - moderate overlap	
Raw Attribute Score = sum of numeric scores			26	**Final Attribute Score = (Raw Score/36) x 100**	72.22%
Overall AA Score (average of four final Attribute Scores)				73.67%	

Worksheet for Stream Corridor Continuity Metric for Riverine Wetlands

Lengths of Non-buffer Segments For Distance of 500 m Upstream of AA			Lengths of Non-buffer Segments For Distance of 500 m Downstream of AA		
Segment No.	Length (m)		Segment No.	Length (m)	
	1-side	2-side		1-side	2-side
1		0	1		0
2		0	2		0
3		0	3		0
4		0	4		0
5		0	5		0
Upstream Total Length	0		Downstream Total Length	0	

Percent of AA with Buffer Worksheet

In the space provided below make a quick sketch of the AA, or perform the assessment directly on the aerial imagery; indicate where buffer is present, estimate the percentage of the AA perimeter providing buffer functions, and record the estimate amount in the space provided.

Percent of AA with Buffer: 100 **%**

Worksheet for calculating average buffer width of AA

☑ Two Sided AA	
Line	Buffer Width (m)
A	250
B	250
C	250
D	250
E	250
F	250
G	250
H	250
Average Buffer Width*	250

*Round to the nearest integer

☐ One Sided AA	
Line	Buffer Width (m)
A	
B	
C	
D	
Average Buffer Width*	0

*Round to the nearest integer

Worksheet for Assessing Channel Stability for Riverine Wetlands

Condition	Field Indicators (check all existing conditions)
Indicators of Channel Equilibrium	☑ The channel (or multiple channels in braided systems) has a well-defined bankfull contour that clearly demarcates an obvious active floodplain in the cross-sectional profile of the channel throughout most of the AA. ☐ Perennial riparian vegetation is abundant and well established along the bankfull contour, but not below it. ☐ There is leaf litter, thatch, or wrack in most pools (if pools are present). ☑ The channel contains embedded woody debris of the size and amount consistent with what is naturally available in the riparian area. ☑ There is little or no active undercutting or burial of riparian vegetation. ☐ If mid-channel bars and/or point bars are present, they are not densely vegetated with perennial vegetation. ☐ Channel bars consist of well-sorted bed material (smaller grain size on the top and downstream end of the bar, larger grain size along the margins and upstream end of the bar). ☐ There are channel pools, the spacing between pools tends to be regular and the bed is not planar throughout the AA ☐ The larger bed material supports abundant mosses or periphyton.
Indicators of Active Degradation	☐ The channel is characterized by deeply undercut banks with exposed living roots of trees or shrubs. ☐ There are abundant bank slides or slumps. ☐ The lower banks are uniformly scoured and not vegetated. ☐ Riparian vegetation is declining in stature or vigor, or many riparian trees and shrubs along the banks are leaning or falling into the channel. ☐ An obvious historical floodplain has recently been abandoned, as indicated by the age structure of its riparian vegetation. ☐ The channel bed appears scoured to bedrock or dense clay. ☐ Recently active flow pathways appear to have coalesced into one channel (i.e. a previously braided system is no longer braided). ☐ The channel has one or more knickpoints indicating headward erosion of the bed.
Indicators of Active Aggradation	☐ There is an active floodplain with fresh splays of coarse sediment (sand and larger that is not vegetated) deposited in the current or previous year. ☐ There are partially buried living tree trunks or shrubs along the banks. ☑ The bed is planar (flat or uniform gradient) overall; it lacks well-defined channel pools, or they are uncommon and irregularly spaced. ☐ There are partially buried, or sediment-choked, culverts. ☑ Perennial terrestrial or riparian vegetation is encroaching into the channel or onto channel bars below the bankfull contour. ☐ There are avulsion channels on the floodplain or adjacent valley floor.
Overall	☑ **Equilibrium** ☐ **Degradation** ☐ **Aggradation**

Riverine Wetland Entrenchment Ratio Calculation Worksheet

The following 5 steps should be conducted for each of 3 cross-sections located in the AA at the approximate midpoints along straight riffles or glides, away from deep pools or meander bends. An attempt should be made to place them at the top, middle, and bottom of the AA.

Steps	Replicate Cross-sections ⟶	TOP	MID	BOT
1 Estimate bankfull width.	This is a critical step requiring familiarity with field indicators of the bankfull contour. Estimate or measure the distance between the right and left bankfull contours.	15.00	16.00	13.00
2: Estimate max. bankfull depth.	Imagine a level line between the right and left bankfull contours; estimate or measure the height of the line above the thalweg (the deepest part of the channel).	1.50	1.50	1.60
3: Estimate flood prone depth.	Double the estimate of maximum bankfull depth from Step 2.	3.00	3.00	3.20
4: Estimate flood prone width.	Imagine a level line having a height equal to the flood prone depth from Step 3; note where the line intercepts the right and left banks; estimate or measure the length of this line.	60.00	32.00	20.00
5: Calculate entrenchment ratio.	Divide the flood prone width (Step 4) by the bankfull width (Step 1).	4.00	2.00	1.54
6: Calculate average entrenchment ratio.	Calculate the average results for Step 5 for all 3 replicate cross-sections. Enter the average result here and use it in Table 13a or 13b.			2.51

Structural Patch Type Worksheet for Riverine wetlands

Circle each type of patch that is observed in the AA and enter the total number of observed patches in Table below. In the case of riverine wetlands, their status as confined or non-confined must first be determined (see page 6) to determine with patches are expected in the system (indicated by a "1" in the table below). Any feature onsite should only be counted once as a patch type. If a feature appears to meet the definition of more than one patch type (i.e. swale and secondary channel) the practitioner should choose which patch type best illustrates the feature. Not all features at a site will be patch types.

****Please refer to the CRAM Photo Dictionary at** *www.cramwetlands.org* **for photos of each of the following patch types.***

STRUCTURAL PATCH TYPE (circle for presence)	**Riverine (Non-confined)**	**Riverine (Confined)**
Minimum Patch Size	**3 m^2**	**3 m^2**
Abundant wrackline or organic debris in channel, on floodplain	☐	☐
Bank slumps or undercut banks in channels or along shoreline	☑	☐
Cobbles and/or Boulders	☑	☐
Debris jams	☐	☐
Filamentous macroalgae or algal mats	☐	☐
Large woody debris	☑	☐
Pannes or pools on floodplain	☐	**N/A**
Plant hummocks and/or sediment mounds	☐	☐
Point bars and in-channel bars	☐	☐
Pools or depressions in channels (wet or dry channels)	☐	☐
Riffles or rapids (wet or dry channels)	☐	☐
Secondary channels on floodplains or along shorelines	☐	**N/A**
Standing snags (at least 3 m tall)	☐	☐
Submerged vegetation	☐	**N/A**
Swales on floodplain or along shoreline	☐	**N/A**
Variegated, convoluted, or crenulated foreshore (instead of broadly arcuate or mostly straight)	☐	☐
Vegetated islands (mostly above high-water)	☐	**N/A**
Total Possible	**17**	**12**
No. Observed Patch Types (enter here and use in Table 14 below)	3	0

Worksheet for AA Topographic Complexity

At three locations along the AA, make a sketch of the profile of the stream from the AA boundary down to its deepest area then back out to the other AA boundary. Try to capture the benches and the intervening micro-topographic relief. To maintain consistency, make drawings at each of the stream hydrologic connectivity measurements, always facing downstream. Include the water level, an arrow at the bankfull contour, and label the benches. Based on these sketches and the profiles in Figure 10, choose a description in Table 16 that best describes the overall topographic complexity of the AA.\

Profile 1

Top

Profile 2

Mid

Profile 3

Bottom

Plant Community Metric Worksheet: Co-dominant species richness for Riverine wetlands
(A dominant species represents ≥10% *relative* cover)

Special Note:

** Combine the counts of co-dominant species from all layers to identify the total species count. Each plant species is only counted once when calculating the Number of Co-dominant Species and Percent Invasion submetric scores, regardless of the numbers of layers in which it occurs.*

Floating or Canopy-forming (non-confined only)	Invasive?	Short (<0.5 m)	Invasive?
	☐		☐
	☐		☐
	☐		☐
	☐		☐
	☐		☐
	☐		☐
	☐		☐
Medium (0.5-1.5 m)	**Invasive?**	**Tall (1.5-3.0 m)**	**Invasive?**
Schoenoplectus californicus	☐	Schoenoplectus californicus	☐
	☐		☐
	☐		☐
	☐		☐
	☐		☐
	☐		☐
Very Tall (>3.0 m)	**Invasive?**	**Total number of co-dominant species for all layers combined (enter here and use in Table 18)**	3
Salix goodingii	☐		
Salix laevigata	☐		
	☐	**Percent Invasion *Round to the nearest integer* (enter here and use in Table 18)**	0
	☐		
	☐		

Horizontal Interspersion Worksheet.

Use the spaces below to make a quick sketch of the AA in plan view, outlining the major plant zones (this should take no longer than 10 minutes). Assign the zones names and record them on the right. Based on the sketch, choose a single profile from Figure 12 that best represents the AA overall.

Assigned zones:

1) Schenoplectus

2) Salix species

3) Tamarisk

4) Mulefat

5)

6)

Worksheet for Wetland disturbances and conversions

Has a major disturbance occurred at this wetland?	Yes	No		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type?	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	lacustrine	seep or spring	playa	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)	☐	☐
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	☐	☐
Flow diversions or unnatural inflows	☐	☐
Dams (reservoirs, detention basins, recharge basins)	☐	☐
Flow obstructions (culverts, paved stream crossings)	☐	☐
Weir/drop structure, tide gates	☐	☐
Dredged inlet/channel	☐	☐
Engineered channel (riprap, armored channel bank, bed)	☐	☐
Dike/levees	☐	☐
Groundwater extraction	☐	☐
Ditches (borrow, agricultural drainage, mosquito control, etc.)	☐	☐
Actively managed hydrology	☐	☐
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**	☐	☐
Grading/ compaction **(N/A for restoration areas)**	✓	☐
Plowing/Discing **(N/A for restoration areas)**	☐	☐
Resource extraction (sediment, gravel, oil and/or gas)	✓	☐
Vegetation management	☐	☐
Excessive sediment or organic debris from watershed	☐	☐
Excessive runoff from watershed	☐	☐
Nutrient impaired (PS or Non-PS pollution)	☐	☐
Heavy metal impaired (PS or Non-PS pollution)	☐	☐
Pesticides or trace organics impaired (PS or Non-PS pollution)	☐	☐
Bacteria and pathogens impaired (PS or Non-PS pollution)	☐	☐
Trash or refuse	☐	☐
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)	☐	☐
Excessive human visitation	☐	☐
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)	☐	☐
Tree cutting/sapling removal	☐	☐
Removal of woody debris	☐	☐
Treatment of non-native and nuisance plant species	☐	☐
Pesticide application or vector control	☐	☐
Biological resource extraction or stocking (fisheries, aquaculture)	☐	☐
Excessive organic debris in matrix (for vernal pools)	☐	☐
Lack of vegetation management to conserve natural resources	✓	☐
Lack of treatment of invasive plants adjacent to AA or buffer	✓	☐
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Significant negative effect on AA
Urban residential	☐	☐
Industrial/commercial	☐	☐
Military training/Air traffic	☐	☐
Dams (or other major flow regulation or disruption)	✓	✓
Dryland farming	☐	☐
Intensive row-crop agriculture	☐	☐
Orchards/nurseries	☐	☐
Commercial feedlots	☐	☐
Dairies	☐	☐
Ranching (enclosed livestock grazing or horse paddock or feedlot)	☐	☐
Transportation corridor	☐	☐
Rangeland (livestock rangeland also managed for native vegetation)	☐	☐
Sports fields and urban parklands (golf courses, soccer fields, etc.)	☐	☐
Passive recreation (bird-watching, hiking, etc.)	☐	☐
Active recreation (off-road vehicles, mountain biking, hunting, fishing)	☐	☐
Physical resource extraction (rock, sediment, oil/gas)	✓	☐
Biological resource extraction (aquaculture, commercial fisheries)	☐	☐
Comments Old mining site directly downstream of this area.		

Basic Information Sheet: Depressional Wetlands

Assessment Area Name: Depressional CRAM; AA-2

Project Name: Otay Land Company Village 8 West and Village 9 Mitigation Site

Assessment Area ID #: AA-2

Project ID #: **Date:** 11/25/2014

Assessment Team Members for This AA Lanika Cervantes, Kristen Klienfelter

AA Category:

☐ Pre-Restoration ☐ Post-Restoration ☒ Pre-Mitigation ☐ Post-Mitigation

□ Pre-Impact □ Post-Impact □ Training □ Ambient

□ Reference □ Other:

Origin of Wetland (if known):

□ Natural system ☒ Artificial system

Type of Management (if known):

□ waterfowl/birds □ amphibians □ general wildlife □ sediment □ water quality □ stormwater

□ water supply (agriculture) □ water supply (livestock) ☒ not managed □ other:

Which best describes the type of depressional wetland?

☒ freshwater marsh □ alkaline marsh □ brackish marsh

□ other (specify):

AA Encompasses:

☒ entire wetland □ portion of the wetland

Which best describes the hydrologic state of the wetland at the time of assessment?

☒ ponded/inundated ☐ saturated soil, but no surface water ☐ dry

What is the apparent hydrologic regime of the wetland?

Perennially flooded systems contain surface water year-round, *seasonally flooded* depressional wetlands are defined as supporting surface water for 4-11 months of the year (in > 5 out of 10 years.) *Temporarily flooded* depressional wetlands possess surface water between 2 weeks and 4 months of the year.

☒ perennially flooded ☐ seasonally flooded ☐ temporarily flooded

Does your wetland connect with the floodplain of a nearby stream? ☐ yes ☒ no

(system subject to overbank flow, a dammed stream does not count)

Does the wetland have a defined on undefined outlet? ☐ defined ☒ undefined

Does the wetland have a defined on undefined inlet? ☐ defined ☒ undefined

Are the inlet and outlet at the same location? ☒ yes ☐ no

Is the topographic basin of the wetland ☒ distinct **or** ☐ indistinct **?**

An *indistinct* topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

Photos should be taken from edge of AA looking toward the centroid of AA

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1	(to) North	32.600750	-116.943150	NAD 83
2	2	(to) East	32.600878	-116.943397	NAD 83
3	3	(to) South	32.601042	-116.943224	NAD 83
4	4	(to) West	32.600923	-116.943039	NAD 83
5					
6					
7					
8					
9					
10					

Site Location Description and Land Use:

The AA is a freshwater depression that appears man made, created several decades ago during mining operations. The depression is perennial, receiving contributions from groundwater throughout the year.

Comments:

Scoring Sheet: Depressional Wetlands

AA Name: Depressional CRAM; AA-2				**Date:** 11/25/2014	
Attribute 1: Buffer and Landscape Context (pp. 8-15)				**Comments**	
Aquatic Area Abundance Score (D)		Alpha.	Numeric		
		D	3	Avg 4% Aquatic Abundance	
Buffer:					
Buffer submetric A: Percent of AA with Buffer	Alpha. / Numeric	A	12	100% Buffer	
Buffer submetric B: Average Buffer Width		A	12	250m Avg width for buffer	
Buffer submetric C: Buffer Condition		C	6	>75% invasives and moderate soil disturbance	
Raw Attribute Score = $D+[C \times (A \times B)^{1/2}]^{1/2}$			11	**Final Attribute Score = (Raw Score/24) x 100**	48
Attribute 2: Hydrology (pp. 16-21)					
		Alpha.	Numeric		
Water Source		A	12	No modified hydrology	
Hydroperiod		A	12	Natural filling and drawdown	
Hydrologic Connectivity		C	6	Steep banks for ~60% of AA	
Raw Attribute Score = sum of numeric scores			30	**Final Attribute Score = (Raw Score/36) x 100**	83
Attribute 3: Physical Structure (pp. 22-28)					
		Alpha.	Numeric		
Structural Patch Richness		C	6	4 patch types	
Topographic Complexity		D	3	no benches, low micro-topography	
Raw Attribute Score = sum of numeric scores			9	**Final Attribute Score = (Raw Score/24) x 100**	38
Attribute 4: Biotic Structure (pp. 29-39)					
Plant Community Composition (based on submetrics A-C)					
Plant Community submetric A: Number of plant layers	Alpha. / Numeric	C	6	2 plant layers	
Plant Community submetric B: Number of Co-dominant species		D	3	3 Co-dominantes	
Plant Community submetric C: Percent Invasion		D	3	33% invasives	
Plant Community Composition Metric *(numeric average of submetrics A-C)*			4		
Horizontal Interspersion		C	6	low interspersion	
Vertical Biotic Structure		A	12	high entrainment	
Raw Attribute Score = sum of numeric scores			22	**Final Attribute Score = (Raw Score/36) x 100**	61
Overall AA Score (average of four final Attribute Scores)				57	

Worksheet for Aquatic Area Abundance Metric (Method 1)

Percentage of Transect Lines that Contains Aquatic Area of Any Kind	
Segment Direction	Percentage of Transect Length That is an Aquatic Feature
North	0
South	0
East	0
West	15
Average Percentage of Transect Length That Is an Aquatic Feature	4

Percent of AA with Buffer Worksheet.

In the space provided below make a quick sketch of the AA, or perform the assessment directly on the aerial imagery; indicate where buffer is present, estimate the percentage of the AA perimeter providing buffer functions, and record the estimate amount in the space provided.

Percent of AA with Buffer: 100 %

Worksheet for calculating average buffer width of AA

Line	Buffer Width (m)
A	250
B	250
C	250
D	250
E	250
F	250
G	250
H	250
Average Buffer Width ***Round to the nearest whole number (integer)***	250

Structural Patch Type Worksheet for Depressional Wetlands

Check each type of patch that is observed in the AA and use the total number of observed patches in Table 15.

STRUCTURAL PATCH TYPE (circle for presence)	**Depressional**
Minimum Patch Size	**3 m^2**
Abundant wrack or organic debris in channel, on floodplain, or across depressional wetland plain	
Animal mounds and burrows	
Bank slumps or undercut banks in channels or along shoreline	
Cobbles and Boulders	1
Concentric or parallel high water marks	
Filamentous macroalgae or algal mats	
Islands (mostly above high-water)	
Large woody debris	
Non-vegetated flats or bare ground (sandflats, mudflats, gravel flats, etc.)	1
Open water	1
Plant hummocks and/or sediment mounds	
Soil cracks	
Standing snag(s) (1 or more at least 3 m tall)	1
Submerged vegetation	
Swales on floodplain or along shoreline	
Variegated, convoluted, or crenulated foreshore (instead of broadly arcuate or mostly straight)	
Woody vegetation in water	
Total Possible	**17**
No. Observed Patch Types (enter here and use in Table 15 below)	4

Worksheet for AA Topographic Complexity

At two locations in the AA, make a sketch of the profile from the AA boundary to AA boundary. Try to capture the major topographic features, slopes and intervening micro-topographic relief. Based on these sketches and the profiles in Figure 7, choose a description in Table 17 that best describes the overall topographic complexity of the AA.

North to South

East to West

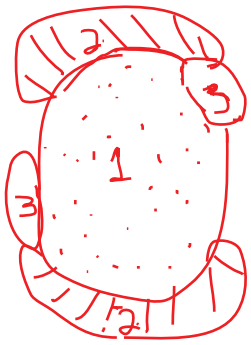
Plant Community Metric Worksheet 2 of 8: Co-dominant species richness
(A dominant species represents ≥10% *relative* cover)

** Combine the counts of co-dominant species from all layers to identify the total species count. Each plant species is only counted once when calculating the Number of Co-dominant Species and Percent Invasion submetric scores, regardless of the numbers of layers in which it occurs.*

Floating or Canopy-forming	Invasive?	Short (<0.5 m)	Invasive?
	☐		☐
	☐		☐
	☐		☐
	☐		☐
	☐		☐
	☐		☐
Medium (0.5 – 1.5 m)	**Invasive?**	**Tall (1.5 – 3.0 m)**	**Invasive?**
	☐	Schoenoplectus californicus	☐
	☐	Typha domingensis	☐
	☐		☐
	☐		☐
	☐		☐
	☐		☐
Very Tall (>3.0 m)	**Invasive?**		
Tamarisk sp.	☑	**Total number of co-dominant species for all layers combined (enter here and use in Table 19)**	3
	☐		
	☐	**Percent Invasion *Round to the nearest whole number (integer)* (enter here and use in Table 19)**	33
	☐		

Horizontal Interspersion Worksheet

Use the spaces below to make a sketch of the AA in plan view, outlining the major plant zones (this should take no longer than 10 minutes). Assign names to the zones and record them on the right. Based on the sketch, choose a single profile from Figure 8 that best represents the AA overall.



Assigned zones:

1) Typha and Schenoplectus

2) Tamarisk

3) Rhus integrifolia

4)

5)

6)

Wetland disturbances and conversions Worksheet

Has a major disturbance occurred at this wetland?	☐ Yes	☑ No		
If yes, was it a flood, fire, landslide, or other?	☐ flood	☐ fire	☐ landslide	☐ other
If yes, then how severe is the disturbance?	☐ likely to affect site next 5 or more years	☐ likely to affect site next 3-5 years	☐ likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type?	☐ depressional	☐ vernal pool	☐ vernal pool system	
	☐ non-confined riverine	☐ confined riverine	☐ bar-built estuarine	
	☐ perennial saline estuarine	☐ perennial non-saline estuarine	☐ wet meadow	
	☐ lacustrine	☐ seep or spring	☐ playa	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)	☐	☐
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	☐	☐
Flow diversions or unnatural inflows	☐	☐
Dams (reservoirs, detention basins, recharge basins)	☐	☐
Flow obstructions (culverts, paved stream crossings)	☐	☐
Weir/drop structure, tide gates	☐	☐
Dredged inlet/channel	☐	☐
Engineered channel (riprap, armored channel bank, bed)	☐	☐
Dike/levees	☐	☐
Groundwater extraction	☐	☐
Ditches (borrow, agricultural drainage, mosquito control, etc.)	☐	☐
Actively managed hydrology	☐	☐
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**	☐	☐
Grading/ compaction **(N/A for restoration areas)**	✓	☐
Plowing/Discing **(N/A for restoration areas)**	☐	☐
Resource extraction (sediment, gravel, oil and/or gas)	☐	☐
Vegetation management	☐	☐
Excessive sediment or organic debris from watershed	☐	☐
Excessive runoff from watershed	☐	☐
Nutrient impaired (PS or Non-PS pollution)	☐	☐
Heavy metal impaired (PS or Non-PS pollution)	☐	☐
Pesticides or trace organics impaired (PS or Non-PS pollution)	☐	☐
Bacteria and pathogens impaired (PS or Non-PS pollution)	☐	☐
Trash or refuse	☐	☐
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)	☐	☐
Excessive human visitation	☐	☐
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)	☐	☐
Tree cutting/sapling removal	☐	☐
Removal of woody debris	☐	☐
Treatment of non-native and nuisance plant species	☐	☐
Pesticide application or vector control	☐	☐
Biological resource extraction or stocking (fisheries, aquaculture)	☐	☐
Excessive organic debris in matrix (for vernal pools)	☐	☐
Lack of vegetation management to conserve natural resources	☐	☐
Lack of treatment of invasive plants adjacent to AA or buffer	✓	☐
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Significant negative effect on AA
Urban residential	☐	☐
Industrial/commercial	☐	☐
Military training/Air traffic	☐	☐
Dams (or other major flow regulation or disruption)	☐	☐
Dryland farming	☐	☐
Intensive row-crop agriculture	☐	☐
Orchards/nurseries	☐	☐
Commercial feedlots	☐	☐
Dairies	☐	☐
Ranching (enclosed livestock grazing or horse paddock or feedlot)	☐	☐
Transportation corridor	☐	☐
Rangeland (livestock rangeland also managed for native vegetation)	☐	☐
Sports fields and urban parklands (golf courses, soccer fields, etc.)	☐	☐
Passive recreation (bird-watching, hiking, etc.)	☐	☐
Active recreation (off-road vehicles, mountain biking, hunting, fishing)	✓	☐
Physical resource extraction (rock, sediment, oil/gas)	✓	✓
Biological resource extraction (aquaculture, commercial fisheries)	☐	☐
Comments This AA and surrounding area is an old mining site and is heavily disturbed.		

Appendix F

Long-Term Management Plan Template

Appendix F

Long-Term Management Plan Template

Section 1.0 Introduction

- 1.1 Purpose of Establishment
- 1.2 Purpose and Goal of the Long Term Management Plan
- 1.3 Regulatory Requirements
- 1.4 Land Owners and Neighbors
- 1.5 Land Manager, Responsibilities, and Qualifications
- 1.6 Conservation Easement Monitor and Responsibilities
- 1.7 Changes in Personnel

Section 2.0 Property Description

- 2.1 Location and Setting
- 2.2 History and Land Use
- 2.3 Adjacent Land Uses
- 2.3 Cultural Resources
- 2.4 Hydrology and Topography
- 2.5 Soil

Section 3.0 Biological Resources Summary

- 3.1 Methods and Surveys
- 3.2 Wetland and Riparian Habitats
- 3.3 Native Transitional and Upland Communities
- 3.4 Endangered and Threatened Species
- 3.5 Rare Species and Species of Special Concern
- 3.6 Wildlife Corridors and Movement Preservation

Section 4.0 Habitat Monitoring Management Activities

- 4.1 Inlet Maintenance
- 4.2 Trash, Debris, and Trespass
- 4.2 Monitoring Elements
  - 4.2.1 Vegetation Monitoring
  - 4.2.2 Species Monitoring
- 4.3 Weed Management Plan and Integrated Pest Management (IPM)
- 4.5 Water Quality Monitoring
- 4.4 California Rapid Assessment Method (CRAM)

Tables and Figures