Attachment 3

Development And Interim Management Plan

Otay River Mitigation Bank Development and Interim Management Plan

City of Chula Vista, San Diego County, California

Bank Sponsor:

HomeFed Otay Land II, LLC
1903 Wright Place, Suite 220
Carlsbad, CA 92008
Contact: Bob Penner
BPenner@hfc-ca.com
(760) 918-8200
Bank Coordinator:
Lindsay Teunis
(619) 917-1872

Prepared by:

ICF
525 B Street, Suite 1700
San Diego, CA 92101
Contact: Courtney Casey
(714) 604-8064

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Key Contributors

ICF
Linnea Spears-Lebrun
525 B Street, Suite 1700
San Diego, CA 92101
(858) 578-8964
Linnea.spears-lebrun@icf.com

SWCA Environmental Consultants
Lindsay Teunis
1455 Frazee Road, Suite 500
San Diego, CA 92108
(619) 917-1872
Lindsay.Teunis@swca.com

ICF
Courtney Casey
525 B Street, Suite 1700
San Diego, CA 92101
(858) 578-8964
Courtney.casey@icf.com

ICF
R.J. Van Sant
525 B Street, Suite 1700
San Diego, CA 92101
(858) 444-3928
RJ.VanSant@icf.com

Distribution List

Otay Land Company
1903 Wright Place, Suite 220
Carlsbad, CA 92008
Contact: Bob Penner
BPenner@hfc-ca.com
(760) 918-8200

City of Chula Vista
276 Fourth Avenue
Chula Vista, CA 91910
Contact: Cheryl Goddard
Cgoddard@chulavistaca.gov
(619) 476-2329

U.S. Army Corps of Engineers
5900 La Place Court, Suite 100
Carlsbad, CA 92008
Contact: Michael Ladouceur
Michael.A.Ladouceur@usace.army.mil
(760) 602-4829

California Department of Fish and Wildlife
3883 Ruffin Rd
San Diego, CA 92123
Contact: Lisa Gymer
Lisa.Gymer@wildlife.ca.gov
(559) 243-4014 x 238

U.S. Fish and Wildlife Service
2177 Salk Avenue
Carlsbad, CA 92008
Contact: Christine Medak
Christine_medak@fws.gov

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Acronyms and Abbreviations

°F	degrees Fahrenheit
AA	Assessment Area
BEI	Bank Enabling Instrument
BMP	best management practice
Border Patrol	U.S. Customs and Border Patrol
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH	critical habitat
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
DoD	Department of Defense
FESA	Federal Endangered Species Act
FR	Federal Register
FUDS	Formerly Used Defense Site
GDP	General Development Plan
GPS	global positioning system
Greenbelt Master Plan	City of Chula Vista Greenbelt Master Plan
HEC-HMS	Hydrologic Engineering Center-Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HUC	hydrologic unit code
IRT	Interagency Review Team
JEPA	Joint Exercise of Powers Agreement
MBTA	Migratory Bird Treaty Act
Mitigation Rule	Compensatory Mitigation for Losses of Aquatic Resources
MMRP	Military Munitions Response Program
MRZ	Mineral Resource Zone
MSCP	Multi-Species Conservation Plan
OHWM	ordinary high water mark
POM	Otay Ranch Preserve Owner/Manager
ORWMP	Otay River Watershed Management Plan
OVRP	Otay Valley Regional Park
OWD	Otay Water District
Quino	Quino checkerspot butterfly
RMP	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
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WMP	Watershed Management Plan
USFWS	U.S. Fish and Wildlife Service

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Chapter 1
Project Description

1.1 Purpose

The purpose of this Development Plan is to outline the mitigation/restoration activities that will occur within the Otay River Mitigation Bank (Bank) and how those activities will be implemented, maintained, monitored and measured for success. The Bank will provide compensatory mitigation for unavoidable adverse impacts to waters of the United States (WOUS) and State (WOS) (including wetlands) as well as California Department of Fish and Wildlife (CDFW) jurisdiction that results from activities authorized under Sections 401 and 404 of the Clean Water Act, California's Porter-Cologne Act, and Section 1602 of the California Fish and Game Code. The Bank will also provide compensatory mitigation for unavoidable adverse impacts to the federally and state listed as endangered least Bell's vireo (*Vireo bellii pusillus*) and the federally listed as endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*) as well as the potential to mitigate for protected habitat under the Multiple Species Conservation Plan (MSCP)/Natural Communities Conservation Plan (NCCP). It is assumed that any activities causing unavoidable adverse impacts have met all applicable requirements and are authorized by the appropriate authority.

1.2 Project Summary

1.2.1 Bank Location

The Bank site covers approximately 220 acres (plus an additional 65 acres for the subsequent phase) in the Otay River Valley in southwestern San Diego County, California (Otay Mesa U.S. Geological Survey [USGS] 7.5-minute quadrangle map (32.599, -116.944) (Figures 1-1 and 1-2). It is within the upper portion of the Lower Otay River Watershed, approximately 1.75 miles downstream of Savage Dam. The Bank boundary begins immediately downstream of a 33-acre mitigation area (referred to as the Pre-Bank) previously approved as permittee responsible mitigation for the Otay Village 3 Project (U.S. Army Corps of Engineers [USACE] Permit No. SPL-2012-00181, Water Quality Certification No. 12C-026, and CDFW Agreement No. 1600-2012-0052-R5), the Otay Village 8W Project (USACE Permit No. SPL-2013-00495, Water Quality Certification No. R9-2014-0104, and CDFW Agreement No. 1600-2013-0147-R5), and Otay Village 2 Project (Waste Discharge Requirement # R9-2017-0179) (Figure 1-3). Access to the site is achieved by entering the Vulcan Materials property off Main Street and Heritage Road and driving east on Hard Rock Road, which then turns into Wiley Road for approximately 4 miles. Historic aerials of the Bank and surrounding area are included as Appendix A.

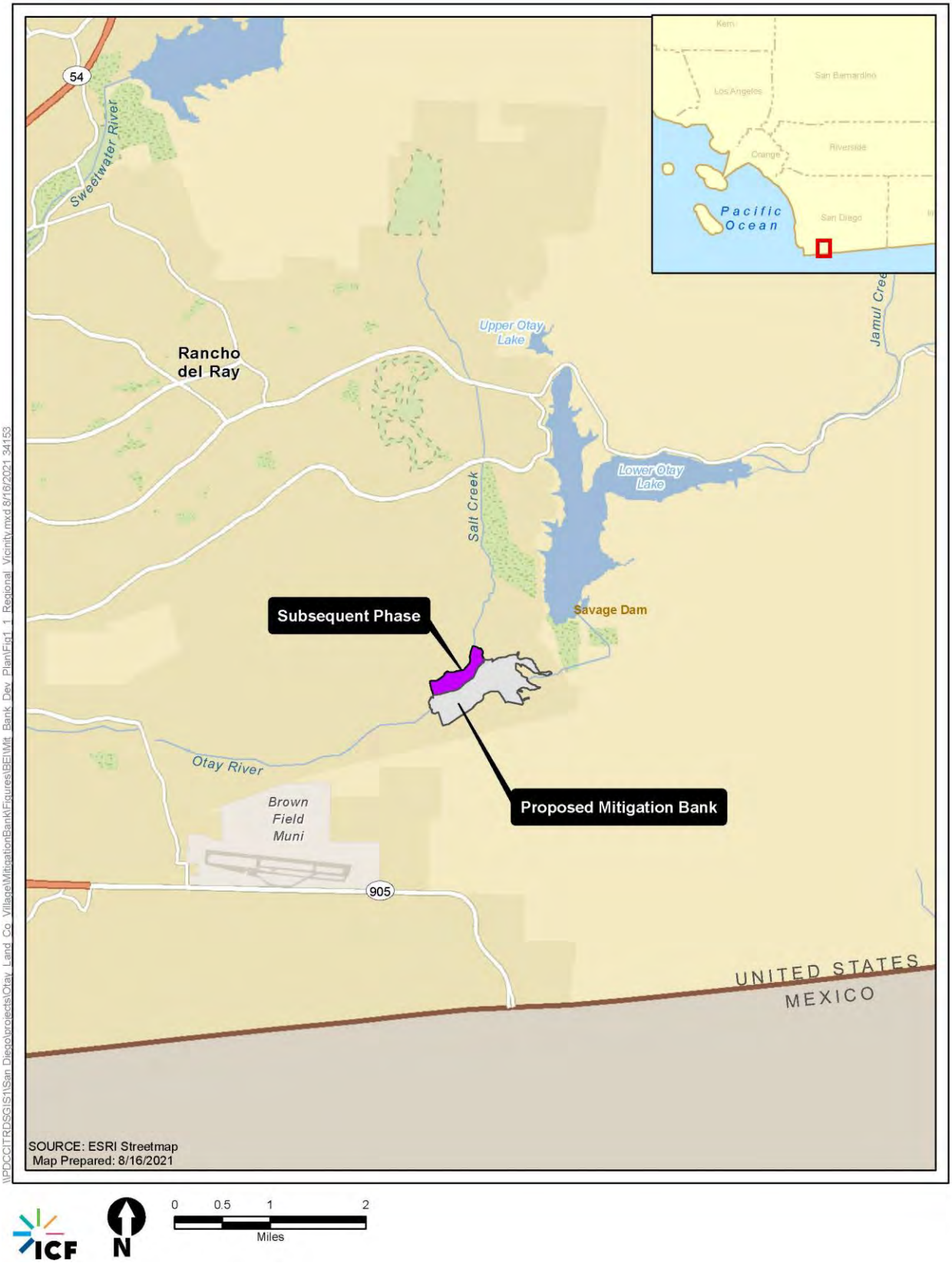


Figure 1-1 Regional Vicinity

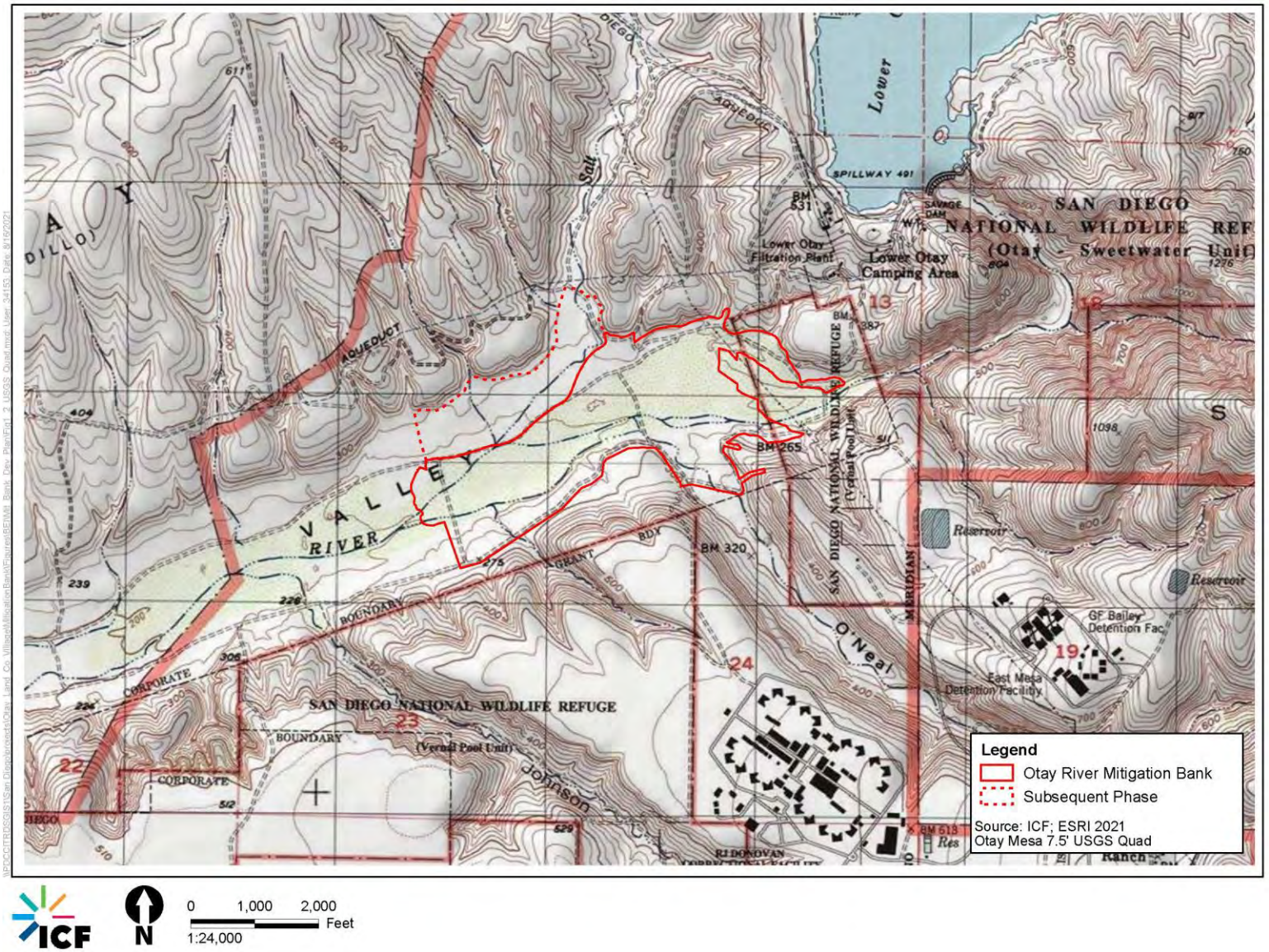


Figure 1-2 Project Location

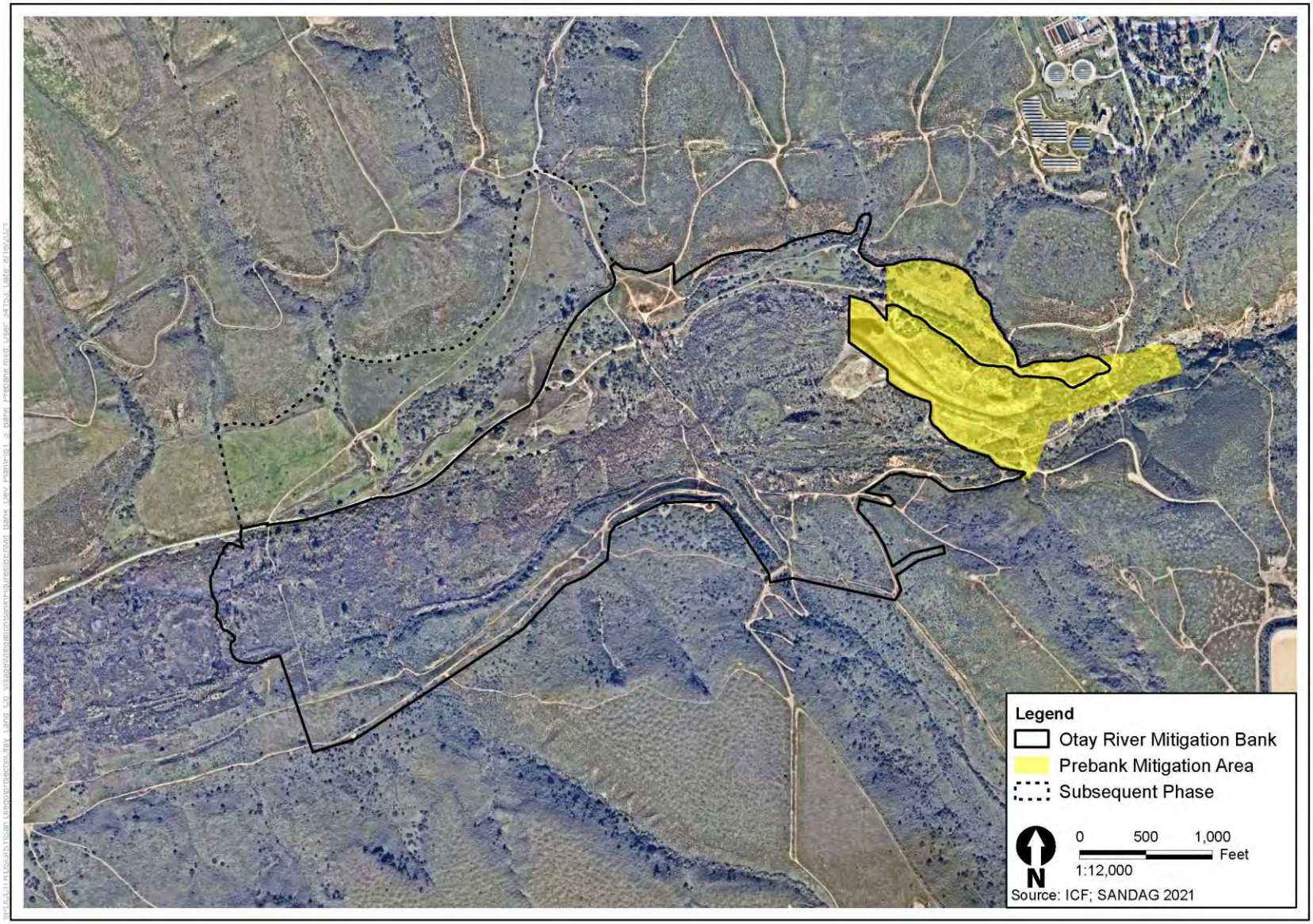


Figure 1-3 Mitigation Bank and Prebank

1.2.2 Anticipated Need

The Bank will provide mitigation opportunities for aquatic resources, listed species, and protected habitat in the proposed service area, and may provide mitigation for the future Otay Village projects and planned City of Chula Vista projects as described in the Otay Ranch General Development Plan (GDP). Additionally, there are no existing mitigation banks with service areas that overlap with the proposed service area, and based on the 2000 U.S. Census and the San Diego Association of Governments (SANDAG) Demographic and Economic Forecasting Model, the San Diego region is projected to grow by 40% between 2008 and 2050. The incorporated cities, including Chula Vista, would accommodate the largest amount of population growth over the forecast period (43%). SANDAG anticipates that approximately 50% of regional future job and housing growth would be in the smart growth opportunity areas in southern San Diego County, such as Otay Ranch. The area is also identified as a transit priority area in the 2050 Regional Growth Forecast. As such mitigation credits will likely be needed within the Bank's proposed service area immediately and in the coming years.

1.2.3 Local Planning Context

Several important planning documents have been created for the Otay River Watershed, including the Otay River Watershed Management Plan (WMP) (Aspen 2006) and the draft Otay River Special Area Management Plan (SAMP) (Jones and Stokes 2006). The WMP includes implementation strategies to ensure the protection of existing beneficial uses and natural resources, including methods to monitor, maintain, and/or enhance existing water quality levels using nonstructural and structural best management practices (BMPs). Recommendations for appropriate aquatic resource enhancement and monitoring programs are also provided. The draft Otay River SAMP (which was never officially finalized but offers a great deal of useful information) provides a comprehensive planning instrument to serve as a basis for development of a programmatic permitting mechanism for unavoidable impacts within the watershed. Together these two documents provide a framework program that is consistent with the local general plans (County and City of San Diego), the San Diego Regional Water Quality Control Board (RWQCB) National Pollutant Discharge Elimination System Permit, and the City of Chula Vista Multi-Species Conservation Program Subarea Plan (MSCP Subarea Plan). They also present a proactive watershed planning and permitting approach that identifies areas within the watershed of "low value" that are more suitable for development and areas of "high value" that should be protected.

Other planning documents of importance to the area include the following.

- The 1997 Otay Valley Regional Park (OVRP) Concept Plan (OVRP Concept Plan), which resulted from a multijurisdictional planning effort in the Otay River Valley by the County of San Diego and the Cities of Chula Vista and San Diego and included recommendations for open space/core preserve areas, recreation areas, trail corridors, staging areas, viewpoint and overlook areas, and interpretive centers. The OVRP Concept Plan boundary includes the entire limits of the Bank.
- The Otay Ranch Resource Management Plan (RMP), which was adopted by the County of San Diego and City of Chula Vista, concurrent with the 1993 enactment of the Otay Ranch GDP. The RMP identified an approximately 11,000 acre preserve (Otay Ranch Preserve) to protect,

preserve, enhance, and manage sensitive natural and cultural resources within Otay Ranch. The Bank site lies within the Otay Ranch Preserve.

- The City of Chula Vista's (City) 2003 MSCP Subarea Plan, which provides a blueprint for conservation of covered species and their associated habitats and forms the basis for federal and state incidental "take" permits for 86 plant and animal species within the City. The Otay Ranch Preserve, which includes the Bank site, will be included in the MSCP Subregional preserve. The City's Preserve, which includes MSCP lands and some Otay Ranch Preserve Lands, will eventually encompass approximately 5,000 acres of the City's most sensitive open space areas. In addition, another approximately 4,200 acres outside the City's jurisdiction will be preserved as a result of development occurring within the City's urban boundaries. Lands set aside within the Preserve will be appropriately managed while still providing passive recreational opportunities for area residents and the public at large.
- The City of Chula Vista Greenbelt Master Plan (Greenbelt Master Plan). The 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 multiuse 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 Bank 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.

1.2.4 Site Description

The approximately 285-acre Bank site (mainstem and subsequent phase) is currently undeveloped, and open space borders its western and northern sides (Figure 1-4) (Section 3.13 contains additional info on adjacent land uses). The OVRP and City of Chula Vista Greenbelt concept trails are also shown on Figure 1-4. The Bank site is currently owned by two entities, with the City of Chula Vista owning the eastern portion of the site (APN 64409004) and HomeFed Otay Land II, LLC (a subsidiary of the Otay Land Company [Bank Sponsor]) owning the western portion (APN 64409003) (Figure 1-5). Once all credits in the Bank have been sold and Bank Closure has occurred, fee title of the western portion of the site owned by the Bank Sponsor will be transferred to the City of Chula Vista.

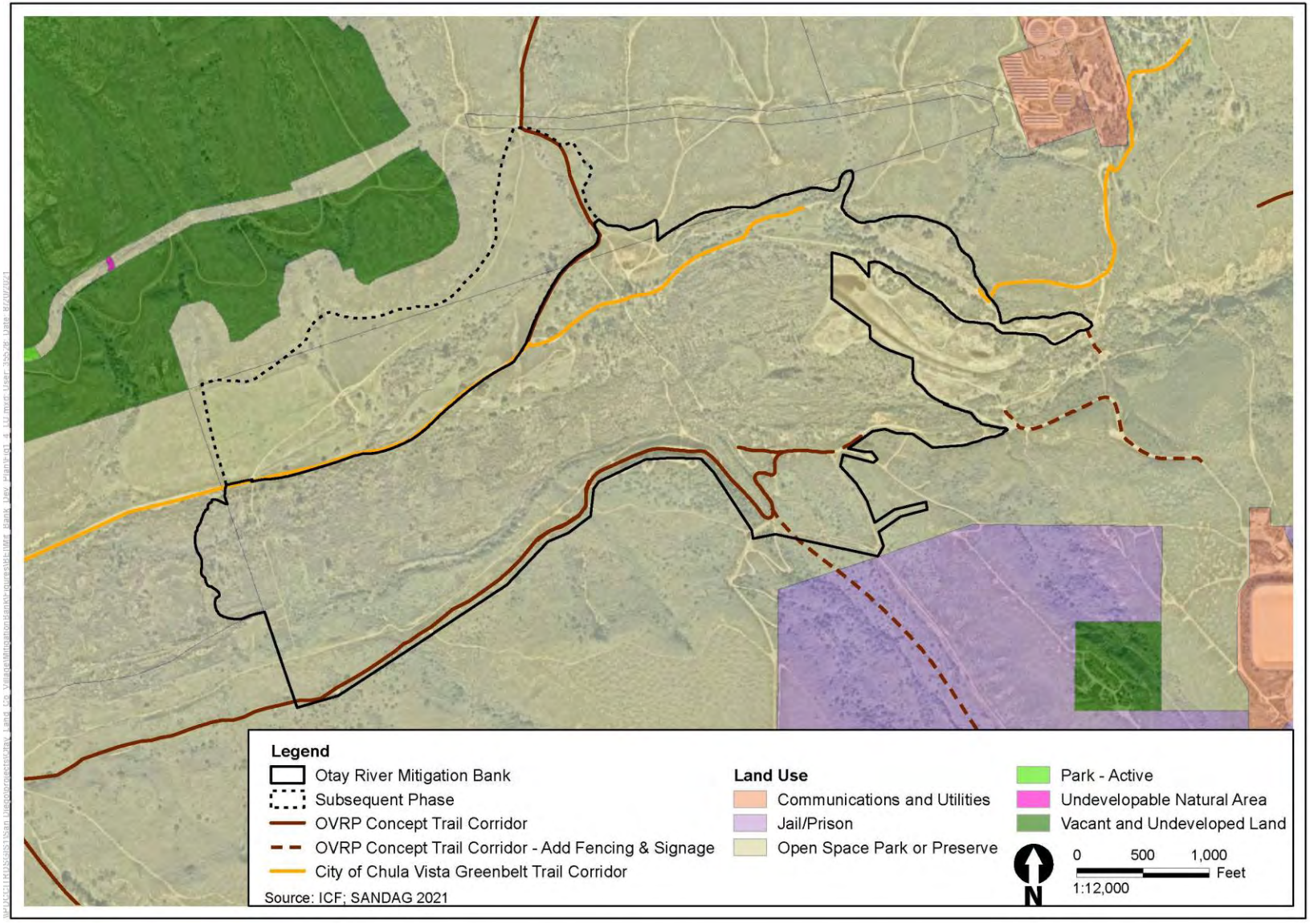


Figure 1-4 Land Use

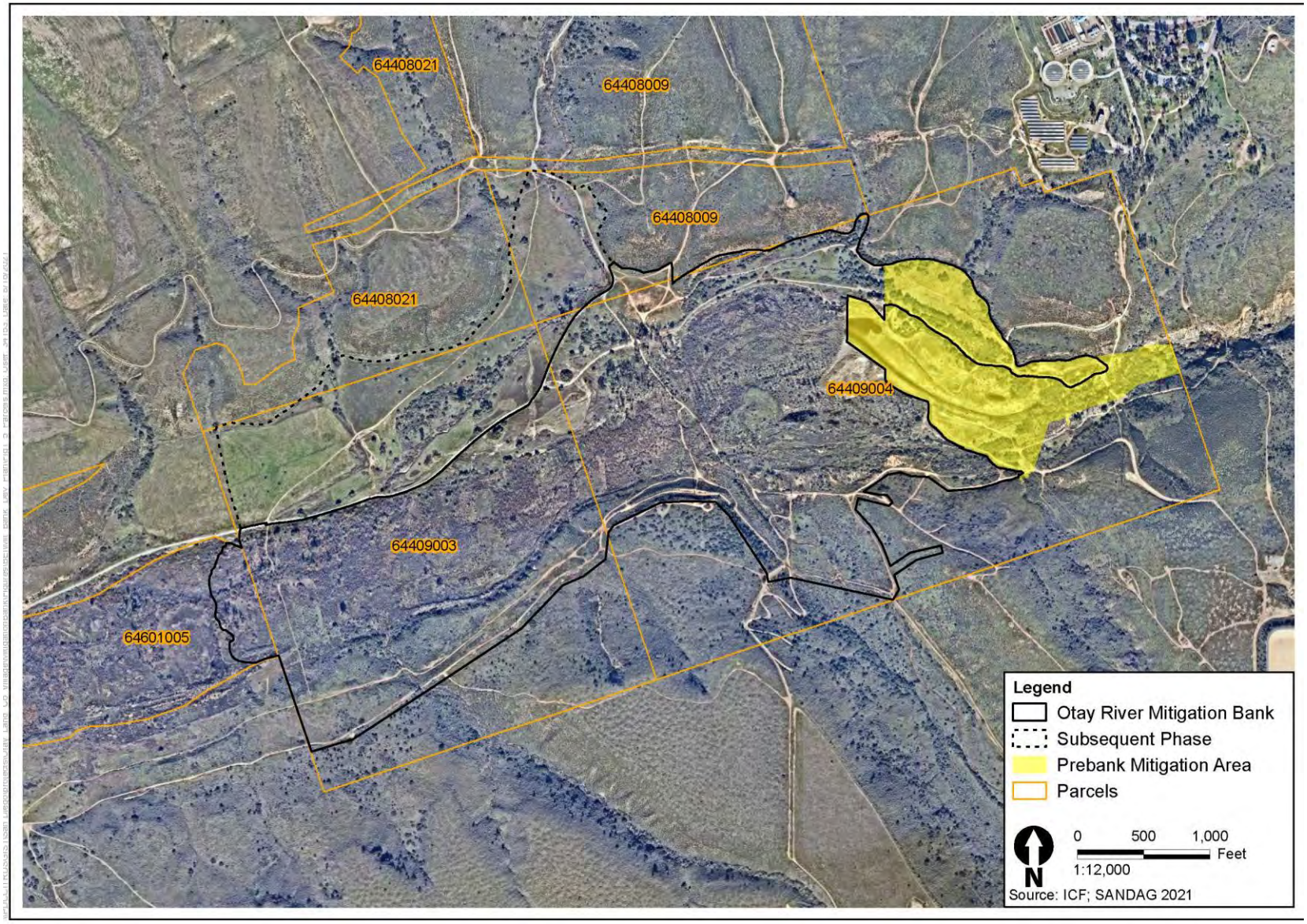


Figure 1-5 Parcel Map

A small portion of the Bank is within the Greenbelt Master Plan boundaries and entirely within the OVRP Concept Plan boundaries. Both of these plans identify future multiuse trails within the Bank limits including prioritizing the use of existing dirt roads and unofficial trails as well as select new trails where needed to improve trail user experience, avoid sensitive resources, and complement other uses on site. The vast majority of the proposed trails are in the upland areas and are outside of the Bank limits (Figure 1-4). However, a few select trails do cross into the Bank limits. These trails are generally existing dirt roads and easements and are currently used by the Border Patrol, San Diego Gas and Electric Company (SDG&E), City of San Diego, and Otay Water District (OWD), as well as by hikers, cyclists, and equestrians; several are official utility rights-of-way (Section 3.13 contains additional info on trails).

The location of the Bank site represents the uppermost reach of the Lower Otay River Watershed that has not been restored and provides an ideal opportunity for mitigation. Immediately upstream of the Bank site is a permittee responsible mitigation (PRM) site that is currently being implemented. The PRM site is approximately 0.75 mile downstream of Savage Dam, after which the Otay River travels through a narrow canyon before opening onto the valley floor. Because Savage Dam does not release water except when the lake overtops (on average every 10 years) and because high flows are restricted, it acts like a hydrologic break in the Otay River watershed with the area below the dam functioning as independent watershed from the area upstream of the dam (i.e., Lower Otay River Watershed and Upper Otay River Watershed).

This PRM site was designed by ICF as part of a larger mitigation project to include future downstream mitigation opportunities, including the Bank. In addition, the PRM project includes removal of invasive perennial vegetation through the narrow canyon of the Otay River up to Savage Dam. As Savage Dam represents a hard break in the watershed, this focused treatment will reduce nonnative seeds/plant material from entering the PRM site and the Bank and all other areas downstream. The restoration activities associated with the Bank will integrate seamlessly with the PRM mitigation site and were designed to be complementary. As with the Bank site, the PRM site includes removal of old mine tailings in the river and floodplain, removal of nonnative vegetation, grading a new primary river channel where one currently does not exist along with several floodplain terraces, and establishment of several seasonal ponds. The Bank would continue this restoration design downstream until the confluence with Salt Creek, one of the more substantial tributaries in the lower watershed, and would include the construction of several floodplain channels outside the main river channel.

The mainstem channel and floodplain in the lower valley, including the Bank site, 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 the release of over 13 billion gallons of water, which left a substantial amount of sediment and debris on the floodplain surface.

San Diego Historical Society

Plate 1. Otay River Valley After 1916 Flood

San Diego Historical Society

Plate 2. Location of Previous Dam After 1916 Flood

The dam was reconstructed in 1918 and remains intact with water leaving the dam only when the lake reaches capacity. The flood material that was deposited in the valley floor was mined for sand and gravel over several decades, beginning in the 1960s and continuing until approximately the mid-1980s (Kohler and Miller 1982) (Figures 1-6, 1-7, 1-8). In 1982, Nelson and Sloan Materials had permits to mine in three locations in the river valley and two locations along terrace deposits adjacent to the river valley. Sand mining operations ended in approximately 1985 because the company was unable to complete new permitting processes required for in-stream mining (Miller 1996).

The flood of 1916, subsequent 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 Bank site. In particular, the mainstem channel was filled in and further manipulated, with the consequence that surface flows now dissipate, and water flows down-gradient from east to west as shallow groundwater through much of the Bank site with no distinct river channel present. Similarly, the floodplain has been manipulated, with much of the area characterized by artificial mounding from the mine tailings of

varying size classes ranging from silt to large car size boulders. The disturbed hydrology and topography of the site are further exacerbated by the presence of dense stands of invasive vegetation, including tamarisk (*Tamarix* spp.), arundo (*Arundo donax*), and Peruvian pepper tree (*Schinus molle*). These species provide a significant nonnative seed source to downstream habitats and use much of the available water in the upper soil profile.

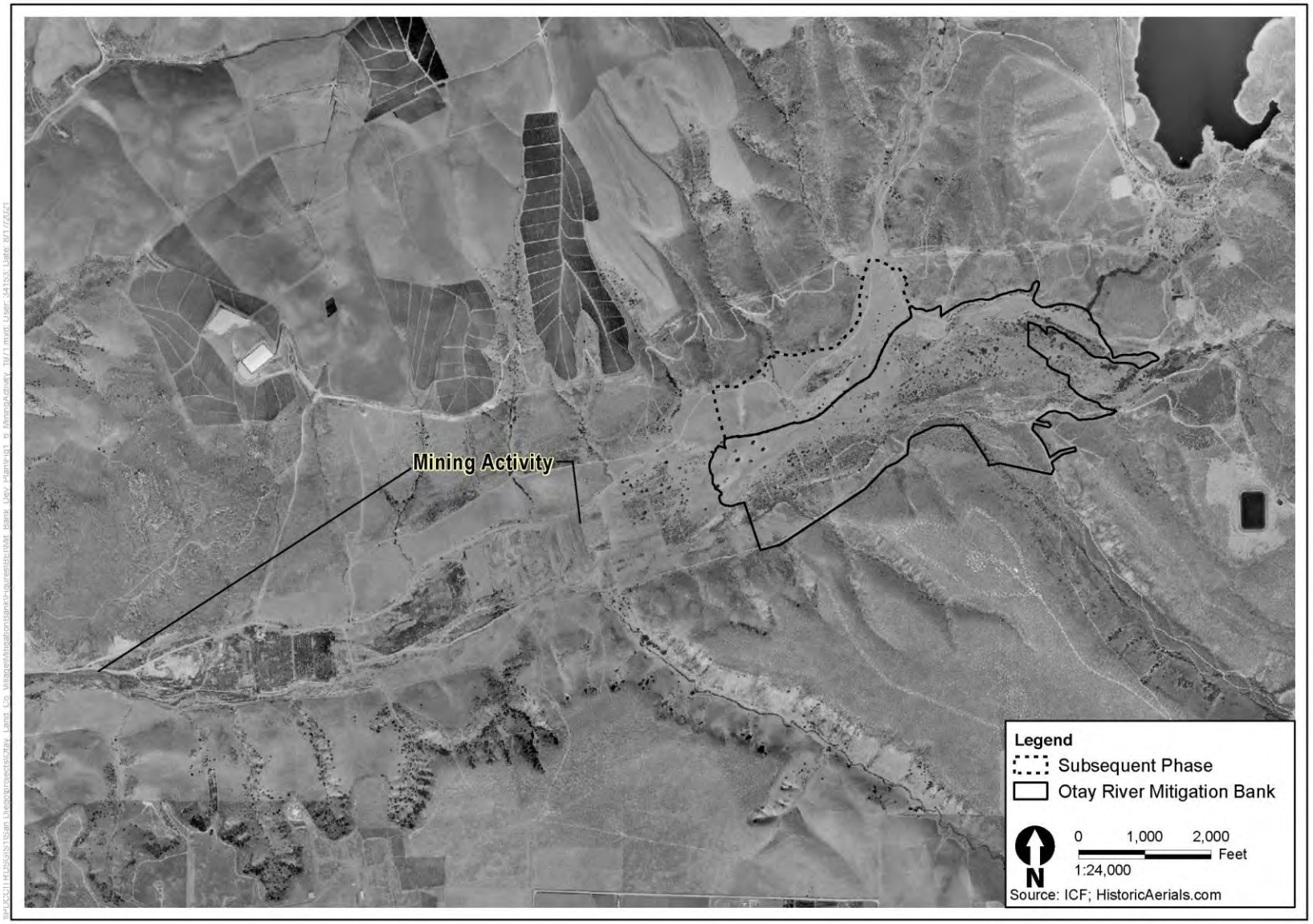


Figure 1-6 Mining Activity 1971

Figure 1-7 Mining Activity 1981

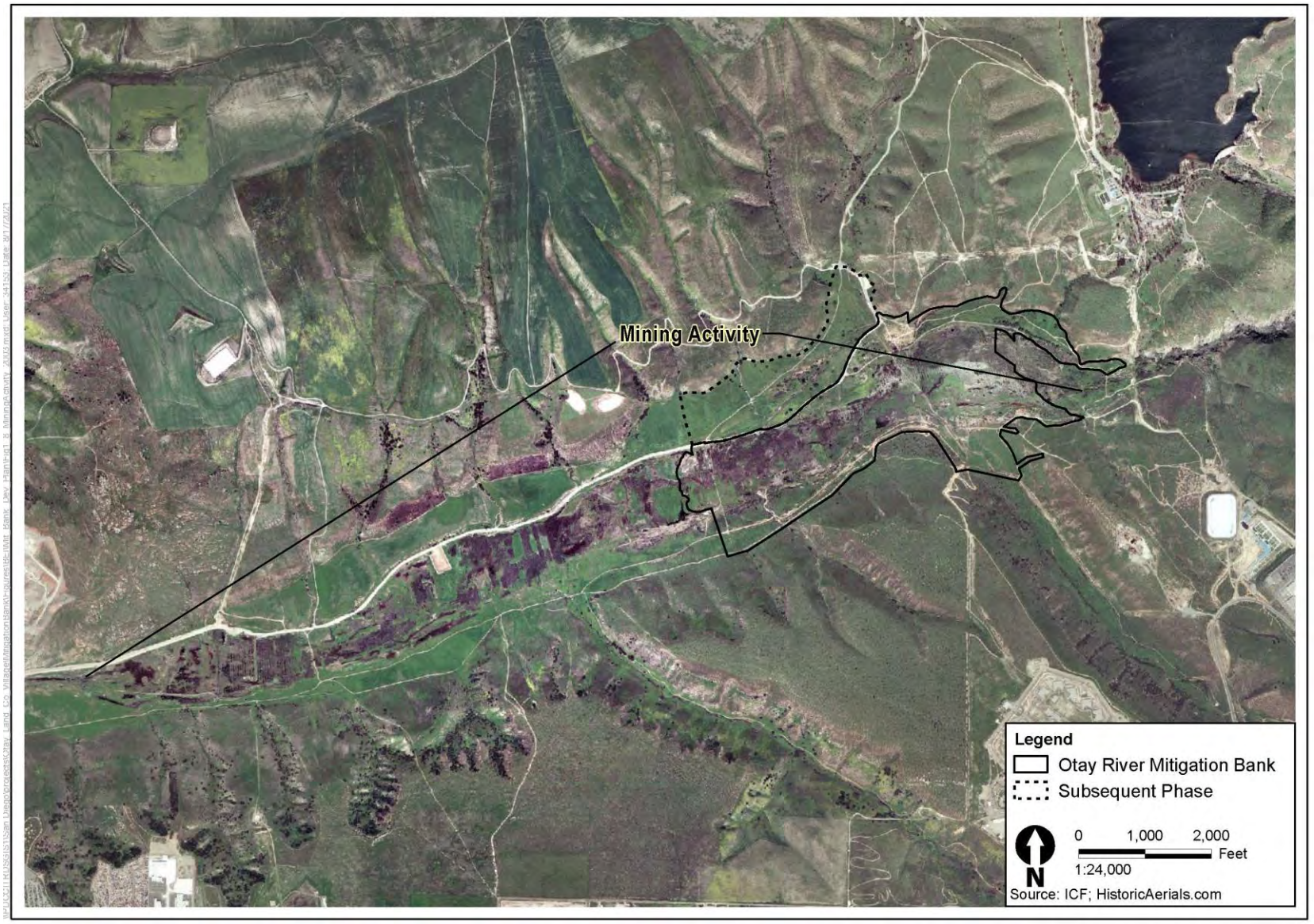


Figure 1-8 Mining Activity 2003

1.2.5 Integration of Watershed Planning

The Bank project would be consistent with the restoration recommendations described in the WMP, 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 WMP provides an evaluation of the baseline conditions of the Upper and Lower Otay River Watersheds and recommendations for BMPs and restoration opportunities based on five key goals identified by the WMP stakeholders.

The WMP provides 17 strategies intended to protect, enhance, restore, and manage watershed resources in consideration of expected natural and anthropogenic stressors. Each strategy is focused on achieving one or more of the stakeholder identified WMP goals. Specifically, the Bank addresses one of the key strategies identified in the WMP: "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 eight other strategies based on their expected large benefits to the watershed and their capacity to build upon other efforts being planned or underway (Aspen 2006).

1.3 Responsible Parties and Roles

1.3.1 Bank Sponsor and Qualifications

Otay Land Company, as the Bank Sponsor, would be the party responsible for (1) implementation of the Bank, (2) interim management of the Bank (maintenance and monitoring until all performance standards are met and the site has been transferred to long-term management), and (3) establishment of a non-wasting endowment fund to cover long-term management activities. The Bank Sponsor would be legally responsible for the mitigation once a permittee secures credits from the Sponsor.

The Bank Sponsor has not previously implemented any mitigation banks or in-lieu fee programs; however, they are implementing the PRM site immediately upstream and are in the process of installing upland mitigation for several of the Otay Ranch Village residential/commercial mixed use projects nearby. The Bank Sponsor would be responsible for contracting a qualified habitat Restoration Contractor and landscape contractor(s) for installing, maintaining, and monitoring the Bank. The Bank Sponsor may select separate contractors for the installation and maintenance phases. Both contractors would meet the minimum requirements described below. The Bank Sponsor would establish contractual mechanisms to ensure the completion of installation, maintenance, and monitoring activities. The Bank Sponsor may, with sole discretion, replace any of these parties.

The Bank Sponsor or the contracted consultant would obtain all required permits for Bank implementation, which may include the following.

- Initial Study/Mitigated Negative Declaration and Grading Permit
- CDFW Lake and Streambed Alteration Agreement
- Clean Water Act 401 Water Quality Certification
- Clean Water Act 404 Verification/Permit

- California Endangered Species Act Permit
- U.S. Fish and Wildlife Service (USFWS) Endangered Species Act Permit

1.3.2 Long-Term Manager

The City of Chula Vista (City) is the proposed Long-Term Manager. The Long-Term Manager will be the primary point of contact and the coordinator overseeing monitoring and management of the Bank. The Long-Term Manager will serve as the liaison between the general public; private landowners adjacent to the Bank; and State, local, and federal public agencies. The Long-Term Manager, with appropriate staff or assistance from consultants and contractors, will implement the LTMP; develop and implement updated management measures; and be responsible for Bank monitoring, maintenance, and reporting. The Bank Sponsor will fund the implementation of this LTMP in perpetuity. The Long-Term Manager will be responsible for providing annual reports that summarize overall management and maintenance activities, describe the site conditions, and detail priorities for the upcoming year. The annual report will outline any revised management priorities, practices, or strategies and indicate any necessary remedial actions.

The Long-Term Manager has specific authority to conduct and control activities within the Bank. However, the Bank has the potential to be affected by activities outside its boundaries, and, although the Long-Term Manager will not have authority to make enforcement actions outside the Bank boundaries, the Long-Term Manager will seek to promote a culture of cooperation with neighbors through community meetings and outreach as necessary. Furthermore, the Long-Term Manager may call upon City staff and local sheriff's department to resolve site issues such as trespassing, vandalism, or illegal encampments, which could negatively affect the Bank.

1.3.2.1 Proposed Long-Term Manager Qualifications

The City of Chula Vista manages its Multiple Species Conservation Program (MSCP) preserve lands by implementing resource management plans and area specific management directives. The City's MSCP Subarea Plan ensures conservation and management of approximately 9,243 acres. Of this total, an estimated 4,993 acres will be located within the City's jurisdictional boundaries and will result in a Preserve that is managed by the City. In cooperation with the County, the City is further committed to preserving approximately 4,250 acres located outside the City's jurisdictional and MSCP Subarea Plan boundary, within the County's MSCP Subarea Plan. To date, 3,296 acres have been conserved within the City and an additional 3,604 acres have been conserved outside of the City for a total of 6,900 acres or 75% preserve assemblage.

The City oversees and coordinates preserve management, monitoring and reporting with the wildlife agencies, adjacent landowners, regional monitoring entities, interested public groups, and the general public. The City uses science-based technical recommendations to conduct specific management tasks, monitoring, data collection and analysis and adaptive management programs.

The City performs biological monitoring and participates in regional and subregional meetings related to preserve management and monitoring to ensure management and monitoring efforts within the Preserve are not being duplicated.

The City implements basic stewardship including, but not limited to, the following:

- Monitor existing fencing/gates and identify needs for additional access control, provide minor repairs and direct the appropriate contractor to repair or construct more significant fencing/gates needs;
- Remove minor amounts of trash, litter, and debris; monitor and direct appropriate contractor to remove significant amounts of trash, litter, and other debris;
- Remove weeds and exotics
- Monitor and report enforcement issues, including off-road traffic, trespassing, grazing, shooting and illegal dumping to enforcement agencies, such as the County Sheriff's Department, City Police Department, U.S. Border Patrol, and property owners.

1.3.3 Endowment Holder

An endowment holder, agreed to by the Bank Sponsor and Signatory Agencies, will hold the non-wasting endowment pursuant to the endowment agreement and distribute funds to the long-term manager for maintenance activities. The San Diego Foundation is currently proposed to hold the endowment.

Chapter 2
Mitigation Goals and Objectives

2.1 Goals

The primary goal for the Bank is to create an ecologically functional, self-sustaining mosaic of wetland and non-wetland habitats that are resilient to a range of natural disturbances (drought, flood, fire, etc.). The following are the specific goals of the Bank. These goals mirror those of the upstream PRM site since the sites are envisioned to function as one unit. No specific water quality goals are sought because water quality within the Otay River Watershed is generally good (SDSU 2019); however, many of the goals below will improve water quality overall.

- Restore proper hydrology based on existing conditions and create complex channel morphology including primary and secondary channels.
- Tie the reestablished main river channel into the existing channel upstream and downstream of the Bank site.
- Recreate a floodplain with low and high terraces capable of conveying various flood events.
- Establish and rehabilitate vernal pools to provide new habitat or improved habitat for the federally listed San Diego fairy shrimp (*Branchinecta sandiegonensis*) and sensitive vernal pool plant species such as the federally listed spreading navarretia (*Navarretia fossalis*)
- Maximize buffer condition by restoring and enhancing the adjacent upland habitat.
- Create and maximize habitat diversity and structural complexity, in part through removal of invasive species.
- Maximize wildlife use opportunities including local, state and federally listed species.
- Identify all potential water crossings for the mainstem river and tributaries and include appropriate low impact design features to avoid ponding and trail/road degradation. This includes the SDGE pipeline crossing as well and O'Neil Canyon, Bobcat Creek, Vireo Creek, and Quino Creek in addition to many small unnamed drainages that currently bisect the existing roads.

2.2 Objectives

Restoration activities for the Bank project would occur within the Otay River mainstem and floodplain as well as tributaries and upland buffer areas. This area was targeted for establishment, reestablishment, and rehabilitation due to its location near the upstream origination point of the Otay River at Savage Dam and its adjacency to an existing mitigation site. This mitigation location is an appropriate step in the overall restoration of the Lower Otay River subbasin that exists below Savage Dam. The reestablishment of the river channel and adjacent floodplains and removal of invasive species within the Bank site would improve the biological, physical, and chemical functions of the existing resources and support native flora and fauna.

The following is a list of objectives for the Bank project. The objectives are organized by restoration category.

2.2.1 Mainstem River and Floodplain

- Reestablish and rehabilitate the Otay River mainstem that has been substantially altered from past mining activities and the invasion of non-native species. Grading would remove flow obstructions including berms, rows of cobble piles, and sediment and spoil piles, and would re-create the contours of the Otay River mainstem and tributary connections, connect existing low-lying pooling areas, and create floodplains. These actions would improve flow conditions during rain events and hydrological conditions for native plants.
- Reestablish and rehabilitate the floodplain habitat 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 Bank currently supports a large, nearly monotypic stand of tamarisk. The tamarisk and other non-native vegetation would be removed, the natural floodplain contours that were corrupted by mining activities would be re-created, and native plants would be installed following invasive plant removal and regrading.
- Reestablish secondary and tertiary channels along the northern and southern high floodplain. This would improve flow conditions during rain events and create hydrologic flow complexity, as well as habitat complexity.
- Reestablish and improve existing mainstem river crossing and add tributary crossings to improve hydrologic conditions onsite and reduce existing artificial ponding and ongoing trail degradation.

2.2.2 Salt Creek Tributary (Subsequent Phase)

- Reestablish braided channel setwork and broad confluence connection with the Otay River Mainstem. Facilitate connectivity to the mainstem by closing Wiley Road across the confluence and relocating access and the Salt Creek Sewer Line to the north side of the valley bottom. Add sinuosity to the mainstem creek channel and re-engage with the currently cutoff floodplain by setting back slopes, changing creek baseline elevation, and encouraging breakout's onto the valley floor.
- Remove non-native/invasive species in the creek and revegetate with appropriate riparian and floodplain species.
- Reconnect the small tributary (Corral Creek) west of Salt Creek to the mainstem floodplain and support the development of alkali/grass wet meadows.
- Replace non-native grass land dominated by invasive annuals with native grassland and coastal sage shrub communities dominated by elderberry, toyon, and laural sumac.
- Extend the maritime succulent scrub habitats on the south facing slope lower onto the foothill bottom.
- Add educational signage highlighting the historical corral and land uses in the area along with the changes to the landscape.

2.2.3 Wet Meadow

- Protect the final trails and avoid erosion and ponded water by reconnecting the three smaller tributaries on the north side of the mainstem Otay River including Bobcat Creek, Quino Creek, and Quino Creek. These small ephemeral to intermittent creeks are currently disengaged at the base of the foothills as a result of the roads and trails created for historical site access. Small sinuous drainages and swales will be extended from the base on the foothills where each of these tributaries exits and will extend through the valley bottom.
- During heavy rainfall years and larger events water can leave the small drainages and swales and engage the adjacent floodplain, creating opportunities for grassland and alkali marsh wet meadows and ongoing engagement with the existing vernal pool features.
- Reclaim redundant roads and enhance road ruts currently supporting endangered fairy shrimp including weed management, select planting, and addition of structure like bolders.
- Create new smaller secondary trails and varied topography to interest trail users while encouraging on-trail use and avoidance of sensitive resources.
- Add educational kiosk near Bobcat Creek entrance to engage visitors entering from Otay Parks.

2.2.4 Vernal Pools

- Establish vernal pools in the northwest portion of the project, adjacent to quino enhanced terrace. Rehabilitate and enhance the remaining pool features onsite including the southern floodplain, pre-bank staging area, and select road rut features. Where appropriate new vernal pools will be added to increase the overall complexity of the site, increasing the habitat for endangered fairy shrimp species and many sensitive vernal pool plant species as well as terrestrial invertebrates like the quino checkerspot butterfly. Select mounds will be created around the new pools and planted with maritime succulent scrub.
- The existing pools will be enhanced and rehabilitated by removing non-native species, adding topographic complexity (cobble), and potentially seeding with vernal pool plant species. Rehabilitated pools will provide higher quality habitat for fairy shrimp and other invertebrates as well as amphibians and vernal pool plant species. The buffer surrounding the pools will also be managed free of non-native species including non-native grasses that can be detrimental to the function of vernal pools.
- Salvage soil from 4 impacted features that support San Diego fairy shrimp and work with Service to identify locations (new vernal pools and existing features) onsite to inoculate with soil material and cyts.

2.2.5 Upland Buffer

- Rehabilitate adjacent transitional and upland habitat surrounding the variety of aquatic resources onsite in both the northern and southern portions of the site. This includes select recontouring, revegetation, and removal of non-native species. This habitat serves as a buffer to the restored aquatic resources and vernal pools. In addition to protecting the resources from outside stressors such as human visitation and invasive species, the buffer areas and the associated ecotones provide foraging and breeding habitat for many native species as well as refugia for riparian species during high flood events.

2.2.6 Other

- Protect existing and proposed native habitat by focusing trail and access road users (i.e., Border Patrol, SDG&E, OWD, hikers, equestrian users, etc.) to key multiuse trails and closing other redundant roads/trails permanently. Fencing, trail signage, and educational kiosks would be installed at key locations.
- Establish OVRP Concept Plan and Greenbelt Master Plan trails within the Bank limits. The trails would primarily be constructed on existing access roads and trails and unauthorized and redundant trails currently in place would be closed. Several new trail connectors, the majority of which are located outside the Bank limits, would be established in order to direct users to designated trail locations and away from sensitive resources, such as vernal pools/road ruts that support San Diego fairy shrimp or upland areas that support habitat for quino checkerspot butterfly. The closed trails would be reclaimed and restored with native vegetation. Split-rail fencing, trail signage, and educational kiosks would be installed to keep users on the trails and outside of the Bank.

Chapter 3
Baseline Information

3.1 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 degrees Fahrenheit (°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 per year (National Weather Service 2013).

The Otay River Watershed occurs within a naturally fire-prone landscape. Data from the U.S. Forest Service Database indicate the mainstem Otay River region immediately below Savage Dam has burned four times since 1994, most recently during the 2007 Harris Fire. 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.

3.2 Hydrologic Conditions

3.2.1 Watershed

The Bank site 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 (Figure 3-1). 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 2006). The Bank is situated approximately in the middle of the Otay River Watershed and 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.

3.2.2 Historic Hydrological Conditions

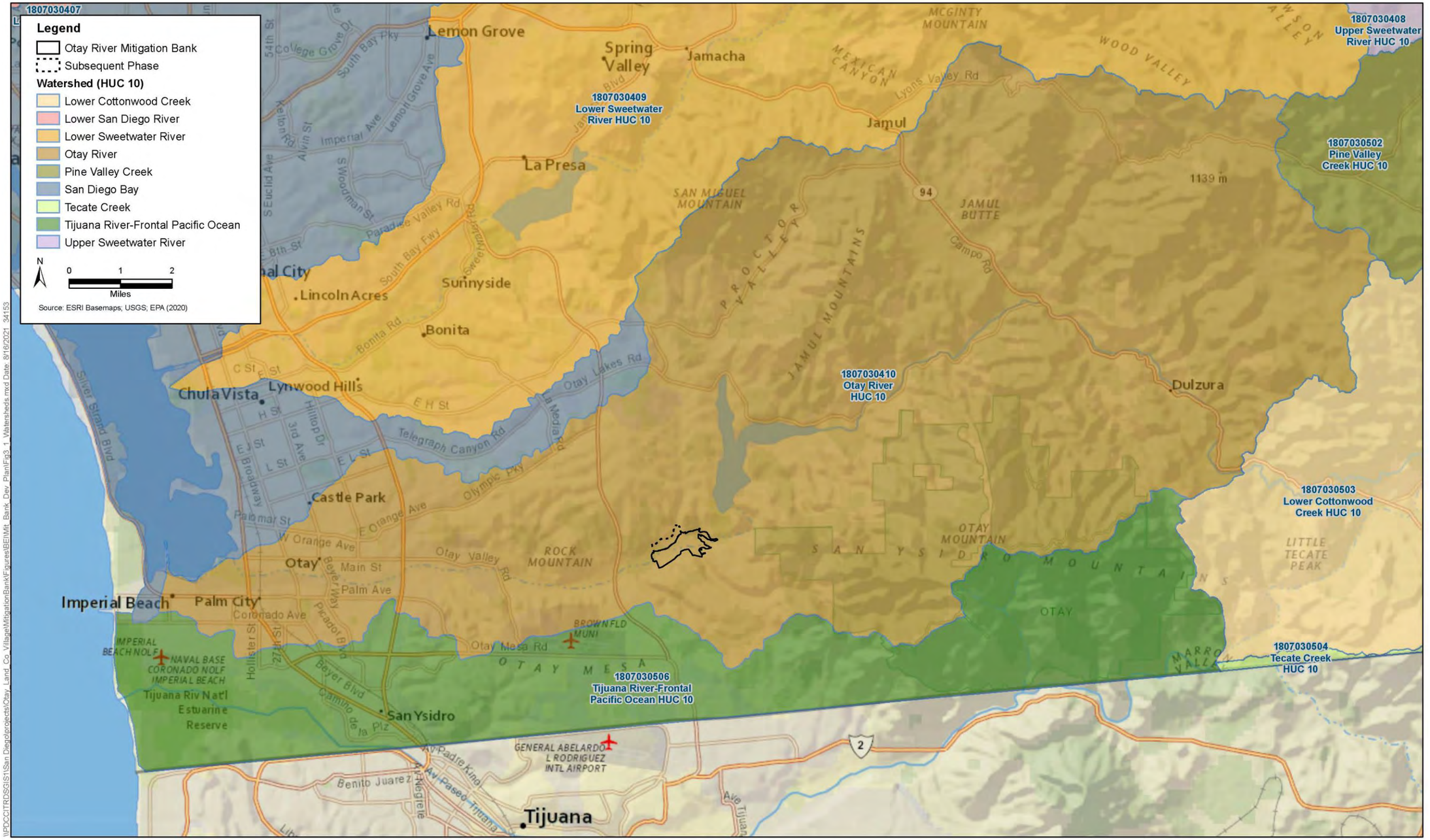
Historically, the mitigation area was part of a large watershed that drained into San Diego Bay at the river's western terminus. The Upper and Lower Otay Dams currently impound flow from the Otay River. The Upper Otay Dam was built in 1901; it forms the Upper Otay Reservoir, which serves as a municipal water supply. The Lower Otay Dam, which is approximately 1.75 miles upstream of the Bank, 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 2006). The original Lower Otay Dam failed catastrophically during a high rain event in 1916. 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 2006). 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.

3.2.3 Existing Hydrological Conditions

Existing conditions for the Bank site 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 12 times since 1919 (1927, 1932, 1937, 1941, 1980, 1981, 1982, 1983, 1993, 1998, 2005) (Aspen 2006), including most recently in February 2017 when the area experienced an above average rain year including a 500–1,000 year storm event (calculated from National Weather Service data). As such, the Otay River immediately downstream of the dam does not receive water from the upper watershed except during infrequent dam 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 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 2006).



I:\PDC\ITRDSG\S1\San Diego\projects\Otay Land Co Village\Mitigation Bank\Figures\BE\Mit Bank Dev Plan\Fig3-1 Watersheds.mxd Date: 8/16/2021 34153

Figure 3-1 Watersheds

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Several tributary creeks flow into the Bank, with the two primary being O'Neal Canyon Creek (Feature 5), which meets the Otay River toward the center of the Bank on the southern side of the river and originates in the Otay Mountain Wilderness near Otay Mountain, and Salt Creek (Feature 10) from the north side, which originates in National Wildlife Refuge land near San Miguel Mountain. 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 2006). 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.

The impounding of river waters by the installation of 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 2006). 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 2006).

Similarly, because the Bank site is situated immediately below 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 that 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*) and abundant non-native 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 post mining. 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 (Aspen 2006); 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 in 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 would experience flattening of slopes and downcuts in the upper reaches and aggrade in the lower reaches. SANDAG (1985)) characterizes the Otay Groundwater basin to be in hydrologic equilibrium, such that recharge and discharge are approximately equal. The portion of the Bank that is directly in 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).

The floodplain and lower terraces in the river valley have a restrictive clay layer that allows the development of vernal pools. The vernal pools are seasonally filled by precipitation directly falling into the basin or drained from the micro-watershed surrounding the vernal pools or a vernal pool complex.

3.2.4 Water Rights

The Bank Sponsor is not currently aware of any conflicting water rights within the Bank site. Based on review of the preliminary title report, there is an easement granted from 1869 to the Kimball Brothers Water Company for the construction and maintenance of flumes, canals, or aqueducts on APN 64409004; however, it appears the right was to bring water to the property, not remove water from the property. In addition, given that the easement was granted prior to 1914, it is highly unlikely it is still valid as the right would have been abandoned if it was not used for three consecutive years.

The upstream portion of the Bank (APN 64409004) is currently owned by the City of Chula Vista and the downstream portion (APN 64409003) by HomeFed Otay Land II, LLC, a division of Otay Land Company (Bank Sponsor). Water rights for both parcels are held with each property owner and any water that flows on site will remain in its natural amount, course and direction. A conservation easement will be recorded over both properties eliminating any alterations to water that could occur. Upstream parcels from the Bank are undeveloped until reaching Savage Dam and are designated open space; therefore alteration to water resources will not occur.

3.3 Water Quality

Water quality monitoring data are not available for the Bank site. Groundwater quality downstream of the Bank site is rated as marginal to inferior for domestic and irrigation purposes because of high total dissolved solids and high chloride concentrations, respectively (Aspen 2006). Groundwater upstream generally meets safe drinking standards; however, some sampling locations have high iron, manganese, chloride, nitrate, and/or total dissolved solids concentrations (Aspen 2006). The Pacific Ocean near Coronado is the only potion of the Otay watershed that is listed as a 303(d) waterbody (coliform bacteria), however this section of the Otay watershed is not generally influenced by the Otay River. Water quality is generally good in the watershed likely because the vast majority of the watershed is undeveloped (44% undeveloped and 30.4% parks and recreation) (SDSU 2019).

3.4 Topography

The Bank site is completely contained within the existing Otay River Valley. Approximately 1.75 miles upstream of the site, the valley is narrow (ranging between 100 and 200 feet) for several hundred feet before widening noticeably to approximately 1,000 to 1,500 feet. Most of the Bank 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 Bank 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 to 10 feet tall), which were left behind as a result of instream sand and gravel mining in the twentieth century. The flat terraces in the floodplain and in the river valley allow for the development of vernal pools with depths ranging from 1 inch to over 3 feet. Mima mounds are commonly found in vernal pool landscapes in San Diego. Mima mounds are low, flattened, circular to oval, domelike, natural mounds that are composed of loose, unstratified, often gravelly sediment that is an overthickened A horizon. However, no mima mound topography occurs in these vernal pool areas. Several ponds are present north of the proposed channel alignment, with an average depth of approximately 5 to 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 to 20 feet below the adjacent ground of the surrounding foothills.

3.5 Formerly Used Defense Site

A portion of the Bank site is within the Brown Field Formerly Used Defense Site (FUDS) (Figure 3-2). 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 between 1942 and 1960 as a dive-bombing practice range and later as an aerial rocket range. 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 or Munitions Constituents. Under the MMRP, USACE is conducting environmental response activities at FUDS for the Army, DoD's Executive Agent for the FUDS program.

An MMRP Site Inspection report was prepared for the Brown Field FUDS boundary (Parsons 2007). The study found that munitions debris (fragments of Mk 15 Mod 3 100 lb practice bombs and fragments of AN-Mk23 practice bombs) were located within the site. There were no other visual indicators (distressed vegetation, stained soil, ground scars or craters) identified. Ten surface soil samples were also analyzed for explosives and metals; explosives were not detected but metals were detected. The report found aluminum, copper, iron, potassium, manganese, and zinc in the surface soils from bombing activities. The report concluded that the site does not pose an unacceptable risk to human health resulting from exposure to munitions constituents in the surface soil and there are no risks expected to ecological receptors resulting from exposure to CERCLA-hazardous munitions constituents in the surface soil. There is an unknown potential risk to human and ecological receptors due to the potentially complete surface water/sediment pathway. The risk is unknown because there are no quantitative data for surface water/sediment at this time. The study recommended a remedial investigation/feasibility study with surface water/sediment sampling for munitions constituents. Because the site generally has a low UXO risk and it's planned

as open space a remedial investigation/feasibility study is not likely to happen (Wied pers. comm.). According to the 2018 *Brown Field Bombing Range Formerly Used Defense Sites Program Management Action Plan* (USACE 2018) the site is not scheduled to be remediated until 2088 and the completion of the Military Munitions Response Program (MMRP) is to be complete in 2116. The FUDS program has an extensive backlog and the Brown Field site is not on the National Priorities List (NPL).

Ongoing conversations with the USACE have occurred over the last year in an effort to remove any risk associated with future remediation actions. As a result a draft agreement between the USACE and the two land owners (HomeFed and the City of Chula Vista) was developed and is included as Appendix B. This agreement will be signed prior to construction and any release of mitigation credits.

Although sand mining activities occurred for more than two decades after range activities ceased, there is still a potential to unearth unexploded ordinances. As such, safety measures will be implemented, including having dedicated unexploded ordnance (UXO) monitors during construction activities.

3.6 Soil Characteristics

Soils in the Otay East subbasin are predominantly clay, with some pockets of loam 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 2006). 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 consists of 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). MRZ-2 areas are locations where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence. The Bank lands are currently owned by the City of Chula Vista and the Bank Sponsor and all surface and sub-surface mineral rights lie with the property owners. A conservation easement will be placed over the Bank, which includes both properties, prohibiting the extraction of minerals.

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. The 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 Bank (Bowman 1973, NRCS 2014): Olivenhain cobbly loam, Huerhuero loam, Visalia gravely sandy loam, Riverwash, and Salinas clay loam (Figure 3-3).

- **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.

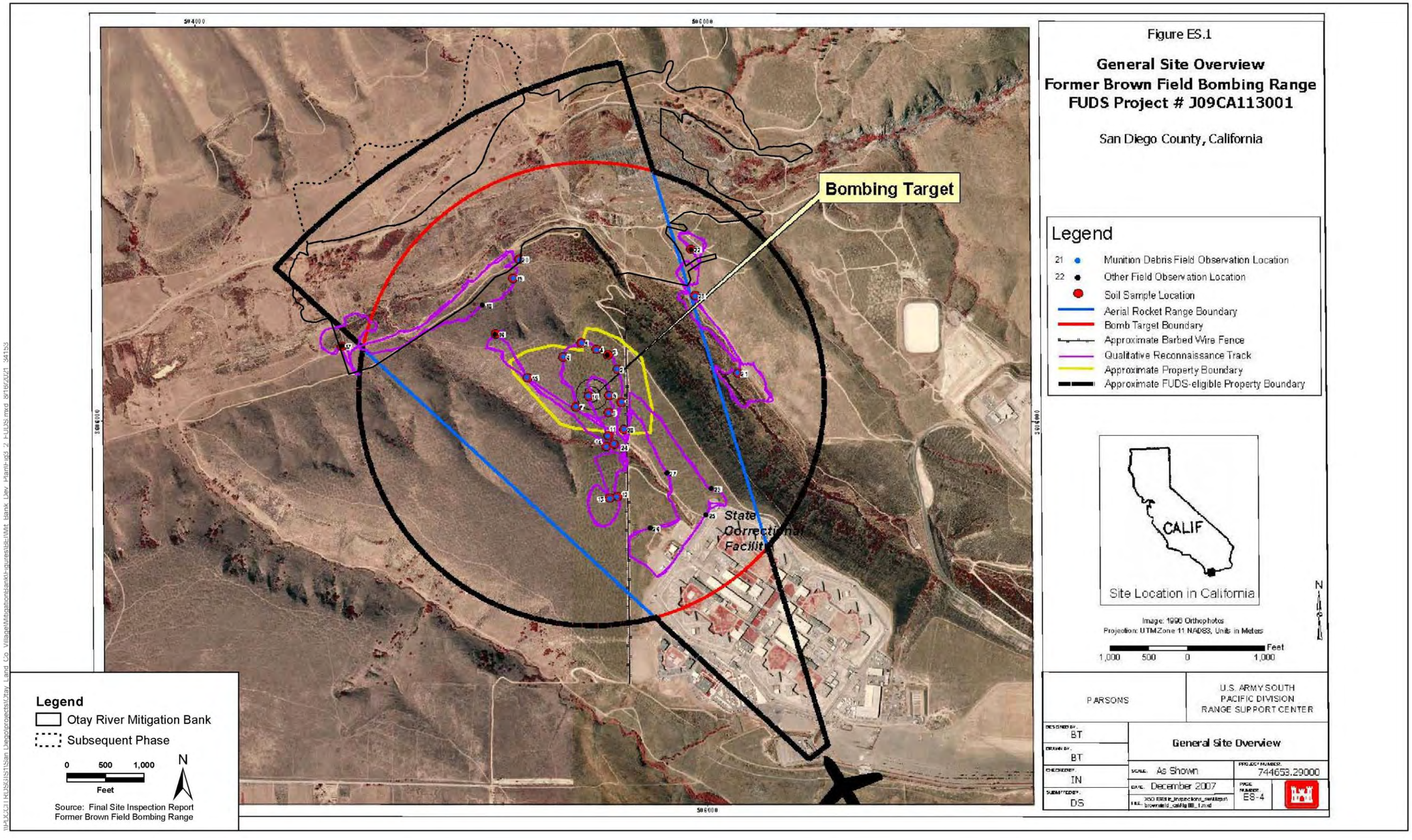

Figure 3-2 FUDS & Mitigation Bank Overlay

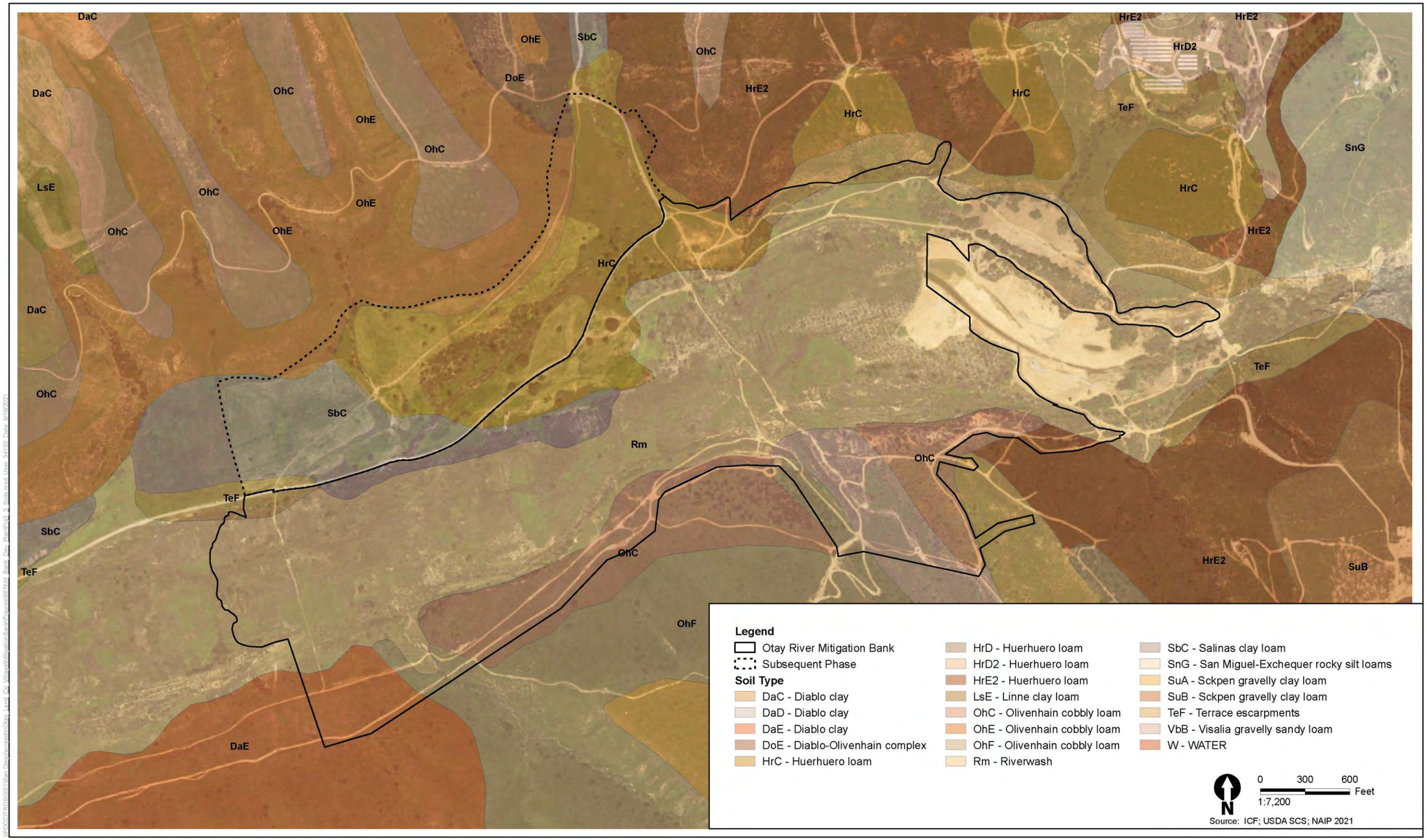

Figure 3-3 Soils

- **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.
- **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.
- **Salinas clay loam** consists of deep, well drained soils that formed in alluvium weathered from sandstone and shale. Salinas soils are on alluvial plains, fans, and terraces, have slopes of 0 to 9 percent, and occur at elevations of 50 to 2,000 feet.

3.7 Vegetation Communities and Habitat Types

The southern portion of the floodplain within the Bank has self-vegetated primarily with plants consistent with Diegan coastal sage scrub and alluvial fan communities; these plants include buckwheat (*Eriogonum fasciculatum*), laurel sumac, California sagebrush (*Artemisia californica*), toyon (*Heteromeles arbutifolia*), and broom baccharis (*Baccharis sarothroides*), although the area also contains numerous non-native invasive species such as pepper tree and tamarisk. The area where O'Neal Canyon merges with the Otay River Valley supports a large expanse of Tecate cypress (*Hesperocyparis forbesii*), although most is just outside the Bank limits. The northern portion of the floodplain is a near monotypic stand of tamarisk. The downstream floodplain also contains scattered areas of riparian habitat containing native trees, such as willows and 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 in the floodplain near the center of the Bank, which also contains numerous individuals of pepper trees and tamarisk.

In October 2014, ICF biologists conducted a vegetation mapping exercise of the eastern portion of the Bank located on City of Chula Vista property, including adjacent areas. This information along with addition biological data is included in the Biological Resource Report (BRR) (Exhibit H of the BEI) (it should be noted that some of the project elements outlined in Exhibit H have slightly changed and the document was created partially to fulfill CEQA requirements; therefore not all text is applicable to the Bank; however, biological information contained within is still valuable) . In May 2018 ICF biologists conducted vegetation mapping of the western portion of the Bank and verified the previous upstream mapping. Vegetation communities were categorized using the standard classifications of Oberbauer et al. (2008). A total of 15 vegetation communities and land cover types were mapped within the Bank site: Diegan coastal sage scrub, *Arundo donax* dominant/southern willow scrub, disturbed/developed, eucalyptus woodland, freshwater, freshwater marsh, non-native grassland, non-native vegetation, southern cottonwood-willow riparian forest, southern interior cypress forest, southern mixed chaparral, southern willow scrub, tamarisk scrub, valley and foothill grassland, and vernal pool (Table 3-1, Figure 3-4).

Table 3-1. Vegetation Communities and Land Cover Types Occurring within the Bank

	Modified Holland Code	Existing Vegetation Communities and Land Cover Types	MSCP Habitat Category[a]	Total Area in Mitigation Bank
Anthropogenic Land Covers	11300	Disturbed Habitat (Bare Ground)	N/A	12.2
Active Restoration Area	N/A	Prebank / Active Restoration Area	TBD	3.7
Uplands	32510	Diegan Coastal Sage Scrub	Tier II	80.4
		Diegan Coastal Sage Scrub (Disturbed)	Tier II	20.4
	32530	Diegan Coastal Sage Scrub (Baccharis dominated)	Tier II	8.7
	37120	Southern Mixed Chaparral	Tier III	0.0
	42110	Valley Needlegrass Grassland	Tier I	2.0
	42130	Saltgrass Grassland	Tier I	0.3
	42200	Non-Native Grassland	Tier III	8.1
	42210	Non-Native Grassland (Broadleaf dominated)	Tier III	16.9
	79000	Non-Native Woodland	Tier IV	4.2
	79100	Eucalyptus Woodland	Tier IV	5.8
	83330	Southern Interior Cypress Forest	Tier I	2.3
Riparian and Wetlands	44322	San Diego Mesa Vernal Pool	W	0.0
	52410	Coastal and Valley Freshwater Marsh	W	3.3
	61330	Southern Cottonwood-Willow Riparian Forest	W	1.6
		Southern Cottonwood-Willow Riparian Forest (Disturbed)	W	0.2
	63310	Mulefat Scrub	W	1.8
	63320	Southern Willow Scrub (Disturbed)	W	0.0
	64140	Freshwater	W	0.1
	65000	Non-Native Riparian (Tamarisk)	W	58.4
	Grand Total[b]			**230.4**

[a] City of Chula Vista's MSCP Subarea Plan Habitat Categories:
W – Wetlands the community considered sensitive under the Wetlands Protection Program
Tier I – Rare Uplands
Tier II – Uncommon Uplands
Tier III – Common Uplands
Tier IV – Other Uplands

[b] Rounded acreages do not exactly sum to the total areas because of the rounding of raw values in GIS.

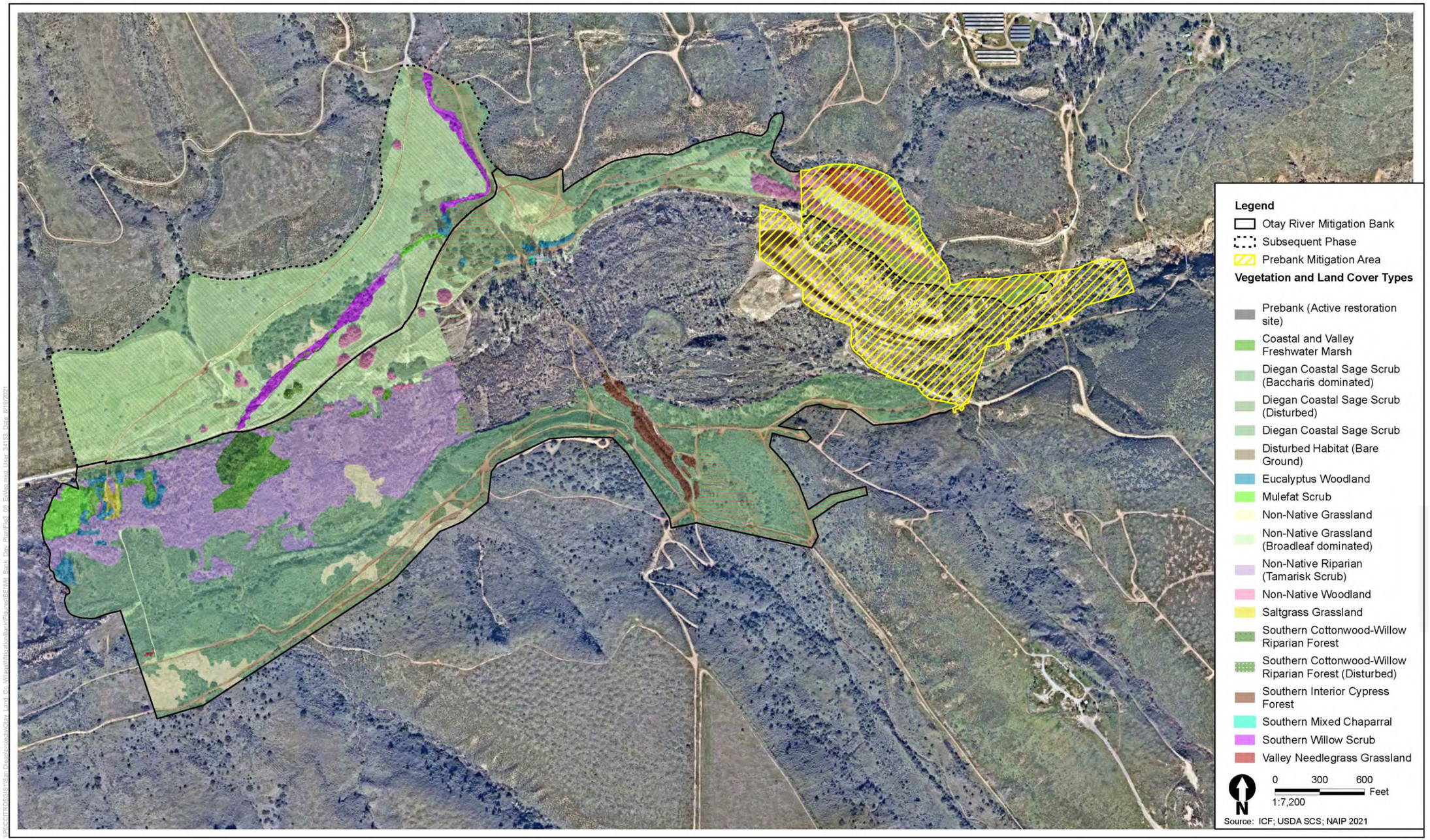

Figure 3-4 Existing Vegetation Communities

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3.7.1 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 in the Bank, Diegan coastal sage scrub exists in tracts of varying quality and species composition. This habitat exists in the Bank along roadsides and hillsides, which 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. Other areas along roads and streambeds are heavily dominated by broom baccharis. The Diegan coastal sage scrub community in 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 [CRPR] 2.2). A few drought-affected individuals of San Diego barrel cactus (*Ferocactus viridescens*) occur within the Bank. 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 threatened and California species of special concern coastal California gnatcatcher (*Polioptila californica californica*) and the federally listed as endangered Quino checkerspot butterfly (*Euphydryas editha quino*).

3.7.2 Diegan Coastal Sage Scrub: Baccharis dominated

Diegan coastal sage scrub typically occurs on disturbed sites or sites with nutrient-poor soils. In addition, it is often found within other forms of Diegan coastal sage scrub on upper terraces of river valleys (Oberbauer et al. 2008). This form of coastal sage scrub is dominated by broom baccharis (*Baccharis sarothroides*). Within the Project Area, Diegan coastal sage scrub is associated with species such as buckwheat, California sage, mule fat, and San Diego marsh-elder (CRPR 2.2). This community occurs within disturbed areas along roads and in small pockets along the margins of riparian vegetation. It is found within the Mitigation Bank Expansion Area proposed for grading.

3.7.3 Disturbed Habitat (Bare Ground)

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 non-native or native vegetation. Disturbed areas exist in the floodplain area as dirt roads and areas that experience heavy use by off-road vehicles.

3.7.4 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 central portion of the site that also contains tamarisk and pepper trees. Eucalyptus woodlands provide habitat and foraging value for many native animals, and are used by raptors for nesting and roosting sites, and may therefore be considered a resource for those species.

3.7.5 Freshwater (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 Bank, these areas are predominantly located in seasonal ponds, which are deep enough to hit groundwater on the northern side of the floodplain. In this dry intermittent/ephemeral setting, these year-round fresh water sources are a unique habitat.

3.7.6 Coastal and Valley 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.

3.7.7 Mulefat Scrub

This is a depauperate, tall herbaceous riparian scrub that is strongly dominated by mule fat (*Baccharis salicifolia*) and commonly found in intermittent stream channels with fairly coarse substrate (Oberbauer et al. 2008). This early seral community is maintained by frequent flooding, and absence disturbance, most stands would succeed to riparian forests or woodlands dominated by cottonwood (*Populus fremontii*) or western sycamore (*Platanus racemosa*). Mule fat within the Project Area is dominated by uniform stands of mule fat, with an understory composed of weedy annuals and biennials such as non-native mustards and poison hemlock. Mule fat scrub occurs at a few locations within the Otay River channel and tributaries of the Project Area but outside the proposed grading within the Project Area. This habitat is heavily used for both nesting and foraging birds, including coastal California gnatcatcher and least Bell's vireo.

3.7.8 Non-Native Grassland

Non-native 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 would 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.

Non-native 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. Non-native grassland occurs in scattered locations within the Bank 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.

3.7.9 Non-Native Grassland: Broadleaf Dominated

Non-native grassland is characterized as a non-native grassland that is co-dominated (50 percent or greater cover) by one or more non-native, broadleaf invasive weed species. It is considered an MSCP Tier III (common uplands) habitat type. This community often develops when there is periodic disturbance that prevents a heavy biomass accumulation that favors development of a monotypic stand of non-native grass but allows the establishment of invasive weeds such as black mustard, smallpod mustard (*hirschfeldia incana*), cheeseweed mallow (*Malva pariflora*), and prickly lettuce. Some non-native species may be characterized as invasive because of their ability to out-compete and displace native species. 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 on natural plant species and habitats for their survival.

3.7.10 Non-Native Woodland

Non-native vegetation communities are dominated by plant species that do not naturally and historically occur in this region. Some non-native species may be characterized as invasive due to their ability to out-compete and displace native species. Non-native vegetation in the Bank 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.

3.7.11 Prebank (Active Restoration Area)

This habitat consists of active restoration activities, including plantings, irrigation, and weeding, and cannot be fully classified until the restoration is complete.

3.7.12 Saltgrass Grassland

Saltgrass occurs in a wide range of habitat types and plant communities. In western riparian areas, saltgrass is a common understory species of willow (*Salix* spp.). In deserts of the southwest, saltgrass occurs with iodinebush (*Allenrolfea occidentalis*), saltcedar (*Tamarix ramosissima*),

saltbush (*Atriplex* spp.), sagebrush (*Artemisia* spp.), and black greasewood (*Sarcobatus vermiculatus*). In grasslands, saltgrass grows with alkali sacaton (*Sporobolus airoides*), brome (*Bromus* spp.), green needlegrass (*Nassella viridula*), western wheatgrass (*Pascopyrum smithii*), Nuttall's alkaligrass (*Puccinellia nuttalliana*), and blue grama (*Bouteloua gracilis*).

3.7.13 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*).

3.7.14 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 Bank 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 on this species for its survival; this butterfly lays eggs only upon this species of cypress.

3.7.15 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.

3.7.16 Southern Willow Scrub

Southern willow scrub communities are riparian thickets dominated by several willow species, mulefat, and occasionally western cottonwood. Many stands are too dense to allow much understory development. Within the Bank 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 Bank 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.

3.7.17 Non-Native Riparian (Tamarisk)

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 a prolific seeder and has replaced riparian habitat within the floodplain that was disturbed as a result of sand-mining activities. Tamarisk is widespread throughout the river and floodplain in the Bank.

3.7.18 Valley Needlegrass 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. Non-native grasses occurring include those described in the non-native 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.

3.7.19 San Diego Mesa Vernal Pool

Vernal pools are seasonally flooded depressions that support a distinctive living community adapted to extreme variability in hydrologic conditions (seasonally very dry and very wet conditions). Although vernal pools are often associated with hummocks or mima-mounds, this feature is not always present, and are not present surrounding the vernal pools in the Bank. In San Diego, vernal pools often retain pooled water for about 2 weeks after significant rain events. Vernal pools can be differentiated from other temporary wetlands by the following criteria: (1) the basin is at least partially vegetated during the normal growing season or is unvegetated due to heavy clay or hardpan soils that do not support plant growth; and (2) the basin contains at least one vernal pool indicator species (e.g., *Psilocarphus* spp., *Downingia cuspidata*, *Eryngium aristulatum* var. *parishii*, or crustaceans – *Branchinecta* spp., *Streptocephalus* spp., and others).

3.8 Special-Status Species

At this time, the presence of many wildlife species within the Bank site is limited due to the lack of suitable habitat and the disturbed nature of the site; however, the site does still contain several listed and unlisted species. Special-status species surveys, including pre-field work database searches, have been conducted over the last several years for the eastern portion of the Bank located on City of Chula Vista property (BEI Exhibit H), and surveys for the western portion of the site were conducted in spring/summer 2018. Prior to conducting fieldwork, the CNDDB was reviewed for the most recent distribution information for special-status plant and wildlife species within the Otay Lakes USGS quadrangles.

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

- Species listed or proposed for listing as threatened or endangered under the Federal Endangered Species Act (FESA) (Code of Federal Regulations [CFR], Title 50, Section 17.12 [listed plants]); 50 CFR 17.11 (listed animals); and various notices in the *Federal Register* (FR) (proposed species).

- Species that are candidates for possible future listing as threatened or endangered under the FESA (79 FR 72450, December 5, 2014).
- Species listed or proposed for listing by the State of California as threatened or endangered under the California Endangered Species Act (CESA) (14 California Code of Regulations [CCR] 670.5).
- Plant species listed as rare under the California Native Plant Protection Act (California Fish and Game Code 1900, et seq.).
- Species that meet the definitions of "rare" or "endangered" under the California Environmental Quality Act (CEQA Guidelines Sections 15380 and 15125).
- Special vascular plants, bryophytes, and lichens listed on the California Rare Plant Ranking.
- Animal species of special concern to the CDFW.
- Bird species of conservation concern as identified by USFWS in Birds of Conservation Concern 2008.
- Animals that are fully protected in California (California Fish and Game Code Sections 3511 [birds], 4,700 [mammals], 5050 [amphibians and reptiles], and 5515 [fish]).
- Species protected by the following regional and local plans:
    - County of San Diego, South County Multiple Species Conservation Program
    - County of San Diego Multiple Species Conservation Subarea Plan
    - City of Chula Vista Multiple Species Conservation Subarea Plan
    - City of San Diego Multiple Species Conservation Subarea Plan
    - City of Chula Vista Wetlands Protection Program
    - Otay Ranch Resource Management Plan

Annual Reports for the Otay Ranch Preserve (RECON 2009–2018) and the CNDDB (CDFW 2018) were reviewed for information on special-status plant and wildlife species observed or potentially occurring within the Bank. The CNDDB search was conducted within a 1-mile radius centered on the Otay Mesa USGS 7.5-minute quadrangle map.

The CNDDB search revealed 53 species of plants and wildlife (29 plants and 24 wildlife) that were recorded within 1 mile of the Bank. An additional 66 plant species and 49 wildlife species with no CNDDB records within 1 mile of the Bank were also evaluated for potential to occur within the project area based on species range, habitat requirements, and observations by biologists.

Federally and/or state-listed plant and wildlife species that are known to occur in the Bank or within 1 mile are presented in Table 3-2.

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

Scientific Name	Common Name	Status	Nearest Distance (feet)
Plants			
Deinandra conjugens	Otay tarplant	FT, SE	Found on site

Scientific Name	Common Name	Status	Nearest Distance (feet)
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	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.

3.8.1 Special-Status Plant Species Known from Within or Adjacent to the Bank

Based on searches of the CNDDB and California Native Plant Society (CNPS) Online Inventory, 67 sensitive plant species are known from the vicinity of the Bank, 22 of which were detected within or adjacent to the Bank. These 22 species are discussed below and displayed on Figure 3-5. Eleven sensitive plant species have a "high" probability of occurring within the Bank due to presence of suitable habitat and proximity of extant populations to the Bank. These 11 sensitive plant species are also discussed below.

Special-status plant species observed or with a high potential to occur within and adjacent to the Bank include California adolphia (*Adolphia californica*), San Diego bur-sage (*Ambrosia chenopodifolia*), singlewhorl burrobush (*Ambrosia monogyra*), Otay manzanita (*Arctostaphylos otayensis*), south coast saltscale (*Atriplex pacifica*), San Diego sunflower (*Bahiopsis laciniata*), San Diego goldenstar (*Bloomeria clevelandii*), Orcutt's brodiaea (*Brodiaea orcuttii*), round-leaved filaree (*California macrophylla*), Otay Mountain ceanothus (*Ceanothus otayensis*), long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*), snake cholla (*Cylindropuntia californica* var. *californica*), Otay tarplant (*Deinandra conjugens*), variegated dudleya (*Duldleya variegata*), San Diego button-celery (*Eryngium aristulatum* var. *parishii*), San Diego barrel cactus (*Ferocactus viridescens*), Palmer's grapplinghook (*Harpagonella palmeri*), Tecate cypress (*Hesperocyparis forbesii*), graceful tarplant (*Holocarpha virgata* ssp. *elongata*), decumbent goldenbush (*Isocoma menziesii* var. *decumbens*), San Diego marsh-elder (*Iva hayesiana*), southwestern Spiny Rush (*Juncus acutus* ssp. *leopoldii*), Robinson's pepper-grass (*Lepidium virginicum* var. *robinsonii*), small-flowered microseris (*Microseris douglasii* ssp. *platycarpha*), little mousetail (*Myosurus minimus* ssp. *apus*), spreading navarretia (*Navarretia fossalis*), Nuttall's scrub oak (*Quercus dumosa*), Munz's sage (*Salvia munzii*), ashy spike-moss (*Selaginella cinerascens*), chaparral ragwort (*Senecio aphanactis*), blue streamwort (*Stemodia durantifolia*), Otay Mesa Mint (*Pogogyne nudiuscula*), and San Diego County needlegrass (*Stipa diegoensis*).

3.8.1.1 Special-Status Plant Species Observed Within or Adjacent to the Bank

Singlewhorl Burrobush (*Ambrosia monogyra*) – CRPR List 2B.2

Singlewhorl burrobush is an evergreen shrub in the sunflower family (Asteraceae) that ranges from southern California to Texas, and south to Sonora, Mexico. This species typically occurs along the edge of intermittent drainages, riparian ecotones and floodplains.

Singlewhorl burrobush was detected in scattered locations within the riparian zones, floodplains, and uplands by RECON in 2011 through 2013 and by ICF in 2018.

Otay Manzanita (*Arctostaphylos otayensis*) – CRPR 1B.2; San Diego County List A; County MSCP Covered Species; City of San Diego MSCP Covered Species

Otay manzanita is an evergreen shrub and is endemic to southern San Diego County. This species occurs within chaparral on soils derived from metavolcanic rock.

Otay manzanita was detected in one location just south of the Bank by RECON in 2011 and 2012, and by ICF in 2018.

South Coast Saltscale (*Atriplex pacifica*) – CRPR 1B.2; San Diego County List A

South coast saltscale (South coast saltbush) is a small, decumbent, herbaceous annual usually occurring in open Diegan coastal sage scrub in areas devoid of larger shrubs. South coast saltscale is considered to have a high potential to occur within the Bank due to the presence of suitable habitat and an extant population occurring immediately south of the Bank. However, it is not expected to occur within the limits of grading due to a lack of suitable habitat.

South coast saltbush was detected in one location by RECON in 2012, just south of the Bank. This species was not detected by ICF in 2018. Lack of sufficient rainfall and severe drought are likely reasons for the absence of detection during the 2018 surveys.

San Diego Sunflower (*Bahiopsis laciniata*) – CRPR 4.2; San Diego County List D

San Diego sunflower (San Diego County Viguiera) is a small to medium sized shrub that typically occurs in clay soils within chaparral and coastal sage scrub on south-facing slopes from Orange County south to Baja California and Sonora, Mexico.

San Diego sunflower was detected in scattered locations within coastal sage scrub by RECON in 2011 through 2013 and by ICF in 2018.

San Diego Goldenstar (*Bloomeria clevelandii*) – CRPR 1B.1; San Diego County List A; City of Chula Vista MSCP Narrow Endemic; City of San Diego MSCP Covered Species

San Diego goldenstar is a corm-based herbaceous perennial that ranges from Riverside and San Diego Counties south to Baja California, Mexico. This species prefers needlegrass grasslands, especially near mima mound topography or the vicinity of vernal pools (Reiser 2001).

San Diego goldenstar was detected by RECON in 2010 about 0.25 mile east of the Bank. San Diego Goldenstar was not detected by ICF in 2018. Lack of sufficient rainfall and severe drought are likely reasons for the absence of detection during the 2018 surveys.

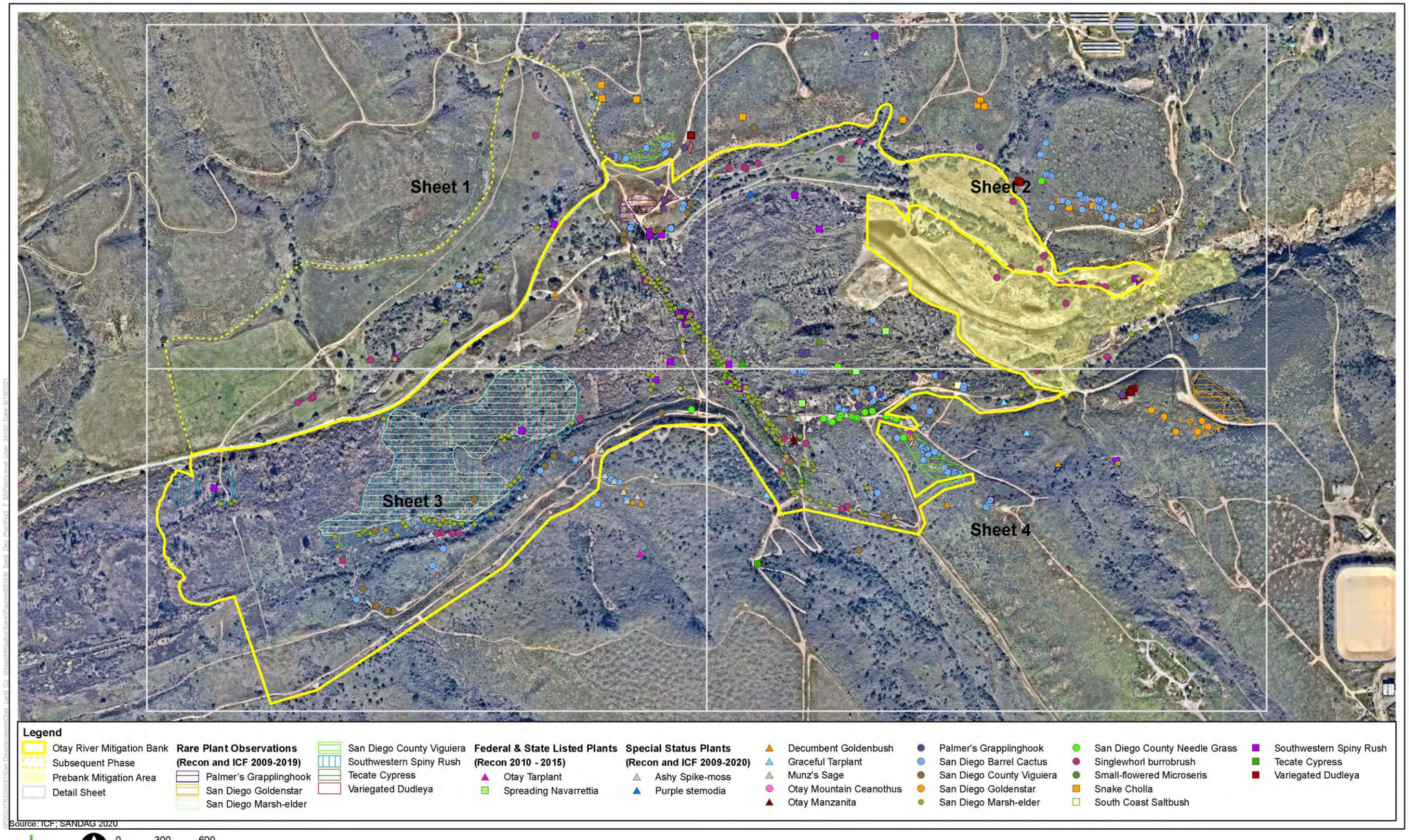

Figure 3-5 Overview, Special-Status and Listed Plant Species Occurring within Mitigation Bank

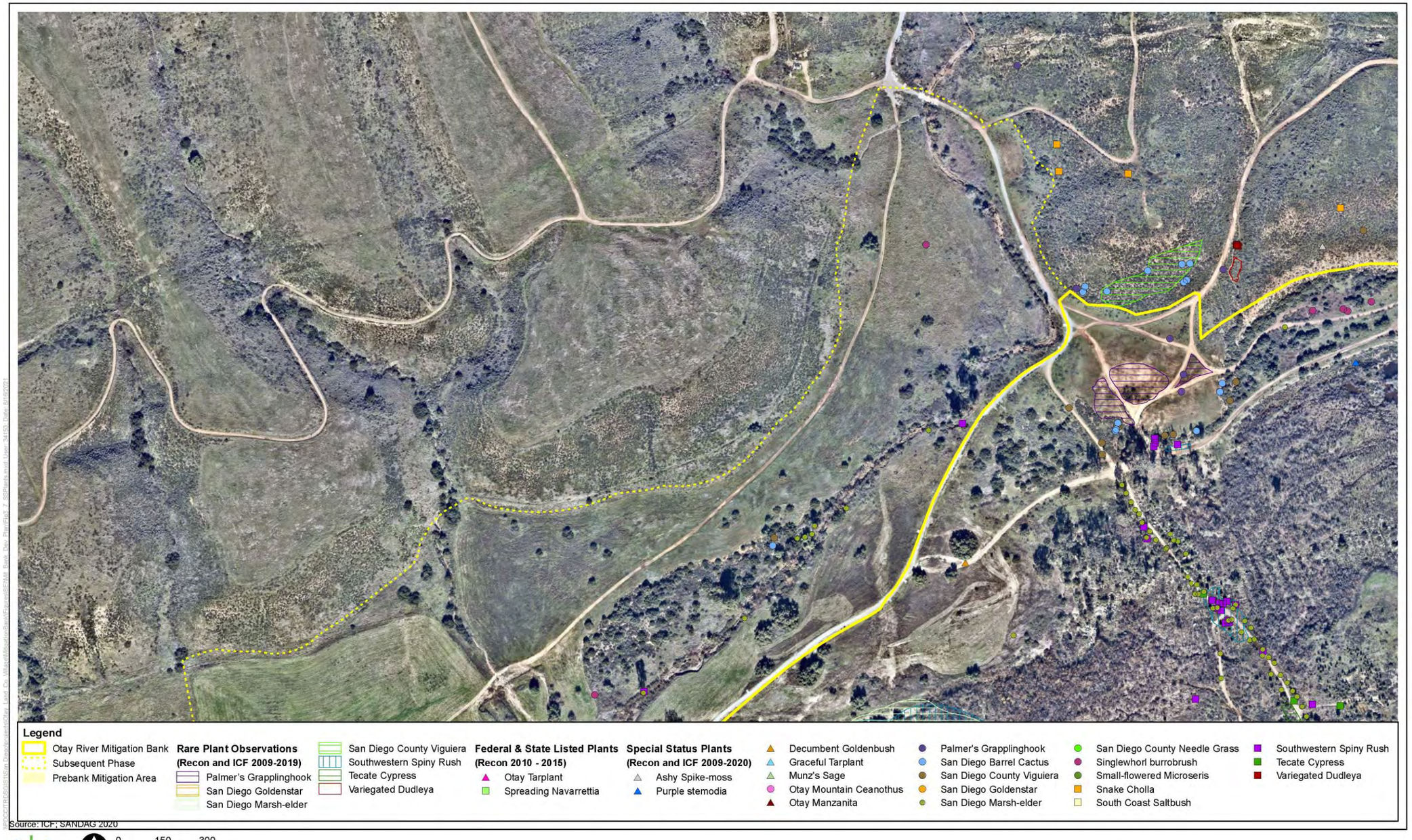

Figure 3-5 Sheet 1, Special-Status and Listed Plant Species Occurring within Mitigation Bank

Figure 3-5 Sheet 2, Special-Status and Listed Plant Species Occurring within Mitigation Bank

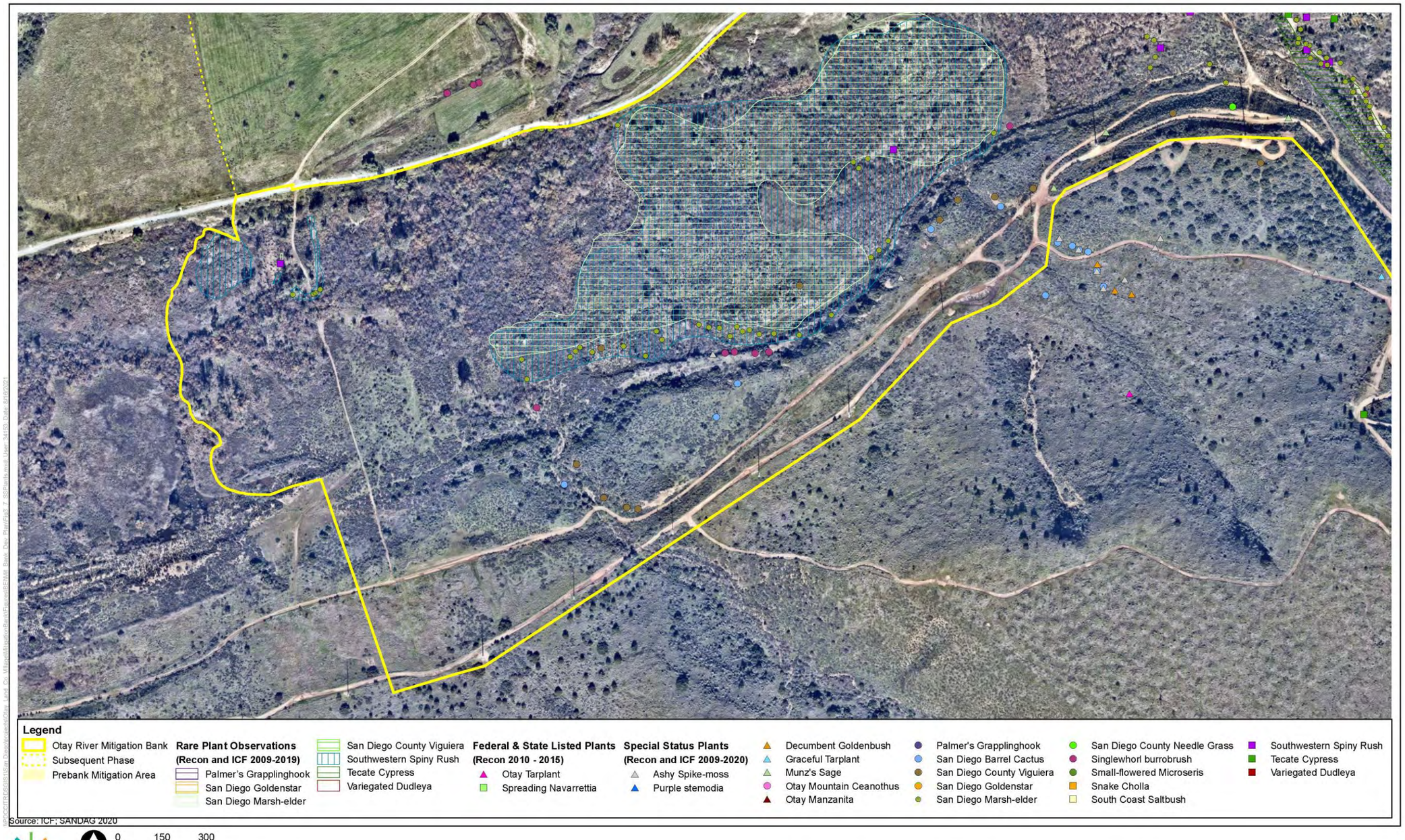

Figure 3-5 Sheet 3, Special-Status and Listed Plant Species Occurring within Mitigation Bank

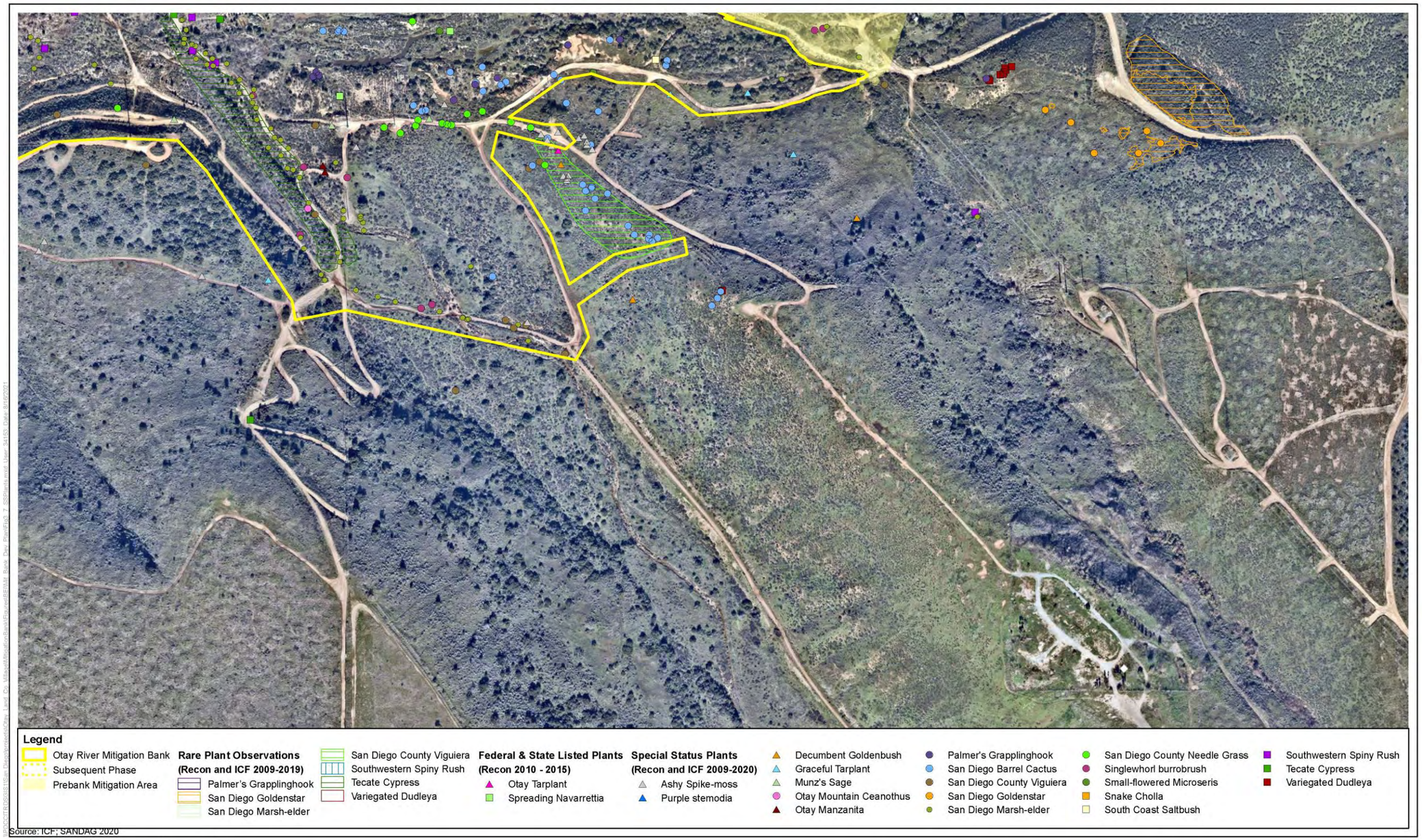

Figure 3-5 Sheet 4, Special-Status and Listed Plant Species Occurring within Mitigation Bank

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Otay Mountain Ceanothus (*Ceanothus otayensis*) – CRPR 1B.2

Otay Mountain ceanothus is an evergreen shrub that ranges from southern San Diego County to Baja California, Mexico. This species occurs in chaparral on soils derived from metavolcanic or gabbroic rock.

Otay Mountain ceanothus was detected in one location in the south-central portion of the Bank vicinity by RECON in 2010 but was not observed by ICF during 2018 surveys. Due to the lack of detection of this large, evergreen shrub in 2018, it is possible that this species no longer occurs within the Bank.

Snake Cholla (*Cylindropuntia californica* var. *californica*) – CRPR 1B.1; San Diego County List A; County MSCP Covered Species; City of Chula Vista MSCP Narrow Endemic; City of San Diego MSCP Covered Species

Snake cholla is a prostrate to suberect perennial stem succulent that ranges from southern San Diego County to Baja California, Mexico. This species occurs within Diegan coastal sage scrub, usually on xeric hillsides.

Snake cholla was detected scattered east of the Bank by RECON in 2010. Snake cholla was not detected by ICF in 2018; however, primarily only the western portion of the Bank was surveyed. It is assumed snake cholla is extant within upland areas of the Bank.

Otay Tarplant (*Deinandra conjugens*) – Federally Threatened, State Endangered, CRPR 1B.1; San Diego County List A; County MSCP Covered Species; City of Chula Vista MSCP Narrow Endemic; City of San Diego MSCP Covered Species

Otay tarplant is an annual herb that grows to approximately 20 inches in height and has aromatic deep green or gray-green leaves covered with soft shaggy hairs. The species is endemic to southwestern San Diego County and adjacent Baja California, Mexico. This species prefers heavy clay soils in valley and foothill grasslands or sparsely vegetated Diegan coastal sage scrub.

Otay tarplant surveys were conducted by RECON in 2012 within the eastern portion of the Bank on City of Chula Vista property and adjacent lands. Otay tarplant was observed in two locations on the hillside south of the Otay River outside the Bank limits. ICF conducted 2018 surveys and did not detect any plants. Lack of sufficient rainfall and severe drought are likely reasons for the absence of detection during the 2018 surveys. Figure 3-5 depicts the locations of Otay tarplant.

Variegated Dudleya (*Dudleya variegata*) – CRPR 1B.2; San Diego County List A; County MSCP Covered Species; City of Chula Vista MSCP Narrow Endemic; City of San Diego MSCP Covered Species

Variegated dudleya is found on clay soils within grassland, chaparral, and coastal scrub. This species is known only from San Diego County and Baja California, Mexico. Variegated dudleya blooms in the late spring with small, yellow, star-shaped flowers.

Variegated dudleya was observed outside the Bank limits, to the southeast and northwest by RECON in 2009 and 2011 through 2013. Variegated dudleya was not detected by ICF in 2018; however, primarily only the western portion of the Bank was surveyed. It's assumed variegated dudleya is extant within upland areas of the Bank.

San Diego Barrel Cactus (*Ferocactus viridescens*) – CRPR 2B.1; San Diego County List B; County MSCP Covered Species; City of Chula Vista MSCP Narrow Endemic; City of San Diego MSCP Covered Species

San Diego barrel cactus occurs within grassland, coastal sage scrub, and chaparral. It is a perennial stem succulent that occurs only in coastal and foothill areas of San Diego County and Baja California, Mexico (Reiser 2001).

San Diego barrel cactus was observed primarily outside the Bank on hillsides with open coastal sage scrub by RECON in 2011 through 2013 and by ICF in 2018. It was also observed within the southern portion of the Bank in upland and high floodplain habitat.

Palmer's Grapplinghook (*Harpagonella palmeri*) – CRPR 4.2; San Diego County List D

Palmer's grappling hook occurs on heavy clay soils within grassland and coastal sage scrub openings. This diminutive annual blooms in early spring and is present in scattered locations throughout Southern California and Baja California, Mexico.

Palmer's grapplinghook was observed north, south and within the Bank in several locations by RECON in 2010 through 2013 and by ICF in 2018.

Tecate Cypress (*Hesperocyparis forbesii*) – CRPR 1B.1, San Diego County List A; County MSCP Covered Species; City of San Diego MSCP Covered Species

Tecate cypress is an evergreen coniferous tree that ranges from Orange County south to Baja California, Mexico. This species occurs on well-drained, north-facing slopes in closed cone coniferous forest and southern mixed chaparral. Large populations of this species on Otay Mountain are threatened by recurrent fires.

Tecate cypress was observed in the south-central portion of the Bank near the confluence of the Otay River valley and the southern tributary by RECON in 2010 through 2013 and by ICF in 2018.

Graceful Tarplant (*Holocarpha virgata* ssp. *elongata*) – CRPR 4.2; San Diego County List D

Graceful tarplant occurs in grasslands with clay soils but also may be found in openings in coastal sage scrub, chaparral, and woodlands. This species occurs from Riverside County south to Baja California, Mexico.

Graceful tarplant was observed south of and outside the Bank limits scattered throughout open areas within coastal sage scrub and non-native grasslands by RECON in 2010 and by ICF in 2018.

Decumbent Goldenbush (*Isocoma menziesii* var. *decumbens*) – CRPR 1B.2; San Diego County List A

Decumbent goldenbush is a perennial shrub that ranges from Los Angeles County south to Baja California, Mexico. This species typically occurs on clay soils within coastal sage scrub intermixed with grassland. The *Isocoma menziesii* complex is a very confusing plant taxonomic group, and, as a result, the status of decumbent goldenbush in San Diego County is poorly understood.

Decumbent goldenbush was observed south of and outside the Bank limits by RECON in 2011 through 2013. It was not observed by in 2018; however, primarily only the western end of the Bank was surveyed by ICF in 2018.

San Diego Marsh-Elder (*Iva hayesiana*) – CRPR 2B.2; San Diego County List B

San Diego marsh-elder is a spring to summer flowering perennial herb. It occurs in marshes and swamps, on playas, and along stream channels in San Diego County and Baja California, Mexico.

San Diego marsh-elder was observed in numerous locations, including with the Bank, by RECON in 2010 and by ICF in 2018.

Southwestern Spiny Rush (*Juncus acutus* ssp. *leopoldii*) – CRPR 4.2; San Diego County List D

Southwestern spiny rush (Leopold's rush) is a large, perennial, rhizomatous, herb, found in moderately brackish coastal salt marshes, riparian marshes, and alkaline meadows. This species ranges from San Luis Obispo County south into Baja California, Mexico.

Southwestern spiny rush was commonly observed within the riparian zone and floodplain of the Bank by RECON in 2010 and by ICF in 2018.

Small-Flowered Microseris (*Microseris douglasii* ssp. *platycarpha*) – CRPR 4.2; San Diego County List D

Small flowered microseris is a diminutive annual herb that ranges from Los Angeles County south to Baja California, Mexico. This species is typically found on clay lenses in grasslands, on the periphery of vernal pools, or within vernal pools.

Small-flowered microseris was observed in three locations by RECON in 2013, two within the southeastern portion of the Bank and one near these locations but outside the Bank. ICF did not observe this species during the 2018 surveys. Lack of sufficient rainfall and severe drought are likely reasons for the absence of detection during the 2018 surveys.

Spreading Navarretia (*Navarretia fossalis*) – Federally Threatened; CRPR 1B.1; San Diego County List A; County MSCP Covered Species; City of Chula Vista MSCP Narrow Endemic; City of San Diego MSCP Covered Species

Spreading navarretia is an annual herb, with a low, mostly spreading growth-form that can reach a height of 6 inches. The species typically blooms in May and June, producing white to lavender flowers in flat-topped, leafy heads. It is found in vernal pool complexes extending from Los Angeles County, south through coastal San Diego County, and farther south to Baja California, Mexico.

Spreading navarretia surveys were conducted by RECON in 2012 within the eastern portion of the Bank on City of Chula Vista property and adjacent lands. Spreading navarretia was observed in two locations—one within and one outside the Bank, both on the south side of the Otay River. In 2019, spreading navarretia was observed by ICF in two vernal pools found on a floodplain terrace south of the Otay River. One pool had approximately 5 individuals while the second pool had over 1000 spreading navarretia individuals. Figure 3-5 depicts the location of spreading navarretia from 2012 and 2019.

Munz's Sage (*Salvia munzii*) – CRPR 2B.2; San Diego County List B

Munz's sage is a perennial evergreen shrub that occurs in chaparral and coastal scrub in southern San Diego County and Baja California, Mexico. This species is mostly confined to the Otay Mesa and Otay Mountain areas within San Diego County.,

Munz's sage was commonly observed within coastal sage scrub, but outside the Bank, by RECON in 2010 through 2013 and by ICF in 2018.

Ashy Spike-Moss (*Selaginella cinerascens*) – CRPR 4.1; San Diego County List D

Ashy spike-moss occurs within openings of coastal sage scrub and chaparral. It is found in Orange and San Diego Counties and Baja California, Mexico. This perennial, rhizomatous herb grows as a flat groundcover on the soil surface.

Ashy spike-moss was observed in several locations within and outside the Bank by RECON in 2009 through 2013 and by ICF in 2018.

Blue Streamwort (*Stemodia durantifolia*) – CRPR 2B.1; San Diego County List B

Blue streamwort is a small perennial herb that ranges from Riverside County, east to Texas, and south to Sonora, Oaxaca, and Baja California, Mexico. This species is typically found growing in wet sand along minor creeks and seasonal drainages.

Blue streamwort was observed within the eastern portion of the Bank by RECON in 2012 in two locations. It was not observed by ICF in 2018; however, the 2018 surveys primarily surveyed the western portion of the Bank.

San Diego County Needlegrass (*Stipa diegoensis*) – CRPR 4.2; San Diego County List D

San Diego County needlegrass is a robust perennial bunch grass that ranges from southwestern San Diego County to Baja California, Mexico. This species occurs in coastal sage scrub in southwestern San Diego County and is closely associated with metavolcanic soils.

San Diego County needlegrass was observed south of the Bank by RECON in 2012 and by ICF in 2018.

3.8.1.2 Special-Status Plant Species with High Potential to Occur Within the Bank

California Adolphia (*Adolphia californica*) – CRPR 2B.1; San Diego County List B

California adolphia is a short spiny shrub, often intermixed with coastal sage scrub, but occasionally occurring on the periphery of coastal sage scrub habitats (Reiser 2001).

California adolphia is considered to have a high potential to occur due to the presence of suitable habitat and an extant population occurring immediately to the southwest. However, California adolphia is not expected to occur within the limits of the Bank based on the absence of detection during surveys from 2009 through 2018.

San Diego Bur-Sage (*Ambrosia chenopodifolia*) – CRPR 2B.1; San Diego County List B

San Diego bur-sage is a small shrub typically found within dry exposed areas of open Diegan coastal sage scrub (Reiser 2001).

San Diego bur-sage is considered to have a high potential to occur due to the presence of suitable habitat and an extant population occurring approximately 0.5 mile southwest of the Bank. However, San Diego bur-sage is not expected to occur within the limits of the Bank based on the absence of detection during surveys from 2009 through 2018.

Orcutt's Brodiaea (*Brodiaea orcuttii*) – CRPR 1B.1; San Diego County List A; City of Chula Vista MSCP Narrow Endemic; City of San Diego MSCP Covered Species

Orcutt's brodiaea is a perennial corm-sprouting herbaceous plant often found growing in vernally moist grasslands and on the periphery of vernal pools. (Reiser 2001).

Orcutt's brodiaea is considered to have a high potential to occur due to the presence of suitable habitat and an extant population occurring approximately 0.25 mile southwest of the Bank. However, Orcutt's brodiaea is not expected to occur within the limits of the Bank based on the absence of detection during surveys from 2009 through 2018.

Round-Leaved Filaree (*California macrophylla*) – CRPR 1B.1; San Diego County List B

Round-leaved filaree is an annual herbaceous plant that is typically found in grasslands in open areas on friable clay soils (Reiser 2001).

Round-leaved filaree is considered to have a high potential to occur due to the presence of suitable habitat and an extant population occurring approximately 0.5 mile west of the Bank. However, round-leaved filaree is not expected to occur based on the absence of detection during surveys from 2009 through 2018.

Long-Spined Spineflower (*Chorizanthe polygonoides* var. *longispina*) – CRPR 1B.2; San Diego County List A

Long-spined spineflower is a mostly prostrate annual herb typically occurring on clay lenses that are largely devoid of shrubs and can also be occasionally found on the periphery of vernal pools (Reiser 2001).

Long-spined spineflower is considered to have a high potential to occur due to the presence of suitable habitat and an extant population occurring approximately 1.0 mile north of the Bank. However, long-spined spineflower is not expected to occur based on the absence of detection during surveys from 2009 through 2018.

San Diego Button-Celery (*Eryngium aristulatum* var. *parishii*) – Federally Endangered; State Endangered; CRPR 1B.1; San Diego County List A; County MSCP Covered Species; City of Chula Vista MSCP Narrow Endemic; City of San Diego MSCP Covered Species

San Diego button-celery is a spreading biennial herb usually restricted to vernal pools or mima mound areas with vernally moist conditions (Reiser 2001).

San Diego button-celery is considered to have a high potential to occur within the Bank due to the presence of suitable habitat and an extant population occurring immediately south of the Bank; however, it has not been observed in the Bank. San Diego button-celery is not expected to occur within the limits of the Bank based on the absence of detection during surveys from 2009 through 2019.

Robinson's Pepper-Grass (*Lepidium virginicum* var. *robinsonii*) – CRPR 4.3; San Diego County List A

Robinson's pepper-grass is an annual herb that is typically found within dry exposed locales within openings in chaparral, sage scrub, or grassland communities (Reiser 2001).

Robinson's pepper-grass is considered to have a high potential to occur due to the presence of suitable habitat and an extant population occurring immediately south of the Bank. However, Robinson's pepper-grass is not expected to occur based on the absence of detection during surveys from 2009 through 2018.

Little Mousetail (*Myosurus minimus* ssp. *apus*) – CRPR 3.1; San Diego County List C

Little mousetail is a cryptic annual herb restricted to vernal pools, usually found in deeper portions of vernal pool basins (Reiser 2001).

Little mousetail is considered to have a high potential to occur due to the presence of suitable habitat and an extant population occurring immediately south of the Bank. However, little mousetail is not expected to occur based on the absence of detection during surveys from 2009 through 2019.

Otay Mesa Mint (*Pogogyne nudiuscula*) – Federally Endangered; State Endangered; CRPR 1B.1; San Diego County List A; County MSCP Covered Species; City of Chula Vista MSCP Narrow Endemic; City of San Diego MSCP Covered Species

Otay Mesa mint is a small aromatic herb restricted to vernal pools (Reiser 2001).

Otay Mesa mint is considered to have a high potential to occur within the Bank due to the presence of suitable habitat and an extant population occurring immediately south of the Bank. However, Otay Mesa mint is not expected to occur within the limits of the Bank based on the absence of detection during surveys from 2009 through 2019.

Nuttall's Scrub Oak (*Quercus dumosa*) – CRPR 1B.1; San Diego County List A

Nuttall's scrub oak is an evergreen shrub in the oak family (Fagaceae) that ranges from Santa Barbra County south to Baja California, Mexico. This species occurs in coastal chaparral with a relatively open canopy in areas of flatter terrain and can form dense monotypic stands on north-facing slopes.

Nuttall's scrub oak is considered to have a high potential to occur due to the presence of suitable habitat and an extant population occurring immediately southwest of the Bank. However, Nuttall's scrub oak is not expected to occur based on the absence of detection during surveys from 2009 through 2018.

Chaparral Ragwort (*Senecio aphanactis*) – CRPR 2B.2; San Diego County List B; City of San Diego MSCP Covered Species

Chaparral ragwort is an annual herb found in areas of open coastal sage scrub and cismontane woodland (Reiser 2001).

Chaparral ragwort is considered to have a high potential to occur due to the presence of suitable habitat and an extant population occurring immediately south of the Bank. However, chaparral ragwort is not expected to occur based on the absence of detection during surveys from 2009 through 2018.

3.8.2 Special-Status Wildlife Species Detected Within and Adjacent to the Bank

Based on searches of the CNDDB Online Inventory and observations by RECON and ICF biologists, 73 special-status wildlife species are known from the vicinity of the Bank. Special-status species that have been observed within or adjacent to the Bank by RECON and ICF biologists during their field surveys are discussed below. Figure 3-6 depicts non-listed special-status species.

3.8.2.1 San Diego Fairy Shrimp (*Branchinecta sandiegonensis*) – Federally Listed as Endangered and Riverside Fairy Shrimp (*Streptocephalus woottoni*) – Federally Listed as Endangered

San Diego fairy shrimp are small freshwater crustaceans that are found in shallow vernal pools and other ephemeral basins (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, 1998, 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).

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.

Dry-season sampling was conducted in the eastern portion of the Bank in the City of Chula Vista parcel and adjacent lands in 2017 (Appendix C). *Branchinecta* species cysts were found in 23 of the 30 sampled pools. No Riverside fairy shrimp cysts were found. Wet season sampling is needed to positively identify if the *Branchinecta* cysts are San Diego fairy shrimp or Lindahl's fairy shrimp. Wet season sampling was conducted within the eastern portion of the Bank in the City of Chula Vista parcel and adjacent lands in winter 2017–2018 (Appendix D). Lindahl's fairy shrimp were observed in 8 of the 30 sampled pools. No San Diego fairy shrimp or Riverside fairy shrimp were observed in any of the areas sampled. Within the eastern portion of the Bank, San Diego fairy shrimp have previously been seen in road ruts along existing dirt roads during surveys conducted by RECON, with the majority occurring outside the bank limits.

Dry-season sampling was conducted in the western portion of the Bank and adjacent lands in summer 2018 (Appendix E). *Branchinecta* species cysts were found in 13 of the 28 sampled pools. No Riverside fairy shrimp cysts were found. Wet season sampling was conducted in the Bank and adjacent lands in fall/winter 2018-2019 (Appendix F). Forty-four basins supported San Diego fairy shrimp and 59 basins supported Lindalh's fairy shrimp. No Riverside fairy shrimp were observed in any pool sampled. Dry season sampling was also conducted in the Bank in 2019. *Branchinecta* species cysts were found in 12 pools and no Riverside fairy shrimp cysts were found. Figure 3-7 depicts the compilation of all fairy shrimp surveys conducted in the project area as well as data provided by the preserve land manager.

3.8.2.2 Quino Checkerspot Butterfly (*Euphydryas editha quino*) – Federally Listed as Endangered

Quino checkerspot butterfly (Quino) 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 annual owl's clover (*Castilleja exerta*) as primary or secondary host plants and would diapause 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; 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).

Quino surveys were conducted by RECON within the eastern portion of the Bank located on City of Chula Vista property and adjacent lands in 2013. Quino was observed by RECON biologists east of the Bank. Quino surveys were also conducted by ICF in April and May 2018 in the western portion of the Bank and surrounding lands (BEI Exhibit H). No Quino were observed. Figure 3-8 depicts the survey results. Suitable habitat occurs primarily north and south of the Bank outside of the Bank limits.

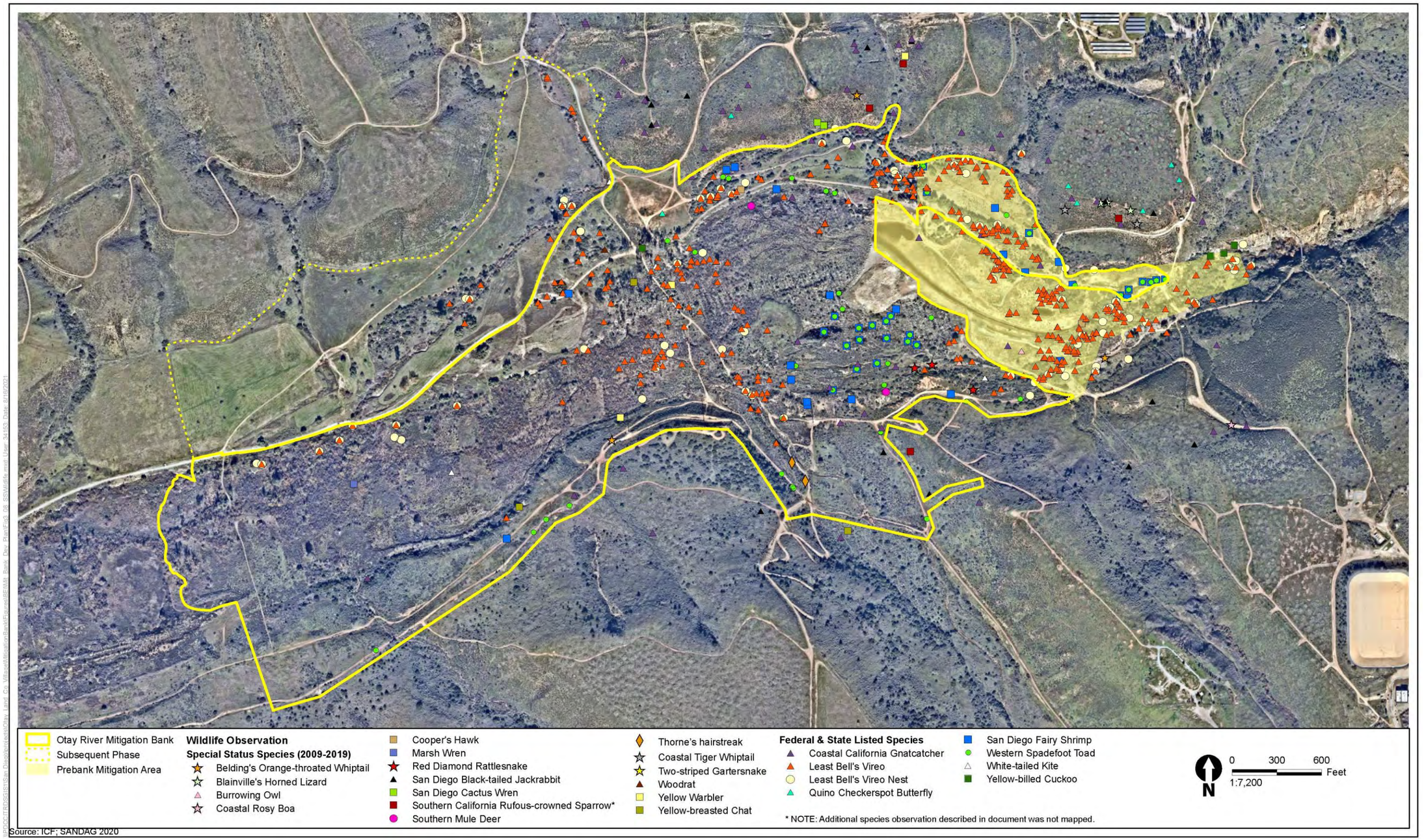

Figure 3-6 **Special-Status and Listed Wildlife Species Occurring within Mitigation Bank**

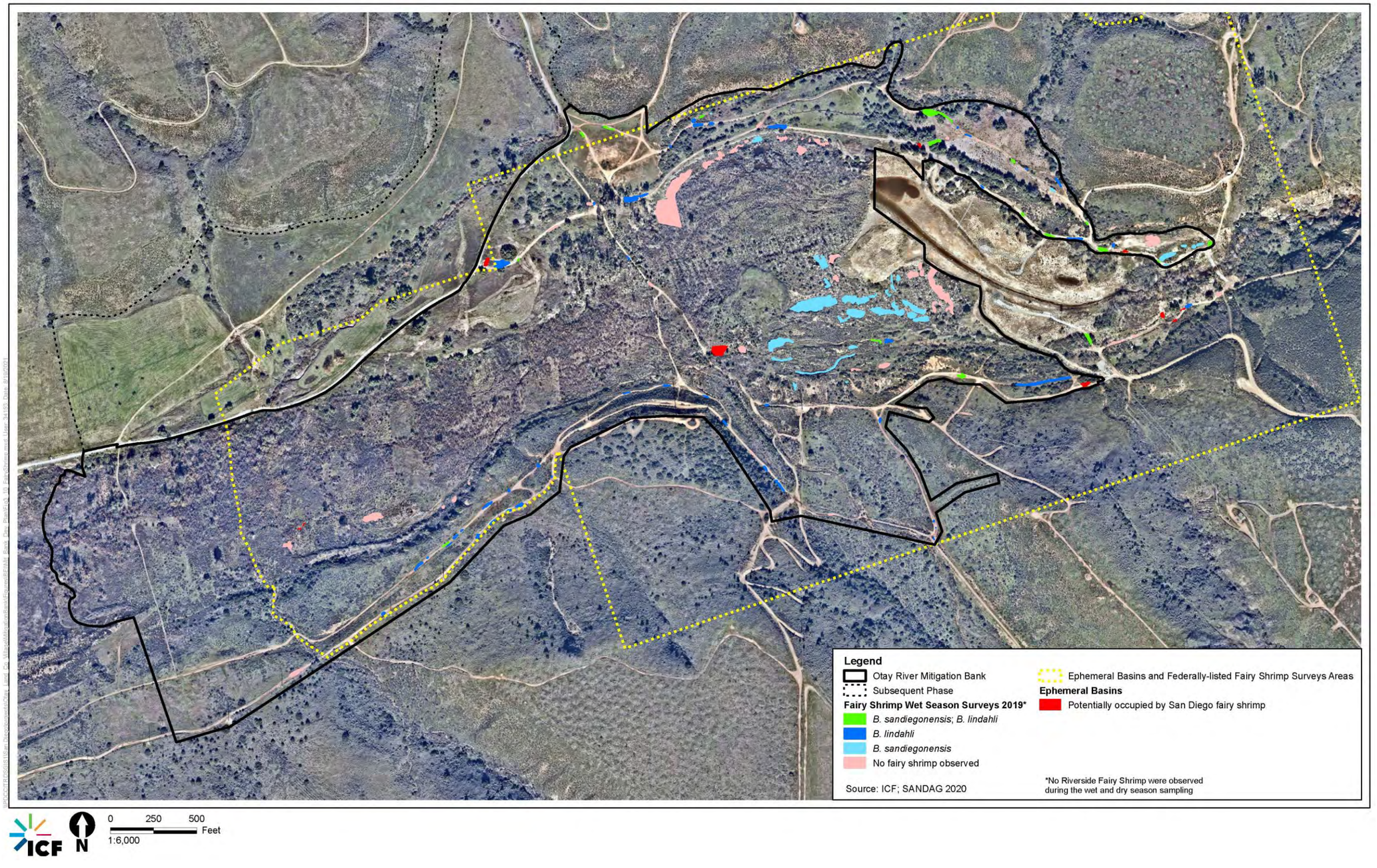

Figure 3-7 Ephemeral Basins and Federally Listed Fairy Shrimp within the Project Area

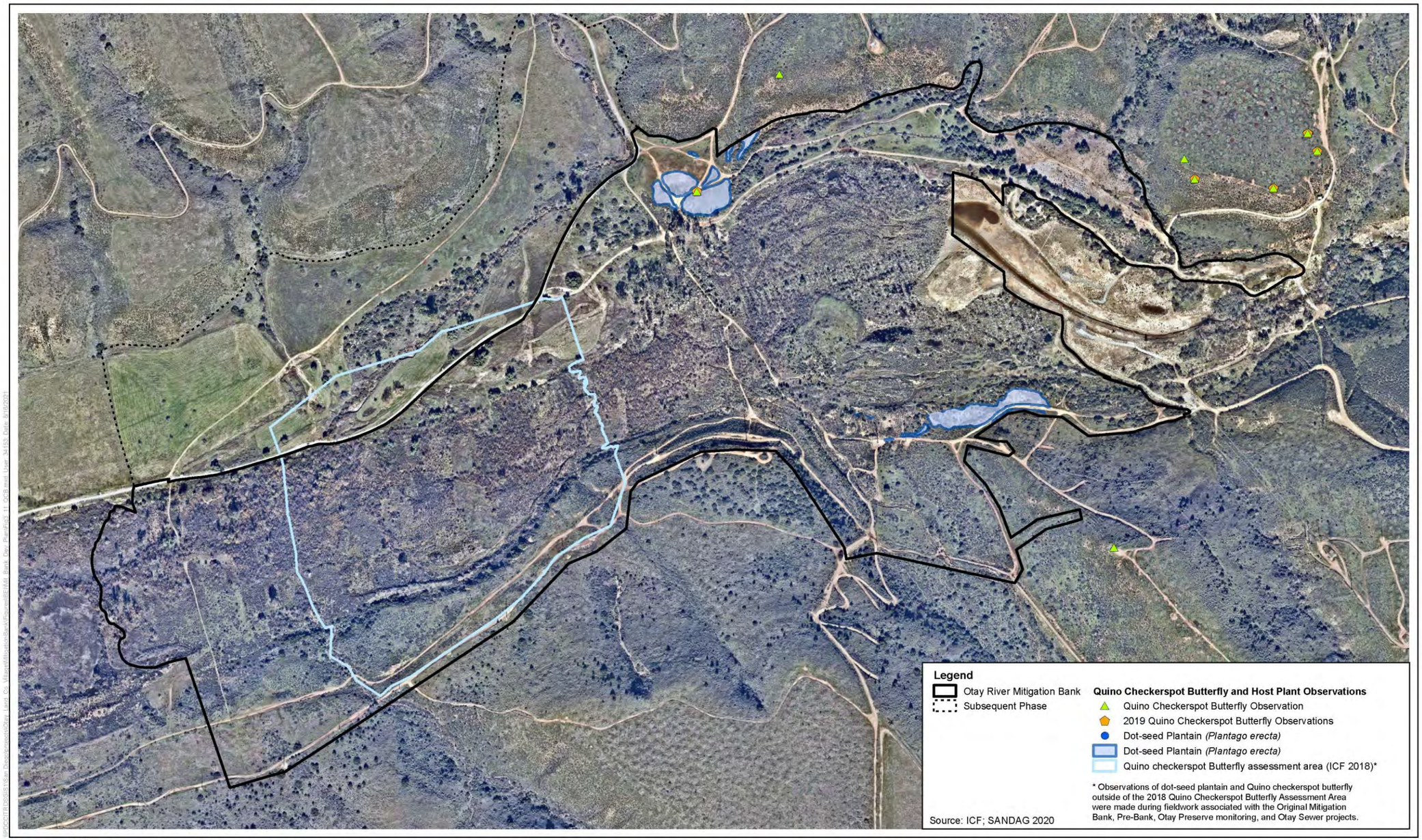

Figure 3-8 Quino Checkerspot Butterfly Observations within the Project Area and Immediate Vicinity, and Host Plants documented within the Project Area

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3.8.2.3 Western Spadefoot (*Spea hammondii*) – California Species of Special Concern; San Diego County Group II

Western spadefoot can be found in dry grassland habitat with friable but usually not sandy soils close to seasonal wetlands such as vernal pool complexes, which it requires for reproduction and metamorphosis (Stebbins 2003). Adult western spadefoots spend most of the year in self-excavated underground retreats and possibly in mammal burrows. They emerge from underground retreats during heavy rains in autumn and winter and spawn in seasonal wetlands, such as vernal pools, in late winter or early spring. Eggs hatch in less than a week, and larvae metamorphose in 30–80 days, apparently depending on the duration of pool depth sufficient to support larvae and possibly on pool temperature (Jennings and Hayes 1994).

During the 2018-2019 wet season fairy shrimp surveys, this species was observed by ICF biologists in 49 vernal pools and road ruts. They were seen in basins across the Bank and Pre-Bank site. Figure 3-9 shows the pools that had western spadefoot tadpoles.

3.8.2.4 Belding's Orange-throated Whiptail (*Aspidoscelis hyperythra hyperythra*) – California Species of Special Concern; San Diego County Group II; City of Chula Vista Subarea Plan MSCP Covered Species; City of San Diego MSCP Covered Species

Orange-throated whiptail occurs in low-elevation coastal scrub, chamise–redshank chaparral, mixed chaparral, and valley–foothill hardwood habitats (Zeiner et al. 1988). Orange-throated whiptail occurs in Orange, Riverside, and San Diego Counties west of the crest of the Peninsular Ranges and in southwestern San Bernardino County near Colton. The species is found up to 3,410 feet above mean sea level (Zeiner et al. 1988). Orange-throated whiptails forage on the ground and scratch through surface debris for food. Their diet consists of a variety of small arthropods, especially termites.

Orange-throated whiptails likely lay eggs in loose, well-aerated soil under or near surface objects or at the base of dense shrubs (Zeiner et al. 1988).

This species has been observed by RECON biologists within the eastern portion of the Bank. Suitable habitat occurs throughout the Bank.

3.8.2.5 Blainville's Horned Lizard (*Phrynosoma blainvillii*) – California Species of Special Concern; San Diego County Group II; City of Chula Vista Subarea Plan MSCP Covered Species Covered Species; City of San Diego MSCP Covered Species

The range of the Blainville's horned lizard extends from the Sacramento Valley south to San Diego County, including the Coast Range Transverse and Peninsular Ranges below 4,000 feet. Blainville's horned lizards are found in a wide variety of vegetation communities, from grasslands and shrublands to woodlands, including open coniferous forests. Critical factors are the presence of loose soils with a high sand fraction, an abundance of native ants or other insects, especially harvester ants (*Pogonomyrmex* spp.), and the availability of both sunny basking spots and dense cover for refuge. The species apparently does not eat the introduced Argentine ant (*Linepithema humile*) (Jennings and Hayes 1994).

This species has been observed by RECON biologists near the eastern portion of the Bank. Suitable habitat occurs throughout the Bank.

3.8.2.6 Coastal Rosy Boa (*Lichanura trivirgata rosefusca*) – California Species of Special Concern; San Diego County Group II

Coastal rosy boas are heavy-bodied snakes that inhabit arid scrublands, semi-arid and rocky shrublands, rocky deserts, canyons, and other rocky areas. This species eats rodents, small birds, lizards, small snakes, and amphibians and kills its prey by constriction. Coastal Rosy Boas occur in southwestern California from the coastal slopes of the San Gabriel and San Bernardino mountains, and across the peninsular ranges into the desert in San Diego County (Stebbins 2003).

This species has been observed by RECON biologists near the eastern portion of the Bank. Suitable habitat occurs throughout the Bank.

3.8.2.7 Two-Striped Gartersnake (*Thamnophis hammondii*) – California Species of Special Concern; San Diego County Group I

The two-striped garter snake is a highly aquatic snake that is rarely found far from water. Two-striped garter snakes inhabit perennial and intermittent streams with rocky beds bordered by willow thickets and other dense vegetation. They may also inhabit stock ponds or other artificially created aquatic habitats. Two-striped garter snakes occur throughout the South Coast and Peninsular Ranges west of the San Joaquin Valley from near Salinas south to La Presa, Baja California, Mexico. The species' elevation range extends from sea level to around 8,000 feet above mean sea level. Two-striped garter snakes forage primarily on fish, fish eggs, and tadpoles. They mate in the spring and bear live young in the fall (Jennings and Hayes 1994).

This species has been observed by RECON biologists in a drainage at the north side of the Bank. Suitable habitat occurs in the tributary channels that feed into the Bank.

3.8.2.8 Red Diamond Rattlesnake (*Crotalus ruber*) – California Species of Special Concern; San Diego County Group II

The red diamond rattlesnake is a heavy-bodied rattlesnake with a tan, link, brick red, or reddish dorsal color with a tail that is marked with broad evenly spaced distinct black rings. Its range extends from near Morongo Valley (San Bernardino County) south along the coast and desert sides of the Peninsular Range to Loreto, Baja California, Mexico. It is found in a variety of habitats, though generally is associated with habitats containing thick brush with large rocks or boulders. Typical habitats include chamise and red-shank as well as coastal sage scrub and desert slope scrub. Its elevation range extends from sea level to around 5,000 feet above mean sea level. Mating occurs in the early spring, and they bear live young between late July and September (Jennings and Hayes 1994).

This species has been observed by RECON and ICF biologists within the Bank.

3.8.2.9 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 from San Diego County 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 Mojave 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 1998a).

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 would 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 1989) 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 and 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.

Least Bell's vireo surveys have been conducted annually within the eastern portion of the Bank in the City of Chula Vista parcel and surrounding lands since 2010, with least Bell's vireo nests and observations occurring frequently. Least bell's vireo surveys were conducted within the entire Bank and adjacent lands in 2018, 2019 and 2020 by the San Diego Natural History Museum. In 2018, four successful nests were observed within the Bank limits and 20 were adjacent to the Bank. In 2019, six successful nests were observed within the Bank limits and 19 were adjacent to the Bank. In 2020, four successful nests were observed within the Bank limits and 21 were adjacent to the Bank. All reports are available, the most current for 2020 is included as Appendix G. Figure 3-10 depicts the 2018, 2019 and 2020 least Bell's vireo survey results.

3.8.2.10 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 to 21 days from incubation to fledging.

Yellow-billed Cuckoo was observed upstream of the Bank site in riparian woodland in 2012 during field surveys conducted by RECON. The field survey included the eastern portion of the Bank site located on City of Chula Vista property and adjacent lands. The species was not observed during field surveys conducted in 2009, 2010, 2011, 2013, 2017, 2018, or in 2020 when the San Diego Natural History Museum conducted surveys for the entire Bank and adjacent land (Appendix C; however, it was observed a single time in 2016 immediately adjacent and upstream of the Bank during least Bell's vireo surveys (Appendix C). One Yellow-billed Cuckoo was also observed during the final survey on 3 September 2019 near the Eucalyptus grove within the Bank limits (Appendix G). Suitable nesting and foraging habitat occurs in riparian habitat located upstream of the Bank. Once the Bank is established and vegetation has matured, the Bank site may provide additional suitable habitat.

3.8.2.11 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).

Coastal California gnatcatcher surveys have been conducted on the eastern portion of the Bank on City of Chula Vista property and adjacent lands. Coastal California gnatcatcher was observed within coastal sage scrub in the Bank site and adjacent areas during protocol surveys conducted by RECON between 2009 and 2013 and by ICF during 2016 surveys (BEI Exhibit H). Surveys were conducted by ICF within the western portion of the Bank in 2018 (Appendix H). Four gnatcatcher territories were observed within the southwest portion of the Bank. Breeding was confirmed at all four territories. An additional two territories were located within 300 feet from the southwest limits of the Bank. Breeding was confirmed at one of the two adjacent territories. Figure 3-11 depicts the survey results.

Figure 3-9 Western Spadefoot Observations within the Project Area and Immediate Vicinity

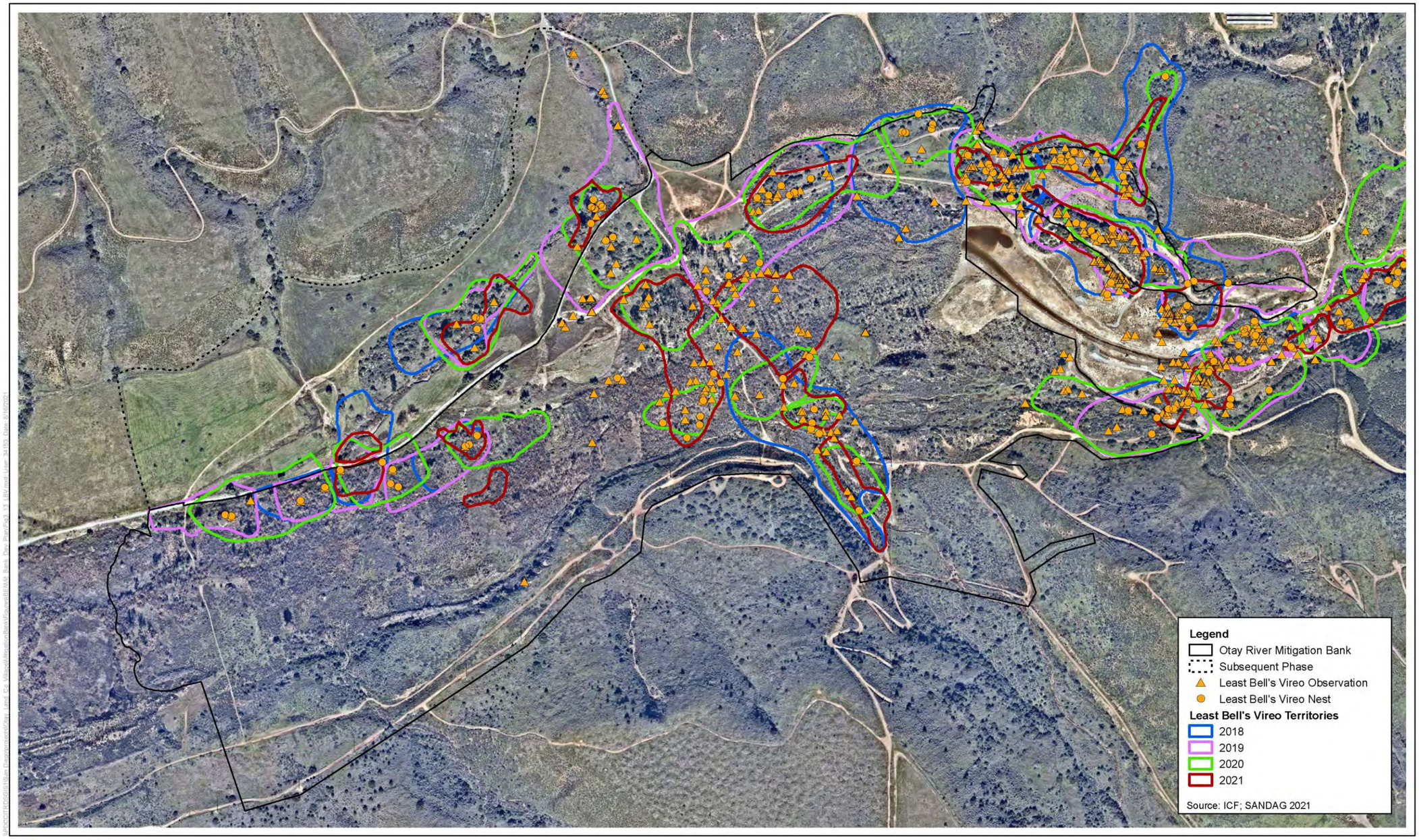

Figure 3-10 Least Bell's Vireo Survey Results

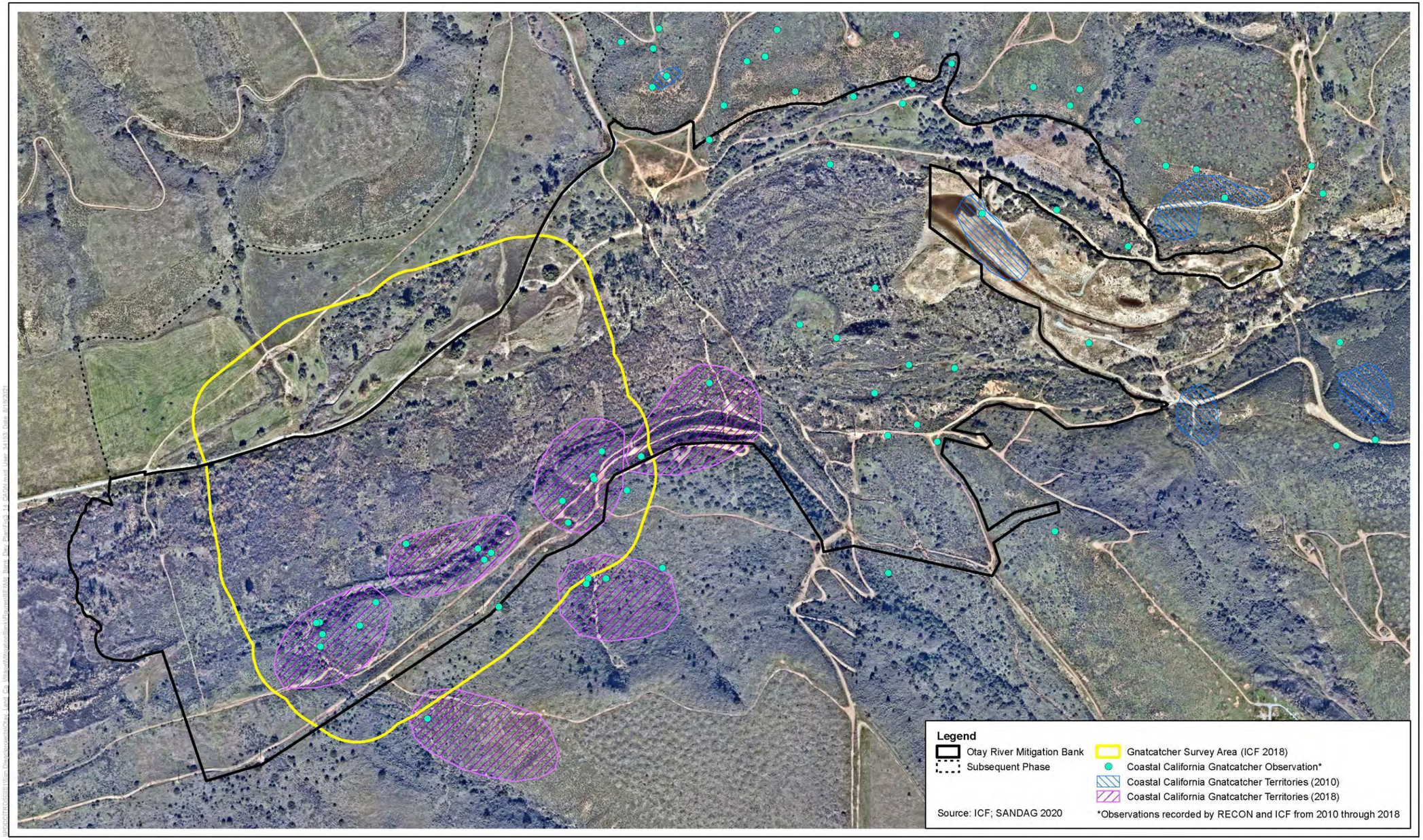

Figure 3-11 Coastal California Gnatcatcher Observations within the Project Area and Immediate Vicinity

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White-Tailed Kite (*Elanus caeruleus*) – California Fully Protected Species (Nesting)

White-tailed kites were threatened with extinction in North America during the early twentieth century. Populations recovered throughout their range in the U.S. from small populations that survived in California, Texas, and Florida. However, since the 1980s, many white-tailed kite populations have been declining, apparently because of loss of habitat and increased disturbance of nests (Dunk 1995).

The breeding season generally extends from early February through early August. White-tailed kites usually nest in large native trees, although non-native trees also are occasionally used. Nest trees are generally at the edge of wooded habitat next to open fields. Large trees in areas that have been developed may also be used, although the trees need to be close to open fields for foraging (Dunk 1995). White-tailed kites feed primarily on small mammals including voles (*Microtus* sp.), pocket mice (*Perognathus* sp.), and harvest mice (*Reithrodontomys* sp.) (Dunk 1995).

The white-tailed kite population is on the decline mostly due to urban sprawl; however, this species is still considered fairly widespread throughout the foothills of San Diego County (Unitt 2004). This species has been observed by RECON and ICF biologists within the Bank. Suitable nesting habitat occurs in the larger trees located within the Bank.

San Diego Cactus Wren (*Campylorhynchus brunneicapillus sandiegensis*) – California Species of Special Concern, San Diego County Group II; City of Chula Vista Subarea Plan MSCP Covered Species; City of San Diego MSCP Covered Species

Cactus wrens are a locally common resident in the Mojave and Colorado Deserts, from Mexico to Inyo and Kern Counties. The San Diego subspecies is found in arid parts of Southern California's westward-draining slopes. The San Diego cactus wren occurs in desert succulent shrub, Joshua tree, and desert wash habitats. It forages for insects, spiders, other small invertebrates, cactus fruits, other fruits, nectar, and seeds. The coastal cactus wren breeds from March to June, commonly with two broods per season and four to five eggs per clutch (Zeiner et al. 1990).

This species has been observed by RECON and ICF biologists within the Bank. Suitable nesting and foraging habitat occurs in the upland portions of the Bank.

Southern California Rufous-Crowned Sparrow (*Aimophila ruficeps canescens*) – CDFW Watch List; San Diego County Group I; City of Chula Vista Subarea Plan MSCP Covered Species; City of San Diego MSCP Covered Species

Southern California rufous-crowned sparrow inhabits mixed chaparral and coastal sage scrub. In California, its range extends southward from Mendocino and Tehama Counties; this species is most numerous in the western part of this range (Zeiner et al. 1990). Southern California rufous-crowned sparrows breed and forage on dry grass and/or forbs on hillsides with scattered shrubs and rock outcrops. Nests are usually made on the ground, at the base of grass tussock or shrubs. It is a year-round resident and diurnally active, eating mostly insects and spiders during the breeding season and seeds, grass, and forb shoots throughout the year. It breeds from mid-March to mid-June with a peak in May. In Southern California coastal sage scrub, the average sized territory is about 2 acres (Zeiner et al. 1990).

This species has been observed by RECON and ICF biologists near the Bank. Suitable nesting and foraging habitat occurs in sage scrub habitat located within the Bank.

Yellow Warbler (*Dendroica petechia brewsteri*) – California Species of Special Concern, San Diego County Group II

The yellow warbler is a summer breeding bird in San Diego County strongly associated with mature riparian woodland. This species is also common as a migrant but rare in winter.

This species has been observed by RECON and ICF biologists within the Bank. The riparian habitats located throughout the Bank provide suitable nesting and foraging habitat.

Yellow-Breasted Chat (*Icteria virens*) – California Species of Special Concern; San Diego County Group I

The yellow-breasted chat is a summer breeding bird in San Diego County strongly associated with mature, dense riparian woodland. This species is also common as a migrant but rare in winter.

This species has been observed by RECON and ICF biologists within the Bank. The riparian habitats provide suitable nesting and foraging habitat.

San Diego Black-Tailed Jackrabbit (*Lepus californicus bennettii*) – California Species of Special Concern; San Diego County Group II

Black-tailed jackrabbits are habitat generalists (Howard 1995). They prefer open areas with sparse vegetation with scattered cacti and shrubs (Best 1996). Black-tailed jackrabbits require shrubs for hiding, nesting, and thermal cover (Howard 1995). They are common in deserts, grasslands, and agricultural areas (Jameson and Peeters 2004) and can also occur in oak woodlands, pinyon-juniper woodlands, and low- to mid-elevation conifer forests (Howard 1995). In areas with high density of chamise chaparral, jackrabbits prefer open areas interspersed with grasses and tend not to occupy closed canopy chaparral (Howard 1995).

Black-tailed jackrabbits breed year-round. Reproduction is generally dependent on the availability of food (Jameson and Peeters 2004). They can have up to four litters of one to eight young in a year and are strictly vegetarian and opportunistic foragers. Black-tailed jackrabbits prefer grasses and forbs, but will eat any kind of vegetation. Diet will change during the seasons as forage availability changes, shifting from foraging on grasses and forbs to woody perennials during dry periods (Lightfoot et al. 2010). They will also forage on agricultural plants when available (Best 1996).

This species has been observed by RECON and ICF biologists within the Bank. Suitable habitat occurs throughout the Bank.

San Diego Woodrat (*Neotoma lepida intermedia*) – California Species of Special Concern, San Diego County Group II

The desert woodrat as a whole is distributed from central California southward well into Baja California, Mexico, and across much of the Great Basin as far north as eastern Oregon and southwestern Idaho. The San Diego subspecies is found along the coast of California from San Luis Obispo (San Luis Obispo County) southward and inland to San Fernando (Los Angeles County), the western foothills of the San Bernardino Mountains (San Bernardino County), and Julian (San Diego County).

It is a medium-sized native rat locally common in a variety of sunny shrub habitats, frequently in rocky and/or steep terrain and upper drainages. This mainly nocturnal vegetarian often builds its dens low in cactus or rock crevices, but will use other sites as needed. Habitats for this subspecies are dry and/or sunny shrub lands, especially (but not necessarily) areas with cactus and abundant rocks and crevices. Desert woodrats do not require a source of drinking water. Sage scrub communities are frequently occupied, but other communities are also used as suitable microhabitats when available.

Woodrat middens have been observed by RECON biologists within the Bank. Suitable habitat occurs throughout the Bank.

Southern Mule Deer (*Odocoileus hemionus fulginata*) – San Diego County Group II; City of Chula Vista Subarea Plan MSCP Covered Species; City of San Diego MSCP Covered Species

Southern mule deer are common across the western U.S. in a variety of habitats from forest edges to mountains and foothills (Whitaker 1996). Mule deer prefer edge habitats, rarely travel or forage far from water, and are most active around dawn and dusk.

This species has been observed by RECON and ICF biologists within the Bank. Suitable habitat occurs throughout the Bank.

3.9 Critical Habitat

Several areas of critical habitat (CH) are located within and adjacent to the Bank (Figure 3-12). San Diego fairy shrimp CH is located to the south of the Bank on the mesa tops, spreading navarretia CH is located to the south-east of the Bank, Quino checkerspot butterfly CH is located to the east and south, and Otay tarplant CH surrounds all sides of the Bank and extends into the Bank site along the northern and southern edges. Otay tarplant CH is the only CH that lies within the Bank limits. Although grading will impact Otay tarplant CH, the physical or biological features essential to the species, specifically soils with high clay content (>25%) are not expected to be impacted by grading activities.

3.10 Jurisdictional Delineation

A jurisdictional delineation was performed by ICF biologists within the Bank on November 12 and 13, 2014; July 16 and 28, 2015; August 7 and 12, 2015; May 3 and 4 and September 20, 2018; and February 25 and 26, 2020. Several jurisdictional delineations have been completed over the last several years due to changes in federal and state regulations (Clean Water Rule, Navigable Waters Protection Rule, State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State) and changes in project limits, as well as at the request of USACE. Potential jurisdictional features were evaluated for the presence of a definable channel and/or wetland vegetation, soils, and hydrology. The project was analyzed for potential wetlands using the methodology set forth in the 1987 *Corps of Engineers Wetland Delineation Manual* (USACE 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]) pursuant to *A Field Guide to the Identification of the*

Ordinary High Water Mark in the Arid West Region of the Western United States: A Determination Manual (USACE 2008b). While in the field, potential jurisdictional features were recorded on an iPad using ESRI Collector and a Trimble hand-held global positioning system 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* (USACE 2016).

3.10.1 Features

A total of 17 jurisdictional features were delineated on site, including the Otay River, Salt Creek, O'Neal Canyon, several unnamed drainages, and wetland depressions and vernal pools. Figure 3-13 shows the location and extent of WOUS and WOS, and Figure 3-14 shows the location and extent of CDFW jurisdiction. Below is a brief description of each feature delineated.

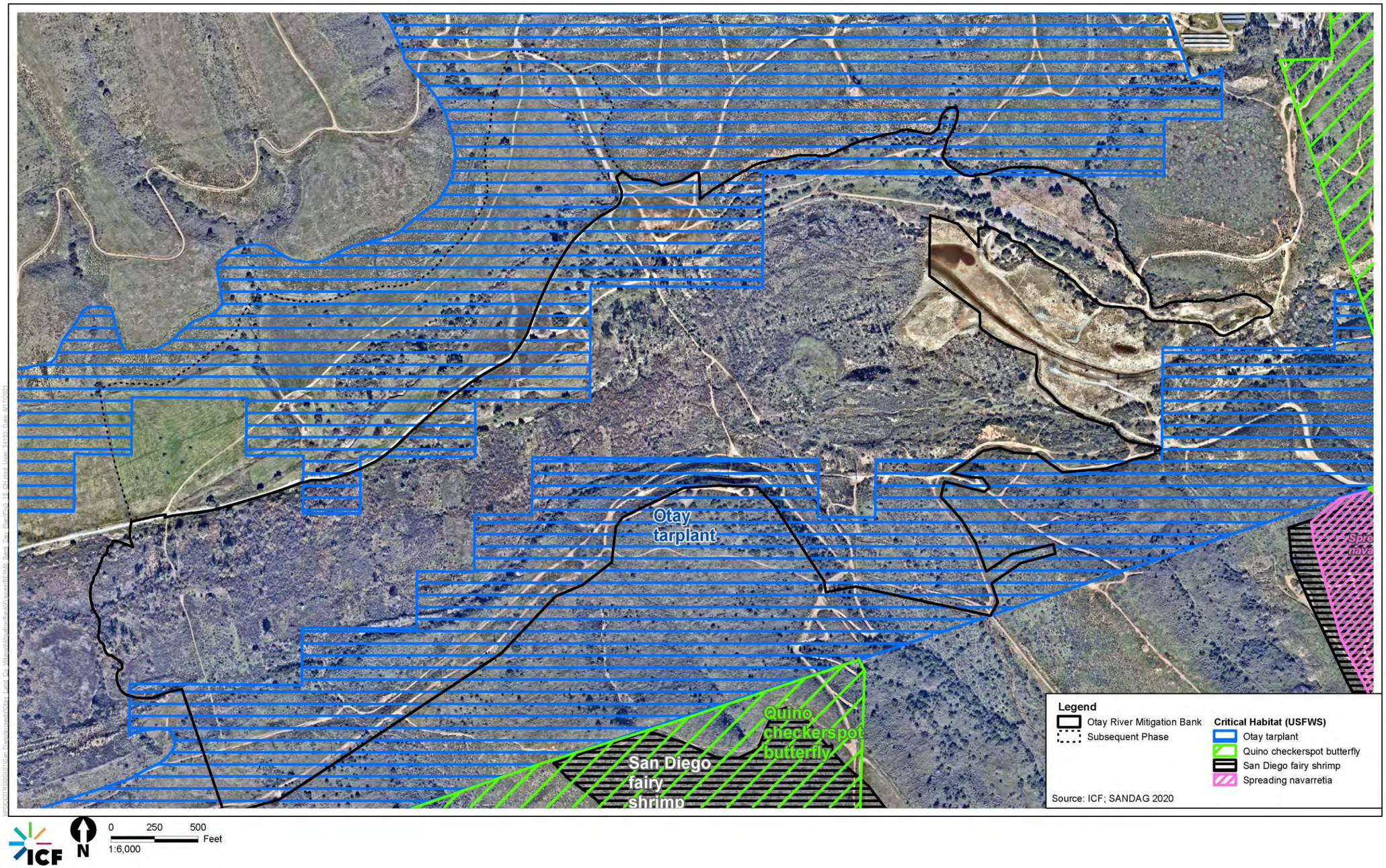

Figure 3-12 Critical Habitat within the Project Area and Immediate Vicinity

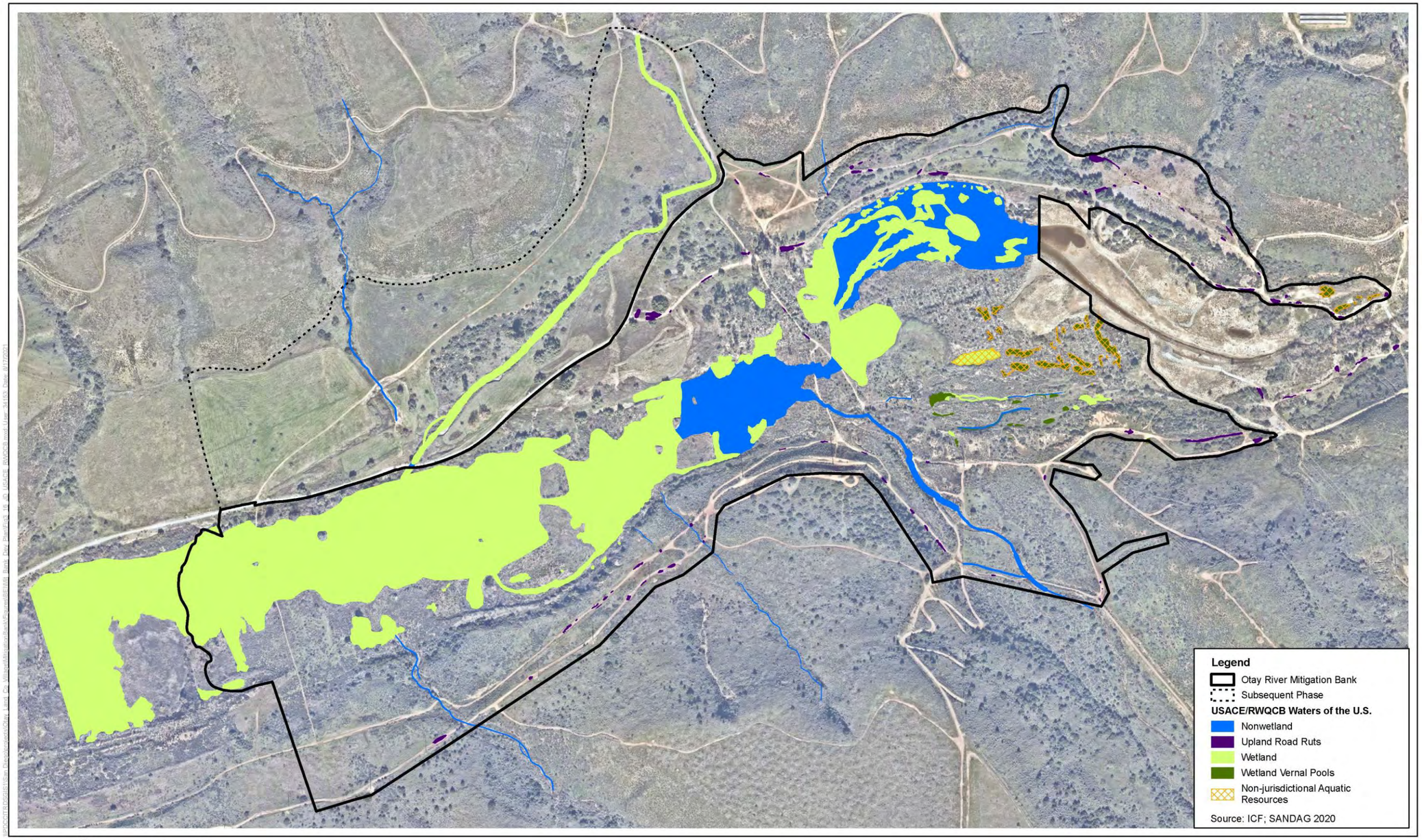

Figure 3-13 Potential USACE/RWQCB Jurisdictional Waters and Wetlands Occurring within the Project Area

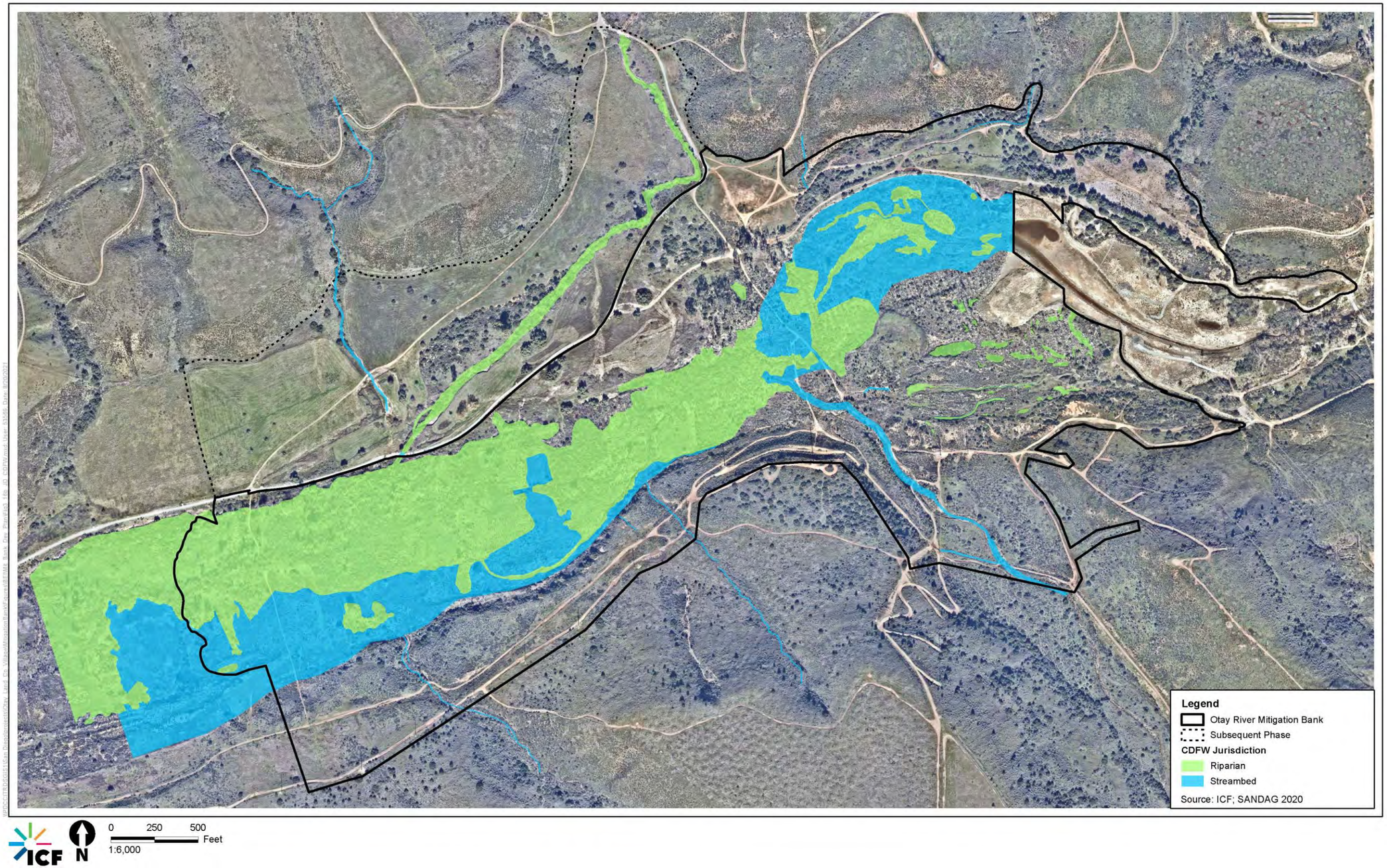

Figure 3-14 Potential CDFW Jurisdiction Occurring within the Project Area

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Feature 1 (Otay River) is a non-wetland and wetland river supported primarily by shallow groundwater. The feature is primarily non-wetland at the upstream end where its watershed is small; however, as the feature moves toward the west additional tributaries and upland areas feed into the feature, more water appears, and the drainage becomes more dominated by wetland, consisting of freshwater marsh habitat within the primary channel and cismontane alkali marsh, tamarisk scrub, and willow riparian forest within the active floodplain. The freshwater marsh is dominated by southern cattails (*Typha domingensis*) and California bulrush (*Schoenoplectus californicus*); the cismontane alkali marsh is dominated by yerba mansa (*Anemopsis californica*), spiny rush (*Juncus acutus*), and saltgrass (*Distichlis spicata*); while the willow riparian forest is dominated by tamarisk (*Tamarix ramosissima*), black willow (*Salix gooddingii*), mulefat (*Baccharis salicifolia*), San Diego marsh-elder (*Iva hayesiana*), and coast goldenbush (*Isocoma menziesii*).

Feature 2 (Salt Creek) is in the northwestern end of the Bank. This feature supports wetland habitat dominated by mulefat.

Feature 3 is a small tributary that is outside the bank and runs from north to south. As it gets closer to the Otay River, the feature loses definition of a channel and begins to sheet flow.

Feature 4 is a wetland depression on the north side of the Otay River floodplain just east of the gas line.

Feature 5 is a small tributary on the upper terrace on the north side of the Otay River floodplain. The feature crosses a dirt road and loses definition of a channel south of the road.

Feature 6 is a small tributary on the upper terrace on the north side of the Otay River floodplain. The drainage travels south and then east just north of a dirt road, where it loses definition of a channel.

Feature 7 is a depressional wetland area on the southern side of the Otay River floodplain dominated by rabbitsfoot grass (*Polypogon monspeliensis*) and spike rush (*Eleocharis palustris*).

Feature 8 is a 10-foot-wide linear vernal pool on the south side of the Otay River floodplain. The feature may be a relict mining scare but ponds water appropriately to support vernal pool species.

Feature 9 is linear drainage/wetland depression/vernal pool on the south side of the Otay River floodplain. Water travels east to west and ponds at the eastern end of the feature where it is classified as a vernal pool. The central portion of the feature is wetland and the eastern portion is non-wetland.

Feature 10 (O'Neal Canyon) is an intermittent drainage on the south side of the Otay River floodplain near the center of the Bank that flows in a northwesterly direction. It supports an OHWM, is characteristic of a desert wash, and is dominated by upland coastal sage scrub species.

Feature 11 is a 5-foot-wide ephemeral drainage on the southern side of the Otay River floodplain and may be a relic channel but appears to still have some flow. OHWM indicators included a bed and bank, sediment sorting, and sediment cracks.

Feature 12 is an approximately 350-foot-long ephemeral tributary on the south side of the Bank that flows from southeast to northwest. The feature crosses a small dirt road and then flows into the Otay River.

Feature 13 is a small, ephemeral tributary just west of Feature 12.

Feature 14 is an ephemeral drainage at the southwestern end of the Bank and flows in a northwesterly direction. As the drainage enters the floodplain, it flows into a wetland area (Feature 15) and likely provides additional hydrology to the wetland. The drainage is dominated by coastal sage habitat and supports a cobble bottom.

Feature 15 is a wetland depression on the south Otay River floodplain. The feature is fed partially by Feature 14 and supports tamarisk and herbaceous wetland species.

Feature 16 is a wetland depression on the south Otay River floodplain at the eastern edge of the Bank and supports tamarisk and herbaceous wetland species.

Wetland Vernal Pools: The Bank supports vernal pools in uplands in the far eastern portion of the site as well as in the southern floodplain in the eastern portion of the site. Due to past mining activities and disturbance, it is likely many of the vernal pools are not of the same size, configuration, or location as historical pools prior to mining activities. Some of the vernal pools may have even been formed from mining activities and the excavation and redistribution of sediment; however, vernal pools are common on the mesa tops in the area and the site contains appropriate sediment for vernal pools. The vernal pools are generally of lower quality and support native and non-native species such as *Eleocharis macrostachya*, *Lythrum hyssopifolia*, and *Psilocarphus brevissimus* var. *brevissimus*, as well as some non-typical vernal pool species such as tamarisk and *Typha*. Many of the pools also support the versatile fairy shrimp (*Branchinecta lindahli*) and federally listed as endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*).

Table 3-3. Waters of the United States

		Waters of the U.S.	
Feature #	Stream Length (LF)	Non-Wetland (acres)	Wetland (acres)
1: Otay River	1,773	13.350	43.208
2: Salt Creek	-	-	0.035
3 (outside bank)	-	-	-
4	-	-	0.124
5	173	0.016	-
6	587	0.029	-
7	-	-	0.084
8	435	0.102	-
9	275	0.025	0.053
10: O'Neal Canyon	2,328	1.048	-
11	146	0.017	-
12	457	0.029	-
13	130	0.008	-
14	860	0.127	-
15	-	-	0.720
16	-	-	0.100
Wetland Vernal Pools	-	-	0.250
Total	7,164	14.751	44.574

Table 3-4. Waters of the State

		Waters of the U.S.	
Feature #	Stream Length (LF)	Non-Wetland (acres)	Wetland (acres)
1: Otay River	1,773	13.350	43.210
2: Salt Creek	-	-	0.035
3 (outside bank)	-	-	-
4	-	-	0.124
5	173	0.016	-
6	587	0.029	-
7	-	-	0.084
8	435	0.102	-
9	275	0.025	0.053
10: O'Neal Canyon	2,328	1.048	-
11	146	0.017	-
12	457	0.029	-
13	130	0.008	-
14	860	0.127	-
15	-	-	0.720
16	-	-	0.100
Wetland Vernal Pools	-	-	1.286
Total	7,164	14.751	45.612

Table 3-5. California Department of Fish and Wildlife Jurisdiction

		CDFW Jurisdiction	
Feature #	Stream Length (LF)	Riparian (acres)	Streambed (acres)
1: Otay River	3,993	52.442	30.537
2: Salt Creek	-	0.035	-
3 (outside bank)	-	-	-
4	-	0.124	-
5	173	-	0.037
6	588	-	0.059
7	-	0.084	-
8	-	0.102	-
9	307	0.182	0.028
10: O'Neal Canyon	2,328	-	1.702
11	146	-	0.039
12	457	-	0.070
13	130	-	0.015
14	643	-	0.109
15	-	0.720	-
16	-	0.100	-
Vernal Pools		1.4660	

		CDFW Jurisdiction	
Feature #	Stream Length (LF)	Riparian (acres)	Streambed (acres)
Total	8,765	55.255	32.596

3.11 Existing Functions and Services

Although the Bank site is degraded and the wetlands and non-wetlands are limited as a result of past activities, there are still various functions provided by the existing aquatic resources and the adjacent upland areas. These functions may include, but are not limited to, groundwater recharge due to the extensive alluvium soils on site, sensitive wildlife habitat, wildlife movement opportunities due to the connectivity to adjacent open space and preserve land, and nesting and foraging habitat associated with existing vegetation. The Bank site provides foraging and limited water sources for a variety of mammal, avian, reptile, and amphibian species, including sensitive species. The Bank also provides habitat for sensitive crustacean species (fairy shrimp). Coastal California gnatcatcher is present within coastal sage scrub communities on site, and the Bank has potential to support the federally listed Quino checkerspot butterfly. Southern willow scrub within the Bank site 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. 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.

Current aquatic conditions were assessed using the California Rapid Assessment Method (CRAM). CRAM measures ambient conditions of an aquatic resource and has been in development since 2005 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 3-6). 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 3-7. The CRAM practitioners assign a letter rating (A through 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 through 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.

CRAM was conducted on the Otay River just upstream of the Bank site where the river comes out of the canyon using the Riverine module, within the Bank boundaries using the Depressional module at

one of the three onsite seasonal pools, and on six vernal pool systems and one individual vernal pool. This information will be used with the restoration design to project the expected "lift" to aquatic conditions following completion of restoration activities.

Table 3-6. 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 3-7. Expected Relationship Between 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					√	√	√			√	√

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
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 3-8. The overall CRAM score for the offsite upstream segment of the Otay River was 74 and the onsite depressional wetland was 57. The average overall CRAM score for the vernal pool assessments areas (AA) was 70. A discussion of the scoring factors is provided below.

Table 3-8. CRAM Attribute Scores for Existing Aquatic Features

Assessment Area	Buffer and Landscape Context	Hydrology	Physical Structure	Biotic Structure	Overall CRAM Score
#1 – Riverine	93%	92%	37.5%	72%	**74**
#2 – Depressional	48%	83%	38%	61%	**57**
#1 – VP System	73%	100%	50%	25%	**62**
#2 – VP Individual	85%	100%	63%	25%	**68**
#3 – VP System	85%	100%	42%	25%	**63**
#4 – VP System	85%	100%	42%	42%	**67**
#5 – VP System	93%	100%	92%	63%	**87**
#6 – VP System	93%	100%	25%	63%	**70**
#7 – VP System	93%	92%	50%	67%	**75**

Attribute 1, Buffer and Landscape Context. Full 250-meter buffers were present throughout the AAs; however, they were primarily vegetated with non-native grasses 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. The Aquatic Area Abundance score for the Vernal Pool AAs was high due to proximity to the Otay River and associated riparian habitat as well as other vernal pools.

Attribute 2, Hydrology. Due to the construction of the reservoir upstream, the watershed that drains to the AAs has diminished significantly. Because this has been the existing condition for the past century, the remaining 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 in 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.

The vernal pool AAs have micro-watersheds that drain directly into the pools. These were not altered, resulting in As for water source for all the vernal pool AAs. There is no artificial adding or removing of water resulting in As for Hydroperiod. Finally, flood waters are able to rise and interact with adjacent uplands without obstruction resulting in As for all but one 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/depression bottom.

One vernal pool AA scored a 92% for Physical Structure but the other six AAs scored low in this attribute due to few patch types, low pool and swale density, and little topographic complexity.

Attribute 4, Biotic Structure. Both the riverine and depressional AAs supported two to three plant layers with low species richness (three codominant species); the overall attribute scored low. However, invasive species were low in these areas, only accounting for 33% or less of the biotic structure.

The vernal pool AAs ranged from 25% to 67% for this attribute. The low scoring AAs were road ruts that had few co-dominants, few endemic species, and low horizontal zonation. The higher scoring AAs were the existing vernal pools in the floodplain that had a few more co-dominants and endemic species and more plant zones and edge resulting in higher Horizontal Interspersion and Zonation scores.

3.12 Cultural Resources

Twenty-three cultural resources have been identified within the Bank site including seventeen previously recorded cultural resources, one newly recorded cultural site and five newly recorded isolated artifacts. Cultural resources surveys conducted in September 2018, April 2019, September 2019 and June 2021 relocated artifacts associated with ten of the seventeen previously recorded cultural resources. Table 3-9 provides a summary of the twenty-three resources located within the Bank site. Portions of CA-SDI-10875 were located in the Prebank portion of the project. The Corps conducted Section 106 consultation with the SHPO beginning in October 2015 for potential impacts to CA-SDI-10875. In December 2015, the SHPO concurred with the Corps determination that CA-SDI-10875 was eligible for listing on the National Register of Historic Places but that restoration activities would have No Adverse Effect. The other 22 cultural resources have not been formally

evaluated for listing in the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR) to date. Cultural resources are treated as potentially eligible for listing in the CRHR until formal evaluation. ICF will be conducting further subsurface exploration in areas of potential ground disturbance to determine if subsurface archaeological deposits exist in those areas. A treatment plan will be developed if subsurface deposits are identified.

Table 3-9. Cultural Resources Located within Bank Site

Resource	Type	Description
CA-SDI-4728/ P-37-004728	Prehistoric site	Lithic scatter. Two artifacts identified within the small portion of the resource located in the Bank site.
CA-SDI-4732/P-37-004732	Prehistoric site	Lithic scatter. Six artifacts identified within the small portion of the resource located in the Bank site.
CA-SDI-4733/P-37-004733	Prehistoric site	Lithic scatter. No artifacts identified within the small portion of the resource located in the Bank site.
CA-SDI-4735/ P-37-004735	Prehistoric site	Lithic scatter. One artifact identified within the small portion of the resource located in the Bank site.
CA-SDI-7212/ P-37-007212	Prehistoric site	Lithic scatter
CA-SDI-8649/ P-37-008649	Prehistoric site	Lithic scatter. No artifacts identified within the small portion of the resource located in the Bank site.
CA-SDI-10875/ P-37-010875	Prehistoric site	Lithic scatter. Eligible for listing in the NRHP
CA-SDI-14216/ P-37-14575	Prehistoric site	Lithic scatter. Lithic scatter. One artifact identified within the small portion of the resource located in the Bank site.
CA-SDI-14199/ P-37-014566	Prehistoric site	Lithic scatter
CA-SDI-14216/ P-37-014583	Prehistoric site	Lithic scatter. Not relocated during survey.
CA-SDI-14218/ P-37-014585	Prehistoric site	Lithic scatter
P-37-015386	Prehistoric isolate	Isolate (collected)
P-37-015391	Prehistoric isolate	Isolate (collected)
P-37-031365	Prehistoric isolate	Isolate
P-37-031366	Prehistoric isolate	Isolate
P-37-032254	Historic site	Historic corral
P-37-034106	Prehistoric isolate	Isolate
ICF-OH-P-001	Prehistoric site	Sparse lithic scatter
ICF-OH-ISO-001	Prehistoric isolate	Isolate
ICF-OH-ISO-002	Prehistoric isolate	Isolate
ICF-OH-ISO-003	Prehistoric isolate	Isolate
ICF-OH-ISO-004	Prehistoric isolate	Isolate
ICF-OH-ISO-005	Prehistoric isolate	Isolate

3.13 Past, Present and Proposed Uses of Mitigation Site and Adjacent Areas

The Bank site is currently undeveloped and as stated in Section 1.2.3 is located within the Otay Ranch Preserve (Preserve), a dedicated open space preserve. The Preserve was set aside as open space to protect, preserve, enhance, and manage sensitive natural and cultural resources within Otay Ranch area as part of the City of Chula Vista General Development Plan/San Diego Otay Subregional Plan Phase 2 and the Otay Ranch Resource Management Plan (RMP). The Preserve was also set aside to offset impacts and provide mitigation to state and federally listed species. The Preserve is currently managed by the Preserve Owner/Manager (POM) which is composed of the County of San Diego and City of Chula Vista and the Preserve will be included in the City of Chula Vista's subarea plan which is part of the City of San Diego and County of San Diego Multiple Species Conservation Plan (MSCP). Although the Bank is located within lands that are currently preserved and are part of a large comprehensive mitigation approach for the MSCP, the lands are not required to be restored as part of any permits or approvals, just preserved. However, restoration activities are permitted (and encouraged) with the Preserve. As stated in Section 3.2.1 of the RMP, "*Preserve management activities, including biological monitoring, habitat restoration and enhancement, and maintenance activities, are permitted within the Preserve. All such activities shall be consistent with the respective jurisdiction's MSCP Subarea Plan and are subject to approval by the POM. Preserve management, scientific, and biologic activities may include (but are not limited to) the following uses: 1. Wetland mitigation banking [2.10]. 2. Habitat restoration [3.1-3.8]. 3. Biological monitoring [5.2, 5.4]…"* Section 3.2.1.1. Mitigation banking goes on further to state, "*Mitigation banks may be established in areas with high biological values within the Preserve. The establishment of mitigation banks would require approvals from the respective jurisdiction and Wildlife Agencies, and would be required to comply with all applicable federal and state regulations. Opportunities and plans for mitigation banks may be developed on Preserve lands held in public and private ownership in conjunction with preparation of wetland enhancement and restoration plans for the Otay River Valley and/or the vernal pool preservation plan. All revenue generated by wetland mitigation banks established by the POM shall be used to fund Preserve activities [2.10]." (*RECON 2018). All revenue generated on City of Chula Vista owned lands will be used to fund further restoration efforts in the Preserve. Revenue generated on Bank Sponsor owned lands will the possession of the Bank Sponsor's. Section 3.2.1.2 Habitat Restoration in the RMP states, "*Restoration programs intended to mitigate for disturbance of sensitive habitats associated with the development of Otay Ranch shall be funded and designed by the landowner in coordination with the POM and the appropriate jurisdiction. Implementation of such restoration programs shall be by an appropriate entity acceptable to the POM and the appropriate jurisdiction [3.2]. Restoration programs may be implemented for purposes other than compensation of impacts associated with development of Otay Ranch. Such programs shall be funded, designed, and implemented by the POM or other entity acceptable to the POM [3.3]. The POM will continue to identify potential restoration opportunities for threatened, endangered, and other sensitive species [3.8]. These restoration opportunities will be identified and implemented through the annual work plan prepared by the POM. The POM may also apply for ancillary funds (e.g., grants) to implement additional restoration activities*." (RECON 2018)

As mentioned in the sections above, the Bank was historically mined for sand and gravel and was not restored post mining activities. As such it does not contain a defined riverine channel or floodplain, and it contains large cobble and bolder piles within the floodplain area left over from mining and is vegetated with a substantial amount of invasive species. Implementation of the Bank

will greatly increase the existing functions and services of aquatic resources and upland areas beyond what is required of the City of Chula Vista General Development Plan/San Diego Otay Subregional Plan Phase 2, the RMP, or the MSCP.

Open space, as part of the Otay Ranch Preserve, borders the northern and western sides of the Bank. Immediately to the east of the Bank are parcels owned by the County of San Diego and City of San Diego as well as BLM and one parcel owned by the City of Chula Vista. These parcels include the steep narrow canyon of the Otay River as well as hilly and mountainous areas. Further to the north and east of the bank is the Otay Mountain Ecological Reserve owned by CDFW, the Otay Mountain Wilderness administered by the BLM and City of San Diego Public Utilities/Cornerstone Lands (see Figure 1-4 in Section 1). The City of San Diego Water Treatment Plant is located north-west of the Bank, and the Richard J. Donovan and George Bailey Correctional Facilities are to the south. Several residential/commercial mixed use developments are planned to the north/north west of the Bank up on the mesa top, including Otay Ranch Village 9, Otay Ranch Village 10 and the University District; however, these developments would not drain to the Bank, rather they'd drain further west to the river valley. Further upstream above Otay Lakes, Otay Ranch Villages 13, 14, 15 and 17 are planned for the future (Figure 3-15).

3.13.1 Current and Future Trails

A small portion of the Bank is within the Greenbelt Master Plan boundaries and entirely within the OVRP Concept Plan boundaries. Both of these plans identify future multiuse trails within the Bank limits, including prioritizing the use of existing dirt roads and unofficial trails as well as select new trails where needed to improve trail user experience, avoid sensitive resources, and complement other uses on site. The vast majority of the proposed trails are in the upland areas and are outside of the Bank limits. However, a few select trails do cross into the Bank limits. These trails are generally existing dirt roads and easements and are currently used for monitoring by Border Patrol, and for utility maintenance and access by SDG&E, City of San Diego, the City of Chula Vista, and OWD. Some of the roads/trails are official easements while others are unofficial, illegal roads and trails. SDG&E accesses and uses some of the roads monthly to monitor the conditions of their power poles and underground gas line. OWD manages a pipeline upstream of the Bank site and accesses supporting infrastructure throughout their right-of-way at the Bank. Many of the trails, although unofficial and on private property, are also periodically used by hikers, cyclists, recreational ATV riders, and equestrians; several are official utility rights-of-way. The general area surrounding the Bank is also a travel route for people entering the United States illegally from Mexico; there is immigrant foot traffic through the river valley and a corresponding significant use of the area by Border Patrol agents using off-road vehicles.

The Bank will implement several improvements to existing informal (not designated) trails and roads as well as decommission redundant roads and excess areas along trail shoulders (Figure 3-16). Select secondary and multiuse trails will be added where strategic access needs exist or to create a unique trail user experience while avoiding sensitive areas. Overall, more trails will be decommissioned than will be created. An SDG&E gas line crosses the mainstem river approximately halfway through the bank limits and is located under placed rock that is also used for access. This crossing will be reconfigured into a rock-lined or concrete mat crossing to facilitate maximum ecological function while allowing SDGE full access.

The trail network will be used by the general community including hikers, pedestrians, mountain bikers, and equestrians. To prevent the sensitive habitat at the Bank from being disturbed by

existing and future users, wooden split-rail fencing would be installed at key locations along with signage to notify users of sensitive habitats in the area. In addition, large boulders and wood from downed eucalyptus will also be used for deterrents where appropriate to aid in the natural feel of the site. Educational kiosks would also be installed at key viewing locations within the disturbed areas to help inform the readers of the importance of the Bank and surrounding habitat.

All trails will be open to the public for passive recreational use. In an effort to minimize environmental impact, many of the existing onsite trail routes will remain and be improved in various ways. The trail system includes primary and secondary trails. Primary trail routes will be wide enough for maintenance vehicle access including all SDG&E vehicles, while secondary trail routes include several existing trails that will be decreased in width and improved with added native vegetation along the edges and in the reclaimed shoulder areas. Primary trails will be up to 16' feet wide, with a compacted surface. Secondary trails will be 4 feet wide with compacted soil. From a construction standpoint, the existing trails onsite fall into three sub-categories: Existing, Improved, and New. Existing trails include portions of trails that will have no need for demolition, grading, or construction. Improved trails include portions of existing trails that need to be leveled out, graded, or slightly moved to improve drainage and minimize environmental impacts or work with the proposed new channel network and adjacent topography. New trails include entirely newly constructed trails that are necessary to improve the safety of pedestrians and vehicles using the trail while incorporating sustainable methods for construction such as local material to minimize environmental impacts.

The trail network has been designed to weave through the habitat areas, providing views into the site, including at two proposed covered shelters (one on the north side of the site, just south of Vireo Wet Meadow, and one just west of Cactus Wren Creek). The design intent is to provide multiple lengths of trail access and varied topographic experience for different user groups.

Onsite, most of the existing trails are wide enough for vehicular traffic, with many being oversized due to ongoing impacts from vehicle use. Those that are larger than needed will be reduced in size by reclaiming the shoulders with native vegetation. Many of the redundant trails will be closed and shoulders reclaimed to decrease the overall footprint. A variety of natural materials and fencing will be placed to discourage off-trail uses. Secondary trails will also include deterrents for vehicles ensuring that only allow pedestrian, mountain bike, and equestrian access. These secondary trails will change high-use vehicular traffic areas into recreational areas for bikes, pedestrians, and equestrians by reducing trail widths and complementing the landscape with a carefully chosen plant palette designed to match the existing native habitat. In order to limit impacts to San Diego fairy shrimp and to avoid encouraging non-natives, the reclaimed roads and shoulders will not be ripped or graded. The intent is to allow native vegetation to encroach into those areas from the adjacent habitat and supplemental plant and seed where needed. Those areas will be managed for non-native species as well.

Although not formally included in the design, select areas have been identified for potential mountain bike features. The project would work with local mountain bike groups to design and field fit features that complement the larger goals of the project while providing opportunities for mountain biker enjoyment. Features could include such as boulders, embankments, and rolling terrain. Partnering with the local mountain bike community creates ownership of the trails and discourages off-trail activities.

3.14 Reference Site

Because of the degraded nature of the Bank site due to past mining activities and the significant change in hydrology from the upstream dam and its uniqueness (broad and sandy) relative to the surrounding areas, no reference site has been identified. The area upstream of the Bank is narrow, dry, and dominated by upland scrub species while the downstream portion is degraded and dominated by non-native tamarisk scrub. The Restoration Contractor will use best professional judgment and experience in similar systems to discuss the trajectory of the site compared to similar natural systems.

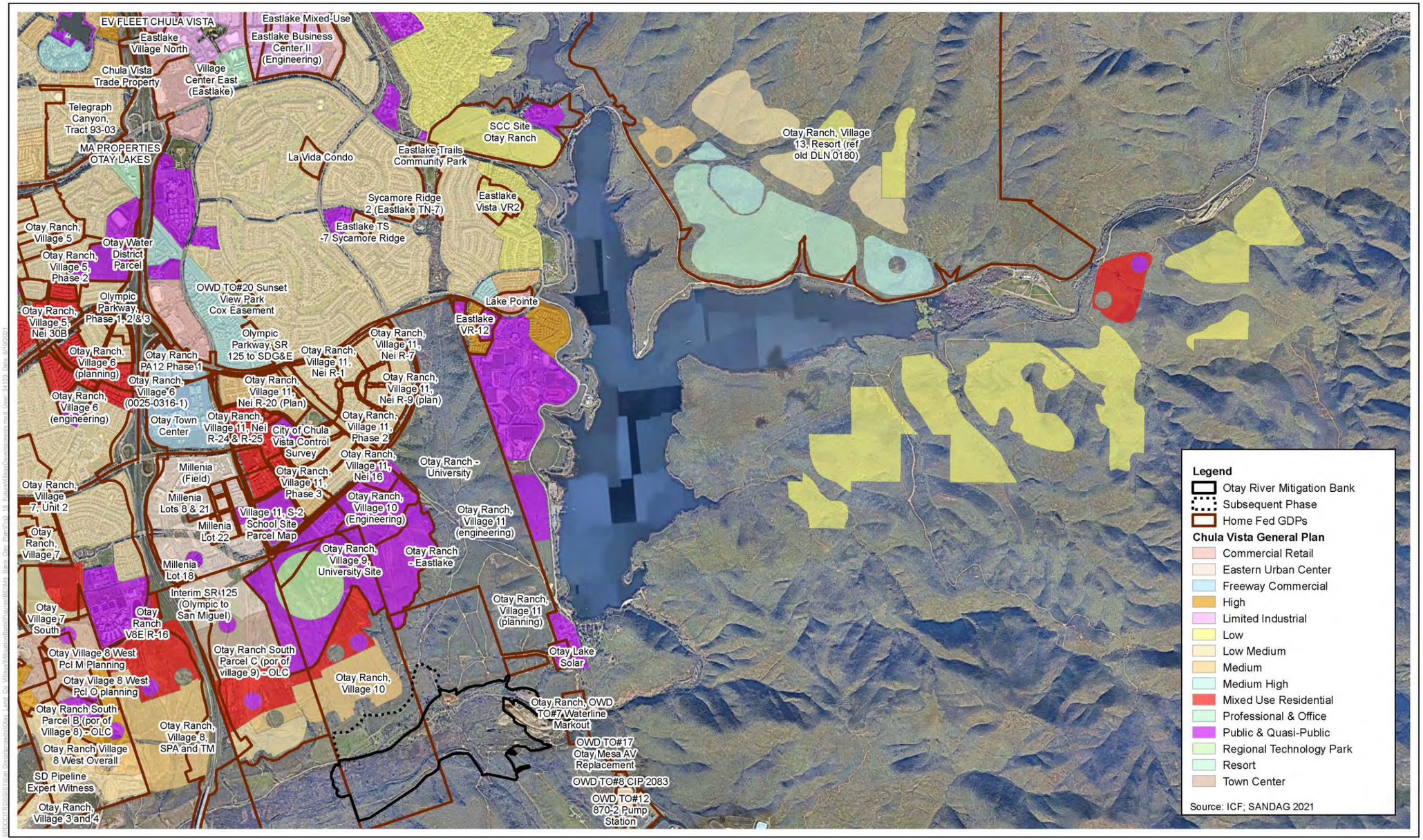

Figure 3-15 Future Village Developments

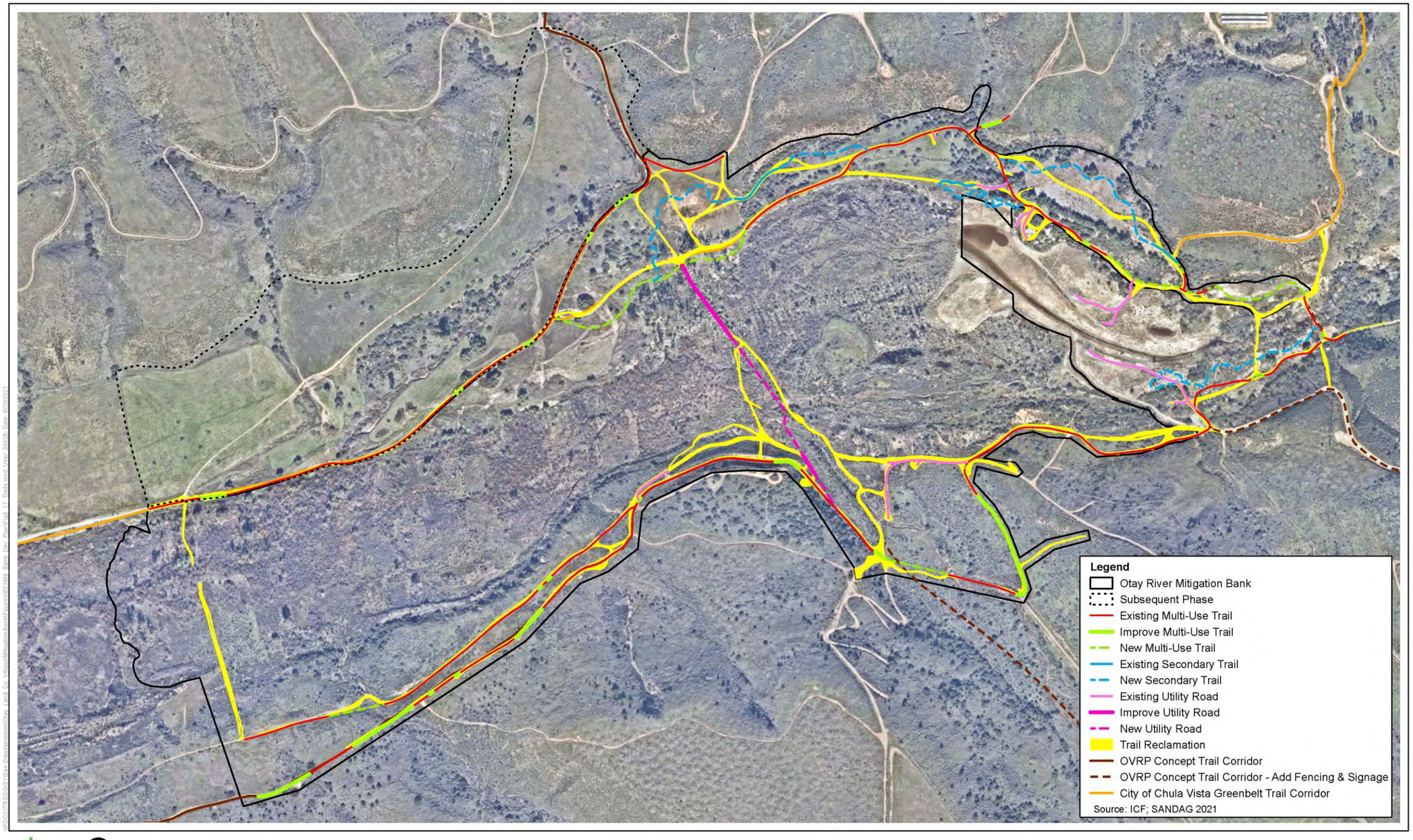

Figure 3-16 Trails

Chapter 4
Mitigation Design

4.1 Site Selection Process

The Bank site was selected after reviewing nearby compensatory mitigation opportunities and watershed planning documents including the WMP and SAMP. The Otay River Valley is an important historic waterway that has existed in a highly disturbed state for decades. This area was targeted for restoration activities due to it being the farthest upstream section of the Lower Otay River watershed (watershed below Savage Dam) that has not been restored, and its adjacency to an existing mitigation site and various surrounding open space lands. This location follows the USACE's watershed approach to site selection and represents the crucial first step in the overall restoration of the Lower Otay River subbasins that exist below Savage Dam. The project would play a critical role in the success of future downstream restoration efforts by removing significant upstream invasive seed sources and improving hydrology and wetland functions.

4.2 Mitigation Design

The Bank will be designed to rehabilitate, establish, and reestablish hydrologic, chemical, and physical processes, vegetation communities, and wildlife habitats associated with the Lower Otay River Watershed. The Bank will be as self-sustaining as possible and adjust to dynamic natural processes.

Restoration activities would occur within the restoration categories listed below. Overall restoration design is included as Figure 4-1, typical cross sections for unique locations (i.e. Otay River Mainstem, O'Neil Canyon, and wet meadows) depicting before and after construction are included as Figure 4-2 through 4-4, and vernal pool layout and design are included as Figure 4-5. Five major ecozones have been mapped for the project including the mainstem river, wet meadow tributaries, O'Neil Canyon, buffer and vernal pools. A few of these are further divided such as the mainstem which is broken into braided channel network, active floodplain, and high floodplain. A description of these zones follows while the rationale is described along with the crediting rationale in Section 4.5.1.

4.2.1 Otay River Mainstem and Floodplain

The Bank's hydrologic and geomorphic processes have been greatly disturbed. The Bank site was historically mined for gravel and sand. When mining operations ceased the site remained significantly disturbed: mine tailings and rock impede the natural flow of water through the site and inundation of the floodplain. Furthermore, Savage Dam has cut off flow and sediment supply from upstream. In addition, over time, invasive species, primarily tamarisk, established on site.

Reestablishment and rehabilitation of the mainstem will focus on areas significantly altered from past mining activities and the invasion of non-native species. Grading would remove flow obstructions including berms, rows of cobble piles, and sediment and spoil piles, and would re-create the contours of the Otay River mainstem and tributary connections, connect existing low-lying pooling areas, create interfluve islands that provide high-flow refugia for wildlife, and create

floodplains. The existing tamarisk and other non-native vegetation would be removed, and native plants would be installed following regrading. These actions would improve flow conditions during rain events and hydrological conditions for native plants.

In particular, the low flow channel is designed to accommodate a 2-year flood event and the active low floodplain is intended to accommodate a 10-year flood event, while the high floodplain would likely correspond to a 25-year event. At larger events, the entire valley floor would be inundated, and the water would rise into the adjacent upland areas. Within the floodplains, secondary and tertiary channels would be reestablished along the northern and southern high floodplain. All channels were sized to accommodate flow from the mainstem and additional input from tributaries along each reach.

The reestablished Otay River mainstem would connect to the upstream mitigation area and its recently reestablished mainstem and the downstream mainstem, located at the western end of the Bank site, where the river is more defined. This would improve flow conditions during rain events and create hydrologic flow complexity, as well as habitat complexity.

4.2.2 Salt Creek Tributary (Subsequent Phase)

Salt Creek originates in National Wildlife Refuge land near San Miguel Mountain and flows into the northeast section of the Bank. It's watershed originates 5 miles to the northeast where it then flows southwest through heavily developed areas for more than 90% of its reach. It is one of the primary tributary creeks of the Bank and supports both an OHWM and wetland habitat, dominated by mulefat. This area of the bank is slated for subsequent phases of the project and may be considered for future implementation. At this time Salt Creek is heavily incised and contained within a historically rerouted channel rather than the historical alluvial confluence.

The basic concept for this phase includes reestablish the historical braided channel network and broad confluence connection with the Otay River Mainstem. To allow Salt Creek to return to its historical dynamic confluence and to facilitate connectivity to its floodplain the project would be proposing to close Wiley Road across the confluence and relocate the access needs and the Salt Creek Sewer Line to the north side of the valley bottom (Figure 4-1). In addition, the channel banks would be setback and sinuosity would be added to the mainstem creek channel. In stream structure and an increase in base elevations would help re-engage the currently cutoff floodplain and encourage breakout onto the valley floor.

Removal of non-native/invasive species in the creek would occur and the area would be revegetated with appropriate riparian and floodplain species. The small tributary west of Salt Creek (Corral Creek) would be reconnected to the mainstem floodplain via a new channel and flood flows to the location would support the development of alkali/grass wet meadows. The surrounding uplands that buffer Salt Creek would be converted from non-native grassland dominated by invasive annuals to native grassland and coastal sage shrub communities including elderberry, toyon, and laural sumac. In addition the subsequent phase would extend the existing maritime succulent scrub habitats on the south facing slope lower onto the foothill bottom.

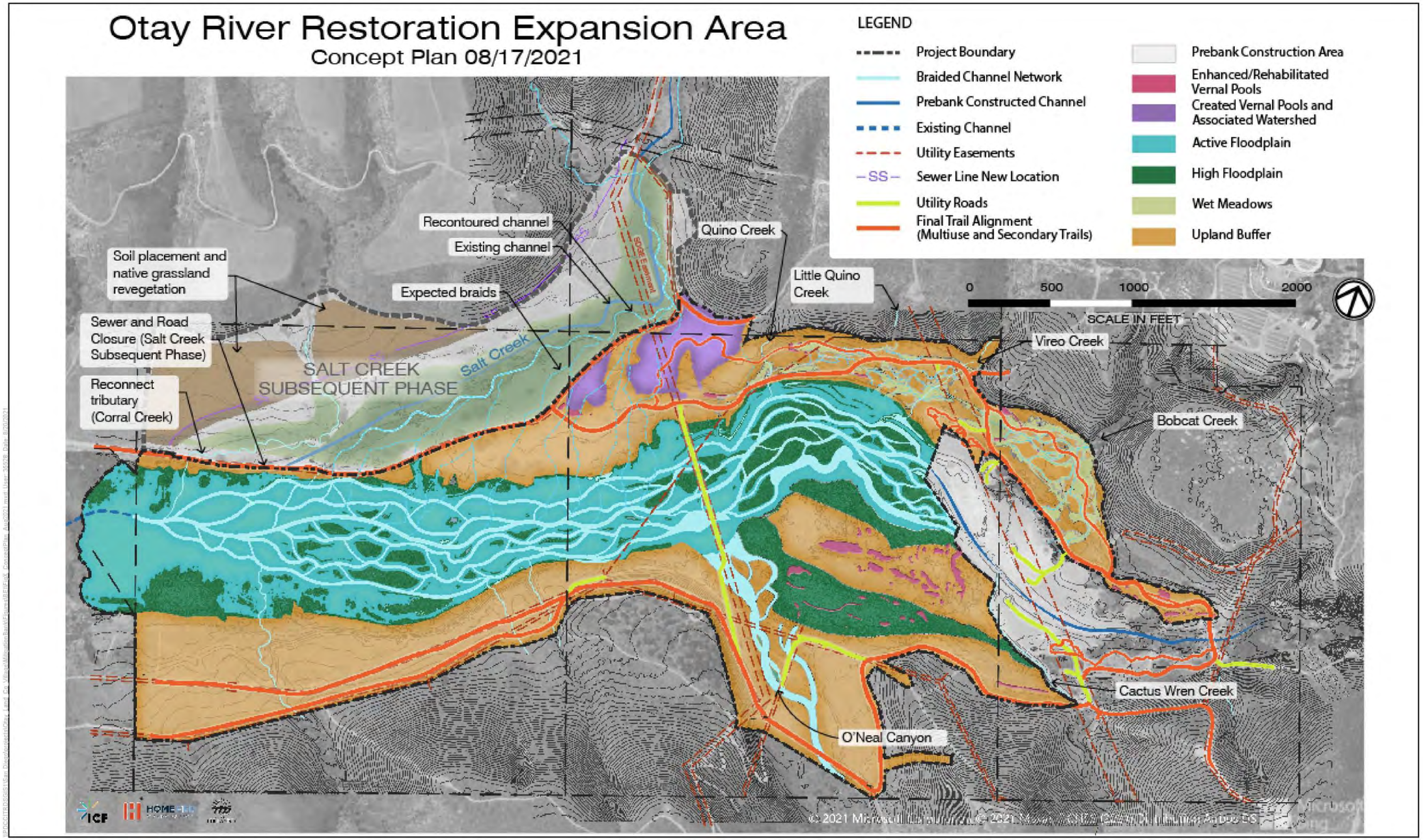

Figure 4-1 Otay Mitigation Bank Detailed Concept Design

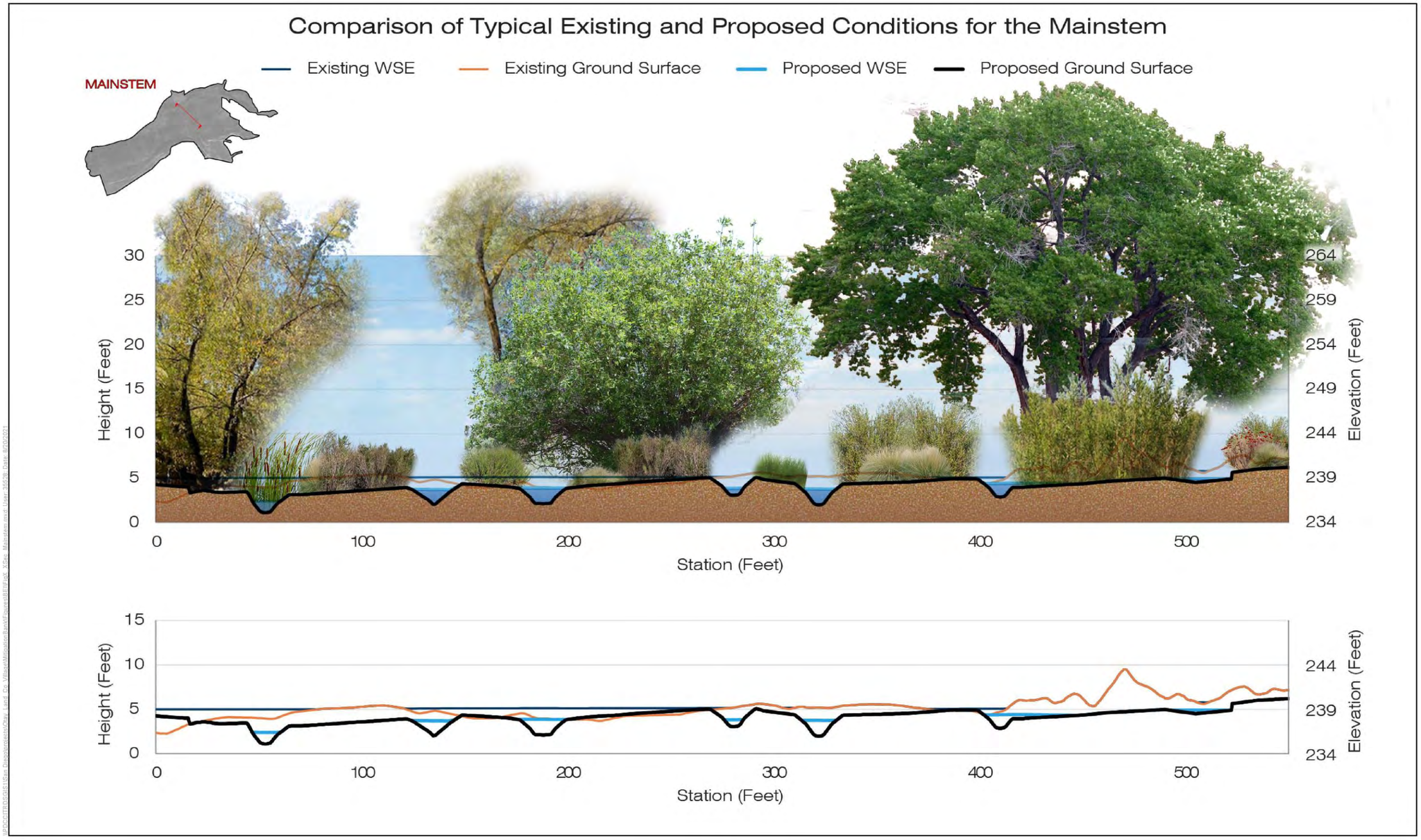

Figure 4-2 **Typical Cross Section, Mainstem**

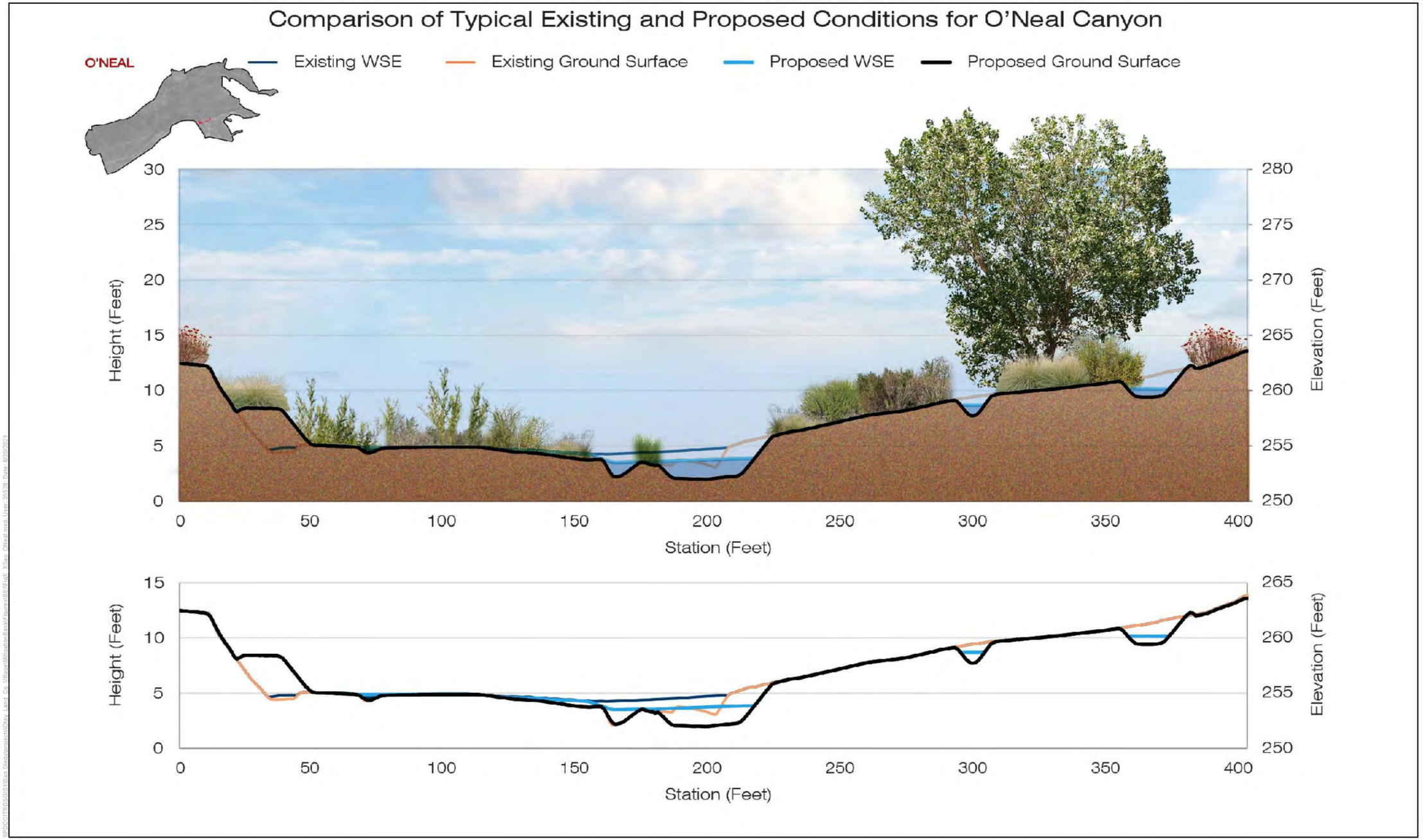

Figure 4-3 Typical Cross Section, O'Neal Canyon

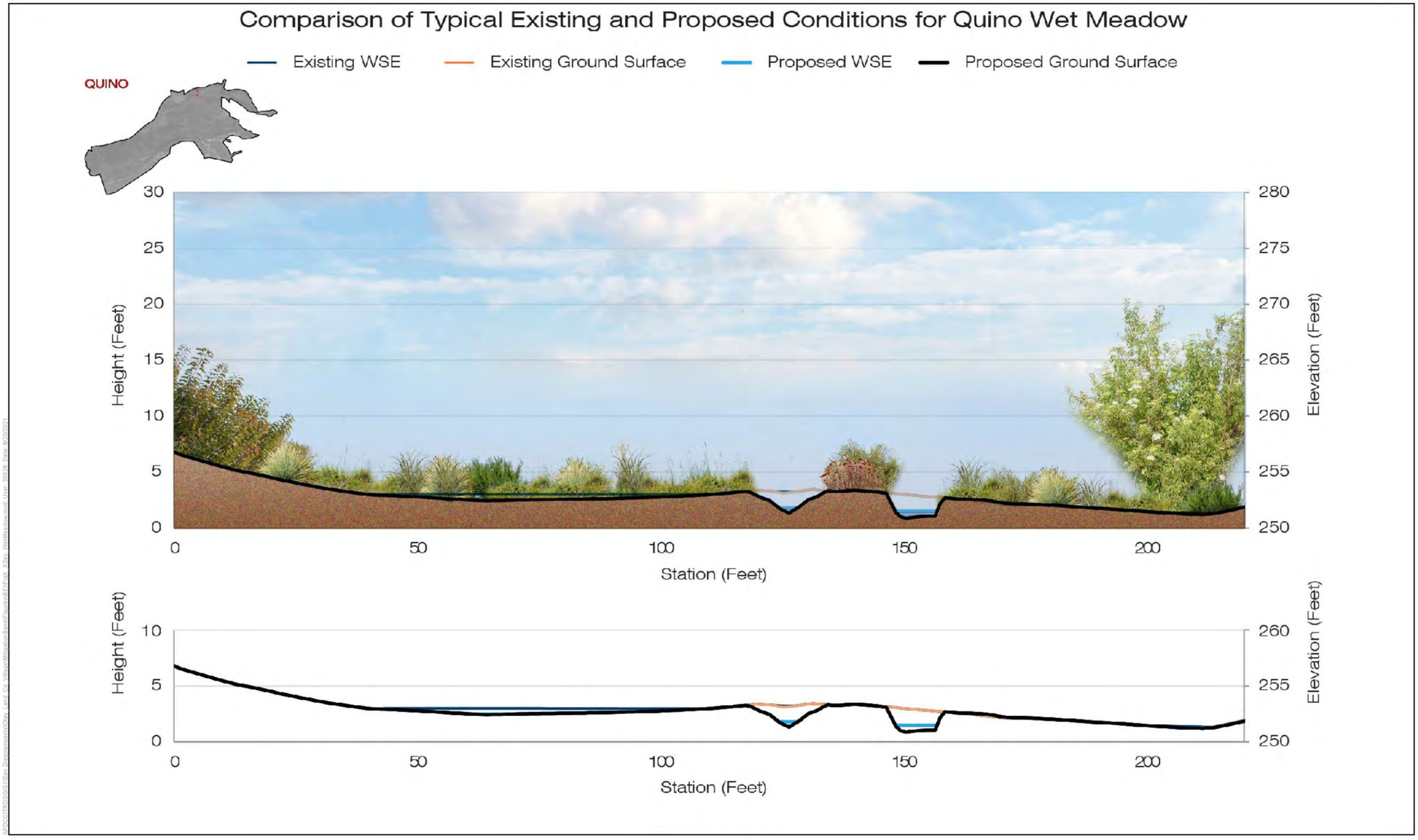

Figure 4-4 **Typical Cross Section, Wet Meadow**

Pool No.	Design No.	Area (sf)	Watershed to Pool Area Ratio
1	5	694	21
2	8	191	40
3	2	100	60
4	9	295	24
5	4	253	33
6	10	711	82
7	1	287	35
8	2	100	41
9	8	191	29
10	3	420	33
11	11	921	12
12	9	295	36
13	6	957	19
14	1	287	35
15	2	100	102
16	10	711	41
17	6	957	12
18	7	1915	40
19	3	420	21
20	6	957	20
21	11	921	19
22	7	1915	7
Total		0.31	acres

Legend

- Vernal Pool
- Pool Watershed
- Mima Mounds
- Flow Direction
- Trail Reclamation
- Trail Grading
- Existing Vegetation

*Pool Contours = 0.1'

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Figure 4-5 Sheet 1, Vernal Pool Concept Layout

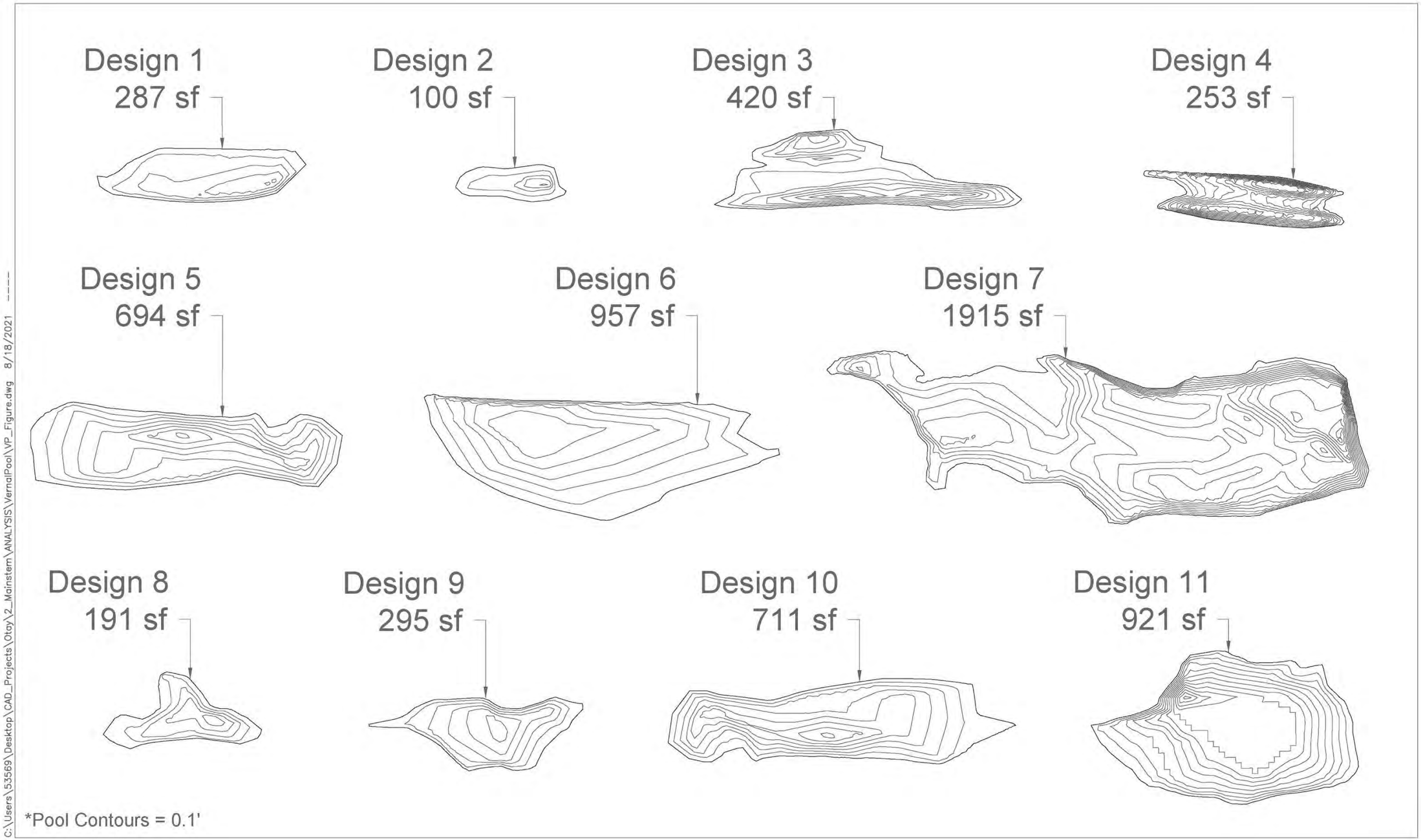

Figure 4-5 Sheet 2, Vernal Pool Concept Designs

4.2.3 O'Neal Canyon Tributary

As one of the primary tributary creeks of the Bank, O'Neal Canyon contributes a significant amount of flow to the mainstem. During a 2-year event, flow in the mainstem increases from 237 cfs in Reach 2 to 470 cfs in Reach 3 after receiving input from O'Neal Canyon. To accommodate this input, the size of secondary and tertiary channels in Reach 3 were expanded on the left bank.

Within the existing O'Neal Canyon, flow travels through a large primary channel with breakout inundation along intersecting roads. Proposed grading increases the sinuosity of this primary channel while following the existing alignment. Several sections have been realigned to avoid utilities or have proposed riffles and pools to increase hydraulic complexity. The primary channel will be extended to direct flow into the mainstem.

Proposed side channels along the primary channel distribute flow to previously dry areas and promote hydraulic complexity in the floodplain. The channels are designed to be meandering with several braided connections. Flows as low as the 2-year event will contribute to the historical connection with Cactus Wren Creek as a result of these side channels.

4.2.4 Wet Meadows

The upland area north of Reaches 1 and 2 houses three distinct areas: Bobcat Creek, Quino Wet Meadow, and Vireo Wet Meadow. Similar to the mainstem, these areas have been substantially disturbed by historical mining activities. Existing roads and spoil piles disrupt natural drainageways and disconnect the wet meadows from the mainstem. Proposed reestablishment and rehabilitation of the wet meadow areas focuses on meandering channels and generating hydraulic complexity.

Existing flow from Bobcat Creek transforms into sheet flow as it enters the flat upland area and becomes dammed as it encounters an existing road. This area was managed for non-native plants and then revegetated with native plants as part of the Pre-Bank. Proposed work in this area would increase overall wetland functions and would include removal of the existing road and the creation of small meandering channels to direct flow from the creek to the mainstem floodplain. Several braided and meandering channels will distribute the flow across the area. Graded mounds will allow for complex inundation patterns and depths to support wet meadow habitat. Several connections to the mainstem will be graded as channels across the terrace. Where possible native plants will be salvaged and reused.

Proposed grading in Vireo Wet Meadow would transfer flow across the meadow with braided channels and swales. An existing flow connection from the east side of Vireo to the west side of Bobcat will be maintained. A small rock weir will direct a portion of flow from Vireo to Quino Wet Meadow under flows greater or equal to the 2-year event. Proposed floodplain terraces will remove existing spoil piles and improve connectivity with Reach 2 of the mainstem. Graded mounds will provide microtopography and provide high-flow refugia, with varying inundation depths adjacent to the channels.

There are two tributaries that contribute flow on the east and west side of Quino Wet Meadow. Proposed grading would transform distributary sheet flow from these tributaries into meandering channels and swales. Graded mounds will provide microtopography with varying inundation depths adjacent to the channels. Roughness patches will be added at channel intersections to promote

backwatering into swales and increase hydraulic complexity. Culverts, trail removal, and graded channels were designed to redirect runoff and reduce flooding on roads.

4.2.5 Vernal Pools

Naturally occurring vernal pools in the San Diego area can be found on mesa tops, in road ruts, and in alluvial floodplains. For the Otay River Mitigation bank, an upper terrace with a series of intersecting trails at the base of a steep slope was chosen for vernal pool creation based on upstream watershed area, soil characteristics, and presence of existing pools.

4.2.6 Upland/Transitional Buffer

In addition to directly improving aquatic resource functions onsite this project aims to improve the adjacent upland buffer areas thereby indirectly further improving (protecting) the aquatic resource functions. Non-native species would be removed and where appropriate planting and seeding would occur. Habitats in the upland transitional buffer are expected to include native grassland, coastal sage scrub, elderberry scrub, toyon/laurel sumac scrub, sycamore woodland, vernal pools, and maritime succulent scrub.

4.3 Rationale for Expecting Implementation Success

Hydrology is generally considered the most important variable driving wetland and aquatic resource development (Mitsch and Gosselink 2000). 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 non-native plant species. The site has historically supported a perennial/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 proper understanding of the current conditions, in particular hydrology and soils, ICF restoration specialists, hydrologists, civil engineers, and landscape architects have developed a restoration strategy with appropriate elevations, contours, and slopes. This, coupled with the correct selection of local riparian, transitional, and upland species, would result in the high probability of successful reestablishment, establishment, and rehabilitation of a functional river channel and floodplain system.

The Bank site design is also expected to be successful because of its location adjacent to an existing mitigation site that is currently being implemented (which includes non-native species removal all the way to Savage Dam), because the Bank has been designed by the same firm (ICF) as the mitigation site and was designed to blend seamlessly together, and because the Bank is the farthest upstream non-restored portion of the Otay River within the Lower Otay River Watershed. In addition, the Bank site is located adjacent to other open space parcels, and a portion of the Bank is within an open space preserve under the management of the City of Chula Vista. The adjacent open space and other potential future restoration and mitigation efforts that may occur in this area as a result of separate projects would contribute to improved native habitat connectivity and wildlife habitat in the Lower Otay River. In addition, the site's likelihood of success would be furthered by a monitoring and maintenance program following installation, combined with long-term management and funding for long-term management.

The surface hydrology and groundwater conditions currently support primarily invasive riparian vegetation (Tamarisk); therefore, appropriate conditions exist to support aquatic species once grading activities and invasive species eradication is conducted. Grading and contouring would improve conditions for water and sediment flow during rain events and would optimize elevations for expansion of the riparian habitat. Species compositions for the Bank plant palettes were determined using surrounding native habitat as a reference and species observed in the area. Invasive non-native species that have displaced native species in the project area would be removed, and an upland buffer area would help protect the site from further invasion.

Groundwater wells are currently established in several areas and would be used to determine depth to groundwater and appropriate grading depths and limits (see Section 4.4). Although Savage Dam impounds the Otay River waters upstream, flow occurs in the channel as a result of seasonal rain events, as well as input via secondary flow channels and overland flows. Groundwater elevations are believed to be shallow onsite, as evidenced by the series of seasonal ponds in the northern section of the site, surface ponding in shallow areas during even dry years, existing riparian vegetation, and records from the projects monitoring wells, which recorded groundwater levels at a range of 1.6–9.5 feet below the existing ground surface (Table 4-2). This information would be used to establish final plant palettes and final elevations as necessary to allow for successful establishment of riparian and floodplain species (Figure 4-6).

4.3.1 Vernal Pool, Rationale

Rehabilitation of existing vernal pools is expected to be successful as the pools currently exhibit the needed hydrology to support vernal pool flora and fauna including the presence of obligate species like San Diego fairy shrimp and spadefoot toad. Removing non-native species and introducing native vernal pool endemic species and structure (i.e., boulders) will enhance the existing habitat without affecting existing invertebrates.

New vernal pools created in the project area were designed based on the size and depth of existing naturally occurring pools onsite. By modeling historic hydrologic conditions, present soil characteristics, and existing natural pool geometry, the proposed design is expected to provide ponding of at least 3cm for at least 2 weeks and will provide habitat for vernal pool flora and fauna.

Proposed vernal pool geometries are based on naturally occurring pools onsite. The size and depth of existing pools near the project area were analyzed for modeling efforts. Pool geometries were optimized based on the number and duration of fill events, while providing a range of depths and microhabitats.

The vernal pools were designed to pond at least 3 centimeters deep for a two-week period during any given year based on the habitat needs and life cycle duration of fairy shrimp. A water balance model was created to calculate ponding depth, volume, and extent. Model inputs include direct precipitation, surface water runoff, and spillover from upstream pools and direct losses including infiltration and evaporation. The model was run for water years 2000-2007 based on available precipitation and evaporation data.

Precipitation data was collected from the Lower Otay Reservoir ALERT Station in one-hour increments from August 1951 to March 2008. Watershed delineation was completed to determine the size and location of areas contributing runoff. The location of each pool maximizes its individual watershed area and allows for overflow into downstream pools. The rational method was used to calculate the volume of runoff to each pool from each timestep of precipitation over the individual

contributing watershed. The runoff coefficient was set equal to 0.4, typical for undeveloped areas with some vegetation. The model was able to account for overflow from upstream pools that spill into downstream pools, assuming no losses between ponds.

An infiltration rate of 0.7 inches per day from field testing was selected for design, emphasizing the need for soil compaction during construction to minimize water loss through infiltration (Appendix I). Evaporation rates were collected from California Irrigation Management Information System at Otay Lake in one-hour increments from April 1999 to August 2020. Evaporative losses from each pool were calculated as a function of the evaporation rate and surface area of the pool at each timestep.

The proposed design includes 22 pools, with 11 different pool geometries (Figure 4-5). Maximum depths range from 0.5 to 1.4 feet, with maximum surface areas of 100 to 1,915 square feet. The proposed vernal pools make up 0.31 acres of the project area. By modeling historic hydrologic conditions, present soil characteristics, and natural pool geometry, the proposed design is expected to be successful.

The rehabilitated vernal pool complexes will receive non-native plant species treatment, installation of additional microtopographic features such as mima mounds that mimic those typically found in vernal pool complexes in the region and seeding and/or planting of vernal pool species.

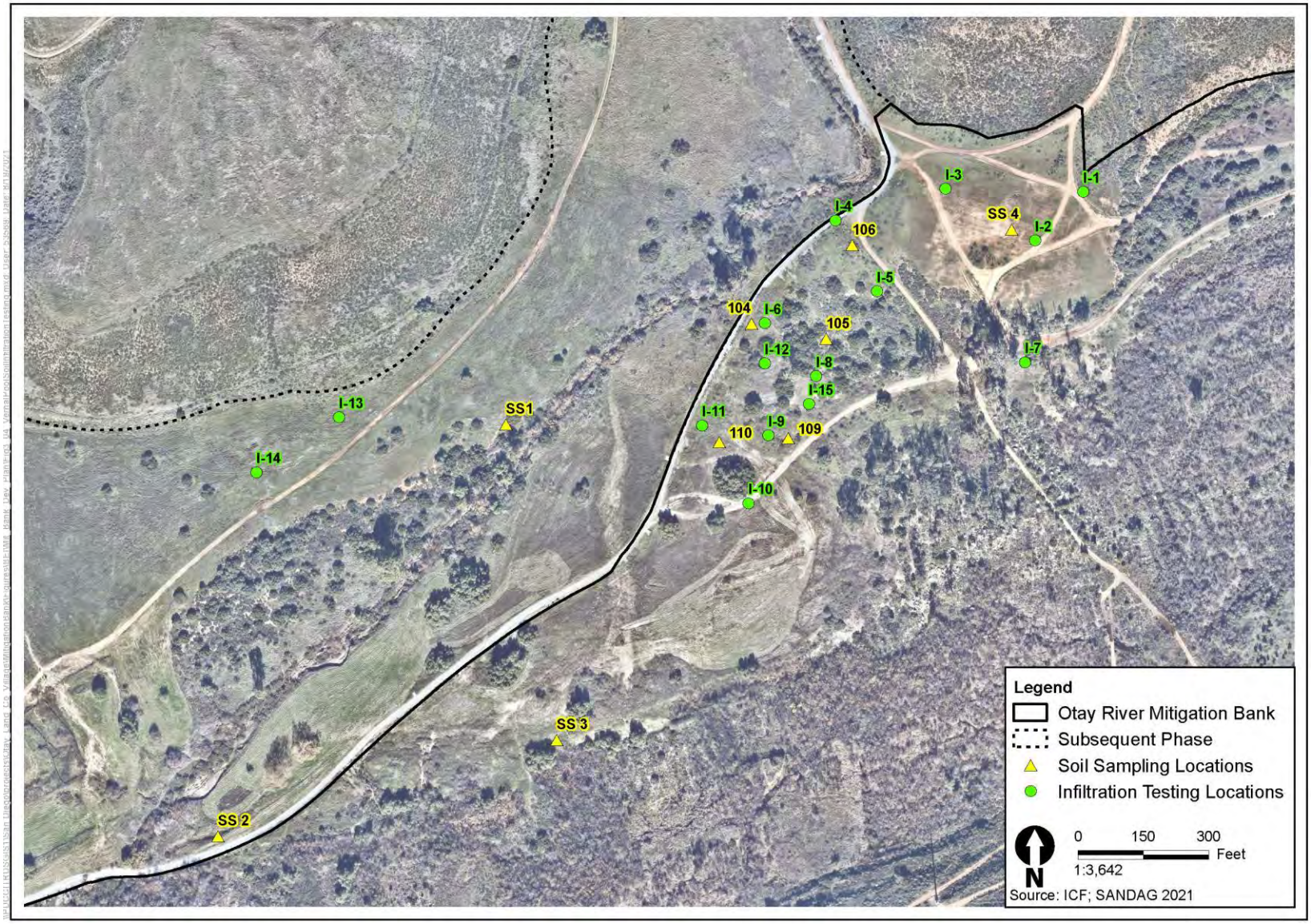

Figure 4-6 Vernal Pool Soil and Infiltration Testing Locations

4.4 Design Hydrology and Hydraulics

Development of an appropriate restoration design to meet the goals and objectives for the Mitigation Bank requires an understanding of historic, existing, and expected hydrologic and hydraulic conditions.

Two types of surface flows dominate the Mitigation Bank site: lower flood flows (<10-year event) and higher flood flows (>10-year event). Runoff from subbasins downstream of Lower Otay Reservoir dominate lower flood flows of all channels and higher flood flows of tributaries. Spills over the Lower Otay Reservoir dominate higher flood flows within the Otay River floodplain.

In order to determine lower flood flows and higher flood flows for tributaries for the Project site, ICF modeled hydrology using USACE's Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) (USACE 2018b) and methods described in the National Engineering Handbook and the*San Diego County Hydrology Manual* (County of San Diego 2003). ICF has adopted FEMA hydrology for flood flows as published in the City of Chula Vista Flood Insurance Study (FEMA 2019).

Table 4-1. Peak Flows for the Project Site Used in Hydraulic Modeling

	Discharge (cfs) for Recurrence Interval				
	2-Year	5-Year	10-Year	25-Year	100-Year
Below Savage Dam	72	190	282	414	640
Cactus Wren Creek	40	80	110	153	223
Bobcat Creek	43	88	121	167	244
Vireo Wet Meadow	21	50	72	103	156
Quino East Wet Meadow	2	6	8	11	17
Quino West Wet Meadow	7	16	23	33	50
Johnson Creek	40	90	127	181	271
O'Neal Canyon	290	666	950	1353	2028
Salt Creek	456	856	1151	1566	2256

Inundation extent, velocities, and depths for historic, existing, and proposed conditions are determined using a hydraulic model. ICF is developing a two-dimensional hydraulic model using USACE's Hydrologic Engineering Center's River Analysis System (HEC-RAS). The results of this analysis will inform the grading design and plant palette/distribution. Results of the hydraulic analysis will be included in the final BEI. Existing and proposed inundation extents for the 2-, 5-, 10-, and 25-year storm event are outlined in Figures 4-7a through 4-7j.

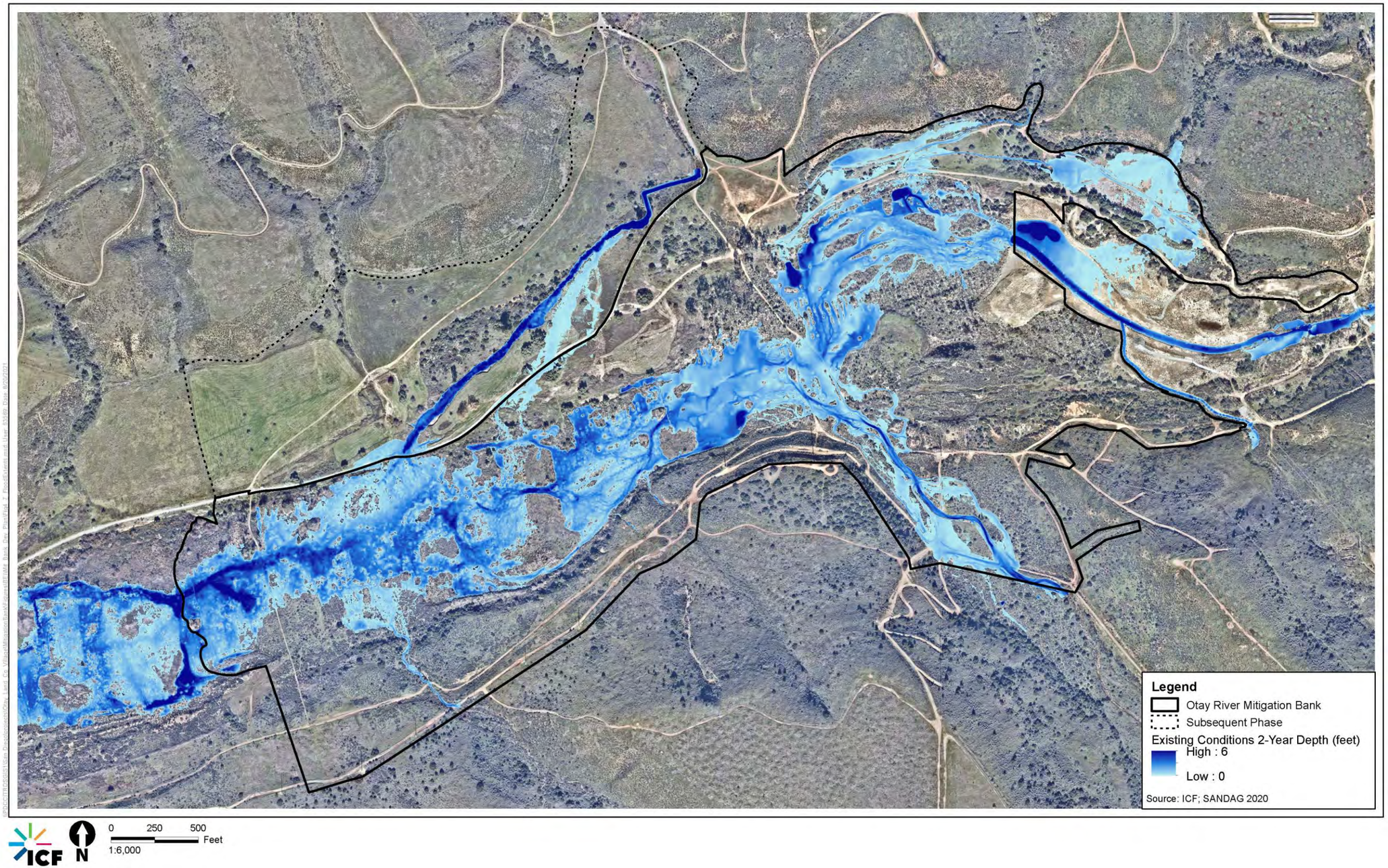

Figure 4-7a Existing Conditions 2-Year Flood Event

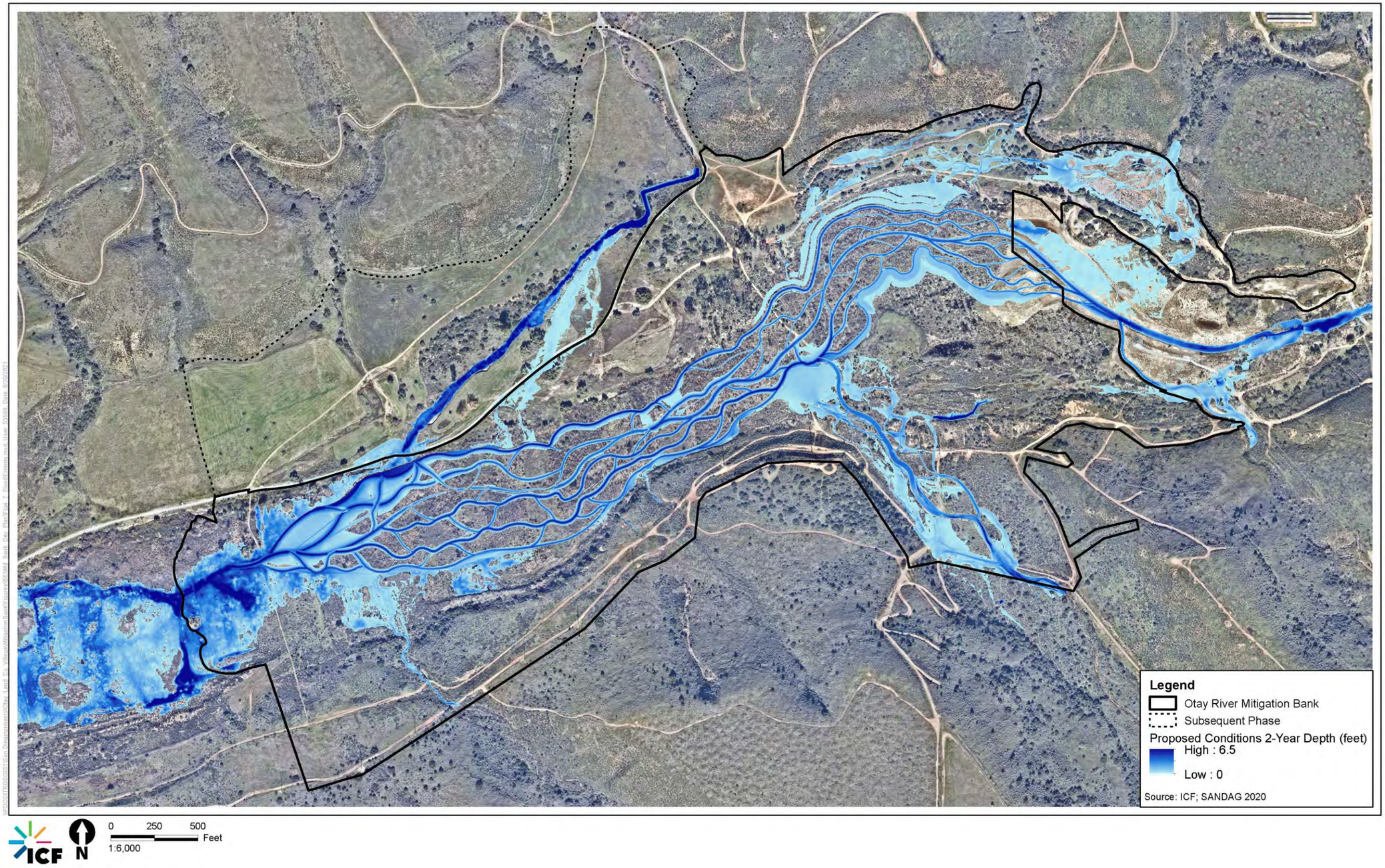

Figure 4-7b Proposed Conditions 2-Year Flood Event

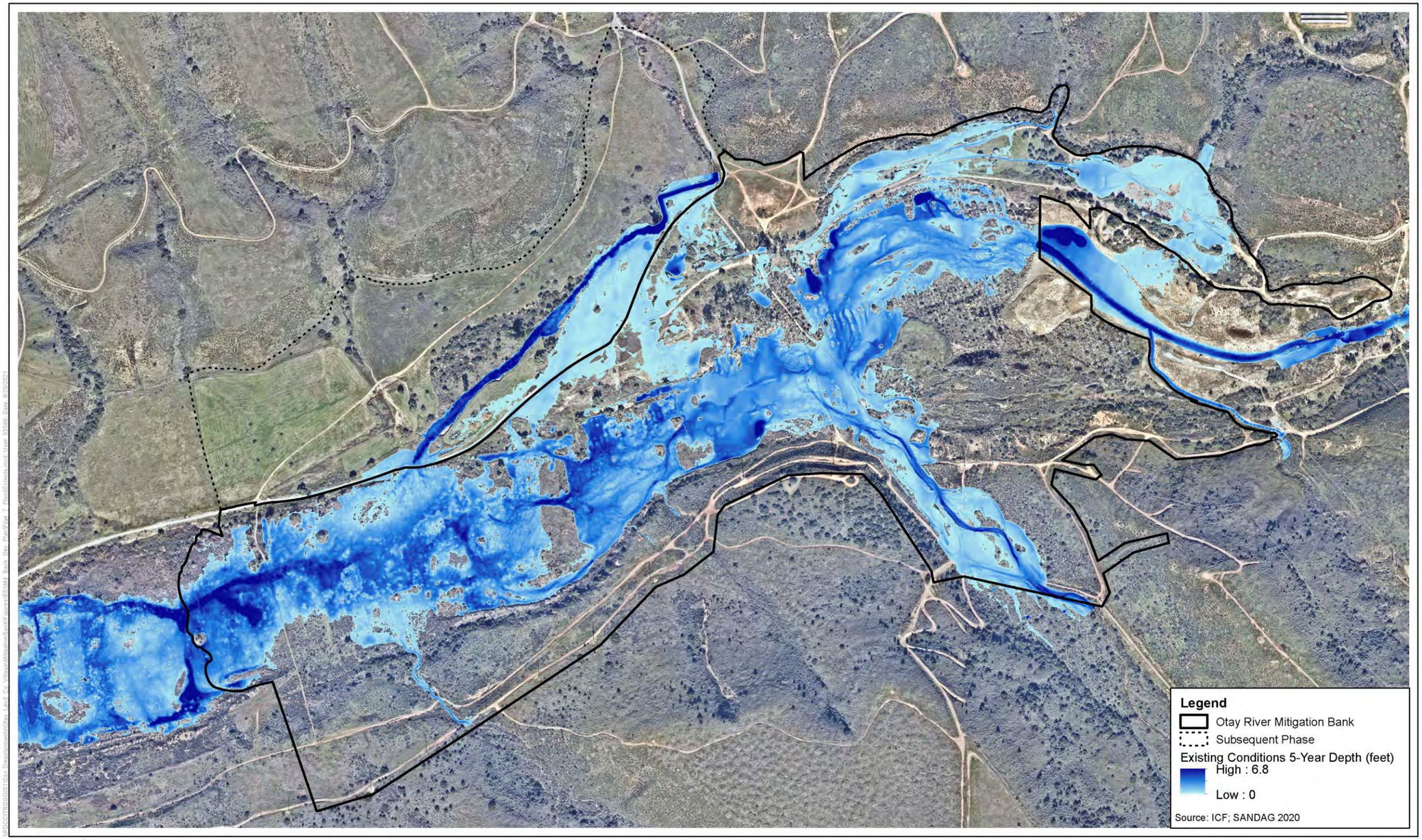

Figure 4-7c Existing Conditions 5-Year Flood Event

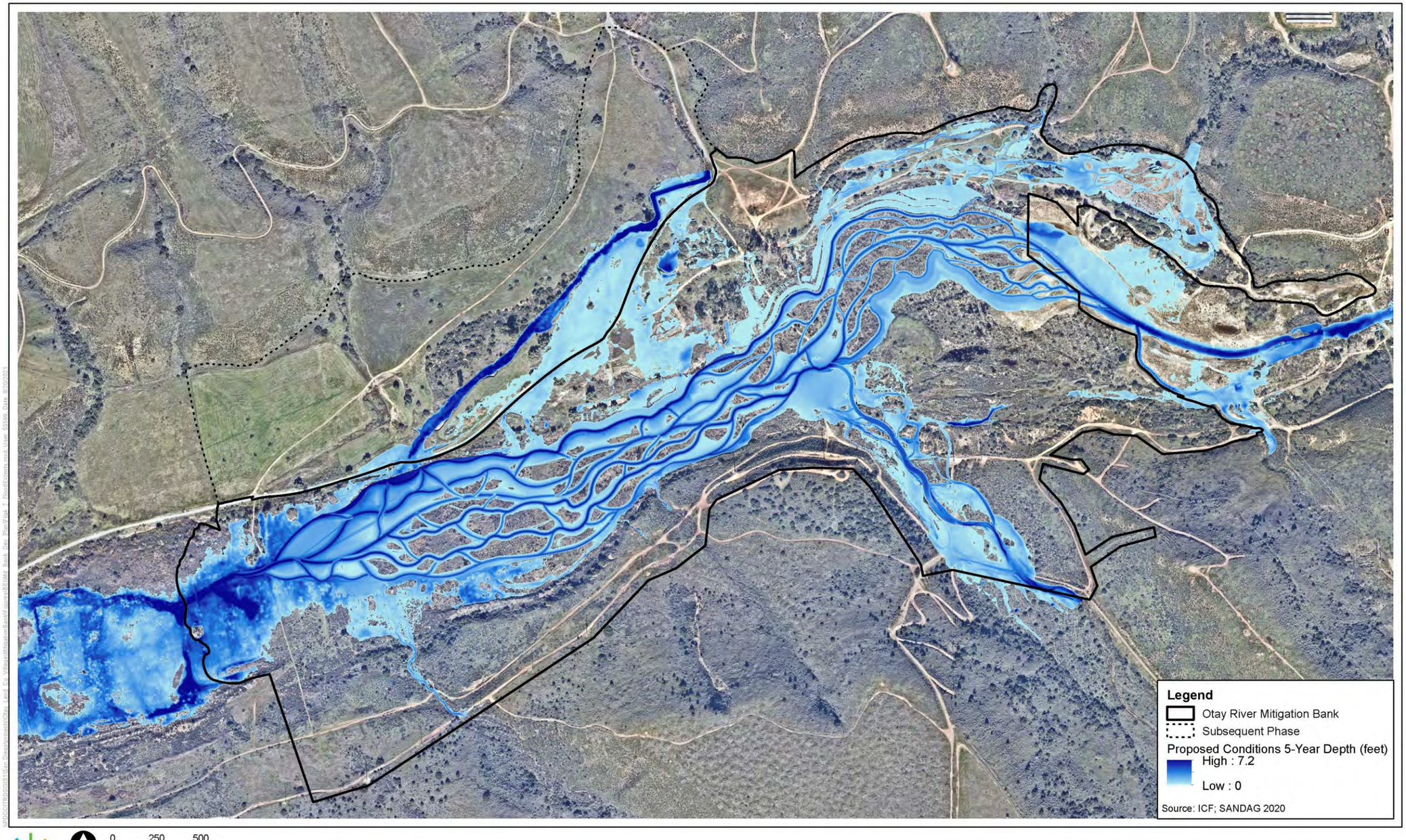

Figure 4-7d Proposed Conditions 5-Year Flood Event

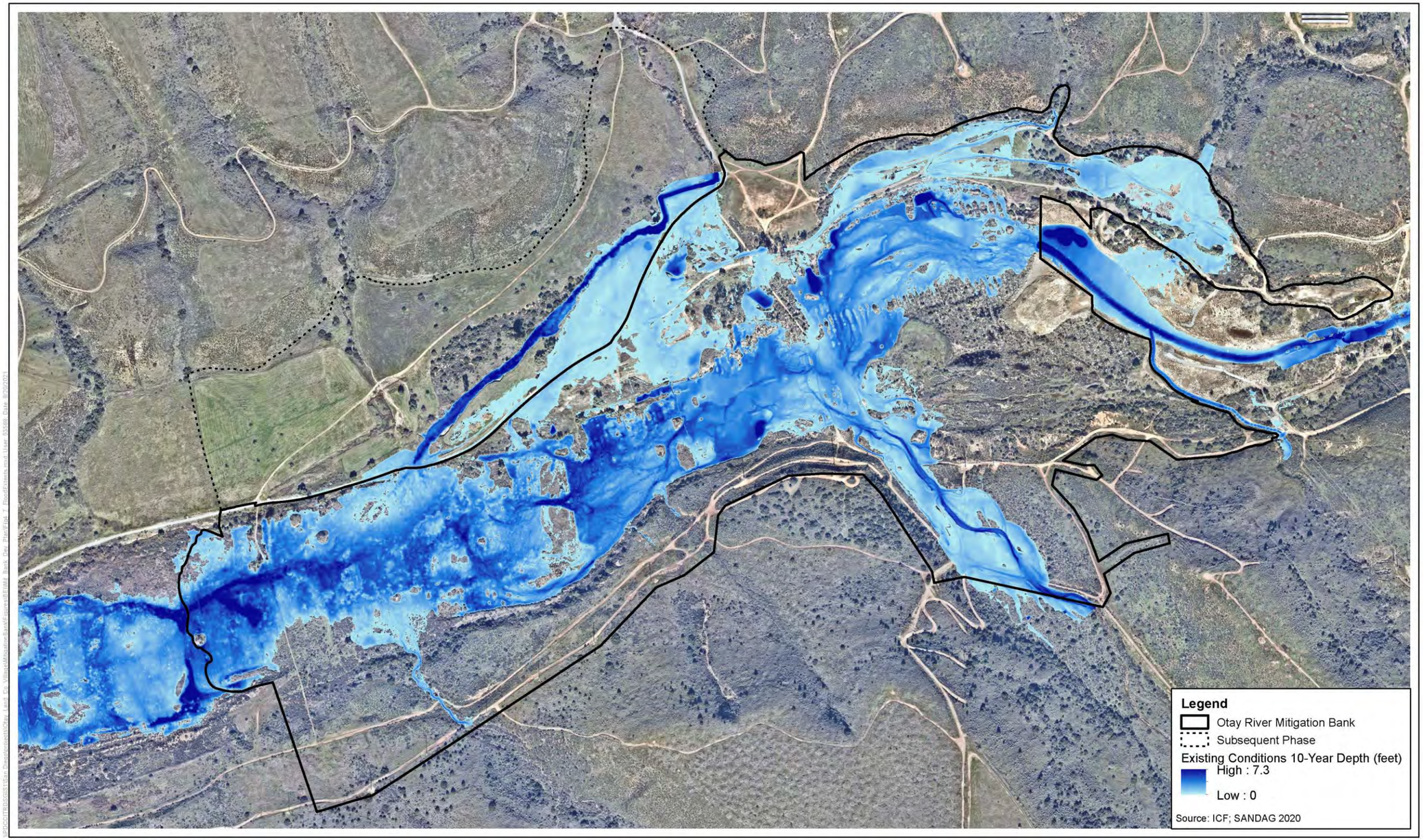

Figure 4-7e Existing Conditions 10-Year Flood Event

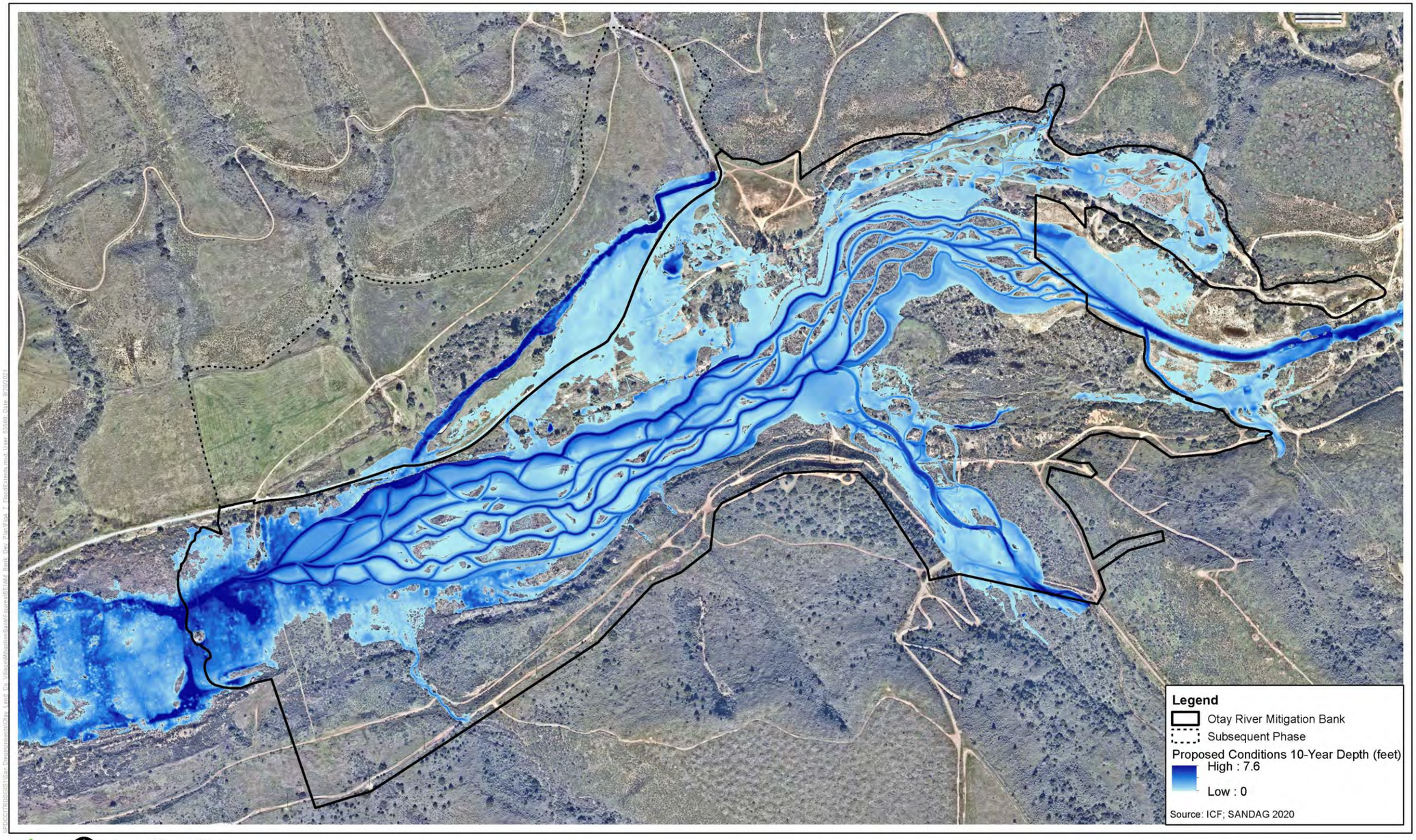

Figure 4-7f Proposed Conditions 10-Year Flood Event

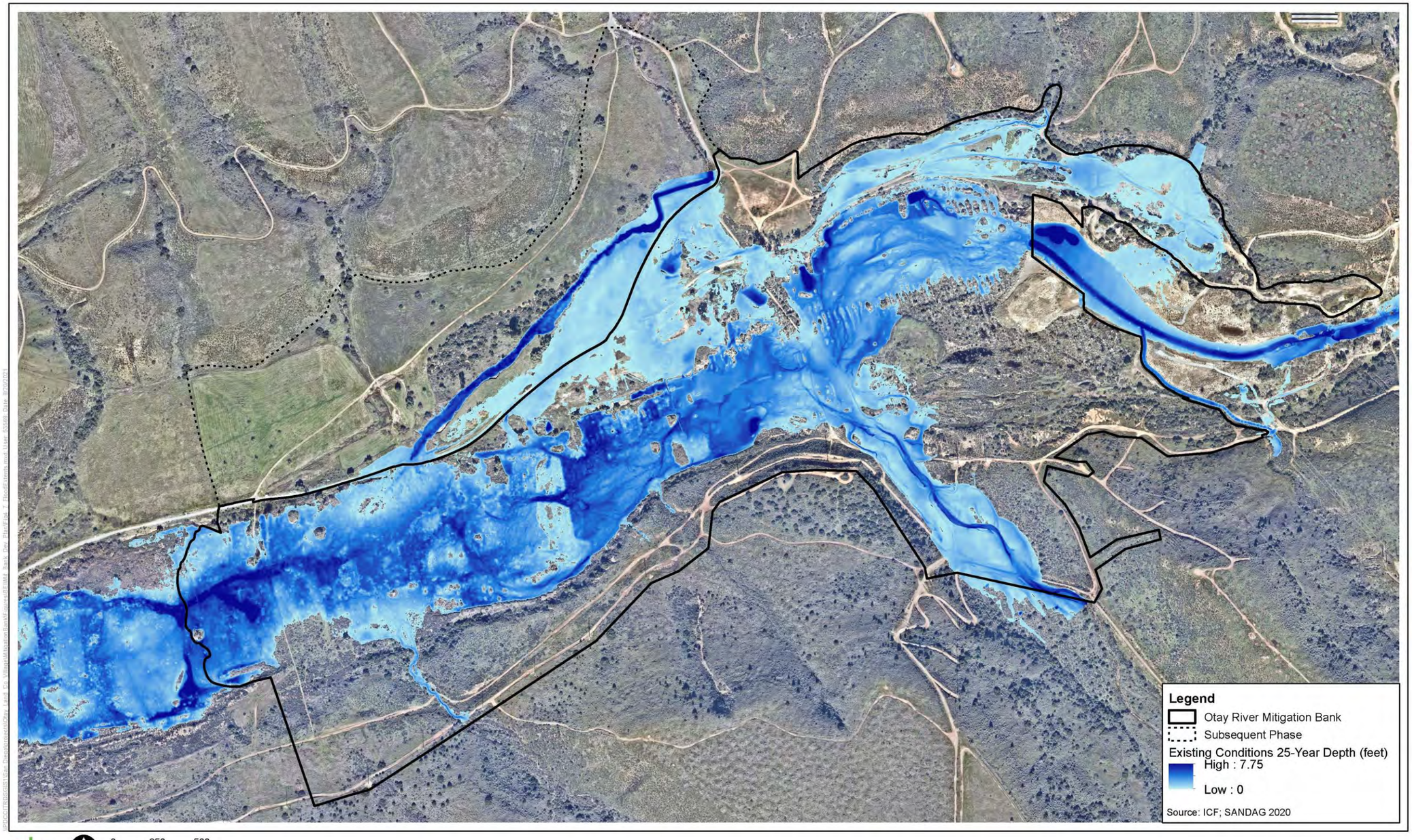

Figure 4-7g Existing Conditions 25-Year Flood Event

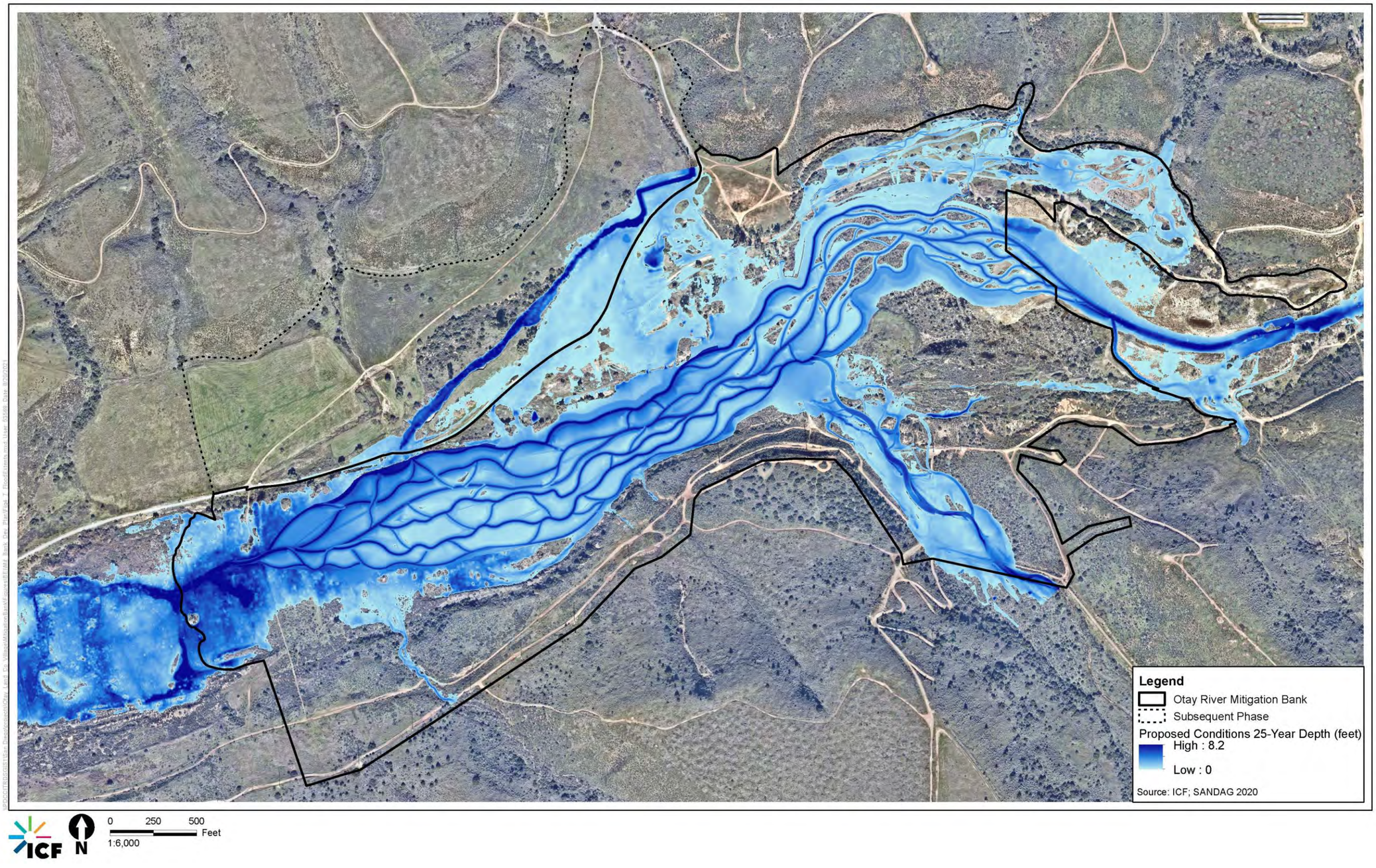

Figure 4-7h Proposed Conditions 25-Year Flood Event

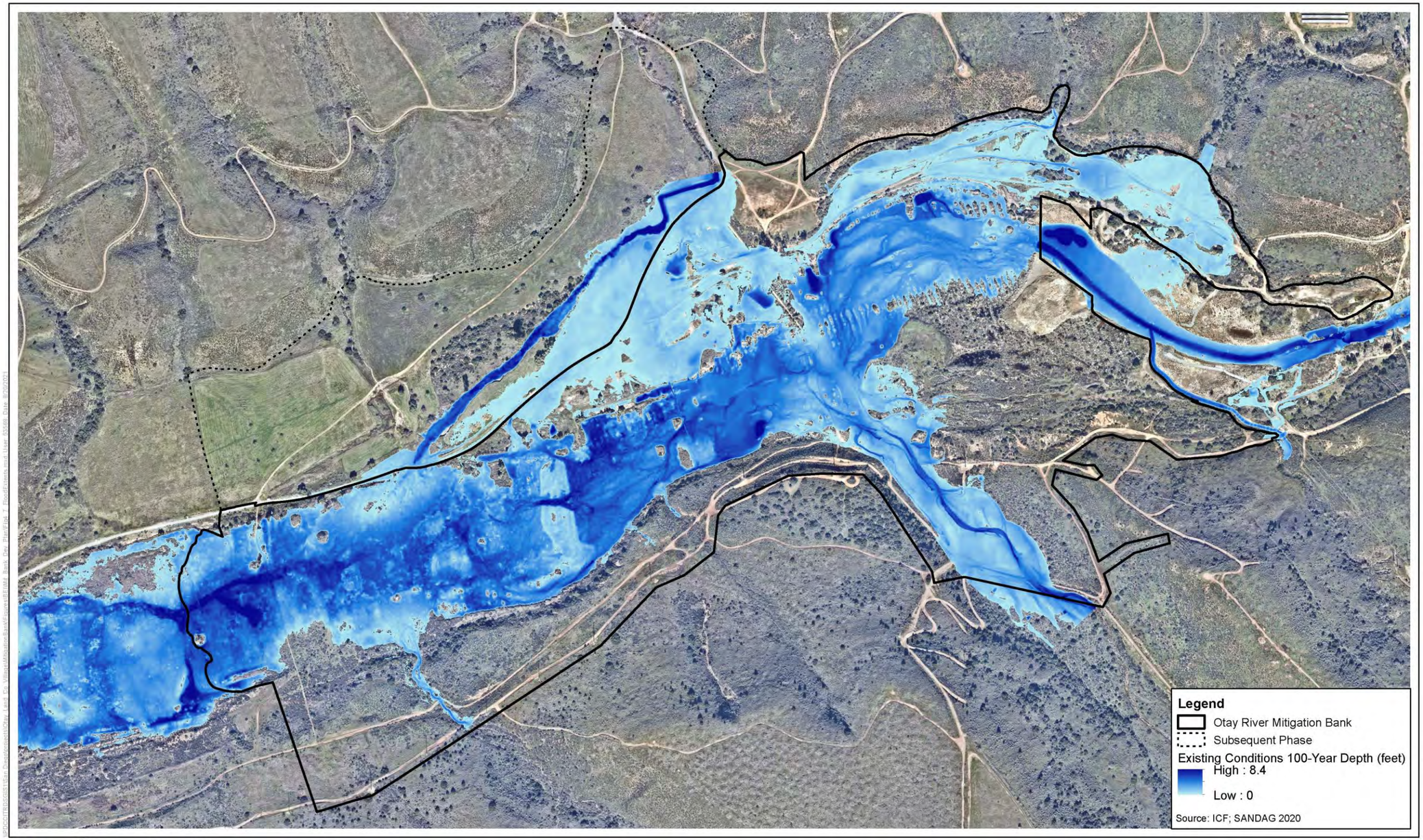

Figure 4-7i Existing Conditions 100-Year Flood Event

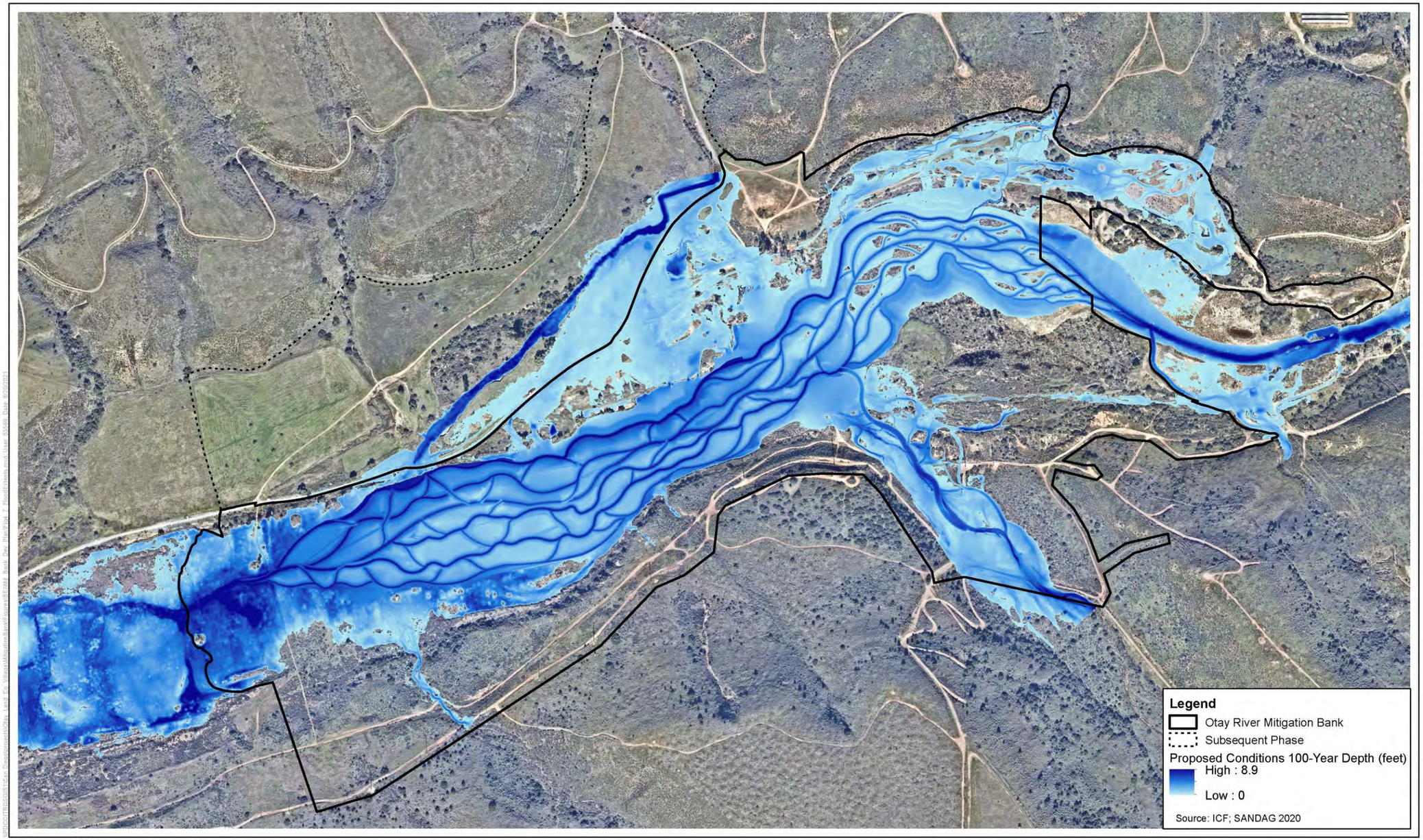

Figure 4-7j Proposed Conditions 100-Year Flood Event

Groundwater data has been continuously collected at 5-minute intervals via loggers in seven wells since September 28, 2020. To inform restoration design and credit calculations, the depth to groundwater was processed and analyzed through May 6, 2021 (Figure 4-8) (Table 4-2). The analysis indicated that the downstream most well experienced the shallowest groundwater levels during the period of record (GWW 9). The wells located on the border of the mainstem experienced the deepest groundwater levels (GWW 8 & 10).

Table 4-2. Groundwater Statistics for the Period of Record

	Depth to Groundwater (feet)						
	GWW 1	GWW 2	GWW 3	GWW 6	GWW 8	GWW 9	GWW 10
Mean for Entire Record	-7.2	-3.6	-5.9	-7.3	-9.4	-1.6	-9.5
Maximum of the Record	-4.5	-2.1	-4.0	-4.9	-6.9	-1.0	-8.4
Minimum of the Record	-9.5	-5.1	-7.9	-9.4	-11.4	-2.1	-10.2
Standard Deviation	1.9	1.0	1.3	1.8	1.5	0.2	0.4

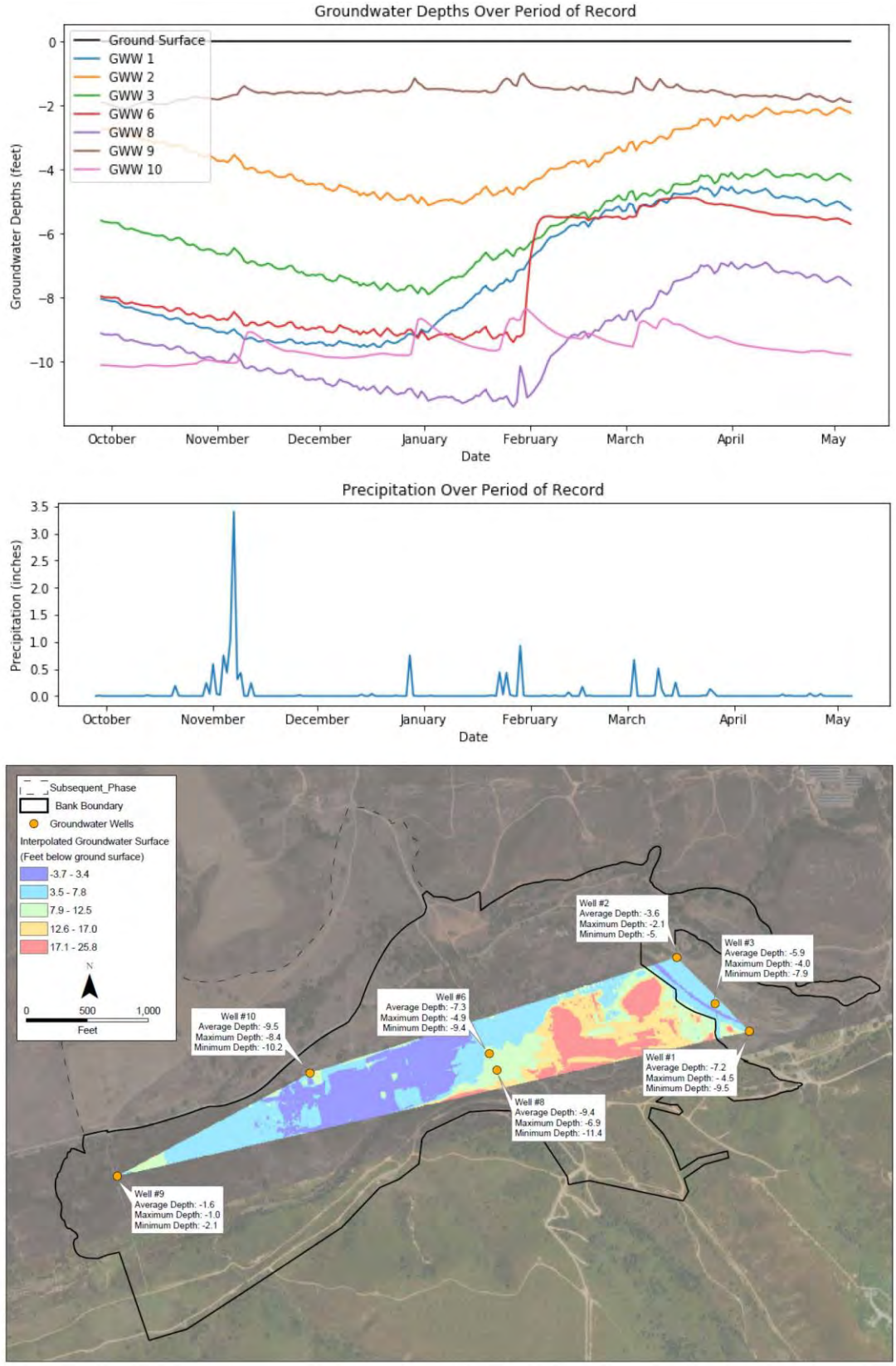

Figure 4-8 Groundwater Surface Levels, Sheet 1

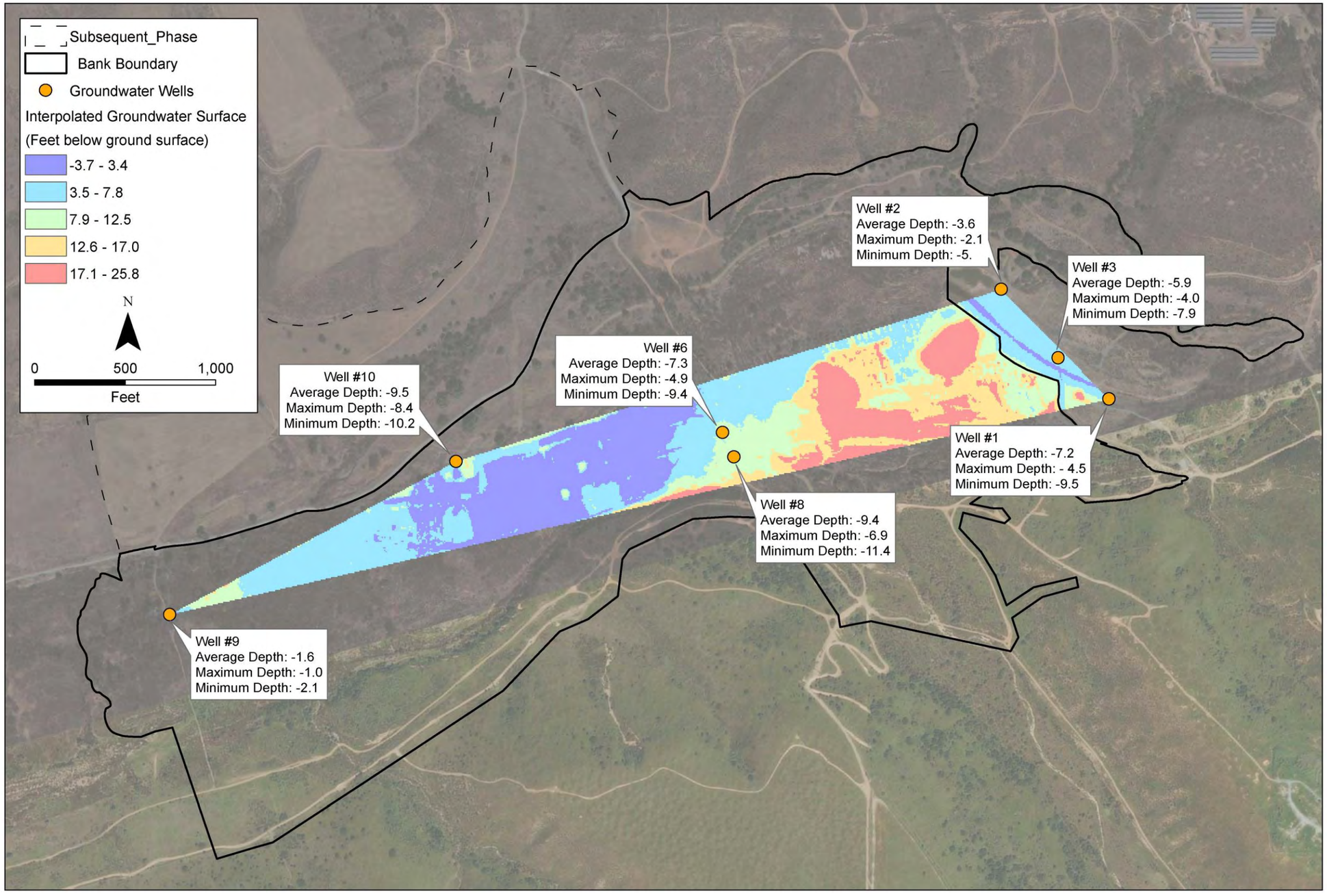

Figure 4-8 Groundwater Surface Levels, Sheet 2

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4.5 Proposed Compensatory Mitigation Credits

The Bank will provide various forms of mitigation credits, including establishment, reestablishment, enhancement and rehabilitation of WOUS, WOS, and CDFW jurisdiction, in addition to Covered Species Establishment and Covered Species Preservation Credits for least Bell's vireo (*Vireo bellii pusillus*) and Covered Habitat Preservation, Covered Habitat Establishment, and Covered Habitat Rehabilitation Credits for vernal pools. The compensatory mitigation acreage and credits proposed for the Bank are shown on Figure 4-4, Tables 4-3 through 4-7 and Exhibit F-1. Figures 4-9 through 4-13 show the credits by major type: WOUS, WOS, CDFW, Covered Species and Covered Habitat, respectively.

There are approximately 11.05 acres of easements within the Bank that are excluded from crediting. WOUS, WOS, and CDFW Credits are based on the jurisdiction of that aquatic resource type. The Covered Species Preservation Credits for least Bell's vireo are those areas with active territories in 2020 that are on land owned by the Bank Sponsor. Lands owned by the City of Chula Vista are excluded since the land is already preserved within the Multi-species Conservation Plan. The Covered Species Establishment Credits for least Bell's vireo are areas within the Otay River and floodplain that will be restored through the removal of nonnative species (primarily tamarisk) and will be replanted with native riparian and wetland vegetation. The Covered Habitat Establishment Credits for vernal pools are a combination of the vernal pool and the created watershed that is essential for it to function (more detail is provided in the footnote of Table 4-7 below).

Table 4-3. Waters of the U.S. Credits

	Buffer	Non-wetland	Wetland	Total
Enhancement				
Otay River and Floodplain		0.18	0.21	0.39
Intermittent Stream (O'Neal Canyon)		0.23	0.00	0.23
Vernal Pools		0	0.04	0.04
Subtotal		*0.41*	*0.25*	*0.66*
Establishment				
Vernal Pools		5.33	0.29	5.62
Subtotal		*5.33*	*0.29*	*5.62*
Reestablishment				
Otay River and Floodplain		2.61	15.44	18.05
Intermittent Stream (O'Neal Canyon)		2.65	0	2.65
Vernal Pools		0	0.10	0.10
Wet Meadow		2.61	4.09	6.69
Subtotal		*7.87*	*19.62*	*27.49*
Rehabilitation				
Otay River and Floodplain		5.04	45.21	50.25
Intermittent Stream (O'Neal Canyon)		0.56	0	0.56
Vernal Pools		0	0.24	0.24
Wet Meadow		0	0.04	0.04

	Buffer	Non-wetland	Wetland	Total
Subtotal		*5.60*	*45.49*	*51.09*
Buffer	134.81	-	-	134.81
Total	**134.81**	**19.21**	**65.65**	**219.66**

Table 4-4. Waters of the State Credits

	Buffer	Non-wetland	Wetland	Total
Enhancement				
Otay River and Floodplain		0.18	0.21	0.39
Intermittent Stream (O'Neal Canyon)		0.23	0.00	0.23
Vernal Pools		0	0.04	0.04
Subtotal		*0.41*	*0.25*	*0.66*
Establishment				
Vernal Pools		5.33	0.29	5.62
Subtotal		*5.33*	*0.29*	*5.62*
Reestablishment				
Otay River and Floodplain		2.61	15.43	18.04
Intermittent Stream (O'Neal Canyon)		2.65	0	2.65
Vernal Pools		0	0.10	0.10
Wet Meadow		2.61	4.09	6.69
Subtotal		*7.87*	*19.61*	*27.48*
Rehabilitation				
Otay River and Floodplain		5.04	45.30	50.34
Intermittent Stream (O'Neal Canyon)		0.56	0	0.56
Vernal Pools		0	1.51	1.51
Wet Meadow		0	0.04	0.04
Subtotal		*5.6*	*46.85*	*52.45*
Buffer	133.46	-	-	133.46
Total	**133.46**	**19.21**	**67.00**	**219.66**

Table 4-5. CDFW Jurisdiction Credits

	Buffer	Riparian	Streambed	Total
Enhancement				
Otay River and Floodplain		0.31	4.06	4.38
Subtotal		*0.31*	*4.06*	*4.38*
Reestablishment				
Otay River and Floodplain		9.79	1.74	11.53
Intermittent Stream (O'Neal Canyon)		2.31	0	2.31
Wet Meadow		6.67	0	6.67
Subtotal		*18.77*	*1.74*	*20.51*
Rehabilitation				

	Buffer	Riparian	Streambed	Total
Otay River and Floodplain		62.29	17.76	80.05
Intermittent Stream (O'Neal Canyon)		1.13	0	1.13
Vernal Pools		1.45	0	1.45
Wet Meadow		0.07	0	0.07
Subtotal		*64.95*	*17.76*	*82.70*
Buffer	112.15	-	-	112.15
Total	**112.15**	**84.03**	**23.56**	**219.74**

Table 4-6. Covered Species Credits (least Bell's vireo)

	Acres
Establishment	42.09
Preservation	1.77
Total	**43.85**

Table 4-7. Covered Habitat Credits (vernal pools)

	Acres
Establishment (pool and associated watershed)[1]	6.27
Rehabilitation	0.39
Preservation	0.55
Total	**7.21**

[1] A total of 0.32 acre of vernal pools will be created along with 5.95 acres of associated watershed. The watershed will feed surface and sub-surface water into the vernal pools and are essential for the pools to properly function. Each vernal pool credit equals 0.05 acre of vernal pool + 0.95 acre of associated watershed.

4.5.1 Compensatory Mitigation Credit and Ecozone Rationale

The compensatory mitigation acreage and credits proposed for the Bank were estimated by utilizing a diverse methodology, including hydrologic and hydraulic modeling, GIS analyses, and field surveys (existing vegetation, jurisdictional delineation, groundwater wells), all refined with best professional judgment (BPJ). In addition to the specific jurisdiction for each credit and the type of restoration, it is also important to understand the local ecosystem, referred to as the ecozone. As such, before the ecozone identification process was complete the primary ecozones were identified for the project limits. The ecozones represent broad distinct areas of similar ecological functions and values for aquatic resources and the associated flora and fauna. These ecozones were classified using anticipated onsite post-restoration variables including but not limited to hydrology (velocity, inundation, etc...), vegetation, geography/topography, and overall landscape setting. The classifications of Ecozones and the delineation of various jurisdictional credits were made using the best available data and best professional judgment from a variety of specialists including hydrologists, ecologists, biologists, and geomorphologists. The following sections present an overview of these decisions.

4.5.2 Modeling Approach

Inundation extents, velocities, and depths for historic, existing, and proposed conditions were determined using a hydraulic model. ICF developed a two-dimensional hydraulic model using USACE's Hydrologic Engineering Center's River Analysis System (HEC-RAS). To best understand the morphological function of the site under various conditions, the 2-, 5-, 10-, 25-, and 100-year storm events were analyzed. The results of these analyses were imported as shapefiles (extent) and rasters (velocities, depths) into ArcMap Version 10.7.1 to evaluate each credited area. The results from proposed conditions form the basis of this crediting exercise, while historic and existing conditions acted as references for current hydrogeomorphic functions at the site.

4.5.3 Best Professional Judgment Approach

Although it might appear ideal to be able to point to one model or one environmental variable and 100% to confidently predict what vegetation, hydrology, and soil characteristics will occur after restoration, in reality this is not possible. All of these variables are affected by each other as well as by regional, local, and micro conditions and long- and short-term temporal patterns, making predictions difficult. However, even with the uncertainty there are patterns to natural systems that can be observed, allowing future conditions to be inferred with moderate confidence. Where possible these inferences should be driven by data, both current and historical, if available. These data can be incorporated into models that require that a variety of assumptions be made, thus introducing uncertainty. Available data and modeled results can be overlayed to visualize how they may interact using the ecological knowledge available for a site, region, and the specific location modeled. Restoration ecologists look at the visualized data and attempt to find overlapping patterns. Where these patterns overlap, confidence increases. Where they don't overlap, often along edges and transition zones, decisions must be made using ecological BPJ. In addition to the modeled exercise above, the restoration team, including hydrologists, geomorphologists, and ecologists, used a series of data to make informed collective BPJ.

In select locations where uncertainty with modeled outcomes existed, supplemental datum were used to inform BPJ decisions. This included looking at exiting vegetation mapping and identifying the riparian (native and non-native) and emergent vegetation communities; the 3-parameter wetlands identified in the jurisdictional delineation; major contour changes from the river bottom to terrace to valley bottom; ground water well data and post-restoration elevations; 10-year modeled velocity was used to help refine potential stream reaches and floodplain extents. An image of select key datum is below. In all cases where BPJ was used, the team worked toward a reasonable yet conservative conclusion.

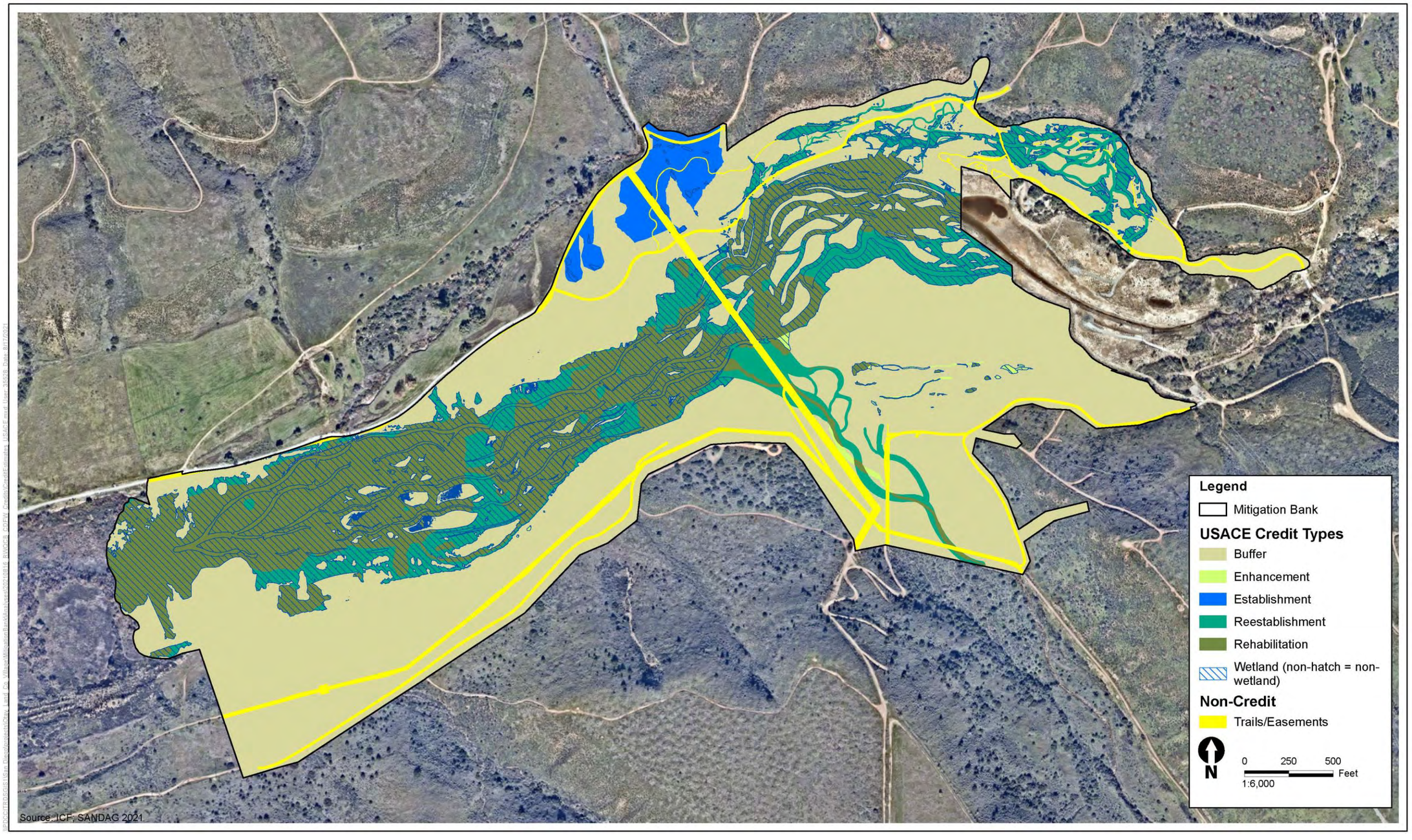

Figure 4-9 USACE Credit Estimates

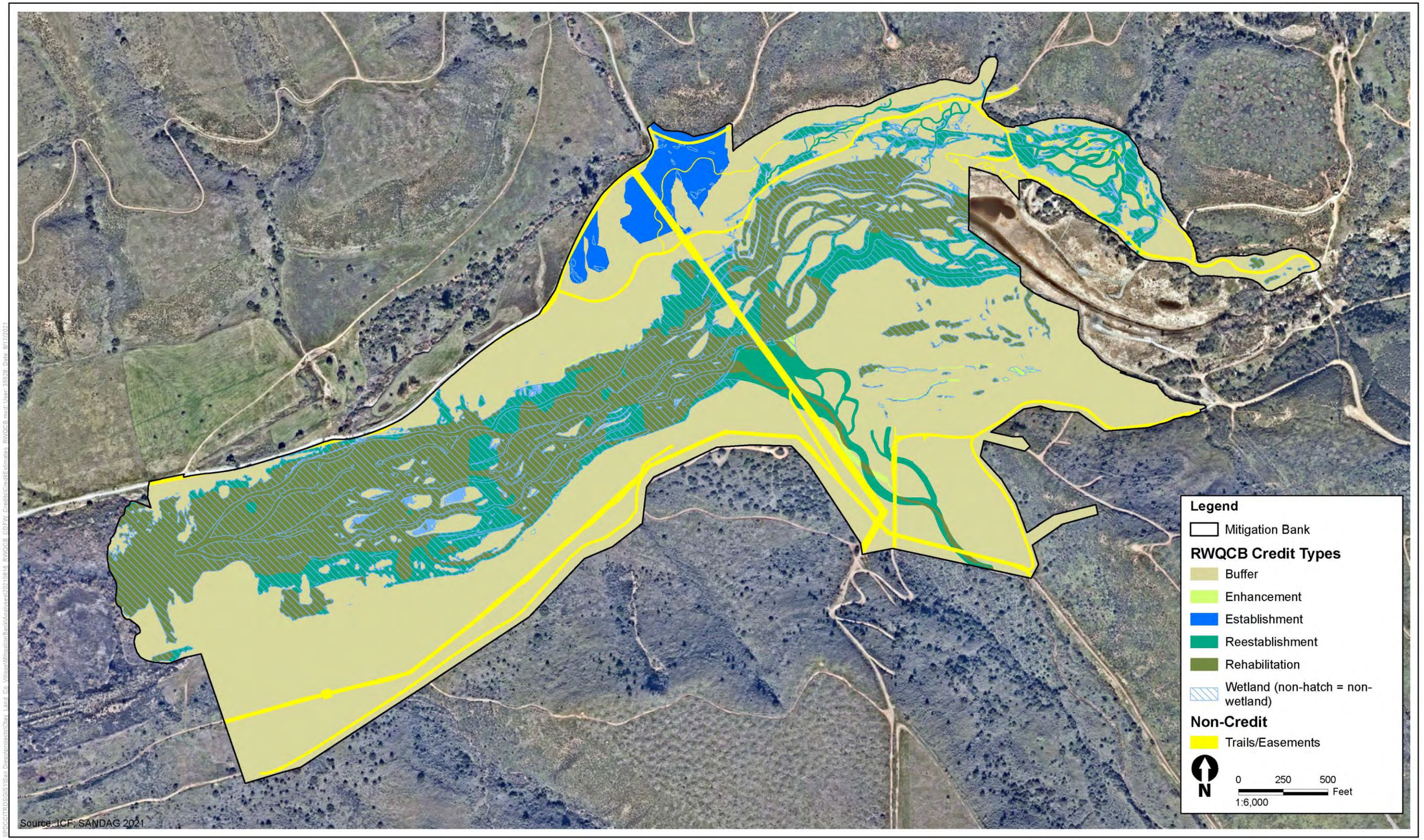

Figure 4-10 RWQCB Credit Estimates

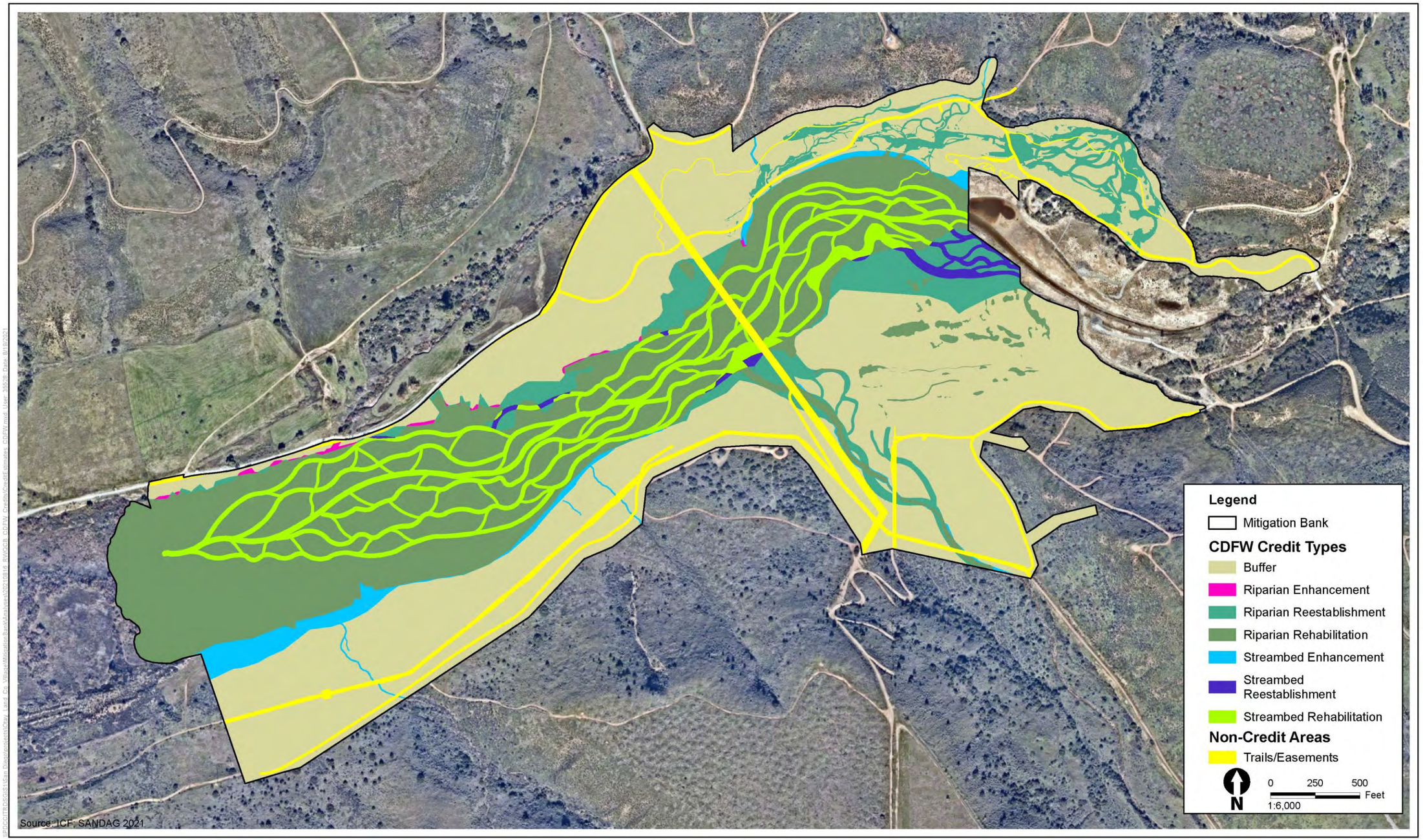

Figure 4-11 CDFW Credit Estimates

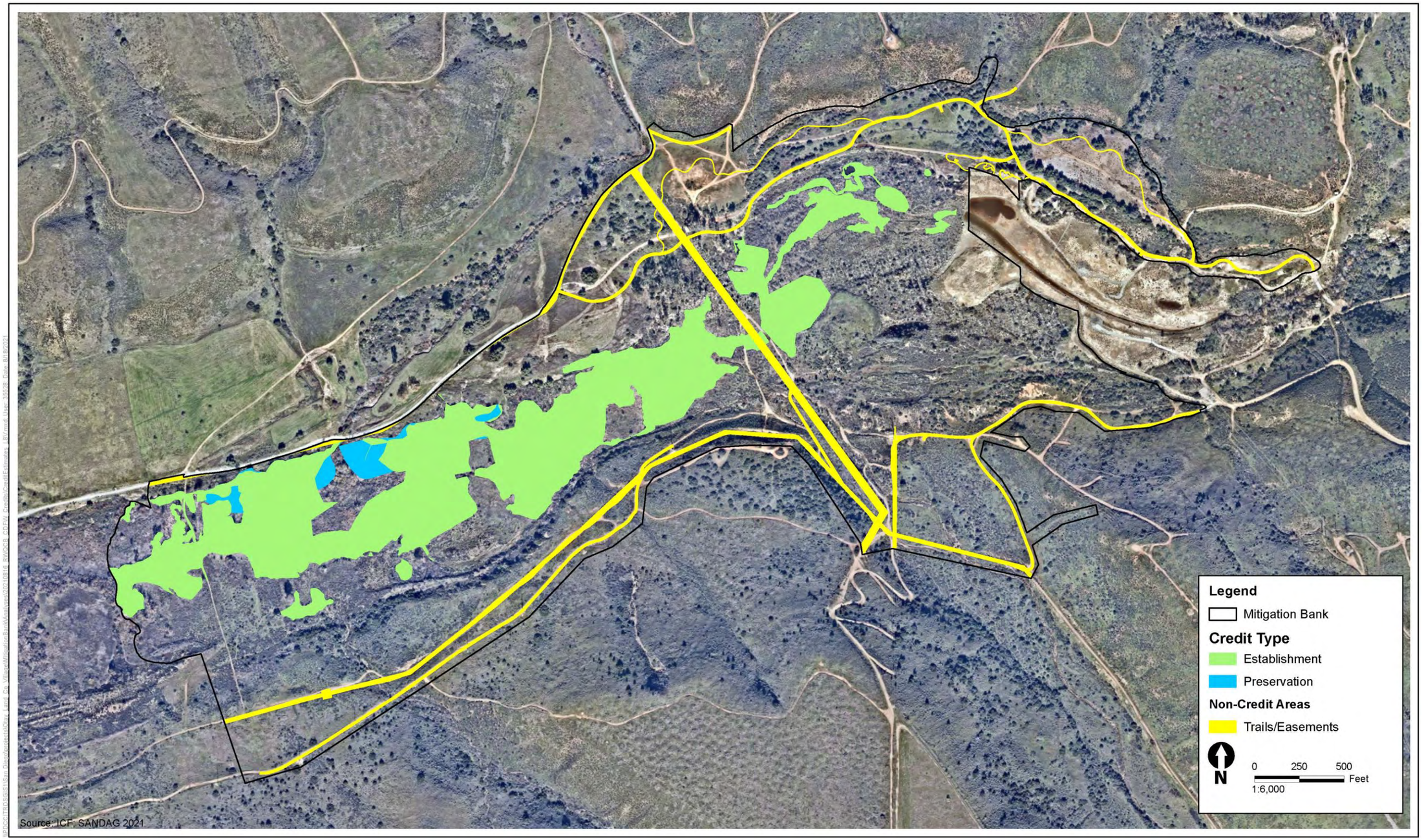

Figure 4-12 Least Bell's Vireo Credit Estimates

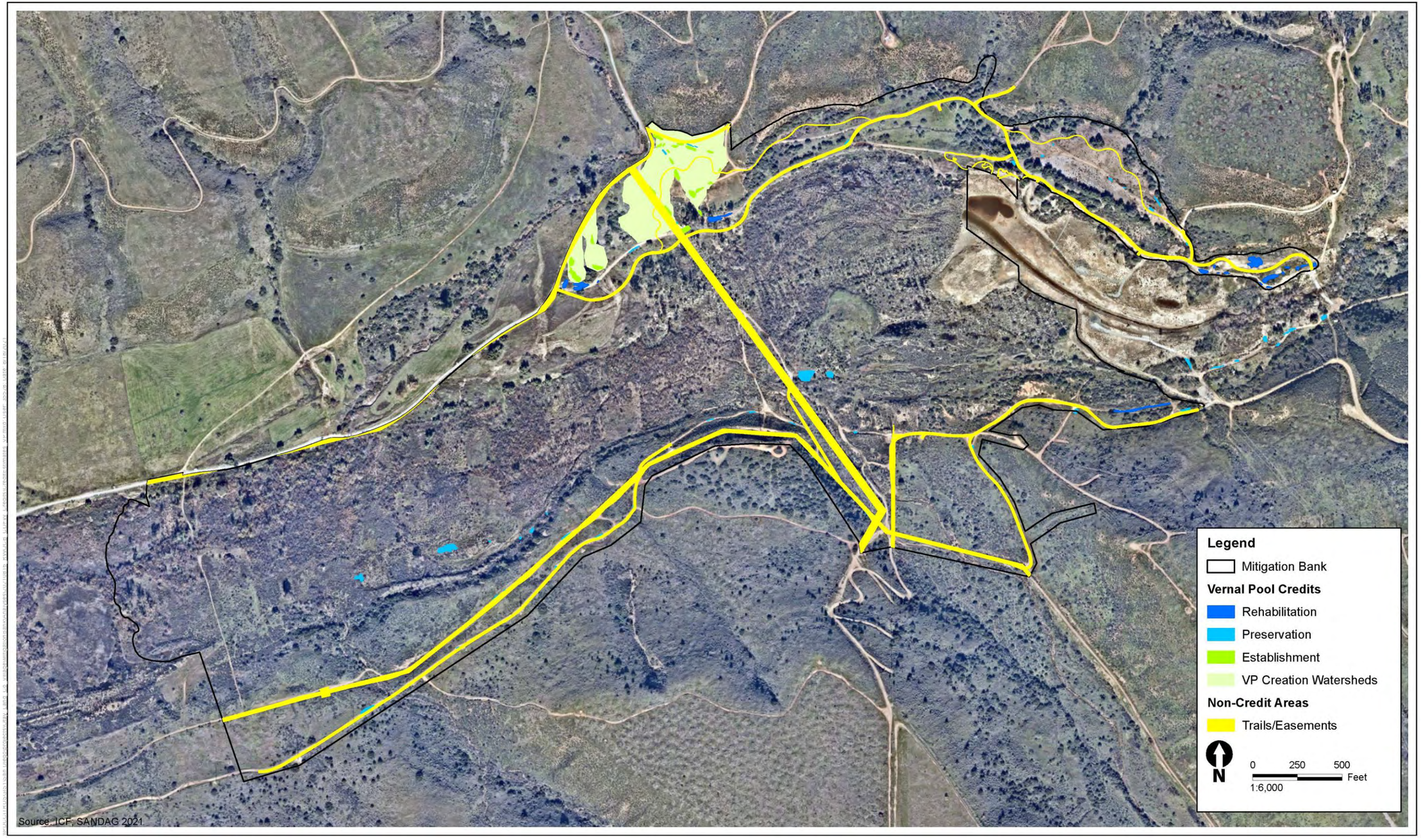

Figure 4-13 Vernal Pool Credit Estimates

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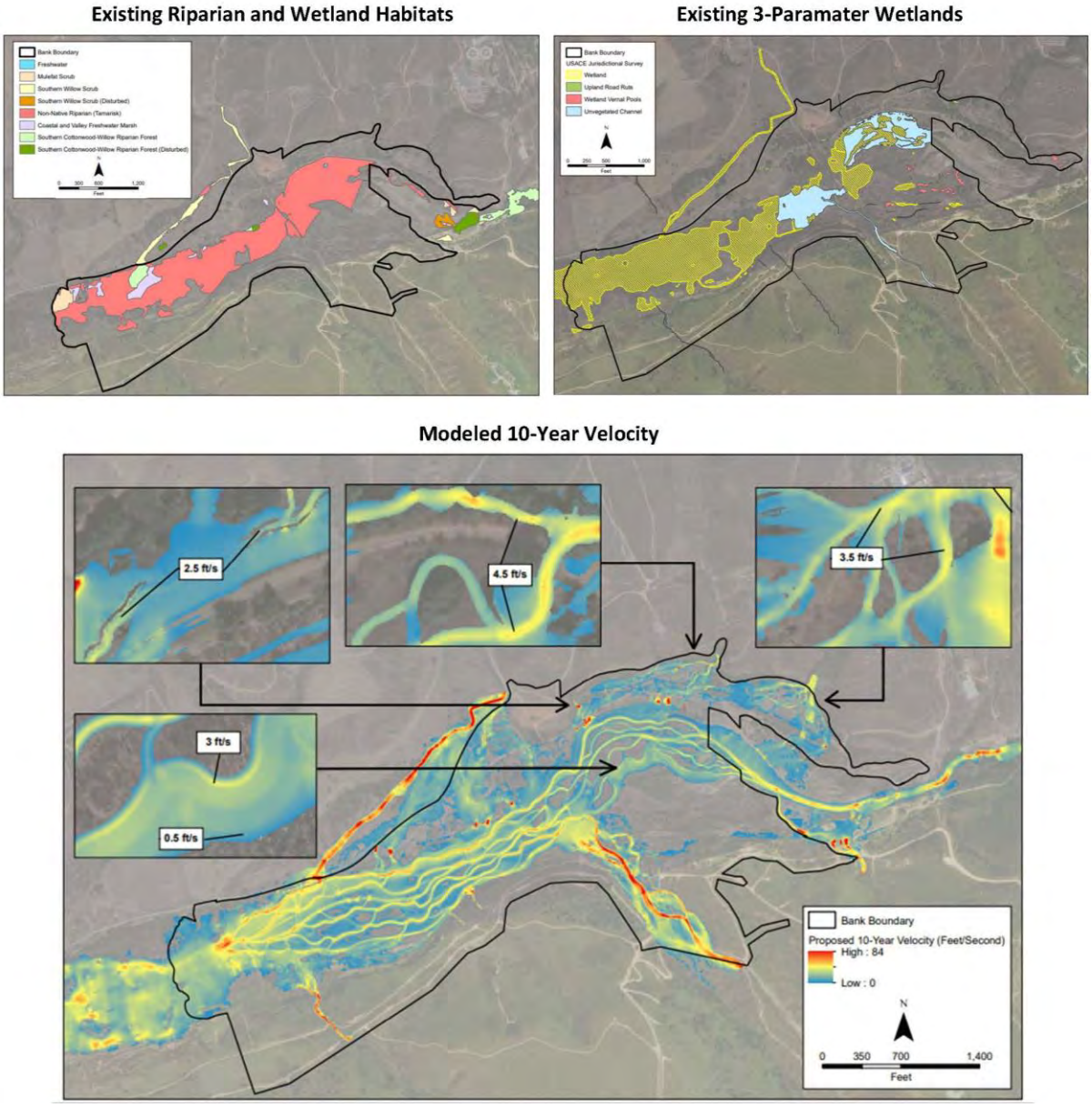

Plate 3. Select screenshots of supplemental datum

4.5.4 Discussion

4.5.4.1 Otay River and Floodplain

The flood of 1916, subsequent 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 Bank site. In particular, the Otay River mainstem channel (mainstem) was filled in and further manipulated, with the consequence that surface flows now dissipate, and water flows down-gradient from east to west as shallow groundwater through much of the Bank site with no distinct river channel present. Similarly, the

floodplain has been manipulated, with much of the area characterized by artificial mounding from the mine tailings of varying size classes ranging from silt to large car size boulders. The disturbed hydrology and topography of the site are further exacerbated by the presence of dense stands of invasive vegetation, including tamarisk (*Tamarix* spp.), arundo (*Arundo donax*), and Peruvian pepper tree (*Schinus molle*). These species provide a significant nonnative seed source to downstream habitats and use much of the available water in the upper soil profile.

Mainstem Braided Network

The proposed Otay River mainstem (mainstem) braided network is made up of primary, secondary, and tertiary channels. These channels are defined by the top of bank limits and areas expected to scour within the 10-year flood extents. The mainstem has been re-contoured to reestablish hydraulic connectivity across the valley bottom and improve flow conditions during rain events. Areas of lower velocities within the braided network are expected to support three parameter wetland characteristics based on site observations of existing wetland areas and the capacity of these locations to hold water for an extended period of time. The other areas of higher velocity are expected to be classified as non-wetland waters as a result of predicted velocities and associated scour. There is likely to be an ebb and flow between wetlands and non-wetlands based on local scour and deposition and natural riverine processes, vegetation characteristics, seasonal rainfall patterns, and long-term weather trends.

Active Floodplain

The proposed active floodplain extends beyond the braided network for the complete 10-year flood extent. It makes up the areas adjacent to channels and varying amounts of the interfluves that have been graded to remove flow obstructions and create hydraulic complexity. The floodplain is typically shallower with slower velocities and is considered entirely wetland waters based on data and onsite observations of vegetation and soils documented in the jurisdictional delineation and vegetation map.

Buffer/Riparian Extent

The proposed mainstem buffer, or riparian extent, refers to the remaining area up to the edge of the valley bottom, including the interfluves between the channels that will provide wildlife refugia during flood events. This area will be almost completely inundated by the 100-year event and will be topographically separate from the upland areas. Some areas have been graded to remove flow obstructions, including berms and sediment piles. These areas are expected to range from 5-8 feet above average ground water and are expected to support riparian species, that grow wide, moderately deep (3-7+ feet deep) root systems and can utilize ground water that has moved upward from the water table into the capillary fringe and into unsaturated soils near the surface. Many of these areas are currently dominated by tamarisk, which studies suggest has a much higher evapotransporation rate compared to many native riparian species, thus contributing to the lowering of groundwater levels. Following restoration and the extensive removal of 70+ acres of tamarisk scrub, it is expected that shallow ground water should be more available to wetland and riparian species. We expect a variety of riparian species to occur throughout the high floodplain post-restoration depending on a variety of predictable and unpredictable micro-environmental factors. The primary native riparian species included in the plant palette and currently observed onsite include arroyo willow, mule fat, black willow, red willow, California sycamore, Fremont's cottonwood, and black elderberry, along with transitional shrub species.

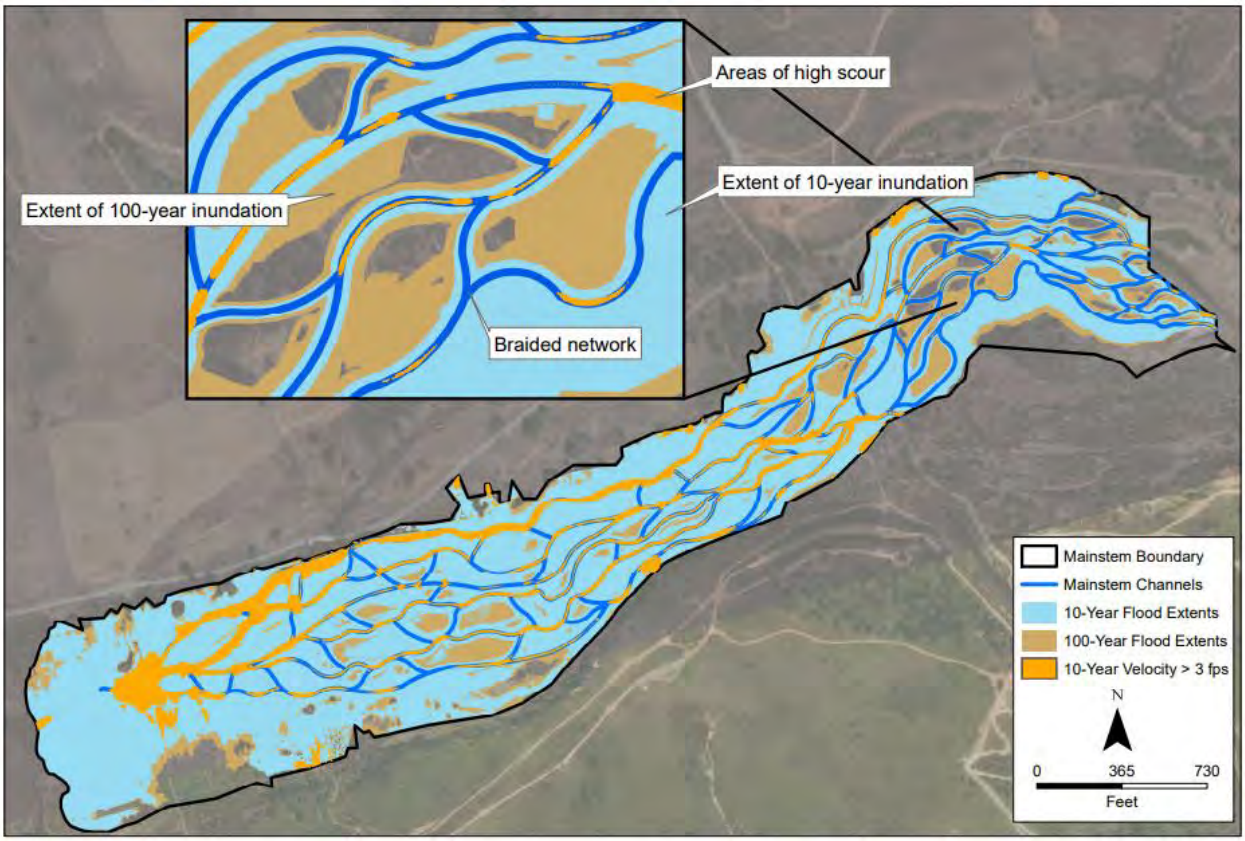

Plate 44. Screenshot of datum for river mainstem

4.5.4.2 Tributaries and Wet Meadows

Tributary Channels flowing into Mainstem (except O'Neal Canyon)

The Bank's tributaries are defined similarly to the braided network. The top of bank limits and areas of scour are incorporated into the channel boundaries. The tributaries are made up of relatively smaller meandering channels and swales. These channels are entirely non-wetland due to their higher velocities during periods of flow and ephemeral/intermittent nature.

Wet Meadows

Wet meadows are essentially the active floodplain of the tributary channels. O'Neal Canyon does not have a wet meadow component, so this is defined only for the other tributaries on the north side of the mainstem river. The wet meadow areas are defined as the shallow surfaces adjacent to tributary channels inundated by the 2-year flood. These lower velocity areas have been classified as ~~to be~~ entirely wetland post-restoration. These areas also include proposed areas of seasonal depressions that could develop into vernal pools.

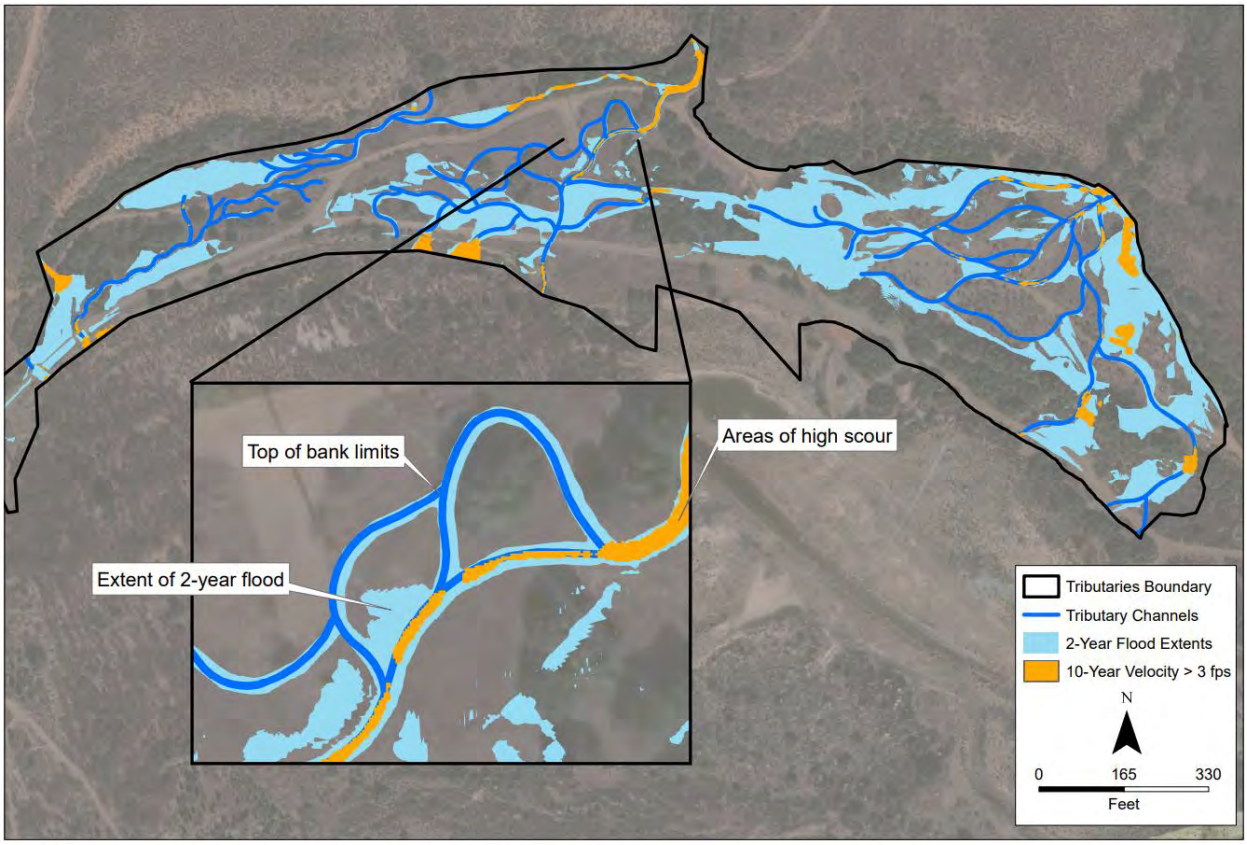

Plate 55. Screenshot of datum for wet meadows

4.5.4.3 O'Neal Canyon

O'Neal Canyon is defined separately from the other tributaries due to its larger conveyance capacity, different hydrology regime (intermittent), larger watershed, steeper grade, and more dynamic nature. The channels that make up the proposed O'Neal design are also defined by the top of bank limits and areas of scour. This tributary is made up of a primary channel with several secondary and tertiary channels that route flows around microtopography in the canyon. O'Neal Canyon is expected to remain primarily non-wetland-since the restoration activities that will occur will not change the overall system characteristics or water holding capacity of the area. However, the secondary and tertiary channels have been designed with the intent that they will increase inundation of the adjacent floodplain during high flow events.

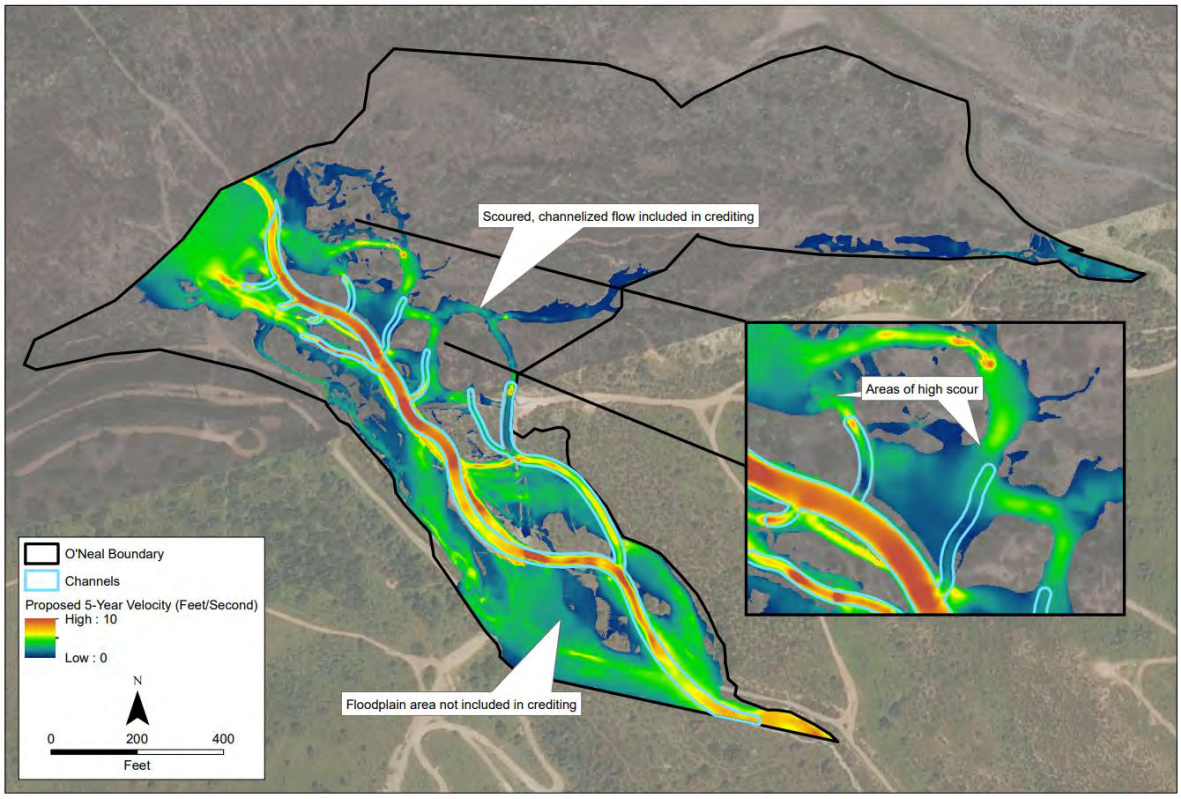

Plate 66. Screenshot of datum for O'Neil Canyon

4.5.4.4 Vernal Pools

As discussed in Section 4.2.5, vernal pools were designed for the northern upland area. The area that makes up the proposed vernal pool credits includes the top perimeter of the pool and the contributing watershed. The top perimeter of the pool represents the maximum inundation of the pool before overflowing. The geometry of each created pool is based on a naturally existing reference vernal pool within the project site. The contributing watershed dictates the volume of runoff that enters each created pool, and the watersheds were delineated from topography and hydrologic analyses in ArcMap. The vernal pools themselves make up just 4% of the total credited area (0.31 acres) versus the watersheds that make up 96% (8.4 acres).

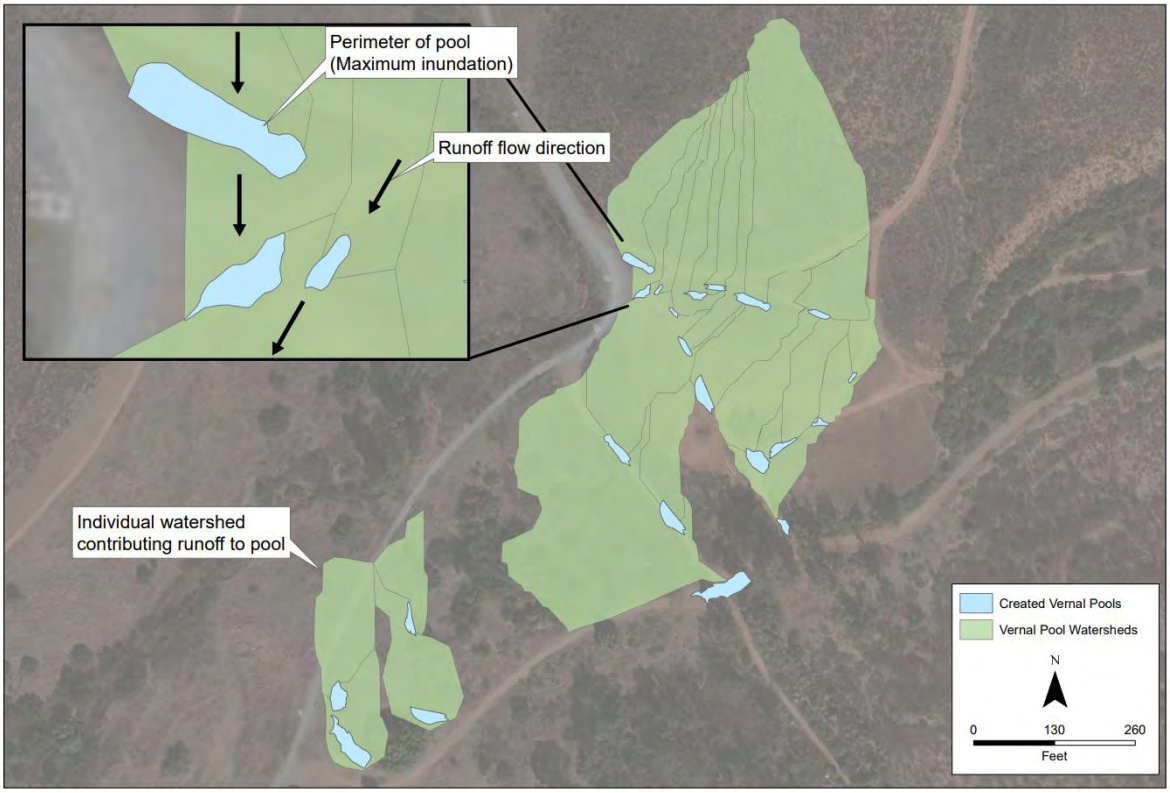

Plate 77. Screenshot of datum for vernal pools

Chapter 5
Implementation Plan

5.1 Responsible Parties

Ultimately, the Bank Sponsor is responsible for installation, maintenance, and monitoring in accordance with this Development Plan to successfully complete the mitigation. The 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.

5.1.1 Restoration Contractor

A multidisciplinary Restoration Contractor would provide a team composed of members with expertise and training in implementing similar restoration projects and would work collectively to perform supervision during construction and conduct post-construction maintenance and monitoring. Members would include:

- **Restoration Ecologist:** 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 and vernal pools). The lead Restoration Ecologist must have knowledge of the riverine, vernal pool, and upland vegetation associations proposed for the restoration effort as well as the nonnative species of concern. The field ecologist would oversee much of the construction and make routine inspections during the planting and maintenance period.
- **Licensed Civil Engineer:** A Professional Engineer with a current license in the State of California and experience working in creek restoration projects. A civil engineer would be onsite at the start and during key points of all phases of construction to ensure the work is completed according to the stamped engineering drawings.
- **Licensed Landscape Architect:** A landscape architect with a current license in the State of California. Where needed they would make routine inspections during construction and planting.
- **Fluvial Geomorphologist**: A certified Professional Hydrologist with a graduate degree in fluvial geomorphology.

The Restoration Contractor would be responsible for the following:

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

- Monitoring and making remedial recommendations (regarding weeding, irrigation frequency, erosion control, etc.) after installation for ongoing maintenance activities performed by the Installation/Maintenance Contractor after installation, as specified herein.
- Carrying out the biological monitoring and reporting program described in this Development Plan. The program would 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.

5.1.2 Installation/Maintenance Contractor

The Installation/Maintenance Contractor would 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.

- **Installation Contractor**: The Installation Contractor would be responsible for installation of a temporary irrigation system for the floodplain and upland transitional habitats in consultation with the Restoration Contractor. Subsequently, the Installation Contractor would be responsible for site protection and installation of all vegetation in accordance with the provisions of this plan and as approved by the Restoration Contractor. In addition, the Installation Contractor would prepare a SWPPP and any other requirements of the permits to avoid impacts on adjacent resources and water quality. The responsibilities of the Installation Contractor would end with the completion of the requirements for the 120-day plant establishment period. The Installation Contractor would verify in writing to the Bank Sponsor 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 the SBVMWD to maintain the restoration site for the remaining balance of the 5 years according to the provisions of this HMMP. The SBVMWD 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 would 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.
    - **Signage/Fencing/Trail Maintenance:** During the 5 years of maintenance and monitoring for the Bank, 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, the Bank Sponsor 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 Bank, San Diego County would maintain OVRP trails and trail improvements per the OVRP Joint Exercise of Powers Agreement (JEPA). The City of Chula Vista would maintain the trails associated with the Greenbelt.

5.1.3 Grading Contractor

The Grading Contractor would be a qualified firm with successful experience in southern California and direct experience with grading native habitat mitigation projects including riverine and vernal pools.

5.2 Schedule

Restoration activities associated with the Bank will be implemented according the schedule in Table 5-1.

Table 5-1. Implementation Schedule

Implementation Tasks	Schedule
Contract growing agreement with native plant nursery	Nine months prior to planting
Clearing and grubbing and invasive species removal	Winter/Spring prior to implementation year, following breeding season completion
Rough Grading	Winter/Spring prior to implementation year, following breeding season completion
Final grading and site work	Spring/Summer/Fall of implementation year
Install fencing and signage	Immediately following final grading
Install temporary irrigation system (as needed)	Promptly following site preparation
Plant container stock	Following irrigation system installation and weed abatement (where needed) beginning early fall

5.3 Grading Site Preparation

The Bank will comply with all pre-construction avoidance and minimization measures identified in the associated permits. The site is currently occupied by least Bell's vireo (LBV), coastal California gnatcatcher (CAGN), and San Diego fairy shrimp, along with several other sensitive species; therefore, specific avoidance and minimization measures for these species will be incorporated in grading and site preparation activities. Measures for activities that could impact federally listed species will be detailed in the Biological Opinion for the project. Avoidance measures may include avoiding or limiting grading and vegetation removal during the nesting/breeding season, having biological monitors on site during all grading and vegetation removal activities, conducting biological awareness training for all construction personnel, conducting pre-construction surveys for listed species, limiting grading activities in areas where species are known to occur and the

habitat is of high quality. These measures are consistent with the Biological Opinion that was issued for the restoration project immediately upstream of the Bank (called the "pre-bank").

In addition, during construction activities species that are disturbed or impacted may be able use nearby areas for refuge, and in particular the newly restored portion of the Otay River immediately upstream. Once restoration activities have ceased and the habitat has had time to re-establish the species would have higher quality habitat to return to and it will likely allow sensitive species numbers to increase in the long term.

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 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. 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.

5.4 Contractor Education

Before beginning any installation activities, the Installation/Maintenance Contractor will meet at the site with the Restoration Contractor to review all installation, scheduling, and resource protection measures specified in this Development Plan. The Restoration Contractor will review all aspects of this Development Plan, including site protection, inspections, landscape installation procedures, and guarantees. It will be made clear at that time that the Restoration Contractor 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 Contractor 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/Maintenance Contractor will notify the Restoration Contractor when new crew personnel will be on site, and an additional environmental training will be scheduled before they are allowed to work.

5.5 Access and Staging

Prior to commencement of installation activities, the area limits of the Bank will be surveyed and marked in the field. These limits will be checked and confirmed by the Restoration Contractor and Bank Sponsor 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.

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 Storm Water Pollution Prevention Plan (SWPPP).

5.6 Grading

5.6.1 Otay River Mainstem, Floodplain, and Tributaries

This Development Plan presents the current conceptual plan (see Figure 4-1), which combined with the digital terrain model, hydrology model, and hydraulic model currently under development will be used to generate 60% grading plans suitable for construction—with the understanding that the ideal construction approach will be design, bid, build with Contractor invitation to bid. This construction/installation strategy allows for maximum flexibility in the final restoration contours and provides opportunities for the Restoration Contractors 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. This supplemented with on the ground survey and additional aerial survey for the Pre-Bank 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 proposed channel alignment and three representative "valley-wide" cross-sections to convey the conceptual design intent (see Figure 4-2). 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 developed cut-and-fill quantities required to achieve the conceptual design grading to 60%. All attempts are made to balance the cut-and-fill on site. Based on a preliminary site visit, it is evident that spoils areas are needed and are identified on the concept plan (Figure 4-1). 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 Development Plan 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.

5.6.2 Vernal Pools

Grading will occur during the dry season with a bulldozer small enough to access and maneuver within the vernal pool establishment limits. The grading plan is considered a rough guideline of final micrograde. The final grade will be accomplished according to directions given by the Restoration Contractor in the field during grading. Vernal pools will be slightly (1 to 2 inches) over-graded and backfilled with topsoil to promote plant propagation. Some vernal pools could be manipulated by hand (using shovels). Care will be taken to avoid harming the underlying clay pan layer.

A pre-grading field visit will be conducted by the Restoration Contractor to delineate areas of grading using pin flagging. No spray paint will be used. A complete set of preconstruction photographs will also be taken at this time. The grading operator will attend the pre-grading field visit to become familiar with the site and potential issues. Areas to be manipulated with grading equipment or hand tools will be graded before the saturation of soils. Ideally, all material removed to create the vernal pools will be balanced elsewhere on-site to avoid off-site export of usable soil.

The Restoration Contractor will be on-site to direct grading activities. The Restoration Contractor or a land surveyor will check the pool depths using survey equipment (laser level or laser transit). Minor modifications to the final grading plan may be required in the field to properly prepare the site for planting, as determined by the Restoration Contractor. Vernal pool site grading is a delicate operation that attempts to manipulate topography at a micro-topographic scale; therefore, establishment of the final grade may require hand tools only.

Site drainage will be maintained by the Grading Contractor during all phases of vernal pool establishment. Erosion control measures such as silt fences and sandbags will be applied by the Grading Contractor, as deemed necessary. Final grades and proper hydrological function will be verified and approved by the Restoration Contractor before seeding or planting is allowed.

5.7 Vernal Pool Hydrologic Testing

The Restoration Contractor will test the hydrology of the vernal pools prior to transplanting or seeding vernal pool species into the constructed pools. This is not required for pools that are being enhanced and already display vernal pool hydrology. Hydrologic testing will be conducted when pools fill naturally from precipitation following initial grading. Water levels will be determined within 24 hours of a storm producing 0.5 inches or more of precipitation, and then every 2 days thereafter for a period of 1 week. If water levels drop by 5 to 10 centimeters (2 to 4 inches) per day, the pool might have a breach of the underlying clay pan or be draining through inappropriate surface contours. Leaks or unintended draining will be repaired through additional contouring and potentially applying clay to the vernal pool floor as determined by the Restoration Contractor. Pools will be seeded and planted with vernal pool species after it has been determined that the hydrology of the vernal pools is functional.

5.8 Soils Analysis

Soil testing has been conducted at several key locations to understand soil classification. These include proposed vernal pool establishment locations and the Otay River floodplain (see Section 4.3.1 and Appendix I). Due to historic sand mining operations, finer sand and silts are expected to be limited within the Otay River floodplain. As such, import of smaller grain materials may be warranted in select locations. This decision will be made during grading by the Restoration Contractor because the overall current composition of soil on site is highly disturbed. Soil testing and amendments for organic material and nutrients is not proposed because the long-term success of species should be based on existing conditions.

5.9 Nonnative Plant Species Removal

Prior to grading and planting, all nonnative plant species will be removed. The Restoration Contractor will work closely with the Installation/Maintenance Contractor to determine the specific approach for each species and area. The following are general recommendations that may be modified as appropriate.

5.9.1 Nonnative Trees

For trees with large woody trunks, the Restoration Contractor 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 Contractor.

Large Woody Trees: Trees with large woody trunks (excluding tamarisk and arundo) within the Bank—including pepper trees and eucalyptus—can be killed and left in place or removed via truck following preparation by ground crews. No large dead eucalyptus trees are to remain upright when in close proximity to trails or access roads. 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 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 the City of Chula Vista, Chula Vista Fire Department, California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, CALFIRE, and the local air quality district.
- 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 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 Bank.

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 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 Interim Management Period. Resprouts will be treated with foliar spray.

5.9.2 Nonnative Shrubs

The Restoration Project site has scattered individuals of nonnative shrub and perennial species such as cator bean, tree tobacco, and perennial pepperweed. All can be treated with herbicide and all require follow up treatment to prevent resprouting. Castor bean and tree tobacco can be cut and stumps treated. Perennial pepperweed should not be cut before treatment as this species can reestablish from very small pieces of root.

5.9.3 Nonnative Herbs

Nonnative grasses and herbs should be sprayed with herbicide or trimmed before seed is set with follow-up spot treatment using herbicide. Where possible the contractor should take advantage of rain events or irrigation to encourage germination of the nonnative seed bank (i.e. grow and kill).

5.10 Planting and Seeding Plan

Container plant palettes and seed mixes were developed specifically for the Bank and its location within the watershed and landscape. Distinct plant palettes were developed for each restoration category of the Bank including the Otay River Mainstem (main channel bank), floodplain (riparian corridor, active low floodplain, high floodplain) and tributaries, wet meadow, vernal pools, and upland transition.

5.10.1 Otay River Mainstem, Floodplain, and Tributaries

Although it is anticipated that within each of these areas more distinct vegetation communities will develop, these broad plant palettes are appropriate, allowing plants to fill-in where conditions suit them best. Because many of the species are expected to occur in multiple areas, one master list has been developed for the Otay River Mainstem, floodplain, and tributaries (Table 5-2). 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 Contractor 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). One seed mix (Table 5-3) will be applied to the floodplain and upland transitional habitat as many species are expected to occur in both habitat types. The species will self-sort based on local conditions.

Table 5-2. Container Plant Palette for Otay River Mainstem, Floodplain, and Salt Creek Tributary

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	rose pot	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
Distichlis spicata	salt grass	rose pot	3	300
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

Species[1,2,3]	Common Name	Container Size	Spacing on Center (feet) [4]	# per Acre
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
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
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
Distichlis spicata	salt grass	square plug	3	300
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 Contractor.
[2] Plants should be propagated on site or from material from the watershed or within 10 miles of the Bank. 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 Contractor 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. Seed Mix for Floodplain and Upland Transitional Habitat

Species[1,2,3]	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
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 Contractor.
[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.
[5] Quantities in this table are presented on a per-acre basis.

5.10.2 Vernal Pools

The species selections are based on native plant species observed or known to occur in or around vernal pools within the Bank and the larger Otay region. Table 5-4 provides the species to be installed in the vernal pool basins and Table 5-5 provides the species to be seeded in the immediate upland watershed surrounding each pool. The immediate watershed is standardized at 10m from the edge of each vernal pool.

Table 5-4. Seed and Plant Palette for Vernal Pools

Species[1,2,3]	Common Name	Method[4]	Quantity
Callitriche marginata	water-starwort	seed/soil inoculum	Exact quantities will depend on amount collected or produced from seed bulking. Total seed available will be distributed evenly based on pool size.
Crassula aquatica	pygmy crassula	seed/soil inoculum	
Deschampsia danthonioides	annual hairgrass	seed	
Eleocharis macrostachya	pale spikerush	seed/transplant	
Eryngium aristulatum var. *parishii*	San Diego button celery	seed/transplant	
Juncus bufonius var. *bufonius*	toad rush	seed	
Marsileaa vestita ssp. *vestita*	hairy clover fern	seed/soil inoculum	
Myosurus minimus	little mousetail	seed/soil inoculum	
Navarretia fossalis	spreading navarretia	seed	
Plantago elongata	prairie plantain	seed/soil inoculum	
Plagiobothrys acanthocarpus	adobe popcorn flower	seed	
Pogogyne nudiuscula	Otay Mesa mint	seed	
Psilocarphus brevissimus	wooly marbles	seed/soil inoculum	

[1] Seed will be applied by hand.
[2] Seed or soil inoculum will be collected from existing vernal pools in the Bank or in the Otay region.
[3] Any potential substitutions or quantity adjustments must be approved by the Restoration Contractor.
[4] Collected seed may be distributed directly or bulked in a greenhouse before being distributed.

Table 5-5. Seed Mix for Vernal Pool Upland Watershed

Species[1,2,3]	Common Name	Pounds of Pure Live Seed (PLS) per Acre[4,5]
Castilleja exserta ssp. *exserta*	purple owl's clover	0.2
Cryptantha intermedia	common cryptantha	2.2
Deinandra fasciculata	fascicled tarplant	3.3
Dichelostemma capitatum spp. *capitatum*	blue dicks	0.5
Eschscholzia californica	California poppy	1.8
Lasthenia gracilis	common goldfields	0.2
Lepidium nitidum	shining peppergrass	1.0
Linanthus dianthiflorus	ground pink	0.6
Plantago erecta	dot-seed plantain	1.8
Sisyrinchium bellum	blue-eyed grass	0.9
Zeltnera venusta	canchalagua	0.3

5.10.3 Upland/Transitional Buffer

Table 5-6. 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
Agrotis exarata	spike bent grass	1-gallon	5	20
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
Bahiopsis lacinata	San Diego County viguiera	1-gallon	5	50
Bothriochloa barbinodis	beard grass	1-gallon	5	20
Cylindropuntia prolifera	coast cholla	1-gallon	4	40
Dudleya edulis	lady fingers	1-gallon	3	5
Dudleya pulverulenta	chalk dudleya	1-gallon	3	5
Elymus triticoides	beardless wild-rye	1-gallon	5	20
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
Koeleria macrantha	June grass	1-gallon	5	
Lycium californicum	boxthorn	1-gallon	6	15
Malosma laurina	laurel sumac	1-gallon	8	15
Muhlenbergia rigens	deer grass	1-gallon	5	20
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
Stipa pulchra	purple needlegrass	1-gallon	10	50
Yucca whipplei	our Lord's candle	1-gallon	12	12

[1] Any potential substitutions or changes to quantity must be approved by the Restoration Contractor,.
[2] Plants should be propagated on site or from material from the watershed or within 10 miles of the Bank. 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 Contractor 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).

5.11 Container Plant Salvaging Specifications

When possible, cuttings will be harvested from adjacent riparian habitat or from within the Bank. Unique plants such as cactus, succulents, and willows cuttings should be salvaged prior to contour grading; the Restoration Contractor will identify and mark all specimens to be salvaged prior to grading and will work with the contractor on appropriate collection methods. Willow cuttings will be potted and maintained with the other salvaged plants at a local nursery. 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 Contractor. 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 Bank. 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 Contractor. Source locations should be as close to the Bank 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 Contractor 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 Contractor and contractor will coordinate the layout for plant material in ecologically appropriate locations and natural groupings. The Restoration Contractor 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 Contractor. If the installation contractor is unable to obtain the specified size or species at the time of planting, commencement of the 120-day plant establishment period will be delayed until all specified plants are installed or until a suitable substitution is determined by the Restoration Contractor. The specific planting areas and corresponding plant palettes will be included in the 60% plans currently being developed.

5.12 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.

5.13 Container Plant Guarantee

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

5.14 Seed Specifications

Seed will be applied throughout the Bank as needed no sooner than 2 years after installation. This allows time for aggressive weed control and to see what native seed bank germinates. Seed will be from Otay Mesa, San Diego, or alternative sources (closest commercially available sources) approved by the Restoration Contractor. If seed is not available from these areas, at minimum, seed will be obtained from within the watershed or within 10 miles of the Bank. 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 Contractor. 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 Contractor. 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.

5.15 Seed Application Steps

The contractor will install seed using standard hydroseed practice or hand dispersal. The Restoration Ecologist will advise If hydroseed occurs the following practice will be followed.

- 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.

5.16 Vernal Pool Plant Translocation

A few species, including pale spikerush and San Diego button-celery, will be planted as plugs, collected from populations in existing vernal pools in the Otay Valley. Transplantation is most effective when vernal pool plants are collected from inundated donor vernal pools and then directly planted into inundated created vernal pools, preferably in the same day. Ten % or less of the population of each species from a donor pool should be collected and transplanted to the created vernal pools. The ecology team will work with the regulatory agencies and local land mangers to identify locations for plant collection. No collection will occur without the appropriate permits and authorization.

5.17 Vernal Pools Seed Bulking and Application

Vernal pool seed will be collected from existing vernal pools in the Otay Valley. Previously restored pools from several restoration sites in the Otay Valley will be targeted for desired vernal pool species rather than natural pools to limit impacts to remaining natural pools. Collection will be performed by a firm with experience collecting seed (e.g. ICF, Native West Nursery, or S&S Seed) when seeds are ripe (timing depends on the species and weather conditions). To avoid harming the reproductive potential of the donor populations the following guidelines will be followed:

- Seed will be collected from populations with at least 20 individuals of each target species
- No more than 5 percent of the seed production of any individual plant or discrete population of plants will be collected
- Genetic variation found in the donor populations will be intentionally collected to preserve local genetics.

Seed will be collected by hand, stored in paper bags, and then transported to a native plant nursery for seed bulking. Seed bulking is the use of collected seeds to grow container plants in the nursery under ideal conditions. The seed collected from the container plants will then either be distributed at the site or used to grow another generation of container plants in the nursery until seed quantities are considered sufficient for distribution at the site. Seed will be distributed by hand into the vernal pool basins and raked into the soil after application.

5.18 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.

Planting of vernal pools should occur when vernal pools are moist but not inundated. These conditions usually occur early in the rainy season between rain events.

5.19 Irrigation Plan

The ultimate goal of the restoration is to create a functioning riparian system capable of maintaining and supporting itself in perpetuity. An automated temporary irrigation system will 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. This irrigation system will be installed to supply supplemental water for newly installed plants and applied seed. Supplemental irrigation should never be used in the vernal pools but can be used in the surrounding upland watersheds.

The irrigation system will tap into a local piped water source, will be constructed of PVC pipe and the amount of watering will be determined based off rain events. The system will be designed for temporary use for at least 3 years and discontinued once plant establishment is met. Damage to the irrigation system will be addressed throughout these three years. Ideally, the irrigation system should be shut-off by the end of the third year of the Interim Management Period. Irrigation system components will be removed from the site entirely at the end of the Interim Management 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.

5.20 Erosion Control

Erosion control for the Bank will be specified within the 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 Bank. Consultation with local jurisdictions regarding local erosion control requirements should precede mitigation implementation. These requirements may include specific erosion control BMPs. The SWPPP prepared for the pre-bank restoration site will be used as a template as many unique approaches were taken to achieve restoration success while also managing undesirable erosion issues.

5.21 Fencing and Signage

As mentioned previously, the Bank 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 Bank 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 Bank. 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, historical uses, allowable uses, and any other pertinent topics. In addition, signage will be used to provide public safety messaging including flooding during hydrology events at low water crossings, wildlife, and heat/fire risk. Fencing will include traditional split rail fencing but will also take advantage of natural material onsite including boulders and removed eucalyptus. 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.

The 60% construction drawings will include fencing specifications and exact locations for permanent placement. Temporary fencing will be installed at key entry points into the site in order 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 Bank, select permanent fencing/rocks/logs will be installed in sensitive areas to maintain the integrity of the area. Although specifications will be provided final 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 the Bank due to the extensive use of the nearby area by equestrians, bicyclists, and Border Patrol agents. Signage will indicate the site is a sensitive native Bank 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 Bank 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).

5.22 Final Earthwork and Landscape Construction Plans

Construction is expected to occur under two contracts: earthwork and landscape. A final set of earthwork construction documents, including site preparation plans, erosion control plans and details, grading plans and profiles, roads and trails plans and details, rock structure details and habitat structure details, engineer's estimate of probably cost, and specifications acceptable for bidding will be prepared in order to implement the conceptual guidelines for the Bank outlined in this document. The proposed final elevations of the grading limits of the Bank will be shown on construction grading plans. The final elevations of the river channel and floodplain will be similar to the upstream mitigation area and will be 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 will 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 Signatory Agencies for review and approval prior to initiating construction.

A set of landscape construction documents, including earthwork plans, invasive plant treatment and removal plans, revegetation plans, , planting details, and specifications acceptable for regulatory compliance and informed decision-making in the field will be prepared in order to implement the conceptual guidelines for the Bank outlined in this document. The irrigation system will be designed and installed by the planting contractor.

Implementation of the restoration 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 implementation.

Species to be planted in the Bank are listed in the plant palette tables above and will be included in the specifications. 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 draft BEI 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.

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Chapter 6
Interim Management Plan

6.1 Maintenance

The goal of the restoration is to create a natural, self-sustaining riverine system requiring minimal follow-up maintenance; however, it's expected that some level of maintenance will be required. The Interim Management Period will begin when restoration activities first begin at the Bank. The majority of maintenance 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 Installation Contractor will be responsible for maintenance during the 120-day plant establishment period (PEP), and the Maintenance Contractor will be responsible for maintenance after the 120-day PEP is complete. As a guideline, the Installation Contractor is expected to perform maintenance approximately once a month during the first 4 months (i.e., 120-day PEP). The Maintenance Contractor is expected to perform maintenance approximately monthly during Year 1; every 2 months during Year 2; and quarterly during Years 3 and on. Maintenance may be needed more frequently to perform remedial measures (e.g., replanting, erosion control). The Maintenance Contractor will coordinate with the Restoration Contractor on a regular basis to determine priority maintenance activities during different periods of the plan. The primary maintenance obligations are reviewed below.

6.1.1 Maintenance Duration

The Interim Management Period will begin at the start of restoration activities and continue until all Performance Standards are met and the endowment has been fully funded for three years (approximately 8 years total). If Performance Standards are not being met, maintenance may be extended. Following completion of the Interim Management Period the Bank will enter into the Long-term Maintenance Period, as outlined in the Long-term Management Plan (Exhibit D-5).

6.1.2 Responsible Parties

The Bank Sponsor is ultimately responsible for the maintenance activities during the Interim Management Period. The Bank Sponsor may hire individual contractors to complete the maintenance activities. Long-term maintenance will be the responsibility of the Long-Term Manager, as outlined in Section 1.3.2.

6.1.3 120-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 an inspection by the Restoration Contractor. The Restoration Contractor will prepare a "punch-list" of correction items for completion by the Installation Contractor. After punch-list items are corrected, the Restoration Contractor will recommend to the Bank Sponsor 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 Development Plan. The number of maintenance visits will vary depending on the amount of work necessary for the mitigation area to meet its Performance Standards on schedule. As a guideline, the Installation Contractor is expected to perform maintenance approximately once a month during the 120-day PEP. Treatment will include all species listed in Table 6-1 and any additional problematic species identified by the Restoration Contractor. Herbicide application will be in accordance with BMPs, manufacturers' recommendations, and agency regulations. At the end of the 120-day PEP, the Restoration Contractor will flag all dead and diseased plant materials requiring replacement and prepare a final maintenance punch-list of correction items. After the Installation Contractor has satisfactorily completed the punch-list, the Restoration Contractor will recommend acceptance of the 120-day PEP to the Bank Sponsor.

6.1.4 Irrigation

The irrigation system used for the Bank will be temporary and will be used to ease the establishment of native seeds and container plantings. It is expected that supplemental irrigation will be used for only the first 2 years. The Restoration Contractor will determine the timing for the termination of irrigation but it will be terminated at least two years before sign-off.

6.1.5 Weed Control

Nonnative weed control will consist of controlling populations of invasive and nonnative weeds within the Bank by the following methods: (1) hand removal, (2) cutting or mowing, (3) chemical herbicide application, and (4) light exclusion. A list of nonnative species detected in the Bank can be found in Table 6-1.

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 year, every 2 months during year 2, 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 Restoration Contractor, string trimmers may be used in certain instances. Chemical control will be used for control of perennial weed species. The Maintenance Contractor will coordinate with the Restoration Contractor 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.

Table 6-1. Nonnative Species Detected in the Bank

Scientific Name	Common Name	Cal-IPC Rating
Amaranthus albus	white tumbleweed	not listed
Anagalis arvensis	scarlet pimpernel	not listed
Apium graveolens	common celery	not listed
Atriplex semibaccata	Australian saltbush	Moderate
Avena barbata	slender wild oat	Moderate
Brassica nigra	black mustard	Moderate
Bromus madritensis	red brome	High
Bromus tectorum	cheat grass	High
Centaurea melitensis	tocalote	Moderate
Convulvulus arvensis	bindweed	not listed
Cortaderia jubata	pampas grass	High
Cynara cardunculus	artichoke thistle	Moderate
Dittrichia graveolens	stinkwort	Moderate
Erodium cicutarium	red-stem filaree	Limited
Eucalyptus sp.	eucalyptus	Limited
Foeniculum vulgare	sweet fennel	Moderate
Helminthotheca echioides	bristly ox-tongue	Limited
Hirschfeldia incana	short-pod mustard	Moderate
Hordeum sp.	barley	Moderate
Lactuca serriola	prickly lettuce	not listed
Lepidium latifolium	perennial pepperweed	High
Melilotus indicus	Indian sweetclover	not listed
Mesembryanthemum crystallinum	crystalline iceplant	Moderate
Nicotiana glauca	tree tobacco	Moderate
Polypogon monspeliensis	rabbitfoot beardgrass	Limited
Ricinus communis	castor-bean	Limited
Rumex crispus	curly dock	Limited
Salsola tragus	tumbleweed	Limited
Schinus molle	Peruvian peppertree	Limited
Schinus terebinthifolius	Brazilian peppertree	Moderate
Sonchus asper	common sow thistle	not listed
Tamarix ramosissima	salt-cedar	High
Washingtonia robusta	Mexican fan palm	Moderate

6.1.6 Supplemental Planting

If planted and seeded vegetation does not readily colonize the Bank, the Maintenance 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 year, every 2 months during Year 2, and quarterly thereafter during the Interim Management Period.

6.1.7 Debris and Trash Removal

Leaf litter and dead wood of native trees and shrubs will not be removed from the Bank. The decomposition of dead wood and leaf litter is essential for the replenishment of soil nutrients and minerals, and dead wood and snags provide valuable habitat for invertebrates, reptiles, small mammals, and birds. Human-made trash and debris will be removed by hand monthly for the first year, every 2 months during Year 2, and quarterly thereafter during the Interim Management Period.

6.1.8 Fence Inspection and Repair

Fencing will be inspected by the Maintenance Contractor monthly for the first year, every 2 months during Year 2, and quarterly thereafter during the Interim Management Period.

6.2 Performance Standards

Performance Standards have been established for the Bank based on the qualitative and quantitative monitoring described in the following sections (6.3, 6.4, and 6.5) as well as the Corps South Pacific Division's 12505-SPD Regulatory Program Uniform Performance Standards for Compensatory Mitigation Requirements (USACE 2012). Tables 6-2 through 6-5 detail Performance Standards for each restoration category that have been designed specifically for the Bank as a means of monitoring the progress and performance of the physical, hydrological, and biological conditions of the Bank. The Performance Standards will be evaluated annually to ensure that each restoration category of the Bank is trending toward success. The success or failure of a Performance Standard will be used to drive adaptive management and maintenance of the Bank the following year.

If the Bank at any time does not appear to be on a trajectory to meet target Performance Standards, the Restoration Contractor will recommend remedial actions (adaptive management).

Table 6-2. Otay River Mainstem and Floodplain Performance Standards

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Vegetation						
Container plant survival[1]	100%	≈80	≈80	N/A	N/A	N/A
Percent **absolute** cover of native species	N/A	≥25%	≥40%	≥55%	≥75%	≥90%
Percentage **absolute** cover of nonnative species	<10%	<10%	<10%	<5%	<5%	<5%
Percentage **absolute** cover of invasive species[2]	<5%	<5%	<5%	<1%	<1%	<1%
Native floral species diversity (Shannon-Wiener Diversity Index or similar)	N/A	N/A	>Year 1	>Year 2	≥Year 3	≥Year 4
Native floral species reproduction and recruitment	N/A	Presence of seedlings and saplings	Presence of seedlings and saplings	Presence of seedlings and saplings	At least 3% of total native cover is made up of naturally recruited species	At least 5% of total native cover is made up of naturally recruited species
Wildlife						
Least Bell's Vireo	N/A	Presence of LBVI	Presence of LBVI	Presence of LBVI	Presence of LBVI	Presence of LBVI
Terrestrial faunal species presence and taxon richness[3]	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

[1] Based on qualitative ocular estimates.

[2] Invasive species are those listed as "High" or "Moderate" on the Cal-IPC inventory or those that are locally known to be problematic.

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

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Aquatic Resources						
Wetland condition assessment (CRAM)	N/A	Baseline CRAM		>Year 1 Overall CRAM Score		≥Year 3 Overall CRAM Score
Jurisdictional Delineation[4]	N/A	N/A	N/A	JD shows the acreage of aquatic features is trending to match the amount and type of aquatic resource credits predicted.	N/A	JD shows the acreage of aquatic features equals the amount and type of aquatic resource credits predicted.[5]
Benthic Macroinvertebrate California Stream Condition Index (BMI CSCI)	N/A	≥ Baseline BMI CSCI score	N/A	≥ Baseline BMI CSCI score	N/A	> Baseline BMI CSCI score
Physical Habitat Index of Physical Integrity (PHAB IPI)	N/A	≥ Baseline PHAB IPI Scores	N/A	≥ Baseline PHAB IPI Scores	N/A	> Baseline PHAB IPI Scores
Geomorphology						
Maintenance and general stability of the active graded channel floodplain	N/A	Repeat cross-sectional analysis, on-the-ground and aerial photographic interpretation to interpret overall site stability (success will include no areas of significant erosion or no loss of significant aquatic or vegetative habitat)	Same as previous year	Same as previous year	Same as previous year	Same as previous year

[4] Delineation shall be done according to *A Field Guide to the identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (ERDC/CRREL TR-08-12) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (ERDC/EL TR-08-28) or the most recent guidance.

[5] The number and type of credits released shall be adjusted either up or down based on the results of the Year 5 JD.

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Development of complex micro-topography on the channel bed, banks, and floodplain surfaces	N/A	Repeat cross-sectional analysis, on-the-ground and aerial photographic interpretation to interpret overall site stability (success will include development of complex micro-topography, including scour and deposition pockets, riffles, point bars and splay deposits, etc.)	Same as previous year	Same as previous year	Same as previous year	Same as previous year
Cross-sectional area and width-to- depth ratio (at any given cross section) should not show more than a 25% change between the annual monitoring events	N/A	Cross-sectional analysis to interpret associated change (change in cross-sectional area will be calculated by subtracting the current year cross-sectional area from the previous year cross-sectional area. Negative changes in cross-sectional area would indicate that bed scour and/or bank erosion has increased the area between two successive surveys, while positive changes would indicate that sediment deposition has reduced the cross-sectional area between the surveys)	Same as previous year	Same as previous year	Same as previous year	Same as previous year

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Average bed elevation should not change more than 2 feet as compared to the previous annual monitoring event	N/A	Longitudinal profile overlay analysis to detect channel bed changes via use of average channel bed elevation for the entire profile (if the profile analysis indicates a net change of more than 2.0 feet in bed elevations averaged over the reach, then bed aggradation and degradation may be occurring in further causal analysis would be warranted)	Same as previous year	Same as previous year	Same as previous year	Same as previous year

Table 6-3. Wet Meadow Performance Standards

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Vegetation						
Container plant survival[6]	100%	≈80	≈80	N/A	N/A	N/A
Percent absolute cover of native species	N/A	>15%	>30%	>Year 2%	>Year 3%	>80%
Percentage absolute cover of nonnative species	<10%	<10%	<10%	<5%	<5%	<5%
Percentage absolute cover of invasive species[7]	<5%	<5%	<5%	<1%	<1%	<1%

[6] Based on qualitative ocular estimates.

[7] Invasive species are those listed as "High" or "Moderate" on the Cal-IPC inventory or those that are locally known to be problematic.

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Native floral species diversity (Shannon-Wiener Diversity Index or similar)	N/A	N/A	>Year 1	>Year 2	≥Year 3	≥Year 4
Native floral species reproduction and recruitment	N/A	Presence of seedlings and saplings	Presence of seedlings and saplings	Presence of seedlings and saplings	At least 3% of total native cover is made up of naturally recruited species	At least 5% of total native cover is made up of naturally recruited species
Aquatic Resources						
Wetland condition assessment (CRAM)	N/A	Baseline CRAM		>Year 1 Overall CRAM Score		≥Year 3 Overall CRAM Score
Jurisdictional Delineation[8]	N/A	N/A	N/A	JD shows the acreage of aquatic features is trending to match the amount and type of aquatic resource credits predicted.	N/A	JD shows the acreage of aquatic features equals the amount and type of aquatic resource credits predicted[9].

Table 6-4. Vernal Pool Performance Standards

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Upland Vegetation						
Container plant survival[10]	100%	≈80	≈80	N/A	N/A	N/A
Percent absolute cover of native species	N/A	≥30%	≥40%	≥50%	≥60%	≥75%
Percent absolute cover of nonnative species	<10%	<10%	<10%	<5%	<5%	<5%

[8] Delineation shall be done according to *A Field Guide to the identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (ERDC/CRREL TR-08-12) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (ERDC/EL TR-08-28) or the most recent guidance.

[9] The number and type of credits released shall be adjusted either up or down based on the results of the Year 5 JD.

[10] Based on qualitative ocular estimates.

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Percent absolute cover of invasive species[11]	<1%	<1%	<1%	<1%	<1%	<1%
Hydrology						
Total Number of Days Inundated	N/A – must pass hydrologic testing as described in section 5.7		Within range of control pools for each year			
Maximum Number of Days Continuously Inundated			Within range of control pools for each year			
Coefficient of Variation of Water Depth			Within range of control pools for each year			
Mean Water Depth			Within range of control pools for each year			
Number of Times Drained Completely During Wet Season			Within range of control pools for each year			
Vernal Pool Flora						
Percent absolute cover of native wetland species	<25%	<25%	<25%	<25%	<25%	<25%
Percent absolute cover of native upland species	<30%	<30%	<30%	<30%	<30%	<30%
Percent absolute cover of vernal pool endemic species	10% of control pools	20% of control pools	30% of control pools	40% of control pools	50% of control pools	60% of control pools
Percent absolute cover of nonnative species	<10%	<10%	<10%	<5%	<5%	<5%
Percent absolute cover of invasive species[12]	<1%	<1%	<1%	<1%	<1%	<1%
Vernal pool endemic species richness	50% of control pools			90% of control pools		
Other native species richness	50% of control pools			75% of control pools		
Wildlife						
San Diego Fairy Shrimp (SDFS)	N/A			Presence of SDFS		

Table 6-5. Upland Buffer Performance Standards

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Percentage absolute cover of native species	N/A	≥30%	≥40%	≥50%	≥60%	≥75%
Percentage absolute cover of nonnative species	<10%	<10%	<10%	<5%	<5%	<5%

[11] Invasive species are those listed as "High" or "Moderate" on the Cal-IPC inventory or those that are locally known to be problematic.

[12] Invasive species are those listed as "High" or "Moderate" on the Cal-IPC inventory or those that are locally known to be problematic.

Performance Standard	Plant Establishment Period (120 days)	Year 1	Year 2	Year 3	Year 4	Year 5
Percentage absolute cover of invasive species[13]	<5%	<5%	<5%	<1%	<1%	<1%

[13] Invasive species are those listed as "High" or "Moderate" on the Cal-IPC inventory or those that are locally known to be problematic.

6.3 Implementation Monitoring

The Restoration Contractor will coordinate with the installation contractor and Bank Sponsor 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 Development Plan. During this period, the Restoration Contractor will prepare a brief weekly memorandum that reviews implementation progress, which will be submitted to the Bank Sponsor.

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 Interim Management Period. The installation contractor will receive approval from the Restoration Contractor and Bank Sponsor, indicating a successful implementation and 120-day PEP before the start of the Interim Management Period. In addition, the installation process will require the Restoration Contractor 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/grading of the channel, floodplain, and vernal pools.
- 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 Contractor 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 establishment period.

6.4 Qualitative Monitoring

A Restoration Contractor with the qualifications outlined previously will direct the plan's qualitative monitoring program. The goal of this monitoring is to proactively assess site conditions to address issues before they become a problem. Qualitative 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 qualitative monitoring is effective coordination with the Installation/Maintenance Contractor to exchange information, provide feedback, and agree on priority maintenance items and potential remedial measures as needed. The Restoration Contractor will perform qualitative monitoring throughout the installation period and the Interim Management Period. Each qualitative 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 Contractor will inspect progress on a weekly basis and then at least once a month during the 120-day PEP. The Restoration Contractor will monitor the restoration areas monthly during the first 6 months and then quarterly for the duration of the Interim Management Period. During each qualitative site visit, the Restoration Contractor 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 Bank.
- 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/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 Contractor will be responsible for a visual estimate of plant survival and condition during qualitative visits. During each annual July/August site visit, the Restoration Contractor 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.

6.5 Quantitative Monitoring

A Restoration Contractor with the qualifications specified previously will supervise all quantitative monitoring. This will allow for adaptive management decisions to be made, as well as allow site progress to be tracked. Quantitative monitoring will consist of photo-documentation, vegetation transects, a condition-based rapid assessment for each wetland type, cross-sections for channel morphology and topography, benthic macroinvertebrate sampling, groundwater monitoring, and jurisdictional aquatic resource mapping. Descriptions of the methods for each of these monitoring types is provided in the subsections below.

6.5.1 Photo-Documentation

Permanent stations for photo-documentation will be established during the installation phase using a GPS unit. Up to 20 photo stations will be; however, others may be added post implementation to maximize capturing the changes on site. 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 location, 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 20 fixed locations and catalogued to be included in the annual reports.

Photographs will be taken at each transect where channel and floodplain morphology monitoring would occur (see 6.3.2.4). At a minimum these will include channel right taken from the left bank permanent monument; channel left taken from the right bank permanent monument; channel center to the left bank; channel center to the right bank; channel center facing upstream; and channel center facing downstream. Each vegetation transect will also have a photo station established at the end farthest from the channel. Photographs will be taken in portrait, showing the length of the vegetation transect.

Photographs from photo stations, channel cross-sections, and vegetation transects will visually display and document the progress of the site.

6.5.2 Vegetation

6.5.2.1 Point-Intercept Transects

The Otay River Mainstem and associated floodplain, the Salt Creek Tributary, and wet meadow restoration categories will use point-intercept transects to monitor the vegetation community. The vegetation community will be quantitatively measured using semi-permanent 50-meter transects that will be established randomly throughout each restoration category. Transects will be run perpendicular to the primary channel, either the Otay River mainstem or Salt Creek Tributary, whichever applies. These transects will be used to determine native and nonnative cover across each of the restoration categories 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 categories and allows the Restoration Contractor and bank sponsor to make prompt adaptive management decisions.

The exact number and location of the transects will be determined during Year 1 quantitative monitoring. 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 seasonal 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). A total of 100 points along the transect is thus sampled. The vegetation cover is calculated as follows.

$$\text{Cover} = \text{number of points covered by a species} / \text{total number of points} \times 100\%$$

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. 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. In addition, a complete list of additional species occurring within each restoration category will be recorded to measure total species richness.

6.5.2.2 Relevé Method

The relevé method relies on ocular estimates of cover and is considered a "semiqualitative" method. This method will be used in the vernal pools and each vernal pool will be considered a plot. In each pool (plot), all species observed are recorded and assigned a cover class. The cover classes to be used are 0-5, 6 -25, 26-50 51-75, and greater than 75 absolute cover. The use of cover classes provide greater repeatability between observers. As ocular estimates of cover are somewhat subjective, it is important to have two biologists collecting data and calibrating cover estimates between them. The relevé method should be conducted after the pools have dried and vegetation growth is at its peak. This is generally late April or early May but can vary based on rainfall received in a given year.

When calculating average native and nonnative cover, the midpoint of the cover class is used. For example, for a species in the 6 – 26 percent cover class, 12.5% cover would be used in statistical calculations. The relevé method will provide cover (both native and nonnative) and species diversity statistics for the vernal pools.

6.5.3 Wetland Condition

A CRAM analysis will be used to provide an evaluation of the ambient conditions of the restoration categories within the Bank. The Otay River mainstem and Salt Creek Tributary will be assessed using the latest version of the California Rapid Assessment Method (CRAM) for Wetlands Riverine Wetlands Field Book at the time of the Year 1 assessment. The wet meadows will be assessed using the latest version of the CRAM Slope Wetlands Field Book, and the vernal pools will be assessed using the latest version of the CRAM for Individual or Vernal Pools Systems Field Book at the time of the Year 1 assessment. Representative AAs will be established in each restoration category to measure the change in ecosystem functions and services over the course of the monitoring program. The exact number and location of the AAs will be determined during Year 1 qualitative monitoring.

The Landscape and Buffer attribute is not expected to change much, if any, over the life of the project as the scale of this attribute is outside the scope of the project to change. However, following grading, the Hydrology Attribute is expected to increase from baseline and both the Physical and Biotic Structure Attributes are expected to increase over time. Table 6-6 shows the anticipated direction of change of CRAM wetland condition scores for the riverine AAs. Table 6-7 shows the anticipated direction of change of scores for the wet meadow AAs, and Table 6-8 for the vernal pools. The tables show post installation (Year 3 and Year 5). It is anticipated that habitat maturity may take 10 to 20 years to achieve and, as such, is not tied to the project's success. Expected changes in CRAM metric scores are based upon best professional judgment, drawing on experience in other reaches of the Otay River and larger Otay Mesa.

Table 6-6. Projected Riverine CRAM Scores for the Otay Mainstem and Salt Creek Tributary in Year 3 and Year 5 Post Installation

CRAM Attributes	CRAM Metric and Submetrics	Year 3	Year 5
	Attribute Score	**+**	**+**

CRAM Attributes	CRAM Metric and Submetrics	Year 3	Year 5
Buffer and Landscape Connectivity	Stream Corridor Continuity	=	=
	Buffer Submetrics (below)	+	=
	% of AA with Buffer	=	=
	Average Buffer Width	=	=
	Buffer Condition	+	=
Hydrology	**Attribute Score**	**+**	**=**
	Water Source	=	=
	Channel Stability	+	=
	Hydrologic Connectivity	+	=
Physical Structure	**Attribute Score**	**+**	**+**
	Structural Patch Richness	+	+
	Topographic Complexity	+	=
Biotic Structure	**Attribute Score**	**+**	**+**
	PC: No. of plant layers	+	+
	PC: No. of codominants	+	=
	PC: Percent Invasion	+	=
	Plant Community Submetric Score	+	+
	Horizontal Interspersion	+	=
	Vertical Biotic Structure	+	=
	Overall AA Score	**+**	**+**

Note: the indication of score movement (+/-/=) is in relation to the previous assessment period.

Table 6-7. Projected Wet Meadow CRAM Scores for Year 3 and Year 5 Post Installation and the Maximum Score

CRAM Attributes	CRAM Metric and Submetrics	Year 3	Year 5
Buffer and Landscape Connectivity	**Attribute Score**	**+**	**+**
	Aquatic Area Abundance	=	=
	Buffer Submetrics (below)	+	=
	% of AA with Buffer	=	=
	Average Buffer Width	=	=
	Buffer Condition	+	=
Hydrology	**Attribute Score**	**+**	**=**
	Water Source	=	=
	Hydroperiod	+	=
	Hydrologic Connectivity	+	=
Physical Structure	**Attribute Score**	**+**	**+**
	Structural Patch Richness	+	+
	Topographic Complexity	+	=
Biotic Structure	**Attribute Score**	**+**	**+**
	PC: No. of codominants	+	=
	PC: Percent Invasion	+	=
	Plant Community Submetric Score	+	+

CRAM Attributes	CRAM Metric and Submetrics	Year 3	Year 5
	Horizontal Interspersion	+	=
	Plant Life Forms	+	+
	Overall AA Score	**+**	**+**

Note: the indication of score movement (+/-/=) is in relation to the previous assessment period.

Table 6-8. Projected Vernal Pool CRAM Scores for Year 3 and Year 5 Post Installation and the Maximum Score

CRAM Attributes	CRAM Metric and Submetrics	Year 3	Year 5
Buffer and Landscape Connectivity	**Attribute Score**	**+**	**+**
	Aquatic Area Abundance	=	=
	Buffer Submetrics (below)	+	=
	% of AA with Buffer	=	=
	Average Buffer Width	=	=
	Buffer Condition	+	=
Hydrology	**Attribute Score**	**+**	**=**
	Water Source	=	=
	Hydroperiod	+	=
	Hydrologic Connectivity	+	=
Physical Structure	**Attribute Score**	**+**	**+**
	Structural Patch Richness	+	+
	Pool and Swale Density (for VP System)	+	=
	Topographic Complexity	+	=
Biotic Structure	**Attribute Score**	**+**	**+**
	Horizontal Interspersion and Zonation	+	+
	PC: No. of codominants	+	=
	PC: Percent Non-Native	+	=
	PC: Endemic Species Richness	+	+
	Plant Community Submetric Score	+	+
	Overall AA Score	**+**	**+**

Note: the indication of score movement (+/-/=) is in relation to the previous assessment period.

6.5.4 Channel and Floodplain Morphology

Permanent monitoring transects will be established throughout the site perpendicular to the primary channel at the Bank site following the methodology of Harrelson et al. (1994). These monitoring transects will be surveyed 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 up to 10 permanent locations throughout the site, occurring approximately every 500 feet. 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 slope breaks and distinct morphological features within the floodplain, and along the channel sides and bottom.

In addition to the channel morphology transects, up to an additional five (5) transects will be established throughout the floodplain to monitor overall topographic changes over time, including changes to the secondary channels and floodplain terraces. These five transects will correspond to five of the channel morphology transects .

The location of each cross-section will be permanently marked in the field using metal t-posts (to easily find the general transect location) and with rebar driven vertically into the ground surface, capped with an appropriate cover (to establish known permanent elevations [permanent monuments or benchmarks] on each side of the transect). The permanent benchmarks for transect will be placed in a stable location above the active channel on the left and right banks (or terraces) of the channel. Transect endpoints (i.e., the permanent monuments) will be documented using a sub-meter GPS unit. At least six photographs will be taken at each transect. At a minimum these will include channel right taken from the left bank permanent monument; channel left taken from the right bank permanent monument; channel center to the left bank; channel center to the right bank; channel center facing upstream; and channel center facing downstream.

In addition to the ten cross sections, a longitudinal profile will be surveyed throughout the length of the primary channel within the restoration site. The longitudinal profiles will extended the entire length of the Bank site (approximately 5,000 feet) and capture similar channel bed habitat units in the downstream and upstream locations (i.e., if the top of the reach starts at a riffle, the bottom of the reach will end at a riffle). The spacing between channel bed data points will vary depending on the length of the total longitudinal profile but will be at least 15 feet. A GPS line of the longitudinal profile will be recorded, and digital photographs will be taken in the upstream and downstream directions at various locations throughout the longitudinal profile.

Within the primary channel, bankfull width and depth measurements will be recorded to assess the hydraulic capacity of the primary channels. Specifically, a geomorphic bankfull or effective surface will be identified in the field. The geomorphic bankfull or effective surface is the surface that is inundated by the discharge that performs the most geomorphic work on a system—typically a flow that occurs every 1.5 to 2 years (Knighton 1998). This discharge, known as the "geomorphic bankfull discharge," is defined as that water discharged when stream water just begins to overflow into the active floodplain. The geomorphic bankfull or effective surface will be identified based on the methodology of Harrelson et al. (1994) and Hauer and Lamberti (1996) and, as part of the analysis, will include identification of debris lines, scour zones, and/or grade breaks on the streambank.

Substrate composition and embeddedness will also be determined at each of the ten transects. The objective of collecting channel bed substrate composition and embeddedness information is to observe a shift in bed material size-frequency distribution, which can be determined over time. The chosen size classes of interest include the D_{16}, the D_{25}, the D_{50}, the D_{75}, and the D_{84}. These size classes will be determined by calculating the percent finer and the cumulative percent finer for a given size class of bed material. Where active channel width is greater than 20 feet, pebble count methods based on the methodology of Bunte and Abt (2001) will be used to determine the substrate composition and embeddedness; where active channel width is less than 20 feet, a modified pebble count method based on the methodology of Wolman (1954) will be used.

6.5.5 Benthic Macroinvertebrate Monitoring

Benthic Macroinvertebrate (BMI) monitoring will include both BMI and Physical Habitat (PHAB) data collection using the methods described in the 2016 version of the Surface Water Ambient

Monitoring Program's (SWAMP) *Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat* (Ode et al. 2016). Algae will not be collected for this project per the permit requirements, which only mention the collection of BMI data.

BMI monitoring was conducted at three monitoring stations (i.e., sampling reaches) in spring of 2017 prior to project restoration activities at the Pre-Bank site (i.e., the baseline monitoring effort). A reference station (control sampling reach) was established upstream of the Pre-Bank and Bank sites (the "Upper" sampling reach; the second station was located within the Pre-Bank site (the "Middle" sampling reach), and third station was located downstream of the Pre-Bank and Bank sites (the "Lower" sampling reach). The reference station was defined as a station which shows minimally disturbed conditions, or the most natural conditions within the river.

BMI monitoring occurred at these locations in 2020 as well - the collected 2020 data at these three sampling reaches represents Year 1 monitoring data. An additional three sampling reaches were added in 2020: one within the Pre-Bank Site (the "PRE-BANK" sampling reach); one within the potential area for future restoration on Salt Creek (the "SALT_LOWER" sampling reach); and one downstream of the potential future restoration area (the "A_OTAY" sampling reach). The data collected at these three additional sampling reaches also represents Year 1 monitoring data, except for the Salt Creek sampling reach, which represents baseline (preconstruction) conditions for potential future restoration. Table 6-9 summarizes the six sampling reaches within the project area.

Table 6-9. Bioassessment Sampling Reach Information

Station Code	Station Name	Type of Sampling Reach	First Year Sampled	2020 Monitoring Year	Date Sampled (in 2020)	Notes
910OTYLWR	Lower	Restoration reach	2017 (preconstruction)	Year 1	6/2/20	Downstream end of the Pre-Bank Restoration Site.
910OTYMDL	Middle	Restoration reach	2017 (preconstruction)	Year 1	6/3/20	Restored in 2018/2019; within Pre-Bank Restoration Site
910OTYUPR	Upper	Control reach	2017 (preconstruction)	Year 1	6/5/20	Upstream of the Pre-Bank Restoration Site
910OTYA	A_OTAY	Response reach	2020	Year 1	6/1/20	Downstream of the Pre-Bank Restoration Site
910OTYPBK	PRE-BANK	Restoration reach	2020	Year 1	6/3/20	Restored in 2018/2019; within Pre-Bank

Station Code	Station Name	Type of Sampling Reach	First Year Sampled	2020 Monitoring Year	Date Sampled (in 2020)	Notes
						Restoration Site
910SLTLWR	SALT_LOWER	Potential future restoration reach	2020	(baseline)	6/4/20	Potential future restoration site

All future surveys will be performed during the appropriate index period for southern California streams (May-July). ICF will utilize a team of two biologists and a geomorphologist with training and expertise in PHAB and SWAMP protocols to conduct the BMI monitoring. All samples will be identified to Standard Taxonomic Effort (STE) Level II of the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT). Chico ABL will be conducting the taxonomy and will be perform their internal QA/QC on the samples. Chico ABL will provide the list of taxa and metrics. The taxa list will be sent to the Moss Landing Marine Laboratory (Moss Landing) for calculation of the California Stream Condition Index (CSCI), which will also load the data into the California Environmental Data Exchange Network (CEDEN). A PHAB Index of Physical Integrity (IPI) will also be calculated by Moss Landing.

A summary of monitoring results and field procedures will be included in the annual monitoring report, along with a comparison of the CSCI and PHAB IPI scores between the 2017 (baseline) and 2020 (Year 1) conditions for Pre-Bank areas (and 2020 baseline results for the Bank mitigation areas). All future reporting efforts will compare the conditions at that time to those collected during the baseline conditions. Performance standards for the bioassessment component of the mitigation plan will be based on quantitative metrics. These performance standards have been designed specifically as a means of monitoring the progress and performance of the physical and biological conditions of the bioassessment monitoring. The performance standards will include two main indicators – the PHAB IPI scores and the BMI CSCI scores.

6.5.6 Updated Jurisdictional Delineation

An updated jurisdictional delineation will be performed within the Bank in Year 3 and Year 5. The Bank 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 be 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.

6.5.7 Wildlife Surveys

USFWS protocol surveys will be conducted each year to document populations of the federally endangered least Bell's vireo to determine short term and long term local population changes in response to the restoration project.

6.6 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 vegetation transects needed to achieve 80% confidence with 10% 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 the 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 80% power is being achieved, alpha of 0.1, and a minimum detectable change of 10% native cover. Using permanent sampling units allows for higher power with fewer samples because variability in location is removed, as the sampling units are in the same place year after year. If 80% power is not being achieved, additional transects may be added.

Additionally, 90% confidence intervals will be calculated each year around performance standards (i.e. native and nonnative cover) for each restoration category. 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.

A sample size/power analysis will be conducted for the restoration categories that have multiple AAs to ensure adequate sampling for the CRAM analysis. The procedures described in the latest Technical Bulletin (CWMW 2019) will be used to determine adequate sample size.

6.7 Reporting

Following each qualitative site visit, the Restoration Contractor 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 Contractor will coordinate with the Installation/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).

Annual monitoring reports will be submitted according to Section IX.B of the BEI to the Signatory Agencies by January 15th of each year during the Interim Management Period. The reporting period will cover July 1 – June 30. The annual reports will include all data forms, documentation, and a discussion of the Bank's progress toward meeting Performance Standards and any deficiencies in attaining and maintaining Performance Standards and any Remedial Action proposed, approved, or performed. If Remedial Action has been completed, the annual report shall also evaluate the effectiveness of that action. Annual reports will also include:

- The time period covered, i.e. the dates "from" and "to."
- A description of each management task conducted, the dollar amount expended, and time required.
- The total dollar amount expended for management tasks.
- A description of the management and maintenance activities proposed for the next reporting year.
- A description of the overall condition of the Bank, including photos documenting the status of the Bank Property and a map documenting the location of the photo points.

Chapter 7
Adaptive Management Plan

Pursuant to 33 CFR 332.7(c) a compensatory mitigation project must include an adaptive management strategy to account for unforeseen problems in the implementation, short-term development, and overall success of the mitigation program. The Bank Sponsor will ensure that an experienced Restoration Contractor who is familiar with the mitigation design and goals is on site during implementation and maintenance and monitoring of the Bank. 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 development. During implementation, the Restoration Contractor 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 Contractor 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 Contractor 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 Contractor will work with the mitigation team and Signatory Agencies if these problems require substantial action. A substantial action needing Signatory 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 Bank Sponsor will prepare a recommendation and gain Signatory 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.

If the Bank has not met the Performance Standards at the end of year 5, and they are considered appropriate and reasonable, maintenance and monitoring obligations will continue until Performance Standards are achieved or alternative contingency measures will be negotiated with Signatory Agencies.

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Chapter 8
Financial Assurances

Pursuant to 33 CFR 332.3(n)(2) and Section VI of the BEI , the Bank Sponsor is to provide financial assurances in the form of a letter of credit or other approved mechanism providing contingency funding in the event that the Bank project is not successfully implemented. The Bank Sponsor would provide three separate financial assurances: a Construction Security, Performance Security, and Interim Management Security. Construction costs and maintenance and monitoring costs used to calculate the three financial assurances are included as Exhibit C-2, C-3 and D-1 of the BEI. The Construction Security will be provided prior to the first credit release, and the Performance Security and Interim Management Security will be provided concurrent with the transfer of the first credit.

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Chapter 9
Long-Term Management

9.1 Long-Term Management Plan

Pursuant to 33 CFR 332.7(a), a Long-term Management Plan to govern the management of the Bank site in perpetuity after all Performance Standards have been met and Bank Closure has occurred has been completed. Although one goal of the Bank is to reestablish self-sustaining native riparian scrub habitat, some level of long-term management would be required to ensure that target functions and services are maintained. The purpose of the Long-term Management Plan is to maintain control over factors that could adversely affect the Bank site, such as invasive species, trespassing, and urban encroachment. Because the Bank is located downstream of a PRM site and the PRM site is not only treating invasive species on-site but also upstream to Savage Dam management for invasive species at the Bank should be reduced. The goals and tasks for long-term management at the PRM site mirror those for the Bank and are outlined in the Long-term Management Plan. The PRM site and the Bank function as one ecological system and will be managed as such with the same management actions occurring to ensure the entire riverine system (including adjacent uplands) functions at the highest level possible. The Bank Sponsor has evaluated the potential factors that could adversely affect the Bank site in light of the location, condition of surrounding riparian/wetland areas, and restoration activities, including the ecological Performance Standards. The Long-term Management Plan is a "living" document and includes 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 includes identification of financing mechanism(s) for long-term management and identification of responsible party(ies), such as a third-party land manager. The Long-term Management Plan is included as Exhibit D-5 of the BEI.

9.2 Site Protection Mechanism

The Bank site will be protected through recordation of a Conservation Easement that would be placed on the property title and obligates the Bank Sponsor or its successor to maintain the Bank site as natural open space in perpetuity. The Conservation Easement would ensure that the Bank site is protected for the primary purpose of maintaining natural aquatic resources functions and services. The Conservation Easement will be conveyed to San Diego River Conservancy, a 3rd party, who will undertake compliance monitoring inspections and reporting to ensure the purposes of the Conservation Easement are being met. The Conservancy was selected after expansion of their geographic footprint in 2020 which now includes the Otay River Watershed.

The Conservation Easement would preclude establishment of new fuel modification zones, road crossings, public trails, maintenance access roads, and future easements other than those identified in the BEI and recorded Conservation Easement. The site currently contains several easements (SDGE, City of Chula Vista sewer, etc.) which contain utility lines and access roads to maintain the utilities. No additional easements would be allowed.

9.3 Funding Mechanisms and Schedule

The Bank Sponsor would fund the long-term management and monitoring of the Bank site by establishing a non-wasting endowment or other mechanism approved by the Signatory Agencies for the purposes of fulfilling the long-term responsibilities described in the Long-term Management Plan. The amount of the endowment would be based on a Property Analysis Record (PAR) or PAR-equivalent analysis accounting for all the required management responsibilities, including monitoring and reporting, and a contingency to account for unforeseen adaptive management needs. The non-wasting endowment would be provided to an approved financial institution such as the National Fish and Wildlife Foundation or similar. A legal agreement between the Bank Sponsor, Signatory Agencies, and the endowment manager would be developed if necessary to govern how the endowment is managed and when monies would be released to the long-term land manager. The Endowment Fund Analysis and Schedule is included as Exhibit D-2 to the BEI.

Chapter 10
Completion of Interim Management Period

10.1 Completion of Performance Standards

Upon completion of the fifth year of maintenance and monitoring the Bank Sponsor will submit an annual report documenting completion of the Year 5 Performance Standards. The Bank Sponsor will request sign-off from the Signatory Agencies and a site visit will be conducted, if deemed necessary. Upon sign-off the Bank will continued to be maintained in accordance with the Interim Management Plan until all Performance Standards have been met and the third anniversary of the full funding of the Endowment Amount has occurred, at which point the Bank will enter into the Long-term Management Period.

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Chapter 11
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