Vernal Pool Mitigation Plan for the La Media Road Widening & Fire-Rescue Air Operations Phase II Project San Diego, California

Prepared for
City of San Diego
Public Works Department
525 B Street, Suite 750 MS 980A
San Diego, CA 92101

Prepared by
RECON Environmental, Inc.
1927 Fifth Avenue
San Diego, CA 92101
P 619.308.9333

RECON Number 9227
May 28, 2020

Meagan Olson, Restoration Ecologist

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Acronyms

Cal-IPC	California Invasive Plant Council
CDFW	California Department of Fish and Wildlife
City	City of San Diego
CRAM	California Rapid Assessment Method
DSD	Development Services Department
DSM	digital surface model
FAA	Federal Aviation Administration
MMC	Mitigation Monitoring and Coordination
MSCP	Multiple Species Conservation Program
MSS	maritime succulent scrub
PEP	Plant Establishment Period
PWD	Public Works Department
sUAV	small unmanned aerial vehicle
USFWS	U.S. Fish and Wildlife Service
VPHCP	City of San Diego Vernal Pool Habitat Conservation Plan

1.0 Introduction

This mitigation plan is intended to mitigate for impacts to vernal pool habitat for the La Media Road Widening Project and the Fire-Rescue Air Operations Phase II Project. Impacts from these projects are still being assessed and will be discussed in more detail in each project-specific biological technical report. Any additional mitigation credits not needed for these projects would be available for future City of San Diego (City) projects.

1.1 Project Location

The La Media Road Widening Project is located in the Otay Mesa neighborhood of the City, along La Media Road, south of Interstate 905. The Fire-Rescue Air Operations Phase II Project is located at Montgomery-Gibbs Executive Airport in the City in the Kearny Mesa Planning Area. The vernal pool mitigation site (mitigation site) is located in the City's Otay Mesa neighborhood, south of the southern terminus of Caliente Avenue, and approximately three miles west of the La Media Road Widening Project. The mitigation site was selected to support mitigation for both projects in an effort to create a larger preserve as opposed to two smaller mitigation sites. On-site mitigation for the Fire-Rescue Air Operations Phase II Project was not feasible due to Federal Aviation Administration (FAA) restrictions that limit restoration near airports. Additionally, the Fire-Rescue Air Operations Phase II Project and the mitigation site are both located within spreading navarretia (*Navarretia fossalis*) critical habitat and, although no spreading navarretia was impacted, the mitigation plan will aim to restore viable populations of this species.

It is situated along a City-owned dirt road south of Dillon Canyon (Figures 1 through 3). The mitigation site is made up of eight City-owned one-acre parcels with an approximately 40-foot road easement that passes north to south through the center, bisecting the site into two four-acre areas. The City-owned parcels are dedicated Open Space as part of the City of San Diego Vernal Pool Habitat Conservation Plan (VPHCP) and managed by the City Park and Recreation Department. The City will be pursuing an easement vacation to dissolve the road easement and incorporate that area into the site. Figures 2 and 3 show the individual one-acre parcels with the road easement in the center while all subsequent figures display the mitigation site boundary as a whole, after road easement vacation.

1.2 Restoration Goals and Objectives

The goal of this plan is restoration of vernal pools as mitigation for 0.125 acre of impacts caused by the La Media Road Widening (three vernal pool basins) and 0.087 acre of impacts caused by the Fire-Rescue Air Operations Phase II project (six vernal pool basins). These impacts are being mitigated through the restoration of 0.814 acre (35,443 square feet) of vernal pool surface area, enhancement of 0.150 acre (6,524 square feet) of existing vernal pools, and restoration of 6.666 acres of adjacent upland watershed.

Project Location

FIGURE 1
Regional Location

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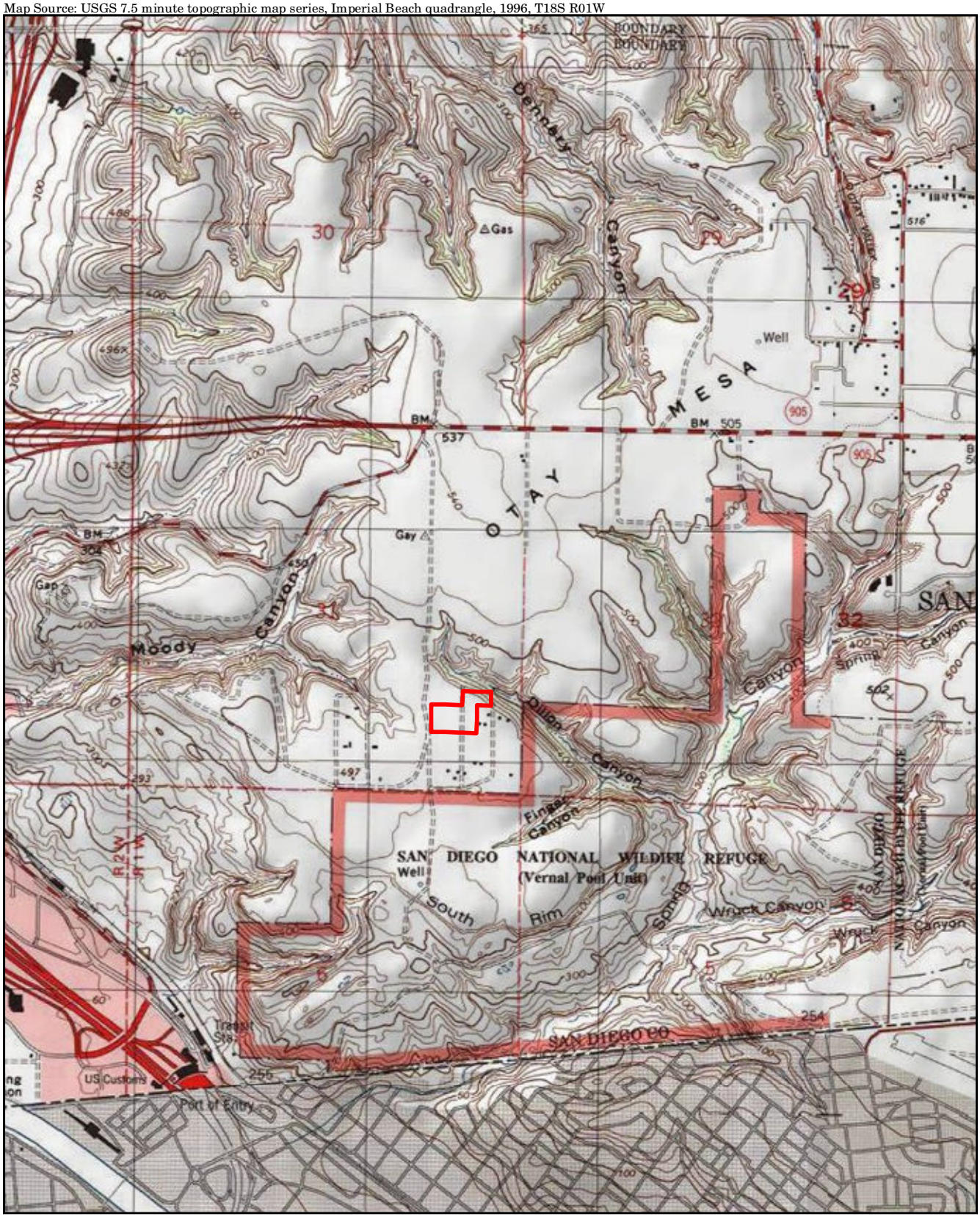
Map Source: USGS 7.5 minute topographic map series, Imperial Beach quadrangle, 1996, T18S R01W



Project Boundary

FIGURE 2

Mitigation Site Location on USGS Map

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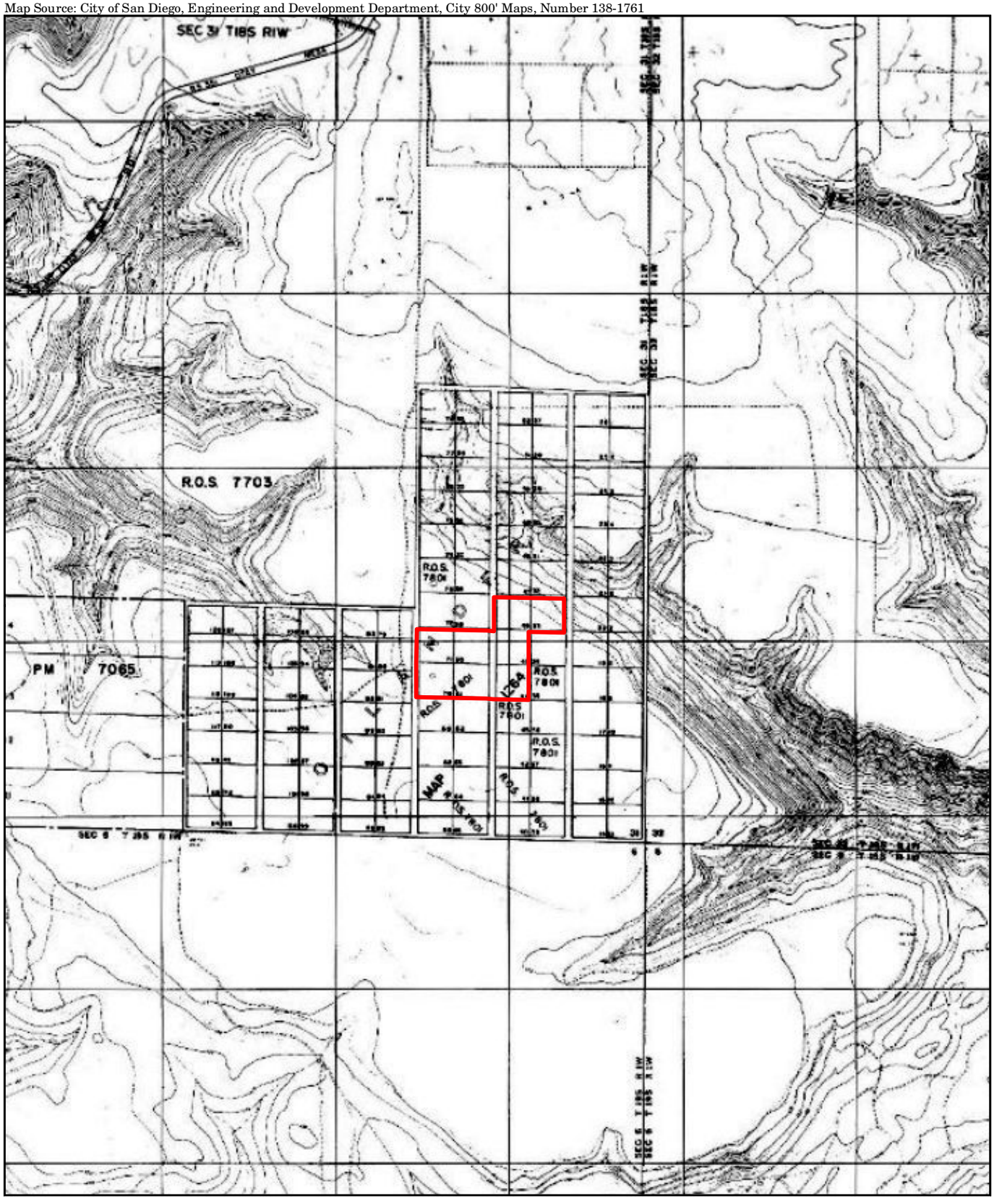
Map Source: City of San Diego, Engineering and Development Department, City 800' Maps, Number 138-1761



Project Boundary

FIGURE 3

Mitigation Site Location on City 800' Map

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2.0 Mitigation Site Existing Conditions

2.1 Mitigation Site Description

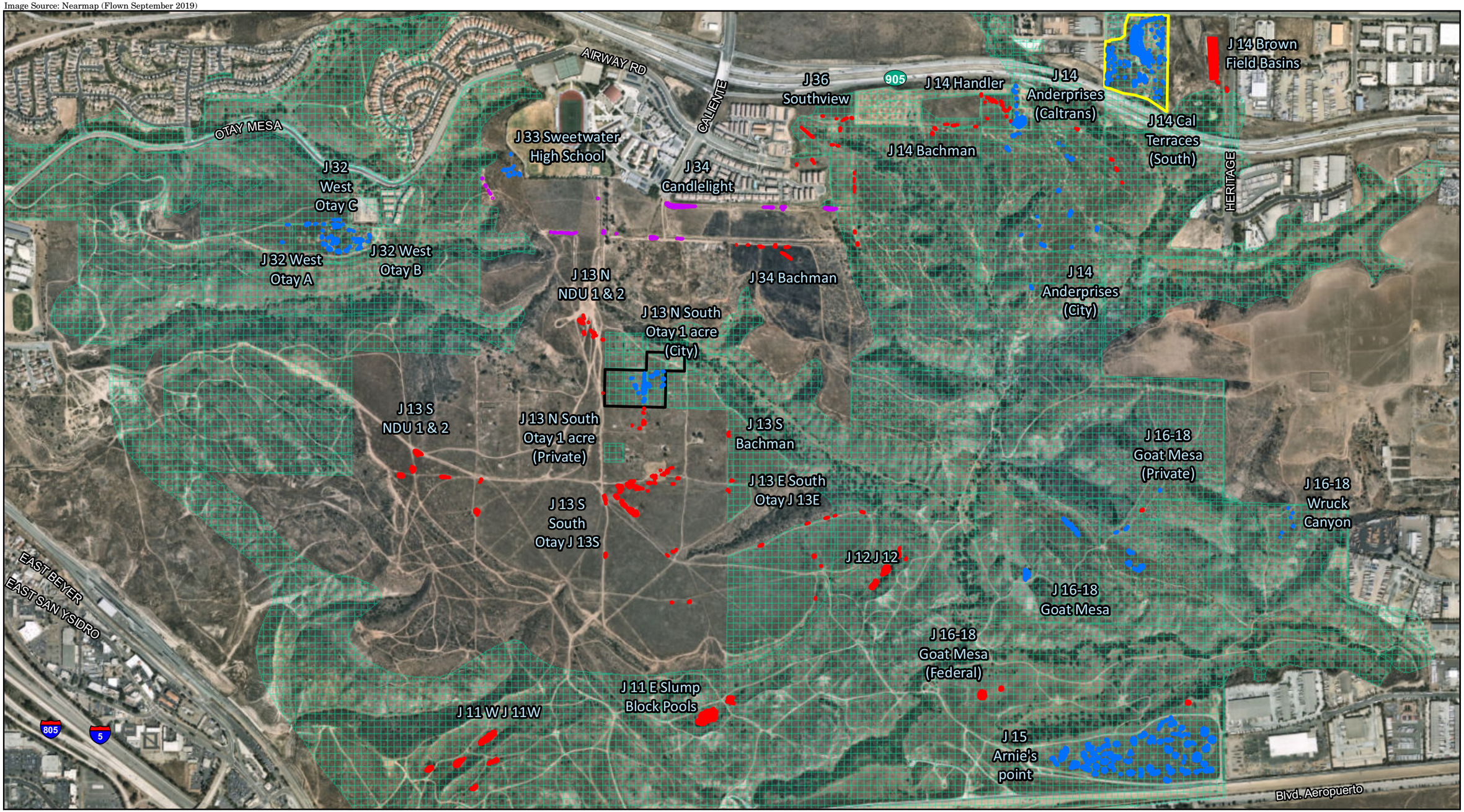
The VPHCP (City of San Diego 2017a) and Vernal Pool Management and Monitoring Plan (VPMMP; City of San Diego 2017b) identify the mitigation site as part of vernal pool complex J 13 N (Figure 4). The J 13 N complex was identified in the Recovery Plan for Vernal Pools of Southern California (U.S. Fish and Wildlife Service [USFWS] 1998) as necessary to stabilize populations of San Diego button-celery (*Eryngium aristulatum*), Otay Mesa mint (*Pogogyne nudiuscula*), spreading navarretia (*Navarretia fossalis*), Orcutt's grass (*Orcuttia californica*), San Diego fairy shrimp (*Branchinecta sandiegoensis*), and Riverside fairy shrimp (*Streptocephalus woottoni*).

Complex J 13 N comprises three sites: South Otay 1 acre (City), South Otay 1 acre (Private), and NDU 1 & 2 (see Figure 4). The VPHCP identifies 37 pools existing in the complex, of which 17 pools are located on the South Otay 1 acre (City) site, which is fully conserved and is owned and managed by the City Park and Recreation Department. The remaining 20 vernal pools are on the South Otay 1 acre (Private) and NDU 1 & 2 sites, which are on private non-conserved properties zoned for multi- and single-family residential development. It is assumed that these non-conserved properties will be developed in the future.

South Otay 1 acre (City) is an approximately 12-acre site comprising 12 one-acre parcels. The City acquired four one-acre parcels from The Environmental Trust as part the latter's bankruptcy proceedings, and the remaining eight one-acre parcels through a Federal Section Six Grant and City funds with the goal of establishing a vernal pool preserve. These 12 one-acre parcels were added to the MHPA pursuant to the VPHCP.

The mitigation site totals 7.63 acres and consists of undeveloped City land and is currently surrounded by undeveloped open space. The areas immediately north and immediately east of the mitigation site will be preserved as open space, while development areas for the Otay Mesa Southwest Village will occur approximately 400 feet to the north, providing at least a 400-foot buffer between development and the mitigation site. Future developments may occur immediately west of the mitigation site and a road is planned 50 feet to the south. All future development that may occur adjacent to the mitigation site would be required to adhere to Section 5.2.1 of the VPHCP, including being designed in a manner that prevents runoff from entering vernal pools. Due to the location of potential future development, the mitigation site was designed in a manner to provide adequate buffer between potential development and the vernal pools and their watersheds. The MHPA runs within Dillon Canyon to the northwest of the mitigation site (Figure 5). The mitigation site has been subjected to recent and historic disturbance and unauthorized activity (e.g., off-highway vehicle use, pedestrian traffic, and trash dumping).

Image Source: Nearmap (Flown September 2019)



Vernal Pools per VPHCP

- Conserved Pools
- Non-Conserved Pools per VPHCP
- Not Part of VPHCP

- Project Boundary
- Cal Terraces Reference Site
- Multi-habitat Planning Area

0 Feet 800

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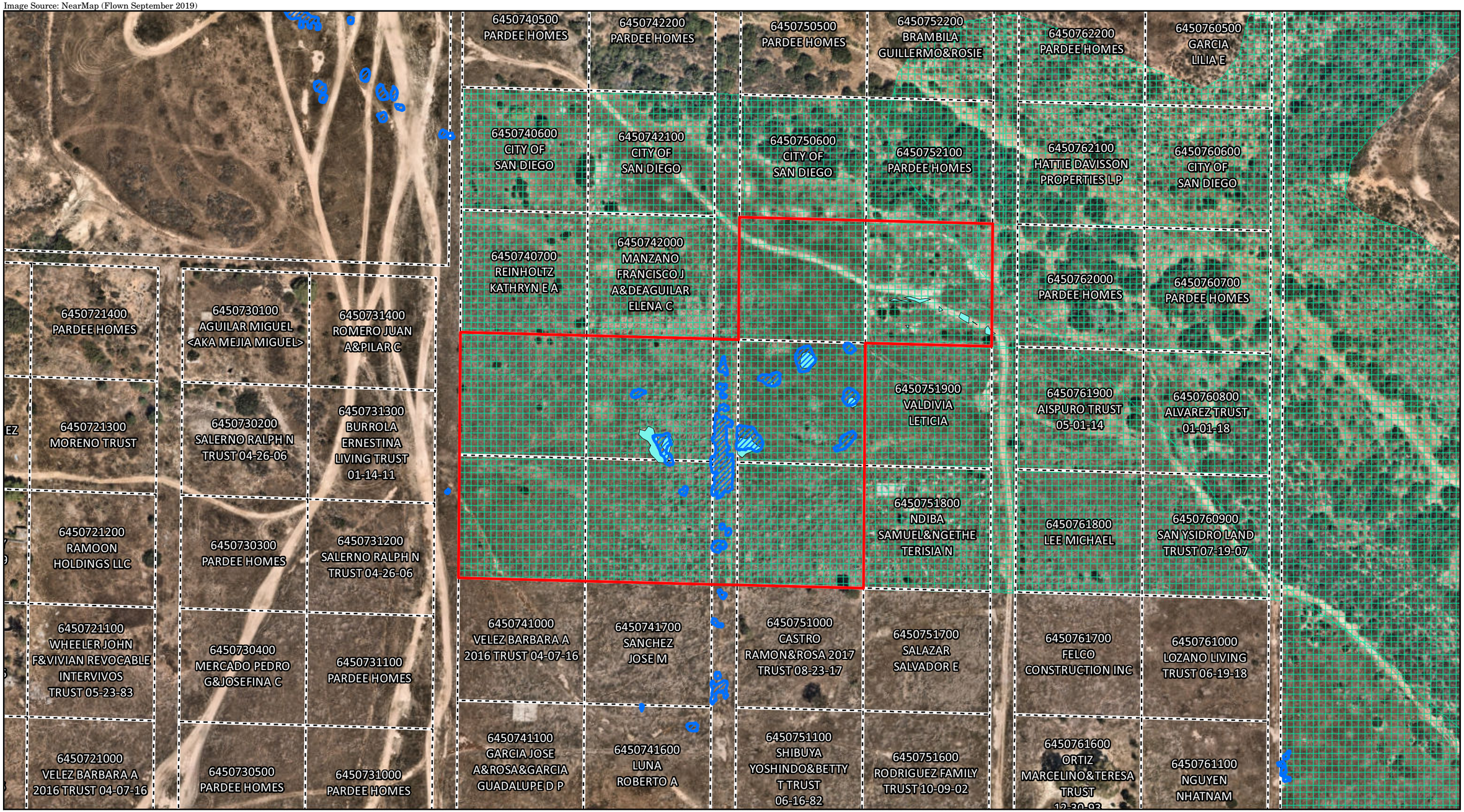
FIGURE 4

Regional Vernal Preservation Context

Image Source: NearMap (Flown September 2019)



Project Boundary
Parcel Boundary
Multi-Habitat Planning Area
Vernal Pools per RECON 2019
San Diego HCP Vernal Pools

0 Feet 150

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FIGURE 5

Mitigation Site Location and Surrounding Land Use

2.2 Soil Characteristics

Two soil series are mapped within the mitigation site: Huerhuero loam and Olivenhain cobbly loam (Figure 6; U.S. Department of Agriculture 1973). Huerhuero loam is the dominant soil, underlying most of the site. This soil series includes moderately well drained soils with clay subsoils. It occurs on gently sloping, undulating sites and often forms mima mounds in less disturbed areas. Olivenhain cobbly loams are present only in the northeast corner of the mitigation site, where the mesa ends and slopes north into a finger canyon. Olivenhain cobbly loams are well-drained, moderately deep soils with cobbly clay subsoils.

Both Huerhuero and Olivenhain soil series are known to support vernal pools, and vernal pools are present on the mitigation site (Bauder and McMillan 1998), so the soils are expected to be suitable for vernal pool restoration.

2.3 Hydrology

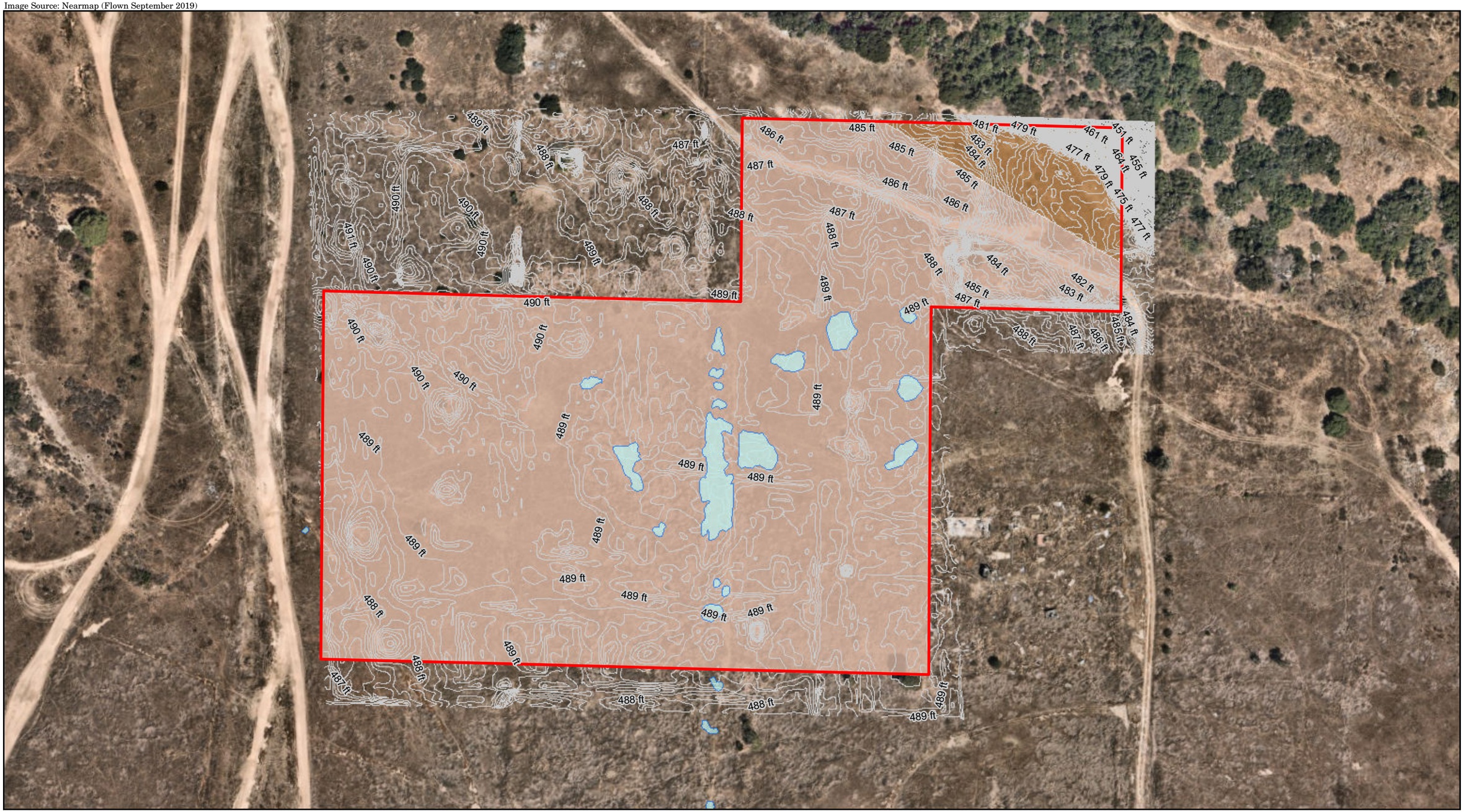
The vernal pool mitigation site is primarily flat and does not contain any drainages or streams; however, there are 17 existing vernal pools as mapped by the City's VPHCP within the site, including nine pools within the 1-acre parcels and eight within the road easement that will be vacated. During the 2019 vegetation mapping conducted by RECON, ten pools with vernal pool vegetation were mapped. Seven of those pools did not overlap with the City's existing VPHCP pools, for a total of 24 existing vernal pools (Figure 7).

In coastal southern California, annual precipitation is highly seasonal, with most of the rainfall occurring in the winter and early spring, from December through April. The first major rainfall event of the season typically functions to wet and recharge soils that dried during the summer drought. Thus, the first rainfall event rarely fills vernal pools, with surface ponding typically occurring from subsequent storms.

The formation of surface ponding in vernal pools requires very low permeability soils that create a perched water table, combined with topographic depressions to capture and hold precipitation. The shape and ponding capacity of the perched water table is influenced by soil permeability, overall site slope, and subsoil permeability (presence of sand, clay lenses, or holes in the hardpan). This surface shape ultimately determines the depth and duration of ponding.

The depth and duration of ponding is highly dependent upon the magnitude, number, and time between each storm, as well as climactic determinants of evaporation and transpiration (temperature, humidity, sunlight, and wind). A seasonal hydrologic regime characterizes the natural inputs to the vernal pools and other isolated waters of the U.S. and waters of the State on the site. The local watersheds of many these pools have been altered by vehicular activity, dumping, and historical agriculture.

Image Source: Nearmap (Flown September 2019)



Project Boundary

Vernal Pools per VPHCP

Topographic Contours

Soil Type

Huerhuero loam, 2 to 9 percent slopes

Olivenhain cobbly loam, 30 to 50 percent slopes

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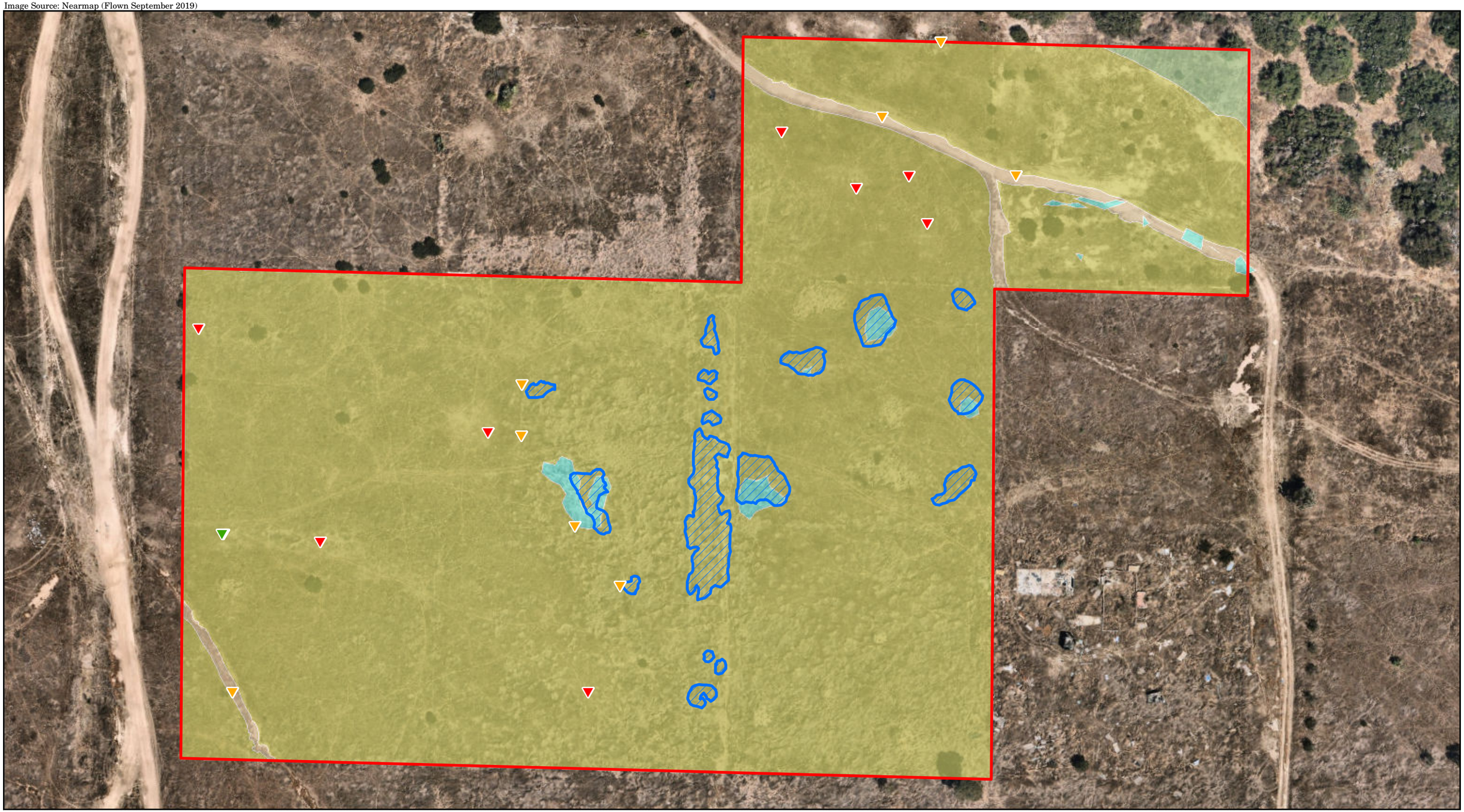
FIGURE 6

Mitigation Site Soil Map

Image Source: Nearmap (Flown September 2019)



Project Boundary

Vernal Pools per VPHCP

Vegetation Community

Vernal Pool (0.079 Acre)

Diegan Coastal Sage Scrub (0.082 Acre)

Non-Native Grassland (7.412 Acres)

Disturbed Land (0.139 Acre)

Sensitive Plants

Ashy Spike-Moss (*Selaginella cinerascens*)

Vernal Pool Indicator Plant Species

Dwarf Pepper Grass (*Lepidiom latipes*)

Dwarf Woollyheads (*Psilocarphus brevissimus*)

0 Feet 100

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FIGURE 7

Mitigation Site Location and Existing Biological Resources

2.4 Biological Conditions

RECON Environmental, Inc. (RECON) biologists conducted a general biological survey of the mitigation site on March 28, 2019, and a vernal pool survey following the California Rapid Assessment Method (CRAM) on May 3, 2019.

2.4.1 Vegetation Communities

The mitigation site is located on a large mesa characterized by non-native vegetation composed primarily of annual grasslands, with patches of native shrub habitat in the canyons. Dillon Canyon, which crosses the northeast corner of the mitigation site, supports grassland and Diegan coastal sage scrub. The area surrounding the project site generally contains flat topography intersected by finger canyons that lead south to the Tijuana River Valley (see Figure 2). There are four vegetation communities within the mitigation site: non-native grassland (7.412 acres), disturbed land (0.139 acre), vernal pool (0.079 acre), and Diegan coastal sage scrub (0.082 acre; see Figure 7).

Non-native grassland. Non-native grassland covers the majority of the mitigation site. Overall vegetation cover is dense, characterized by non-native annual grasses, such as rye grass (*Festuca perennis*), slender wild oat (*Avena barbata*), ripgut grass (*Bromus diandrus*), and wall barley (*Hordeum murinum*), as well as patches of black mustard (*Brassica nigra*), Russian thistle (*Salsola tragus*), and fennel (*Foeniculum vulgare*). A number of native herbs and annuals are present, including bluedicks (*Dichelostemma capitatum*), collar lupine (*Lupinus truncatus*), and common muilla (*Muilla maritima*). Additionally, there are occasional native shrubs, like California buckwheat (*Eriogonum fasciculatum*), broom baccharis (*Baccharis sarothroides*), and lemonade berry (*Rhus integrifolia*) present.

Disturbed land. Disturbed land, consisting of several dirt roads, occurs within the mitigation site, with one road in the northeast portion and one crossing the southwest corner of the site. These areas are only sparsely vegetated, with long-beak filaree (*Erodium botrys*) providing the majority of the cover, with scattered fascicled tarplant (*Deinandra fasciculata*), garland daisy (*Glebionus coronaria*), native pygmy weed (*Crassula connata*), and non-native grasses.

Vernal pools. The City's Vernal Pool Habitat Conservation Plan (VPHCP; City of San Diego 2017a) identifies 9 vernal pools within the mitigation site, plus an additional 8 vernal pools within the road easement bisecting the eight one-acre parcels (see Figure 7). During the general biological survey, RECON identified 11 vernal pool areas within the mitigation site based on the presence of vernal pool indicator plants, such as dwarf woollyheads (*Psilocarphus brevissimus* var. *brevissimus*), American pillwort (*Pilularia americana*), toad rush (*Juncus bufonius*), and pale spikerush (*Eleocharis macrostachya*). Five of the 11 RECON-identified pools are pools that are also identified in the VPHCP. In total, 23 pools have been observed on-site based on the presence of vernal pool vegetation.

Diegan coastal sage scrub. Diegan coastal sage scrub occurs in the northeast corner of the mitigation site, where the flat mesa slopes into Dillon Canyon. Vegetation in this area

is dominated by lemonade berry and black mustard, with lesser components of California sagebrush (*Artemisia californica*) and jojoba (*Simmondsia chinensis*).

2.4.2 Wildlife Species

Wildlife diversity is fairly low within the mitigation site, as may be expected for an area dominated by non-native grassland. The majority of the wildlife species detected are typical of grassland habitats and disturbed areas. A total of 12 birds were observed during the biological survey, including western meadowlark (*Sturnella neglecta*), common raven (*Corvus corax clarionensis*), American crow (*Corvus brachyrhynchos hesperis*), house finch (*Haemorhous mexicanus frontalis*), horned lark (*Eremophila alpestris*), white-crowned sparrow (*Zonotrichia leucophrys*), northern mockingbird (*Mimus polyglottos polyglottos*), red-tailed hawk (*Buteo jamaicensis*), Say's phoebe (*Sayornis saya*), mourning dove (*Zenaida macroura marginella*), cliff swallow (*Petrochelidon pyrrhonota tachina*), and wrentit (*Chamaea fasciata henshawi*). Additionally, three butterfly species were detected: painted lady (*Vanessa cardui*), west coast lady (*Vanessa atalanta rubria*), and Pacific Sara orangetip (*Anthocharis sara sara*). One crustacean species, seed shrimp (*Cladocera* sp.), was observed in the vernal pools, although fairy shrimp surveys were not conducted. Fairy shrimp species were not identified on-site by the VPHCP.

2.5 Cultural Resources

RECON archaeologists conducted a record search with the California Historical Resources Information System in March 2019. A total of 44 cultural resource records were found within the one-half mile search radius, including two records located between approximately 130 and 400 feet northwest of the mitigation site. These records consist of lithic scatters, including milling implement fragments. No cultural resource records, historic structures, or historic addresses are listed within or immediately adjacent to the mitigation site.

RECON conducted a field survey on March 19, 2019. No cultural material was observed during the survey; however, ground visibility was very low as a result of dense vegetation cover.

2.6 Rationale for Expecting Success

2.6.1 Regional Factors

The proposed mitigation site lies on a relatively flat portion of western Otay Mesa. The VPHCP identifies 28 distinct sites with vernal pool complexes in the vicinity. The mitigation site, identified as part of complex J 13 N on Figure 4, is on conserved land in the MHPA. Most of these complexes are located within the MHPA and several are on conserved lands; however, many of the vernal pool complexes closest to the mitigation site (red pools on Figure 4; J 11, J 13, J 13 S, J 34, and J 36) are on private property and may not be conserved. The complexes beyond these non-conserved areas (blue pools on Figure 4; J 32 and J 33 to the west and J 14, J 15, and J 16 to the east) are all conserved. Thus, the

mitigation site will connect to the vernal pool preserve area to the north and open space to the east, and be buffered by the open space in Dillon Canyon to the northeast. Even with the Otay Mesa Southwest Village development, the mitigation site will improve the number and quality of vernal pools in Complex J 13 N and maintain a stepping stone connection between the conserved complexes on western Otay Mesa.

Currently, most of the land in the project vicinity is undeveloped; however, the planned Otay Mesa Southwest Village, other developments, and a road are expected to develop portions of the surrounding land to the west and south. The Southwest Village development is expected to preserve the areas north and east of the restoration site as open space. The locations and proximity of the nearby developments were considered when developing this mitigation plan and the vernal pool basins were designed to have adequate watershed-to-basin ratios to support vernal pool flora and fauna, despite adjacent development plans. The watersheds of all vernal pool basins are either within the mitigation site or just outside the mitigation site (i.e., extending no further than 50 feet outside the mitigation site) but within areas not planned for development. Additionally, any development that may occur adjacent to the mitigation site will be required to comply with Section 5.2.1 of the VPHCP and the Land Use Adjacency Guidelines in the MSCP Subarea Plan (City of San Diego 1997). These guidelines apply to projects that are adjacent to the MHPA and include restrictions on drainage of urban runoff, release of toxic materials, lighting, noise, public access, invasive non-native species, brush management, and grading within the MHPA. As the mitigation site is within the MHPA, these guidelines would provide protections for the restored pools from indirect impacts. The design of this mitigation site provides sufficient buffers to adequately protect the proposed vernal pools and their watersheds.

2.6.2 Environmental Factors

The mitigation site contains soils that are highly suitable for vernal pool restoration (Bauder and McMillan 1998), and there are a large number of vernal pool complexes on the site and surrounding area (see Figure 4). It is situated within an area of designated critical habitat for listed fairy shrimp species and also within the City of San Diego's Multiple Species Conservation Plan (MSCP) hardline preserve. Moreover, vernal pool restoration on the site would add to the value of existing adjacent preserved open space areas (see Figure 4).

2.6.3 Design Factors

The proposed restoration includes an 8:1 watershed to basin ratio with additional watershed being provided by the preserved areas adjacent to the site. This ratio combined with the preserved areas adjacent to the site helps ensure that the basins will receive adequate hydrologic input to support vernal pool plant and animal species, assuming average or better rainfall. In addition, the planting and seeding palette for the vernal pool basins includes species with a wide range of hydrological and inundation requirements, and an emphasis on indicator species that are known to germinate and survive in lower rainfall years.

2.7 Consistency Analysis

This Mitigation Plan has been prepared in accordance with the mitigation measures included in the Biological Resources Report for the La Media Road Widening Project (RECON 2020) and the Montgomery-Gibbs Executive Airport: Fire-Rescue Air Operations Facility Project – Phase II (City of San Diego 2020) and the VPHCP. Table 1 includes a consistency analysis for this Mitigation Plan with the VPHCP Conservation Objectives.

3.0 Roles and Responsibilities

3.1 Project Proponent and Financially Responsible Party

The project proponent (City of San Diego Public Works Department [PWD]) will be responsible for retaining (1) a qualified vernal pool restoration specialist with over seven years of experience monitoring vernal pool habitat restoration to oversee the entire installation and monitoring of the mitigation program in coordination with City Development Services Department (DSD) staff and (2) a qualified installation/maintenance contractor with documented success in restoration of vernal pool habitat restoration and maintenance. Contact information for the City's PWD Project Manager is provided below:

Contact: Mr. Sean Paver
City of San Diego
Public Works Department
525 B Street, Suite 750
San Diego, CA 92101
Office: 619-533-3629

The City PWD will be responsible for financing the installation, five-year maintenance program, and biological monitor of the proposed mitigation described in the plan.

3.2 Responsible Agencies

The City DSD will be responsible for issuing any necessary permits and reviewing and approving this plan.

Contact: Mr. Mark Brunette
City of San Diego
Development Services Department
1222 First Avenue, MS 301
San Diego, CA 92101-4101
Office: 858-654-4237

Table 1
VPHCP Conservation Objectives Consistency Analysis

Objectives	Restoration Goals	Consistency
Vernal Pool Objectives (Habitat Based)	Restore 19 vernal pool sites (within 12 complexes) to a "Level 1" (stewardship) management condition within the MHPA through implementation of the VPHCP Management and Monitoring Plan or Site-Specific Management Plans (that are consistent with the VPHCP goals and objectives).	The La Media Road Widening Project proposes to impact three vernal pools (0.125-acre), one inside the MHPA and two outside the MHPA. The Fire Rescue Air Operations Phase II Project proposes to impact six vernal pools (0.089 acre) outside of the MHPA. The projects propose to reestablish and restore vernal pools inside the MHPA at a 2:1 ratio in a configuration that maintains long-term viability of VPHCP covered species. The mitigation associated with these projects will increase the number of pools and basin surface area of conserved vernal pools within the MHPA. The restoration project will restore the J13N complex from a Level 3 to a Level 1 management condition. The J13N complex will be managed in perpetuity in accordance with the VPMMP.
Species-Specific Objectives	Restore specific complexes identified in Appendix A of the VPMMP to enhance covered species populations to ensure long-term viability.	The La Media Road Widening Project will impacts pools that are occupied by SDFS but are not within a complex identified in the VPHCP. The Fire Rescue Air Operations Phase II Project will impact pools occupied by SDFS located within Montgomery Field Complex (N 5-6). The pools being impacted are located outside of the MHPA, were not previously identified, and were not included as part of the Montgomery Field Complex. The VPHCP Conservation Objectives for SDFS states "Restoration is not necessary for this covered species, as the populations of this species are adequately conserved under the VPHCP." The population of SDFS within Otay Mesa and the Montgomery Field Complex are currently stable and these projects will not impact any of the conserved vernal pools occupied by covered species. This project proposes to restore and re-establish vernal pools within the Otay 1-Acre Complex (J13N). This restoration work will address the Conservation/Restoration Objectives for the J13N Complex and Conservation/Restoration Objectives for spreading navarretia, San Diego button-celery, California Orcutt grass, Otay mesa mint and Riverside fairy shrimp. The restoration project will establish viable populations of these species.
Otay Mesa mint	Establish viable populations of Otay Mesa mint within the J13E, J13N, J16–18, J20–21, J27, and J28 complex series.	The La Media Road Widening Project and the Fire Rescue Air Operations Phase II Project will not impact any vernal pools occupied by Otay Mesa mint, and all existing, occupied, and conserved vernal pools will continue to be managed consistent with the VPMMP. To offset impacts associated with these projects, restoration of vernal pools at the J13N Complex will occur. The restoration will incorporate Otay Mesa Mint to establish a viable population at J13N.

Table 1 VPHCP Conservation Objectives Consistency Analysis		
Objectives	Restoration Goals	Consistency
San Diego Mesa mint	Restoration is not necessary for this covered species, as the populations of this species are adequately conserved under the VPHCP.	The La Media Road Widening Project and the Fire Rescue Air Operations Phase II Project will not impact any vernal pools occupied by San Diego Mesa mint, and all existing, occupied, and conserved vernal pools will continue to be managed consistent with the VPMMP.
Spreading navarretia	Establish viable populations of spreading navarretia within J11E, J11W, J12, J13E, J13 N, J16–18, J20–21, J27, J28, and R1.	The La Media Road Widening Project and the Fire Rescue Air Operations Phase II Project will not impact any vernal pools occupied by spreading navarretia, and all existing, occupied, and conserved vernal pools will continue to be managed consistent with the VPMMP. To offset impacts associated with this project, restoration of vernal pools at the J13N Complex will occur. The restoration plan will restore and incorporate spreading navarretia to establish a viable population at J13N.
San Diego button-celery	Establish a viable population of San Diego button-celery within J13E and J13N.	The La Media Road Widening Project and the Fire Rescue Air Operations Phase II Project will not impact any vernal pools occupied by San Diego button-celery, and all existing, occupied, and conserved vernal pools will continue to be managed consistent with the VPMMP. To offset impacts associated with this project, restoration of vernal pools at the J13N Complex will occur. The restoration will restore and incorporate San Diego button-celery to establish a viable population at J13N.
California Orcutt's grass	Establish viable populations of California Orcutt grass within J11E, J11W, J12, J13E, J14, J16-18, J20–21, J21, J27, and J28E.	The La Media Road Widening Project and the Fire Rescue Air Operations Phase II Project will not impact any vernal pools occupied by California Orcutt grass, and all existing, occupied, and conserved vernal pools will continue to be managed consistent with the VPMMP. To offset impacts associated with these projects, restoration of vernal pools at the J13N Complex will occur. The restoration will restore and incorporate California Orcutt grass to establish a viable population.
Riverside fairy shrimp	Establish viable populations of Riverside fairy shrimp within J11E, J11W, J12, J13E, J13N, J14, J16-18, J20–21, J21, J27, and J28E.	The La Media Road Widening Project and the Fire Rescue Air Operations Phase II Project will not impact any vernal pools occupied by Riverside fairy shrimp, and all existing, occupied, and conserved vernal pools will continue to be managed consistent with the VPMMP. To offset impacts associated with these projects, restoration of vernal pools at the J13N Complex will occur. The restoration plan will incorporate Riverside fairy shrimp to establish a viable population.
San Diego fairy shrimp	Restoration is not necessary for this covered species, as the populations of this species are adequately conserved under the VPHCP.	The La Media Road Widening Project will impact pools occupied by SDFS. One of the pools being impacted is located within the MHPA and the other two pools are located outside the MHPA, but none of the pools are located within a VPHCP identified complex. The Fire Rescue Air

Table 1 VPHCP Conservation Objectives Consistency Analysis		
Objectives	Restoration Goals	Consistency
		Operations Phase II Project will impact pools occupied with SDFS. The pools being impacted are located outside of the MHPA, were not previously identified, and were not included as part of the Montgomery Field Complex. The populations of SDFS on Otay Mesa and within the Montgomery Field Complex are currently stable and these projects will not impact any of the conserved vernal pools occupied by SDFS.

Due to the location of the mitigation site on City-owned preserve lands, the City's Parks and Recreation Department will be responsible for overseeing the establishment and development of habitat during the five-year maintenance and monitoring period and beyond. The primary avenue for the City's participation is through the permitting process; reviewing and commenting on this plan, the construction documents, and subsequent annual reports; and inspecting and commenting on significant milestones involved in the implementation of this plan.

Contact: Mr. Mark Berninger
City of San Diego
Parks and Recreation Department
Office: 619-685-1314
mberninger@sandiego.gov

3.3 Vernal Pool Restoration Specialist

Overall supervision of the installation and maintenance of this restoration effort will be the responsibility of a vernal pool restoration specialist. The vernal pool restoration specialist must have at least seven years of vernal pool restoration and maintenance experience and be approved by the wildlife agencies and the City. The vernal pool restoration specialist will oversee the efforts of the installation/maintenance contractor for the life of the restoration. Specifically, the restoration specialist will educate all construction and maintenance personnel about restoration goals and requirements; inspect plant material; directly oversee vernal pool grading, planting, seeding, weeding, and other maintenance activities; and conduct regular monitoring as well as annual assessments of the restoration effort. The restoration specialist will provide the PWD Project Manager and contractor with a written monitoring memo, including a list of items in need of attention, after qualitative monitoring visits (see Section 4.5 and 5.0 for discussion of qualitative monitoring). The restoration specialist will prepare and submit annual monitoring reports.

3.4 Installation/Maintenance Contractor

The City PWD Project Manager will hire a qualified restoration contractor with at least seven years of applicable restoration experience, i.e., vernal pool restoration, sensitive plant

species restoration, and native and non-native plant identification. The contractor will be a firm holding a valid C-27 Landscape Contracting License from the State of California, a valid Pest Control Business License, and a Qualified Applicator Certificate or Qualified Applicator License, with Category B, that will allow them to perform the required work for this restoration effort. The contractor may be from the same firm as the restoration specialist. The PWD Project Manager may change contractors at their discretion.

During the installation, the contractor will be responsible for initial weed control/dethatching, fencing/barrier installation, irrigation installation (if applicable), top soil salvage and translocation, and planting and seeding, as well as maintenance of the restoration site during the 120-day plant establishment period (PEP) and five-year maintenance period.

Following installation, the contractor will submit marked up as-built plans for all implementation activities to the PWD Project Manager. The contractor will be held responsible for meeting all PEP success criteria until formal sign-off of the PEP has been obtained from the restoration specialist, PWD Project Manager, City DSD staff, City MSCP staff, and wildlife agencies.

Following formal sign-off of the PEP, the contractor will be responsible for maintaining the mitigation site for a minimum of five years. During this period, the contractor will service the entire mitigation site according to the maintenance schedule (Section 5.0, below). Service will include, but not be limited to, weed control, irrigation maintenance (if applicable), trash removal, watering, dead plant replacement, re-seeding, and pest and disease management. All activities conducted will be seasonally appropriate and approved by the restoration specialist and PWD Project Manager. The contractor will meet with the restoration specialist and PWD Project Manager at the site when requested and will perform all checklist items in a timely manner as directed.

3.5 Grading Contractor

The installation contractor will hire a qualified grading contractor, if they are not capable of performing the grading themselves. The grading contractor will have at least five years of applicable vernal pool restoration experience working in and near vernal pools. The grading contractor must have demonstrated at least three projects with successful vernal pool creation, as determined by the basin's ability to hold water after rainfall events and support both vernal pool endemic plants and fairy shrimp species. The contractor will be a firm holding a valid A General Engineering or C-27 Landscape Contracting License from the State of California that will allow them to perform the required work for this restoration effort. The PWD Project Manager may change contractors at their discretion.

During installation, the grading contractor will be responsible for topographic reconstruction and implementation of any best management practices required during grading.

3.6 Vernal Pool Biologist

The vernal pool biologist will work closely with the vernal pool restoration specialist to direct vernal pool restoration. The vernal pool biologist and vernal pool restoration specialist may be the same person provided all qualifications are met. The vernal pool biologist will have at least five years of vernal pool restoration experience and will be approved by the City and wildlife agencies. The biologist will possess a Section 10(a)1(A) Recovery Permit for Conducting Surveys for Listed Large Branchiopod Species and will directly supervise all work to be conducted in or adjacent to vernal pools known to support sensitive species.

3.7 Native Plant Nursery

Seed collection and bulking and container plant propagation will be conducted by a nursery that specializes in native plants and contract seed collection and growing. The nursery will have the appropriate collection permits for sensitive plant species and will have demonstrated experience in the collecting and bulking of vernal pool plant species seed. The nursery will be responsible for providing brief updates on the progress of seed collection and bulking activities to the restoration specialist and City PWD Biologist.

4.0 Implementation Plan

This section describes the design of the compensatory mitigation and how it will be implemented. Implementation of mitigation efforts will be conducted under the direction of a qualified vernal pool restoration specialist as defined in Section 3.3. All restoration and enhancement activities will commence the first summer–fall season prior to, or concurrently with, the initiation of project impacts.

4.1 Avoidance and Minimization Measures

During mitigation implementation, avoidance and minimization measures will be implemented to avoid impacts to existing vernal pools and to ensure that the existing hydrology (rainwater runoff and subsurface flows) of the preserved vernal pools is maintained or enhanced during grading, construction, and implementation. The VPHCP includes avoidance and minimization measures that are specific for construction or development projects rather than mitigation projects; however, these measures have been adapted and modified to ensure the protection of existing resources at the mitigation site. These measures help ensure avoidance of negative impacts to the existing vernal pools and their watersheds.

General avoidance and minimization measures will be implemented as follows:

Mitigation Site Design

1. Any development adjacent to the MHPA shall be constructed to slope away from the extant pools to be avoided, to ensure that runoff from the project does not flow into the pools.

2. Vernal pool topsoil will not be salvaged from the vernal pools to be impacted at the La Media Road Widening Project and the Fire-Rescue Air Operations Phase II construction sites. Occurrences of versatile fairy shrimp (*Branchinecta lindahli*) have been reported at the La Media Road Widening Project and the Fire-Rescue Air Operations Phase II site is located at Montgomery-Gibbs Executive Airport in Kearny Mesa, a significant distance north of the mitigation site, which raises concerns regarding genetic integrity of fairy shrimp.

   Prior to mitigation site grading, topsoil will be salvaged from existing pools that will be expanded through grading as described in Section 4.3.6.

3. Permanent protective fencing along any interface with developed areas and/or use of other measures approved by the City of San Diego to deter human and pet access to on-site habitat will be installed. Fencing will be shown on the development plans and should have no gates (accept to allow access for maintenance and monitoring of the mitigation area) and be designed to prevent intrusion by pets. Signage for the mitigation area will be posted and maintained at conspicuous locations. The requirement for fencing and/or other preventative measures is further discussed in Section 4.3.4.

During Mitigation Implementation

1. Temporary fencing (with silt barriers) will be required at the limits of the mitigation site (including implementation staging areas and access routes) to prevent additional vernal pool impacts and the spread of silt from the mitigation construction zone into adjacent vernal pools outside of the mitigation site. Fencing will be installed in a manner that does not impact native vegetation and existing vernal pools. Final construction plans will include photographs that show the fenced limits of impact and all areas of vernal pools to be impacted or avoided. If work inadvertently occurs beyond the fenced or demarcated limits of impact, all work will cease until the problem has been remedied to the satisfaction of the wildlife agencies and the City. Temporary construction fencing will be removed upon project completion.

2. Impacts from fugitive dust that may occur during vernal pool grading will be avoided and minimized through watering and other appropriate measures.

3. The qualified vernal pool biologist that has been approved by the City will be on-site as needed during implementation activities to ensure compliance with all mitigation measures identified in the CEQA environmental document. The biologist will perform the following duties:

   a. Oversee installation of and inspect the fencing and erosion control measures within or upslope of vernal pool restoration and preservation areas as needed, including daily during all rain events to ensure that any breaks in the fence or erosion control measures are repaired immediately.

   b. Periodically monitor the work area to ensure that work activities do not generate excessive amounts of dust.

   c. Train all contractors and construction personnel on the biological resources associated with this project and ensure that training is implemented for construction personnel. At a minimum, training will include discussions of (1) the purpose for resource protection; (2) vernal pool species and their habitats; (3) the conservation measures that must be implemented during implementation to conserve the vernal pool species, including strictly limiting activities, vehicles, equipment, and construction materials to areas that require grading; (4) environmentally responsible construction practices as outlined in measures 4, 5, and 6 below; (5) the protocol to resolve conflicts that may arise at any time during the construction process; and (6) the general provisions of the project's mitigation monitoring and reporting program, the need to adhere to the provisions of the federal Endangered Species Act, and the penalties associated with violating the federal Endangered Species Act.

   d. Submit regular monthly letter reports to the City of San Diego Mitigation Monitoring and Coordination (MMC), City MSCP staff, and wildlife agencies during mitigation implementation and a final as-built report within 60 days following completion of construction. The final report will include as-built construction drawings with an overlay of habitat that was restored, final maximum extent of ponding for each vernal pool basin, general location of mounds, and other relevant summary information documenting that authorized impacts were not exceeded and that general compliance with all conservation measures was achieved.

4. The following conditions will be implemented during project implementation:

   a. Employees will strictly limit their activities, vehicles, equipment, and implementation materials to the fenced project footprint.

   b. The project site will be kept as clean of debris as possible. All food-related trash items will be enclosed in sealed containers and regularly removed from the site.

   c. Disposal or temporary placement of excess fill, brush, or other debris will be limited to areas within the fenced project footprint.

5. All equipment maintenance, staging, and dispensing of fuel, oil, coolant, and any other such activities will occur in designated areas as approved by the vernal pool biologist. These designated areas will be located in previously compacted and disturbed areas to the maximum extent practicable in such a manner as to prevent any runoff from entering the vernal pools or their watersheds and should be shown on the construction plans. Fueling of equipment will take place within existing disturbed areas greater than 100 feet from the vernal pools or their watersheds. Contractor equipment should be checked for leaks prior to operation and repaired as necessary. A spill kit for each piece of construction equipment should be on-site to be used in the event of a spill. "No-fueling zones" will be designated on construction plans.

6. Grading activities immediately adjacent to vernal pools will be timed to avoid wet weather to minimize potential impacts (e.g., siltation) to the vernal pools unless the area to be graded is at an elevation below the pools. To achieve this goal, grading adjacent to avoided pools will comply with the following:

    a. Grading will occur only when the soil is dry to the touch both at the surface and one inch below. A visual check for color differences (i.e., darker soil indicating moisture) in the soil between the surface and one inch below indicates whether the soil is dry.

    b. After a rain of greater than 0.2 inch, grading will occur only after the soil surface has dried sufficiently as described above and no sooner than two days (48 hours) after the rain event ends.

    c. To prevent erosion and siltation from storm water runoff due to unexpected rains, best management practices (i.e., silt fences) will be implemented as needed during grading.

    d. If rain occurs during grading, work will stop and resume only after soils are dry, as described above.

    e. Grading will be done in a manner to prevent runoff from entering preserved vernal pools.

    f. If necessary, water spraying will be conducted at a level sufficient to control fugitive dust but not to cause runoff into vernal pools.

    g. If mechanized grading is necessary, grading will be performed in a manner to minimize soil compaction (i.e., use the smallest type of equipment needed to feasibly accomplish the work).

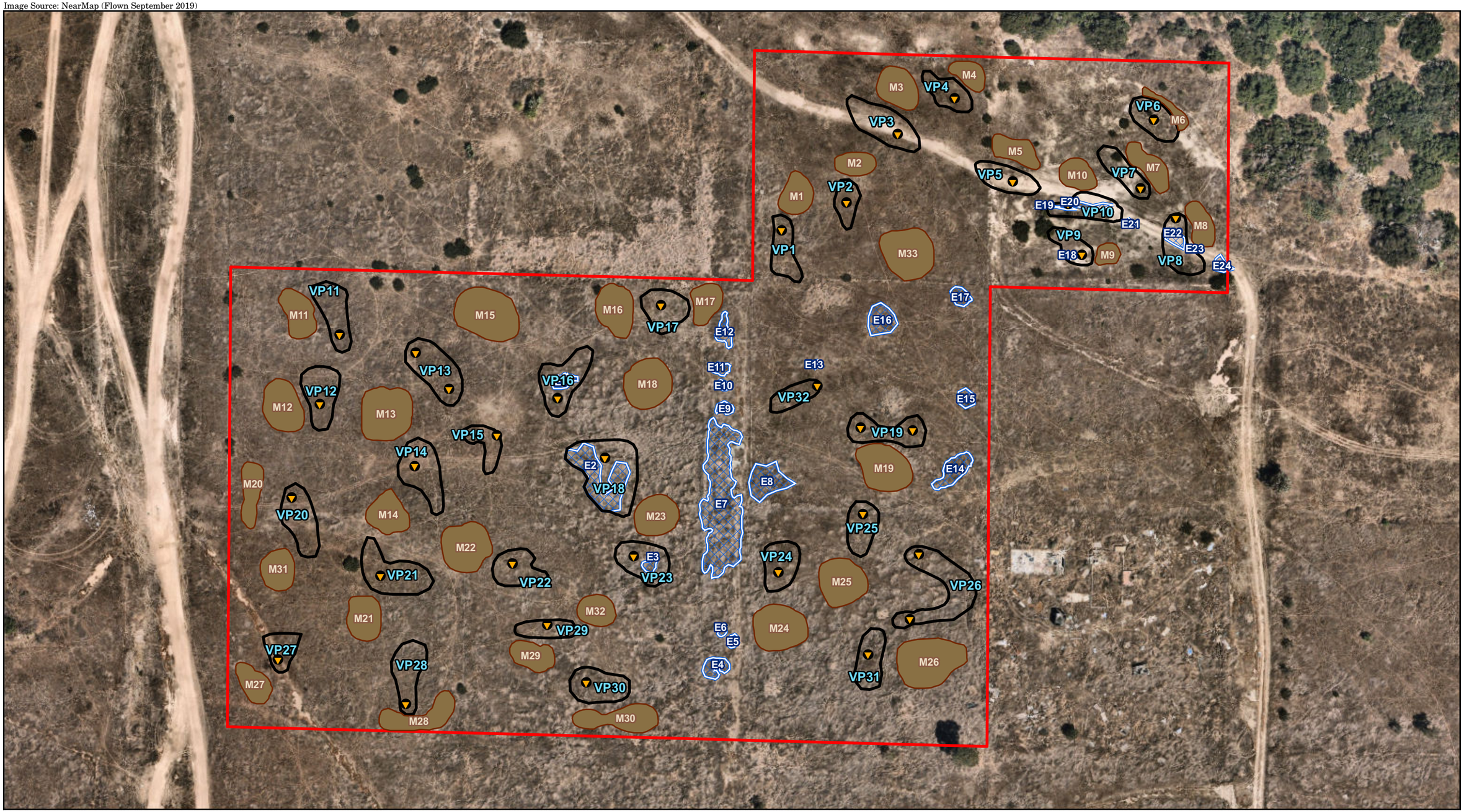
4.2 Preliminary Design and Engineering

This mitigation plan proposes restoration of 32 vernal pools and enhancement of 16 existing pools. The mitigation site contains a total of 24 existing vernal pools (labeled with an "E" on Figure 8). Existing pools are those that were either identified in the VPHCP or by RECON vegetation surveys conducted in 2019. The RECON vegetation surveys were used to refine the vernal pool boundaries presented in the VPHCP. In instances where the RECON boundaries differed from the VPHCP boundaries, the RECON boundaries were utilized. Eight of the 24 existing pools (E1, E2, E3, E18, E19, E20, E22, and E23) will be expanded and/or combined with other existing pools through minor grading. After grading, these eight existing pools will form five larger new pools with a new "VP" label (VP8, VP9, VP10, VP16, VP18, and VP23; see Figure 8 and Table 2). The existing basins will be enhanced and the extra acreage created/restored through expansion will count towards the City's mitigation credits. The remaining 15 existing pools that are not planned for grading will be enhanced through weeding, remedial seeding, and possible fairy shrimp inoculation. These pools will be referred to as "Enhanced Pools" and will keep the "E" label as shown on Figure 8. An additional 26 new pools will be created/restored through grading and are also labeled with a "VP" on Figure 8. For the purposes of this mitigation plan, all of the pools shown in Figure 8 will be collectively referred to as the "restored/enhanced pools", pools that will be graded will be referred to as "restored" and pools where no grading will take place will be referred to as "enhanced".

A hydrology study was prepared by Rick Engineering Company (2019) to confirm that each restored or enhanced vernal pool has sufficient watershed that a typical 1-year storm event would create 2 to 3 inches of ponding for a period of 14 days to support San Diego fairy shrimp or 21 days to support Riverside fairy shrimp. The hydrology study shows that all 32 proposed pools will, after a typical 1-year storm event, hold at least 2 to 3 inches of water for at least 14 days and 24 of the proposed pools will hold at least 2 to 3 inches of water for at least 21 days. Figure 9 shows the planned location of the vernal pools and their respective watersheds and flow patterns (this figure will be further refined as grading plans are prepared).

A minimum of 0.814 acre (35,443 square feet) of new vernal pool surface area will be restored through topographic recontouring/grading, soil translocation, seed collection and dispersal, and continued maintenance and monitoring. An additional 0.150 acre (6,524 square feet) of existing vernal pools (pools identified by the City's VPHCP or by vegetation surveys conducted in March 2019) will be enhanced through hand weeding, soil translocation, seed collection and dispersal, and continued maintenance and monitoring.

Image Source: NearMap (Flown September 2019)



Project Boundary

E# Existing Pools to be Enhanced

VP# Restored Vernal Pools

Deepest Point of Pool

M# Mounds to be Established

0 Feet 100

RECON

M:\JOBS5\9227\common_gis\fig8_vpmit.mxd 11/21/2019 bma

FIGURE 8

Mitigation Site Restoration Plan

Table 2 Restored and Enhanced Vernal Pools										
Proposed Pool Number	Overlap with Existing Pool	Proposed Final Size (sq. ft.)	Existing Pool Size (total if multiple pools)	Increase in Size (sq. ft.)	Target Depth	Ponding Depth After 14 days[1]	Ponding Depth After 21 days[1]	Existing Native Species[2, 3]	Target Native Vernal Pool Species[4]	Existing Non-native Species[3]
VP1		971		971	12.0	3.4	2.7		CALMAR DOWCUS ERYARI MYOMIN NAVFOS ORCCAL TRISCI	
VP2		626		626	12.0	6.7	6.0		CALMAR ELEMAC ERYARI ORCCAL TRISCI	
VP3		1,560		1,560	12.0	2.9	2.2	PSIBRE	CALMAR DOWCUS ERYARI MYOMIN NAVFOS ORCCAL TRISCI	
VP4		853		853	8.0	2.9	2.2		DOWCUS MYOMIN NAVFOS	
VP5		980		980	12.0	8.0	7.3	PSIBRE	CALMAR ELEMAC ERYARI MALLEP ORCCAL TRISCI	
VP6		1,009		1,009	12.0	2.6	1.9		CALMAR DOWCUS ERYARI MYOMIN NAVFOS TRISCI	

Table 2 Restored and Enhanced Vernal Pools										
Proposed Pool Number	Overlap with Existing Pool	Proposed Final Size (sq. ft.)	Existing Pool Size (total if multiple pools)	Increase in Size (sq. ft.)	Target Depth	Ponding Depth After 14 days[1]	Ponding Depth After 21 days[1]	Existing Native Species[2, 3]	Target Native Vernal Pool Species[4]	Existing Non-native Species[3]
VP7		874		874	12.0	2.6	1.9		DOWCUS MYOMIN NAVFOS	
VP8	E22, E23	1,135	152	984	12.0	2.6	1.9		CALMAR DOWCUS ERYARI MYOMIN NAVFOS	
VP9	E18	699	12	687	12.0	3.0	2.3		DOWCUS MYOMIN NAVFOS ORCCAL	
VP10	E19, E20	1,047	240	807	8.0	2.7	2.0		CALMAR DOWCUS ERYARI MYOMIN NAVFOS ORCCAL TRISCI	
VP11		1,177		1,177	6.0	2.6	1.9		CALMAR DOWCUS ERYARI MYOMIN NAVFOS TRISCI	
VP12		1,262		1,262	12.0	2.7	2.0		CALMAR DOWCUS ERYARI MYOMIN NAVFOS ORCCAL TRISCI	

Table 2 Restored and Enhanced Vernal Pools										
Proposed Pool Number	Overlap with Existing Pool	Proposed Final Size (sq. ft.)	Existing Pool Size (total if multiple pools)	Increase in Size (sq. ft.)	Target Depth	Ponding Depth After 14 days[1]	Ponding Depth After 21 days[1]	Existing Native Species[2, 3]	Target Native Vernal Pool Species[4]	Existing Non-native Species[3]
VP13		1,606		1,606	12.0	3.0	2.4		CALMAR DOWCUS ERYARI MALLEP MYOMIN NAVFOS ORCCAL TRISCI	
VP14		1,505		1,505	12.0	2.6	1.9		CALMAR DOWCUS ERYARI MYOMIN NAVFOS TRISCI	
VP15		689		689	12.0	2.8	2.1		DOWCUS MYOMIN NAVFOS	
VP16	E1	1,470	192	1,278	8.0	4.4	3.7	PSIBRE	CALMAR ELEMAC ERYARI MALLEP ORCCAL TRISCI	
VP17		1,091		1,091	12.0	3.0	2.3		CALMAR DOWCUS ERYARI MYOMIN NAVFOS ORCCAL TRISCI	
VP18	E2	2,797	1,403	1,394	12.0	2.6	1.9	PSIBRE (5-10%), ERYARI, CRETRU (<1%), DEIFAS (<1%), ELEMAC (5-10%), MALLEP (5-10%),	CALMAR ELEMAC ERYARI MALLEP TRISCI	BROMAD (<1%), EROBOT (<1%), FESPER (50-75%), HORMAR (5-10%)

Table 2 Restored and Enhanced Vernal Pools										
Proposed Pool Number	Overlap with Existing Pool	Proposed Final Size (sq. ft.)	Existing Pool Size (total if multiple pools)	Increase in Size (sq. ft.)	Target Depth	Ponding Depth After 14 days[1]	Ponding Depth After 21 days[1]	Existing Native Species[2, 3]	Target Native Vernal Pool Species[4]	Existing Non-native Species[3]
VP19		1,235		1,235	12.0	2.7	2.0		CALMAR DOWCUS ERYARI MALLEP MYOMIN NAVFOS TRISCI	
VP20		1,346		1,346	12.0	3.7	3.0	LEPLAT	CALMAR ELEMAC ERYARI MALLEP ORCCAL TRISCI	
VP21		1,691		1,691	12.0	2.6	1.9		CALMAR DOWCUS ERYARI MYOMIN NAVFOS TRISCI	
VP22		1,059		1,059	12.0	2.6	1.9		CALMAR DOWCUS ERYARI MYOMIN NAVFOS TRISCI	
VP23	E3	1,249	118	1,131	12.0	2.7	2.0	PSIBRE	CALMAR DOWCUS ERYARI MYOMIN NAVFOS TRISCI	

Table 2 Restored and Enhanced Vernal Pools										
Proposed Pool Number	Overlap with Existing Pool	Proposed Final Size (sq. ft.)	Existing Pool Size (total if multiple pools)	Increase in Size (sq. ft.)	Target Depth	Ponding Depth After 14 days[1]	Ponding Depth After 21 days[1]	Existing Native Species[2, 3]	Target Native Vernal Pool Species[4]	Existing Non-native Species[3]
VP24		1,052		1,052	12.0	2.7	2.0		CALMAR DOWCUS ERYARI MYOMIN NAVFOS TRISCI	
VP25		947		947	12.0	2.8	2.1		DOWCUS MYOMIN NAVFOS	
VP26		2,128		2,128	12.0	2.7	2.0		CALMAR DOWCUS ERYARI MYOMIN NAVFOS TRISCI	
VP27		713		713	12.0	6.4	5.7	PSIBRE	CALMAR ELEMAC ERYARI MALLEP ORCCAL TRISCI	
VP28		1,203		1,203	12.0	4.3	3.6		CALMAR ELEMAC ERYARI MALLEP ORCCAL TRISCI	
VP29		695		695	12.0	5.8	5.1		CALMAR ELEMAC ERYARI MALLEP ORCCAL TRISCI	

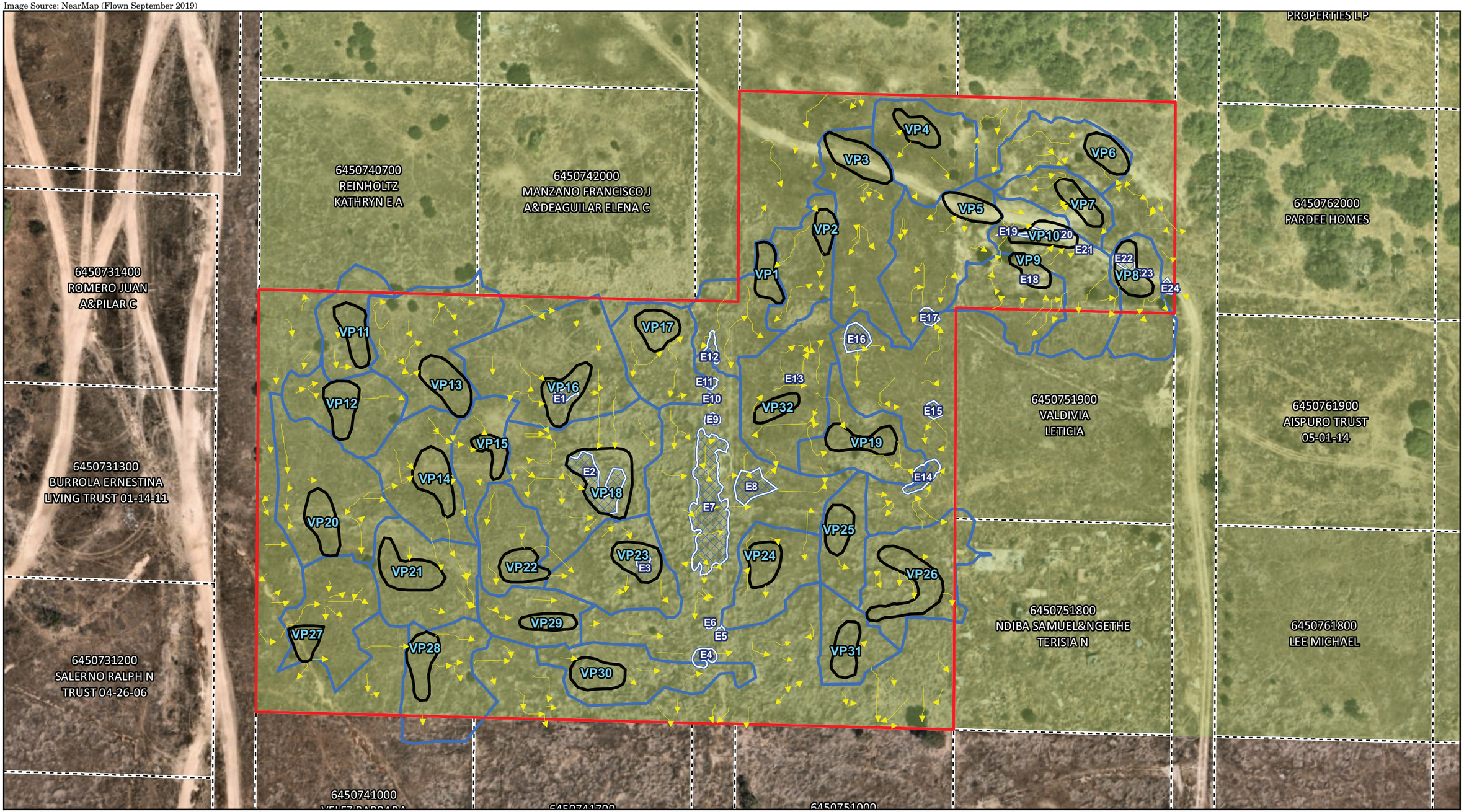
Table 2 Restored and Enhanced Vernal Pools										
Proposed Pool Number	Overlap with Existing Pool	Proposed Final Size (sq. ft.)	Existing Pool Size (total if multiple pools)	Increase in Size (sq. ft.)	Target Depth	Ponding Depth After 14 days[1]	Ponding Depth After 21 days[1]	Existing Native Species[2, 3]	Target Native Vernal Pool Species[4]	Existing Non-native Species[3]
VP30		1,215		1,215	12.0	2.9	2.2		CALMAR DOWCUS ELEMAC ERYARI MYOMIN NAVFOS TRISCI	
VP31		1,020		1,020	12.0	2.8	2.1		CALMAR DOWCUS ERYARI MYOMIN NAVFOS	
VP32		655		655	12.0	2.9	2.2		DOWCUS MYOMIN NAVFOS	
	E4	280	280					PSIBRE	4	
	E5	74	74					PSIBRE	4	
	E6	53	53					PSIBRE	4	
	E7	3,300	3,300					PSIBRE (25-50%), NAVFOS, ORCCAL, ELEMAC (<1%), DEIFAS (1-5%), LEPNIT (<1%), LYSMIN (<1%), MALLEP (5-10%)	4	ATRSEM (<1%), BROHOR (<1%), BROMAD (<1%), EROBOT (1-5%), FESPER (50-75%), HORMAR (<1%), HYPGLA (<1%), LACSER (<1%), LYTHYS (<1%), MESNOD (<1%), PHAAQU (1-5%), PHAMIN (<1%), SALTRA (<1%), SONASP (<1%), SPEBOC (<1%)
	E8	750	750					PSIBRE	4	

Table 2 Restored and Enhanced Vernal Pools										
Proposed Pool Number	Overlap with Existing Pool	Proposed Final Size (sq. ft.)	Existing Pool Size (total if multiple pools)	Increase in Size (sq. ft.)	Target Depth	Ponding Depth After 14 days[1]	Ponding Depth After 21 days[1]	Existing Native Species[2, 3]	Target Native Vernal Pool Species[4]	Existing Non-native Species[3]
	E9	112	112						[4]	
	E10	61	61					PSIBRE	[4]	
	E11	116	116					PSIBRE	[4]	
	E12	222	222					PSIBRE	[4]	
	E13	29	29						[4]	
	E14	514	514						[4]	
	E15	180	180						[4]	
	E16	501	501						[4]	
	E17	203	203					PSIBRE	[4]	
	E21	23	23						[4]	
	E24	130	130						[4]	
TOTAL		**44,107**	**8,664**	**35,443**						
Created square feet				*35,443*						
Enhanced square feet				*8,664*						

[1]SOURCE: Rick Engineering 2019, depth of restored pools remaining after 1-year storm event
[2]SOURCE: VPHCP (City of San Diego 2017b and RECON 2019)
[3]Cover data only available for two pools, from City of San Diego 2019 surveys.
[4]CRAAQU, DESDAN, JUNBUF, LYSMIN, PILAME, PLAACA, PLAELO, POGNUD, PSIBRE targeted to be present in all pools.

Key for Species:
ATRSEM = *Atriplex semibaccata*
BROHOR = *Bromus hordeaceus*
BROMAD = *Bromus madritensis rubens*
CALMAR = *Callitriche marginata*
CRAAQU = *Crassula aquatica*
CRETRU = *Cressa truxillensis*
DEIFAS = *Deinandra fasciculata*
DESDAN = *Deschampsia danthonioides*
DOWCUS = *Downingia cuspidata*
ELEMAC = *Eleocharis macrostachya*
EROBOT = *Erodium botrys*
ERYARI = *Eryngium aristulatum*
FESPER = *Festuca perennis*
HORMAR = *Hordeum marinum*
HYPGLA = *Hypochaeris glabra*
JUNBUF = *Juncus bufonius*
LACSER = *Lactuca seriola*
LEPLAT = *Lepitium latifolium*
LEPNIT = *Lepidium nitidum*
LYSMIN = *Lysimachia minima*
LYTHYS = *Lythrum hyssopifolia*
MALLEP = *Malvella leprosa*
MESNOD = *Mesembryanthemum nodiflorum*
MYOMIN = *Myosurus minimus*
NAVFOS = *Navarettia fossalis*
PHAAQU = *Phalaris aquatica*
PHAMIN = *Phalaris minor*
PILAME = *Pilularia american*
PLAACA = *Plagiobothrys acanthocarpus*
PLAELO = *Plantago elongata*
POGNUD = *Pogogyne nudiuscula*
PSIBRE = *Psilocarphus brevissimus*
SALTRA = *Salsola tragus*
SONASP = *Sonchus asper*
SPEBOC = *Spergularia bocconi*
TRISCI = *Triglochin scilloides*

Image Source: NearMap (Flown September 2019)



Project Boundary
Existing Pools to be Enhanced
Restored Vernal Pools
Surface Flow
Drainage Basins
Parcel Boundary
Multi-Habitat Planning Area

0 Feet 100

RECON

M:\JOBS5\9227\common_gis\fig9_vpmit.mxd 5/27/2020 ccn

FIGURE 9

Restored Vernal Pool Watersheds and Flow Patterns

In addition, the mitigation will consist of 6.666 acres of upland watershed that will be restored to native maritime succulent scrub (MSS) habitat on the mima mounds and native herbs, grasses, and forbs in the interspaces. Otay Mesa historically supported MSS habitat and establishing MSS at this site is an appropriate goal. However, if on-site trends (i.e., low container plant survival, lack of recruitment) indicate that MSS habitat may not be appropriate, adaptive management measures (i.e., replanting and reseeding) will utilize species that are already performing well on-site. This may result in upland habitat that is more indicative of Diegan coastal sage scrub, such as that already present in the northeastern corner of the site. Restoration will occur through weed dethatching, barrier installation, native plant and seed introduction, and continued maintenance and monitoring. Implementation activities are described in more detail in Section 4.3, and ongoing maintenance and monitoring activities are discussed in Sections 5.0 and 7.0.

4.3 Implementation Activities

Implementation activities include seed collection and bulking, non-native weed dethatching, topographic recontouring/grading, barrier/signage installation, irrigation system installation, vernal pool soil salvage and translocation, and planting and seeding. The implementation schedule is shown in Table 3. Implementation will commence prior to or concurrently with the start of construction of the project.

All final specifications and topographic-based grading, planting, and watering plans will have 0.2-foot contours for the vernal pools, watersheds, and surrounding uplands (including adjacent mima mounds) at the restoration site. The basis for this fine-scale resolution is the micro-depth (i.e., several inches) of the vernal pools that will be restored. The grading plans will also show the watersheds of existing vernal pools and overflow pathways that hydrologically connect the restored pools in a way that mimics natural vernal pool complex topography and hydrology.

Table 3
Implementation Schedule

Task	Time of Year
Seed Collection and Bulking	Spring/Summer for vernal pool seed and annual upland seed, Summer/Fall for perennial upland seed
Non-native Weed Dethatching	Summer/Fall (prior to grading)
Topographic Recontouring/Grading	Summer/Fall (prior to start of wet season)
Barrier/Signage Installation	Fall (after grading)
Irrigation System Installation	Fall (after grading)
Vernal Pool Soil Salvage	Summer/Fall (prior to start of wet season)
Vernal Pool Soil Translocation	Winter[1]
Maritime Succulent Scrub Plant and Seed Installation	Winter
Vernal Pool Hand Seeding	Winter[1]
[1]After vernal pool hydrology accepted	

4.3.1 Seed Collection and Bulking

Seed collection should begin immediately and should be conducted within the mitigation site vicinity. Species recommended for collection are shown in Table 4 and will be used for container plant propagation, seed bulking, and hand seeding. The Species-Specific Objectives in the VPMMP (City of San Diego 2017b) for vernal pool complex J 13 N include protecting and managing populations of San Diego button celery, spreading navarretia, and Orcutt's grass and establishing viable populations of Otay Mesa mint. Collection of seed from these four species will be of particular importance during the mitigation project.

Seed should be collected first from existing on-site pools that support endemic vernal pool plant species. If adequate seed cannot be obtained on-site, then an alternate site located on Otay Mesa site will be used upon approval by the City. Nearby vernal pool complexes owned by the City that may be targeted for seed collection include Cal Terraces and Goat Mesa (see Figure 4). If seed cannot be obtained from within these parameters, seed collected within San Diego County at a similar elevation to the mitigation site or commercial sources may be acceptable with consultation with the restoration specialist and the City PWD Biologist and approval by the City and wildlife agencies. Care will be taken to avoid collection of soil during seed collection as fairy shrimp eggs may be mixed with the seed and soil. The sources and proof of local origin of all plant material and seed will be provided to the City prior to dispersal.

Seed bulking and plant propagation should begin as soon as possible by a qualified native plant nursery as defined in Section 3.7. Seed collected or procured for the project will be used for container plant propagation in the species and quantities discussed in Section 4.3.7. Container plants will be inoculated with mycorrhizae (mutualistic fungi) by using native soil that contains fungi and other microorganisms. Providing the necessary microorganisms can increase outplanted plants survival rates (Allen 1988). Seed bulking includes propagating container plants specifically for the purposes of seed production. Container plants will be sown and grown under ideal conditions, allowed to germinate and flower, and all resulting seed will be harvested, rough cleaned, and stored for hand seeding. Species that will be targeted for bulking are shown in Table 4.

Vernal pool species will be introduced to the site through either soil transfer or seed collection and dispersal. The hand-collected vernal pool seeds will be distributed in the newly established vernal pools according to the planting plan outlined in Section 4.3.9 or at the discretion of the restoration specialist.

Table 4 Plant Species Targeted for Collection	
Plant Species	Common Name
Upland Maritime Succulent Scrub Species	
Acmispon glaber[1]	Deerweed
Amsinkia menziesii[1]	Common fiddleneck
Artemisia californica[1]	California sagebrush
Artemisia chenopodifolia	San Diego bur-sage
Atriplex pacifica	South coast saltbush
Bahiopsis laciniata	San Diego sunflower (viguiera)
Bergerocactus emoryi	Golden cereus
Brodiaea terrestris[2]	Dwarf brodiaea
Bothriochloa barbinodis	Cane bluestem
Cylindropuntia prolifera[1]	Coast cholla
Dichelostemma capitatum[1, 2]	Blue dicks
Distichlis spicata[1]	Salt grass
Dodecatheon clevelandii[2]	Padre's shooting star
Encelia californica	California encelia
Eriogonum fasciculatum[1]	California buckwheat
Eriophyllum confertiflorum	Golden yarrow
Euphorbia misera	Cliff spurge
Ferocactus viridescens	Coast barrel cactus
Isomeris arborea	Bladderpod
Lasthenia californica[2]	Goldfields
Linanthus dianthiflorus[1, 2]	Ground pink
Lupinus bicolor[1]	miniature lupine
Lupinus truncatus[1]	collar lupine
Lycium californicum	California desert thorn
Microseris douglasii var. *platycarpa*[1, 2]	Silverpuffs
Muilla maritima[1, 2]	Common muilla
Opuntia littoralis	Coast prickly pear cactus
Plantago erecta[1, 2]	Dot-seed plantain
Simmondsia chinensis[1]	Jojoba
Sporobolus airoides	Alkali sacaton
Stipa pulchra[2]	Purple needlegrass
Trifolium willdenovii[1]	Tomcat clover
Vernal Pool Plant Species	
Callitriche marginata[3]	Water-starwort
Crassula aguatica[1, 3]	Stone-crop
Deschampsia danthonioides[2]	Annual hairgrass
Downingia cuspidata[2]	Toothed calico flower
Eleocharis macrostachya[1, 2]	Pale spikerush
Eryngium aristulatum var. *aristulatum*[1, 2,4,5]	San Diego button-celery
Juncus bufonius[1, 2]	Toad rush
Lysimachia minima[1]	chaffweed
Malvella leprosa[1]	Alkali mallow
Myosurus minimus[2]	Little mouse tail
Navarretia fossalis[4,5]	Spreading navarretia
Orcuttia californica[4,5]	California Orcutt's grass
Pilularia americana[1,3]	American pillwort
Plagiobothrys acanthocarpus[1, 2]	Adobe popcornflower
Plantago elongata[1, 2]	Plantain

Table 4 Plant Species Targeted for Collection	
Plant Species	Common Name
Pogogyne nudiuscula[2,5]	Otay Mesa mint
Psilocarphus brevissimus[1]	Dwarf woollyheads
Triglochin scilloides[3]	Flowering quillwort
SOURCE: VPHCP (City of San Diego 2017a) [1]Observed at mitigation site during 2019 vegetation surveys [2]To be bulked at a native plant nursery [3]To be targeted for introduction to the site via soil collection [4]Identified as occurring on-site per the VPHCP [5]Required per VPMMP Species – Specific Objectives (City of San Diego 2017b)	

4.3.2 Non-native Weed Dethatching

Prior to topographic recontouring and outside of the bird breeding season (February 15 through August 15), crews familiar with native and non-native plants will remove the accumulated weedy thatch throughout the mitigation site through the use of line trimmers and rakes. If dethatching must occur during the bird breeding season, a nesting bird survey will be conducted by a qualified biologist before work begins. Cut material will be raked into piles, removed from the site, and taken to a landfill or put into a green waste dumpster for disposal. Removal of the weedy thatch material will enable the project biologist and heavy equipment operator to see the soil surface so that the proper vernal pool elevations could be contoured. Removal of the thatch will also aid in preparing the site for container plant installation, creating space for hand seeding of native annual species, and reducing future weed growth, which could be aided by the mulching effect of the thatch.

4.3.3 Topographic Recontouring/Grading

Topographic recontouring, or grading, at the site will be implemented to create mound and basin topography typical of vernal pool habitats on Otay Mesa. The result will be the establishment of natural watershed topography with the ability to capture and retain precipitation for the restored/enhanced vernal pools.

The primary physical change accomplished by grading will be the redistribution of a portion of the soil surface to establish (i.e., excavate) new vernal pool basins and allow ponding and water retention. Excess material displaced by the excavation process will be used to construct low mounds as shown on Figure 8. Mounds will placed in a manner that enhances the local watershed of the complex by encouraging ponding of restored/enhanced pools and improving hydrologic connectivity between pools.

Existing vernal pools on-site will be either left as is or expanded (see Figure 8). Expansion of existing pools will include light grading along the pool's edges to improve the pool's ponding capabilities, erase tire ruts, and manipulate soil to create greater topographic complexity.

Grading activities will be timed to avoid wet weather in order to minimize potential impacts (e.g., siltation) to the existing vernal pools. To ensure that potential impacts to the

existing vernal pools are avoided, grading activities will be performed consistent with the following:

- Grading will occur only when the soil is dry to the touch at the surface and one inch below. A visual check for color differences (i.e., darker soil indicating moisture) in the soil between the surface and one inch below indicates the soil is dry.

- After a rain of greater than 0.2 inch, grading will occur only after the soil surface has dried sufficiently as described above and no sooner than two days (48 hours) after the rain event ends.

- Grading will commence only when no rain is forecasted during the anticipated grading period. If rain occurs during grading, work will stop and resume only after soils are dry.

- Grading will be done in a manner to prevent silt from entering the preserved vernal pools. To prevent erosion and siltation from storm water runoff due to unexpected rains, best management practices (e.g., silt fences or other means such as fiber rolls) will be implemented as needed during any recontouring work.

The grading will be conducted under the direction of a qualified vernal pool restoration specialist, as described in Section 3.3. Areas that are to remain unaffected by grading activities will be marked prior to implementation. The grading will be implemented using a small bulldozer or skidsteer, as deemed appropriate by the grading contractor. The machine operator will also be experienced in vernal pool restoration work.

After grading, cobble generated by grading activities will be placed within the vernal pool basins to provide topographic complexity to the basin bottoms. After grading and prior to container plant installation, the maximum potential ponding area of the newly established vernal pools will be surveyed to ensure that the boundary for each pool does not differ by more than 10 percent from the target areas. High resolution aerial photography will be captured using a professional small unmanned aerial vehicle (sUAV). Using industry standard photogrammetry software and procedures, a digital surface model (DSM) will be generated using the data collected by the sUAV. The as-built grading plans and report figures will include vernal pool boundaries and 0.2-foot contours, both of which will be derived from the DSM, and will be replotted at 1 inch equals 40 feet.

4.3.4 Barrier/Signage Installation

Protection of the mitigation site from human disturbance is essential for success. Of particular importance is protection of the mitigation site from pedestrians and off-road vehicles. Concurrent with topographic recontouring, a temporary fence will be erected and maintained around the perimeter of the mitigation site to bar unauthorized vehicle access. Once the topographic recontouring is complete, the mitigation site will be permanently fenced with chain-link and three-strand barbless wire fencing in consultation with the City. Chain-link will be installed on the north, west, and south project limits where adjacent

planned development presents an increase probability of trespassing. Three-strand barbless wire will be installed on the eastern limits and along the edge of Dillon Canyon to allow for wildlife movement through the site. In addition, signs will provide notice that the area is an ecological preserve, notify that trespassing is prohibited, and cite penalties for trespass violation, including liability for repair of any damage to soil or biological resources within the barrier. Signs in both Spanish and English will be mounted at approximately 200-foot intervals around the mitigation site.

4.3.5 Irrigation System Installation

If a point of connection to a reliable water source is available at the time of mitigation implementation, a temporary aboveground irrigation system will be installed within areas planned to receive container plants in the upland MSS habitat at the restoration contractor's discretion and with the approval of the City PWD Biologist. The irrigation system will be field fit to ensure adequate irrigation coverage to all installed container plants to the extent practicable with avoidance of overspray into the vernal pool basins. At no point will irrigation water that results in pooling of water be allowed to enter the vernal pool basins. The system will also be installed with hose bibs to allow for hand watering of container plants that cannot be watered by the system due to their proximity to vernal pools.

If a reliable point of connection is not available at the time of container plant installation, all container plants and germinating upland seed will be watered by water truck and hoses. The water truck will fill up at the closest fire hydrant using the appropriate water meter (mostly likely City of San Diego).

4.3.6 Salvage and Translocation of Vernal Pool Soil for Fairy Shrimp

Vernal pool soil will not be salvaged from the vernal pools to be impacted at the La Media Road Widening Project and the Fire-Rescue Air Operations Phase II construction sites. Occurrences of versatile fairy shrimp (*Branchinecta lindahli*) have been reported at the La Media Road Widening Project and the Fire-Rescue Air Operations Phase II site is located at Montgomery Field in Kearny Mesa, a significant distance north of the mitigation site, which raises concerns regarding genetic integrity of fairy shrimp.

The City owns and manages several nearby vernal pool complexes on Otay Mesa (i.e., Cal Terraces, Goat Mesa) where versatile fairy shrimp have not been observed or are known to be present in a few limited vernal pools. Soil from nearby vernal pools containing San Diego and Riverside fairy shrimp eggs will be collected and used to inoculate all of the restored/enhanced pools where fairy shrimp are not already present. Vernal pools known to support versatile fairy shrimp will not be targeted for collection of soil.

Necessary criteria for this mitigation plan include establishment of populations of Riverside fairy shrimp. Establishment of San Diego fairy shrimp is desirable but not required as they are adequately conserved under the VPHCP (City of San Diego 2017a). Following

topographic recontouring, the newly established vernal pools will be inoculated with shrimp egg–bearing soils collected from nearby pools only after the newly established vernal pools have demonstrated suitable hydrologic conditions (i.e., at least 14 to 21 days for San Diego fairy shrimp and 21 to 28 days for Riverside fairy shrimp). Fairy shrimp eggs will be introduced into these vernal pools following the guidelines listed below.

The following translocation guidelines will be adhered to for the fairy shrimp translocation effort:

- Egg-bearing soil (inoculum) will be collected when it is dry to avoid damaging or destroying fairy shrimp eggs, which are fragile when wet.

- A hand trowel or similar instrument will be used to collect the top two inches of soil from the pools. Whenever possible, soil will be collected in chunks. The trowel will be used to pry up intact chunks of sediment, rather than loosening the soil by raking and shoveling, which can damage the eggs. The soil from donor pools will be stored individually in labeled boxes with adequate ventilation and away from direct sunlight. Salvaged soil will be kept at an approved seed storage facility that provides the appropriate conditions of light and temperature.

- Prior to placing any salvaged egg-bearing soil into the restored/enhanced pools, the pools will have been surveyed for versatile fairy shrimp to the satisfaction of the wildlife agencies and the City. Versatile fairy shrimp are undesirable in vernal pools as they can be considered weedy and possibly hybridize with sensitive fairy shrimp species. The survey will consist of soil collection and testing for the presence of the versatile fairy shrimp. If the soil contains versatile fairy shrimp cysts, then inoculum will not be introduced until measures approved by the above agencies have been implemented to remove the versatile fairy shrimp from the pools.

- Salvaged soil will be dispersed into the bottoms of the restored/enhanced vernal pools to give the greatest chance for the material to be inundated during the rainy season. Inoculum will be placed in a manner that preserves, to the maximum extent possible, the orientation of the fairy shrimp eggs within the surface layer of soil (e.g., collected inoculum will be shallowly distributed within the pool so that eggs have the potential to be brought into solution upon inundation).

- Inoculum will not be introduced until the restored/enhanced vernal pool basins have demonstrated the ability to retain water for the appropriate amount of time to support San Diego fairy shrimp (i.e., at least 14 to 21 days) and Riverside fairy shrimp (i.e., at least 21 to 28 days), as approved by the wildlife agencies and the City.

- Inoculum from different source pools will not be mixed for translocation to any restored/enhanced vernal pools.

4.3.7 Maritime Succulent Scrub Plant and Seed Installation

Planting of the upland watersheds will occur following site preparation and after the first significant rain of the rain season. See Table 3 for the seeding and planting schedule.

Approximately 7.1 acres of watershed will be restored to MSS. The portion of the mitigation site to be restored currently supports non-native grassland and disturbed land. The areas immediately southeast and southwest of the mitigation site contain non-native grasslands with MSS. The restoration of native plant communities will be based on a principle of reestablishing suitable soil conditions (i.e., mycorrhizal fungi) and native seed banks, and reintroduction of native shrub and herbaceous species. The container plant palette for the MSS restoration are listed in Table 5 and includes species indicative of MSS habitat as well as species more typical of coastal sage scrub and grasslands to provide a plant palette that will readily establish on mounds and vernal pool interspaces.

All plant material will be installed in a way that mimics natural plant distribution. In general, larger shrub species will be installed on mounds with smaller shrubs and grass species installed in the pool and mound interspaces, at the direction of the restoration specialist (see Table 5). Bulbs will be installed within the same planting hole as the purple needlegrass (*Stipa pulchra*) and foothill needlegrass (*Stipa lepida*) container plants. Container plants will be installed using standard horticultural practices, using a hole at least twice the diameter of the root ball. All plants will be thoroughly watered in their pots before planting, as will the soil in all planting holes. Each container plant will be installed with a small two- to three-inch berm or planting basin approximately 24 inches in diameter around the edge of the plant to hold irrigation water.

Table 5 Container Stock for the Maritime Succulent Scrub Restoration			
Scientific Name	Common Name	Size	Number per Acre
Mound Installation			
Artemisia californica	California sagebrush	1-gallon	200
Atriplex pacifica	South coast saltbush	1-gallon	100
Bahiopsis laciniata	San Diego sunflower (viguiera)	1-gallon	200
Bergerocactus emoryi	Golden cereus	1-gallon or cuttings	50
Bothriochloa barbinodis[1]	Cane bluestem	1-gallon	100
Cylindropuntia prolifera	Coast cholla	1-gallon or cuttings	100
Encelia californica	California encelia	1-gallon	150
Euphorbia misera	Cliff spurge	1-gallon	200
Ferocactus viridescens	Coast barrel cactus	1-gallon	10
Lycium californicum	California desert thorn	1-gallon	100
Opuntia littoralis	Coast prickly pear cactus	1-gallon or cuttings	100
Simmondsia chinensis	Jojoba	1-gallon	250
		TOTAL	**1,560**
Interspace Installation			
Artemisia chenopodifolia	San Diego bur-sage	1-gallon	150
Brodiaea terrestris[2]	Dwarf brodiaea	bulb	25
Dichelostemma capitatum[2]	Blue dicks	bulb	50
Distichlis spicata	Salt grass	Rose-pot	1,000
Eriogonum fasciculatum	California buckwheat	1-gallon	100
Isomeris arborea	Bladderpod	1-gallon	125
Muilla maritima[2]	Common muilla	bulb	50
Sporobolus airoides	Alkali sacaton	1-gallon	300
Stipa lepida	Foothill needlegrass	1-gallon	750
Stipa pulchra	Purple needlegrass	1-gallon	1,500
		TOTAL	**2,550**

[1]To be installed on north sides of mounds
[2]Bulb species to be installed within the planting hole of purple or foothill needlegrass container plants

4.3.8 Hand Seeding

The site will be hand-seeded with native seed purchased from the approved native plant nursery. The areas to receive seed, the upland interspaces, and edges of mounds, will be lightly raked prior to a depth of 0.5-inch to ensure good soil to seed contact. All species of seed will be mixed together with an inert material, such as sand or rice hulls, and applied to the freshly raked areas through hand broadcasting. Seed will be applied during the late winter months, immediately prior to (within 48 hours) a forecasted rain event of 0.25 inch or more. Table6 includes a recommended seed list and appropriate quantities; this list may be adjusted based on the results of seed collection and in consultation with the restoration specialist and City PWD Biologist and approval by the City and wildlife agencies.

Table 6 Seed Mix for the Maritime Succulent Scrub Restoration		
Scientific Name	Common Name	Pounds per Acre
Acmispon glaber	Deerweed	1.0
Amsinkia menziesii	Common fiddleneck	0.25
Eriophyllum confertiflorum	Golden yarrow	2.0
Lasthenia californica	Goldfields	1.0
Linanthus dianthiflorus	Ground pink	0.5
Lupinus bicolor	Miniature lupine	1.0
Lupinus truncatus	Collar lupine	1.0
Malvella leprosa	Alkali mallow	0.25
Microseris douglasii	Silverpuffs	0.5
Plantago erecta	Dot seed plantain	2.0
Stipa pulchra	Purple needlegrass	4.0
Trifolium willdenovii	Tomcat clover	0.25
	TOTAL	**10.5**

4.3.9 Establishment of Vernal Pool Vegetation

Establishment of vernal pool habitat requires the reintroduction of vernal pool target plant species, in addition to the physical topographic recontouring described above. The establishment or enhancement of vernal pool habitat can be greatly accelerated by the active transport of propagules from donor sites into the new vernal pools and associated watershed (Scheidlinger et al. 1985). This will be accomplished by one or a combination of the following:

- The redistribution of topsoil containing seeds, spores, bulbs, and other propagules salvaged from on-site vernal pools. Table 4 identifies species to be targeted for seed or soil collection. Species that are more readily collected and dispersed by soil collection and are known to occur on-site include stone-crop (*Crassula aquatic*) and American pillwort (*Pilularia americana*). Additional species that are more readily collected and dispersed by soil collection but are not known to occur on-site include water-starwort (*Callitriche marginata*) and flowering quillwort (*Triglochin scilloides*). Soil containing these species will be collected from City-owned pools on Otay Mesa known to support these species and do not support versatile fairy shrimp.

- If necessary, the use of vernal pool soil from an off-site source approved by the wildlife agencies and the City.

- Collection and dispersal of vernal pool soil will follow the methods described in Section 4.3.6.

- The use of locally collected vernal pool seed from within Otay Mesa. Vernal pool seed will be directly dispersed in the basins or will be used for bulking at a native plant nursery per Section 4.3.1.

- The vernal pools will only be seeded and/or inoculated with soil after they have been shown to have hydrology adequate to support vernal pool species (i.e., hold water for seven consecutive days).

- Care will be taken when hand seeding vernal pool species to ensure that species are seeded into pools that have the appropriate hydrology to support the species. In addition, species that tend to more readily colonize will not be seeded with species that are more easily out competed.

- Pools and species to be hand seeded will be approved by the qualified restoration specialist.

In the event that natural rain is inadequate to support plant establishment during the initial reintroduction of vernal pool plants, artificial watering of the restored/enhanced pools and their watersheds may be done upon approval by the wildlife agencies and the City in order to establish plants but not hydrate shrimp. Any artificial watering will be done in a manner that prevents ponding in the pools. Only water identified and documented to be free of contaminants that could harm the pools or target species will be used.

Soil will be spread evenly over the surface, no more than 0.25-inch deep. If any ponding water is present at the time of soil inoculation, the soil will only be placed on the wet soil adjacent to the ponded areas. Soil will be placed into the bottoms of the restored/enhanced pools in a manner that preserves, to the maximum extent possible, the orientation of the plant seeds within the surface layer of soil (e.g., collected soil will be shallowly distributed within the pond so that seeds have the potential to be brought into solution upon inundation).

4.4 As-Built Reporting

At the completion of implementation, the installation will be approved by the City PWD Biologist; City DSD, MMC, and MSCP staff; and wildlife agencies. The installation/maintenance contractor will submit an as-built report that documents implementation activities and the dates they were completed. The report will include but not be limited to dates of on-site work, location and size of vernal pools basins, final plant and seed lists and quantities, and modifications to the mitigation site design that occurred through consultation with the restoration specialist and City PWD Project Manager. The report may be a brief letter report with photos of the final site design and figures with locations of site elements. Figures will include the results of the DSM created after vernal pool grading.

4.5 120-day PEP

The 120-day PEP will begin once the implementation activities are approved by the City, likely once all container plants and native seed have been installed. The PEP will last for 120 calendar days and will consist of all maintenance activities and methods discussed in Section 5.0. Regular (at least once per week) qualitative monitoring will be conducted to

assess native container plant establishment and non-native weed germination and make recommendations for maintenance activities, as needed (Table 7). At the end of the PEP, any dead container plants will be replaced in kind and the site will be free of non-native weed species. Year 1 will begin after successful completion of the PEP and any required remedial container plant installation has been completed. At the completion of the PEP, the restoration specialist will prepare a letter report for submittal to the City DSD, MMC, and MSCP staff, and wildlife agencies to document activities conducted during the PEP and the site progress towards final success criteria.

Table 7
Vernal Pool and Watershed Maintenance Schedule

Task	120-day PEP	Year 1	Year 2	Year 3	Year 4	Year 5
Weed Control (herbicide treatment)	As needed	Monthly[1]	Monthly[1]	5 to 6 times per year[1]	4 to 5 times per year[1]	4 times per year[1]
Weed Control (hand pulling – vernal pools)	As needed	3 times per year[1]	3 times per year[1]	2 times per year[1]	2 times per year[1]	2 times per year[1]
Watering	As needed	As needed	As needed	As needed	As needed	–
Supplemental Upland Planting/Seeding	At end of PEP	Fall/Winter	Fall/Winter	–	–	–
Vernal Pool Seeding	Winter	Winter	Winter	Winter	–	–
Trash Removal	As needed	As needed	As needed	As needed	As needed	As needed
Barrier/Sign Maintenance	As needed	As needed	As needed	As needed	As needed	As needed
Footpath Decompaction/ Hydroseeding	--	–	–	–	–	End of project

[1]Minimum frequency

5.0 Maintenance Plan

Regular maintenance of the mitigation site will be required during the five-year maintenance and monitoring period to establish native container plants and control aggressive non-native weeds in the vernal pools and adjacent upland watershed habitats. The need for weeding is expected to decrease substantially by the end of the monitoring period provided successful habitat restoration has been achieved. Weeding activities will include herbicide application within the associated uplands. Herbicide has been used to control weeds safely and successfully in the vernal pool restoration programs on Otay Mesa and elsewhere. In these projects the success criteria for listed fairy shrimp have been met or exceeded with no negative effects on fairy shrimp noted. Maintenance activities will also include watering of planted container stock, hand weeding of the vernal pool basins, replanting and reseeding of native species, repair of fencing and signage, and trash removal. Maintenance activities will be performed per the schedule in Table 7.

5.1 Weed Control

Weed control will be performed consistent with the following:

- All weeding will be done by hand within and immediately adjacent to the preserved and newly established vernal pools. Use of herbicides within and immediately adjacent to restored pools will only be used under conditions approved by USFWS, RWQCB, and the City.

- All herbicide and pesticide use will be under the direction of a licensed qualified applicator and will be applied by personnel trained to apply herbicide. All weeding personnel will be educated to distinguish between native and non-native species to ensure that local native plants are not inadvertently killed.

- Herbicides will be applied on all areas that have been dethatched and at least three feet from the edge of the pools. Herbicide will only be applied when wind speed is less than five miles per hour, and spray nozzles will be of a design to maximize the size of droplets, to reduce the potential for drift of herbicide to non-target plants. Application of herbicide will not occur if rain is projected within 24 hours of the scheduled application.

- Weeding of the uplands will be done at a frequency and duration to ensure that weeds are not allowed to flower and set seed within the site. During the growing season this may be as frequently as weekly, depending on weather patterns. Any weeds that have set seed will be removed by hand and disposed of off-site.

- When vernal pools are ponding or close to saturation, weeds germinating along the basin edge will be cut using line trimmers by specially trained field personnel to ensure that germinating native species are not harmed. Cut material will be lightly raked away from the pools and care will be taken to not disturb the soil with raking activities.

- Herbicide treatment will be avoided within a 10-foot buffer from any concentrations of sensitive plant species.

5.2 Watering

Watering will be performed consistent with the following:

- Irrigation system operation or hand watering of container plants will be done in a manner to mimic natural rainfall, at a frequency and duration to encourage deep root establishment, but not enough to create runoff into the vernal pool basins.

- Irrigation system operation or hand watering will be carefully tapered off during the summer months to allow plants to experience their typical summer dormancy and

avoid potential root rot or excessive soil shrinking and swelling that can damage plant roots.

5.3 Supplemental Planting and Seeding

Remedial planting and seeding of the MSS uplands and remedial seeding of the vernal pool basins will be performed consistent with the following:

- Container plants will be replaced, as needed, within the upland watersheds. All dead plants will be replaced during years 1 and 2 after initial plant installation, unless their function has been replaced by natural recruitment.
- Areas of the site where native plants and seed struggle to recruit will be remedially seed during Years 1 and 2.
- Remedial seeding will be conducted to increase vegetative cover and native species richness.
- Vernal pool basins that do not support their target vegetation (see Table 2) are not demonstrating the desired vernal pool endemic coverage, or are not meeting native richness performance standards will be remedially seeded.
- Hand seeding of the vernal pool basins will be conducted in the winter, after the pools begin to pond after the start of the wet season.

5.4 Trash Removal and Barrier/Sign Maintenance

Trash removal and barrier/sign maintenance will be performed consistent with the following:

- Trash in the mitigation areas will be removed as necessary.
- All fencing and signs will be checked and repaired as necessary.
- Other site problems, such as vehicle damage and erosion, will be reported to the City or other adjacent landowners with recommendations for remedial measures.

5.5 Footpath Decompaction and Hydroseeding

Footpath decompaction and hydroseeding will be performed consistent with the following:

- At the completion of the five-year maintenance and monitoring period and prior to final sign-off, foot paths and access routes that may have developed within the site as a result of maintenance and monitoring activities will be lightly decompacted by hand tools or heavy equipment and hydroseeded with the species and quantities

shown in Table 7. Any footpath areas that have developed soil crusts will not be decompacted, and seed will only be applied in these areas by hand.

5.6 Maintenance Monitoring

Qualitative monitoring of the mitigation site to guide maintenance activities will be performed consistent with the following:

- After completion of the PEP, mitigation areas will be qualitatively monitored once a week by the vernal pool restoration specialist for the first two months, once every other week for the next four months, and monthly thereafter during the growing season. Monitoring will include, but not be limited to, assessment of container plant health, native seed germination, weed presence, and unauthorized trespassing. Monitoring results will be used to determine the timing and frequency of maintenance activities.

5.7 Adaptive Management Approach

An adaptive management approach will be implemented for the mitigation site in the event that areas of the site are not attaining the desired habitat values and functions. Adaptive management is defined, for the purposes of this project, as a flexible, iterative approach to the long-term management of biological resources that is directed over time by the results of ongoing monitoring activities and direct observation of environmental stressors that are producing adverse results within the mitigation site. Effects of any catastrophic events that affect the mitigation will receive prompt and appropriate corrective actions.

Adaptive management measures to be implemented will include the utilization of qualitative data gathered in the field throughout the five-year maintenance and monitoring period to assess the health and vigor of newly established vernal pools and restored upland watershed habitat within the mitigation sites. Following an event that causes damage to all or part of the mitigation sites, this data will be used in part to drive management considerations for the repair of the damaged areas. Achieving the key goals of the mitigation program and establishing self-sustaining native habitats will be the focus of all adaptive management decisions. Adaptive measures may include collection and dispersal of vernal pool plant seed, recontouring of vernal pool basins, reintroduction of additional soil inoculum, upland replanting or reseeding, additional weed control efforts, and others deemed appropriate through consultation with the City and wildlife agencies.

If an interim performance standard is not met for any of the restored/enhanced vernal pools or restored upland MSS habitat in any year or if the final performance standards are not met, the project proponent will prepare an analysis of the cause(s) of failure and, if deemed necessary by wildlife agencies and the City, propose remedial actions for approval. If any of the established/enhanced vernal pools or restored upland watershed habitat has not met a performance standard during the initial five-year period, the maintenance and monitoring obligations will continue until the above agencies deem the mitigation successful, or contingency measures are implemented. Mitigation will not be deemed successful until at

least two years after any contingency measures are implemented, as determined by the wildlife agencies and the City.

6.0 Performance Standards

The performance standards used to determine successful vernal pool mitigation include the achievement of standards for CRAM, hydrologic regime; vernal pool vegetation cover, plant species richness, and weed tolerance; and species-specific standards for fairy shrimp. Standards for hydrologic regime, vernal pool vegetation cover, plant species richness, weed tolerance, and fairy shrimp will be compared to the same values taken from a reference site.

A reference site will be used to define the target vegetation and establish target values for cover, species richness, wildlife usage, and weed abundance for the vernal pool and upland MSS restoration areas.

Each of the specified performance standards will be evaluated following the completion of seasonal field monitoring to determine if the final performance standards have been met and to assess the likelihood that any particular standard will be met (taking into account the seasonal conditions). The final assessment of success will be based on the combined performance over the monitoring period and an analysis of the trends established.

6.1 Location of Reference Site

The City-owned Cal Terraces vernal pool complex on Otay Mesa supports high-quality vernal pools surrounded by established upland MSS habitat. Cal Terraces is located within two miles northwest of the mitigation site and will serve as the reference site for this project (see Figure 4). Representative, high-quality reference vernal pools will be chosen from within Cal Terraces. The most functional vernal pools will be chosen at the time of the analysis to include the ranges of both physical and biotic characteristics that meet the performance standards. All reference vernal pools will support vernal pool vegetation, as defined below in the target vegetation and cover criteria. Any vernal pools to be used as reference pools for this mitigation project must be approved by the City. Cal Terraces will also serve as the reference site for the MSS habitat for the watershed restoration. Most vernal pool complexes on Otay Mesa are either restored vernal pools or severely degraded and while Cal Terraces is a restoration site itself, the site achieved all success criteria and was signed off by regulatory agencies in 2003. The site has remained high-quality vernal pool and MSS habitat for 17 years. Cal Terraces represents one of the older restoration sites and provides a high-quality example of what restoration sites should look like upon completion.

The VPHCP requires that vernal pool mitigation projects utilize reference pools from each of the three VPHCP subareas, however, due to the unique nature of Otay Mesa pools (endemic vernal pool plant species, clay pan substrate), one reference site located on Otay Mesa will be utilized for this project. Multiple vernal pools from the Cal Terrace reference site will be used to provide a variety of conditions for comparison to the restored pools.

6.2 California Rapid Assessment Methodology– Vernal Pools

CRAM is a wetland assessment method that combines landscape, hydrological, physical, and biological structure attributes, further separated into metrics and submetrics, into an index value. These indexed values (A=12, B=9, C=6, D=3) are repeatable, are scientifically defensible, and offer a window into overall wetland functionality (California Wetlands Monitoring Workgroup 2019).

CRAM will be used as an additional monitoring method to demonstrate mitigation site improvement and provide a more overall view of the mitigation system as whole. CRAM will not be used in lieu of quantitative monitoring efforts but in combination to demonstrate the functionality of the vernal pool systems within the mitigation site.

A vernal pool CRAM assessment was conducted for the mitigation site on May 3, 2019, and will be used to determine baseline conditions. The site was separated into two assessment areas and the average results of the assessments are shown in Table 8.

Table 8
CRAM Metric Goals for Five Years
Post-Establishment of Vernal Pools

CRAM Attribute	CRAM Metric and Submetrics	Average Current Score	Target CRAM Metric Goal
Buffer and Landscape Context	Aquatic Area Abundance	B	B
	Percent of AA with Buffer	A	B
	Average Buffer Width	A	B
	Buffer Condition	C	C
Hydrology	Water Source	A	A
	Hydroperiod	A	A
	Hydrologic Connectivity	A	B
Physical Structure	Structural Patch Richness	D	B
	Pool and Swale Density	D	C
	Topographic Complexity	D	B
Biological Structure	Horizontal Interspersion and Zonation	D	B
	A. Number of Codominant Species	D	B
	B. Percent Non-native	C	A
	C. Endemic Species Richness	D	C

In general, buffer and landscape context and hydrology attributes are expected to stay the same even after restoration activities are completed. CRAM metric and submetric scores for physical and biological are expected to change from the baseline as a result of both vernal pool restoration and completion of adjacent residential development. CRAM scores for physical structure and biological structure may be expected to increase, although buffer and landscape context scores may be expected to decrease as a result of the adjacent development. The goals for each metric are shown in Table 8; however, attainment of these goals will not confirm site success, nor should inability to achieve these goals determine site

failure. Rather, the measurement of these metrics will add to the qualitative discussion of the progress of the mitigation site.

CRAM assessments will use the Vernal Pool Module (version 6.1 or most recent) and be conducted a total of two times during the five-year maintenance and monitoring period to inform adaptive management: Year 0 (post-implementation) and Year 5 (prior to sign-off).

Although no official success standards will be applied to this project, CRAM scores will be used to evaluate form and function of the vernal pool mitigation site and therefore general achievement of non-wetland waters mitigation requirement of the project. When compared to the as-built condition, the results of the Year 5 CRAM surveys should show, at a minimum, the following:

- Physical form and structure suitable for ponding and hydrologic connectivity
- Development of hydrologic features within the system that provide evidence of expected function
- Continued improvement in biotic structure
- Overall trajectory toward improved rather than degraded condition

These attributes assess the areas adjacent to the assessment area and, therefore, are mostly outside the mitigation site and not within the control of this mitigation program.

The improvement of the physical structure and biological structure of the mitigation site will be the primary focus of mitigation as these attributes focus on the topography and biology within the assessment area, which is well within the control of this mitigation program.

6.3 Vernal Pool Hydrological Regime Performance Standards

The depth and duration of water in restored/enhanced vernal pools is highly dependent upon the magnitude and number of storm events, the time interval between each event, and the climactic determinants of evaporation and transpiration (temperature, humidity, sunlight, and winds) between each storm event in a given year. Annual rainfall in the region is remarkably variable. Therefore, the performance standards for hydrological characteristics depend on a comparison with control habitats representing the expression of performance standards during each monitoring year. In general, newly restored vernal pools pond earlier and longer than older, more established pools, and this variation should be taken into consideration when discussing the success of the restored/enhanced pools.

- The duration, periodicity, and depth of inundation for the restored/enhanced vernal pools will be considered successful if, prior to the end of the monitoring period, the vernal pools demonstrate hydrological patterns of duration, periodicity, and depth of inundation that fall within the range of the highest-functioning reference vernal pool.

- Total area of inundation of the restored/enhanced vernal pools must be equal to or greater than the area proposed in the mitigation plan 0.806 (35,128 square feet) during an average or above rainfall year.

- Each restored/enhanced vernal pool must be inundated, during an average or above rainfall year, for a duration and depth that supports vernal pool flora and fauna.

- Each restored/enhanced vernal pool must be inundated for a duration and depth that is within range of inundation for the reference vernal pools.

- The average depth and duration of inundation of the restored/enhanced pools must be within one standard deviation of the average depth and duration of the reference pools.

6.4 Vernal Pool Vegetation Performance Standards

The restored/enhanced vernal pools will be subject to the vegetation performance standards listed below. The upland watershed is restored to MSS and will be subject to the performance standards listed in Section 6.6.

Desired absolute vernal pool vegetation goals are shown in Table 9 and serve as a guide for monitoring annual changes and determining needs for adaptive management; however, the performance standards included in 6.4.1 through 6.4.3 will be utilized to determine ultimate project success and whether the site meets the objectives identified in the Site Specific Objectives of the VPMMP (City of San Diego 2017b).

6.4.1 Endemic Vernal Pool Plant Species Richness Performance Standards

The restored/enhanced vernal pools will support reproducing populations of a minimum number of endemic vernal pool plant species (see CRAM Vernal Pool modules) equivalent to that supported by the reference vernal pools (see Table 9). Equivalence is met when (1) the endemic vernal pool species richness (i.e., number of native vernal pool species) value for each of the restored/enhanced vernal pools is equal to or greater than the minimum value found in the reference vernal pools and (2) the average value of vernal pool species richness in the restored/enhanced vernal pools is equal to or greater than that of the average of the reference vernal pools.

Table 9
Vernal Pool Vegetation Performance Standards

Year	Native Species Richness	Endemic Vernal Pool Species Cover (%)	VPHCP Cover Species Presence (# of pools)	Non-native Cover (%)
1	2	5	• ERYARI – 4 • NAVFOS – 5 • ORCCAL – 2 • POGNUD – 10	• <5 • 0 Cal-IPC high or perennial species
2	3	10	• ERYARI – 8 • NAVFOS – 10 • ORCCAL – 4 • POGNUD – 15	• <5 • 0 Cal-IPC high or perennial species
3	4	20	• ERYARI – 11 • NAVFOS – 12 • ORCCAL – 6 • POGNUD – 20	• <5 • 0 Cal-IPC high or perennial species
4	5	30	• ERYARI – 12 • NAVFOS – 13 • ORCCAL – 8 • POGNUD – 25	• <5 • 0 Cal-IPC high or perennial species
5	6	40	• ERYARI – 20 • NAVFOS – 15 • ORCCAL – 10 • POGNUD – 30	• <5 • 0 Cal-IPC high or perennial species

Cal-IPC = California Invasive Plant Council
ERYARI = San Diego button-celery (*Eryngium aristulatum* var. *aristulatum)*
NAVFOS = spreading navarretia (*Navarretia fossalis)*
ORCCAL = California Orcutt's grass (*Orcuttia californica)*
POGNUD = Otay Mesa mint (*Pogogyne nudiuscula)*

6.4.2 Endemic Vernal Pool Vegetation Cover Performance Standards

For the restored/enhanced vernal pools the performance standards are as follows:

- The vernal pool endemic plant species cover of all restored/enhanced pools on average must be at least 70 percent of the average for the reference pools.
- For each of the restored/enhanced pools, the absolute vernal pool endemic species cover must be at least 50 percent of the average absolute cover of vernal pool endemic species for the reference pools.
- Vernal pool endemic species cover for each restored/enhanced vernal pool must increase in each successive year based on initial quantitative monitoring, except in years of extreme drought.

6.4.3 Vernal Pool Non-native Cover Performance Standards

The non-native cover performance standards are as follows:

- Within all of the vernal pools in the mitigation site (restored/enhanced), Cal-IPC List High or perennial weed species will not be present, and the relative cover of all other non-native species will not exceed five percent.

- The average absolute cover of non-native species in the restored/enhanced vernal pools must be less than the average absolute cover of non-native species of the reference pools.

6.5 Fairy Shrimp Performance Standards

The restored/enhanced vernal pools will support reproducing populations of Riverside and San Diego fairy shrimp (i.e., gravid females). Re-establishment of San Diego fairy shrimp is not a requirement of this project as they are adequately conserved under the VPHCP (City of San Diego 2017a); therefore, presence of San Diego fairy shrimp on-site is desirable and will be measured, but it is not required for project success. Success for fairy shrimp reintroduction will be determined by measuring the ponding of water, presence of viable eggs, hatched fairy shrimp, and gravid females within the restored/enhanced vernal pools as outlined below:

- The restored/enhanced vernal pools will pond for a period of time similarly to reference vernal pools during an average rainfall year and at an appropriate depth and quality to support San Diego and/or Riverside fairy shrimp.

- Protocol wet season sampling will be taken annually in the restored/enhanced vernal pools to determine presence and approximate quantities of hatched fairy shrimp and gravid females, by species (USFWS 1996).

- At the end of the monitoring period, Riverside fairy shrimp presence will be confirmed in 25 percent of the pools on-site.

- At the end of the monitoring period, San Diego fairy shrimp presence will be confirmed in 33 percent of the pools on-site.

6.6 Maritime Succulent Scrub Vegetation Performance Standards

The performance standards for the upland MSS areas will be based on a reference site that supports vernal pools and the upland habitat targeted for restoration in this mitigation plan. While achieving a fully mature system within five years may not be possible, the site should demonstrate that it is exhibiting a positive trajectory towards long-term viability.

The City-owned Cal Terraces vernal pool complex has been identified as the reference site for this mitigation site. The reference site will be used to establish target values for vegetation cover, species richness (number of different species present), wildlife usage, and weed abundance. Target values will be relative to the reference site where quantities observed for the mitigation site will be divided by those same values observed at the reference site to determine how the mitigation site is performing relative to the reference site. Yearly target values for the performance standards cover and species richness of MSS habitat are presented in Table 10.

Table 10
Maritime Succulent Scrub Performance Standards as a Relative Percentage of Reference Site Values

Year	Percent Cover–Native Shrub Species	Percent Cover–Native Herbaceous Species	Species Richness
1	10	5	30
2	20	10	40
3	30	20	50
4	50	40	60
5	70	60	85

6.6.1 Plant Survivorship, Vegetation Cover, and Species Richness Performance Standards

In combination with the performance standards included in Table 10, the standards listed below will also be evaluated annually and applied to the mitigation site. The plant survivorship, vegetation cover, and species richness performance standards are as follows:

- Container plant survival will be 80 percent of the initial plantings for Years 1 through 5. After Years 1 and 2, all dead plants will be replaced unless their function has been replaced by natural recruitment.
- At the end of the five-year maintenance and monitoring program, the upland habitat relative percent cover values will be 70 percent of the reference site for shrub cover and 60 percent of the reference site for herbaceous cover.
- At the end of the five-year maintenance and monitoring period, 85 percent of the upland plant taxa are shared with the reference site.

6.6.2 Non-native Weed Cover Performance Standards

The relative cover of all non-native species within the upland MSS will not exceed an absolute value of 10 percent and no Cal-IPC List High or perennial species will be present at the end of the five-year maintenance and monitoring period.

6.7 Photographic Documentation

Permanent photopoints will be located at each restored/enhanced vernal pool and at locations within the upland MSS. Representative photographs will be taken at each photopoint to visually document the progress of vegetation cover development over the monitoring period.

7.0 Monitoring Requirements

A minimum commitment of five years of monitoring of the vernal pool and upland MSS restoration areas will be completed. In addition to the qualitative monitoring discussed in Section 5.6, biological monitoring for performance standards will include quantitative hydrology monitoring, quantitative vegetation monitoring, USFWS protocol surveys (wet season), complete flora and fauna inventories, and photographic documentation. To minimize impacts to the soil surface of any vernal pools during restoration and monitoring activities, cobbles will be oriented within the restored vernal pools to serve as stepping stones. The monitoring schedule is presented in Table 11.

7.1 Vernal Pool Hydrology Monitoring

The success criteria for hydrological characteristics will be based on comparing performance measurements for the restored/enhanced vernal pools with those for reference vernal pools during each monitoring year. Hydrological characteristics to be monitored include depth, periodicity, and duration of inundation in both the restored/enhanced and reference pools. Precipitation will be based on records from the nearest reporting weather station. Field methods for the quantitative hydrological monitoring are described below.

- The restored vernal pools will be topographically mapped at 0.2-foot contour intervals.

- The water depth for restored vernal pools and reference pools will be measured every two weeks after initial ponding between November 1 and May 15 or until the standing water is gone. Water depth will be measured using a ruler placed in the low point of each pool.

- A water depth versus time chart will be prepared illustrating water depth at the deepest point and ponding periodicity of each restored/enhanced vernal pool and reference pool.

- Water measurements will also be taken annually in the restored/enhanced pools and reference pools to determine water quality (e.g., pH, temperature, total dissolved solids, salinity) of ponding.

Table 11 Vernal Pool and Maritime Succulent Scrub Monitoring Schedule						
Task	120-day PEP	Year 1	Year 2	Year 3	Year 4	Year 5
Qualitative Monitoring	Weekly	Every other week during growing season	Every other week during the growing season	Monthly during the growing season	Bi-monthly during the growing season	Bi-monthly during the growing season
Hydrology Monitoring	Every two weeks after initial ponding	Every two weeks after initial ponding	Every two weeks after initial ponding	Every two weeks after initial ponding	Every two weeks after initial ponding	Every two weeks after initial ponding
Vernal Pool Plant (quantitative)	None[1,2]	March (aquatic phase) and May (dry phase)[2]	March (aquatic phase) and May (dry phase)[2]	March (aquatic phase) and May (dry phase)[2]	March (aquatic phase) and May (dry phase)[2]	March (aquatic phase) and May (dry phase)[2]
Fairy Shrimp (wet season)	Protocol survey[2]	Protocol survey[2]	Protocol survey[2]	Protocol survey[2]	Protocol survey[2]	Protocol survey[2]
Photograph Documentation	Monthly	As-needed	Spring	Spring	Spring	Spring
Maritime Succulent Scrub Vegetation Monitoring (quantitative)	None[1]	Spring	Spring	Spring	Spring	Spring
[1]Quantitative monitoring to begin in Year 1. [2]Time dependent on rainfall.						

7.2 Vernal Pool Vegetation Monitoring

Monitoring tasks for vernal pool vegetation are as follows:

- The restored/enhanced vernal pools and reference pools will be sampled for plant species presence and estimated cover using a meander survey of at least a 15-minute duration per basin during the aquatic phase (e.g., March, dependent on weather patterns) and within 30 days of the disappearance of standing water (e.g., May, dependent on weather patterns). All species present will be noted and their cover estimated.

- The restored/enhanced vernal pools will be photographed from an established photopoint during the vegetation sampling period.

7.3 Vernal Pool Invertebrate Monitoring

Monitoring tasks for vernal pool invertebrates are as follows:

- Annually, the created/enhanced vernal pools will be sampled for aquatic invertebrates using pole-mounted dip-nets of appropriate mesh size to capture cladocerans, ostracods, branchiopods, and tadpoles following USFWS protocol survey methods (1996). The presence of hatched fairy shrimp and gravid females by species will be recorded.

7.4 Maritime Succulent Scrub Monitoring

It is anticipated that the MSS habitat will become established within the five-year maintenance and monitoring period, although full maturation of the community may take longer. Overall native cover (i.e., shrubs, herbaceous species) and species richness will be evaluated for these areas as well as for the reference site.

The native vegetation cover will be measured quantitatively using line-intercept sampling method in the spring, beginning in Year 2. This method involves the establishment of randomly placed transects, usually 10 meters long, to gather data to estimate native vegetation cover (i.e., shrub and herbaceous). Approximately two 10-meter transects will be sampled per acre. Species richness will be determined by lists of all plant species present within the restoration areas.

7.4.1 Invasive Non-native Plants

The presence of invasive non-native plant species will be monitored in the restored MSS areas. Information collected during monitoring visits will be used to schedule the maintenance crews to conduct maintenance activities.

7.4.2 Wildlife Usage

A list of wildlife species observed using the mitigation site will be prepared and included in the annual reports. Species lists for both restored/enhanced vernal pools and the MSS areas will be compiled annually.

7.5 Reporting

Annual reports that assess both the attainment of yearly interim and progress toward the final performance standards for the restored/enhanced vernal pools and restored upland MSS will be submitted to the City by December 1 of each year. The City will be responsible for submitting these reports to the appropriate wildlife agencies. The reports will also summarize the project's compliance with all applicable mitigation measures and permit conditions. A final monitoring report will be prepared and submitted to the City for use in the notification of completion and final acceptance of the mitigation effort.

8.0 Long-term Management

The mitigation site is within the City MSCP's Multi-Habitat Planning Area and the vernal pool complex is a VPHCP preserve area. After the successful restoration of the vernal pool basins and associated uplands, the vernal pool complex will be managed pursuant to the guidelines of the VPHCP and VPMMP (City of San Diego 2017a, 2017b).

The VPHCP provides the requirements of the long-term management of vernal pool complex K 13 N, including mitigation site. Management activities identified for J 13 N include a combination of habitat restoration and stewardship. These are identified as Level 3 and Level 1 management, respectively, in the VPHCP.

This mitigation plan is intended to address the Level 3 management (habitat restoration). As described in the VPHCP, the goal of this management level is to increase the populations of covered species, namely Otay mesa mint, spreading navarretia, San Diego button-celery, California Orcutt grass, Riverside fairy shrimp, and San Diego fairy shrimp.

Following successful completion of restoration, the mitigation site will be subject to stewardship management in perpetuity by the City of San Diego Park and Recreation Department Open Space Division. Stewardship activities identified in the VPHCP for the mitigation site are intended to maintain habitat conditions and covered species populations within the vernal pool complex. Management activities will include annual (or more frequent) trash and debris removal; fence and signage maintenance; monitoring and adaptive measures for edge effects; fire suppression and fire damage repair; access patrol, enforcement, and trespass damage repair; monitoring and repair of topographic damage; and weed control within and around the vernal pools.

9.0 Notification of Completion

If the final success criteria have been met at the end of the five-year maintenance and monitoring program, notification of these events will be provided with the Year 5 report. If the final success criteria have not been met by the end of the five-year maintenance and monitoring program, the Year 5 report will discuss the possible reasons and recommendations for remedial measures to cause the site to meet the criteria. If any of the established/enhanced/restored vernal pools or upland watershed habitats have not met the performance standards, the project proponent's maintenance and monitoring obligations will continue, until the wildlife agencies and City deem the mitigation program as successful or contingency measures must be implemented (see Section 8, Adaptive Management Plan).

Following receipt of the final annual report, the wildlife agencies and the City will be invited to visit the restoration site to confirm completion of the mitigation effort. The mitigation requirements will be deemed complete once the final success criteria are met and after written approval by the wildlife agencies and the City has been received.

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