APPENDIX P

Conceptual Revegetation Plan

Conceptual Revegetation Plan for the North City Project, City of San Diego, California

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Conceptual Revegetation Plan for the North City Project, City of San Diego, California

1 INTRODUCTION

The North City Project (Project) is the first phase of the Pure Water Program, which would produce 30 million gallons per day (MGD) of potable recycled water for the Miramar Reservoir Alternative. The North City Project would expand the existing North City Water Reclamation Plant (NCWRP) and construct an adjacent North City Pure Water Facility (NCPWF). Additional project components include: (1) a new pump station and forcemain to deliver additional wastewater to the NCWRP, (2) a brine/centrate discharge pipeline, (3) upgrades to the existing Metro Biosolids Center (MBC), (4) a new renewable energy facility at the NCWRP, and (5) and a new Landfill Gas Pipeline (LFG Pipeline) between the Miramar Landfill gas collection system and the NCWRP. An in-depth project description can be found in the project's Environmental Impact Report (EIR). This plan provides guidelines for habitat revegetation activities associated with the Project's temporary impacts.

1.1 Project Location

The Project includes a variety of facilities located throughout the central and coastal areas of San Diego County in the North City geographic area (Figures 1 and 2). The majority of proposed facilities in the North City Project occur within developed land and/or along existing paved streets. The facilities were designed and sited to avoid and minimize impacts to biological resources to the extent possible. A new pure water facility and three pump stations would be located within the City. Pipelines would traverse a number of local jurisdictions, including the communities of University, Clairemont Mesa, and Linda Vista within the City of San Diego; the City of Santee; and the community of Lakeside in unincorporated San Diego County, and federal lands within Marine Corps Air Station (MCAS) Miramar (Figure 2). Specifically, the Miramar Reservoir Alternative is within the Poway, La Jolla, and Del Mar U.S. Geological Survey (USGS) 7.5-minute quadrangle maps, (Figure 2). The components are described in detail in the Project EIR and Biological Resources Report (BRR).

1.2 Restoration Goals and Revegetation Requirements

The goal of this revegetation plan is to restore temporary impacts to sensitive vegetation communities by restoring the areas to a pre-impact condition with similar species composition, density and percent cover. The goal for non-sensitive vegetation communities is to establish adequate vegetative cover to prevent erosion. The temporary impact areas and corresponding revegetation locations are shown on Figures 3-1 through 3-12. Since the majority of the temporary impacts (5.~~34~~ 25 acres) are within MCAS Miramar, compliance with the *Integrated Natural Resources Management Plan* (INRMP; MCAS Miramar INRMP (Integrated Natural Resources Management Plan) 2011) would be necessary. In addition to the revegetation of temporary impact areas on MCAS Miramar, habitat enhancement would be conducted to satisfy the INRMP requirements. Thus, the City would provide a total of ~~6.27~~ 6.14 acres of habitat enhancement within MCAS Miramar as shown on Figure 4. Enhancement will occur within disturbed habitats and would include weed and invasive plant control, trash removal, erosion control, and seeding and/or supplemental planting as necessary in accordance with this plan. Prior to implementing enhancement work the City will coordinate with utility agencies and avoid any existing easements, if necessary.

Revegetation and erosion control treatments will be installed within temporary disturbance areas in accordance with the City's Land Development Code: Landscape Standards (City of San Diego 2016) and the City's "Whitebook," Standard Specifications for Public Works Construction, 2015 Edition hereafter referred to as the "Whitebook" (City of San Diego 2015). Revegetation of sensitive vegetation communities will include native species typical of the habitat in the area. Revegetation of non-sensitive vegetation communities such as disturbed habitat, landscaped areas, and/or non-native vegetation will be revegetated with an erosion control seed mix.

Revegetation and INRMP enhancement areas will be subject to an initial 120-day Plant Establishment and Warranty period and thereafter be monitored and maintained for 25 months, or until the performance standards outlined herein are met.

The quantity and location of temporary impacts are shown in Table 1.

Table 1
Temporary Impacts to Vegetation Communities and Land Cover Types – Miramar Reservoir Alternative (Acres)

Vegetation Community/ Land Cover Type	Subarea Plan Designation	Impact Acreage	Outside MCAS Miramar Restoration Acres	Within MCAS Miramar Restoration Acres	Enhancement Occurring within MCAS Miramar[1]	
					Ratio[2]	*Enhancement Acreage*
Tier II – Uncommon Uplands						
Coastal Sage-Chaparral Transition (Level II MA)	II	0.14	—	0.14	2:1	0.27
Diegan Coastal Sage Scrub (Level I-V MA)	II	~~4.15~~4.06	0.19	~~3.96~~3.88	2:1 (Level I, II MA)	~~1.51~~1.43
					1:1 (Level III-V MA)	~~3.21~~3.16
Diegan Coastal Sage Scrub (disturbed) (Level IV-V MA)	II	~~0.80~~0.81	~~0.12~~0.13	0.68	1:1	0.68

Table 1
Temporary Impacts to Vegetation Communities and Land Cover Types – Miramar Reservoir Alternative (Acres)

Vegetation Community/ Land Cover Type	Subarea Plan Designation	Impact Acreage	Outside MCAS Miramar Restoration Acres	Within MCAS Miramar Restoration Acres	Enhancement Occurring within MCAS Miramar[1]	
					Ratio[2]	*Enhancement Acreage*
Diegan Coastal Sage Scrub: Baccharis-Dominated (Level I MA)	II	0.03	—	0.03	2:1	0.05
Flat-Topped Buckwheat (Level I MA)	II	<0.01	—	<0.01	2:1	<0.01
Flat-Topped Buckwheat (disturbed) (Level I MA)	II	0.01	—	0.01	2:1	0.02
Tier III – Common Uplands						
Chamise Chaparral (Level IV, V MA)	IIIA	0.50	—	0.50	1:1	0.50
Southern Mixed Chaparral (Level III MA)	IIIA	<0.01	—	<0.01	1:1	<0.01
Non-native Grassland (Level V MA)	IIIB	~~0.13~~0.16	~~0.10~~0.13	0.03	1:1	0.03
Tier IV – Other Uplands						
Urban/Developed	IV	~~85.86[3]~~85.35[3]	No habitat restoration required; however, these land covers would be included in the Landscape Plan as appropriate. Temporary disturbance requirements would be implemented in areas within MCAS Miramar (MM-BIO-9(j)). Roadways, parking areas and other active use areas will not be included in this revegetation plan.			
Developed – Concrete Channel	IV	0.03[4]				
Non-native Vegetation	IV	~~0.23~~0.96				
Eucalyptus Woodland	IV	~~1.98~~1.78				
Extensive Agriculture – Field/Pasture, Row Crops	IV	~~0.45~~0.33				
Disturbed Habitat	IV	~~7.85~~7.63				
	Total	**~~102.16~~101.76**	**~~0.41~~0.45**	**~~5.34~~5.25**	—	**~~6.27~~6.14**

Notes:

1 To satisfy the INRMP requirements, the City will be conducting 6.~~27~~ 14 acres of habitat enhancement within MCAS Miramar, in addition to the restoration of 5.~~34~~ 25 acres of temporary impact areas within MCAS Miramar.

2 Mitigation ratios for temporary impacts within MCAS Miramar are based on Table 6.2.2.2a in the INRMP and consideration is given to the Management Area where the vegetation community occurs.

3 This total includes the 0.01 acre of impact within the MHPA from the Morena Pipelines along Genesee Avenue.

4 Although no wetland vegetation would be removed, agency permits would still be required.

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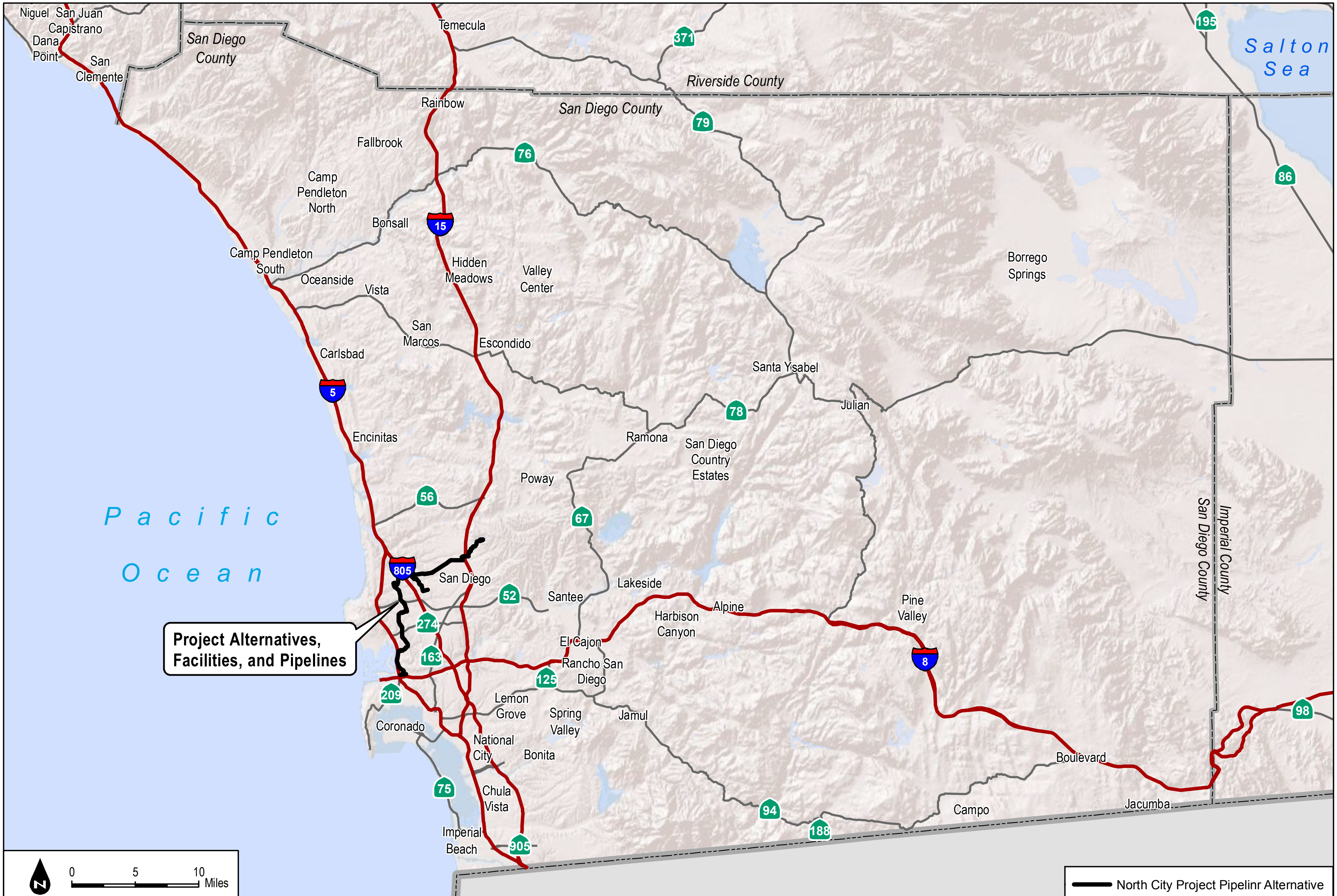

SOURCE: City San Diego 2016; ESRI 2016

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FIGURE 1

Regional Map

Revegetation Plan for the North City Project

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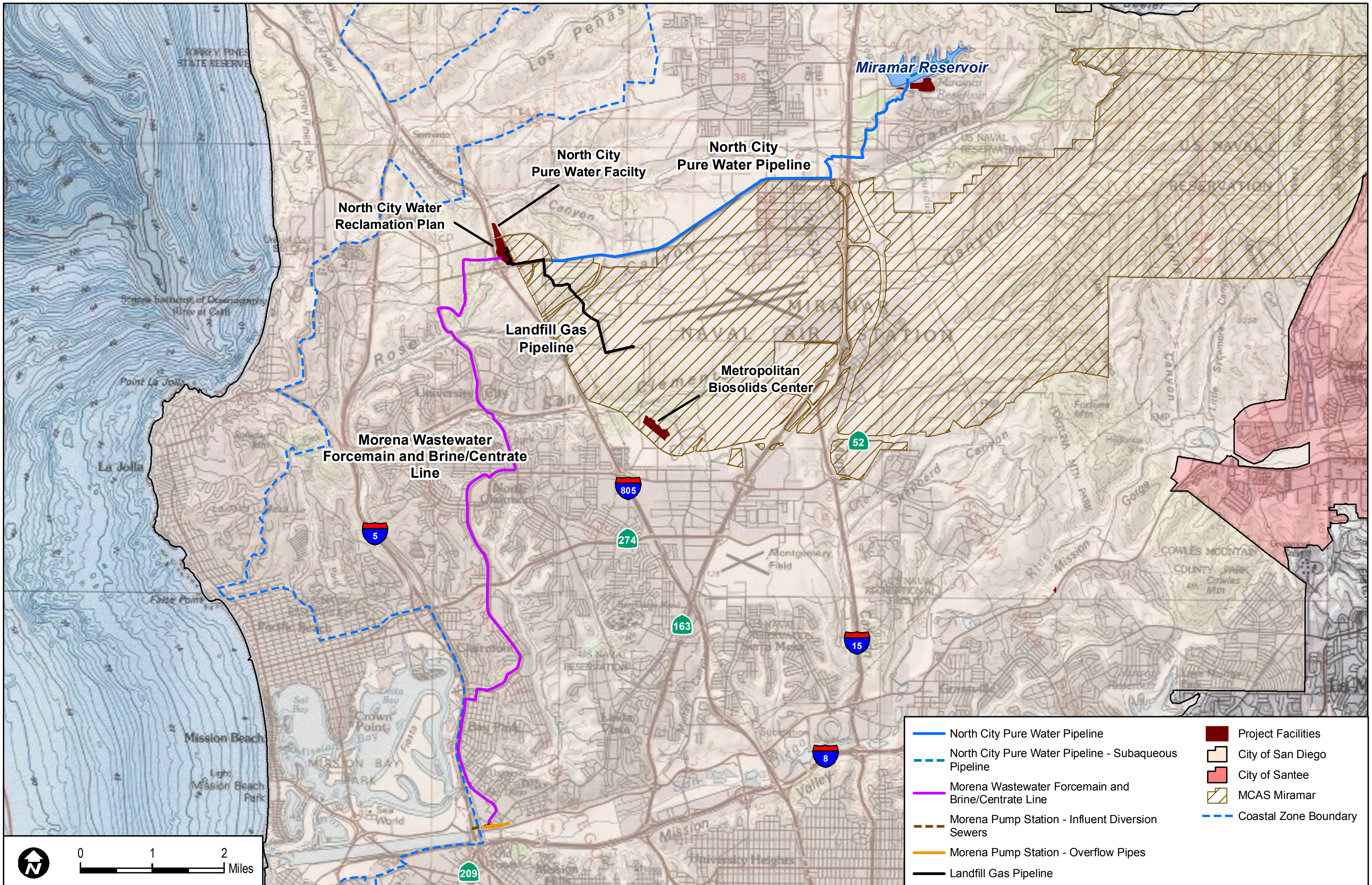

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SOURCE: USGS 7.5-Minute Series Del Mar, Poway, La Jolla, La Mesa Quadrangles; City of San Diego 2016; CA Coastal Commission

FIGURE 2

Vicinity Map

Revegetation Plan for the North City Project

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2 EXISTING CONDITIONS

The North City Project is located within the lower Peninsular Ranges and the coastal plain, and west of the desert basin. Elevation ranges from approximately 10 feet to 1,080 feet above mean sea level (AMSL) within the North City Project. Much of the project area is gently sloping or relatively flat, with steeper areas around the reservoirs. The Coastal Plain region ranges in elevation from 0 feet AMSL to 600 feet AMSL, and includes characteristic features, such as mesa tops, coastal benches, elevated marine terraces, and level floodplains of river valleys. The lower Peninsular Ranges foothills are characterized by rolling to hilly uplands, frequent narrow and winding valleys, and traversed by several rivers and drainages.

As indicated in Table 1, Diegan coastal sage scrub and its variants, chaparral, and annual grassland are the most frequently impacted sensitive vegetation communities. Details of each vegetation community are included in the BRR. A cumulative list of all vegetation communities and common sensitive plant species observed in the Project footprint area is also included in the BRR. The vegetation community descriptions and species lists in the BRR were utilized to generate the revegetation planting and seeding pallets included herein.

The following sensitive wildlife species were found to be present within the Project study area: Cooper's hawk (*Accipiter cooperii*), coastal California gnatcatcher (*Polioptila californica californica*), yellow warbler (*Setophaga petechia*), white-tailed kite (*Elanus leucurus*), San Diego fairy shrimp (*Branchinecta sandiegonensis*), and western pond turtle (*Actinemys marmorata*). A comprehensive list of sensitive wildlife species observed within the 500-foot buffer of the Project is listed in the BRR.

2.1 Regulatory Requirements

Integrated Natural Resources Management Plan

Because a portion of the North City Project crosses through MCAS Miramar lands, locations where it crosses MCAS Miramar land are subject to the regulations of the INRMP. The following measures will satisfy the INRMP requirements outlined under the INRMP Table 6.2.2.2a, mitigation for temporary impacts to sensitive habitat communities would include:

1. implementing temporary disturbance requirements (SWPPP and BMPs);
2. restoration at a 1:1 ratio with additional habitat enhancement at a 1:1 or 2:1 ratio (depending on the vegetation community impacted) as described in Table 1 above;
3. minimizing habitat-disturbing activities between February 15 and August 31 by conducting preconstruction surveys for coastal California gnatcatcher (MM-BIO-4b).

State and Regional Water Quality Control Board

The intent of the Porter–Cologne Water Quality Control Act is to protect water quality and the beneficial uses of water, and it applies to both surface water and groundwater. Under this law, the State Water Resources Control Board develops statewide water quality plans, and the Regional Water Quality Control Boards (RWQCB) develop basin plans that identify beneficial uses, water quality objectives, and implementation plans. The RWQCBs have the primary responsibility to implement the provisions of both statewide and basin plans. Waters regulated under the Porter–Cologne Water Quality Control Act include isolated waters that are no longer regulated by the ACOE. Developments with impact to jurisdictional waters must demonstrate compliance with the goals of the act by developing Stormwater Pollution Prevention Plans, Standard Urban Storm Water Mitigation Plans, and other measures.

Multiple Species Conservation Program

The City of San Diego is a participant in the San Diego Multiple Species Conservation Program (MSCP), a comprehensive, regional long-term habitat conservation program designed to provide permit issuance authority for take of covered species to the local regulatory agencies. The MSCP establishes a preserve system designed to conserve large blocks of interconnected habitat having high biological value that are delineated in Multi-Habitat Planning Areas (MHPAs). The City MHPA is a "hard line" preserve developed by the City in cooperation with the wildlife agencies, property owners, developers, and environmental groups.

Compliance with the MSCP for covered species and work in or adjacent to MHPA areas would be achieved through adherence to the mitigation measures outlined in the EIR/EIS. Specifically, all restoration work would adhere to the EIR/EIS mitigation measure MM-BIO-4a when work occurs within or adjacent to the MHPA or MM-BIO-4b when work occurs within MCAS Miramar. Impacts to coastal California gnatcatcher would be avoided by conducting preconstruction surveys for coastal California gnatcatcher and minimizing habitat-disturbing activities between March 1 to August 15 (MM-BIO-4a) or February 15 and August 31 (MM-BIO-4b).

City of San Diego Biology Guidelines

The City of San Diego Development Services Department developed the Biology Guidelines presented in the Land Development Manual "to aid in the implementation and interpretation of the Environmentally Sensitive Lands Regulations (ESL), San Diego Land Development Code (LDC), Chapter 14, Division 1, Section 143.0101 et seq., and the Open Space Residential (OR-1-2) Zone, Chapter 13, Division 2, Section 131.0201 et seq." (Biology Guidelines; City of San Diego 2012). The guidelines also provide standards for the determination of impact and mitigation under CEQA and the California Coastal Act.

3 REVEGETATION ROLES AND RESPONSIBLE PARTIES

The project proponent is the City of San Diego Public Utilities Department located at 9192 Topaz Way, San Diego, California 92123. The project proponent is responsible for the implementation, maintenance, monitoring, bonding, and success of the revegetation program.

3.1 Revegetation Team

Project Biologist

The project biologist/habitat restoration specialist (PB) shall be a qualified individual or firm with demonstrated experience performing at least one habitat restoration project of similar type, size and complexity in Southern California. The PB shall have a four-year degree or higher degree in ecology, biology, botany, natural resources management, landscape architecture, or a closely related field. The PB shall be familiar with native plants and weed species. The PB will ensure the revegetation work is installed in accordance with this revegetation plan, the final revegetation landscape construction documents, the environmental permits, and the final Environmental Impact Report. The PB will perform monitoring and reporting duties, as outlined herein and on the Landscape Construction Documents (LCDs).

Landscape Architect

The landscape architect shall be a registered landscape architect with a valid license issued by the California Architects Board, Landscape Architect's Technical Committee (LATC). The landscape architect shall work closely with the project biologist in preparation of the LCDs, including site preparation, planting, seeding, irrigation, erosion control, notes, details and specifications.

Revegetation Contractors

The Revegetation Installation Contractor (RIC) and Revegetation Maintenance Contractor (RMC) shall be a qualified person or entity that holds a valid California landscape contractor's license, Class C-27, and have experience with at least one other habitat restoration project of similar type, size and complexity in Southern California. The contractor shall be familiar with weeds and invasive species and have in-depth experience in controlling wildland weeds and invasive species within sensitive habitat areas. The contractor shall have a Qualified Pesticide Applicator's License or have a Pesticide Applicators' Certificate issued by the Department of Pesticide Regulation. The RIC and RMC shall provide verification of experience and provide copies of licenses upon request. The RIC will provide installation and 120-Day Plant Establishment Period (PEP) maintenance services. The RMC will provide revegetation maintenance services for 25 consecutive months following approval of the 120-Day PEP.

Nursery

The native plant nursery shall be located in the Southern California region, have a valid license to grow nursery stock issued by the California Department of Food and Agriculture (CDFA). The nursery shall have at least two years of verifiable experience collecting native seeds and contract growing native plant materials. The nursery shall adequately label all containers to indicate genus, species and subspecies, if applicable. The nursery shall allow inspections during the contract growing period so the project biologist can inspect plants to ensure they are the proper species, size, adequately rooted and free of pests and diseases. The supplying nursery grounds and associated container plants shall be kept free of weeds and invasive species and shall ensure all plant containers are free of Argentine ants.

Seed Suppliers

The native plant seed supplier shall be located in Southern California region, have a valid license to sell seed materials from the California Department of Food & Agriculture (CDFA) and a valid Department of Agriculture Inspection Certificate. The seed supplier shall have at least two years of verifiable experience growing, collecting and storing native seed materials. The seed supplier shall adequately store, test and label all seed to indicate genus, species and subspecies. Seed supplier shall provide seed testing data indicated in the LCDs to the City upon request. All seed shall be provided free of invasive weed species. Seed supplier shall provide seed from origins indicated herein and per the LCDs and specifications. Seed supplier(s) shall abide by the California Seed Law requirements outlined by the CDFA.

4 REVEGETATION IMPLEMENTATION

Revegetation will be achieved through a process that includes delineating the revegetation boundaries, removing trash and debris, clearing weeds and invasive species, and restoring contours to their pre-project condition. Salvaged topsoil will be replaced and, or the top eight inches of soil amended to provide a suitable growing medium for native plants.

Following the initial site cleanup, topsoil placement/amending and contouring, the soil will be tested for its suitability to grow native plant species. If soil testing determines soil amending is needed, it will be performed as recommended in the soil laboratory's report. Upon conclusion of soil preparation work, the revegetation areas will be planted and, or seeded using the methods and species described herein. A temporary drip irrigation system or other supplemental watering will be implemented to establish container plants where feasible. Following planting/seeding, the revegetation areas will be maintained by the RIC during the 120-day PEP and maintained by the RMC for 25 months following approval of the PEP. Each component of the implementation plan is outlined in more detail below.

4.1 Site Preparation

4.1.1 Site Access

Access to the site shall be from existing disturbed areas within the Pure Water Project footprint and shall not incur impacts to environmentally sensitive lands (ESL) or improvements. All proposed access routes shall be pre-approved by the City and PB. Contractor shall stake and fence access routes with orange ESA snow fencing if ESL's are adjacent. If access is in part or in whole, proposed to be gained from an adjacent property approval shall be obtained ahead of time in writing along with any necessary right-of-entry permits.

4.1.2 Revegetation Area Fencing

Revegetation areas shall be delineated with 5-foot metal t-post set 12 inches into grade. Metal t-posts will be placed at 12 feet on-center and at all vertices. T-post will be installed plumb with non-impalement caps when adjacent to paths, trails, roads, recreation areas or other human use areas. Impalement caps shall be glued onto top of t-posts. Orange "snow" fencing may be installed onto the metal t-posts with zip ties if needed to protect the revegetation areas from damage by persons, vehicles, pets, etc. The PB and MMC staff will determine if orange fencing is needed.

4.1.3 Weed Control and Trash Removal

If weeds and or invasive species are present in the revegetation areas they will be cleared outside of the migratory bird nesting season (February 1 – September 15), to the extent practical. If weeds, and or invasive species need to be removed during the nesting season, a nesting bird survey will be conducted no more than ten days beforehand to ensure there are no nesting birds. Active nests will be protected in accordance with the MBTA, and as directed by the PB. An appropriate buffer will be established around any nesting birds in consultation with the PB and City MMC.

The revegetation areas will be cleared of all weeds, invasive species, trash, and debris. Perennial invasive species shall be grubbed out or cut to grade and treated with the appropriate systemic herbicide. All weed slash and trash will be bagged or containerized and promptly removed from the site. All weed slash and trash will be brought to a green waste recycling or landfill facility.

4.1.4 Topsoil Salvaging

Areas slated for temporary impacts to sensitive plant communities will have the top eight inches of soil salvaged by the grading contractor. Salvaged soils will be stockpiled as near to the site as possible at a height not to exceed 5 feet, or as determined appropriate by the City. Stock piled soil shall have silt fence placed around it and be labeled indicating where the soil came from. If stockpiles recruit weeds during storage they shall be cut or sprayed with the appropriate herbicide before the weeds begin to bloom. Weed slash and stubble may be left on stockpiles for erosion control. If stockpiles require interim erosion control they will be sprayed with the Native Erosion Control Hydroseed Mix and Slurry indicated in Table 2.

4.1.5 Soil Placement, Testing, Amending, Importation and Grading

Following weed and trash removal the revegetation areas will have salvaged topsoil replaced and be contour graded to match pre-impact conditions. If topsoil was not present, or was not able to be salvaged, the soil shall be tested by a qualified soil testing laboratory for agricultural suitability and amended per the laboratory's directions to create soil capable of growing native plant species. Soil samples for testing shall be taken at distances and depths indicated by the PB. Alternatively Class "A" topsoil may be imported and placed at a depth of 8 inches to create the final finished grades. Following topsoil placement/amending/soil importing and final approved grading the soil will be tilled or ripped to a depth of 12 inches. Ripping/tilling shall be performed on contour and shall leave no clods on the surface larger than 3 inches along the long axis on-grade. Ripping teeth shall be spaced no more than 10" apart. Slopes with a run:rise ratio equal to or greater than 6:1 will be track-walked upon completion of ripping work. Track-walking shall be conducted up and down slope. Any debris brought to the surface by ripping/tilling will be removed from the revegetation areas and disposed of at an appropriate landfill facility.

4.2 Revegetation Planting and Seeding Palettes

Planting and seeding palettes for the revegetation areas, including erosion control only areas are provided in Tables 2 through 8. Plant and seed species have been selected based on species inventoried during pre-project biological surveys. Thus, the selected species have been determined to be naturally occurring within or immediately adjacent to the revegetation areas. All container plants and seed materials will have origins from the cismontane San Diego County, unless approval is granted otherwise by the PB in coordination with MMC staff. The seed mixes have been designed to create habitat similar to those impacted and provide interim erosion control via nurse crop species until the perennial native vegetation becomes established. Many of the revegetation areas will not be irrigated with a traditional irrigation system due to the lack of water source, their remote locations, and their relatively small and scattered locations. However, planting will occur in the fall to the maximum extent practical and container plants may receive supplemental watering via a water truck, water buffalo, or similar, as outlined in the final LCDs. The revegetation locations are shown on Figures 3-1 through 3-12 and the proposed INRMP enhancement areas are shown on Figure 4.

Table 2
Native Erosion Control Hydroseed Mix

Scientific Name	Common Name	Pure Live Seed (PLS)	Pounds per Acre
Bromus carinatus	California brome	76	3.0
Eschscholzia californica	California poppy	71	5.0
Lupinus succulentus	arroyo lupine	83	3.0
Acmispon glaber	deerweed	24	3.0
Eriophyllum confertiflorum	golden yarrow	26	3.0
Sisyrinchium bellum	blue eyed grass	71	3.0
		Total	**20**

Note: This seed mix is to be used to revegetate Disturbed Habitat (DH) areas and Non-Native Grassland (NNG) areas in need of erosion control, as shown on the figures and, or indicated by MMC staff or City Engineer. Roads, paths parking lots and other active use areas will not be seeded unless directed otherwise by the City.

Table 3
Diegan Coastal Sage Scrub Seed Mix

Scientific Name	Common Name	Pure Live Seed (PLS)	Pounds per Acre
Acmispon glaber	deerweed	24	2.0
Artemisia californica	California sagebrush	9	6.0
*Bromus carinatus**	California brome	76	2.0

Table 3
Diegan Coastal Sage Scrub Seed Mix

Scientific Name	Common Name	Pure Live Seed (PLS)	Pounds per Acre
Castilleja exserta	Purple owl's clover	25	1.0
Eriogonum fasciculatum	California buckwheat	7	5.0
Eriophyllum confertiflorum	golden yarrow	26	2.0
*Eschscholzia californica**	California poppy	71	4.0
Hazardia squarrosa	Sawtooth goldenbush	2	2.0
Isocoma menziesii	coastal goldenbush	8	2.0
Peritoma arborea	bladderpod	58	2.0
Salvia apiana	white sage	43	3.0
Salvia columbariae	chia	54	2.0
Salvia mellifera	black sage	40	4.0
Stipa pulchra	purple needlegrass	42	1.0
		Total	**38**

Note: This seed mix is to be used to revegetate areas designated as CSS and dCSS on the revegetation plan figures
* Indicates nurse crop species.

Table 4
Diegan Coastal Sage Scrub: Baccharis Dominated Seed Mix

Scientific Name	Common Name	Pure Live Seed (PLS)	Pounds per Acre
Artemisia californica	California sagebrush	9	3.0
Baccharis pilularis	Coyote brush	1	3.0
Baccharis sarothroides	broom baccharis	2	3.0
*Bromus carinatus**	California brome	76	2.0
Eriogonum fasciculatum	California buckwheat	7	2.0
Eriophyllum confertiflorum	golden yarrow	26	1.0
*Eschscholzia californica**	California poppy	71	2.0
Isocoma menziesii	coastal goldenbush	8	1.0
Salvia mellifera	black sage	40	3.0
		Total	**20**

Note: This seed mix is to be used to revegetate areas designated as CSSB and dCSSB on the revegetation plan figures
* Indicates nurse crop species.

Table 5
Flat Topped Buckwheat Seed Mix

Scientific Name	Common Name	Pure Live Seed (PLS)	Pounds per Acre
Artemisia californica	California sagebrush	9	2.0
*Bromus carinatus**	California brome	76	2.0
Eriogonum fasciculatum	California buckwheat	7	8.0

Table 5
Flat Topped Buckwheat Seed Mix

Scientific Name	Common Name	Pure Live Seed (PLS)	Pounds per Acre
*Eschscholzia californica**	California poppy	71	2.0
Isocoma menziesii	coastal goldenbush	8	1.0
Lotus scoparius	deerweed	24	3.0
Salvia mellifera	black sage	40	2.0
		Total	**20**

Note: This seed mix is to be used to revegetate areas designated as BSC on the revegetation plan figures
* Indicates nurse crop species.

Table 6
Coastal Sage-Chaparral Transition Seed Mix

Scientific Name	Common Name	Pure Live Seed (PLS)	Pounds per Acre
Acmispon glaber	deerweed	24	2.0
Adenostoma fasciculata	chamise	10	8.0
Artemisia californica	California sagebrush	9	5.0
*Bromus carinatus**	California brome	76	2.0
Ceanothus tomentosus	wooly ceanothus	54	3.0
*Eschscholzia californica**	California poppy	71	2.0
Gutierrezia californinca	matchweed	2	3.0
Helianthemum scoparium	peak rush rose	NA**	1.0
Malosma laurina	Laurel sumac	57	2.0
Rhus integrifolia	lemonadeberry	45	3.0
Salvia mellifera	black sage	40	3.0
		Total	**34**

Note: This seed mix is to be used to revegetate areas designated as CSS-CHP on the revegetation plan figures
* Indicates nurse crop species.
** Percent purity and germination standards not established.

Table 7
Chamise Chaparral Container Plant Pallet and Seed Mix

Scientific Name	Common Name	Container Size	Qty
Adenostoma fasciculata	chamise	1 gallon	TBD
Ceanothus tomentosus	wooly ceanothus	1 gallon	TBD
Malosma laurina	laurel sumac	1 gallon	TBD
Cneoridium dumosum	bushrue	1 gallon	TBD
Rhus integrifolia	lemonadeberry	1 gallon	TBD
		Total	**TBD**

Table 7
Chamise Chaparral Container Plant Pallet and Seed Mix

Scientific Name	Common Name	Pure Live Seed (PLS)	Pounds per Acre
Acmispon glaber	deerweed	24	2.0
Adenostoma fasciculata	chamise	10	10.0
*Bromus carinatus**	California brome	76	2.0
*Eschscholzia californica**	California poppy	71	2.0
Gutierrezia californinca	matchweed	2	3.0
Helianthemum scoparium	peak rush rose	NA**	1.0
Malosma laurina	Laurel sumac	57	2.0
Rhus integrifolia	lemonadeberry	45	3.0
Salvia apiana	White sage	35	2.0
Salvia mellifera	black sage	35	2.0
		Total	**29**

Note: This seed mix is to be used to revegetate areas designated as CC on the revegetation plan figures

* Indicates nurse crop species.

** Percent purity and germination standards not established.

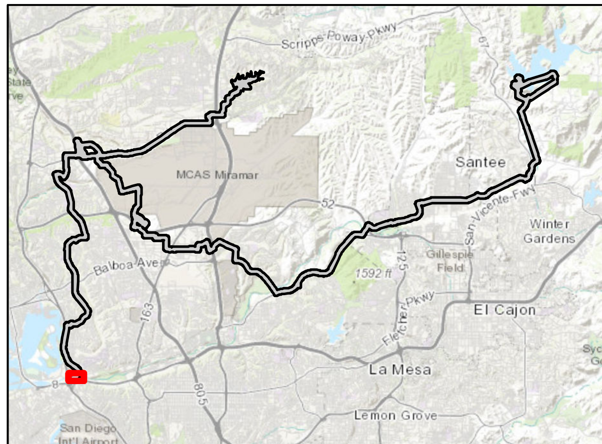
Table 8
Southern Mixed Chaparral Container Plant Pallet and Seed Mix

Scientific Name	Common Name	Container Size	Qty
Adenostoma fasciculata	chamise	1 gallon	TBD
Ceanothus tomentosus	Wooly ceanothus	1 gallon	TBD
Heteromeles arbutifolia	redberry	1 gallon	TBD
Malosma laurina	laurel sumac	1 gallon	TBD
Rhus integrifolia	lemonadeberry	1 gallon	TBD
Yucca whipplei	Mojave yucca	1 gallon	TBD
		Total	**TBD**
Scientific Name	**Common Name**	**Pure Live Seed (PLS)**	**Pounds per Acre**
Acmispon glaber	deerweed	24	2.0
Adenostoma fasciculata	chamise	10	6.0
*Bromus carinatus**	California brome	76	2.0
Ceanothus tomentosus	wooly ceanothus	54	2.0
*Eschscholzia californica**	California poppy	71	3.0
Gutierrezia californinca	matchweed	2	3.0
Helianthemum scoparium	peak rush rose	NA**	1.0
Malosma laurina	laurel sumac	57	2.0
Yucca whipplei	Mojave yucca	54	1.0
		Total	**21**

Note: This seed mix is to be used to revegetate areas designated as SMX on the revegetation plan figures

* Indicates nurse crop species.

** Percent purity and germination standards not established.



LEGEND

Temporary Impact Limits

Project Pipeline Alternatives

Morena Wastewater Forcemain and Brine/Centrate Line

Morena Pump Station - Influent Diversion Sewers

Morena Pump Station - Overflow Pipes

Project Facilities

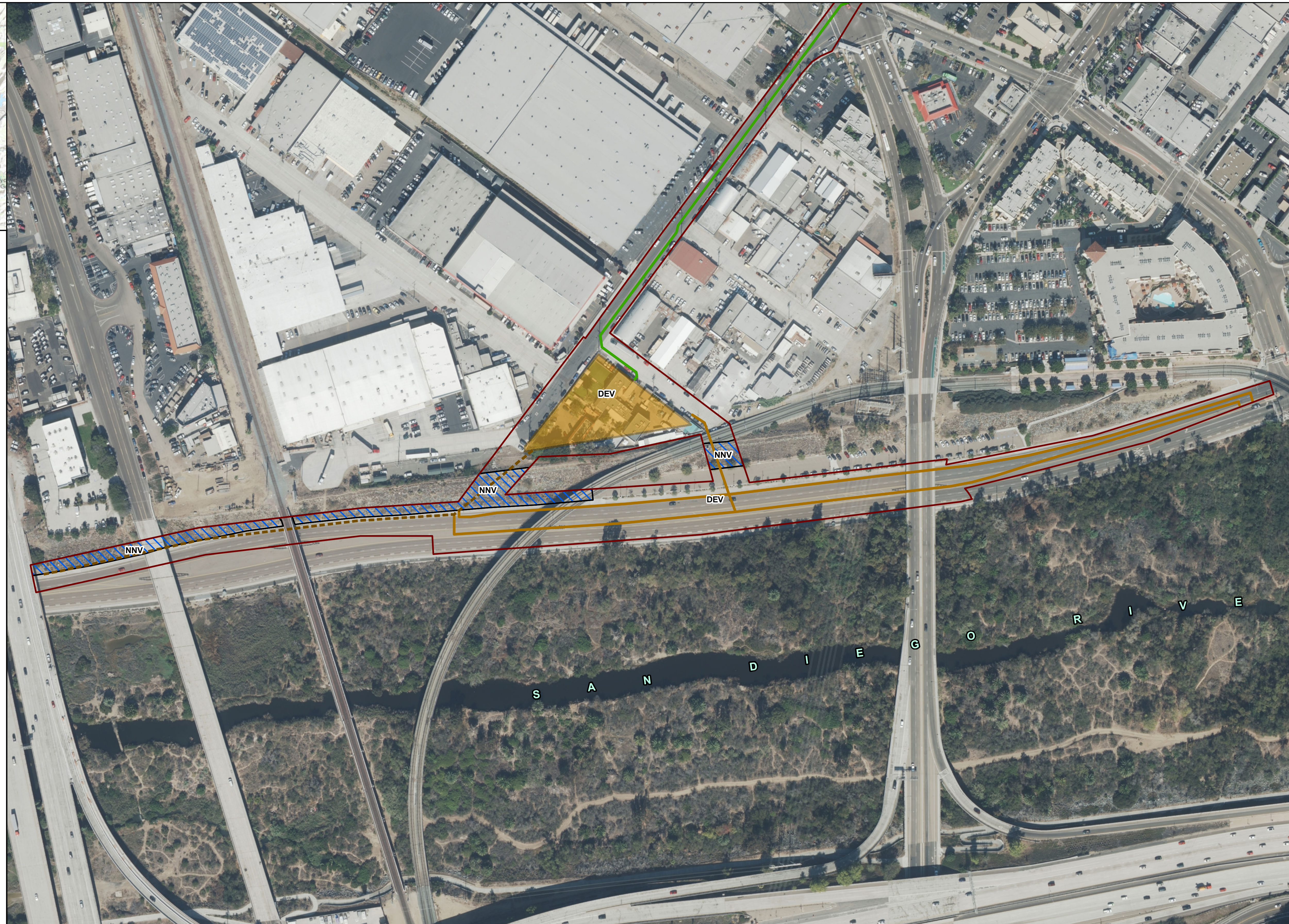
Morena Pump Station

Erosion Control Areas

Vegetation Communities/Land Covers

DEV, Urban/Developed

NNV, Non-Native Vegetation



SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-1

Revegetation Plan - Temporary Impact Areas

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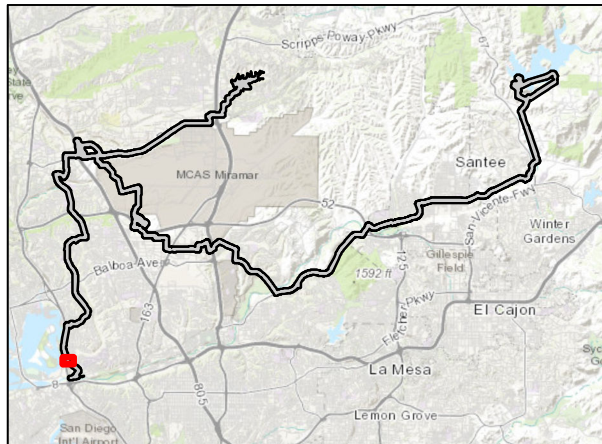

LEGEND

Temporary Impact Limits

Project Pipeline Alternatives

Morena Wastewater Forcemain and Brine/Centrate Line

Erosion Control Areas

Vegetation Communities/Land Covers

DEV, Urban/Developed

DEV-CC, Developed - Concrete Channel

EUC, Eucalyptus Woodland

0 75 150 Feet

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-2

Revegetation Plan - Temporary Impact Areas

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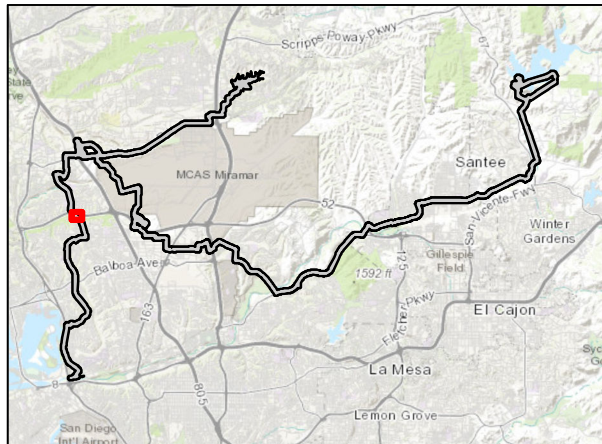

LEGEND

Temporary Impact Limits

Project Pipeline Alternatives

Morena Wastewater Forcemain and Brine/Centrate Line

Trenchless Segments of Alignment

Erosion Control Areas

Vegetation Communities/Land Covers

DEV, Urban/Developed

DH, Disturbed Habitat

N

0 75 150 Feet

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-3

Revegetation Plan - Temporary Impact Areas

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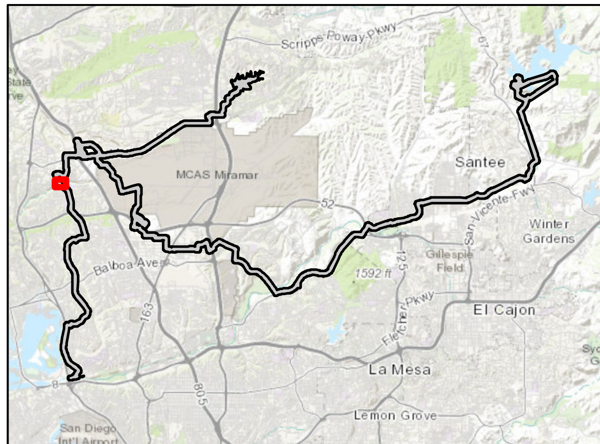

LEGEND

Temporary Impact Limits

Project Pipeline Alternatives

Morena Wastewater Forcemain and Brine/Centrate Line

Trenchless Segments of Alignment

Revegetation Areas

Vegetation Communities/Land Covers

CSS, Diegan Coastal Sage Scrub

DEV, Urban/Developed

DH, Disturbed Habitat

NNV, Non-Native Vegetation

dCSS, disturbed Diegan Coastal Sage Scrub

0 75 150 Feet

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-4

Revegetation Plan - Temporary Impact Areas

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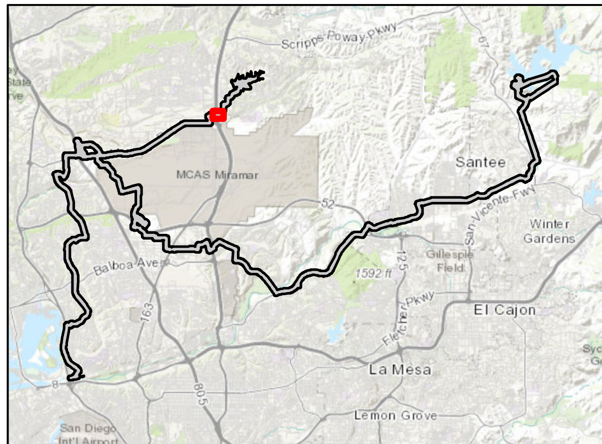


LEGEND

Temporary Impact Limits

Project Pipeline Alternatives

North City Pure Water Pipeline

Trenchless Segments of Alignment

Erosion Control Areas

Vegetation Communities/Land Covers

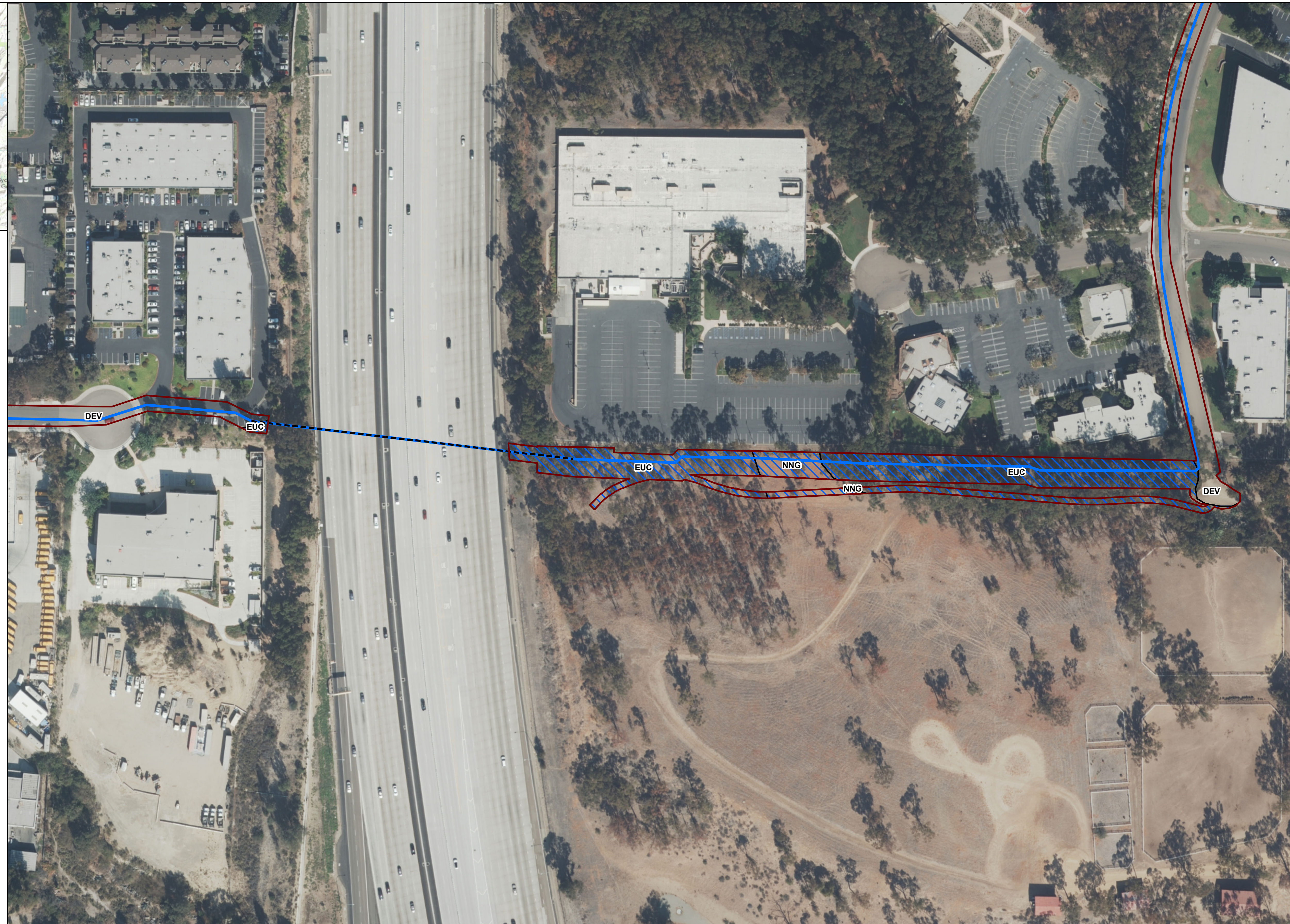
DEV, Urban/Developed

EUC, Eucalyptus Woodland

NNG, Non-Native Grassland

* Eucalyptus will be replaced/replanted at
the land owener's request

0 75 150
Feet



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SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-5

Revegetation Plan - Temporary Impact Areas

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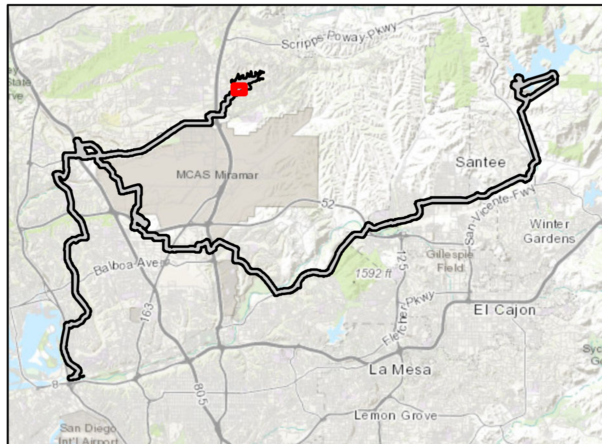

LEGEND

- Temporary Impact Limits

Project Pipeline Alternatives

- North City Pure Water Pipeline
- Trenchless Segments of Alignment

Project Facilities

- Pure Water Dechlorination Facility
- Miramar Water Treatment Plant Improvements
- Revegetation Areas
- Erosion Control Areas
- **Vegetation Communities/Land Covers**

DEV, Urban/Developed
DH, Disturbed Habitat
EUC, Eucalyptus Woodland
dCSS, disturbed Diegan Coastal Sage Scrub

0 75 150 Feet

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-6

Revegetation Plan - Temporary Impact Areas

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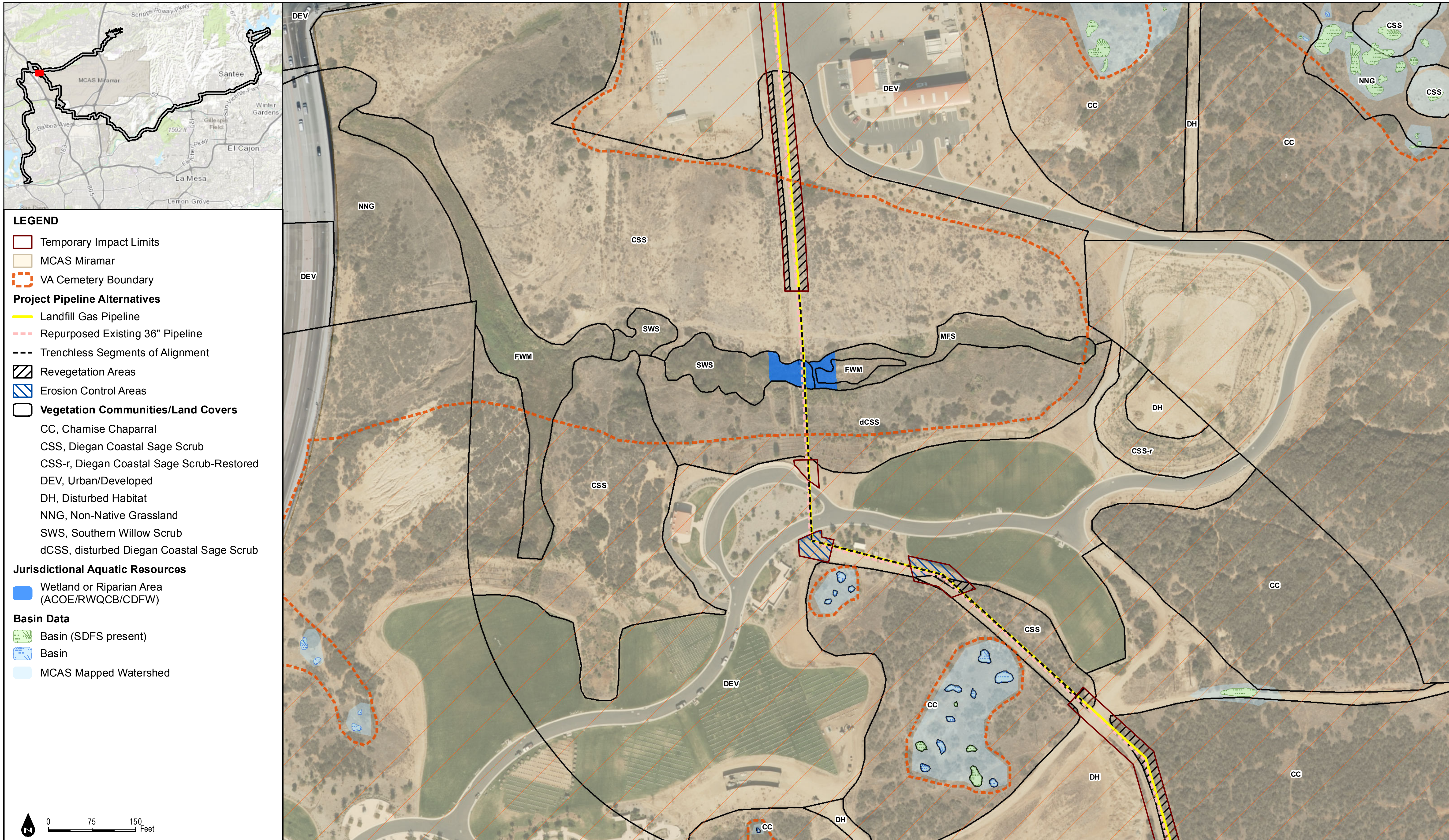

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-7

Revegetation Plan - Temporary Impact Areas

DUDEK

Revegetation Plan for the North City Project

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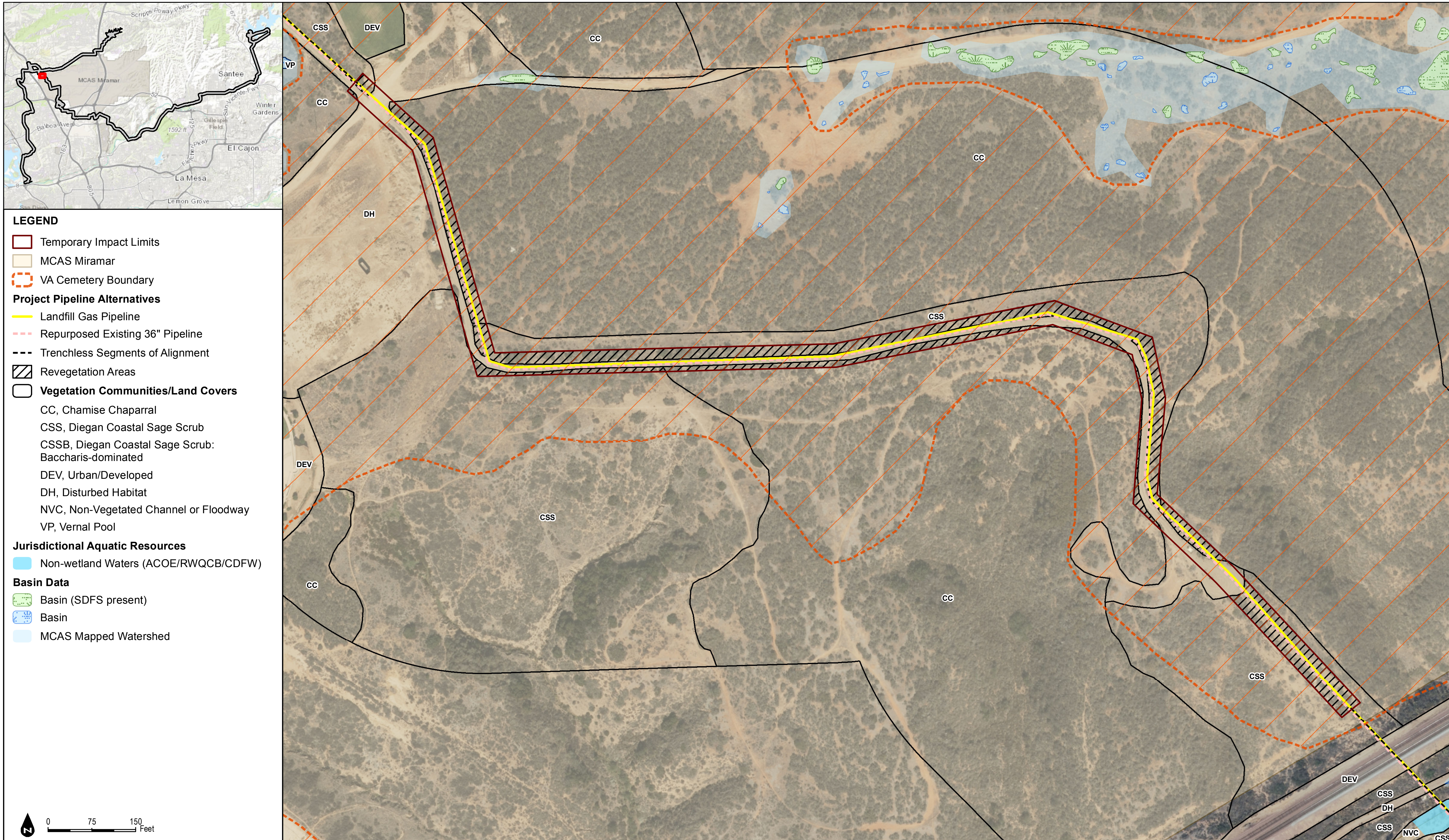

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-8

Revegetation Plan - Temporary Impact Areas

Revegetation Plan for the North City Project

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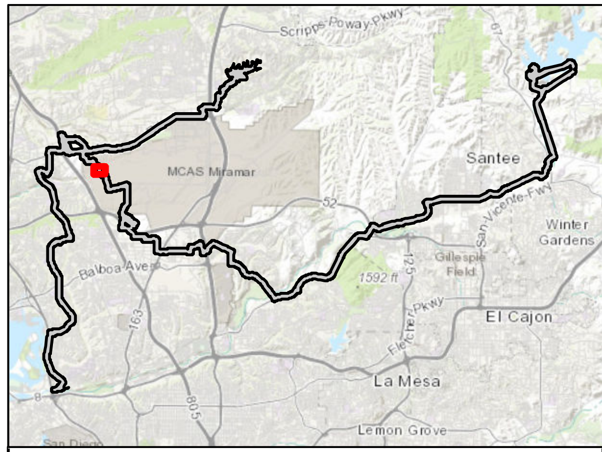


LEGEND

- Temporary Impact Limits
- MCAS Miramar

Project Pipeline Alternatives

- Landfill Gas Pipeline
- Repurposed Existing 36" Pipeline
- Trenchless Segments of Alignment
- Revegetation Areas

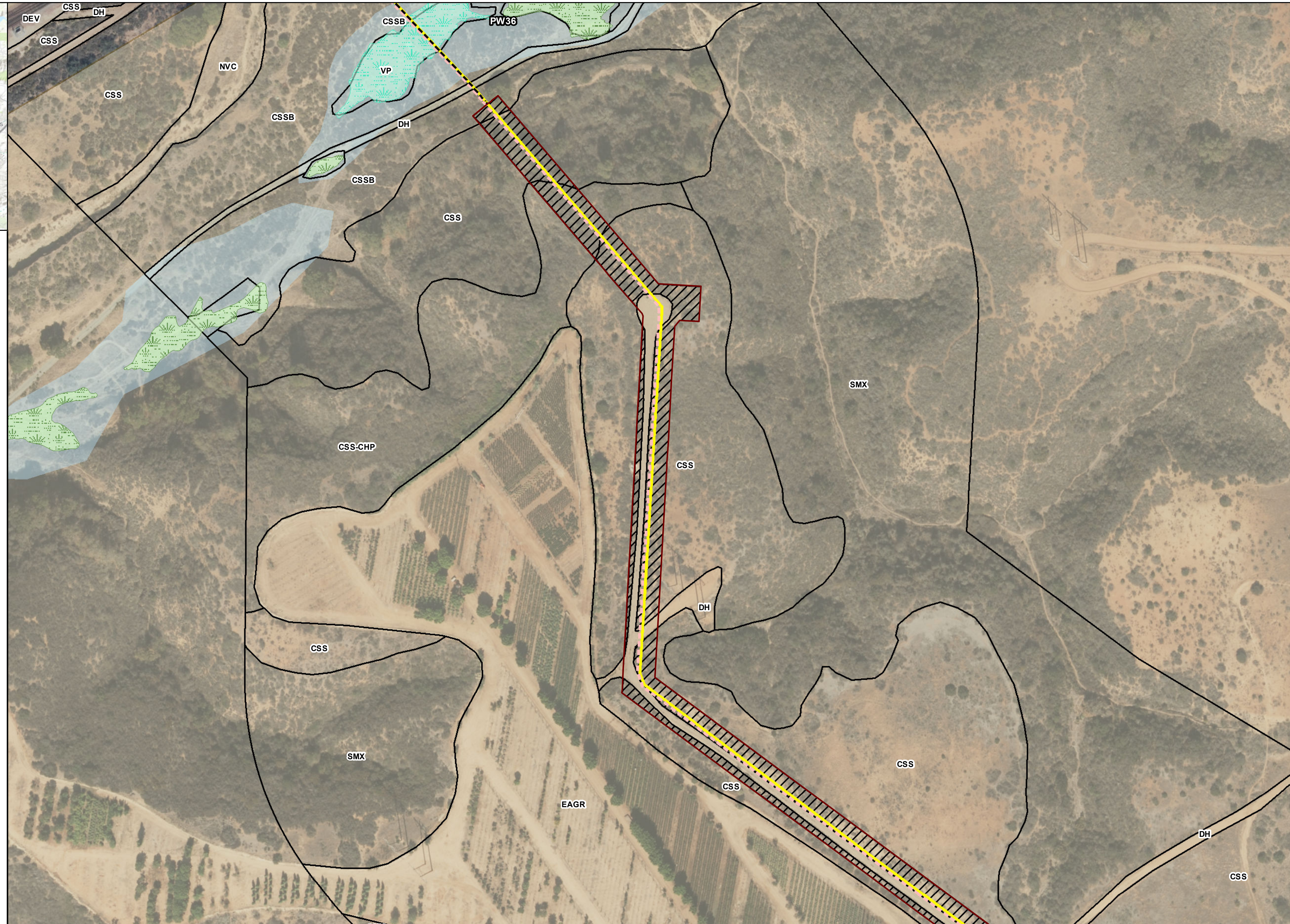
Vegetation Communities/Land Covers

EAGR, Extensive Agriculture - Field/Pasture, Row Crops
CSS, Diegan Coastal Sage Scrub
CSS-CHP, Coastal Sage-Chaparral Transition
CSSB, Diegan Coastal Sage Scrub: Baccharis-dominated
DEV, Urban/Developed
DH, Disturbed Habitat
NVC, Non-Vegetated Channel or Floodway
SMX, Southern Mixed Chaparral
VP, Vernal Pool

Basin Data

- Vernal pool (SDFS present)
- Basin (SDFS present)
- MCAS Mapped Watershed

N 0 75 150 Feet



SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-9
Revegetation Plan - Temporary Impact Areas

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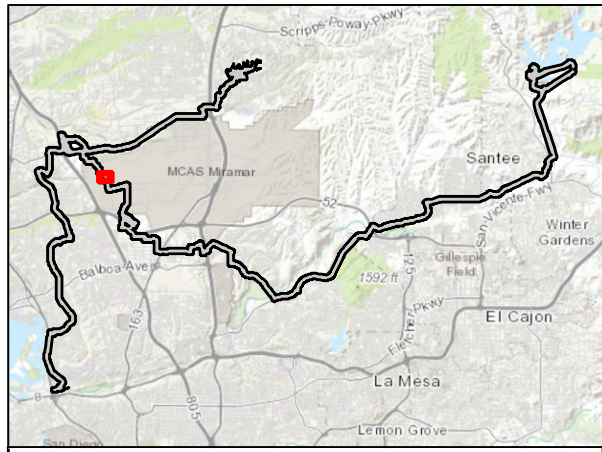

LEGEND

- Temporary Impact Limits
- MCAS Miramar

Project Pipeline Alternatives

- Landfill Gas Pipeline
- Repurposed Existing 36" Pipeline
- Trenchless Segments of Alignment
- Revegetation Areas
- Erosion Control Areas

Vegetation Communities/Land Covers

EAGR, Extensive Agriculture - Field/Pasture, Row Crops
CSS, Diegan Coastal Sage Scrub
CSSB, Diegan Coastal Sage Scrub: Baccharis-dominated
DEV, Urban/Developed
DH, Disturbed Habitat
NNG, Non-Native Grassland
SMX, Southern Mixed Chaparral

Basin Data

- Basin (SDFS present)
- Basin
- MCAS Mapped Watershed

0 75 150 Feet

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-10
Revegetation Plan - Temporary Impact Areas

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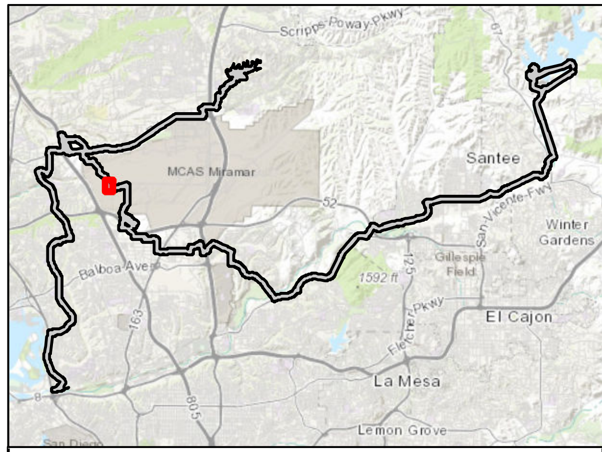


LEGEND

- Temporary Impact Limits
- MCAS Miramar

Project Pipeline Alternatives

- Landfill Gas Pipeline
- Repurposed Existing 36" Pipeline
- Trenchless Segments of Alignment
- Revegetation Areas
- Erosion Control Areas

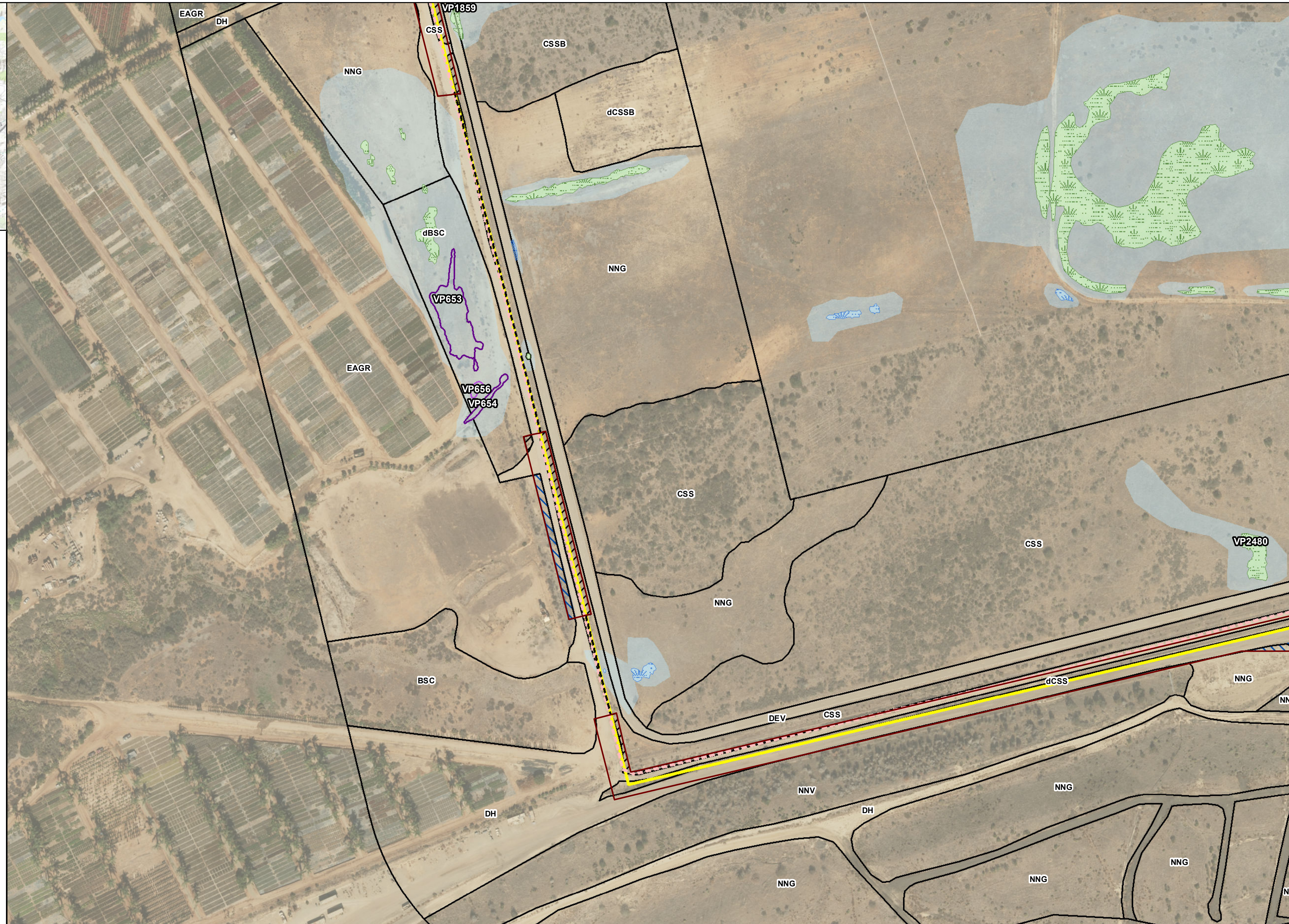
Vegetation Communities/Land Covers

- EAGR, Extensive Agriculture - Field/Pasture, Row Crops
- BSC, Flat-topped Buckwheat
- CSS, Diegan Coastal Sage Scrub
- CSSB, Diegan Coastal Sage Scrub: Baccharis-dominated
- DEV, Urban/Developed
- DH, Disturbed Habitat
- NNG, Non-Native Grassland
- NNV, Non-Native Vegetation
- dBSC, disturbed Flat-topped Buckwheat
- dCSS, disturbed Diegan Coastal Sage Scrub

Basin Data

- Basin (SDFS present)
- Basin
- Other SPFs
- MCAS Mapped Watershed

0 75 150 Feet



SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-11

Revegetation Plan - Temporary Impact Areas

Revegetation Plan for the North City Project

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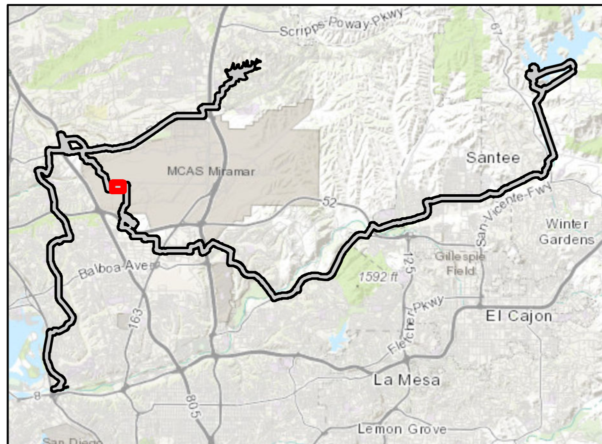


LEGEND

Temporary Impact Limits

MCAS Miramar

Project Pipeline Alternatives

Landfill Gas Pipeline

Repurposed Existing 36" Pipeline

Project Facilities

Landfill Gas Compressor Station

Revegetation Areas

Erosion Control Areas

Vegetation Communities/Land Covers

CSS, Diegan Coastal Sage Scrub

CSSB, Diegan Coastal Sage Scrub: Baccharis-dominated

DEV, Urban/Developed

DH, Disturbed Habitat

NNG, Non-Native Grassland

NNV, Non-Native Vegetation

dCSS, disturbed Diegan Coastal Sage Scrub

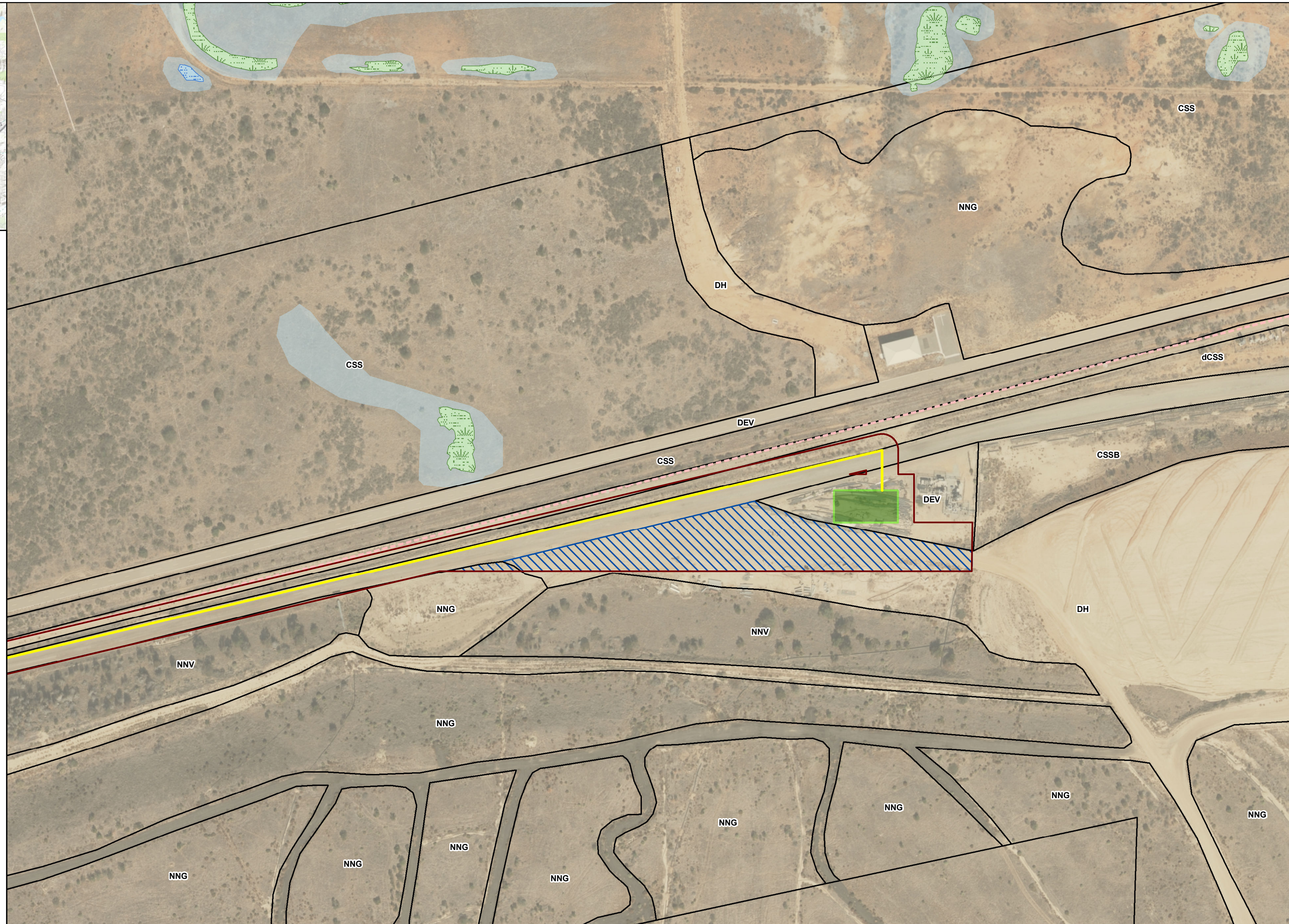
Basin Data

Basin (SDFS present)

Basin

MCAS Mapped Watershed

0 75 150 Feet



SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-12

Revegetation Plan - Temporary Impact Areas

Revegetation Plan for the North City Project

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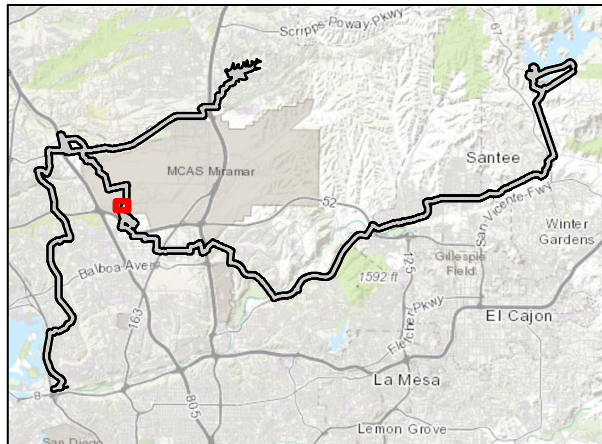


LEGEND

- MCAS Miramar
- Overhead Electrical Line (City SD owned)
- Operational Fuel line (Naval Supply Depot to Point Loma)
- Utilities 20-Foot Buffer

Project Pipeline Alternatives

- Repurposed Existing 36" Pipeline
- Enhancement Areas (6.14-acres)

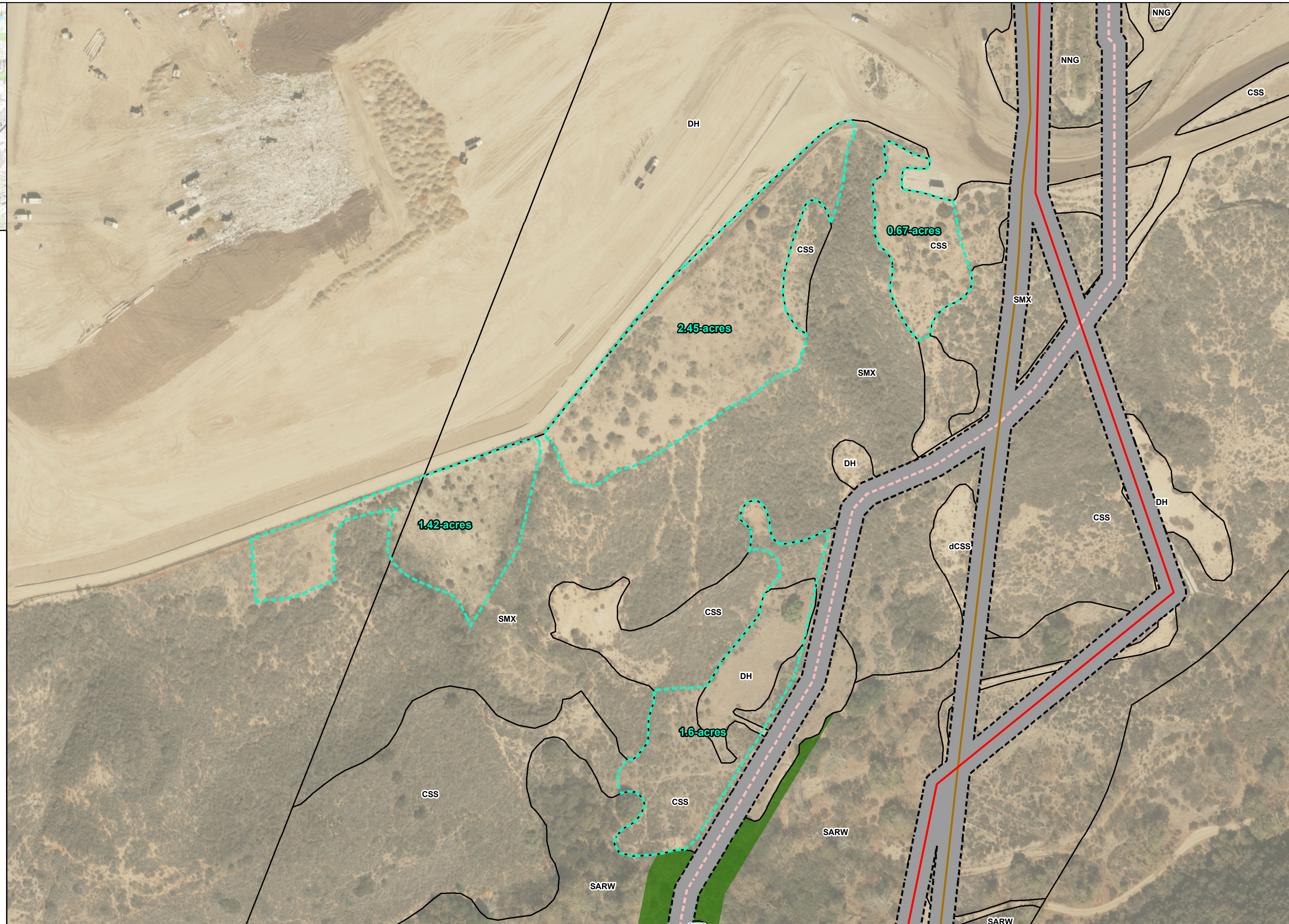
Vegetation Communities/Land Covers

- CSS, Diegan Coastal Sage Scrub
- DH, Disturbed Habitat
- NNG, Non-Native Grassland
- SARW, Southern Sycamore-Alder Riparian Woodland
- SMX, Southern Mixed Chaparral
- SWS, Southern Willow Scrub
- dCSS, disturbed Diegan Coastal Sage Scrub

Jurisdictional Aquatic Resources

- Wetland or Riparian Area (CDFW Only)

0 75 150 Feet



DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 4

Revegetation Plan - INRMP Enhancement Areas

Revegetation Plan for the North City Project

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All native hydroseed mixes above shall contain the following slurry mix slurry mix per acre:

- 2,500 pounds virgin wood fiber mulch
- Green marker dye
- 60 pounds Ecology Controls M-binder, or approved equal.
- Seed mix indicated above

4.3 Planting Techniques

Planting should be scheduled to occur in fall to early winter (October-January) to take advantage of the cooler rainy season and minimize the amount of supplemental irrigation needed. In addition, transplanting shock, stress and plant mortality is minimized when planting occurs during this time period.

Container stock shall be inspected by the PB upon delivery to the site to ensure they are the correct species, correct size, adequately rooted, free of pests (insects and weeds) and diseases, and of appropriate quality. Container plants shall be installed using standard horticulture practices. Plants will not be installed in rows, but placed in a natural fashion, as directed by the project biologist. Planting holes two times the diameter of the root ball shall be excavated to the depth of the root ball. Each planting pit will be filled with water and allowed to drain 24 hours prior to plant installation. Each container plant root ball shall be lightly scarified prior to installation. Planting backfill shall be native soil, amended if necessary, and based on the recommendations of the soil laboratory report. Each container plant shall have a 6-inch-tall watering basin that measures 24 inches diameter. The planting basin shall have a 4-inch-deep mulch layer to help retain moisture, keep the root zone cool, and preclude weed growth. Mulch should be obtained from the City of San Diego's Miramar Greenery and be 2" Mulch product. Care shall be taken to keep soil and mulch off of the trunk of the plants to avoid trunk rot. Immediately after installation each plant shall be thoroughly irrigated with a garden hose to the depth of the root ball.

4.4 Seed Application

Once the container stock has been planted and all planting work has been approved, the revegetation areas will be hydroseeded with the seed mix and hydroseed slurry shown in Tables 3-8. The PB shall review the site prior to, during and after seeding work to help ensure conformance with this plan and final LCDs. The RIC shall submit to the PB the proposed seed and slurry material at least five days prior to seeding. The biologist shall verify that the proposed seed mixes and hydroseed slurry components meet the specified requirements. The revegetation areas shall be free of weeds and trash and have best management practices (BMPs) (if applicable) installed beforehand. Larger, relatively flat areas that are not slated for container planting and that do not have a source of irrigation water may be seed-imprinted to help facilitate seed germination in non-irrigated areas. The seed application method for each revegetation area will be included on the LCDs.

4.5 Irrigation

A temporary drip irrigation system will be installed for the establishment of container stock where feasible. Irrigation will be used to maximize plant survival, establishment, and to promote healthy growth.

Drip irrigation systems will include a programmable solar or battery operated controller and master valve. Continuous pressure mainlines, ball valves, and remote control valves will be installed below grade. Lateral lines, drip distribution tubing and emitters will be staked to grade. Irrigation will be applied using water-efficient pressure compensating drip emitters. The above grade components of the irrigation system will be removed once the revegetation effort has met the performance standards and deemed complete.

Where an irrigation system is not feasible due to lack of a water source, remote location, or small size of the revegetation area, container planting will occur in fall to early winter to the extent practical. Container plants at these locations may receive supplemental watering with a water truck, water buffalo or similar equipment on an as-needed basis until the plants are capable of surviving without supplemental watering.

4.6 Erosion Control

The container plants and, or hydroseed mix will be installed promptly after site preparation work is completed and will provide erosion control. Fiber rolls or silt fence will be installed if necessary to prevent erosion. Fiber rolls will be biodegradable and encased in burlap material. They will be free of nylon/plastic netting and mesh and be certified free of noxious weeds. The location of the BMPs within revegetation areas will be determined by the PB and City, and, or in accordance with the project’s Stormwater Pollution Prevention Plan (SWPPP) and Qualified Stormwater Practitioner (QSP).

4.7 Revegetation Schedule

An outline of the anticipated project installation sequence and schedule is provided in Table 9 below. Container plants will be grown at a nursery for installation according to the final construction schedule and allow for the necessary lead time for plant propagation. Weed and invasive species removal, site cleanup, topsoil placement, soil amending, grading, irrigation and BMP installation will occur prior to planting and seed installation. Container plant and seed installation is best performed between October and January in order to minimize plant mortality, maximize seed germination, and minimize irrigation usage. In general, revegetation will begin within 30 days upon completion of each phase of the project. Erosion control we be performed continually as outlined in the project SWPPP until the Notice of Termination is filed and accepted. The 25-month biological monitoring and maintenance period will commence upon successful completion of the 120-day PEP.

Table 9
Revegetation Schedule

Task Description	Anticipated Work Period
Plant and seed ordering	9–12 months prior to anticipated installation
Site preparation	Within 30 days of construction completion
Irrigation installation	Within 60 days of construction completion
Planting and seeding	Within 90 days of construction completion
120-day plant establishment and warranty period (PEP)	Commence upon approval of all installation work
25-month maintenance and monitoring program	Commence upon successful completion of 120-day PEP

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5 REVEGETATION MAINTENANCE AND MONITORING

This revegetation maintenance and monitoring section provides direction for maintenance and monitoring activities to be performed during the initial 120-day PEP and the 25-month maintenance and monitoring period. The 25-month maintenance period begins when the project biologist and City certify that the revegetation installation work and 120-day PEP have been completed in substantial conformance with the final conceptual plan, LCDs, and applicable environmental documents and permits.

5.1 120-Day Plant Establishment and Warranty Period

The RIC will begin the 120-day plant-establishment, maintenance, and warranty period following completion and acceptance of the revegetation installation work. Maintenance during this time period includes controlling weeds and invasive species, litter removal, watering as needed for healthy plant establishment, irrigation system maintenance and programming, boundary fence maintenance and repair, BMP maintenance and repair, and replacing any dead container plants. At a minimum, maintenance will be performed weekly during the 120-day PEP in accordance with the Whitebook. Dead plants shall be replaced within two weeks of their occurrence. RIC shall review the revegetation areas monthly with the Project Biologist. At the end of the 120-day PEP the contractor shall review the site with the City’s representative and project biologist. If all work has been completed as outlined herein and per the LCDs, the City will provide deem the PEP complete.

5.2 25-Month Maintenance Period

Following successful completion of the 120-day PEP, the RMC will maintain the revegetation areas for 25 continuous months. The contractor shall review the site with the project biologist and City representative at least once every 6 months. At the end of the 25-month maintenance period the revegetation areas will be reviewed with the City and project biologist. If the revegetation maintenance work has been performed in accordance with this plan and the LCDs the city will provide an acceptance letter to the RMC. Any punch-list items must be corrected and accepted by the City prior to final approval.

5.2.1 Irrigation

Where an irrigation system is installed the revegetation areas will be irrigated as-needed to keep container plants alive until they are established and acclimated to natural rainfall cycles (1 to 2 years). The contractor shall adjust the watering time and frequency as needed to ensure healthy container plant growth while avoiding erosion and over-watering. The contractor will inspect the irrigation systems regularly and make any necessary repairs and adjustments, as required, for proper system operation. Once the plants are established, the irrigation schedules will be reduced and/or terminated in consultation with the project biologist and City. The irrigation systems will be removed once the restoration has been accepted as successful.

The RMC shall water container plants in non-irrigated areas as necessary using a water truck, water buffalo or similar equipment as-needed to keep the plants alive and healthy.

5.2.2 Weeding

Weeding shall be performed weekly as outlined in the Whitebook Section 801-6, item No. 9.

5.2.3 Trash and Debris Removal

During each site visit the RMC will remove any trash and debris that has accumulated in the revegetation areas. Natural debris such as leaf drop will be left on site. Weeds slash and debris shall be removed from the site the same day it is cut and disposed of in a legal manner.

5.2.4 Boundary Fence Maintenance

During each site visit the RMC will perform fence repairs and maintenance if necessary.

5.2.5 Pest and Disease Control

Vertebrate pest control is not anticipated as part of this project, nor are insect pests expected to be severe enough to warrant control. However, if an insect pest becomes significant enough to warrant control (i.e., threatens overall plant/habitat establishment), the contractor shall implement control methods utilizing the Integrated Pest Management methodologies. If plant diseases become a problem during the 25-month maintenance period the RMC shall notify the project biologist and city to determine the appropriate control measures. Herbivory problems such as loss of plant material from herbivores such as rabbits, deer and gophers shall be brought to the immediate attention of the project biologist and city to determine the appropriate control measures.

Pest and disease control will be conducted following all applicable laws, regulations, label directions, and safety precautions. Should the contractor require specific pest control recommendations, the contractor shall consult a licensed pest control adviser. The contractor shall provide reports of all pest control measures implemented at the site, including details of methods and materials used, such as pesticide applications. Copies of any written recommendations shall also be provided.

5.2.6 Vandalism, Site Protection and Access Control

Fencing, barriers and, or signage may be installed if necessary to prevent vandalism and off-road vehicle activity in the revegetation areas. Signs may be posted around the perimeter of the revegetation areas or at key potential access points to discourage entry into the areas. The city will coordinate with the police department if needed to have trespassers and or homeless encampments removed from revegetation areas.

5.2.7 Remedial Work and Corrective Actions

The project biologist will make corrective recommendations, such as replacement of dead plants or seeding of sparse areas, if needed to bring the restoration areas into compliance with the performance standards.

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6 BIOLOGICAL MONITORING

Biological monitoring and reporting of the revegetation areas will be performed as outlined below.

6.1 Qualitative Monitoring

The project biologist will visit the revegetation areas monthly during the 120-day plant-establishment period and quarterly during the 25-month maintenance period. Qualitative surveys will assess plant health, seedling establishment, weed control, erosion control, trash accumulation, and fencing. A summary report will be submitted following each site visit. Remedial measures, if needed, will be included in the reports.

Permanent photo viewpoints will be established so vegetation development and cover can be visually documented during the 25-month maintenance and monitoring period.

6.2 Quantitative Monitoring

Quantitative monitoring will include conducting dead plant counts of container plant material each September and visually estimating the percent native and weed cover each year. Vegetative cover will be visually estimated using the CNPS Rapid Vegetation Assessment, relevé, or similar assessment protocol. Data will be recorded onto field forms and include percentage cover by native species, percent cover weed and invasive species, the percent bare ground, notes on surface condition (e.g., rock, sand, vegetative detritus), and overall species richness within the revegetation area boundaries.

6.3 Reporting

Annual biological reports will be prepared by the PB to document the progress of the revegetation effort, including vegetation assessment data and a comparison of the results with the performance standards outlined herein. Each annual report will include photographs from key vantage points, and make remedial recommendations, if necessary to meet the annual performance standards. Annual reports will be submitted to the City each year.

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7 PERFORMANCE STANDARDS

The goal of the revegetation effort is to revegetate sensitive vegetation communities temporarily impacted by the Project to a condition equal to their pre-project condition. The secondary goal is to ensure non-sensitive vegetation areas (erosion control areas) are adequately revegetated to prevent erosion. The performance standards below have been established to define when the revegetation effort is judged successful and are based on the pre-project habitat assessment and conditions documented in the BRR.

Should the habitat restoration specialist determine that any part of the revegetation program is not meeting the performance standards corrective measures will be recommended in the annual report. Corrective measures may include, but are not be limited to replacing dead container plants, reseeding, applying fertilizers or other soil amendments, or making adjustments to irrigation and maintenance practices.

7.1 Annual Performance Standards for Revegetation Areas

First-Year Performance Standards

- 100% survival of planted container stock
- 30% native cover or 70% of pre-project cover
- No more than 30% weed cover
- No more than 10% cover by perennial invasive species*

Second-Year Performance Standards

- 90% survival of planted container stock
- 40% native cover or 70% of pre- project cover
- No more than 20% weed cover
- No perennial invasive species present*

* Invasive species shall include all species on Cal-IPC's list of highly or moderately invasive species for the Southwest region, and the City's list of prohibited species.

7.2 Annual Performance Standards for Enhancement Areas

First-Year Performance Standards

- ~~At least 50% native cover in areas that were mapped as disturbed native habitat (e.g., dCSS) prior to construction~~An increase of at least 20% native cover over baseline conditions
- ~~At least 10% native cover in areas that were mapped as non-native habitat (e.g., NNG) prior to construction~~
- Less than 30% non-native species cover ~~in areas that were mapped as disturbed native habitat (e.g., dCSS) prior to construction~~
- No perennial invasive species present*

* Invasive species shall include all species on Cal-IPC's list of highly or moderately invasive species for the Southwest region, and the City's list of prohibited species.

Second-Year Performance Standards

- ~~At least 70% native cover in areas that were mapped as disturbed native habitat (e.g., dCSS) prior to construction~~
- ~~At least 20% native cover in areas that were mapped as non-native habitat (e.g., NNG) prior to construction~~An increase of at least 30% native cover over baseline conditions
- Less than 20% non-native species cover ~~in areas that were mapped as disturbed native habitat (e.g., dCSS) prior to construction~~
- No perennial invasive species present*

* Invasive species shall include all species on Cal-IPC's list of highly or moderately invasive species for the Southwest region, and the City's list of prohibited species.

7.3 Annual Performance Standards for Erosion Control Areas

First-Year Performance Standards

- 70% of pre-impact vegetative cover (to meet Construction General Permit (CGP) and SWPPP requirements and meet criteria necessary to File Notice of Termination with SWRCB to terminate GCP.
- No signs of active erosion

Second-Year Performance Standards

- 70% of pre-impact vegetative cover (to meet Construction General Permit (CGP) and SWPPP requirements and meet criteria necessary to File Notice of Termination with SWRCB to terminate GCP.
- No signs of active erosion

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8 COMPLETION OF 25-MONTH REVGETATION PROGRAM

Upon completion of 25-months of revegetation maintenance and monitoring and achievement of the performance standards, the PB, in consultation with the City will prepare a letter indicating that the revegetation program is complete. The letter will indicate that the revegetation areas are in substantial conformance with the performance standards outlined herein. If the project does not meet the performance standards, the PB will make recommendations to bring the project into compliance, and the maintenance-and-monitoring period will continue until the performance standards are met.

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9 REFERENCES

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APPENDIX Q

MHPA Boundary Line
Adjustment Equivalency Analysis

The City of SAN DIEGO
Public Utilities Department
Engineering and Program Management Division

June 2nd, 2017

Ms. Kristy Forburger
City of San Diego
Planning Department/Multiple Species Conservation Program (MSCP)

Dear Ms. Forburger:

Subject: SANDER East Site Multi-Habitat Planning Area Boundary Line Adjustment Equivalency Analysis

The Public Utilities Departments is requesting a Multi-Habitat Planning Area Boundary Line Adjustment to include a portion of a parcel referred to as the SANDER East parcel, APN 35603113. Attached you will find the MHPA BLA equivalency analysis memo dated June 2, 2017.

If you have any questions or need additional information, please contact me at (858) 614-5789.

Sincerely,

Summer Adleberg
Project Officer

Attachments – Equivalency Analysis

cc: Keli Balo, Public Utilities Department

9192 Topaz Way, M.S. 901A
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HELIX Environmental Planning, Inc.
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Suite 200
La Mesa, CA 91942
619.462.1515 tel
619.462.0552 fax
www.**helixepi**.com

June 2, 2017 SDD-32.04

Ms. Summer Adleberg
City of San Diego
Public Utilities Department
9192 Topaz Way, MS 901A
San Diego, CA 92123

Subject: MHPA Boundary Line Adjustment Review for the Pure Water San Diego Program Sander East Site

Dear Ms. Adleberg:

This letter has been prepared to support the proposed Multi-Habitat Planning Area (MHPA) boundary line adjustment for the Sander East site of the City of San Diego (City) Public Utilities Department's Pure Water San Diego Program (Pure Water Program) North City Pure Water Project.

PROJECT LOCATION AND SETTING

The Sander East site encompasses an approximately 30-acre area located in the community of Kearny Mesa, south of State Route 52 (SR 52), and north of Mercury Street (Figure 1). The site is located in unsectioned land within Townships 15 South, Range 3 West on the San Bernardino Base and Meridian U.S. Geological Survey 7.5-minute La Jolla quadrangle map (Figure 2). Elevations in the Sander East site range from approximately 362 feet (ft) above mean sea level (amsl) to approximately 412 ft amsl. Soil types mapped within this study area include Redding cobbly loam (9 to 30 percent slopes) and Redding gravelly loam (2 to 9 percent slopes).

The Sander East site occurs within the City's Multiple Species Conservation Program (MSCP) Subarea Plan (City 1997); however, it is not located within the MHPA. The southeastern portion of the Sander East site is designated as Hardline Preserve for the Draft City of San Diego Vernal Pool Habitat Conservation Program (Vernal Pool HCP; City 2016).

PROJECT DESCRIPTION

The Pure Water Program is the City Public Utilities Department's proposed program to provide a safe, secure, and sustainable local drinking water supply for San Diego. Advanced water purification technology will be used to produce potable water from recycled water. The Pure Water Program consists of the design and construction of new advanced water treatment facilities, wastewater treatment facilities, pump stations, transmission lines, and pipelines. The North City Project is the first phase of the Pure Water Program, which proposes to expand the existing North City Water Reclamation Plant (NCWRP) and build a new advanced water treatment facility, referred to as the North City Pure Water Facility (NCPWF), adjacent to the NCWRP. The NCPWF project would include construction of a new full-scale advanced water purification facility, pipelines, electrical transmission lines, and support facilities such as pump stations.

Construction of the NCPWF would result in unavoidable impacts to vernal pool resources and upland habitats. Permanent impacts to vernal pools and upland habitats within the NCPWF site would be mitigated through restoration, enhancement, and preservation of vernal pools and associated upland watershed habitat at the Sander East site. The mitigation approach involves re-establishment of vernal pools within degraded areas of the Sander East site, as well as rehabilitation and enhancement of existing, low-functioning vernal pools. Portions of the site have been degraded due to disturbances associated with Miramar Landfill operations, as well as vehicular activity, illegal dumping, human visitation, and non-native plant invasion. Restoration of disturbed areas within the Sander East vernal pool complex, including vernal pools and associated mima mounds, and degraded upland habitats is proposed. The restored habitat would consist of a mosaic of chaparral, coastal scrub, and wildflower habitat, typical of vernal pool complexes in the region.

An MHPA boundary line adjustment is proposed to ensure that all mitigation occurs within the City's MHPA. Vernal pools and associated micro-watersheds within the Sander East site are proposed to be preserved and incorporated into the City's MHPA. Upon success completion of the proposed mitigation program, the habitat within the MHPA would be managed in accordance to MHPA requirements.

EXISTING BIOLOGICAL CONDITIONS

HELIX Environmental Planning, Inc. (HELIX) and Rocks Biological Consulting, Inc. (Rocks) completed a general biological survey, fairy shrimp surveys, and rare plant surveys for the Sander East site, as described in the Existing Conditions Letter Report for the Pure Water San Diego Program North City Water Purification Project (Existing Conditions Report; HELIX 2016a). The general biological survey consisted of mapping vegetation communities, conducting habitat assessments for sensitive species, documenting the locations of sensitive plant and animal species observed, evaluating potentially jurisdictional habitats/drainages, as well as mapping potential ponding basins. A baseline assessment of the functions and services of the vernal pool systems within the Sander East site was conducted by Dudek in April 2017. The vegetation community mapping was adjusted slightly by Dudek in 2017 to reflect current conditions. Wet and dry season fairy shrimp surveys were conducted by HELIX and Rocks (as a subconsultant to HELIX) in 2016 (Rocks 2016 and HELIX 2016b, respectively), and the surveys were conducted in accordance with the U.S. Fish and Wildlife Service (USFWS) protocol (USFWS 2015) to determine the presence/absence of San Diego fairy shrimp (*Branchinecta sandiegonensis*) and Riverside fairy shrimp (*Streptocephalus woottoni*). In addition, soil from the basins that contained dry season fairy shrimp cysts were sent to the University of Kansas for hatching to determine if the presence of the non-listed versatile fairy shrimp (*Branchinecta lindahli*) or the listed San Diego fairy shrimp (University of Kansas 2017).

Vegetation Communities

A total of 12 vegetation communities/land use areas occur on the Sander East site (Table 1; Figure 3): vernal pool, disturbed wetland, scrub oak chaparral, coastal sage-chaparral transition, Diegan coastal sage scrub (including disturbed), Diegan coastal sage scrub: baccharis-dominated, chamise chaparral, eucalyptus woodland, disturbed habitat, non-native vegetation, maintained engineered landfill surface, and developed. These communities are discussed in detail below.

Table 1
EXISTING VEGETATION COMMUNITIES/LAND USE AREAS (ac.)

VEGETATION COMMUNITY/LAND USE AREA[1]	TIER	AREA
Wetlands		
Vernal pool (44000)	Wetland	0.55
Disturbed wetland (11200)	Wetland	1.79
Wetlands Subtotal		**2.34**
Uplands		
Scrub oak chaparral (37900)	I	2.54
Coastal sage-chaparral transition (37G00)	II	12.94
Diegan coastal sage scrub (including disturbed) (32500)	II	0.82
Diegan coastal sage scrub: baccharis-dominated (32530)	II	1.25
Chamise chaparral (37200)	IIIA	1.30
Eucalyptus woodland (79100)	IV	0.31
Disturbed habitat (11300)	IV	0.22
Non-native vegetation (11000)	IV	0.08
Maintained engineered landfill surface (12000)	N/A	8.03
Developed (12000)	N/A	0.01
Uplands Subtotal		**27.50**
TOTAL		**29.84**

[1]Vegetation community codes are from Oberbauer (2008)

Vernal Pool

Vernal pools are a highly specialized plant habitat that supports a unique flora. Vernal pools are associated with two important physical conditions: a subsurface hardpan or claypan that inhibits the downward percolation of water and a topography characterized by a series of low hummocks called mima mounds and low depressions (the vernal pools), which prevent above ground water runoff. As the result of these two physical conditions, water collects in these depressions during the rainy season. As the rainy season ends and the dry season begins, the water that has collected in these vernal pools is gradually evaporated. As water evaporates from these pools, a gradient of low soil water availability to high soil water availability is created from the periphery of the pool margins to the center of the pool. The chemical composition of the remaining pool water becomes more concentrated as the pool water is evaporated, creating a gradient of low ion concentration at the pool periphery to high ion concentration at the pool center. A temporal succession of plant species will occur at the receding pool margins, depending upon the physical and chemical microenvironmental characteristics of the pool. Vernal pool indicator species observed within these pools include hyssop loosestrife *(Lythrum hyssopifolia*), long leaf plantain (*Plantago elongata*), San Diego mesa mint (*Pogogyne abramsii*), and woolly marbles (*Psilocarphus brevissimus*). Thirty-seven vernal pools were documented within the Sander East site, totaling 0.55 acre.

Disturbed Wetland

Disturbed wetlands are dominated by exotic wetland species that invade areas that have been previously disturbed or undergone periodic disturbances. These non-natives become established more readily following natural or human-induced habitat disturbance than the native wetland flora. The disturbed wetland on the Sander East site makes up approximately 1.79 acres in association with an unnamed drainage that crosses through the site, and the community is dominated by pampas grass (*Cortaderia* spp.), tamarisk (*Tamarix* spp.), eucalyptus (*Eucalyptus* sp.), date palm (*Phoenix* spp.), Washington fan palm (*Washingtonia robusta*), and Bermuda grass (*Cynodon dactylon*).

Scrub Oak Chaparral

Scrub oak chaparral is a dense, evergreen chaparral up to 20 feet tall, dominated by scrub oak (*Quercus dumosa*) with considerable mountain mahogany (*Cercocarpus betuloides*). Scrub oak chaparral occurs in somewhat more mesic areas than many other chaparrals, such as north facing slopes, and recovers more rapidly from fires than other chaparrals due to resprouting capabilities of scrub oak (Holland 1986). Approximately 2.54 acres of scrub oak chaparral occur within the Sander East site.

Coastal Sage-Chaparral Transition

Coastal sage-chaparral scrub transition is a mixture of sclerophyllous chaparral shrubs and drought-deciduous sage scrub species regarded as an ecotone (transition) between two vegetation communities. This singular community contains floristic elements of both communities including California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum* ssp. *fasciculatum*), laurel sumac (*Malosma laurina*), chamise (*Adenostoma fasciculatum*), inland scrub oak (*Quercus berberidifolia*), and ceanothus (*Ceanothus* spp.). This community varies in species composition but always contains coastal sage and chaparral species. Approximately 12.94 acres of coastal sage-chaparral scrub occur within the Sander East site.

Diegan Coastal Sage Scrub

Diegan coastal sage scrub is the wide-spread coastal sage scrub in coastal southern California. This vegetation community occupies xeric sites characterized by shallow soils. The Diegan coastal sage scrub on site is dominated by California sagebrush, California buckwheat, laurel sumac, lemonadeberry (*Rhus integrifolia*), and black and white sage (*Salvia mellifera* and *S. apiana*). Approximately 0.82 acre of primarily disturbed Diegan coastal sage scrub occurs within the Sander East site.

Diegan Coastal Sage Scrub: baccharis-dominated

Diegan coastal sage scrub: baccharis-dominated is similar to Diegan coastal sage scrub but dominated by *Baccharis* species. It is typically found on disturbed sites or those with nutrient-poor soils. This habitat is often found within other forms of Diegan Coastal Sage Scrub and on upper terraces of river valleys. Dominant species include broom baccharis (*Baccharis sarothroides)* and/or coyote brush (*Baccharis pilularis)*, and may also include California sagebrush, California buckwheat, sawtooth goldenbush (*Hazardia squarrosa)*, Menzies' goldenbush (*Isocoma menziesii*), and black sage in lesser amounts. Approximately 1.25 acres of Diegan coastal sage scrub: baccharis-dominated habitat occur within the Sander East site.

Chamise Chaparral

Chamise chaparral is the most widely distributed chaparral shrub and is dominated by the species chamise. This vegetation community is found from Baja to northern California in pure or mixed stands. Chamise chaparral's ubiquitous distribution may be the result of chamise being the only chaparral species that regenerates from fire from both an underground root crown and the production of seeds (Rundel 1986). It often dominates at low elevations and on xeric south facing slopes with 60 to 90 percent canopy cover. Mission manzanita (*Xylococcus bicolor)* and black sage are minor plant species associated within this vegetation community. Approximately 1.30 acres of chamise chaparral occur within the Sander East site.

Eucalyptus Woodland

Eucalyptus woodland is dominated by eucalyptus, an introduced species that has often been planted purposely for wind blocking, ornamental, and hardwood production purposes. Most groves are monotypic with the most common species being either the blue gum (*Eucalyptus gunnii*) or red gum (*E. camaldulensis* ssp. *obtusa)*. The understory within well-established groves is usually very sparse due to the closed canopy and allelopathic nature of the abundant leaf and bark litter. If sufficient moisture is available, this species becomes naturalized and is able to reproduce and expand its range. Approximately 0.31 acre of eucalyptus woodland occurs within the Sander East site.

Disturbed Habitat

Disturbed habitat includes land cleared of vegetation (e.g., dirt roads), land containing a preponderance of non-native plant species such as ornamentals or ruderal exotic species that take advantage of disturbance (previously cleared or abandoned landscaping), or land showing signs of past or present animal usage that removes any capability of providing viable habitat. Approximately 0.22 acre of disturbed habitat occur within the Sander East site, which primarily includes the landfill access easement that traverses the western portion of the Sander East site. A partially paved roadway varying in width from 10 to 18 feet traverses the western portion of the Sander East site and provides access to the adjacent landfill.

Non-native Vegetation

Non-native vegetation is a category describing stands of naturalized trees and shrubs (e.g., acacia [*Acacia* sp.], peppertree [*Schinus* sp.]), many of which are also used in landscaping. Approximately 0.08 acre of non-native vegetation occurs within the Sander East site.

Maintained Engineered Landfill Surface

Maintained engineered landfill surface includes land that is considered developed due to active maintenance associated with landfill operations. These areas have been physically altered by landfill activities and typically does not support native vegetation. Approximately 8.03 acres of maintained engineered landfill surface occurs within the northern portion of the Sander East site.

Developed

Developed land is where permanent structures and/or pavement have been placed, which prevents the growth of vegetation, or where landscaping is clearly tended and maintained. Approximately 0.01 acre of developed land occurs within the Sander East site and consists of a stabilized crossing of the unnamed drainage.

Sensitive Biological Resources

Sensitive Vegetation Communities

Sensitive vegetation communities that occur within the Sander East site include Diegan coastal sage scrub, Diegan coastal sage scrub: baccharis-dominated, chamise chaparral, and scrub oak chaparral.

Sensitive Plants

One federally and state listed as endangered plant species, San Diego mesa mint, was observed within the Sander East site. Six other special-status plant species were observed: Orcutt's brodiaea (*Brodiaea orcuttii*), long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*), San Diego barrel cactus (*Ferocactus viridescens*), Nuttall's scrub oak (*Quercus* *dumosa*), ashy spike-moss (*Selaginella cinerascens*), and San Diego County viguiera (*Viguiera laciniata*) (Figure 4).

San Diego mesa mint (*Pogogyne abramsii*)
Listing: FE/SE; CNPS Rank 1B.1
Distribution: Western San Diego County; Baja California, Mexico
Habitat: This small annual is restricted to vernal pools in grasslands, chamise chaparral, and coastal sage scrub on mesas.
Status on site: A total of 12 individuals were documented by Dudek in 2017 in a single vernal pool in the central portion of the site.

Orcutt's brodiaea (*Brodiaea orcuttii*)
Listing: --/--; CNPS Rank 1B.1; City MSCP Covered
Distribution: Riverside and San Bernardino counties south to Baja California, Mexico
Habitat: Vernally moist grasslands, mima mound topography, and vernal pool periphery are preferred habitat. Occasionally will grow on streamside embankments in clay soils.
Status on site: A total of 130 individuals were estimated within the site.

Long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*)
Listing: --/--; CNPS Rank 1B.2
Distribution: Western Riverside, San Diego, and Santa Barbara counties; Baja California, Mexico
Habitat: This small annual is typically found on clay lenses largely devoid of shrubs and can be occasionally seen on vernal pool peripheries.
Status on site: A minimum of 15,992 individuals were estimated within the site.

San Diego barrel cactus (*Ferocactus viridescens*)
Listing: --/--; CNPS Rank 2.1; City MCSP Covered
Distribution: San Diego County; Baja California, Mexico
Habitat: Optimal habitat for this cactus appears to be Diegan coastal sage scrub hillsides, often at the crest of slopes and growing among cobbles. Occasionally found on vernal pool periphery and mima mound topography in Otay Mesa.
Status on site: One individual was documented in the western portion of the site.

Nuttall's scrub oak (*Quercus dumosa*)
Listing: --/--; CNPS Rank 1B.1
Distribution: San Diego, Orange, and Santa Barbara counties; Baja California, Mexico
Habitat: Chaparral with a relatively open canopy cover is the preferred habitat in flat terrain (also found in coastal scrub). On north-facing slopes, may grow in dense monotypic stands. Occurs on sandy or clay loam soils.
Status on site: A total of 432 individuals were estimated within the site.

Ashy spike-moss (***Selaginella cinerascens***)
Listing: --/--; CNPS Rank 4.1
Distribution: Orange and San Diego counties; northwestern Baja California, Mexico
Habitat: Flat mesas in coastal sage scrub and chaparral. A good indicator of site degradation, as it rarely inhabits disturbed soils.
Status on site: A total of 2,921 individuals were estimated within the site.

San Diego County viguiera (*Viguiera laciniata*)
Listing: --/--; CNPS Rank 4.2
Distribution: San Diego and Orange County; Baja California, Mexico
Habitat: Diegan coastal sage scrub. Generally, shrub cover is more open than at mesic, coastal locales supporting sage scrub. Occurs on a variety of soil types.
Status on site: One individual was documented within the western portion of the site.

No other sensitive plant species, including City narrow endemic species, were observed during the biological surveys that took place between October 2015 and April 2017.

<u>Sensitive Animals</u>

Sensitive animal species are considered those listed as federal/state endangered or threatened, proposed for listing, fully protected by California Department of Fish and Wildlife (CDFW), MSCP covered species, or California species of special concern. Two sensitive animal species were observed or detected during the biological surveys: San Diego fairy shrimp and western spadefoot toad (Figure 4).

San Diego fairy shrimp (*Branchinecta sandiegonensis*)
Status: FE/--
Distribution: San Diego County and extreme northern Baja California, Mexico.
Habitat(s): Seasonally astatic pools which occur in tectonic swales or earth slump basins and other areas of shallow, standing water often in patches of grassland and agriculture interspersed in coastal sage scrub and chaparral.
Status on site: San Diego fairy shrimp were observed within two vernal pools on the site during the wet season surveys during the 2015-2016 wet season. San Diego fairy shrimp were documented in three additional vernal pools as part of the dry season hatching work that was completed in 2017.

Western spadefoot (*Spea hammondii*)
Status: --/SSC
Distribution: Throughout the Central Valley and San Francisco Bay area south along the coast to northwestern Baja California
Habitat: Occurs in open coastal sage scrub, chaparral, and grassland, along sandy or gravelly washes, floodplains, alluvial fans, or playas; requires temporary pools for breeding and friable soils for burrowing; generally excluded from areas with bullfrogs (*Rana catesbiana*) or crayfish (*Procambarus* sp.).

Status on site: One individual was observed on the eastern portion of the site in 2016. In addition, Dudek observed tadpoles and juveniles in 2017 in the eastern portion of the site.

Jurisdictional Wetlands

Vernal pools with indicator species are considered City jurisdictional aquatic resources in accordance with the City's Biology Guidelines (City 2012). The on-site vernal pools are considered jurisdictional wetlands by the U.S. Army Corps of Engineers (USACE) under the federal Clean Water Act based of the observation of ponding for greater than 14 days (wetland hydrology), ponding for a minimum length duration during the growing season (hydric soils), and the presence of vernal pool indicator species. The on-site drainage channel, which crosses the Sander East site approximately 100 feet to the north of the vernal pool complex, may provide connectivity of surface flows to an USACE-jurisdictional waterbody. The Regional Water Quality Control Board (RWQCB) may assert jurisdiction over the vernal pools as wetland waters of the State under the Porter Cologne Act. Based on these considerations, the vernal pools are considered jurisdictional in the context of City, USACE, and RWQCB guidelines. A formal jurisdictional delineation has not been conducted and would be needed to assess whether the on-site drainage would be under the jurisdiction of USACE, RWQCB, and/or CDFW.

BOUNDARY LINE ADJUSTMENT

The Project would include an MHPA boundary line adjustment to add areas of existing native wetland and upland habitats as well as proposed vernal pool restoration, enhancement, and preservation areas currently outside the MHPA (Figure 5). Adjustments to the MHPA boundary may be made without amending the City's MSCP Subarea Plan in cases where the new MHPA boundary preserves an area of equivalent or greater biological value. The proposed boundary line adjustment would result in the addition of approximately 21.61 acres of upland and wetland habitat and the sensitive species supported therein into the MHPA (Table 3).

Table 3
PROPOSED ADDITIONS TO THE MHPA (acres)

HABITAT	TIER	TOTAL SITE ACREAGE	PROPOSED MHPA ADDITION
Wetlands			
Vernal pool	Wetland	0.55	0.55
Disturbed wetland	Wetland	1.79	1.79
Wetland Subtotal		**2.34**	**2.34**

Table 3 (cont.)
PROPOSED ADDITIONS TO THE MHPA (acres)

HABITAT	TIER	TOTAL SITE ACREAGE	PROPOSED MHPA ADDITION
Sensitive Uplands			
Scrub oak chaparral	I	2.54	2.54
Coastal sage-chaparral transition	II	12.94	12.94
Diegan coastal sage scrub (including disturbed)	II	0.82	0.82
Diegan coastal sage scrub: baccharis-dominated	II	1.25	1.25
Chamise chaparral	IIIA	1.30	1.30
Sensitive Upland Subtotal		**18.86**	**18.86**
Non-sensitive Uplands			
Eucalyptus woodland	IV	0.31	0.28
Disturbed habitat	IV	0.22	0.05
Non-native vegetation	--	0.08	0.08
Maintained engineered landfill surface	--	8.03	--
Developed	--	0.01	--
Non-sensitive Upland Subtotal		**8.64**	**0.41**
TOTAL		**29.84**	**21.61**

In order for a boundary line adjustment to be approved, six findings must be made in accordance with Section 5.4.2 of the Regional MSCP Plan (dated August 1998). These six findings are discussed below.

1. *Effects on significantly and sufficiently conserved habitats (i.e., the exchange maintains or improves the conservation, configuration, or status of significantly and sufficiently conserved habitats, as defined in Section 4.2.4 of the Regional MSCP Plan).*

   The proposed boundary line adjustment would result in the addition of 21.61 acres to the MHPA. The maintained engineered landfill surface areas within the northern portion of the site, as well as the disturbed/developed habitat associated with the access easement for the landfill, would be excluded. The addition of the proposed area would result in an overall net gain in functional wetland and upland habitats to be conserved and managed as part of the MHPA, including a number of sensitive vegetation communities.

2. *Effects on covered species (i.e., the exchange maintains or increases the conservation of covered species).*

   The habitat proposed for addition to the MHPA supports six sensitive plant species (Orcutt's brodiaea, long-spined spineflower, San Diego barrel cactus, San Diego mesa mint, Nuttall's scrub oak, ashy spike-moss, and San Diego County viguiera) and two sensitive animal species (San Diego fairy shrimp and western spadefoot toad). Inclusion of this habitat in the

MHPA would increase the conservation of covered species (Orcutt's brodiaea, San Diego barrel cactus, San Diego mesa mint, and San Diego fairy shrimp).

3. *Effects on habitat linkages and function of preserve areas (i.e., the exchange maintains or improves any habitat linkages or wildlife corridors).*

   The proposed boundary adjustment would add wetland and upland habitat to the MHPA, including vernal pools, a drainage channel supporting disturbed wetland, and sensitive upland habitats including coastal sage-chaparral transition, Diegan coastal sage scrub, Diegan coastal sage scrub: baccharis-dominated, chamise chaparral, and scrub oak chaparral. The proposed boundary line adjustment would improve habitat linkages because the Sander East site would provide stopover habitat for avian species and would preserve an unnamed drainage that provides local movement for wildlife species.

4. *Effects on preserve configuration and management (i.e., the exchange results in similar or improved management efficiency and/or protection of biological resources).*

   The proposed MHPA boundary adjustment will improve the protection of biological resources. Specifically, all 37 vernal pools, including those that support listed species (San Diego fairy shrimp and San Diego mesa mint), along with a number of other sensitive species, would be included in the MHPA. Active restoration and management work that would be completed during a five-year maintenance and monitoring period, including the control of non-native vegetation in and around the existing and restored vernal pools, protection of the area from future disturbance with exclusionary fencing, and reducing unauthorized access through the restoration of a dirt road and trails that bisect the vernal pool complex. Long-term and adaptive management will be necessary to manage the site in perpetuity and to protect the viability of the vernal pool complex, but the boundary adjustment is not expected to affect the management efficiency or configuration of the MHPA. The boundary adjustment will add 21.61 acres of high-quality restored lands, and preserve management will not begin until the site achieves its success criteria and the mitigation is accepted by the regulatory agencies. Upon successful completion of the proposed mitigation activities, the habitat would be managed in accordance with MHPA requirements and in accordance with the City's Vernal Pool HCP.

5. *Effects on ecotones or other conditions affecting species diversity (i.e., the exchange maintains topographic and structural diversity and habitat interfaces of the preserve).*

   The areas proposed for addition to the MHPA currently consist of wetland and upland habitat supporting a variety of sensitive plant and animal species. The proposed boundary line adjustment would maintain topographic and structural diversity by including the existing habitats into the MHPA. Habitat interfaces would also be maintained through the addition of these lands into the MHPA, including the habitat restoration areas that are proposed. Species diversity is also expected to increase as a result of the vernal pool mitigation that is proposed for the site.

6. *Effects on species of concern not on the covered species list (i.e., the exchange does not significantly increase the likelihood that an uncovered species will meet the criteria for listing under either the federal or state Environmental Species Acts).*

   The proposed boundary adjustment would protect the habitats that support sensitive species on the site, including those that are not on the covered species list. Furthermore, the proposed mitigation would improve the quality of the habitat on site and would take measures to reduce future human intrusion through exclusionary fencing and restoration of trails to native habitat. As a result, the boundary line adjustment would not significantly increase the likelihood that an uncovered species would meet the criteria for listing under the federal or state Endangered Species Acts.

Please call either of us if you have any questions or require further information regarding this review.

Sincerely,

Shelby Howard
Principal Biologist

Vanessa Toscano
Project Manager

<u>Enclosures</u>:
Figure 1 Regional Location
Figure 2 Project Vicinity (USGS Topography)
Figure 3 Vegetation
Figure 4 Special Status Species
Figure 5 Proposed MHPA

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University of Kansas. 2017. Culture Results of Soil Samples Collected from the Pure Water San Diego Program (Sander East Site), San Diego, California. May 8.

U.S. Fish and Wildlife Service. 2015. Survey Guidelines for Listed Branchiopods. May 31.

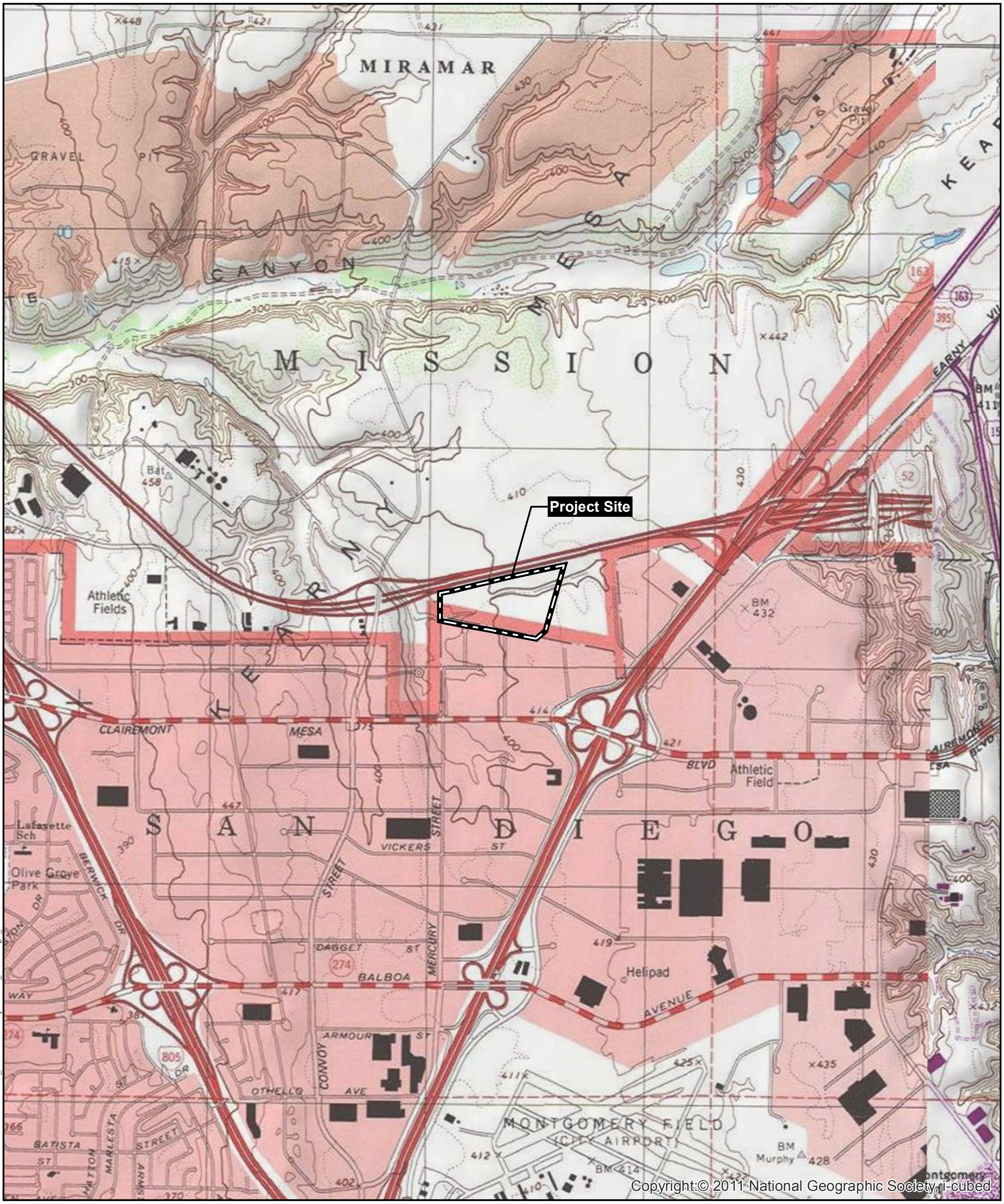
I:\PROJECTS\S\SDD\SDD-32.04_SanderEast\Map\MHPA_Letter\Fig1_Regional.mxd SDD-32.04 05/26/17 -RK

Regional Location

SANDER EAST - MHPA BOUNDARY LINE ADJUSTMENT

HELIX Environmental Planning

Figure 1



I:\PROJECTS\S\SDD\SDD-32.04_SanderEast\Map\MHPA_Letter\Fig2_USGS.mxd SDD-32.04 05/26/17 -RK

Project Vicinity (USGS Topography)

SANDER EAST - MHPA BOUNDARY LINE ADJUSTMENT

HELIX Environmental Planning

N

0 2,000 Feet

Figure 2

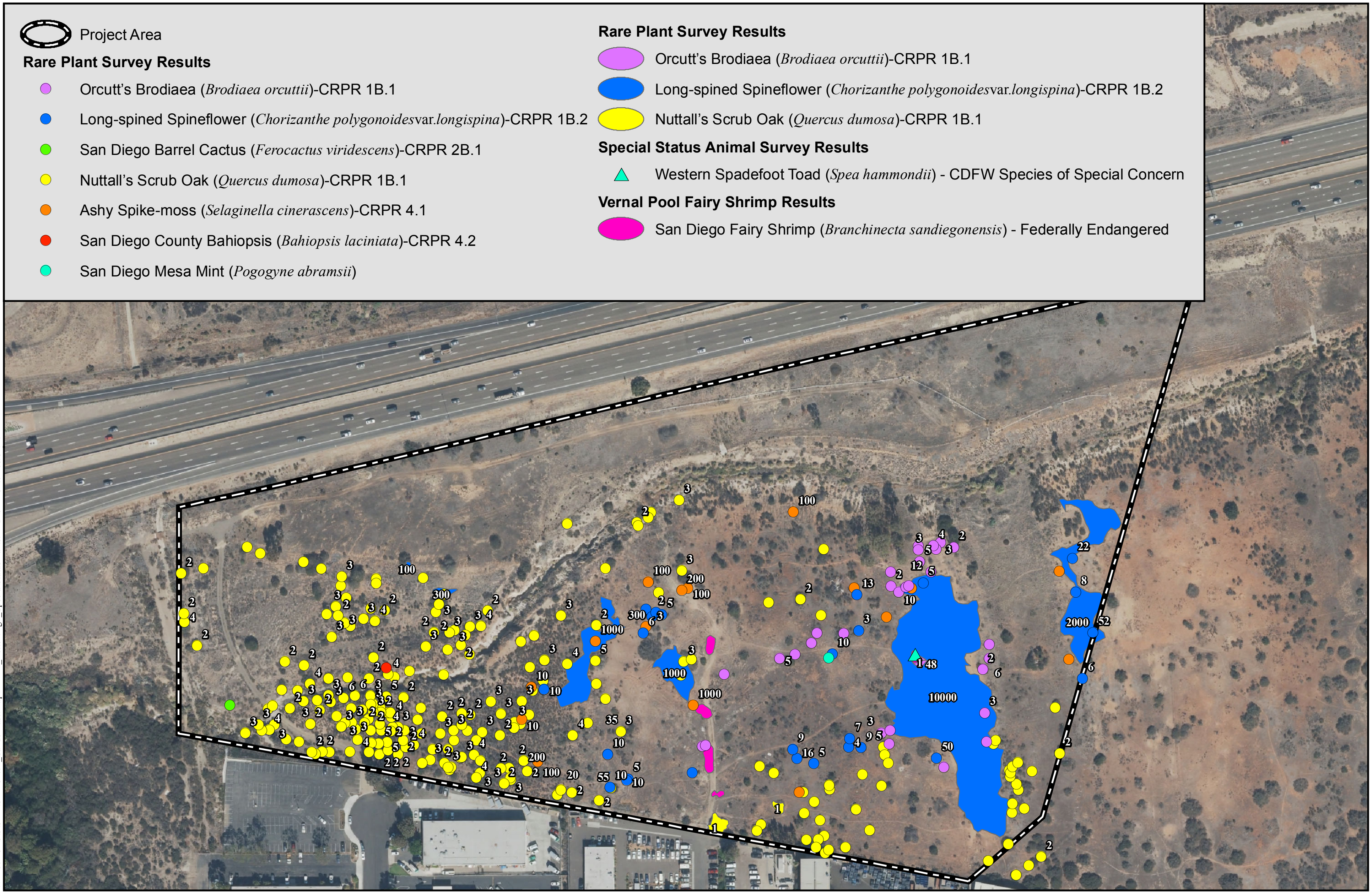
I:\PROJECTS\S\SDD\SDD-32.04_SanderEast\Map\MHPA_Letter\Fig3_Vegetation.mxd SDD-32.04 06/01/17 - RK

Vegetation

SANDER EAST - MHPA BOUNDARY LINE ADJUSTMENT

HELIX Environmental Planning

Figure 3



I:\PROJECTS\S\SDD\SDD-32.04_SanderEast\Map\MHPA_Letter\Fig4_SpecialStatusPlants.mxd SDD-32.04 05/31/17 - RK

Special Status Species

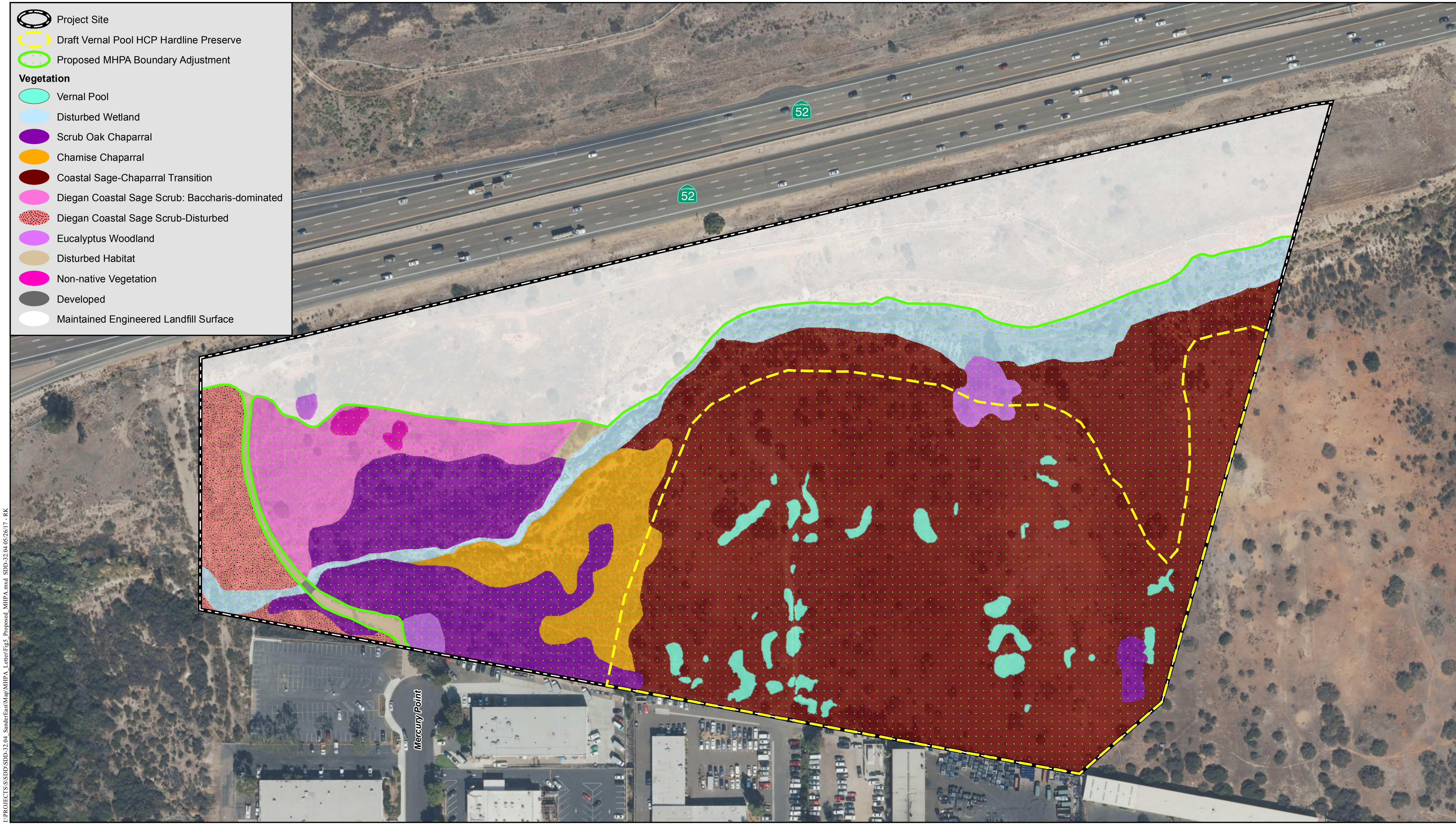
SANDER EAST - MHPA BOUNDARY LINE ADJUSTMENT

HELIX Environmental Planning

N

0 250 Feet

Figure 4



Proposed MHPA Areas

SANDER EAST - MHPA BOUNDARY LINE ADJUSTMENT

Figure 5

HELIX Environmental Planning

I:\PROJECTS\S\SDD\SDD-32.04_SanderEast\Map\MHPA_Letter\Fig5_Proposed_MHPA.mxd SDD-32.04 05/26/17 - RK

APPENDIX R

SANDER Vernal Pool and Upland Mitigation Plan

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project
City of San Diego
San Diego County, California

Prepared for:

City of San Diego
Public Utilities Department
9192 Topaz Way, MS 901 92123
San Diego, California 92101
Contact: Summer Adleberg

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024

FEBRUARY 2018

Printed on 30% post-consumer recycled material.

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Page No.

TABLES

1 INTRODUCTION

The North City Project is the first phase of the Pure Water Program, which will produce potable recycled water for the City of San Diego (City). The North City Project will expand the existing North City Water Reclamation Plant (NCWRP) and construct an adjacent North City Pure Water Facility (NCPWF). The construction of the NCPWF will result in unavoidable impacts to vernal pool resources and upland habitats. Mitigation for impacts is required pursuant to City guidelines. This SANDER Vernal Pool and Upland Mitigation Plan for the North City Project (Mitigation Plan) includes a description of the process for implementing activities to restore, enhance, and preserve vernal pools and upland habitat to satisfy the vernal pool and upland habitat mitigation requirements for the North City Project.

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2 PROJECT DESCRIPTION

2.1 Development Project Location

The North City Project includes a variety of facilities located throughout the central and coastal areas of San Diego County in the North City geographic area (Figure 1). The majority of proposed facilities in the North City Project occur within developed land and/or along existing paved streets. The facilities were designed and sited to avoid and minimize impacts to biological resources to the full extent possible. A new pure water facility and three pump stations would be located within the City. Pipelines would traverse a number of local jurisdictions, including the communities of University, Clairemont Mesa, and Linda Vista within the City of San Diego; the City of Santee; and the community of Lakeside and other areas in unincorporated San Diego County, and federal lands within Marine Corps Air Station (MCAS) Miramar (Figures 1 and 2).

2.2 Development Project Summary

The focus of this Mitigation Plan is on mitigation for impacts to vernal pool and upland habitat that will occur at the new NCPWF and associated pipelines, which is one component of the overall North City Project. The City plans to deliver water from the proposed NCPWF, to be constructed adjacent to the existing NCWRP. The NCPWF would produce 30 MGD annual average daily flow of purified water through a complex purification process. The purified water would then be pumped to the Miramar Reservoir via the North City Pipeline.

The NCPWF will be located on the vacant 10-acre City-owned lot across Eastgate Mall to the north of the NCWRP (also referred to as the Pueblo North site), with associated pipelines extending to the south and east (Figures 2 and 3-1 through 3-15). The NCWRP site occurs within the City's Multiple Species Conservation Program (MSCP) Subarea Plan (City of San Diego 1997).

2.3 Project Impacts and Required Mitigation

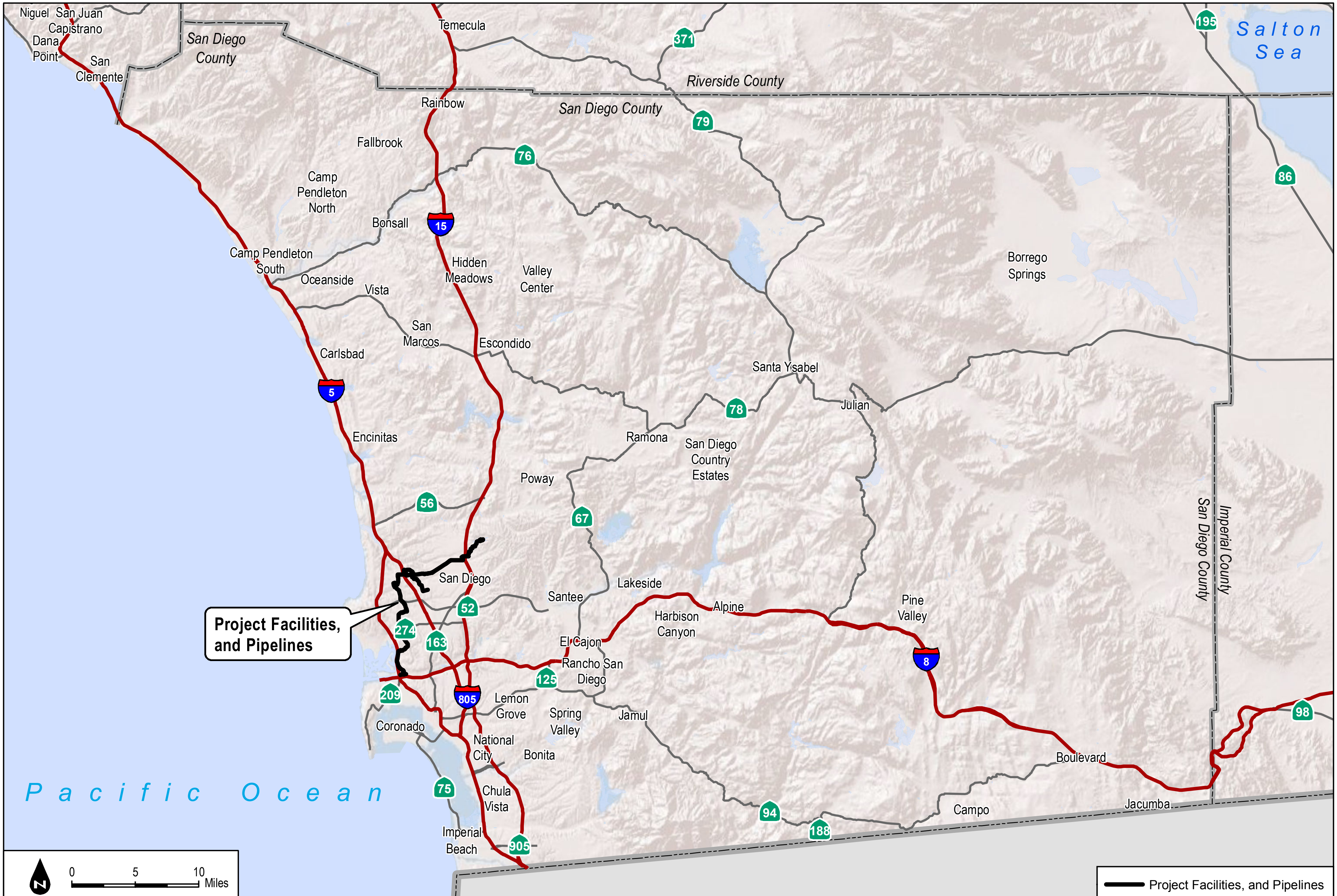
Pursuant to the San Diego Municipal Code, Land Development Code—Biology Guidelines, direct impacts to sensitive upland habitat and vernal pools require mitigation (City of San Diego 2012). Permanent impacts to vernal pools will be mitigated through restoration, enhancement, and preservation of vernal pools at the SANDER Vernal Pool and Upland Mitigation Site (SANDER Site) within the portion of which is designated to be within the ~~draft~~ VPHCP hardline preserve. Permanent impacts to sensitive upland habitats will also be mitigated through restoration, enhancement, and preservation of upland habitat at the SANDER site. The SANDER Vernal Pool and Upland Mitigation site is currently within Multiple Habitat Planning Area (MHPA)-designated lands; a boundary line adjustment was approved by MSCP and the California Department of Fish and Wildlife (CDFW) on July 12, 2017. Therefore, the site will provide mitigation occurring within the MSCP's MHPA designated lands. Mitigation for native grassland impacts will occur both at the SANDER site (in-tier, but out-of-kind) and off site at the Pueblo South site (in-kind), as described in the Conceptual Native Grassland Creation Mitigation Plan – Pueblo South for the North City Project (Dudek 2017a).

This Mitigation Plan has been prepared to be consistent with the Biological Resources Report for the North City Project (Dudek 2018a~~7b~~), the ~~Draft~~ Final City of San Diego Vernal Pool Habitat Conservation Plan (~~Draft~~ Final VPHCP; City of San Diego ~~2016~~2017), and all applicable permits for the North City Project.

This Mitigation Plan is prepared in accordance with Mitigation Measure BIO-1a and BIO-1b of the Biological Resources Report for the North City Project (Dudek 2018a~~7b~~) which state:

MM-BIO-1a **Mitigation for Upland Impacts.** In order to offset the permanent impacts to sensitive upland vegetation communities, 6.61 acres of mitigation would be required for the Miramar Reservoir Alternative. Mitigation would be provided through restoration and preservation of uplands at the SANDER Vernal Pool and Upland Mitigation Site or through allocation of credit at an existing approved mitigation site. All mitigation would occur within the Multiple Species Conservation Program's (MSCP's) Multi-Habitat Planning Area (MHPA). Additionally, in order to satisfy the cumulative impacts requirement 1.30 acres of native grassland creation (conducted outside the MHPA) would be required for either alternative and the Native Grassland Creation Mitigation Plan – Pueblo South (Dudek 2017a) would be implemented.

MM-BIO-1b **Mitigation for Vernal Pool Impacts.** In order to offset permanent impacts to vernal pools, a minimum of 0.75 acre of mitigation would be required for the Miramar Reservoir Alternative. Mitigation would be provided through restoration of vernal pools and adjacent uplands at the SANDER Vernal Pool and Upland Mitigation site, which is within the Vernal Pool Habitat Conservation Plan (VPHCP) hard line preserve. The SANDER Vernal Pool and Upland Mitigation Site is located within designated MHPA lands; therefore, all mitigation would occur within the MSCP's MHPA and would be implemented in accordance with City/U.S. Army Corps of Engineers (ACOE)/California Department of Fish and Wildlife (CDFW)/Regional Water Quality Control Board (RWQCB) guidelines. The SANDER Vernal Pool and Upland Mitigation Plan would be developed and implemented at the SANDER Vernal Pool and Upland Mitigation Site. Both upland vegetation, including in Tier mitigation, and vernal pool impacts would be mitigated at the SANDER site.



DUDEK

SOURCE: City San Diego 2016; ESRI 2016

FIGURE 1

Regional Map

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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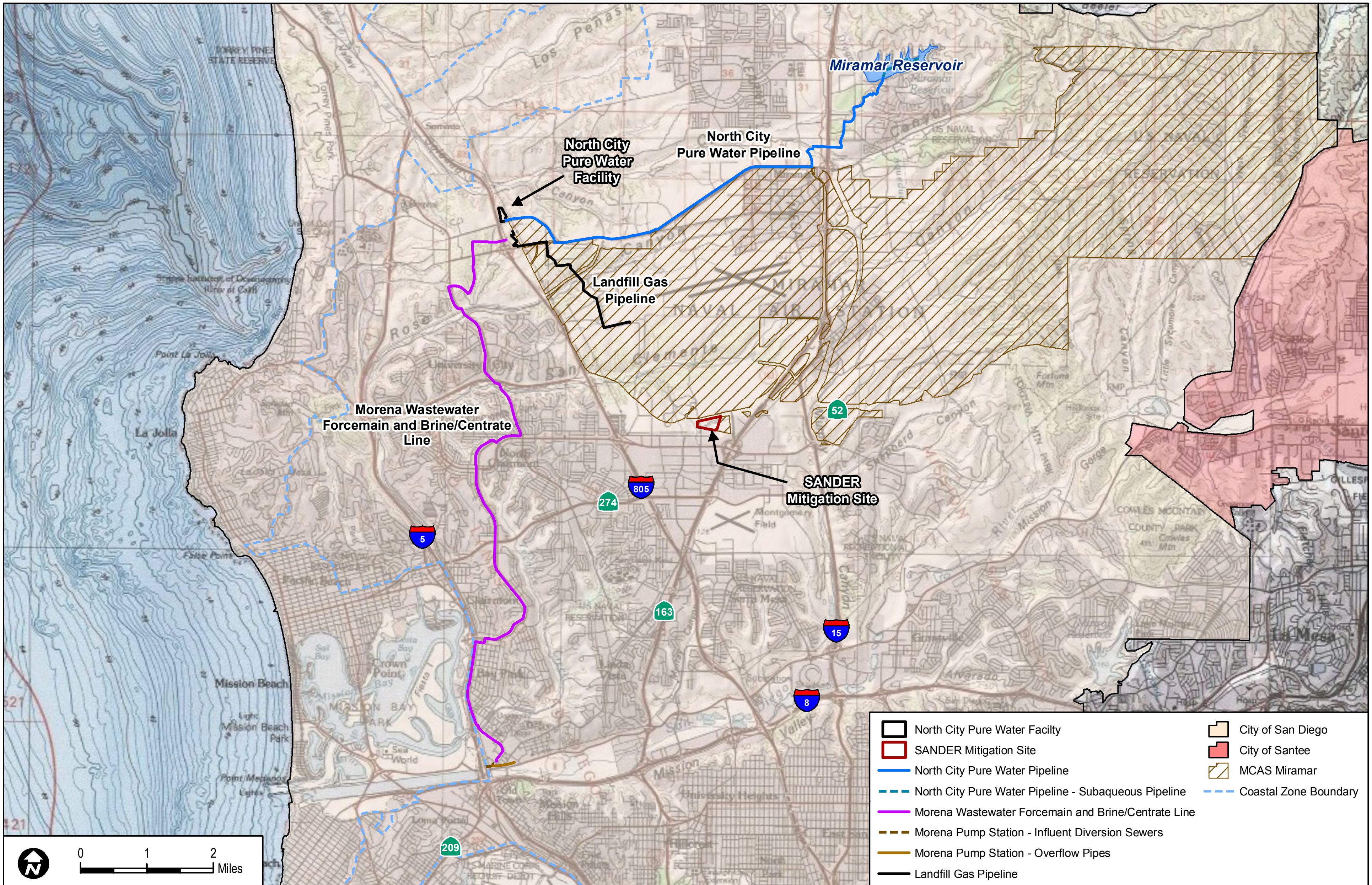

DUDEK

SOURCE: USGS 7.5-Minute Series Del Mar, Poway, La Jolla, La Mesa, Quadrangles; City of San Diego 2016; CA Coastal Commission

FIGURE 2

Vicinity Map

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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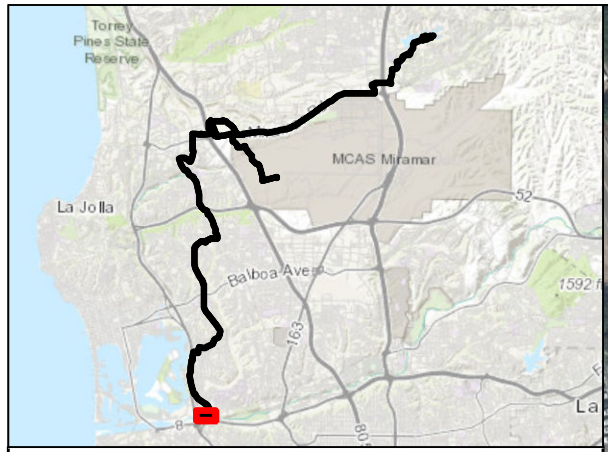

LEGEND

Impact Limits

Impact Type

Permanent

Temporary

Project Facilities, and Pipelines (Inset Map)

Morena Wastewater Forcemain and Brine/Centrate Line

Morena Pump Station - Influent Diversion Sewers

Morena Pump Station - Overflow Pipes

Project Facilities

Morena Pump Station

Vegetation Communities/Land Covers

DEV, Urban/Developed

NNV, Non-Native Vegetation

Multi-Habitat Planning Area

0 75 150 Feet

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-1

North City Project Habitat Impacts

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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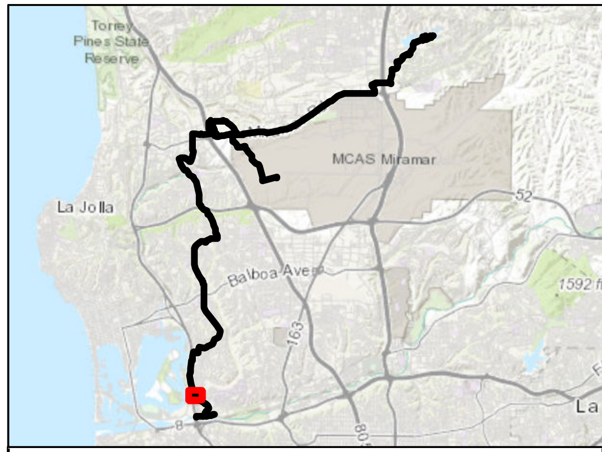

LEGEND

- Impact Limits

Impact Type

- Temporary
- Project Facilities, and Pipelines (Inset Map)
- Morena Wastewater Forcemain and Brine/Centrate Line

Vegetation Communities/Land Covers

- DEV, Urban/Developed
- DEV-CC, Developed - Concrete Channel
- DH, Disturbed Habitat
- EUC, Eucalyptus Woodland
- Multi-Habitat Planning Area

N

0 75 150 Feet

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-2

North City Project Habitat Impacts

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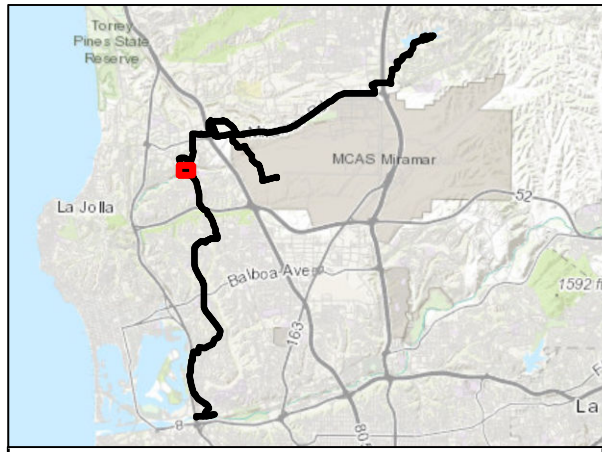

LEGEND

- Impact Limits

Impact Type

- Temporary
- Project Facilities, and Pipelines (Inset Map)
- Morena Wastewater Forcemain and Brine/Centrate Line
- Trenchless Segments of Alignment

Vegetation Communities/Land Covers

- CSS, Diegan Coastal Sage Scrub
- DEV, Urban/Developed
- DH, Disturbed Habitat
- NNV, Non-Native Vegetation
- dCSS, disturbed Diegan Coastal Sage Scrub
- Multi-Habitat Planning Area

0 75 150 Feet

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-3

North City Project Habitat Impacts

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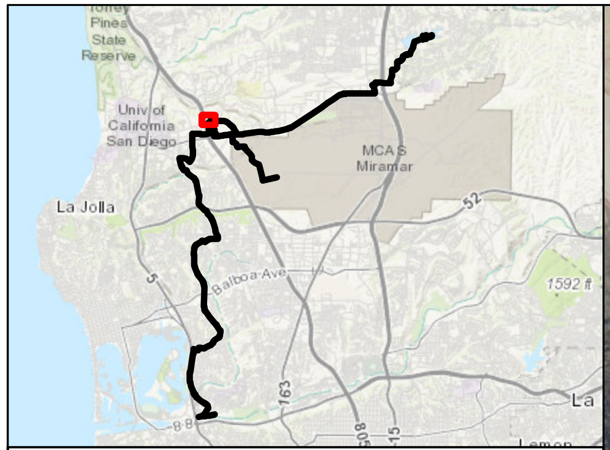


LEGEND

Impact Limits

Impact Type

Permanent

Temporary

Project Facilities, and Pipelines (Inset Map)

North City Pure Water Pipeline

Project Facilities

North City Pure Water Facilty

North City Pure Water Pump Station

North City Water Reclamation Plant Expansion

Sensitive Plants

Holocarpha virgata ssp. elongata

Holocarpha virgata ssp. elongata

Vegetation Communities/Land Covers

CSS, Diegan Coastal Sage Scrub

DEV, Urban/Developed

DH, Disturbed Habitat

NG, Native Grassland

NNG, Non-Native Grassland

NNV, Non-Native Vegetation

VP, Vernal Pool

dCSS, disturbed Diegan Coastal Sage Scrub

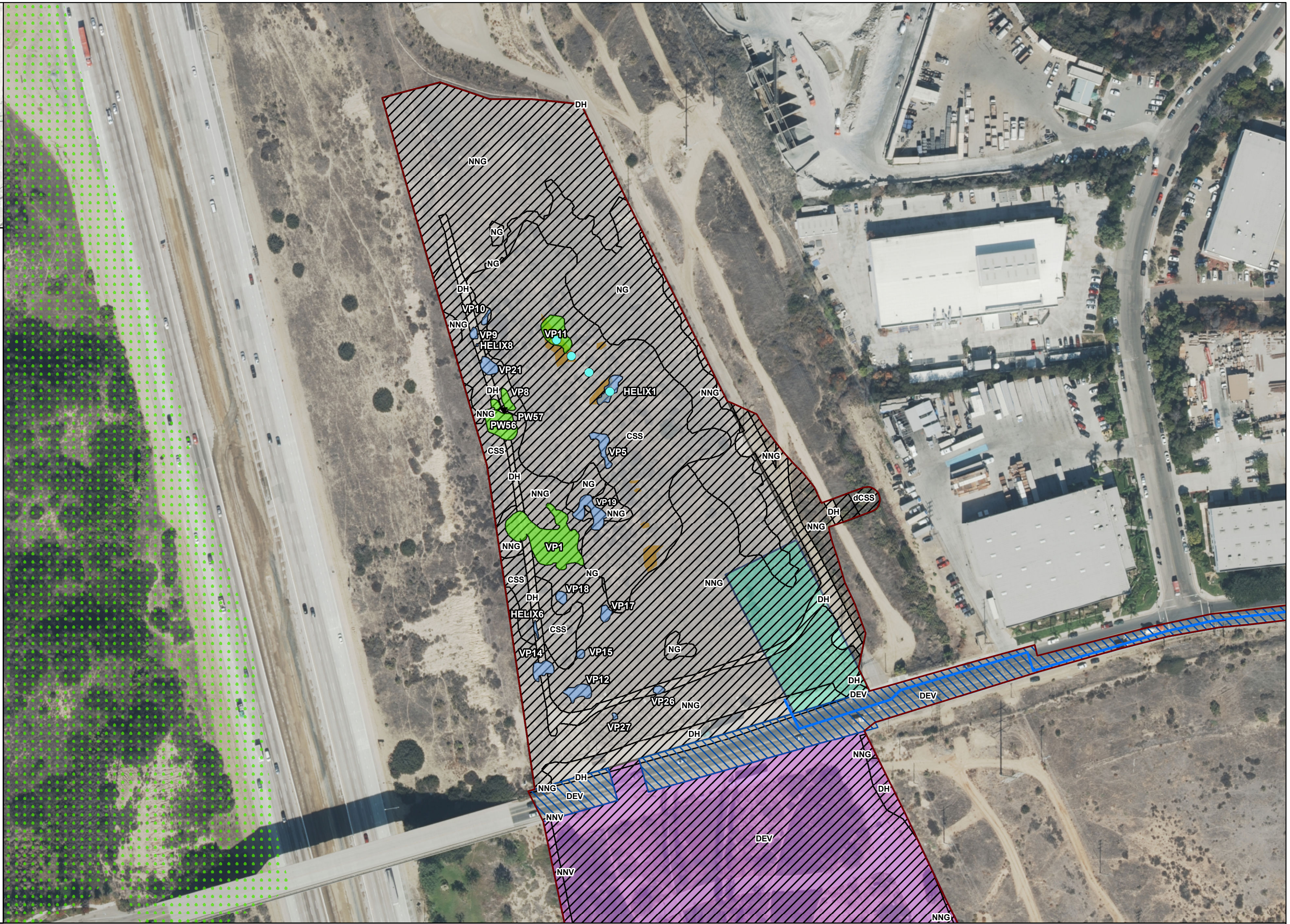
Vernal Pools (City Wetlands/potentially RWQCB)

No fairy shrimp present - 0.14 acre

Branchinecta lindahlii - 0.24 acre

Multi-Habitat Planning Area

0 75 150 Feet



SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-4

North City Project Habitat Impacts

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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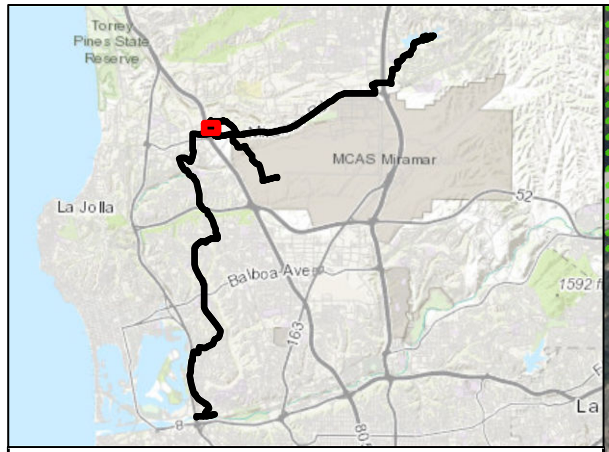

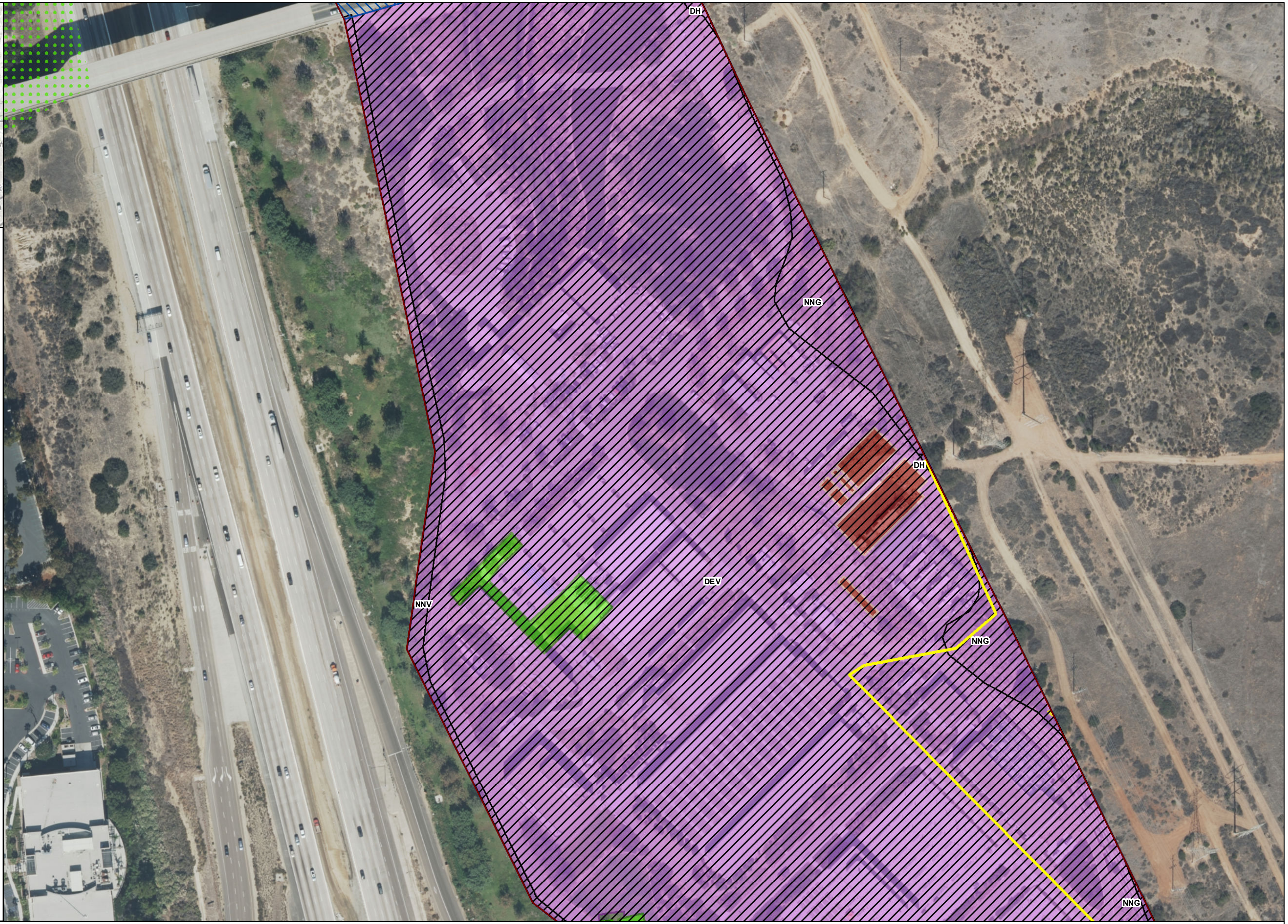

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-5

North City Project Habitat Impacts

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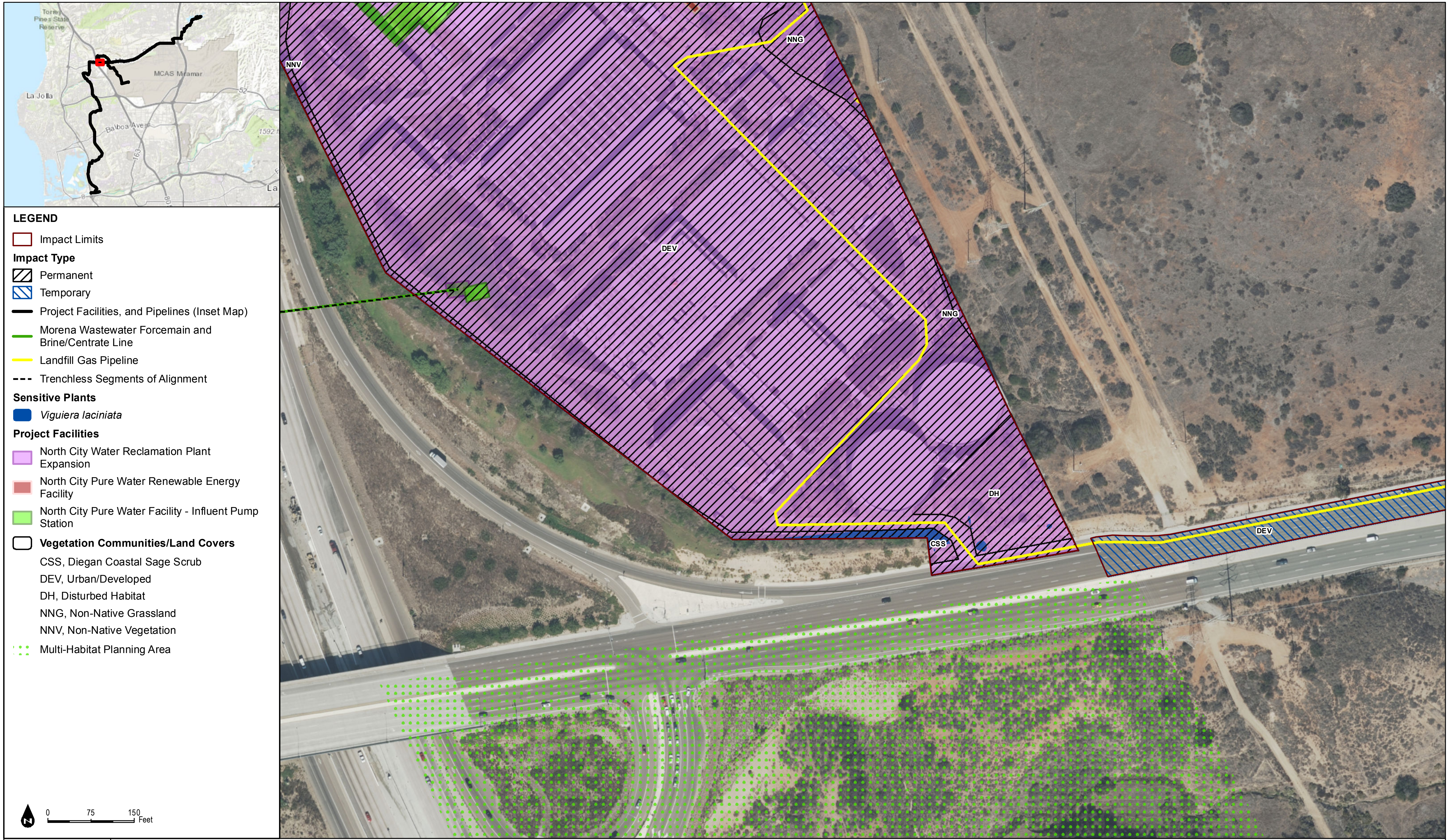

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-6

North City Project Habitat Impacts

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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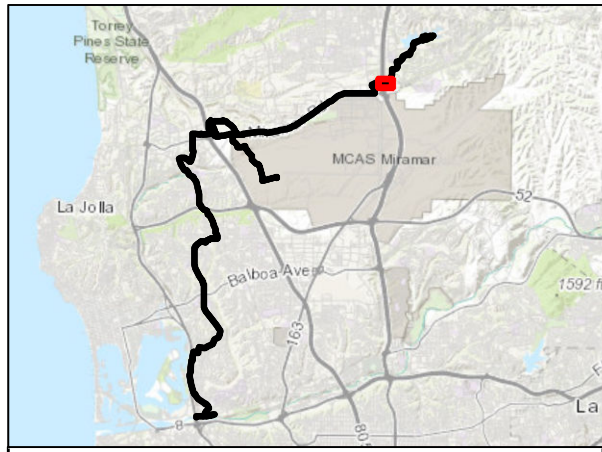


LEGEND

Impact Limits

Impact Type

Temporary

Project Facilities, and Pipelines (Inset Map)

North City Pure Water Pipeline

Trenchless Segments of Alignment

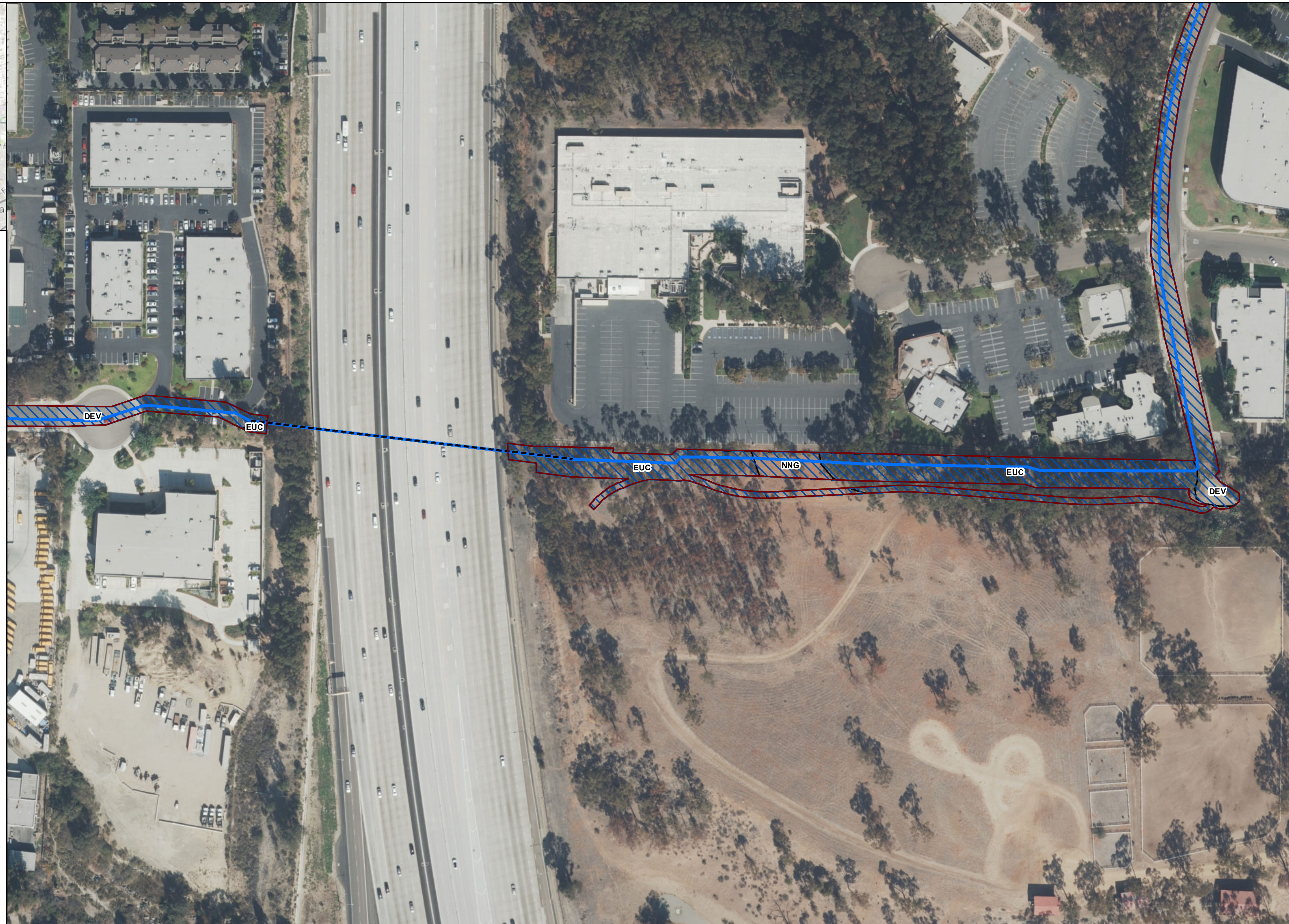
Vegetation Communities/Land Covers

DEV, Urban/Developed

EUC, Eucalyptus Woodland

NNG, Non-Native Grassland

0 75 150 Feet



DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-7

North City Project Habitat Impacts

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SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

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FIGURE 3-8
North City Project Habitat Impacts

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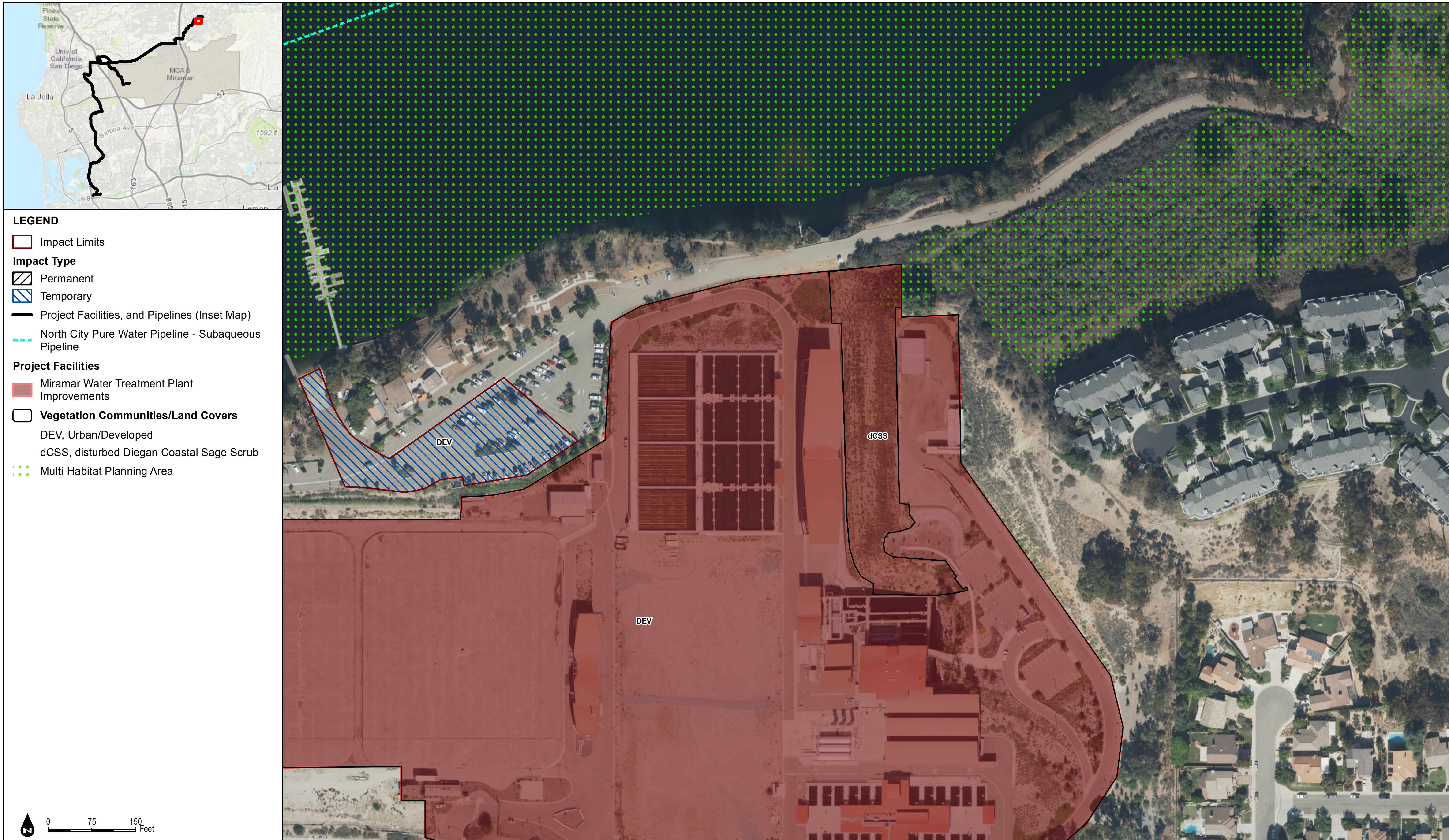

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-9
North City Project Habitat Impacts

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-10

North City Project Habitat Impacts

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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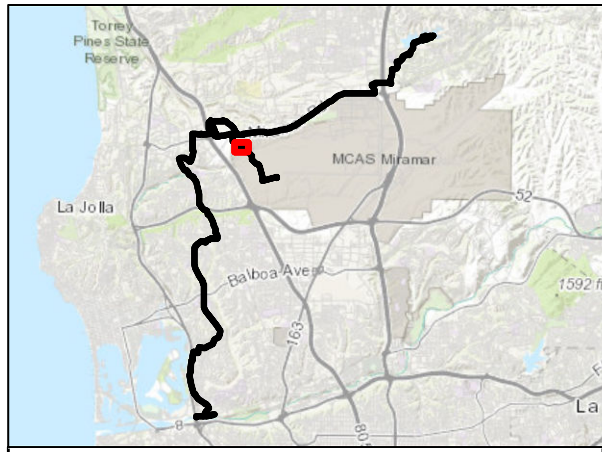

LEGEND

Impact Limits

Impact Type

Temporary

Project Facilities, and Pipelines (Inset Map)

Landfill Gas Pipeline

Trenchless Segments of Alignment

Sensitive Plants

Brodiaea orcuttii

Ceanothus verrucosus

Selaginella cinerascens

Vegetation Communities/Land Covers

CC, Chamise Chaparral

CSS, Diegan Coastal Sage Scrub

DH, Disturbed Habitat

0 75 150 Feet

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-11

North City Project Habitat Impacts

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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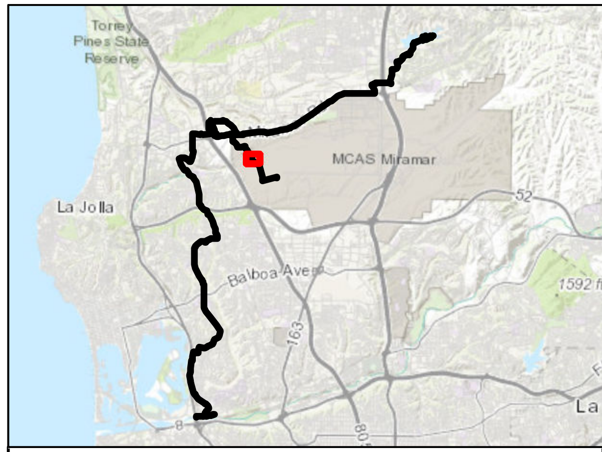

LEGEND

- Impact Limits

Impact Type

- Temporary
- Project Facilities, and Pipelines (Inset Map)
- Landfill Gas Pipeline
- Trenchless Segments of Alignment

Sensitive Plants

- *Ceanothus verrucosus*
- *Holocarpha virgata ssp. elongata*
- *Selaginella cinerascens*

Vegetation Communities/Land Covers

CSS, Diegan Coastal Sage Scrub

CSS-CHP, Coastal Sage-Chaparral Transition

CSSB, Diegan Coastal Sage Scrub: Baccharis-dominated

DH, Disturbed Habitat

SMX, Southern Mixed Chaparral

0 75 150 Feet

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-12

North City Project Habitat Impacts

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LEGEND

Impact Limits

Impact Type

Temporary

Project Facilities, and Pipelines (Inset Map)

Landfill Gas Pipeline

Trenchless Segments of Alignment

Sensitive Plants

Holocarpha virgata ssp. elongata

Selaginella cinerascens

Vegetation Communities/Land Covers

EAGR, Extensive Agriculture - Field/Pasture, Row Crops

CSS, Diegan Coastal Sage Scrub

DH, Disturbed Habitat

NNG, Non-Native Grassland

SMX, Southern Mixed Chaparral

0 75 150 Feet

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

DUDEK

FIGURE 3-13

North City Project Habitat Impacts

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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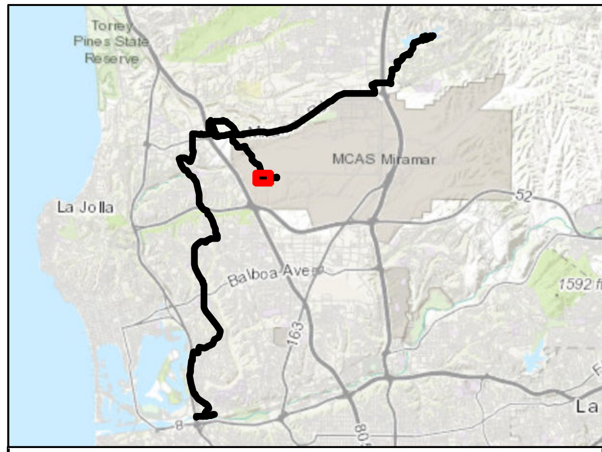

LEGEND

Impact Limits

Impact Type

Temporary

Project Facilities, and Pipelines (Inset Map)

Landfill Gas Pipeline

Trenchless Segments of Alignment

Sensitive Plants

Holocarpha virgata ssp. elongata

Vegetation Communities/Land Covers

EAGR, Extensive Agriculture - Field/Pasture, Row Crops

BSC, Flat-topped Buckwheat

CSS, Diegan Coastal Sage Scrub

DH, Disturbed Habitat

NNV, Non-Native Vegetation

dBSC, disturbed Flat-topped Buckwheat

dCSS, disturbed Diegan Coastal Sage Scrub

0 75 150 Feet

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-14

North City Project Habitat Impacts

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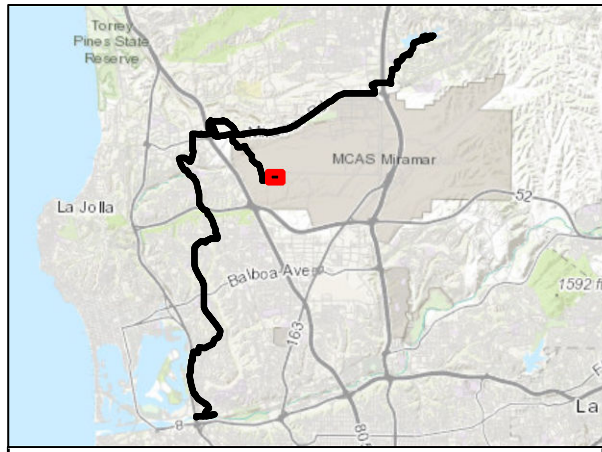

LEGEND

Impact Limits

Impact Type

Permanent

Temporary

Project Facilities, and Pipelines (Inset Map)

Landfill Gas Pipeline

Project Facilities

Landfill Gas Compressor Station

Vegetation Communities/Land Covers

DEV, Urban/Developed

DH, Disturbed Habitat

NNG, Non-Native Grassland

NNV, Non-Native Vegetation

dCSS, disturbed Diegan Coastal Sage Scrub

0 75 150 Feet

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG, 2016

FIGURE 3-15

North City Project Habitat Impacts

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The mitigation approach described in this Mitigation Plan consists of restoring, enhancing, and preserving vernal pool resources and upland habitat at the SANDER Site. This would involve re-establishment of vernal pools within degraded areas of the site where appropriate near surface hard pan exists, rehabilitation and enhancement of existing, low functioning vernal pools, restoration and enhancement of existing upland habitat, and preservation of the site in perpetuity. All vernal pools and upland habitat used for mitigation or enhancement credit within the SANDER Site are proposed to be preserved and incorporated into the City's Multiple Habitat Planning Area (MHPA). Restoration will involve reconfiguration and reconstruction of the mima mounds and basins, removal of weedy vegetation, revegetation of the mounds with upland sage scrub and chaparral species, and inoculation of the pools with vernal pool species. Upland restoration and enhancement will also include removal of invasive plant species, removal of trash, concrete and asphalt debris, weed control, and planting native species.

2.3.1 Vernal Pool Impacts and Mitigation

The development of the Pueblo North site for construction of the NCPWF will result in permanent impacts to 0.38 acre of vernal pool area (Helix 2016, Dudek 2018a~~7b~~). Impacted vernal pools were defined based on the presence of vernal pool indicator plant species (Bauder et al. 2009). Species identified in each pool are shown on Table 1.

Table 1
Species Observed in Vernal Pools within the NCPWF

Pool	Vernal Pool Indicator Plant Species							Fairy Shrimp
	Centunculus minimus	*Crassula aquatica*	*Elatine californica*	*Eleocharis macrostachya*	*Juncus bufonius*	*Plantago bigelovii*	*Psilocarphus brevissimus*	*Branchinecta lindahli*
Helix 1	X				X	X		
Helix 5 (Same as 2017 VP14)	X	X			X	X	X	
Helix 6	X	X				X	X	
Helix 7 (Same as 2017 VP16)	X				X	X		
Helix 8	X					X	X	
Helix 9 (Same as 2017 VP9)	X				X	X		
Helix PW55 (Same as 2017 VP1)	X	X		X	X	X	X	X
Helix PW56 (Same as 2017 VP6)	X	X	X		X	X	X	X
Helix PW57 (Same as 2017 VP7)	X			X		X	X	X
Helix PW58 (Same as 2017 VP1)	X	X		X	X	X	X	
2017 VP10	X				X			
2017 VP11	X		X		X	X		X

Table 1
Species Observed in Vernal Pools within the NCPWF

Pool	Vernal Pool Indicator Plant Species							Fairy Shrimp
	Centunculus minimus	*Crassula aquatica*	*Elatine californica*	*Eleocharis macrostachya*	*Juncus bufonius*	*Plantago bigelovii*	*Psilocarphus brevissimus*	*Branchinecta lindahli*
2017 VP12	X	X			X			
2017 VP15	X	X			X			
2017 VP17	X				X			
2017 VP18	X				X			
2017 VP19	X				X			
2017 VP26	X	X						
2017 VP27	X				X			
2017 VP5	X			X	X			
2017 VP8	X				X	X	X	X

Protocol-level surveys were conducted within all vernal pools (0.38 acre) at Pueblo North either during 2015/2016 or 2017, and the vernal pools were deemed unoccupied by San Diego fairy shrimp (*Branchinecta sandiegonensis*). Vernal pool indicator plant species have been documented within the 0.38 acre of mapped vernal pools at Pueblo North.

Because the Pueblo North vernal pools that will be impacted by the North City Project are characterized as having low to moderate value, and because survey results for pools confirmed the absence of San Diego fairy shrimp (Helix 2016, City of San Diego ~~2016~~2017, Dudek 2017b~~c~~), the proposed mitigation ratio will be 2:1 (Table 2). A mitigation ratio of at least 2:1 is consistent with the ~~Draft~~ Final City of San Diego Vernal Pool Habitat Conservation Plan (City of San Diego ~~2016~~2017; Vernal Pool HCP; Section 5.3.1).

Table 2
Proposed Vernal Pool Mitigation

Permanent Impacts	Mitigation Ratio	Mitigation Type	Restored Acreage
0.38	1:1	Re-establishment	0.38
	1:1	Rehabilitation/Enhancement	0.38
Subtotal	*2:1*	*Re-establishment/Rehabilitation/Enhancement*	*0.75*
		Total[1]	**0.75**

Note:
[1] Acreages should not be summed to reach subtotal due to rounding.

Vernal pool mitigation will include restoration of a minimum of 0.38 acre and enhancement of a minimum of 0.38 acre of vernal pools within the SANDER site. Thus the total area subject to proposed vernal pool mitigation for impacts associated with the North City Project within the SANDER site is 0.75 acre, with 50% coming in the form of enhancement and approximately 50% in the form of restoration. Vernal pool mitigation will be performed within locations of disturbed upland and degraded vernal pool habitat within the SANDER site (Figure 4).

2.3.2 Upland Habitat Impacts and Mitigation

Implementation of the North City Project would result in direct impacts to sensitive upland vegetation communities, including native grassland, Diegan coastal sage scrub, coastal sage-chaparral transition, flat-topped buckwheat, chamise chaparral, southern mixed chaparral, and non-native grassland. Mitigation for permanent impacts to native grassland will occur both on site at the SANDER site (in-tier), and in-kind on a separate site located at a parcel referred to as Pueblo South, described in a separate plan (Dudek 2018b~~7d~~). All other mitigation for permanent impacts to sensitive upland habitats will occur at the SANDER site. Mitigation for permanent impacts will be enhancement and preservation of native habitats through incorporation of portions of the SANDER site into the MHPA as outlined in Table 3.

Given the history of disturbance at the site several different types of enhancement opportunities are present. Enhancement opportunities include eradication of perennial invasive plant species, control of annual invasive plant species, removal of concrete and asphalt debris that appear to have been illegally dumped on the site, and remediation of dense patches of trash associated with transient habitations. Additionally, restoration will consist of removing dense stands of eucalyptus woodland and replanting with the native plant palette included in this plan.

Table 3
Anticipated Permanent Impacts to Sensitive Upland Vegetation Communities that will be Mitigated at the SANDER Site

Vegetation Community/ Land Cover Type	Subarea Plan Designation	Impact Acreage (Outside the MHPA)*	SANDER Site Mitigation (Within MHPA)		
			Outside MCAS Miramar		
			Mitigation Ratio	*Mitigation Acres*	*Proposed Mitigation Habitat Type*
Tier I – Rare Uplands					
Native Grassland	I	1.30	1:1**	1.30	Scrub Oak Chaparral
Tier II – Uncommon Uplands					
Diegan Coastal Sage Scrub (II, V MA)	II	2.72	1:1	2.72	Diegan Coastal Sage Scrub (2.13 acres) and Coastal Sage-Chaparral Transition (0.59 acre)

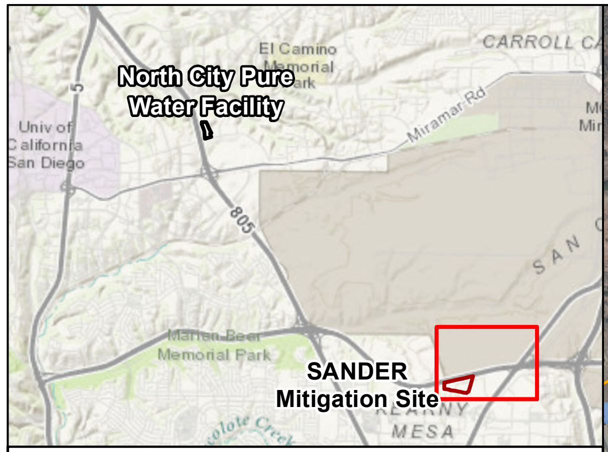
Table 3
Anticipated Permanent Impacts to Sensitive Upland Vegetation Communities that will be Mitigated at the SANDER Site

			SANDER Site Mitigation (Within MHPA)		
			Outside MCAS Miramar		
Vegetation Community/ Land Cover Type	**Subarea Plan Designation**	**Impact Acreage (Outside the MHPA)***	*Mitigation Ratio*	*Mitigation Acres*	*Proposed Mitigation Habitat Type*
Diegan Coastal Sage Scrub (disturbed)	II	0.03	1:1	0.03	Coastal Sage-Chaparral Transition
Tier III – Common Uplands					
Non-native Grassland	IIIB	5.10	0.5:1	2.55	Chamise Chaparral (1.30 acres) and Coastal Sage-Chaparral Transition (1.25 acres)
Total Mitigation at the SANDER Site for Permanent Impacts to Sensitive Uplands				**6.61**	**—**

Notes:

* The impact acreage totals do not include acreage that has already been mitigated by other projects, as outlined in the Biological Resources Report for the North City Project (Dudek 2018a~~7b~~).

** The total mitigation ratio for native grassland is 2:1, but 1:1 of the ratio will be mitigated by creating native grassland at the Pueblo South site as specified in the Conceptual Native Grassland Creation Mitigation Plan (Dudek 2017a). The remaining 1:1 will be mitigated at SANDER as in-tier preservation of scrub oak chaparral.



LEGEND

- North City Pure Water Facilty
- SANDER Mitigation Site
- Existing Vernal Pool Basins
- NWI Wetlands
- Soils

0 250 500 Feet

SOURCE: City of San Diego 2016, 2017; SanGIS; SANDAG

DUDEK

FIGURE 4

Existing Vernal Pool Resources and Soils

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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2.3.3 Special-Status Species

Focused surveys for sensitive plant and wildlife species were conducted in 2016 and 2017 as described in the ~~BTR~~Biological Resources Report (Dudek 2018~~7b~~). An overview of impacts and proposed mitigation are provided below.

2.3.3.1 Impacts and Mitigation for Sensitive Plant Species

There are seven sensitive plant species occurring within the impact limits of the Miramar Reservoir Alternative. However, there are no impacts to sensitive plant species within the MHPA (Table 4).

Table 4
Impacts to Sensitive Plant Species within the Miramar Reservoir Alternative Footprint

Common Name (Scientific Name)	Status (Federal/State/CRPR/MSCP)	Project Component(s)	Total Individuals
San Diego County viguiera *(Viguiera laciniata)*	None/None/4.2/None	~~North City Pipeline,~~ North City Water Reclamation Plant	~~12~~58
Orcutt's brodiaea *(Brodiaea orcuttii)*	None/None/1B.1/Covered	LFG Pipeline	12[1]
wart-stemmed ceanothus *(Ceanothus verrucosus)*	None/None/2B.2/Covered	LFG Pipeline	~~3~~7
long-spined spineflower *(Chorizanthe polygonoides* var. *longispina)*	None/None/1B.2/None	Metro Biosolids Center	6[1]
graceful tarplant *(Holocarpha virgata* ssp. *elongata)*	None/None/4.2/None	LFG Pipeline, North City Pure Water Facility, MBC	~~87~~9,307
decumbent goldenbush *(Isocoma menziesii* var. *decumbens)*	None/None/1B.2/None	Metro Biosolids Center	2[1]
ashy spike-moss *(Selaginella cinerascens)*	None/None/4.1/None	LFG Pipeline, Metro Biosolids Center	~~8~~15*

Note:
1 This species was not observed in 2017 within the impact footprint, and figures only show the 2017 data; however, since it was observed during the 2016 surveys within the impact footprint, it is included in the Project's impact analysis.
* This number represents the number of polygons mapped. This species is a fern and grows as a continuous mat, which makes it difficult to provide accurate population counts.

Per the San Diego Municipal Code, Land Development Code—Biology Guidelines, securing comparable habitat at the required ratio would mitigate for the direct impacts to most sensitive species. No species with very limited geographic ranges (narrow endemic species) would be impacted by the proposed Project. Therefore, significant direct impacts to sensitive plant species would be mitigated or restored to a less-than-significant level through implementation of habitat enhancement, restoration, and preservation, as described in this Mitigation Plan and the Conceptual Native Grassland Creation Mitigation Plan.

2.3.3.2 Impacts and Mitigation for Sensitive Wildlife Species

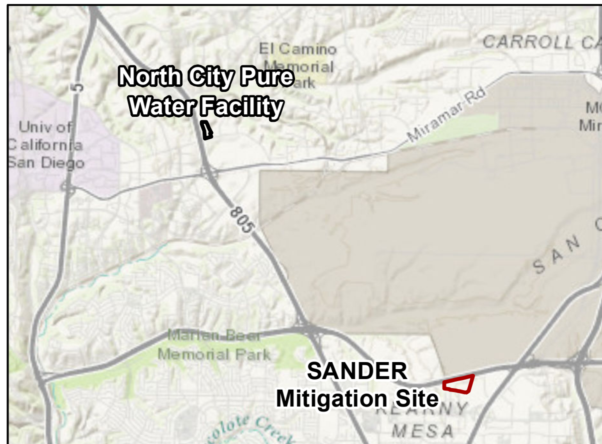
Sensitive wildlife species directly observed in the study area during focused surveys, or those known to occur in the surrounding region, are described in the ~~BTR~~Biological Resources Report (Dudek 2018a~~7b~~). Sensitive wildlife species observed within the 500-foot buffer of the Miramar Reservoir Alternative study areas include Cooper's hawk (*Accipiter cooperii*), coastal California gnatcatcher (*Polioptila californica californica*), yellow warbler (*Setophaga petechia*), white-tailed kite (*Elanus leucurus*), San Diego fairy shrimp, and western pond turtle (*Actinemys marmorata*).

In 2015-16, Rocks Biological Consulting, Inc. (Rocks), as a subconsultant to Helix Environmental Planning Inc. (Helix), conducted a wet season survey according to United States Fish and Wildlife Service (USFWS) protocol (USFWS 2015) to determine the presence/absence of San Diego fairy shrimp (*Branchinecta sandiegonensis*) and Riverside fairy shrimp (*Streptocephalus woottoni*) at the Pueblo North site (Rocks 2016). Additionally, Helix collected dry season soil samples within the Pueblo North site according to USFWS protocol (USFWS 2015). Results of the surveys included the identification of versatile fairy shrimp (*Branchinecta lindahli*) in one pool and versatile fairy shrimp cysts in two additional pools (Helix 2016). No additional fairy shrimp were detected during sampling.

Due to record rainfall in the region during the 2016/2017 rainy season, additional previously undescribed inundated features were documented on the Pueblo North site in 2017. Dudek verified and mapped all depressional features that held water for 24 hours and contained vernal pool plant indicator species (Figure 5). A protocol-level dry season survey was conducted for the 11 additional vernal pools (0.14 acre) in 2017 to confirm that these pools are not occupied by listed fairy shrimp species. Only two pools (VP8 and VP11; 0.05 acre) had fairy shrimp cysts, which were determined to be non-listed species, and the remaining 9 pools (0.09 acre) were unoccupied. However, the record rainfall in 2017 that produced the greatly enlarged inundation area may not re-occur during the 2017-18 rainy season. Therefore, it may not be possible to perform wet season surveys on some or all of the new pools in accordance with the FWS fairy shrimp survey protocols.

Because the vernal pools at the Pueblo North site are not known to support special-status species, the mitigation for vernal pool impacts is habitat based rather than species based, and occupation of special-status species is not a requirement.

Per the San Diego Municipal Code, Land Development Code—Biology Guidelines, direct impacts to vegetation communities used by wildlife would be conserved or restored through the implementation of habitat enhancement, restoration and preservation. Therefore, no wildlife species-specific mitigation requirements are planned for this Project.



LEGEND

- North City Pure Water Facilty
- SANDER Mitigation Site
- Vernal Pool HCP Hardline (City of San Diego)
- MHPA Boundary
- Existing Vernal Pool Basins

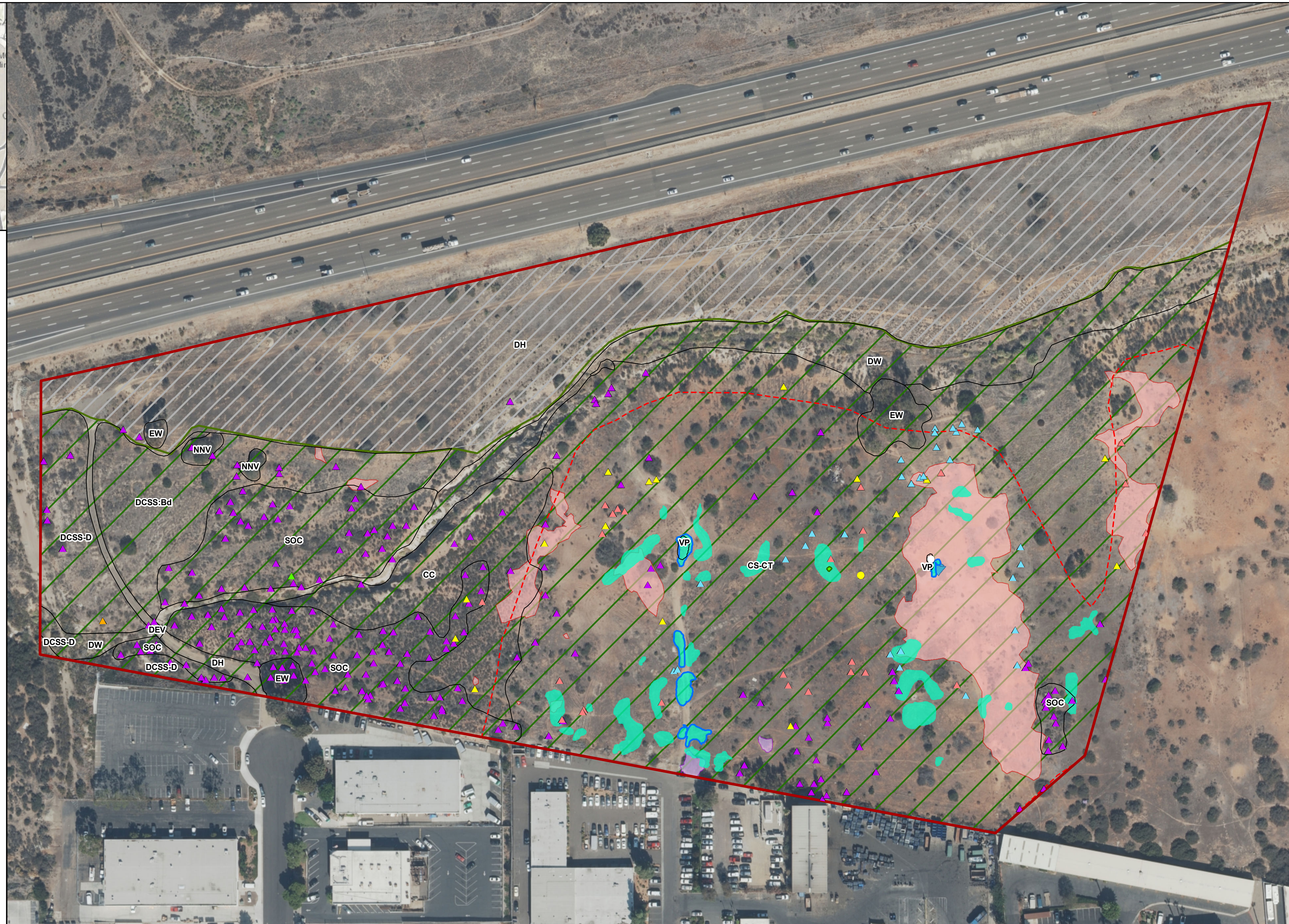
Senstive Species

- western spadefoot toad
- western spadefoot toad juveniles
- Orcutt's brodiaea (*Brodiaea orcuttii*)
- Long spined spineflower (*Chorizanthe polygonoides var. longispina*)
- San Diego barrel cactus (*Ferocactus viridescens*)
- Nuttall's scrub oak (*Quercus dumosa*)
- Ashy spike moss (*Selaginella cinerascens*)
- San Diego viguiera (*Viguiera laciniata*)
- Orcutt's brodiaea (*Brodiaea orcuttii*)
- Long spined spineflower (*Chorizanthe polygonoides var. longispina*)
- Nuttall's scrub oak (*Quercus dumosa*)
- San Diego mesa mint (*Pogogyne abramsii*)
- San Diego fairy shrimp (*Branchinecta sandiegonensis*)

Vegetation Communities/Land Cover Types

- CC, Chamise Chaparral
- CS-CT, Coastal Sage-Chaparral Transition
- DCSS-D, Diegan Coastal Sage Scrub-Disturbed
- DCSS:Bd, Diegan Coastal Sage Scrub: Baccharis-dominated
- DEV, Developed
- DH, Disturbed Habitat
- DW, Disturbed Wetland
- EW, Eucalyptus Woodland
- NNV, Non-Native Vegetation
- SOC, Scrub Oak Chaparral
- VP, Vernal Pool
- Maintained Engineered Landfill Surface

0 75 150 Feet



SOURCE: City of San Diego 2016, 2017; SanGIS; SANDAG

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FIGURE 5

Existing Site Conditions

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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2.4 Jurisdictional Status

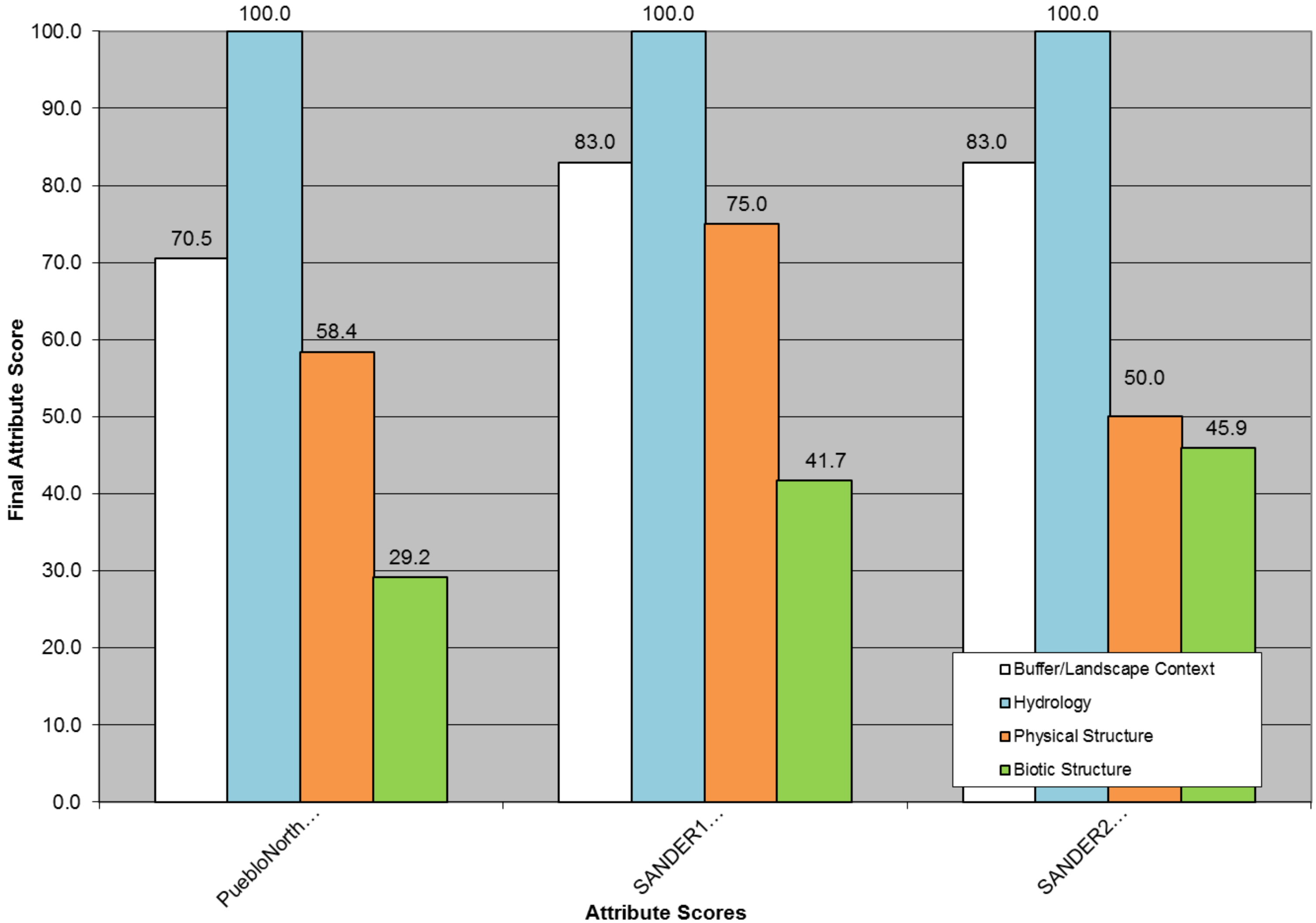
All vernal pools (0.38 acre) at the Pueblo North site have vernal pool indicator plant species present and therefore are considered jurisdictional City wetlands in accordance with the City's Biology Guidelines (Helix 2016; Dudek 2018a~~7b~~).

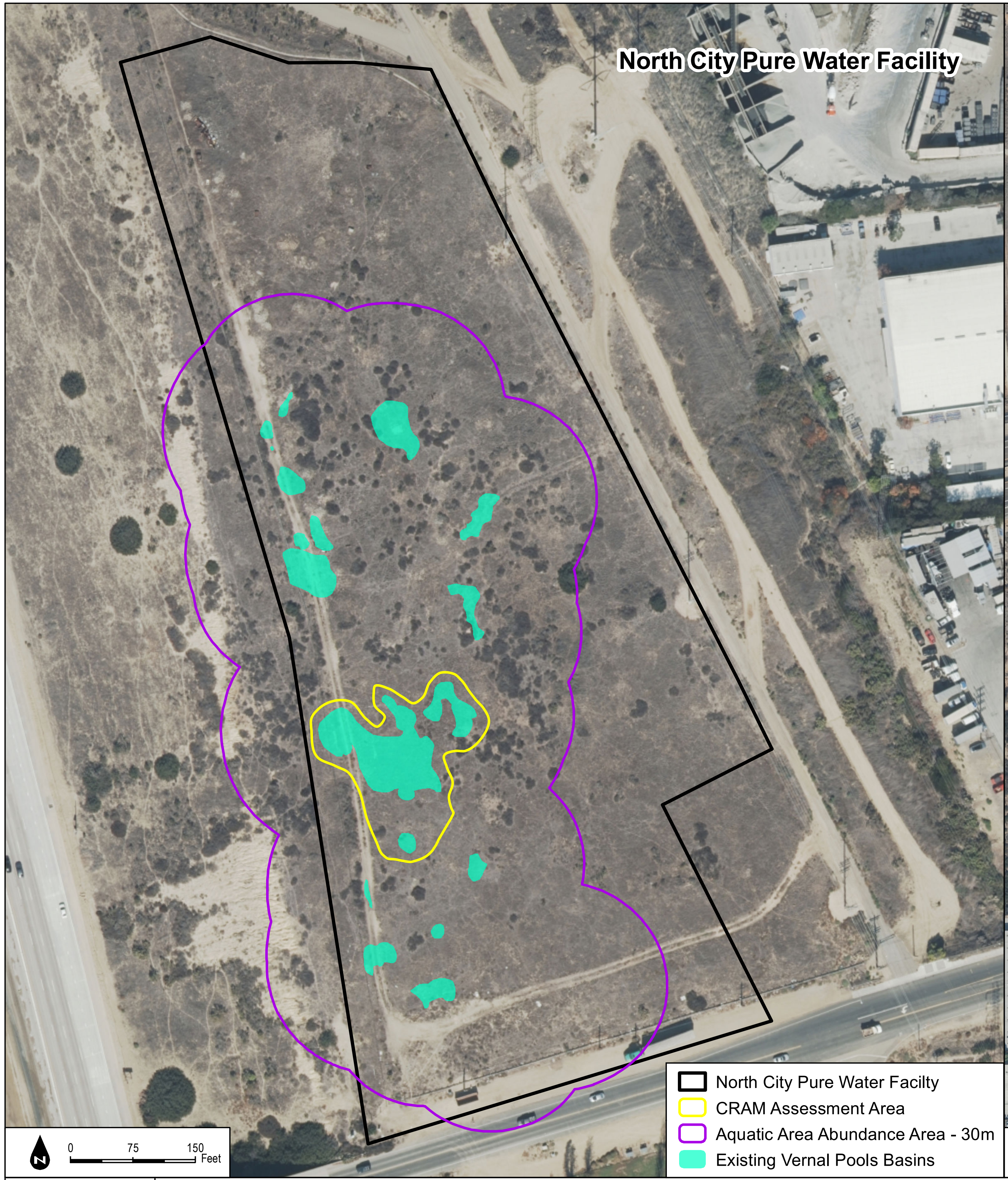
The vernal pools mapped at the Pueblo North site were determined by Helix to be isolated from navigable waters with no federal nexus that would allow these pools to be considered jurisdictional wetlands by the U.S. Army Corps of Engineers (ACOE) under the federal Clean Water Act (Helix 2016). The RWQCB may try to assert jurisdiction over the vernal pools as wetland waters of the state under the Porter-Cologne Act; however, these pools are small, isolated, and based on 2015/2016 and 2017 protocol-level surveys, contain limited biological value given that they do not support listed species (Helix 2016).

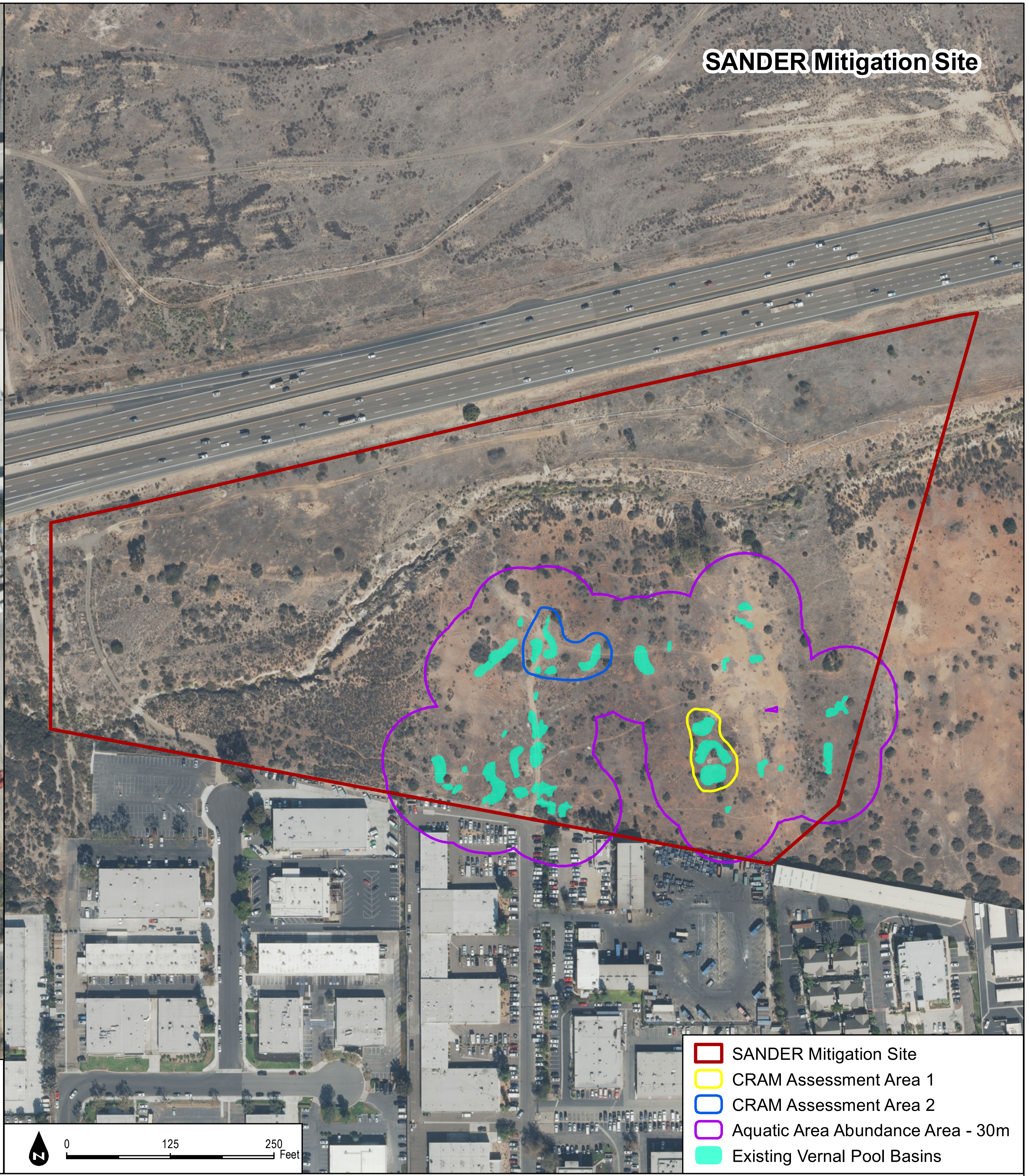
2.5 Functions and Services of Vernal Pool Resources at Pueblo North

The functions and services of the vernal pool resources at the Pueblo North site were evaluated using the most recent version California Rapid Assessment Method (CRAM) for Vernal Pool Systems, version 6.1 (California Wetlands Monitoring Workgroup, 2013). The assessment was conducted by Dudek biologists Jayme Timberlake and Stuart Fraser on April 26, 2017 (Appendix A) (Figure 6). The existing functions and services of the impact areas at Pueblo North were evaluated based on a combination of quantitative measures and qualitative evaluations defined by the CRAM protocols. The purpose of the CRAM assessment was to evaluate the existing functions and services of vernal pool aquatic resources within the impact footprint in order to facilitate a comparison of functions and services to the proposed mitigation site. A summary of the attribute scores from the CRAM assessment is provided in Table 5.

Table 5
Summary of CRAM Attribute Scores for Pueblo South and SANDER







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SOURCE: City of San Diego 2016, 2017; SANDAG

FIGURE 6

California Rapid Assessment Method (CRAM) Results

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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The site was characterized as disturbed due to the prevalence of non-native species, including Italian rye grass (*Festuca perennis*), foxtail barley (*Hordeum murinum*), and hyssop loosestrife (*Lythrum hyssopifolia*), as well as physical disturbance in the form of road ruts, trash, and debris. Vernal pools found at the Pueblo North site are disturbed, likely from past land use disturbances associated with construction of the Interstate 805 freeway (circa 1972; NETRonline 2017) and dirt roads. The mima mound topography that is typical in locations with properly functioning vernal pool ecosystems has been lost in portions of the site as evidence by historical aerial imagery (NETRonline 2017). While the site still supports natural vernal pool basins, there are also several basins that appear to have formed along compacted dirt roads. While these depressional areas have vernal pool indicator species present as a result of periodic inundation, they do not represent natural and highly functioning vernal pool ecosystems. Additionally, many of the vernal pools do not support a high diversity or density of vernal pool indicator species and are dominated by non-native plant species (Figure 7a). Consequently, the vernal pools at the Pueblo North site are of low ecological function. The vernal pool complex received an overall CRAM score of 65 out of a possible 100, with the lowest scores related to physical and biotic metrics, and relatively moderate to high scores for buffer and hydrology metrics (Appendix A).

2.6 Excess MHPA Mitigation Credits

Mitigation credits produced by the implementation of this Mitigation Plan at the SANDER site will exceed the amount required to mitigate the vernal pool and sensitive upland habitat impacts associated with the North City Project (Table 6) (Figures 8 and 9). These excess mitigation credits will be available through the MHPA process for future City projects. Additionally, the City may incorporate this project into the program for advanced permittee responsible mitigation for credits with the ACOE for aquatic habitat mitigation. This requires that this Mitigation Plan is reviewed and approved by ACOE in accordance with the Memorandum for the Record for Advance Permittee-Responsible Mitigation Related to City of San Diego Essential Public Works Projects within the County of San Diego, California (ACOE 2015).

Table 6
MHPA Mitigation Acreage Allocation for the Pure Water Project at the SANDER Mitigation Site

Vegetation Community/Land Cover	Subarea Plan Designation (Tier)	Within MHPA	Pre-Restoration Acres	Post-Restoration Acres	Mitigation Acreage Allocated for Pure Water Project by Impact Type				Unallocated Acreage
					NG	*DCSS*	*DCSS-D*	*NNG*	
Chamise Chaparral (CC)	IIIA	Yes	1.30	1.30	-	-	-	1.30	0.00
Coastal Sage-Chaparral Transition (CS-CT)	II	Yes	12.94	12.55	-	0.59	0.03	1.25	10.68
Diegan Coastal Sage Scrub (DCSS)	II	Yes	0.00	0.88	-	0.88	-	-	0.00
Diegan Coastal Sage Scrub: Baccharis-dominated (DCSS: Bd	II	Yes	1.25	1.25	-	1.25	-	-	0.00
Diegan Coastal Sage Scrub-Disturbed (DCSS-D)	II	Yes	0.82	0.00	-	-	-	-	0.00
Disturbed Wetland (DW)	IV	Yes	1.79	0.00	-	-	-	-	0.00
Eucalyptus Woodland (EW)	IV	Yes	0.29	0.00	-	-	-	-	0.00
Non-vegetated Channel (NVC)	Wetland	Yes	0.00	1.81	-	-	-	-	1.81
Non-native Vegetation (NNV)	IV	Yes	0.08	0.00	-	-	-	-	0.00
Scrub Oak Chaparral (SOC)	I	Yes	2.54	2.62	1.30	-	-	-	1.32
Vernal Pool (VP)	Wetland	Yes	0.57	1.17	-	-	-	-	1.17
Developed (DEV)	IV	Yes	0.01	0.01	-	-	-	-	0.01
Disturbed Habitat (DH)	IV	Yes	0.33	0.33	-	-	-	-	0.33
Totals	—	—	**21.92**	**21.92**	1.30	2.72	0.03	2.55	15.32

Photo 1: View looking north from the southwest corner towards VP14\Helix4

Photo 2: View looking north at VP18

Photo 3: View looking south at VP1/PW58

Photo 4: View looking west towards VP19

Photo 5: View looking east towards VP1/PW55

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FIGURE 7a

Representative Site Photographs - Pure Water Facility Impact Site

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Photo 1: View looking south towards Vernal Pool #7

Photo 2: View looking south towards Vernal Pool #8

Photo 3: View looking south towards Vernal Pool #14

Photo 4: View looking south towards Vernal Pool #19

Photo 5: View looking south towards Vernal Pool #26

Photo 6: View looking south towards Vernal Pool #32

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FIGURE 7b

Representative Site Photographs - SANDER Mitigation Site

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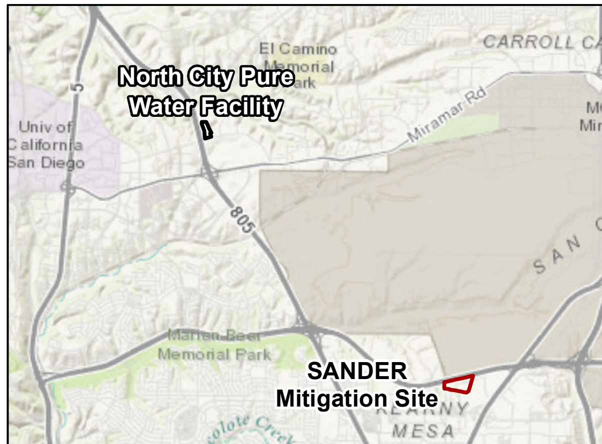

LEGEND

- North City Pure Water Facilty
- SANDER Mitigation Site
- Vernal Pool HCP Hardline (City of San Diego)
- MHPA Boundary
- Brush Management Zone

Vernal Pool Mitigation

- Re-establishment - 0.61 acre
- Rehabilitation - 0.26 acre
- Enhancement - 0.29 acre

Disturbance Areas

- Rubble (concrete and asphalt) - 0.28 acre
- Trash - 0.14 acre
- Invasive Plant Species - 1.13 acre
  - Acalon, Acacia
  - Caredu, Carpobrotus edulis
  - Corsel, Cortaderia selloana
  - Euc, Eucalyptus
  - Wasrob, Washingtonia robusta
- Dirt Roads/Trails

0 75 150 Feet

DUDEK

SOURCE: City of San Diego 2016, 2017; SanGIS; SANDAG

FIGURE 8

Site Disturbances and Invasive Plant Species

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DUDEK

SOURCE: City of San Diego 2016, 2017; SanGIS; SANDAG

FIGURE 9

Upland and Wetland Restoration and Enhancement

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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3 GOAL OF MITIGATION

The primary goal of the proposed mitigation for the North City Project is to compensate for the impacts to the native habitats located within the North City Project development footprint. Mitigation will occur through enhancement, restoration, and preservation of vernal pools and upland habitat, including the SANDER site vernal pool complex, which occurs within the ~~draft~~ final VPHCP hardline preserve (City of San Diego ~~2016~~2017). As components of the overall goal, this Mitigation Plan will provide guidance for enhancement and restoration of adjacent mima mounds and degraded upland vernal pool watershed habitat surrounding the vernal pools at the SANDER site.

3.1 Restoration Definitions

Restoration is a general term for the repair and rehabilitation of natural ecosystems. The ACOE has defined restoration as “the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource (ACOE 2008). The ACOE further subdivides the definition of restoration into two subcategories, including re-establishment and rehabilitation with the difference being the “returning” of natural/historic functions (re-establishment) or “repairing” of natural/historic functions (rehabilitation). For the purpose of this report, three categories of restoration activities are described, including re-establishment, rehabilitation, and enhancement. These terms are used herein to describe the following restoration activities:

- **Restoration—**general term to describe re-establishment and rehabilitation of vernal pools, as well as a term to describe restoring upland habitats through planting and/or seeding and weed control.
- **Re-establishment—**the return to a pre-existing condition through manipulation of the surface topography to support inundation and ponding for vernal pools. Re-establishment can consist of the conversion of a currently non-wetland habitat into wetland (or other aquatic) habitat. Note: in some instances, re-establishment may consist of establishing new vernal pools where they did not previously occur. However, restrictive or impermeable soils have to be present for vernal pools to function. Therefore, vernal pool re-establishment consists of the restoration of the characteristic vernal pool topography and associated habitat.
- **Rehabilitation—**the repair of an existing, degraded vernal pool through the manipulation of the surface topography. Rehabilitation in this Mitigation Plan is used to describe repairing vernal pools that have been damaged by vehicles (e.g., road ruts and depressions) or excavations. Rehabilitation may also include expanding the inundation area of a degraded vernal pool to improve overall ecological function of the vernal pool system.

- **Enhancement—**the improvement of ecological function through control of invasive plant species and planting of appropriate native plant species.

3.2 Types of Habitat to be Restored and Enhanced

This Mitigation Plan proposes restoration of disturbed areas within the SANDER site, including vernal pools and associated mima mounds, and degraded upland habitats. The restored habitat will consist of a mosaic of chaparral, coastal scrub, and wildflower habitat, typical of vernal pool complexes in the region. The mitigation area will include vernal pools (both existing and re-established), mima mounds, and upland habitats including coastal sage – chaparral transition, chamise chaparral, Diegan coastal sage scrub (including disturbed), disturbed wetland, and scrub oak chaparral.

Recent biological field work and topographic analysis have identified locations for re-establishment of some additional mima mounds and vernal pools within the SANDER site. The mesa has been previously disturbed (both vegetation and topography), and several areas that appear to have previously functioned as vernal pools and mima mounds are impaired and no longer functioning as such. These areas will be contoured to enhance the concave/convex attributes of vernal pool/mima mound topography. Surrounding topography will be left undisturbed. The herbaceous vegetation that currently exists is largely non-native and the intent of the Mitigation Plan is to enhance the surrounding habitat with the addition of native species. Habitat enhancement in the surrounding habitat areas will consist of weed control, native container plant installation, and native species seeding.

3.3 Functions and Services to be Restored

The degraded condition of the SANDER site is the result of previous vehicular access, sediment accumulation from erosion, and other prior site disturbances (e.g., landfill operations north of the channel). As a result of prior disturbances, the area is currently functioning well below capacity relative to historic conditions. Thus, the functions and services to be restored include those typical of a properly functioning vernal pool/mima mound complex. For example, this Mitigation Plan intends to improve the existing functions and services, including adding additional vernal pool and mima mound area through restoration, thereby increasing biological and hydrological functions and services, controlling non-native vegetation in and around the existing and restored vernal pools, protecting the area from future disturbance with exclusionary fencing, restoring the dirt road and trails that bisect the vernal pool complex to native habitat, and providing adaptive, long-term management to address the viability of the vernal pool complex in perpetuity.

A baseline assessment of functions and services was conducted in April 2017 (Appendix A). The functions and services of the vernal pool systems at the SANDER site are higher than the Pueblo North site (see Section 4.4). Additionally, this Mitigation Plan proposes to increase the functions and services at the SANDER site, as described in Section 8.1.

3.4 Time Lapse

It is likely that the restoration areas will require many years to approach the ultimate structure and composition of naturally occurring vernal pool habitat; however, within 5 years it is anticipated that the intended floral compositions for the restored pools should be established sufficiently to persist on their own under natural conditions. In addition, the hydrology anticipated to support the restored vernal pools should be similar to the hydrology of the existing vernal pools within the SANDER site and should not affect the functionality of the existing pools. By the end of the 5-year maintenance and monitoring period it should be apparent whether the restoration and enhancement effort is proceeding toward successful establishment of a viable vernal pool habitat.

The success criteria outlined in Section 8.0 herein, which are goals to be achieved during the 5-year monitoring period, represent an intermediate stage in the development of the vernal pool habitat. The target species composition and cover to be achieved during the 5-year period should provide an adequate foundation for the long-term development of the restored vernal pool habitat.

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4 EXISTING CONDITIONS OF PROPOSED VERNAL POOL AND UPLAND MITIGATION SITE

4.1 Site Selection and Location of Mitigation Area

As part of the planning for the North City Project, six distinct survey areas were assessed for biological resources, including the Pueblo North and the SANDER site (Helix 2016). The results of baseline condition surveys indicated that the SANDER site is suitable for off-site mitigation for vernal pools and associated upland habitats as the mitigation area includes an existing vernal pool complex. Existing conditions are documented in Figure 7b.

The SANDER site is located in the eastern portion of the USGS 7.5-minute series, La Jolla quadrangle (Figure 2). Elevations within the restoration site range from approximately 370 feet to 420 feet above mean sea level. The SANDER Site is approximately 29.84 acres in size. It is located on a gently sloping mesa that declines in elevation from east to west.

4.2 Soils

Soil type is a critical factor in the formation of vernal pools and must consist of a nearly impermeable surface or subsurface soil layers (U.S. Fish and Wildlife Service (USFWS) 1997). According to the USDA Web Soil Survey, soils within the SANDER site consist of Redding gravelly loam 2% to 9% slopes, and Redding gravelly loam 9 to 30% slopes (USDA 2017). The typical profile for the Redding gravelly loam soil type is gravelly loam (0-15 inches) and a transition from gravelly clay loam to gravelly clay (15-30 inches). At some point in the 15-30 inch depth, there is an abrupt textural change and the soil becomes indurated (e.g., duripan) (USDA 2017).

The existing vernal pools on the SANDER site and all proposed vernal pool mitigation locations occur within Redding gravely loam (2% to 9% slopes). Redding gravely loam (9% to 30% slopes) occurs within and directly adjacent to the drainage which runs within the northern section of the site. The soil type in the proposed vernal pool mitigation locations within the SANDER site is the same as that containing the vernal pools being impacted at Pueblo North (Redding gravely loam 2% to 9% slopes). It is also the same soil type as that found underlying the extensive vernal pool landscape to the north of the site on Miramar (Figure 4). This soil type is known to support vernal pools and certain rare plant species.

4.3 Jurisdictional Status

The vernal pools at the SANDER site were evaluated to determine jurisdictional status. The 37 vernal pools identified on site contain vernal pool indicator species, and therefore would be considered City jurisdictional aquatic resources. Additionally, the vernal pools were assumed to be ACOE jurisdictional wetlands based of the observation of ponding for greater than 14 days (wetland hydrology), ponding for a minimum length duration during the growing season (hydric soils), and the presence of vernal pool indicator species. There is a drainage channel within 100 feet to the north of the vernal pool complex that runs east to west that may also provide connectivity of surface flows to an ACOE-jurisdictional waterbody. The RWQCB would also likely assert jurisdiction over the vernal pools as wetland waters of the State under the Porter Cologne Act. Therefore, all 37 of the vernal pools are considered jurisdictional in the context of City, ACOE and RWQCB guidelines.

4.4 Existing Vernal Pool Functions at Mitigation Area

A condition assessment using CRAM was conducted by Dudek biologists Jayme Timberlake and Stuart Fraser on the vernal pool complex at the SANDER site on April 27th (Appendix A).

The site was characterized as disturbed due to excessive human visitation, trash, illegal dumping, road ruts, and the presence of non-native species, including red stemmed filaree (*Erodium cicutarium*), hyssop loosestrife, and rattail sixweeks grass (*Festuca myuros*). Two vernal pool complexes were evaluated, receiving an average CRAM score of 72.

The abundance of non-native plant species at the site is indicative of prior site disturbance. The vegetation is composed of a mosaic of patchy chaparral and non-native annual grassland. Non-native species are predominantly annuals, but include perennial species such as Sydney golden wattle (*Acacia longifolia*), and Hottentot fig (*Carpobrotus edulis*).

A dirt access road bisects the vernal pool complex at the SANDER site, which modifies the contiguity of vernal pools, mima mounds and their associated plant and wildlife resources. Additionally, dirt foot paths intersect much of the vernal pool topography within the site, and are an avenue of continued disturbance due to human occupation of the site. As a result of prior disturbances, the area is currently functioning well below capacity relative to historic conditions.

Vernal pools found at the SANDER site are remnants of historically naturally occurring vernal pools characteristic of the surrounding mesa, but have been disturbed over the long history of land use associated with unauthorized dumping, off-road activity, and homeless encampments. The mima mound topography that is typical in locations with properly functioning vernal pool ecosystems is erratic, and has been lost in portions of the site. While some portions of the site still support natural vernal pool basins, there are also several depressions that appear to have formed from site disturbances. Due to the underlying thick clay layer, which makes up the impermeable soil layer that creates vernal pools, disturbances such as road ruts and trails have created inundated areas that are functioning as vernal pools. Several of these depressional areas have vernal pool indicator species present as a result of periodic inundation. However, they do not represent natural and highly functioning vernal pool ecosystems. The vernal pools on the SANDER site are shallow and many do not pond water during less favorable rainfall years. Additionally, many of the vernal pools do not support a high diversity or density of vernal pool indicator species and are dominated by non-native plant species (Table 7). Consequently, the vernal pools at the SANDER site are of low to moderate ecological function. CRAM attribute scores for the vernal pools at the SANDER site are depicted in Table 5.

Table 7
Species Observed in Vernal Pools at SANDER Site

Pool	Vernal Pool Indicator Species											Fairy Shrimp
	Brodiaea orcuttii	*Crassula aquatica*	*Deschampsia danthonioides*	*Downingia cuspidata*	*Elatine brachysperma*	*Eleocharis macrostachya*	*Juncus bufonius*	*Lythrum hyssopifolium*	*Pogogyne abramsii*	*Psilocarphus brevissimus*	*Psilocarphus tenellus*	*Branchinecta sandiegonensis*
1					X			X		X	X	
2					X			X		X		
3					X		X	X				
4					X		X	X				
5					X		X	X		X		
6	X				X		X	X		X		
7	X		X		X		X	X		X	X	
8	X	X	X		X		X	X				X
9					X		X	X		X	X	
10					X		X	X				
11					X	X	X	X		X		X
12					X	X	X	X				X
13	X				X		X	X				
14					X		X	X				X
15								X				
16					X		X	X				
17		X			X		X			X	X	
18		X					X				X	
19			X		X		X	X		X	X	X
20		X	X		X		X	X		X	X	
21					X		X	X				

Table 7
Species Observed in Vernal Pools at SANDER Site

Pool	Vernal Pool Indicator Species											Fairy Shrimp
	Brodiaea orcuttii	*Crassula aquatica*	*Deschampsia danthonioides*	*Downingia cuspidata*	*Elatine brachysperma*	*Eleocharis macrostachya*	*Juncus bufonius*	*Lythrum hyssopifolium*	*Pogogyne abramsii*	*Psilocarphus brevissimus*	*Psilocarphus tenellus*	*Branchinecta sandiegonensis*
22					X		X	X				
23	X		X		X		X	X			X	
24	X		X	X	X			X	X	X	X	
25					X		X					
26	X		X		X		X	X		X		X
27			X		X		X			X		
28		X			X							
29		X			X		X			X		
30	X		X		X		X			X		
31			X		X		X	X				
32	X	X	X		X		X	X				
33					X		X					
34		X	X		X		X	X				
35		X	X		X					X		
36					X		X	X				
37							X	X				

4.5 Status of Existing Vegetation Communities

Existing vegetation communities and land cover types are summarized in Table 8. Overall, the general character of the native vegetation communities south of the channel is intact, but historic site disturbances from previous unauthorized dumping, off-road vehicular activity and homeless encampments have degraded portions of the habitats on site. The area to the north of the channel is a maintained engineered landfill surface with non-native vegetation growing on the surface. Additionally, the site supports several areas dominated by non-native species (e.g., eucalyptus, iceplant, pepper trees).

The wetland habitat associated with the channel is disturbed and supports patches of invasive Pampas grass (*Cortaderia selloana*), among other non-native species. Additionally, the downstream one-third of the channel is deeply incised and eroded with barren, steep banks. The wetland habitat provides limited functions and services in the current degraded condition.

Table 8
Existing Vegetation Communities at the SANDER site

Vegetation Community/Land Cover	Within VP HCP	Within MHPA	ACRES
Chamise Chaparral	No	Yes	1.17
Chamise Chaparral	Yes	Yes	0.13
Coastal Sage-Chaparral Transition	No	Yes	1.90
Coastal Sage-Chaparral Transition	Yes	Yes	11.04
Developed	No	Yes	0.01
Maintained Engineered Landfill Surface (Non-native vegetation)	No	No	7.92
Diegan Coastal Sage Scrub: Baccharis-dominated	No	Yes	1.25
Diegan Coastal Sage Scrub-Disturbed	No	Yes	0.82
Eucalyptus Woodland	No	No	0.03
Disturbed Habitat	No	Yes	0.33
Disturbed Wetland	No	Yes	1.79
Eucalyptus Woodland	No	Yes	0.21
Eucalyptus Woodland	Yes	Yes	0.08
Non-native Vegetation	No	Yes	0.08
Scrub Oak Chaparral	No	Yes	2.41
Scrub Oak Chaparral	Yes	Yes	0.13
Vernal Pool	No	Yes	0.57
TOTAL			**29.86**

4.6 Special-Status Species

Wet season fairy shrimp sampling at the SANDER site identified two pools containing San Diego fairy shrimp during the 2015-2016 wet season (Pools E19 and E26, or PW16 and PW25 per Helix 2016). Dry season sampling identified San Diego fairy shrimp cysts within the same two pools and in three additional pools (Pools E8, E11, E12, E14, or PW10, PW11, and PW13 per Helix 2016; University of Kansas 2017). San Diego fairy shrimp is a federally listed endangered species.

Western spadefoot toad (*Spea hammondii*) has been observed by Dudek as tadpoles and juveniles within the SANDER site. The western spadefoot toad is a California designated Species of Special Concern. This species currently does not have any federal listing status.

Six special-status plant species have been observed on site, including Orcutt's brodiaea (*Brodiaea orcuttii;* CRPR 1B.1), long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*; CRPR 1B.2), San Diego barrel cactus (*Ferocactus viridescens*; CRPR 2B.1), Nuttall's scrub oak (*Quercus nutallii*; CRPR 1B.1), ashy spike-moss (*Selaginella cinerascens*; CRPR 4.1), San Diego County Bahiopsis (*Bahiopsis laciniata*; CRPR 4.2) and San Diego mesa mint (*Pogogyne abramsii*; CRPR 1B.1, CE, FE). With the exception of San Diego mesa mint, each of these species was documented and mapped by Helix in 2016 (Helix 2016). A small cluster of San Diego mesa mint plants (12) were documented by Dudek within one vernal pool in April 2017 (Pool E24, Helix PW19).

4.7 Cultural Resources

Dudek conducted a cultural resources inventory for the SANDER site. The pedestrian survey of the SANDER site was conducted on April 17, 2017. The pedestrian survey did not identify any cultural or built-environment resources within the SANDER site (Dudek 2017ce).

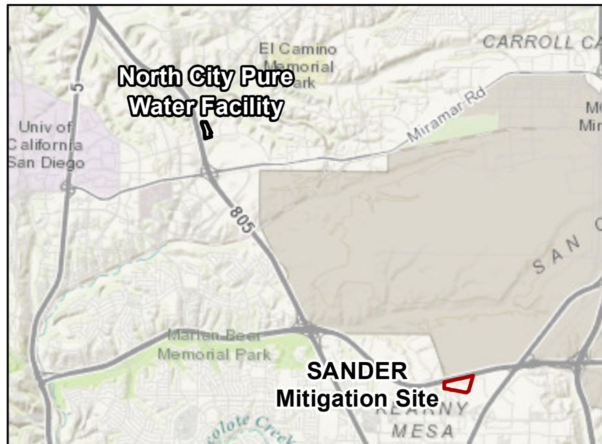
4.8 Existing and Proposed Uses of Mitigation Area

The mitigation area is currently in an unimproved state. Proposed use of the mitigation site will be for plant and wildlife habitat and as a preservation area for mima mound and vernal pools and adjacent upland habitat. The restored vernal pool area and adjacent upland habitat will be preserved and managed as part of the MHPA, consistent with the preservation of vernal pool resources and other natural habitats on site. The elimination and restoration of the road and foot paths, and the enhancement of upland vegetation surrounding the restored vernal pools will help provide an added buffer to the vernal pool habitat and will help eliminate future disturbance.

4.9 Vernal Pool Restoration Capacity

Vernal pool area required for mitigation totals to 0.75 acre, including 0.38 acre of re-establishment and 0.38 acre of rehabilitation and enhancement. Based on the configuration of areas targeted for vernal pool re-establishment, the SANDER site has a maximum capacity of approximately 0.61 acre of area for re-establishment, including expansion of some small degraded vernal pools (Figure 10). A total of approximately 0.26 acre of vernal pools are targeted for rehabilitation. Enhancement would occur at the remaining vernal pools, encompassing approximately 0.29 acre.

The combined area identified for potential vernal pool restoration includes areas that have a range of suitability, with some appearing to be ideal locations with excellent potential and others less ideal requiring more significant land surface modifications. This Mitigation Plan has designated all 0.86 acre for restoration (re-establishment and rehabilitation), acknowledging that not all basins may develop into high functioning vernal pools. However, the required acreage of vernal pool mitigation for the North City Project should be achieved, with excess acreage to be applied to future City projects.



LEGEND

- North City Pure Water Facilty
- SANDER Mitigation Site
- Vernal Pool HCP Hardline (City of San Diego)

Vernal Pool Mitigation

- Re-establishment - 0.61 acre
- Rehabilitation - 0.26 acre
- Enhancement - 0.29 acre
- Reference Vernal Pool

0 50 100 Feet

SOURCE: City of San Diego 2016, 2017; SanGIS; SANDAG

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FIGURE 10

Vernal Pool Mitigation Plan

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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5 IMPLEMENTATION PLAN

The following section describes the necessary implementation measures for restoring the intended habitat and implementing the intended restoration and enhancement program. Final grading plans for the mitigation area will be prepared at a later date, in coordination with the project biologist, in order to implement the biological intent outlined in this document. The project biologist/restoration specialist will supervise implementation of the mitigation and monitoring program.

5.1 Rationale for Expecting Implementation Success

The probability for successful restoration of vernal pools is increased when the pools to be restored are located near existing pools (USFWS 1997). The fact that the proposed vernal pool restoration locations are adjacent to, and within, existing vernal pool habitat, provides assurance that the locations are suitable, and also improves the likelihood that the appropriate vernal pool species will be able to persist at the mitigation site.

The vernal pools within the SANDER site vernal pool complex experience seasonal inundation for a long enough period to support vernal pool habitat (e.g., depressions with vernal pool plant indicator species). However, many of these vernal pools are degraded from anthropogenic disturbance, including road ruts. Repairing and enhancing degraded vernal pool habitat has a high likelihood of success due to the presence of suitable soil conditions, including an impermeable clay layer.

Currently, the locations designated for vernal pool re-establishment consist of insufficient depressions, or too much disturbance to currently support prolonged inundation to develop vernal pool conditions. Some of the locations are believed to have existed as functioning vernal pools in the past prior to site disturbance. While they are not currently functioning as vernal pools, but they are part of the historical vernal pool landscape which includes the overall topographic patterns of hummocks (mima mounds) and depressions on a soil type known to support vernal pools (Redding gravelly loam).

Through topographical modification (i.e., either mechanical and/or by hand), the drainage patterns within the restoration site will be altered sufficiently to help retain hydrologic input within the restored basins consistent with appropriate vernal pool topography. The hydrologic input to existing basins will not be significantly altered.

A 100-foot buffer from the edge of the vernal pool complex will also be enhanced through weed management and native seeding to help improve the adjacent upland habitat areas. Enhancement of this buffer area will help increase the success of the restored vernal pools by limiting the input of non-native plant propagules into the vernal pool complex. Enhancement of all additional areas will improve the biological function of the site and its value to wildlife.

Vernal pools are not homogenous throughout San Diego County due to differences in climate, topography and soils (USFWS 1997). Therefore, the native plant species composition of the surrounding vernal pool habitat will be used as the model for the restoration effort. Native seed and inoculum will be collected from donor pools at the SANDER site. The donor pools will be the highest functioning vernal pools within the complex of pools on site. Seed for the upland habitat enhancement will be collected from local sources within 25 miles of the coast. The use of local seed and inoculum improves the chances for successful restoration because the species are locally adapted to the conditions present at the site.

Implementation of the requirements of this Mitigation Plan will commence during the dry season (summer/fall) prior to, or concurrent with, the initiation of impacts for the North City Project (City of San Diego ~~2016~~2018). Implementation will be conducted under the direction of a qualified biologist, with at least three years of vernal pool restoration experience, approved by the City, CDFW and USFWS.

5.2 Preliminary Design Consideration and Site Modifications

Previous detailed mapping of the existing vernal pools within the SANDER site vernal pool complex was utilized to evaluate the existing spatial distribution of vernal pools and mima mounds within the target mitigation/restoration area (Figure 10). The general location and quantity of the potential vernal pool re-establishment and rehabilitation sites are based upon surveys of the area conducted in spring 2017 by Dudek habitat restoration specialists Andy Thomson and Jake Marcon. The site was evaluated relative to the mitigation needs for the North City Project and overall site potential.

To support the design concepts, Dudek evaluated the soil conditions, and more specifically, the depth to the restrictive layer by excavating small test pits and collecting soil density measurements with ground penetrating radar (GPR). Results of this analysis revealed that the depth to the restrictive layer is variable across the site, but generally present between zero and 18 inches below the surface. The restrictive layer is a dense gravelly clay overlain on a cobbly cemented conglomerate. The soils above the restrictive layer are primarily a sandy/gravelly loam texture. These findings are consistent with the Redding Cobbly loam soil description (USDA 2017).

The site encompasses sufficient area to support the intended restoration effort, and has adequate watershed area to support the additional vernal pool basins, without adversely affecting the existing vernal pools. Final vernal pool density is intended to mimic nearby vernal pool complexes at

Miramar Airforce Base. In accordance with the Vernal Pool HCP, re-established pools will not impact the watersheds of extant pools except as appropriate to establish hydrological connections between re-established and extant pools (City of San Diego ~~2016~~2017).

The preliminary plan view layout for the vernal pool restoration area is shown on Figure 10. This plan shows the locations of the proposed vernal pool restoration areas in relation to the existing pools in the SANDER site area. The exact locations, sizes, and shapes of the restored vernal pools will be further analyzed during the design phase. Photographs of the existing site conditions at the proposed vernal pool mitigation area are shown on Figure 7b.

Existing mima mounds between the proposed vernal pool restoration areas may be heightened with the excavated material from the basin bottoms. If not already present, new mima mounds may be created to frame the restored vernal pool locations and help develop micro-watershed catchments. An important design consideration for the mima mound alterations is the presence of existing native plant resources. If existing mima mound vegetation is largely native and undisturbed, it will be unmodified. Mima mounds with an abundance of non-native plants and exhibiting a disturbed character may be modified and revegetated with native species.

Figure 12 provides a typical schematic cross sectional view illustrating the relationship of the existing topography, vernal pool basin excavation, and new mima mound creation/modification. Figure 13 provides an example plan view layout for the proposed revegetation treatments for the modified or newly established mima mounds.

The initial site preparation work necessary to prepare the restoration area for the intended revegetation effort will include the removal of invasive plant and tree species and general weed control, removal of asphalt and concrete debris from the limits of the mitigation site, including the adjacent upland areas, and removal of trash and non-native debris piles. Disposal of these materials shall be at an acceptable off-site source or landfill facility. If determined appropriate by the project biologist, native perennials within the vernal pool and mima mound restoration areas (i.e., limits of disturbance), would be salvaged prior to grade modification and would later be transplanted into the improved upland mima mound and transitional upland areas.

Hydrological data of the restored vernal pool and mima mound area will be collected the winter following grading and will determine whether additional excavation or contouring may be necessary to attain the desired vernal pool hydrology.

5.3 Water Balance Study

Dudek reviewed the hydrological balance of the proposed re-established basins (R1-R28) and the existing basins (E1-E37). Dudek reviewed the watershed size compared to the basin size to calculate the ratio of watershed area to basin area. Data from this analysis is provided in Table 9 and depicted in Figure 11. A key outcome of the analysis was determination of the approximate watershed side for existing basins relative to the watershed size for the proposed re-established basins. The proposed re-established basins have ratios (watershed:basin) that range between 3.0 and 15.2. These ratios are comparable to the ratios calculated for existing, functioning basins, which ranged between 1.9 and 18.3. Based on this analysis, Dudek feels that the topographic and hydrologic characteristics of the proposed basins are similar to functioning basins on site and should be adequate to support the desired ponding.

Table 9
Watershed and Basin Ratios for Proposed and Existing Vernal Pools

	Re-established Vernal Pool Basins		Existing Vernal Pool Basins	
	Range	*Average*	*Range*	*Average*
Watershed size (square feet)	1,780 - 13,580	5,710	280 – 5,530	1,990
Basin area (square feet)	236 – 4,233	950	630 – 1,850	80
Watershed:Basin Ratio	3.0 - 15.2	7.2	1.9 – 18.3	4.3

5.4 Implementation Procedures (Sequence of Tasks)

Tasks:

1. Under the direction of the project biologist, the restoration contractor will collect vernal pool inoculum from the donor/reference pools at the SANDER site. Inoculum will not be collected from the impact site (Pueblo North) to avoid translocation of versatile fairy shrimp (*Branchinecta lindahli*). No more than 5% of the surface of each donor basin will be collected to a depth of no more than 1 inch. The collected soil from the donor pools will be combined to increase the diversity of species within the inoculum. The intent of mixing the inoculum soil is to promote the maximum diversity of vernal pool endemic species to be expressed in the restored pools. The soil from each basin will be stored individually in labeled boxes that are adequately ventilated and kept dry. During grading activities, the boxes will be temporarily stored off-site at an appropriate facility. The soil will be divided for inoculation based on the general size of the restoration pools. Thus, larger restoration pools will receive a greater quantity of crustacean inoculum soil than the smaller restoration pools. Inoculum will be spread only once pools are demonstrated to retain water for at least 21 to 28 days and they have been surveyed for versatile fairy shrimp to the satisfaction of the City, CDFW, and USFWS. Inoculum soil will be spread evenly, no more than 0.25 inch deep, across the deeper portions of each restored pool. If any ponded water is present at the time of soil inoculation, the soil will be placed outside of ponded areas.

2. Native seed collection from upland and vernal pool indicator species will be conducted at the mitigation site prior to any dethatching, clearing, or grading of the site. The collected seed will be cleaned, dried, and temporarily stored until site preparation and grading are complete. At that point, the seed will be used to revegetate the mitigation site or will be used to propagate plants in the greenhouse.
3. Native vegetation, within the limits of grading for the restored vernal pools will be salvaged and/or cut and mulched as deemed appropriate by the project biologist, for reuse within the restoration area.
4. The mitigation site will be weeded prior to grading to control non-native plant species. Following initial weeding, thatch and weed material will be removed and disposed of off-site. Weed management procedures will be continued on a monthly basis until deemed by the project biologist as being appropriately controlled for seeding.
5. Prior to any grading/excavation, temporary perimeter construction fencing and silt fencing will be installed around the perimeter of the existing vernal pools to prevent inadvertent disturbance and deposition of soil and dust within the existing vernal pools.
6. Excavate (mechanical and/or by hand) the re-establishment basins and restore adjacent mima mound topography. Contour the basins and mima mounds to have a natural form comparable to that of the existing basins and mima mounds on the SANDER site.
7. Contour the rehabilitation basins to remove road ruts and slightly deepen and shape vernal pools to develop a natural form.
8. Perform soil compaction analysis on restored pools and compare against existing pools. Soil compaction within the restored pool should be similar to the soil compaction within the existing pools (i.e., no more than a 5% variation).
9. After soil compaction analysis, it may be necessary to further compact the soil within the restored vernal pool basins to the appropriate level. Compact soil using a hand tamper or mechanical compactor. Subsequent soil compaction analyses should follow to verify that the appropriate compaction has been achieved.
10. Rip the dirt access road and foot paths within the mitigation area with the exception of the proposed vernal pool restoration sites. Rip the soils to at least a 12-inch depth to facilitate decompaction and revegetation.
11. Install drip irrigation system in uplands and on mima mounds designated for restoration and enhancement in accordance with the irrigation plans (to be prepared). The vernal pools will not be irrigated.

12. Install container plants in uplands and on mima mounds in accordance with the planting plans (to be prepared).
13. Apply native seed mix and container plants on newly restored mima mounds. Also, apply native seed mix within designated enhancement areas within the surrounding upland habitat.
14. Apply the salvaged vernal pool inoculum to the restored vernal pools.
15. Upon successful completion of the initial restoration phase, initiate biological monitoring and maintenance and continue for 5 years as described later in this Mitigation Plan.

Note: The actual dates for implementation of these tasks will be determined based on seasonal weather constraints and through coordination with the resource agencies. All restoration work involving soil manipulation shall be conducted during the dry season prior to the onset of the rainy season.

5.5 Topographic Reconstruction

The capacity to capture and store water has been compromised in locations proposed for vernal pool restoration. These areas will be contoured to enhance the attributes of vernal pool/mima mound topography. Surrounding topography will be left undisturbed. Topographic grading plans with 0.5-foot contours will be prepared for the vernal pool area as part of the final restoration construction document package.

Excavation (mechanical and/or hand) of the bottom of the vernal pool restoration areas will function to increase the water holding capacity of the individual basins. In addition, soil compaction analysis will be conducted on the existing pools and the restored pools to determine optimal soil conditions to facilitate long-term water retention to support the desired vernal pool habitat. In order to restore the water holding capacity of the restored pools to that of the existing pools, the soils within the restored pool may need to be compacted in order to match the soil compaction within the existing pools.

A qualified biologist/habitat restoration specialist will supervise the restoration grading activities. Grading of the restoration site will be conducted during the summer and early fall in order to minimize soil disturbance during the rainy season when vernal pools fill with water. The grading plans will identify the limits of grading, as well as those areas of existing habitat that are not to be impacted by the restoration activities and that would be protected/preserved.

SOURCE: City of San Diego 2016, 2017; SanGIS; SANDAG

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FIGURE 11

Vernal Pool Watersheds - Water Balance Results

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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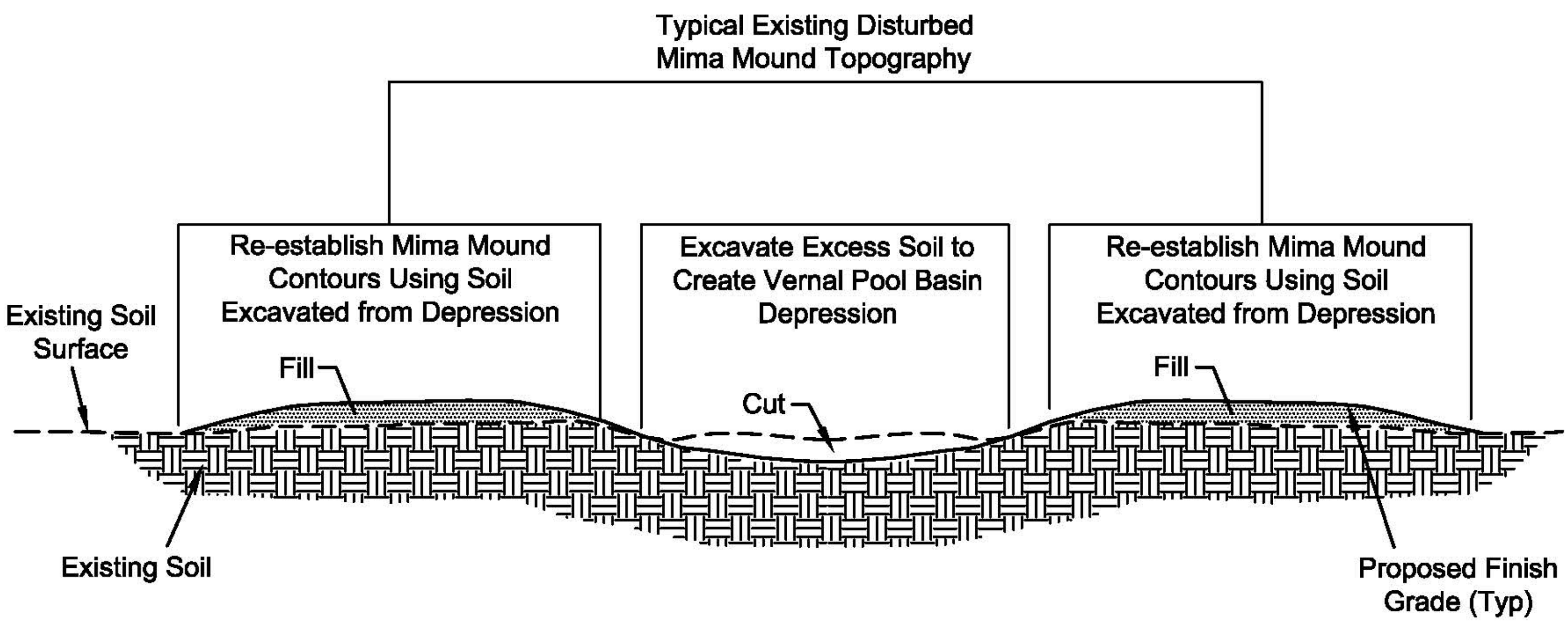

NOTE:
1. Height of mima mound fill soil will be directly proportional to the depth & area of excavation.

No Scale

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FIGURE 12
Section of Typical Vernal Pool and Mima Mound Grading

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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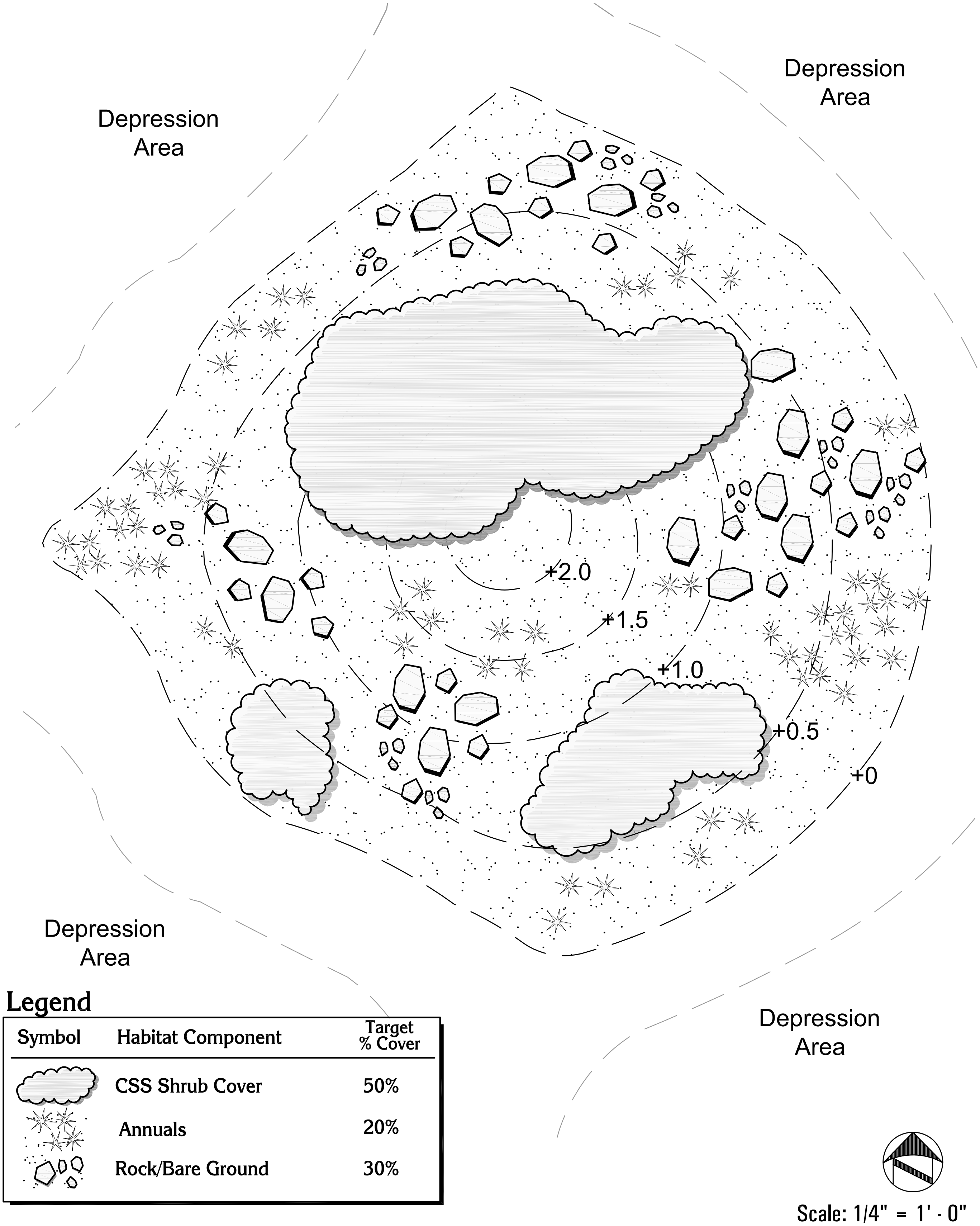

FIGURE 13
Mima Mound Habitat Example

SANDER Vernal Pool and Upland Mitigation Plan for the North City Project

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Spadefoot toad tadpoles have been observed within one of the vernal pools on site, and juvenile spadefoot toads have been observed in adjacent uplands. Adult spadefoot toads burrow within friable soils where they stay for much of the year, emerging to breed after significant rainfall events. A preconstruction survey during an appropriate time in the winter prior to soil disturbance shall be conducted, and any spadefoot toads shall be removed from the project area. The perimeter of the work area shall be delineated with exclusion fencing (e.g., trenched silt fence) to prevent spadefoot from re-entering the work area during grading. The exclusion fencing shall be maintained until construction begins and through the duration of the construction period.

Vernal pool restoration areas shall be defined by temporary markers (staking, flagging, silt fencing, etc.) prior to initiation of the grading activities. Silt fencing will be installed around the perimeter of adjacent existing vernal pools during construction and during the weed control procedures, to help protect the pools from wind-blown seed invasion and siltation. The silt fencing will be removed after all initial weed control and installation procedures are complete.

5.6 Fencing and Signage

In accordance with the City's VPHCP, site-appropriate fencing and access controls will be installed to protect the resources on site. Exclusionary fencing will be installed and maintained, beginning with the commencement of grading to ensure the exclusion of disturbances including off-road vehicles, foot traffic, and/or mountain bikes through the mitigation area. Key locations for exclusionary fencing are on the southern and western borders. The fencing will consist of chain link fencing with gated access points. No vehicular access will be allowed through the mitigation area after completion of restoration work, with the exception of the authorized access road for landfill maintenance activities on the western side of the site.

Steel signs (12 inches × 18 inches) indicating that the area is an ecological preserve and that habitat restoration is in progress, with no trespassing allowed, will be attached to the fencing at 200-foot intervals along the fence. Penalties for trespassing will also be cited on the signs. Signage text will be provided in both Spanish and English. The project biologist shall provide the final wording for the signs, in coordination with the City.

If problems are identified, recommendations for repair or replacement will be made and implemented (e.g., replacement of locks, gates, signs, or fence repairs).

5.7 Final Landscape and Revegetation Plans

A final set of landscape construction documents including a grading plan, irrigation plan, planting plan, and details and specifications acceptable for bidding and construction shall be prepared by a registered landscape architect with experience designing vernal pool restoration projects. The final plans shall be submitted to the City and resource agencies prior to implementation of the mitigation program. Implementation of the landscape construction documents must be coordinated among the resource agencies, City, project biologist, landscape architect, landscape contractor, and plant material suppliers.

The contracting nursery and seed collectors should be given the maximum possible lead time (i.e., no less than 12 months prior to actual seed application) to salvage, collect seed, store and to prepare plant material for the project in order to assure availability and minimize cost. No more than 5% of seed shall be collected from plants that will be undisturbed. In areas that will be disturbed due to proposed restoration activities (e.g., restored vernal pools and associated mima mound locations), 100% of native seed may be collected. Field coordination shall be provided by the revegetation specialist or project biologist to verify the sources for plant material propagation and for construction of the restoration areas. Coordination also will be essential for successful salvage, storage, and eventual replanting of salvaged native plant materials.

The selection of species to be planted at the SANDER site is based on the known native plant species currently present within the site as well as native species expected on site based on the site location. Species to be planted in the restored upland areas are shown on Table 10. Species to be seeded in vernal pool – upland transition areas and upland enhancement areas are shown in Tables 11 and 12. Species to be seeded in vernal pools are shown in Table 13.

Inoculum from the SANDER site donor vernal pools will be collected for redistribution within the restored vernal pools when the grading and contouring of the restored basins is complete. The inoculum is expected to contain propagules of vernal pool endemic plant species, as well as fairy shrimp cysts and other crustaceans. If initial seed collections and inoculum are not sufficient to develop the target vernal pool flora, seed collection from native vernal pool indicator species and seed bulking programs may be implemented as an adaptive management measure. All seed collection from existing vernal pools should be overseen by a qualified biologist or habitat restoration specialist to ensure the collection of appropriate desirable species.

Planting at the site will be accomplished during the late fall of the implementation year prior to winter rainfall. Any native plant material salvaged prior to grading will be transplanted onto the new mima mounds and adjacent uplands. Organic mulch shall be used around all salvaged/relocated plant material. The new and enhanced mima mounds will be seeded with seed collected from local sources within 25 miles of the coast (southwest San Diego County). The species list was compiled based on the composition of existing pools and adjacent native upland vegetation. Seeding, planting, and inoculum distribution should be timed to take advantage of seasonal rainfall patterns and should be performed ideally between November 1 and January 1.

A seed supplier specializing in native species, such as S&S Seeds in Carpinteria, or an approved equal, should be contracted with to collect, store, and supply the necessary seed. The City or the designated restoration contractor shall make these arrangements a minimum of 12 months prior to actual implementation.

Table 10
Upland Species to be Planted in Upland Restoration Areas

Botanical Name	Common Name	Container Size	Spacing	Quantity per acre*
Adenostoma fasciculata	Chamise	1 gallon	5	87
Artemisia californica	California sage brush	1 gallon	4	54
Bahiopsis laciniata	San Diego sunflower	1 gallon	4	54
Ceanothus tomentosus	Chaparral lilac	1 gallon	5	35
Cneoridium dumosum	Spice bush	1 gallon	4	54
Eriodictyon crassifolium	Hairy-leaf yerba santa	1 gallon	5	52
Eriogonum fasciculatum	California buckwheat	1 gallon	4	136
Heteromeles arbutifolia	Toyon	1 gallon	6	36
Isocoma menziesii	Coast goldenbush	1 gallon	4	136
Isomeris arborea	Bladderpod	1 gallon	4	27
Lessingia filaginifolia	sand aster	1 gallon	2	218
Lonicera subspicata	Honeysuckle	1 gallon	5	17
Malosma laurina	Laurel sumac	1 gallon	6	61
Mirabilis californica	Wishbone bush	1 gallon	3	48
Quercus dumosa	Nuttall's scrub oak	1 gallon	6	73
Rhamnus crocea	Spiny redberry	1 gallon	5	35
Rhus integrifolia	Lemonade-berry	1 gallon	6	73
Salvia mellifera	black sage	1 gallon	4	109
Xylococcus bicolor	Mission manzanita	1 gallon	5	35
Yucca schidigera	Mohave yucca	1 gallon	4	27
			Total	**1369**

* **Note:** the specified spacing and quantity of plants per acre is estimated to account for approximately 60% shrub cover on average. The remaining cover would consist of annual species and bare ground.

Table 11
Species to be Seeded in Upland Restoration Areas

Botanical Name	Common Name	Purity (%)	Germination (%)	Pure Live Seed	lbs/acre
Acmispon glaber	deerweed	95	80	76	1
Croton setiger	doveweed	90	80	72	1
Cryptantha intermedia	common cryptantha	10	50	5	4
Deinandra fasciculata	fascicled tarplant	10	25	3	1
Eriophyllum confertiflorum	golden yarrow	36	62	22	1

Table 11
Species to be Seeded in Upland Restoration Areas

Botanical Name	Common Name	Purity (%)	Germination (%)	Pure Live Seed	lbs/acre
Festuca microstachys var. *microstachys*	small fescue	90	80	72	2
Lupinus bicolor	pygmy lupine	98	80	78	3
Navarretia hamata	hooked stinkweed	NI	NI	NI	1
Plantago erecta	dot-seed plantain	97	89	86	4
Salvia columbariae	chia	90	60	54	2
Sisyrinchium bellum	blue-eyed grass	95	75	71	3
Stipa pulchra	purple needlegrass	70	60	42	6
Total Cost/Acre					**29**

Table 12
Diegan Coastal Sage Scrub Seed Mix for Upland Enhancement Areas

Botanical Name	Common Name	Purity (%)	Germination (%)	Pure Live Seed	lbs/acre
Artemisia californica	California sagebrush	15	50	7.5	1
Baccharis pilularis	chaparral broom	5	40	2	0.5
Bahiopsis laciniata	San Diego sun flower	40	50	20	1
Eriogonum fasciculatum	California buckwheat	10	65	6.5	4
Eriophyllum confertifolium	golden yarrow	30	50	15	0.5
Eschscholzia californica	California poppy	98	75	73.5	1
Festuca microstachys	small fescue	90	80	72	1
Gnaphalium californicum	California everlasting	10	25	2.5	0.2
Hazardia squarrosa	sawtooth goldenbush	10	20	2	4
Helianthemum scoparium	rock rushrose	95	60	57	0.4
Lasthenia californica	California goldfields	50	60	30	0.4
Lessingia filaginifolia	sand aster	2	4	0.08	2
Lotus scoparius	deerweed	95	40	38	1
Lupinus bicolor	pygmy lupine	98	80	78.4	1
Malosma laurina	laurel sumac	95	60	57	2
Mimulus aurantiacus puniceus	sticky monkeyflower	2	60	1.2	1
Mirabilis californica	California wishbone bush	80	70	56	1
Plantago erecta	dot seed plantain	98	75	73.5	1
Rhus integrifolia	lemonade berry	90	60	54	3
Salvia apiana	white sage	70	30	21	1
Salvia mellifera	black sage	70	50	35	2
Stipa pulchra	purple needlegrass	70	60	42	6
Total					**35**

Note: The Diegan coastal sage scrub seed palette will be used in locations of upland enhancement within existing Diegan coastal sage scrub habitat.

Table 13
Vernal Pool Seed Mix

Botanical Name	Common Name	lbs/acre**
*Callitriche marginata**	water starwort	1.0
Crassula aquatica	common pygmy-weed	0.5
Deschampsia danthonioides	graceful hairgrass	4.0
Downingia cuspidata	toothed downingia	1.0
Elatine brachysperma	waterwort	1.0
*Eleocharis macrostachya**	pale spikerush	0.5
Eryngium aristulatum var. *parishii**	San Diego button celery	1.0
Juncus bufonius	toadrush	0.1
Plantago elongata (=bigelovii)	vernal pool plantain	0.5
Pogogyne abramsii	San Diego mesa mint	0.5
Psilocarphus brevissimus	woolly marbles	2.0
Psilocarphus tenellus	slender woolly marbles	1.0
Spergularia marina	sand spurrey	0.5
Total		**13.6**

Notes:
* These species were not observed on site, but occur in the vicinity and would be appropriate for the site if a nearby seed collection source can be identified.
** Seed from vernal pool species will be collected locally and opportunistically. Therefore seed purity and germination percent will not be determined for these species. Additionally, the recommended pounds per acre should only be used as a guide, as not all of these species or quantities may be available on site or at approved locations nearby.

5.8 As-Built Conditions

An initial completion report documenting as-built conditions will be submitted to the City within 6 weeks of completion of the installation. The report will include a marked-up duplicate copy of the planting plan drawing showing the final configuration of the restoration area. Photographs also will be included to document the final "as-built" field conditions. A final GPS map showing the final boundaries of all restoration areas shall also be provided. This map would also be used as a reference figure during the long-term maintenance and monitoring period.

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6 MAINTENANCE DURING MONITORING PERIOD

The purpose of the maintenance program is to provide guidelines for maintenance of the restored habitats during an initial 120-day plant establishment period and then throughout the 5-year maintenance and monitoring period. Because the goal of the restoration program is to create a natural system that can ultimately support itself with minimal maintenance, the primary effort of the maintenance program is concentrated in the first few seasons of growth to control non-native plant species and to help the desired species become established. Maintenance will focus initially on addressing remedial measures to help achieve the success standards. Maintenance of the fencing and signage on the perimeter of the site will be required throughout the 5-year maintenance period.

6.1 Maintenance Activities

Non-native plant species are common within the proposed restoration area. The predominant maintenance work effort will be related to management and control of non-native plant species. Weed control efforts will include a combination of physical removal, and/or herbicide applications where appropriate and legal according to herbicide restrictions. Any weeding within or adjacent to vernal pools will be performed by hand. Any herbicide use shall be under the direction of a licensed pest control advisor, applied by a licensed applicator, and coordinated with the project biologist to ensure that vernal pools and desirable vegetation is not inadvertently damaged from herbicide overspray. Herbicide use shall be restricted in vernal pools.

The non-native plant species within Table 14 are documented at the SANDER site (see Tables 1 and 6). All of non-native species documented in existing vernal pools are annuals; therefore, effective control will rely on minimizing seed production. Many of these species are ubiquitous, and complete control will not be feasible (e.g., filaree, rattail fescue). Further, some of these species may not pose a considerable threat to the establishment and successful function of the vernal pool and mima mound habitat (e.g., narrow-leaf cottonrose [*Logfia galica*]). While maintenance efforts will attempt to address all non-native species, the focus of the weed control efforts shall be on those species that present the greatest threat to the success of the project. Those species include those listed on the California Invasive Plant Council's (Cal-IPC) California Invasive Plant Inventory Database (Cal-IPC 2017) that have a moderate to high rating for threat to natural lands (Table 14).

Weed control efforts should be conducted early in the growing season prior to seed set and dispersal. Thus, the maintenance visits will be closely spaced during the winter and early spring when the annual weed species are developing seed. Weed control efforts will likely be minimal in summer and fall when the annual weeds have died.

Any rodent infestations (i.e., squirrels, gophers, etc.) which impact the mima mound vernal pool habitat should be controlled using acceptable pest management methods, as recommended by a Pest Control Advisor.

The fencing and signage will be checked and repaired as necessary, and any trash and debris present in the mitigation area will be removed on a quarterly basis.

Table 14
Non-native Plant Species Documented at the SANDER Site

Scientific Name	Common Name	Cal-IPC Rating
Carpobrotus edulis	Hottentot fig	High
Dittrichia graveolens	Stinkwort	Moderate
Festuca myuros	Rattail sixweeks grass	Moderate
Bromus hordeaceus	Soft chess brome	Limited
Erodium cicutarium	red stemmed filaree	Limited
Hypochaeris glabra	Smooth cat's ear	Limited
Lythrum hyssopifolium	Hyssop loosestrife	Limited
Polypogon monspeliensis	Annual beard grass	Limited
Eucalyptus camaldulensis	River gum	Limited
Acacia longifolia	Sydney golden wattle	Not Listed
Bromus madritensis	Foxtail brome	Not Listed
Logfia gallica	Narrowleaf cottonrose	Not Listed

6.2 Responsible Parties

The City is responsible for initiating and funding all maintenance and monitoring requirements during the 5-year program. They shall be responsible for hiring a qualified landscape maintenance contractor to carry out all maintenance work and for hiring a qualified biological monitor to carry out the monitoring program for the duration of the 5-year period.

6.3 Schedule

Maintenance activities described above will be conducted monthly during the initial 120-day plant establishment period and then a minimum of four times per year thereafter for the remainder of the 5-year maintenance and monitoring period as necessary to achieve the success criteria. Maintenance visits will be timed to be conducted during the most productive and effective time of year for weed control (e.g., winter and early spring).

7 MONITORING PLAN

The following monitoring methods shall be implemented as part of the long-term biological monitoring program.

7.1 Reference Vernal Pools

Restored pools at the mitigation site will be inoculated for plants and possibly fairy shrimp cysts with soil from the five reference pools within the site (Figure 10). Reference pools were selected based on a number of factors including presence of vernal pool indicator plants, potential presence of San Diego fairy shrimp (six pools have been documented to support San Diego fairy shrimp), comparable size relative to restored pools, and minimal evidence of disturbance. Monitoring will include evaluating the reference pools as well as restored pools for comparison.

7.2 Qualitative Monitoring

Qualitative monitoring of vernal pools and associated upland habitats will consist of general site assessments, inspection of vegetation health and establishment, special status wildlife use, and documentation of disturbance. Qualitative monitoring will occur every two weeks during the 120 day establishment period, monthly during the growing season (approximately February through June) and quarterly during the dormant season of the first and second year. Qualitative monitoring will occur quarterly in years 3 through 5.

Site assessments will include photo documentation from permanent photo documentation stations. Permanent photo documentation stations will be located at the reference pools and all restored (re-established and rehabilitated) pools. Color photographs will be taken throughout the five year monitoring period to record establishment in accordance with the following schedule:

- Prior to planting/seeding
- Immediately after planting/seeding
- After the first heavy rain leading to vernal pool ponding/inundation
- Once annually during the flowering period of vernal pool indicator species

These photographs will be included in the annual reports.

Qualitative monitoring will also produce maintenance recommendations for the restoration contractor. Maintenance notes should include the health of container plants, status of seed mix establishment, status of ponding, pest problems, erosion issues, disturbance, and non-native species occurrence. The results of qualitative monitoring events and relevant maintenance observations and/or recommendations will be recorded in a site observation report, and distributed to the City and the approved maintenance contractor. All significant observations will be included in the annual monitoring report.

7.3 Quantitative Monitoring

Quantitative monitoring will be used to assess vegetation establishment within the restored vernal pools and uplands, as well as the hydrologic function of the restored vernal pools.

7.3.1 Vernal Pools

Species richness, presence of indicator species, and cover of native and non-native plant species will be monitored within the reference and restored pools on an annual basis. Each pool will be assigned a unique code, marked in the field, and mapped using a GPS unit. Permanent transects will be established within each restored vernal pool, extending from one end to the other and passing through the deepest section. Quadrats will be placed every other meter along each transect to estimate percent cover by species to the nearest 5%.

7.3.2 Upland Areas

Point intercept transects will be used to collect species richness, and cover of native and non-native plant species. Ten transects measuring 25-meters in length will be randomly placed throughout the upland restoration and enhancement areas. Transects will be permanently marked in the field using t-posts or rebar stakes, and their endpoints will be recorded using a GPS. All species occurring within a 4-meter species richness belt, 2 meters on either side of the transect tape, will be recorded for inclusion in species richness data. Native cover, non-native cover, and species richness will be calculated for upland areas.

7.3.3 Hydrology

A battery operated electronic rain gauge shall be installed on site to derive local precipitation data. Additionally, precipitation measurements will be determined from the closest reliable regional location to verify on-site results. The precipitation levels for each season shall be calculated on an annual basis from October 1 through September 30. Daily precipitation measurements shall be collected and recorded in a project database.

Depth, duration, and frequency of inundation will be monitored within a representative sample of at least five of the existing pools (reference pools) and compared with the restored and enhanced pools. The five reference pools and the restored pools will be mapped with a GPS unit to determine the extent of potential water inundation. In addition, a depth gauge will be temporarily installed at the lowest elevation of the reference pools and restored pools to measure maximum retained water depth. The gauge will be marked so that water depth can be read from the pool edge. Within 48 hours of each rainfall event of more than 0.5 inch, the pool water depth will be recorded, unless additional rainfall occurs within the 48-hour period. While the basins are inundated, the water depth will be recorded weekly until the pools dry-out. Measurement instruments (e.g., thermochron iButtons) may be used to supplement physical site visits and water inundation data collection.

Each year a water-depth versus time graph will be prepared for each of the reference pools and the restored pools. This should provide an adequate comparison regarding the hydrological functioning of the existing and restored pools and provide an average of the period of typical inundation.

7.4 Adaptive Management

If annual goals are not being met, or the project biologist observes that some aspect of the mitigation program requires attention, adaptive measures will be implemented by the restoration contractor. Adaptive measures for vernal pool restoration may include but are not limited to: collecting and adding additional vernal pool soil inoculum, recontouring of non-functioning pools, improving weed control execution, and re-seeding or replanting. Any adaptive measures with potential impacts to vernal pools (i.e., recontouring) must be approved by the resource agencies prior to implementation. Adaptive measures not requiring agency approval shall be implemented immediately and no later than 60-days of the recommendation by the project biologist.

7.5 Annual Reports

Annual reports will include information regarding all persons involved in the collection of data and the preparation of the reports. The report shall include a copy of all pertinent permits which may be required, including any special conditions and/or modifications. The reports will contain analysis of all monitoring data relative to success criteria, photos from permanent photo points, and GPS maps/figures showing the mitigation site. The annual reports will be prepared by the August of each monitoring year, so there is adequate lead time to implement remedial recommendation prior to the next growing season.

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8 FINAL SUCCESS CRITERIA AND PERFORMANCE STANDARDS

The final success criteria and interim performance standards outlined herein will be used to determine fulfillment of the project's mitigation obligations. Fulfillment of these criteria and standards should help demonstrate that the mitigation area is progressing toward the habitat types, functions, and values that constitute the long-term goals of the mitigation effort. Specific performance standards are outlined in Section 8.4. The mitigation area will become part of the City MSCP's MHPA, and be managed pursuant to the guidelines therein.

8.1 Target Habitat Functions

The goal of the restoration and enhancement effort is to create self-sustaining vernal pool and associated upland habitat which exhibits improved functions and services compared to the existing vernal pools and upland habitat at the SANDER site. The mitigation program intends to restore habitat with appropriate topography and vernal pool hydrology to support the intended vernal pool target species, as well as appropriate upland species. Measurement of the improved functions and services will be completed using CRAM.

Target function and services are provided in Table 15. In the context of CRAM scores, preservation of the existing vernal pools at the SANDER site without restoration and enhancement would result in a gain in functions and services of approximately 7.8 points. Implementation of the restoration and enhancement as proposed in this Mitigation Plan would result in an additional gain in functions and services of approximately 8.6 points, for a combined increase of 16.4 points (from an index score at the impact site of 64.5 to an average index score at the mitigation site of 80.9). The majority of the gain in functions and services is in the biotic structure metric, where there is expected to be a substantial improvement of endemic species richness, percent non-native species, and interspersion/zonation.

Table 15
CRAM Data Summary and Vernal Pool Target Functions and Services

CRAM Metrics	Baseline Scores				Functional Gain (Impact to Preservation)	Target Scores - Post-Restoration	Functional Lift (Baseline to Restoration)
	PuebloNorth (Impact Site)	*SANDER1 (Mitigation Site)*	*SANDER2 (Mitigation Site)*	*SANDER-Average*	*ImpactDelta*	*SANDER-Target Scores*	*RestorationDelta*
Buffer & Landscape Context							
Aquatic Area Abundance	9	12	12	12	3	12	0
Percent AA with Buffer	12	12	12	12	0	12	0
Average Buffer Width	9	9	9	9	0	9	0
Buffer Condition	6	6	6	6	0	9	3
Raw Score	**16.9**	**19.9**	**19.9**	**19.9**	**3.0**	**21.7**	**1.8**
Final Score	**70.5**	**83.0**	**83.0**	**83.0**	**12.5**	**90.3**	**7.3**
Hydrology							
Water Source	12	12	12	12	0	12	0
Hydroperiod/Stability	12	12	12	12	0	12	0
Hydrologic Connectivity	12	12	12	12	0	12	0
Raw Score	**36.0**	**36.0**	**36.0**	**36.0**	**0.0**	**36.0**	**0.0**
Final Score	**100.0**	**100.0**	**100.0**	**100.0**	**0.0**	**100.0**	**0.0**
Physical Structure							
Patch Richness	3	9	6	7.5	4.5	9	1.5
Pool and Swale Density	12	12	6	9	-3	9	0
Topographic Complexity	6	6	6	6	0	6	0
Raw Score	**21.0**	**27.0**	**18.0**	**22.5**	**1.5**	**24.0**	**1.5**
Final Score	**58.4**	**75.0**	**50.0**	**62.5**	**4.1**	**66.7**	**4.2**
Biotic Structure							
Number of Co-dominant species	6	6	6	6	0	6	0
Percent Non-native	3	3	6	4.5	1.5	9	4.5

Table 15
CRAM Data Summary and Vernal Pool Target Functions and Services

CRAM Metrics	Baseline Scores				Functional Gain (Impact to Preservation)	Target Scores - Post-Restoration	Functional Lift (Baseline to Restoration)
	PuebloNorth (Impact Site)	*SANDER1 (Mitigation Site)*	*SANDER2 (Mitigation Site)*	*SANDER-Average*	*ImpactDelta*	*SANDER-Target Scores*	*RestorationDelta*
Endemic Species Richness	3	3	3	3	0	6	3
Plant Community Metric	4.0	4.0	5.0	4.5	0.5	7.0	2.5
Interspersion/Zonation	3	6	6	6	3	9	3
Raw Score	**7.0**	**10.0**	**11.0**	**10.5**	**3.5**	**16.0**	**5.5**
Final Score	**29.2**	**41.7**	**45.9**	**43.8**	**14.6**	**66.7**	**22.9**
Overall AA Score	**64.5**	**74.9**	**69.7**	**72.3**	**7.8**	**80.9**	**8.6**

8.2 Target Hydrological Regime

Previous habitat disturbances, including vehicular activity, illegal dumping, human visitation, and non-native plant invasion, have reduced the extent and biological functions of the assumed former vernal pool and mima mound area at the SANDER site. The degraded areas at the intended restoration sites do not currently retain sufficient water, nor stay in an undisturbed condition for a sufficient period, to support vernal pool plant species. As described previously, the existing depressions will be excavated to remove sediment and the excavated material will be used to supplement or form new mima mounds adjacent to the restored vernal pools. It is anticipated that the restoration of the vernal pool basins and adjacent mima mound topography will result in improved hydrologic conditions, with better retention of surface water within the restored basins for a period sufficient to sustain the vernal pool target species.

8.3 Target Vernal Pool Mitigation Acreage

Total vernal pool mitigation acreage required for the North City Project is 0.75 acre, including a combination of restoration and enhancement. At least 0.38 acre of restoration in the form of re-establishment shall be achieved. The remainder will be achieved through rehabilitation or enhancement of 0.38 acre of existing vernal pools. The conceptual design in this Mitigation Plan provides for 0.61 acre of re-establishment, 0.26 acre of rehabilitation and 0.29 acre of enhancement. These acreage estimates will likely be modified during the preparation of construction documents when the site capacity for grading, soil excavations, and mounding are carefully calculated and designed in the context of sensitive resources and existing vernal pools. However, at a minimum, the SANDER site has the capacity to mitigate impacts to vernal pools from the North City Project, with a likely surplus of acreage.

8.4 Performance Standards

Due to the variability of seasonal rainfall patterns in the project region and the dependence of the vernal pool communities on precipitation and inundation for an appropriate period to encourage plant growth, it is difficult to establish rigid annual performance standards for an initial 5-year program. The annual performance standards proposed herein are both quantitative and qualitative, with an emphasis on vernal pool hydrology and achievement of vernal pool plant associations similar to the conditions of the existing pools at the SANDER site. At the completion of each field season, hydrology and species cover will be evaluated to determine the progress towards plant establishment and the achievement of the final success criteria. The final assessment of the success of the restored vernal pool and mima mound habitat will be based on the achievement of the target performance criteria/standards and a determination of plant establishment within the mitigation area. This approach represents an adaptive restoration strategy that would be responsive to natural variation. The mitigation, maintenance, and monitoring program would be altered as necessary to respond to changing conditions and to help guide the project in an appropriate direction to help assure success.

The following target performance standards are guidelines to assess the success of the restored vernal pool and mima mound habitat. These performance standards may be modified as the mitigation, maintenance, and monitoring program evolves.

8.4.1 Vernal Pool Habitat Performance Standards

Performance standards for the vernal pool habitat will be evaluated with CRAM (for ecological functions and services) and with traditional species composition and native cover goals. Ecological performance standards based on CRAM are provided in Table 16, and species composition and cover goals are provided in Table 17.

Table 16
Vernal Pool Success Targets (CRAM)

CRAM Metrics	SANDER-Target Scores
Buffer & Landscape Context	
Aquatic Area Abundance	12
Percent AA with Buffer	12
Average Buffer Width	9
Buffer Condition	9
Raw Score	**21.7**
Final Score	**90.3**
Hydrology	
Water Source	12
Hydroperiod/Stability	12
Hydrologic Connectivity	12
Raw Score	**36.0**
Final Score	**100.0**
Physical Structure	
Patch Richness	9
Pool and Swale Density*	9
Topographic Complexity	6
Raw Score	**24.0**
Final Score	**66.7**
Biotic Structure	
Number of Co-dominant species	6
Percent Non-native	9
Endemic Species Richness*	6

Table 16
Vernal Pool Success Targets (CRAM)

CRAM Metrics	SANDER-Target Scores
Plant Community Metric	7.0
Interspersion/Zonation	9
Raw Score	**16.0**
Final Score	**66.7**
Overall AA Score	**80.9**

Table 17
Summary of Interim Performance Standards and Final Success Criteria for Restored Vernal Pools

Year	Minimum # of Vernal Pool Indicator Plant Species Present on Average for Restored and Enhanced Pools (Species Richness)	Native Cover Relative to Reference Pools on Average for Restored and Enhanced Pools	Non-native Species Cover
1	1	30%	<5% total relative cover 0% Cal-IPC rated high or moderate
2	2	40%	<5% total relative cover 0% Cal-IPC rated high or moderate
3	3	50%	<5% total relative cover 0% Cal-IPC rated high or moderate
4	3	60%	<5% total relative cover 0% Cal-IPC rated high or moderate
5	3	70%	<5% total relative cover 0% Cal-IPC rated high or moderate

The pool hydrology, (i.e., water retention and water depth) of the restored vernal pools should be similar to that of the existing vernal pools within the SANDER site. The vernal pools mapped on site in 2017 were mapped after a significantly higher than average rainfall year for the region, resulting in what likely constitutes the maximum inundation extent. Therefore it is probable that when precipitation returns to average that some of these basins may very rarely inundate for more than a few days. At a minimum, for ACOE mitigation, the re-established vernal pools must be documented to stay inundated for a period of 14 consecutive days (wetland hydrology), must pond for a minimum length duration during the growing season (hydric soils), and must support vernal pool indicator species to constitute ACOE-jurisdictional vernal pools.

The basis for the percent cover standards for non-native plant species is based on requirements in the VPHCP. The basis for the threshold quantity of vernal pool indicator species is derived from analyzing the data from the existing vernal pools. On average, the vernal pools on SANDER site support 4.1 indicator species with a range of 1 to 8 (see Appendix B for species considered to be indicator species for these complexes of vernal pools). Therefore, the success criteria for endemic species richness was set at a minimum of 3.

For the vernal pools subject to enhancement efforts, performance standards are the same as the restored vernal pools in terms of percent non-native cover. Performance standards for vernal pool indicator species and hydrology do not apply to the vernal pools to be enhanced.

8.4.2 Upland Habitat Performance Standards

Upland habitat development, including the mima mounds forming vernal pool watersheds, will be evaluated annually to determine conformance to goals for species richness, native cover, and non-native cover. Success criteria for upland habitat restoration are provided in Table 18.

Table 18
Summary of Upland Habitat Restoration Success Criteria

Year	Native Species Richness	Native Species Cover (Absolute)	Container Plant Survival	Non-native Species Cover
1	5	20%	100%[1]	<10% total relative cover 0% Cal-IPC rated high or moderate
2	6	30%	100%[1]	<10% total relative cover 0% Cal-IPC rated high or moderate
3	7	40%	90%	<10% total relative cover 0% Cal-IPC rated high or moderate
4	8	50%	80%	<10% total relative cover 0% Cal-IPC rated high or moderate
5	8	60%	80%	<10% total relative cover 0% Cal-IPC rated high or moderate

Note:
1 Natural recruitment may be counted toward the survival goal if adequate replacement of container plant function has occurred.

8.4.3 Wetland Habitat Performance Standards

Specific annual performance standards for the wetland enhancement areas have not been established because the approach of the enhancement effort is focused on non-native species removal and subsequent management to keep weeds from inhibiting the success of passive regeneration of native wetland habitat. The wetland enhancement will be considered successful when non-native plant cover is below 10%, and the area has revegetated with native species. If the wetland enhancement areas are used by the City for compensatory mitigation, additional performance standards may be applied.

9 COMPLETION OF MITIGATION

9.1 Notification of Completion

Upon completion of the 5-year maintenance and monitoring period, if the target success criteria and performance standards have been achieved, notification of completion will be included within the final annual report submitted to the City. The final report also will include documentation that the vernal pool restoration success criteria have been met. The City will confirm if success criteria have been adequately achieved and if the maintenance and monitoring period can be discontinued. If the vernal pools are used for ACOE mitigation credit, the ACOE will need to confirm successful completion of the success criteria.

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10 LONG-TERM MANAGEMENT

Upon success completion of the mitigation program, the habitat within the MHPA will be managed in accordance to MHPA requirements. Additionally, the vernal pool complex is within the hardline preserve area for the City's Vernal Pool HCP, and therefore will be managed consistent with that document. Fencing and signage will remain on site in perpetuity.

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APPENDIX A

CRAM Assessment for the NCPWF Site (Pueblo Site) and the SANDER Site

Basic Information: Vernal Pool Systems

Assessment Area Name: PUEBLO NORTH	
Project Name: PUEBLO NORTH PORENATEL	
Assessment Area ID #: 1	
Project ID #:	**Date:** 4/26/2017
Assessment Team Members for This AA	
SFF & JLT(M)	

AA Location:
Latitude: 32°52'56.27"N **Longitude:** 117°12'00.69" W **Datum:**

Wetland Category:
☑ Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:
☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?
☐ ponded/inundated ☐ saturated soil, but no surface water ☑ dry

What is the apparent hydrologic regime of the wetland?
☐ long-duration ☐ medium-duration ☒ short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?
☐ yes ☒ no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1	North	32°52'56.78" N	117°12'00.84" W	
✓ 2	2	South	32°52'55.33" N	117°12'00.48" W	
3	3	East	32°52'56.55" N	117°11'59.67" W	
4	4	West	32°52'56.04" N	117°12'01.92" W	
5					
6					

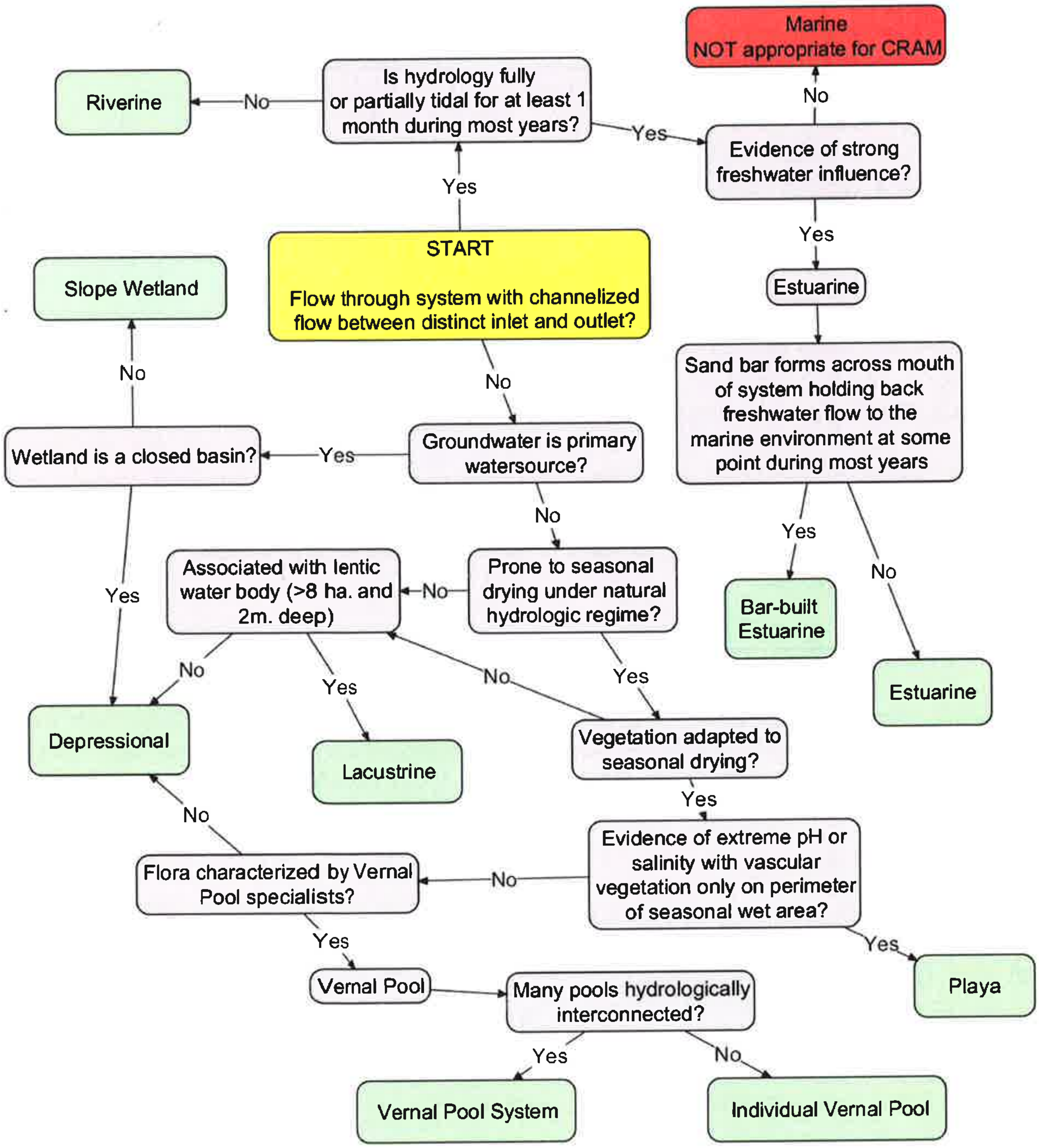
Comments:

Scoring Sheet: Vernal Pool Systems

AA Name:			Date: 4/24/17	
Attributes and Metrics	Alpha.	Numeric	**Comments/Scores**	
Attribute 1: Buffer and Landscape Context (pg. 7-15)				
(A) Aquatic Area Abundance	B	9		
(B): Percent of AA with Buffer	A	12		
(C): Average Buffer Width	B	9		
(D): Buffer Condition	~~C~~ B	~~6~~ 9		
Initial Attribute Score $= A + [D \times (B \times C)^{1/2}]^{1/2}$ (12, ~~6~~ 6, 9, 9)		21	**Final Attribute Score = (Initial Score/24) x 100**	~~88~~ 70.5
Attribute 2: Hydrology (pg. 16-18)				
Water Source	A	12	NO ARTIFICIAL INPUTS	
Hydroperiod	A	12	ROAD RUT (VP1/PWSS)	
Hydrologic Connectivity	A	12	NO ADJACENT GRADING/EARTHWORK	
Initial Attribute Score= sum of metric scores	36.0		**Final Attribute Score = (Initial Score/36) x 100**	100
Attribute 3: Physical Structure (pg. 19-25)				
Structural Patch Richness	D	3	4 PATCH TYPES	
Worksheet 5 Pool and Swale Density	~~C~~ A	12		
Topographic Complexity	C	6		
Initial Attribute Score= sum of metric scores	21		**Final Attribute Score = (Initial Score/36) x 100**	58.4
Attribute 4: Biotic Structure (pg. 26-31)				
Horizontal Interspersion and Zonation	D	3 ?		
Plant Community submetric A: Number of Co-dominant species	C	6		
Plant Community submetric B: Percent Non Native	D	3		
Plant Community submetric C: Endemic Species Richness	D	3	Included Lythys. as endemic (vpa?)	
Plant Community Composition Metric (numeric average of submetrics A-C)		4		
Initial Attribute Score= sum of metric scores		7	**Final Attribute Score = (Initial Score/24) x 100**	29
Overall AA Score (Average of four Final Attribute Scores)			64.5	

Identify Wetland Type

Figure 1: Flowchart to determine wetland type and sub-type.



Vernal Pool Wetlands

Vernal pools are ephemeral wetlands that form in shallow depressions underlain by bedrock or by an impervious, near-surface soil horizon. These depressions fill with rainwater and runoff during the winter and may remain inundated until spring or early summer, sometimes filling and emptying repeatedly during the wet season. Vernal pools undergo four distinct annual phases: (1) the wetting phase with the onset of the first rains; (2) the aquatic phase when the peak rainfall and inundation occurs; (3) the drying phase when many plants flower and produce seed and many animals disperse; and finally (4) the drought phase when the soil dries and cracks, and the plants succumb to extreme dry conditions. Vernal pools typically support a minimum of 30% cover of native plant species during the aquatic or drying phase. Vernal pools in disturbed areas or subjected to abnormal rainfall patterns might not meet this criterion due to invasion by non-native plants. If the wetland is mostly characteristic of a vernal pool but also has characteristics of other kinds of wetlands, such that its classification as a vernal pool is not completely certain, then it should be considered a vernal pool.

Vernal Pool Systems and Individual Vernal Pools

Vernal pools often occur together and with vernal swales as vernal pool systems. These can have many pools of various sizes and shapes, varying floral and faunal composition, and various hydroperiods. Water can move between adjacent pools and swales through the thin soils above the underlying impervious substrate. The lack of surface flow between pools does not necessarily indicate that they are not hydrologically inter-connected. Unusual or extremely large vernal pools should be assessed using the Individual Vernal Pool Module.

Pools can be assessed individually or as parts of systems. **This CRAM module is designed to assess vernal pool systems.**

Vernal Pool Landscapes

Vernal pools and vernal pools systems are underlain by bedrock or by an impervious, near-surface soil horizon. These conditions can extend for many kilometers. Large areas having numerous individual vernal pools, swales, or multiple vernal pool systems are termed vernal pool landscapes.
In general, vernal pools and swales must comprise at least 10% of the land surface to define a vernal pool landscape. This definition can be revised as new data on pool density are assembled.

Other Depressional Wetlands

Depressional wetlands other than vernal pools can be seasonal or perennial, but their flora and fauna are mostly not characteristic of vernal pools, and **they lack the impervious substrate that controls vernal pool hydrology**. They differ from lacustrine wetlands by lacking an adjacent area of open water at least 2 m deep and 8 ha total area. They differ from playas by lacking an adjacent area larger than the wetland of either alkaline or saline open water less than 2 m deep or non-vegetated, fine-grain sediments. Unlike slope wetlands (i.e., springs and seeps), depressional wetlands depend more on precipitation than groundwater as their water source.

Establish the Assessment Area (AA)

Table 1: Examples of features that should be used to delineate AA boundaries.

- above-grade roads and fills
- major point sources of water inflows or outflows
- weirs, berms, levees and other flow control structures

Table 2: Examples of features that should not be used to delineate any AAs.

- at-grade, unpaved, single-lane, infrequently used roadways or crossings
- bike paths and jogging trails at grade
- bare ground within what would otherwise be the AA boundary
- equestrian trails
- fences (unless designed to obstruct the movement of wildlife)
- property boundaries
- riffle (or rapid) – glide – pool transitions in a riverine wetland
- spatial changes in land cover or land use along the wetland border
- state and federal jurisdictional boundaries

Table 3: Recommended maximum and minimum AA sizes for the Vernal Pool wetland type.
Note: Wetlands smaller than the recommended AA sizes can be assessed in their entirety.

Wetland Type	Recommended AA Size
Individual Vernal Pool	There are no size limits
Vernal Pool Systems	Preferred size is <10 ha (about 300m x 300m; shape can vary); there is no minimum size so long as there are at least 3 pools. If the system has between 3 and 6 pools, assess all of them. If there are more than 6 pools, select 6 that represent the range in size of pools present on the site.

Table 4: Steps to delineate a vernal pool system and its component pools.

Step	Vernal Pool System Delineation Task
1	On the site imagery, draw the boundary around the system of vernal pools that are probably interconnected by surface or subsurface flow. To the extent possible, the AA boundary should follow the drainage divide or rim of the basin encompassing the selected vernal pool system, without extending further than about 30m from any pool and without extending into non-buffer land cover.
2	Delineate or circle and number all pools within the pool system from Step 1. These pools comprise the AA.
3	If there are more than 6 pools within the AA, randomly select 6 of them. Pools to be assessed within the system should be of different sizes but similar in terms of vegetation, depth, etc. These pools will be assessed individually and their scores will be averaged using the Vernal Pool System CRAM module. If you have between 3 and 6 pools in your AA, assess **<u>all</u>** of them. If you have fewer than 3 pools, assess each of them using the Individual Vernal Pool CRAM module. Additionally, if a pool looks substantially different than the others in the system (in terms of vegetation, depth, etc.), then it should be assessed as an individual vernal pool.

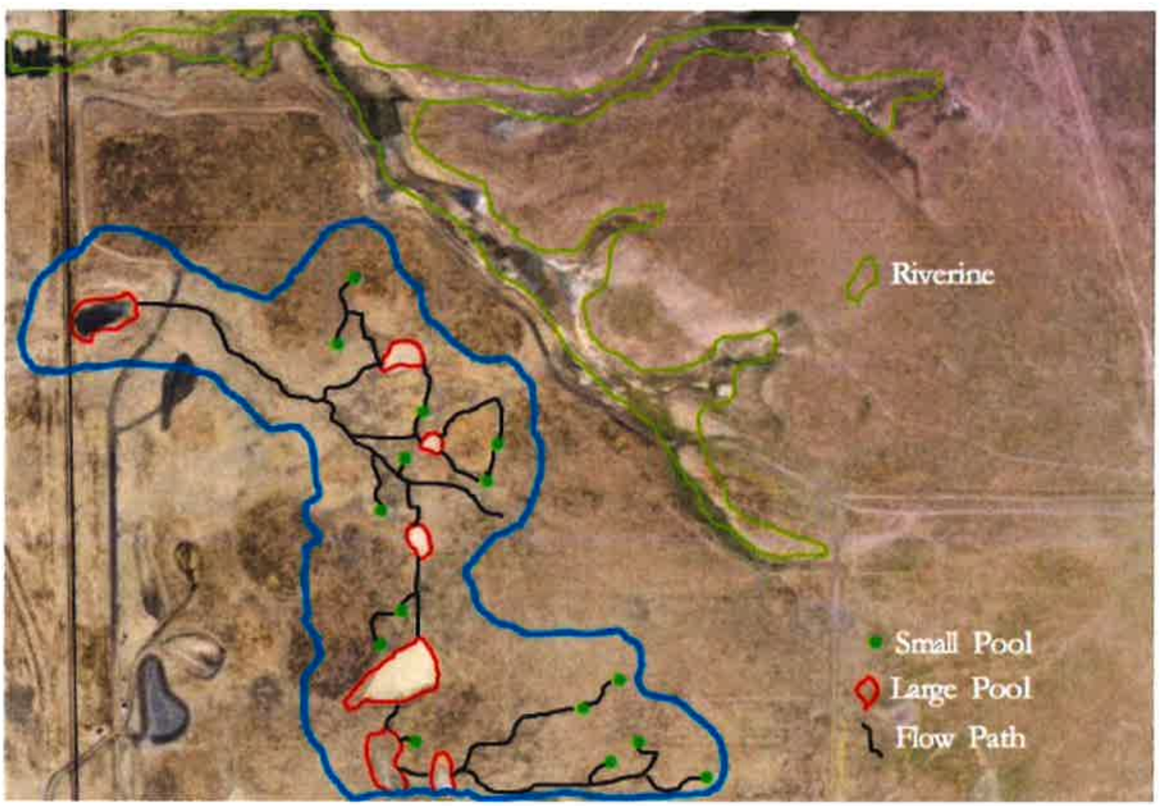


Figure 2: Example map of one vernal pool system and its component elements. The boundary around the system of vernal pools is shown as a turquoise line.

Attribute 1: Buffer and Landscape Context

Metric 1: Aquatic Area Abundance

The Aquatic Area Abundance of an Assessment Area is assessed in terms of its spatial association with other areas of aquatic habitat, such as other wetlands, lakes, streams, etc. It is assumed that wetlands close to each other have a greater potential to interact ecologically and hydrologically, and that such interactions are generally beneficial.

On digital or hardcopy site imagery, at a scale 1:6000 to 1:8000, identify the approximate center of the AA. In each of the four cardinal compass directions, draw a straight transect line from edge of the AA boundary (in line with the center of the AA) to a point 500 m from the AA boundary. Estimate the percentage of the 500-m segment of each transect line outside the AA that passes through wetland or other aquatic habitat, including open water. Include a 30 m buffer around vernal pool systems and individual vernal pools in the estimation of aquatic habitat. For all other wetland types in the VP system (swales, etc.) include a 5 m buffer. Areas dedicated to flood control but not otherwise mapped as aquatic habitat or not otherwise exhibiting characteristics of aquatic habitat in aerial imagery should not be identified as aquatic areas. Use Worksheet 1 below to record these estimates. Ignore any aquatic area that intercepts less than 5m of a line.

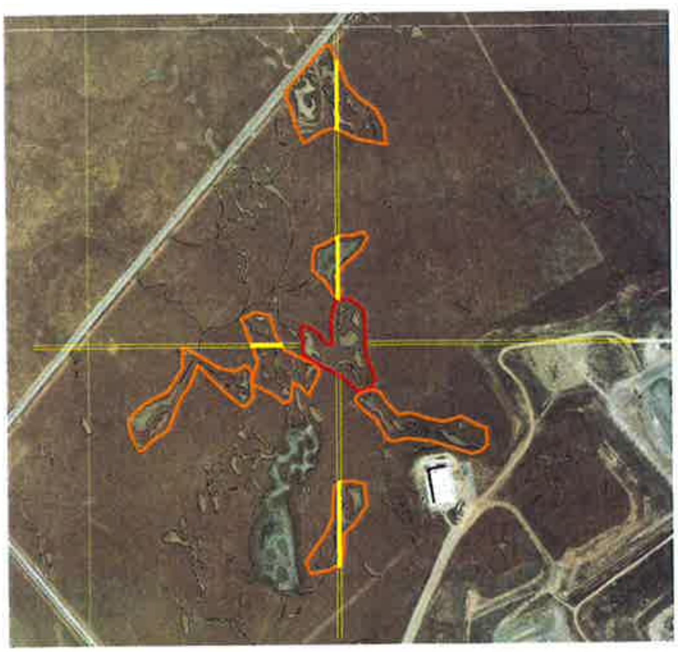


Figure 3. Diagram of method to assess Aquatic Area Abundance of vernal pool wetlands.

Worksheet 1: Aquatic Area Abundance for Vernal Pool Systems.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	160m = 32%
South	75m = 15%
East	85m = 17%
West	19m = 4%
Average value for all Four Transects *Round to the nearest integer*	17%

Table 5: Rating for Aquatic Area Abundance for Vernal Pool Systems (enter rating in Scoring Sheet)

Rating	Alternative States
A	An average of 21 – 100 % of the transects pass through an aquatic feature of any kind.
B	An average of 11 – 20 % of the transects pass through an aquatic feature of any kind.
C	An average of 6 – 10 % of the transects pass through an aquatic feature of any kind.
D	An average of 0 – 5 % of the transects pass through an aquatic feature of any kind.

Metric 2: Buffer

The buffer is the area adjoining the AA that is in a natural or semi-natural state and currently not dedicated to anthropogenic uses that would severely detract from its ability to entrap contaminants, discourage forays into the AA by people and non-native predators, or otherwise protect the AA from stress and disturbance.

To be considered as buffer, a suitable land cover type must be at least 5 m wide and extend along the perimeter of the AA for at least 5 m. The maximum width of the buffer is 250 m. At distances beyond 250 m from the AA, the buffer becomes part of the landscape context of the AA.

Special Note:

*Any area of open water at least 30 m wide that is adjoining the AA, such as a lake, large river, or large slough, is not considered in the assessment of the buffer. Such open water is considered to be neutral, and is neither part of the wetland nor part of the buffer. There are three reasons for excluding large areas of open water (i.e, more than 30 m wide) from Assessment Areas and their buffers.

1) Assessments of buffer extent and buffer width are inflated by including open water as a part of the buffer.

2) While there may be positive correlations between wetland stressors and the quality of open water, quantifying water quality generally requires laboratory analyses beyond the scope of rapid assessment.

3) Open water can be a direct source of stress (i.e, water pollution, waves, boat wakes) or an indirect source of stress (i.e, promotes human visitation, encourages intensive use by livestock looking for water, provides dispersal for non-native plant species), or it can be a source of benefits to a wetland (eg, nutrients, propagules of native plant species, water that is essential to maintain wetland hydroperiod, etc).

*However, any area of open water that is within 250 m of the AA but is not adjoining the AA is considered part of the buffer.

Submetric A: Percent of AA with Buffer

Definition: This submetric is based on the relationship between the extent of buffer and the functions provided by aquatic areas. Areas with more buffer typically provide more habitat values, better water quality and other valuable functions. This submetric is scored by visually estimating from aerial imagery (with field verification) the percent of the AA that is surrounded by at least 5 meters of buffer land cover (Figure 4).

In the example below, most of the area around the AA (outlined in white) consists of non-buffer land cover types. The AA adjoins a major roadway, parking lot, and other development that is a non-buffer land cover type. There is a nearby wetland but it is separated from the AA by a major roadway and is not considered buffer. The open water area is neutral and not considered in the estimation of the percentage of the AA perimeter that has buffer. In this example, the only areas that would be considered buffer is the area labeled "Upland Buffer".

Figure 4: Diagram of buffer and non-buffer land cover types. Open water adjoining the AA is disregarded; it is neither considered to be buffer nor non-buffer. This is not a vernal pool system example, but the concepts apply to all wetland types.

Worksheet 2: Percent of AA with Buffer

In the space provided below make a quick sketch of the AA, or on aerial the imagery, indicate where buffer is present, and record the total amount in the space provided.

See Buffer Map

Percent of AA with Buffer: 100 %

Table 7: Rating for Percent of AA with Buffer.
(enter rating in Scoring Sheet)

Rating	Alternative States (not including open-water areas)
A	Buffer is 75 - 100% of AA perimeter.
B	Buffer is 50 – 74% of AA perimeter.
C	Buffer is 25 – 49% of AA perimeter.
D	Buffer is 0 – 24% of AA perimeter.

Table 6: Guidelines for identifying wetland buffers and breaks in buffers.

Examples of Land Covers Included in Buffers	**Examples of Land Covers Excluded from Buffers** Notes: buffers do not cross these land covers; areas of open water adjacent to the AA are not included in the assessment of the AA or its buffer.
• at-grade bike and foot trails, or trails (with light traffic) • horse trails • natural upland habitats • nature or wildland parks • range land and pastures • railroads (with infrequent use: 2 trains per day or less) • roads not hazardous to wildlife, such as seldom used rural roads, forestry roads or private roads • swales and ditches • vegetated levees	• commercial developments • fences that interfere with the movements of wildlife (i.e. food safety fences that prevent the movement of deer, rabbits and frogs) • intensive agriculture (row crops, orchards and vineyards) • golf courses • paved roads (two lanes or larger) • lawns • active railroads (more than 2 trains per day) • parking lots • horse paddocks, feedlots, turkey ranches, etc. • residential areas • sound walls • sports fields • urbanized parks with active recreation • pedestrian/bike trails (with heavy traffic)

Submetric B: Average Buffer Width

Definition: The average width of the buffer adjoining the AA is estimated by averaging the lengths of eight straight lines drawn at regular intervals around the AA from its perimeter outward to the nearest non-buffer land cover or 250 m, whichever is first encountered. It is assumed that the functions of the buffer do not increase significantly beyond an average width of about 250 m. The maximum buffer width is therefore 250 m. The minimum buffer width is 5 m, and the minimum length of buffer along the perimeter of the AA is also 5 m. Any area that is less than 5 m wide and 5 m long is too small to be a buffer. See Table 6 above for more guidance regarding the identification of AA buffers.

Table 8: Steps to Estimate Buffer Width.
(use Worksheet 2 or aerial to prepare sketch)

Step 1	Draw eight straight transects 250 m in length perpendicular to the AA through the buffer area at regular intervals along the portion of the perimeter of the AA that has a buffer. These lines should not cross.
Step 2	Estimate the buffer width of each of the transects as they extend away from the AA. Record these lengths on worksheet 3 below.
Step 3	Calculate the average buffer width. Record this width on worksheet 3 below.

Worksheet 3: Calculating average buffer width of AA.

Transect	**Buffer Width (m)**
A North	250 m
B	450 ft. = 135 m
C East	500 ft = 152 m
D	300 ft = 93 m
E South	250 ft = 76 m
F	315 ft = 96 m
G West	300 ft = 91 m
H	250 m
Average Buffer Width ***Round to nearest integer***	143 m

Table 9: Rating for Average Buffer Width
(enter rating in Scoring Sheet)

Rating	Alternative States
A	Average buffer width is 190 – 250 m.
B	Average buffer width 130 – 189 m.
C	Average buffer width is 65 – 129 m.
D	Average buffer width is 0 – 64 m.

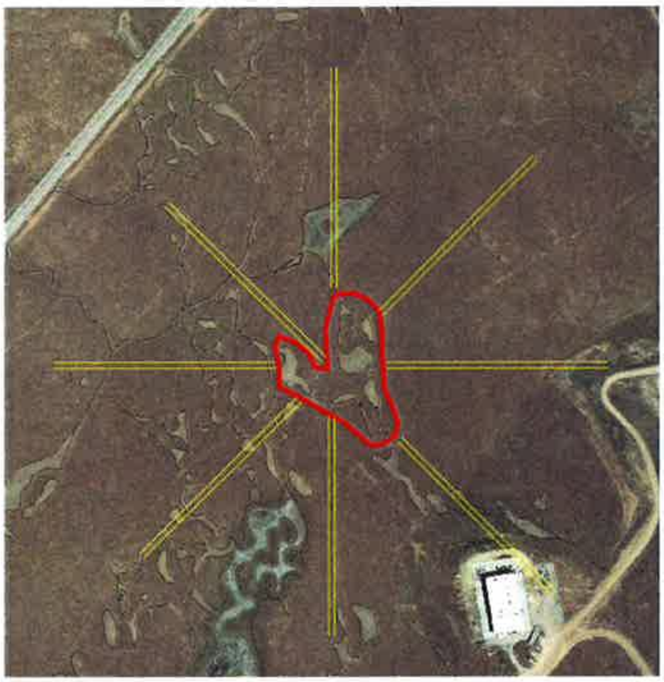


Figure 5. Example of the method used to estimate Buffer Width. Note that the width is based on the lengths of eight lines A-H that extend at regular intervals around the perimeter of the AA where buffer is present. If a portion of the perimeter of the AA does not have buffer that is at least 5 meters wide, do not place a line there.

Submetric C: Buffer Condition

Definition: The condition of a buffer is assessed according to the extent and quality of its vegetation cover, the overall condition of its substrate, and the amount of human visitation. Evidence of direct impacts (parking lots, buildings, etc.) by people are excluded from this metric and included in the Stressor Checklist. Buffer conditions are assessed only for the portion of the wetland border that has **already been identified as buffer in the previous step**. If there is no buffer, assign a score of D.

Table 10: Rating for Buffer Condition
(enter rating in Scoring Sheet)

Rating	Alternative States
A	Buffer for AA is dominated by native vegetation, has undisturbed soils, and is apparently subject to little or no human visitation.
B	Buffer for AA is characterized by native and naturalized vegetation, has no appreciable phytomass accumulation or invasive infestations, and has mostly undisturbed soils and is apparently subject to little or low impact human visitation.
C	Buffer for AA is characterized by non-native vegetation with little or no native component, or has appreciable phytomass accumulation or invasive infestations, or has a moderate degree of soil disturbance/compaction, or there is evidence of at least moderate intensity of human visitation.
D	Buffer for AA is characterized by barren ground or otherwise compacted or disturbed soils, or there is significant cover of invasive species, or there is evidence of very intense human visitation.

Attribute 2: Hydrology

Metric 1: Water Source

Definition: Water Sources directly affect the extent, duration, and frequency of saturated or ponded conditions within an Assessment Area. Water Sources include the kinds of direct inputs of water into the AA as well as any diversions of water from the AA. Diversions are considered a water source because they affect the ability of the AA to function as a source of water for other habitats while also directly affecting the hydrology of the AA. Natural, direct sources include rainfall, and ground water discharge. Examples of unnatural, direct sources include stormdrains that empty directly into the AA or into an immediately adjacent area.

To score this metric use site aerial imagery and any other information collected about the region or watershed associated with the vernal pool system the AA is located in to assess the water source in an area up to 2 km upstream of your AA (Table 11). If the watershed is smaller than 2km, assess only the area that is associated with the vernal pool system the AA is located in.

Table 11: Rating for Water Source
(enter rating in Scoring Sheet)

Rating	Alternative States
A	There is no indication that dry season conditions are substantially controlled by artificial water sources.
B	Freshwater sources that affect the dry season conditions of the AA are mostly natural, but also obviously include occasional or small effects of modified hydrology. Indications of such anthropogenic inputs include developed land or irrigated agricultural land that comprises less than 20% of the immediate vicinity.
C	Freshwater sources that affect the dry season conditions of the AA are primarily urban runoff, direct irrigation, pumped water or other artificial hydrology. Indications are developed land or irrigated agriculture that comprise more than 20 % of the immediate vicinity.
D	Natural, freshwater sources that affect the dry season conditions of the AA have been eliminated, or all wet season inflows have been impounded or diverted.

Sanders
4/27 9:30 - 3:00

Metric 2: Hydroperiod

Definition: Hydroperiod is the characteristic frequency and duration of inundation or saturation of a wetland during a typical year. Vernal pools are ephemeral wetlands that form in shallow depressions underlain by bedrock or by an impervious, near-surface soil horizon. These depressions fill with rainwater and runoff during the winter and may remain inundated until spring or early summer, sometimes filling and emptying repeatedly during the wet season.

Table 12: Field Indicators of Altered Hydroperiod.

Direct Engineering Evidence	Indirect Ecological Evidence
Reduced Extent and Duration of Inundation or Saturation	
• Upstream spring boxes • Impoundments • Pumps, diversions, ditching that move water **out of** the wetland	• Evidence of aquatic wildlife mortality • Encroachment of terrestrial vegetation • Stress or mortality of hydrophytes • Compressed or reduced plant zonation
Increased Extent and Duration of Inundation or Saturation	
• Berms • Dikes • Pumps, diversions, ditching that move water **into** the wetland	• Late-season vitality of annual vegetation • Recently drowned riparian vegetation • Extensive fine-grain deposits

Table 13: Rating of Hydroperiod for Vernal Pool Systems.
(enter rating in Scoring Sheet)

Rating	Alternative States
A	Hydroperiod of the AA is characterized by natural patterns of filling, inundation, or saturation as well as natural patterns of drying or drawdown with no indication of hydro-modification. There are no artificial controls on the hydroperiod.
B	The filling, inundation, or saturation patterns in the AA are of greater magnitude or longer duration than would be expected under natural condition (or compared to comparable natural wetlands), but thereafter, the AA is subject to natural processes and patterns of drawdown or drying.
C	The patterns of filling, inundation or saturation of the AA as well as the patterns of drawdown or drying of the AA are naturalistic but controlled by unnatural processes due to hydromodification.
D	The patterns of filling, inundation or saturation of the AA as well as the patterns of drawdown or drying of the AA significantly deviate from natural patterns due to hydromodification.

Metric 3: Hydrologic Connectivity

Definition: Hydrologic Connectivity describes the ability of water to flow into or out of the wetland, or to inundate their adjacent uplands. It provides for the ecotone caused by the moisture gradient between the vernal pool and its surrounding upland. For vernal pool systems, it is scored by assessing the degree to which hydrologic connectivity along the margin of the AA is restricted by unnatural features, such as levees and excessively high banks. **This metric applies to both within and immediately adjacent to the AA.**

Table 14: Rating of Hydrologic Connectivity for Vernal Pool Systems. (enter rating in Scoring Sheet)

Rating	Alternative States
A	Rising water in the AA has unrestricted access to adjacent areas, without levees or other obstructions to the lateral movement of flood waters.
B	There are unnatural features such as levees or road grades that limit the amount of adjacent transition zone or the lateral movement of flood waters, relative to what is expected for the setting. But, the limitations exist for less than 50% of the boundary of the AA. Restrictions may be intermittent along margins of the AA, or they may occur only along one side of the AA. Flood flows may exceed the obstructions, but drainage back to the AA is obstructed.
C	The amount of adjacent transition zone or the lateral movement of flood waters is limited, relative to what is expected for the setting, by unnatural features, such as levees or road grades, for 50-90% of the AA. Flood flows may exceed the obstructions, but drainage back to the AA is obstructed.
D	The amount of adjacent transition zone or the lateral movement of flood waters is limited, relative to what is expected for the setting, by unnatural features, such as levees or road grades, for more than 90% of the AA.

Attribute 3: Physical Structure

Metric 1: Structural Patch Richness

Patch richness is the number of different obvious types of physical surfaces or features that may provide habitat for aquatic (including wetland) or riparian species. This metric is different from topographic complexity in that it addresses the number of different patch types, whereas topographic complexity helps evaluate the spatial arrangement and interspersion of the types. Physical patches can be natural or unnatural.

Worksheet 4: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for Presence		
Adjacent shrub or tree cover individ Eri fas; Bac pil	Pueblo A	5 B	5 E
Animal mounds and burrows	X		
Bare soil (minimum 3 m²)			
Cobble and boulders			
Complexly-shaped pools	X		
Drainage branches (more than 1 drainage branch)			
Islands			
Large individual pools			
Large swales			
Mima mounds			
Patches of dense vegetation			
Pool Cluster	X		
Simply-shaped pools			
Small individual pools			
Small swales			
Soil cracks			
Within Pool Mounds	X		
Total Possible	17		
No. Observed Patch Types (enter here and use in Table 15)	4		

Table 15: Rating of Structural Patch Richness.
(enter rating in Scoring Sheet)

Rating	Vernal Pool Systems
A	≥ 11
B	8 – 10
C	5 – 7
D	≤ 4

Patch Type Definitions for Vernal Pool Systems

Adjacent shrub or tree cover. These are patches of adjacent shrub or tree areas adjacent to pools. They provide shading, nutrient input, and potentially affect pool dry-down among other biogeochemical processes.

Animal mounds and burrows Many vertebrates make mounds or holes as a consequence of their foraging, denning, predation, or other behaviors. The resulting soil disturbance helps to redistribute soil nutrients and thus it influences plant species composition and abundance. To be considered a patch type there should be evidence that a population of burrowing animals has occupied the Assessment Area. A single burrow or mound does not constitute a patch.

Bare soil. Bare soil is any area at least 3m^2 in size within a vernal pool system that has less than 5% cover of vegetation during the peak of the growing season. Rock outcrops do not qualify as bare soil.

Cobble and boulders Cobble and boulders are rocks of different size categories. The long axis of cobble ranges from about 6 cm to about 25 cm. A boulder is any rock having a long axis greater than 25 cm. Submerged cobbles and boulders provide abundant habitat for aquatic macroinvertebrates. Exposed cobbles and boulders provide roosting habitat for birds and shelter for amphibians. They contribute to patterns of shade and light and air movement near the ground surface that affect local soil moisture gradients, deposition of seeds and debris, and overall substrate complexity.

Complexly-shaped pools Vernal pool systems or complexes usually consist of many pools of different shapes. In general, pools can be separated into two shape classes; simply-shaped pools and complexly-shaped pools. Complexly-shaped pools do not resemble circles or ovals. They are much longer than wide, or they are kidney-shaped, or they vary in width in complex ways that are not well represented by either a circle or an oval.

Drainage branches (more than 1 drainage branch). Vernal pool systems usually consist of many pools that are interconnected by, or dispersed among, one or more shallow pathways of surface water flow called swales. In their downstream reaches, some swales develop obvious banks and beds and therefore can be called channels. The swales and/or channels that drain to a common place comprise a drainage network. If the drainage network consists of two or more swales and/or channels that are clearly confluent with each other (i.e., they are connected to, and contribute to the flow of, another swale or channel), then the network is considered to have more than one branch. There must be obvious overland flow (swales) to be considered a drainage branch.

Islands There are patches of upland vegetation located within pools and lying topographically above the maximum zone of pool inundation.

Large vernal pools Vernal pool systems or complexes usually consist of many pools of different sizes. For the purpose of assessing pool systems using CRAM, two pool size classes are recognized – large and small. Large pools are defined for the purposes of this patch type checklist as pools that are at least 3 times the size of the smallest pool in the AA.

Large swales Large swales transport water, but also generally contain wide, flat areas that pond similar to vernal pools (but are less well defined than those occupying the terraces). Large swales are fed by other large and small swales and are rarely directly connect to pools.

Mima mounds Mima mounds are elliptical mounds of soil, usually 1-3 meters tall, and uniformly distributed across a landscape. The sizes of areas between mounds is often very similar to the mound sizes, such that the landscape, as viewed from a few thousand feet above, resembles the surface of a golf ball. Vernal pools tend to form in the low areas between mima mounds.

Patches of dense vegetation (Juncus, Eleocharis, bunchgrasses) – Patches of vegetation in which one or several species have significantly higher vegetative cover in comparison with the remainder of the pool. These patches should be visually distinguishable.

Pool Cluster. Vernal pool systems or complexes usually consist of many pools of different sizes. Some pools are interconnected by shallow pathways of surface water flow called swales. In their downstream reaches, some swales develop obvious banks and beds and therefore can be called channels. The swales and/or channels that drain to a common place comprise a drainage network. Three or more vernal pools of any size that exist in the same drainage network compose a vernal pool cluster.

Simply-shaped pools Vernal pool systems or complexes usually consist of many pools of different shapes. In general, pools can be separated into two shape classes; simply-shaped pools and complexly-shaped pools. Simply-shaped pools resemble circles or ovals.

Small individual pools Vernal pool systems or complexes usually consist of many pools of different sizes. For the purpose of assessing pool systems using CRAM, two pool size classes are recognized. The small pools in a system are simply smaller than most other pools in the system. There is no maximum size of small pools.

Small swales Small swales are linear features that simply transport water between well defined pools or from pools to steam features.

Soil cracks Repeated wetting and drying of fine grain soil that typifies some wetlands can cause the soil to crack and form deep fissures that increase the mobility of heavy metals, promote oxidation and subsidence, while also providing habitat for amphibians and macroinvertebrates. Cracks must be a minimum of 1 inch deep to qualify.

Within Pool Mounds These are patches (of earth) located within pools and raised above the pool bottom at elevation that lies within the zone of maximum inundation. Mounds may be inundated periodically during the wet season or saturated by surrounding ponded water for sufficient duration to promote a dominance of hydrophytic vegetation characteristic of pool basins or edges.

Metric 2: Pool and Swale Density (Vernal Pool Systems ONLY)

One aspect of vernal pool system physical structure that emerges at the AA scale is the density of pools and swales, meaning their absolute percent cover across the AA. As density increases, the potential for each pool or swale to be hydrologically and ecologically interconnected also increases, as does the potential for density-independent disturbance and stress to be accommodated by the system as a whole.

Density is assessed by estimating the percent of each of four line transects that crosses swales or pools within the AA. These transect lines are the same as the "within the AA" segments of the transect lines used for the Aquatic Area Connectivity metric (see the Aquatic Area Connectivity metric of the Landscape and Buffer Attribute). The method for establishing the transect lines is also provided here.

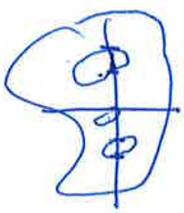
On digital or hardcopy site imagery, identify the approximate center of the AA. In each of the four cardinal compass directions, draw a straight transect line from the center of the AA to the AA boundary. While viewing the site imagery at a scale of 1:1000 to 1:2000, estimate the percentage of each of these four transect lines inside the AA that passes through a pool or swale. Use worksheet 5 below to record these estimates.

Figure 6. Example of method to assess pool and swale density in a vernal pool system.

Worksheet 5: Pool and Swale Density for Vernal Pool Systems.

Percentage of Each Transect Line Crossing A Vernal Pool or a Vernal Swale	
Transect	Percent Crossing a Pool or Swale
North	20m = 95 %
South	12m = 50 %
East	12m = 85 %
West	13m = 80 %
Average value for all Four Transects ***Round to nearest integer***	78 %

Table 16: Rating for Pool and Swale Density for Vernal Pool Systems. (enter rating in Scoring Sheet)



Rating	Alternative States
A	An average of 31– 100 % of the transects crosses pools or swales.
B	An average of 21 – 30 % of the transects crosses pools or swales.
C	An average of 11 – 20 % of the transects crosses pools or swales.
D	An average of 0 – 10 % of the transects crosses pools or swales.

Metric 3: Topographic Complexity

Topographic complexity refers to the variety of elevations within a wetland due to micro- topographic features and elevation gradients. This metric is assessed for each of the 3-6 pools randomly selected from the Vernal Pool System. Cross sections of the individual pools are recorded in Worksheets 6a-6f below. Scores for each pool are then recorded in Worksheet 6g below based on the practitioners drawings, the indicators listed in Table 17, the scale-independent schematic profiles in Figure 7, and the ratings in table 18.

Table 17: Typical indicators of Macro- and Micro-topographic Complexity.

Type	Examples of Topographic Features
Vernal Pools and Pool Systems	soil cracks, "mima-mounds," rivulets between pools or along swales, cobble, plant hummocks, cattle or sheep tracks

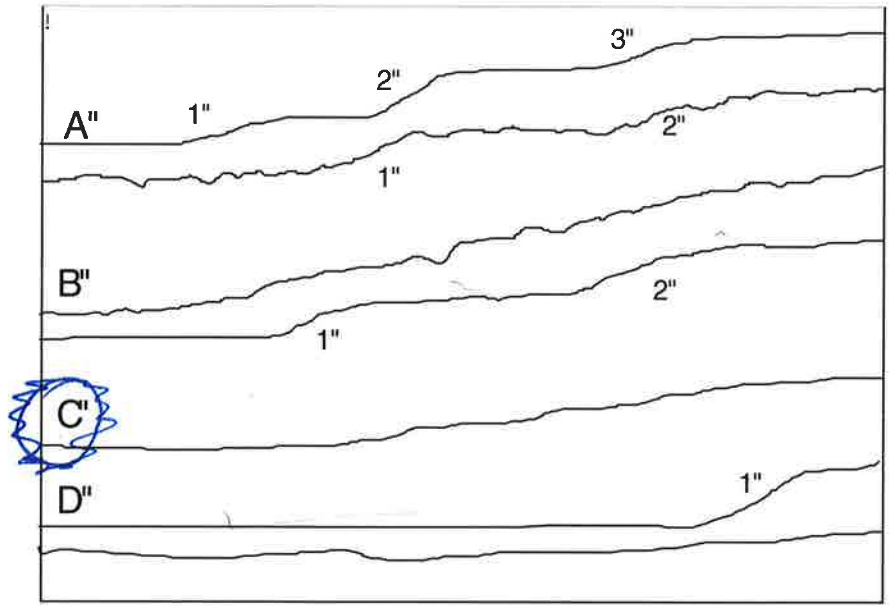


Figure 7: Scale-independent schematic profiles of Topographic Complexity. For vernal pool systems, the right end represents the lower margin of the upland matrix, slightly above the edge of a large or small vernal pool. The choice of indicative profile should be based on sketches along the 4 cardinal compass directions. In the uppermost profile, the numbers 1, 2, and 3 refer to separate apparent breaks in the topographic slope. In other profiles, either two, one, or no breaks in the slope are evident.

VP A = ~~B~~ C	VP B =	VP C =
VP 1/PW 55 = B ~~VP~~ PW 58 = C	C	C

Table 18: Rating Topographic Complexity for Vernal Pool Systems.
(enter results in Worksheet 6g below)

Rating	Alternative States
A	There are three obvious breaks in slope with or without abundant micro-topographic relief along most of the average profile. OR There are two breaks in slope with abundant micro-topographic relief.
B	There is essentially a single slope with abundant micro-topographic relief. OR There are two breaks in slope without abundant micro-topographic relief.
C	There is a single slope without abundant micro-topographic relief.
D	There is essentially no slope, with or without micro-topographic relief. OR There is a single slope that is unusually steep and short for a natural profile.

Worksheet 6g: Rating of Topographic Complexity for Vernal Pool Systems.

Replicate Number	Replicate Score (A = 12; B = 9; C = 6; D = 3)	
	Alpha.	Numeric
Replicate 1 - VPA.	C	6
Replicate 2 - VPB	C	6
Replicate 3 - VPC	C	6
~~PH. Replicate 4 - VP1/PWSS~~	~~B~~	~~9~~
~~AH. Replicate 5 PWSS~~	~~C~~	~~6~~
Replicate 6		
Overall Average Score for All Pool Replicates ***Round to nearest integer*** **(enter here and use in Table 19)**		6

Table 19: Rating for Overall Topographic Complexity for Vernal Pool Systems.
(enter rating in Scoring Sheet)

Rating	Vernal Pool Systems
A	≥ 11
B	8 – 10
C	5 – 7
D	≤ 4

Attribute 4: Biotic Structure

Metric 1: Horizontal Interspersion and Zonation

Horizontal biotic structure refers to the variety and interspersion of plant "zones," plant monocultures or obvious multi-species association that are arrayed along gradients of elevation, moisture, or other environmental factors. Interspersion is essentially a measure of the number of distinct plant zones and the amount of shared edge between them.

This metric is assessed for each of the 3-6 pools randomly selected from the AA. Drawings of the individual pools are recorded in Worksheets 7a-7f below. Make special note of amount of shared edge. Scores for each pool are then recorded in Worksheet 7g below based on the practitioners drawings, the scale-independent images in Figure 8, and the narrative in Table 20.

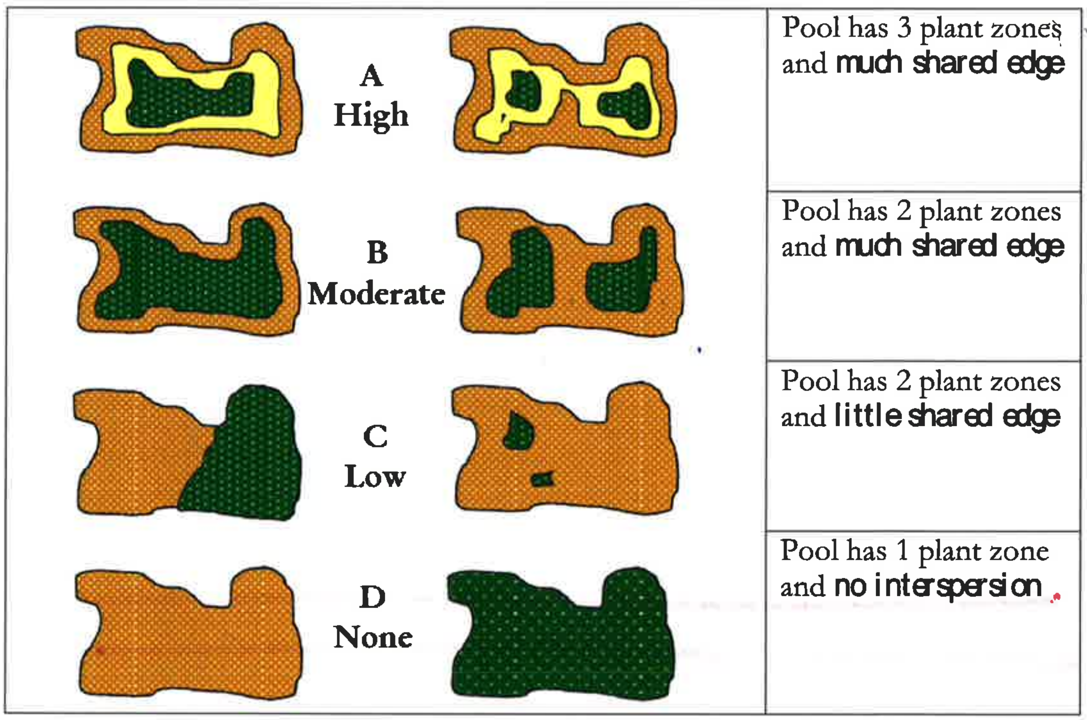


Figure 8: Degrees of interspersion of plant zones for Individual Vernal Pools. Each zone must comprise at least 5% of the pool area. The white area in this figure surrounding each pool represents the upland matrix; the orange area represents the marginal saturation zone. All pools, even as shown for score "D", therefore have at least 1 zone. It is helpful to assign names of plant species or associations of species to the colored patches and to make special note of amount of shared edge.

Table 20: Rating of Horizontal Interspersion and Zonation of Plant Zones for Vernal Pools.
(enter results in Worksheet 7g below)

Rating	Alternative States
A	Pool has a high degree of plan-view interspersion.
B	Pool has a moderate degree of plan-view interspersion.
C	Pool has a low degree of plan-view interspersion.
D	Pool has essentially no plan-view interspersion.

Worksheet 7g: Rating of Horizontal Interspersion for Vernal Pool Systems.

Replicate Number	Replicate Score (A = 12; B = 9; C = 6; D = 3)	
	Alpha.	Numeric
Replicate 1 - VPA	D	3
Replicate 2 - VPB	D	3
Replicate 3 - VPC	C	6
Replicate 4		
~~Alt Replicate 5 - PW 55~~	~~B~~	
~~Alt. Replicate 6 - PW 58~~	~~D~~	
Overall Average Score for All Pool Replicates ***Round to nearest integer*** **(enter here and use in Table 21)**		4

Table 21: Rating for Horizontal Interspersion for Vernal Pool Systems.
(enter rating in Scoring Sheet)

Rating	Vernal Pool Systems
A	≥ 11
B	8 – 10
C	5 – 7
D	≤ 4

Metric 2: Plant Community

The Plant Community Metric is composed of three submetrics. The first two submetrics, Number of Co- dominant Species and Percent Invasion, are assessed for each of the 3-6 pools randomly selected from the AA. The individual pool scores are recorded in Worksheets 8a-6f. The third submetric, Endemic Species Richness, is not assessed for each replicate pool. Rather, a list of all vernal pool endemics is compiled for all replicate pools combined.

Submetric A: Number of Co-dominant Species

For the pool as a whole, all plant species that comprise at least 10% relative cover are considered to be dominant. Only living vegetation in growth position is considered in this metric. Dead or senescent vegetation is disregarded.

Submetric B: Percent Non-native

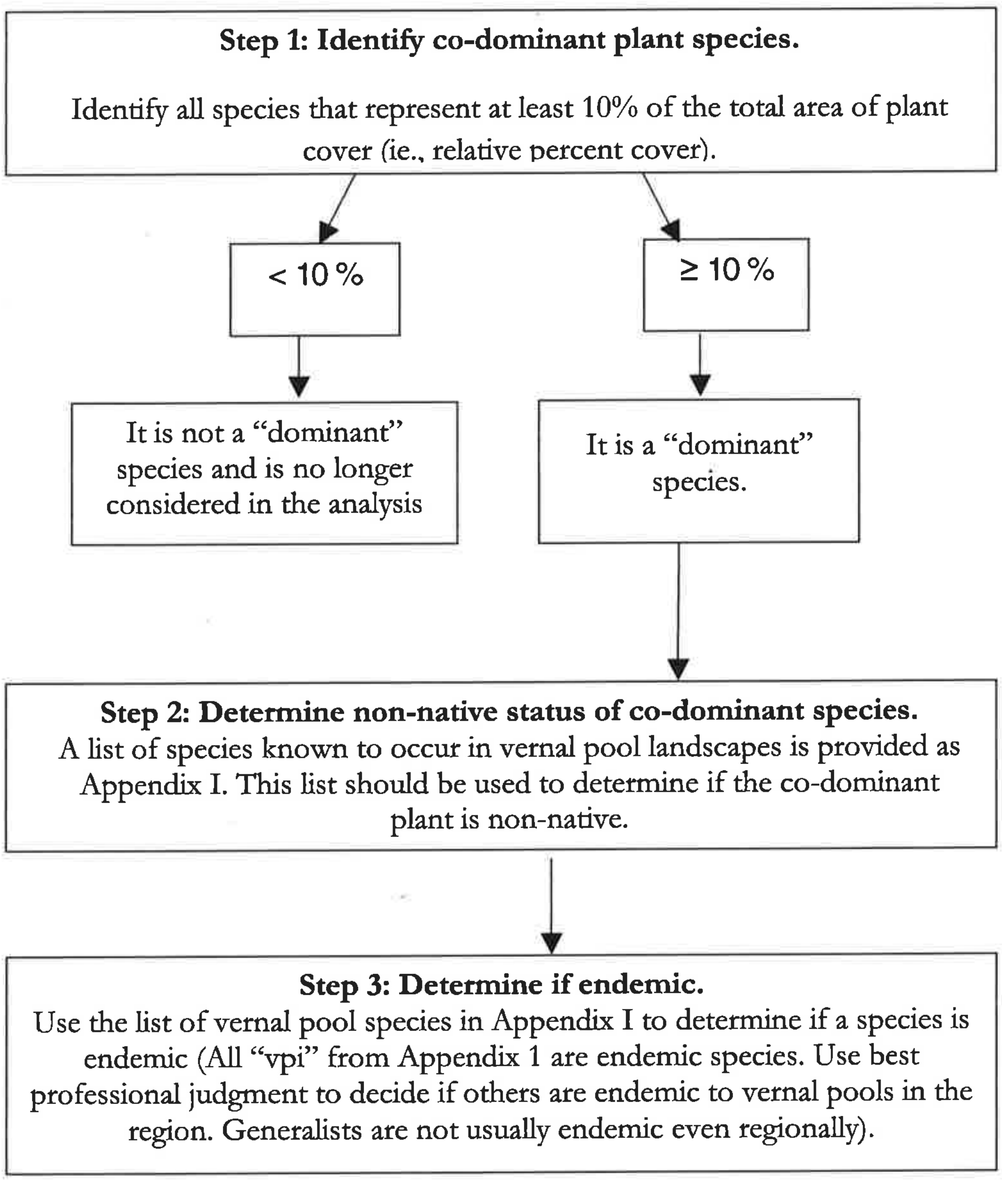
A list of native pool species is provided in Appendix I. Any species not on this list is considered to be non- native. However, this list is not exhaustive, and there may be native upland species occurring in a pool. Expertise is required to assure that species are correctly identified as native or non-native.

Submetric C: Endemic Species Richness

This submetric is based on the total number of co-dominant native plant species endemic to vernal pools that occur in the AA. All "vpi" from Appendix 1 are endemic species. Use best professional judgment to decide if others are endemic to vernal pools in the region. Generalists are not usually endemic even regionally. For Vernal Pool Systems, this metric is assessed for all the replicate pools combined.

VPA - Endemic	VP-B	VP-C
~~Plag~~	Avena	Dein fas
Dein fas	Dein fas.	Fest myuros
Fest. perin	Bro hord	Avena sp.
Hordeum murile	Hord	Lythrum hyp
Lythrum hyssopifolia	Fest. peren	Ero.
wooly marble	Strep pol	Atriplex semi
Rumex crispus	Sonchus. asper	Hordeum murile
Juncus mx	Erodium sp.	Fest perenis
	Medicago sp.	
	Bro dia	

Figure 9: Flow Chart to Determine Plant Dominance



Worksheet 8g: Plant Community Metric-

Calculation of Average Number of Co-dominants in all Replicate Pools.

Pool Replicate	**Number of Co-dominants**	Prcnt Invasive
Pool 1 - VPA	2	2/2 / 100%
Pool 2 - VPB	3	2/3 / 67%
Pool 3 - VPC	3	2/3 / 67%
Pool 4		
Alt Pool 5 WRW PW 58	5	3/5 = 60%
Alt Pool 6 PW 58	3	3/3 = 100%
Average Number of Co-Dominants ***Round to nearest integer*** **(enter here and use in Table 22)**	3	

Table 22: Ratings for Number of Co-dominant Species
(enter rating in Scoring Sheet)

Rating	**Average number of Co-dominants**
A	≥ 6
B	4 - 5
C	2 - 3
D	1

Worksheet 8h: Plant Community Metric –
List of Unique Co-dominant Plant Species from all Vernal Pools Combined.

Plant Name	Check if non-native	Check if in Appendix I
~~[illegible]~~		
Festuca perennis	X y	X No
Hordeum marinum	X y	X No
~~Deinandra fasciculatum~~	~~[illegible]~~	~~X No~~
Lythrum hyssopifolium	X y	X No
Avena fatua	X y	X No
Erodium sp.	X y	X No
~~Stipa pulchra~~		
Total number of co-dominant species (A)	~~7~~ 5	
Total number of co-dominant species that are non-native (B)	5	
Percent non-native [(B)/(A) x 100] *Round to nearest integer* (enter here and use in Table 23)	5/5 x100 =100%	
Total number of co-dominant species that are endemic (enter here and use in Table 24)		0

Table 23: Ratings for Percent Non-native species.
(enter rating in Scoring Sheet)

VPA | VPB

Rating	Percent Non-native
A	0 - 20%
B	21 - 33%
C	34 - 49%
D	≥ 50 %

Table 24: Ratings for VP Endemic Species Co-Dominants.
(enter rating in Scoring Sheet)

Rating	VP Endemic Species Co-dominants
A	≥ 9
B	6 – 8
C	3 – 5
D	0 – 2

Pool Replicate 1 - VP A (Large) INCLUDES PN58 & PN55

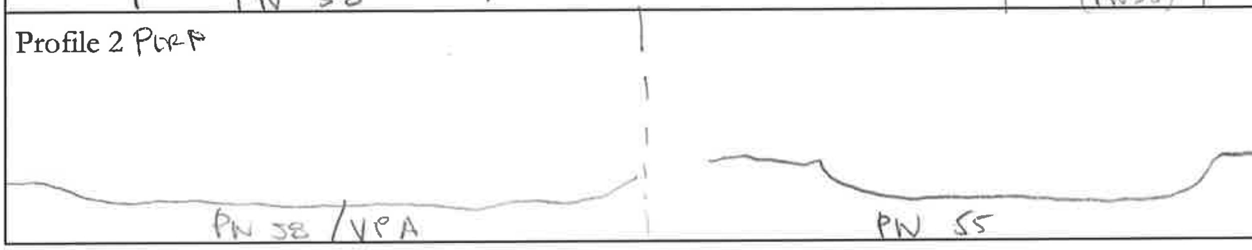
SOME TOPOGRAPHIC = C

Worksheet 6a: Sketches of Vernal Pool Profiles

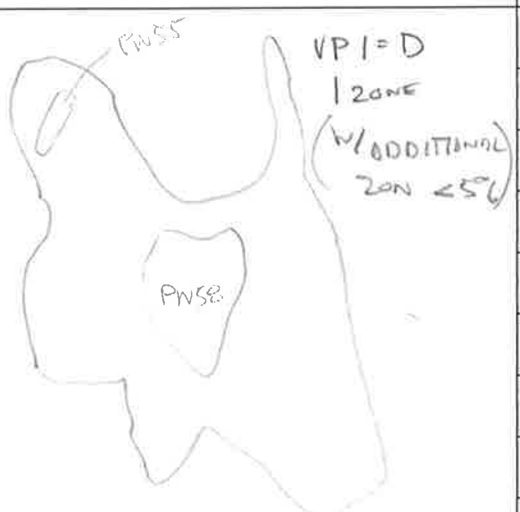
Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1 LONG

Profile 2 PERP



Worksheet 7a: Sketch of Vernal Pool Interspersion.

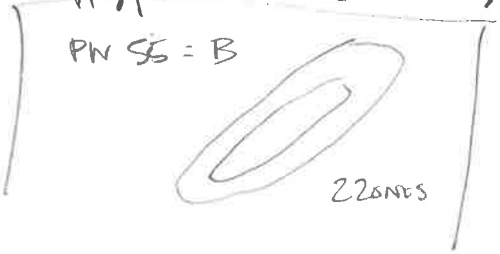


Worksheet 8a: Co-dominant Plant Species in Vernal Pool

Note: A dominant species represents ≥10% relative cover.

VP-A	PN55	PN58
Festica perenne	Rumex crispus	Festuca per
Hordeum murinum	Juncus mex	Hord mur
	Psilocarpus brev	Lythrum
	Lythrum hyssop	
	Hordeum	

VPA ZONE - D (ONE-ZONE)



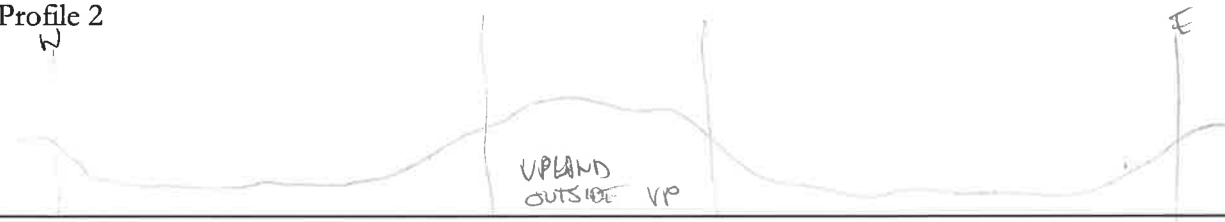
Pool Replicate 2 VP-9/B

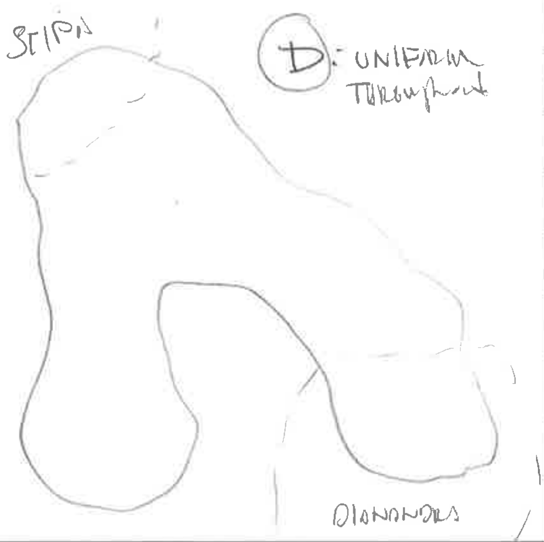
Worksheet 6b: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1 VP B = C SOME TOPOGRAPHIC COMPLEXITY BUT LITTLE TO NO BRAIDING

Profile 2



Worksheet 7b: Sketch of Vernal Pool Interspersion.	Worksheet 8b: Co-dominant Plant Species in Vernal Pool Note: A dominant species represents ≥10% relative cover.
	Festuca perenne Avena fatua Dianaklra fasc

Pool Replicate 3 VP C

Worksheet 6c: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1

Profile 2

Worksheet 7c: Sketch of Vernal Pool Interspersion.

VP C = C
SLIGHT
VARIATION
& PATTERN
DIANANDRA
AREA

Worksheet 8c: Co-dominant Plant Species in Vernal Pool

Note: A dominant species represents ≥10% relative cover.

*INVASIVE

DIANANDRA FAC
FESTUCA MYUROS* 2/3
ERODIUM CIC *

3 CODOMINANTS

Pool Replicate 4

Worksheet 6d: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1
Profile 2

Worksheet 7d: Sketch of Vernal Pool Interspersion.	**Worksheet 8d: Co-dominant Plant Species in Vernal Pool** Note: A dominant species represents ≥10% relative cover.

Guidelines to Complete the Stressor Checklists

A stressor, as defined for the purposes of the CRAM, is an anthropogenic perturbation within a wetland or its environmental setting that is likely to negatively impact the condition and function of the CRAM Assessment Area (AA). A disturbance is a natural phenomenon that affects the AA.

There are four underlying assumptions of the Stressor Checklist: (1) deviation from the best achievable condition can be explained by a single stressor or multiple stressors acting on the wetland; (2) increasing the number of stressors acting on the wetland causes a decline in its condition (there is no assumption as to whether this decline is additive (linear), multiplicative, or is best represented by some other non-linear mode); (3) increasing either the intensity or the proximity of the stressor results in a greater decline in condition; and (4) continuous or chronic stress increases the decline in condition.

The process to identify stressors is the same for all wetland types. For each CRAM attribute, a variety of possible stressors are listed. Their presence and likelihood of significantly affecting the AA are recorded in the Stressor Checklist Worksheet. For the Hydrology, Physical Structure, and Biotic Structure attributes, the focus is on stressors operating within the AA or within 50 m of the AA. For the Buffer and Landscape Context attribute, the focus is on stressors operating within 500 m of the AA. More distant stressors that have obvious, direct, controlling influences on the AA can also be noted.

Table 25: Wetland disturbances and conversions.

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

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)	X	
Actively managed hydrology		
Comments		
Nothing flowing onto site		

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

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

– Road ruts

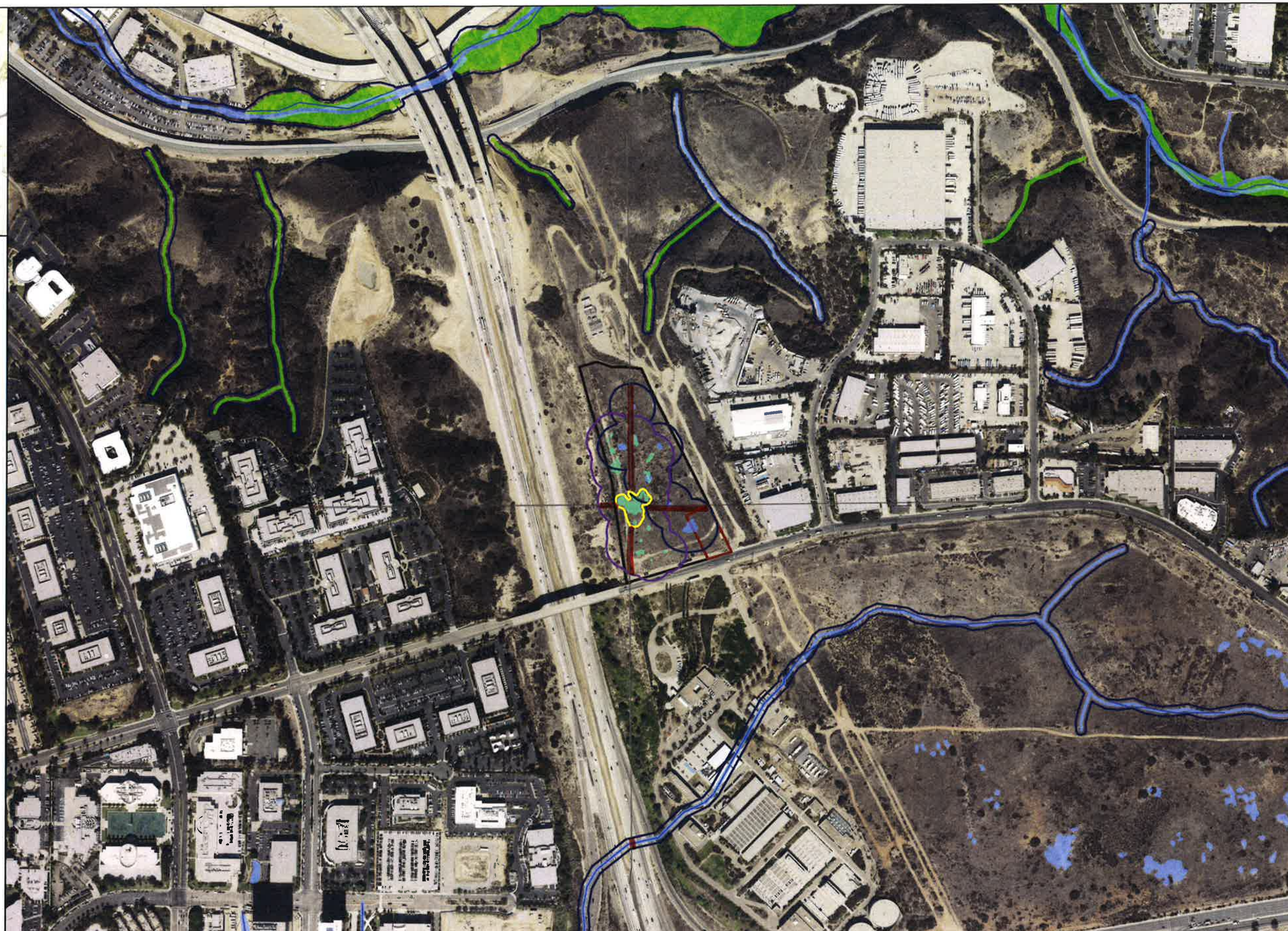
BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential	X	
Industrial/commercial	X	
Military training/Air traffic	X	
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture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

LEGEND

- Pure Water Project Study Area
- North City Pure Water Facilty
- North City Pure Water Pump Station
- CRAM Assessment Area
- Aquatic Area Abundance Area - 30m
- Vernal Pools

Other Aquatic Resorouces

- USGS NHD blue line streams
- NWI Wetlands
- NWI Riparian Areas
- Aquatic Resources Buffer



DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG

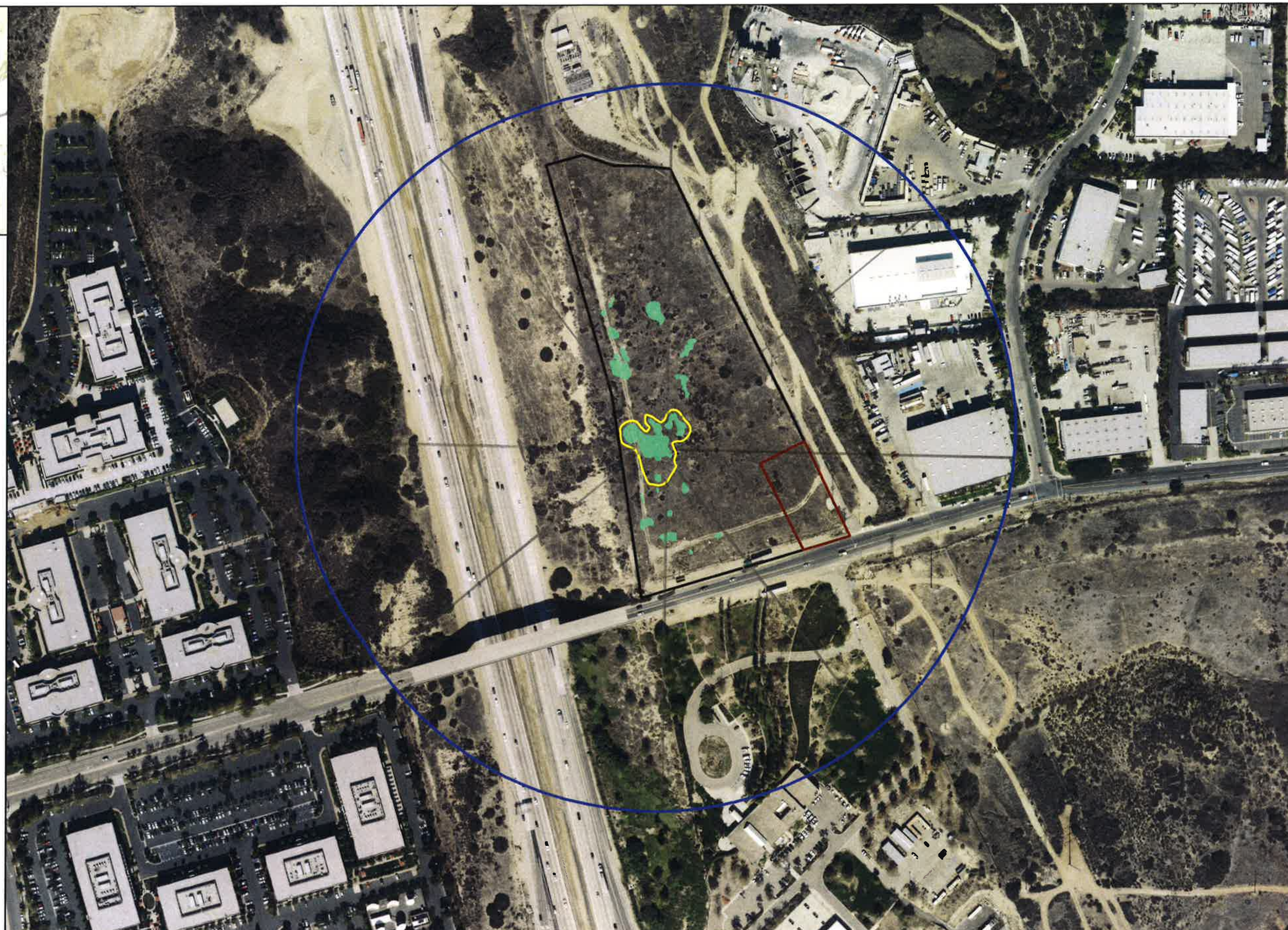
Aquatic Area Abundance Map - Pure Water Facility Site CRAM Assessment

North City Pure Water Project

LEGEND

- Project Study Area
- North City Pure Water Facility
- North City Pure Water Pump Station
- CRAM Assessment Area
- Assessment Area Buffer - 250m
- Vernal Pools

0 37.5 75 Meters

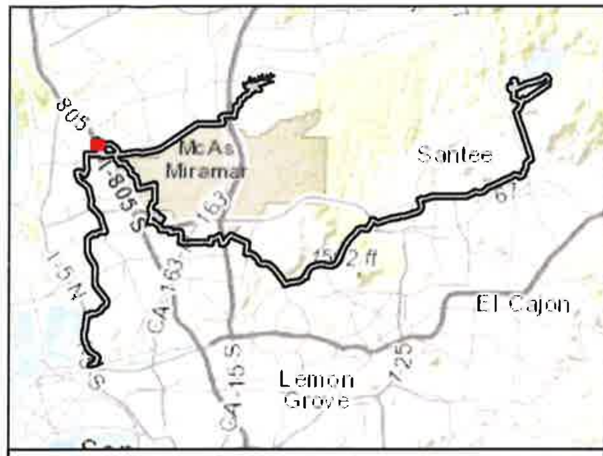


SOURCE: City of San Diego 2016, 2017; SANDAG

DUDEK

Buffer Map - Pure Water Facility Site CRAM Assessment

North City Pure Water Project



LEGEND

- Pure Water Project Study Area
- North City Pure Water Facilty
- North City Pure Water Pump Station
- CRAM Assessment Area
- Vernal Pools

0 25 50 Meters

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG

Pool and Swale Density Map - Pure Water Facility Site CRAM Assessment

North City Pure Water Project

Basic Information: Vernal Pool Systems

Assessment Area Name: SANDERS 1	
Project Name: PUREWATER PROJECT - SANDERS	
Assessment Area ID #: AA-1	
Project ID #:	**Date:** 4/27/2017
Assessment Team Members for This AA SPF & JLM/T	
AA Location: **Latitude:** 32° 50.218 **Longitude:** 117° 8.690 **Datum:**	
Wetland Category: ☒ Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)	
If Created or Restored, does the action encompass: ☐ entire wetland ☐ portion of the wetland	
What best describes the hydrologic state of the wetland at the time of assessment? ☐ ponded/inundated ☐ saturated soil, but no surface water ☒ dry	
What is the apparent hydrologic regime of the wetland? ☐ long-duration ☐ medium-duration ☒ short-duration	
Does the vernal pool system connect with the floodplain of a nearby stream? ☒ yes ☐ no	

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	~~#00~~ 1	North	32°50.205	117° 8.682	
2	2	South	32° 50.195	117° 8. 683	
3	3	East	32°50.208	117° 8.673	
4	4	West	32°50.202	117° 8.688	
5					
6					

Comments:

Scoring Sheet: Vernal Pool Systems

AA Name: Sanders 1					Date: 4/27/2017	
Attributes and Metrics			Alpha.	Numeric	**Comments/Scores**	
Attribute 1: Buffer and Landscape Context (pg. 7-15)						
(A) Aquatic Area Abundance			A	12		
(B): Percent of AA with Buffer	Alpha. A	Numeric 12				
(C): Average Buffer Width	B ~~A~~	9 ~~12~~				
(D): Buffer Condition	C ~~B~~	6 ~~9~~				
Initial Attribute Score $= A + [D \times (B \times C)^{1/2}]^{1/2}$ (12 + 9 × 12 × 12)				~~22~~	**Final Attribute Score = (Initial Score/24) x 100**	~~93~~ 83
Attribute 2: Hydrology (pg. 16-18)						
Water Source			A	12		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12	Buildings don't restrict flows	
Initial Attribute Score= sum of metric scores			36		**Final Attribute Score = (Initial Score/36) x 100**	100
Attribute 3: Physical Structure (pg. 19-25)						
Structural Patch Richness			B ~~A~~	9 ~~12~~		
Pool and Swale Density			A	12		
Topographic Complexity			C ~~B~~	6 ~~9~~		
Initial Attribute Score= sum of metric scores			~~33~~ 27		**Final Attribute Score = (Initial Score/36) x 100**	~~92~~ 75
Attribute 4: Biotic Structure (pg. 26-31)						
Horizontal Interspersion and Zonation			C ~~B~~	~~9~~ 6		
Plant Community submetric A: Number of Co-dominant species	Alpha. C ~~B~~	Numeric ~~9~~ 6				
Plant Community submetric B: Percent Non Native	D ~~C~~	~~6~~ 3				
Plant Community submetric C: Endemic Species Richness	D	3				
Plant Community Composition Metric (numeric average of submetrics A-C)				4		
Initial Attribute Score= sum of metric scores			~~15~~ 10		**Final Attribute Score = (Initial Score/24) x 100**	~~63~~ 42
Overall AA Score (Average of four Final Attribute Scores)					~~87~~ 74.9	

Worksheet 1: Aquatic Area Abundance for Vernal Pool Systems.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	120 m = 24 %
South	38 m = 8 %
East	243 m = 49 %
West	190 m = 38 %
Average value for all Four Transects *Round to the nearest integer*	30 %

Table 5: Rating for Aquatic Area Abundance for Vernal Pool Systems (enter rating in Scoring Sheet)

Rating	Alternative States
A	An average of 21 – 100 % of the transects pass through an aquatic feature of any kind.
B	An average of 11 – 20 % of the transects pass through an aquatic feature of any kind.
C	An average of 6 – 10 % of the transects pass through an aquatic feature of any kind.
D	An average of 0 – 5 % of the transects pass through an aquatic feature of any kind.

Worksheet 2: Percent of AA with Buffer

In the space provided below make a quick sketch of the AA, or on aerial the imagery, indicate where buffer is present, and record the total amount in the space provided.

See Figure - Buffer Map

Percent of AA with Buffer: ______ %

Table 7: Rating for Percent of AA with Buffer.
(enter rating in Scoring Sheet)

Rating	Alternative States (not including open-water areas)
A	Buffer is 75 - 100% of AA perimeter.
B	Buffer is 50 – 74% of AA perimeter.
C	Buffer is 25 – 49% of AA perimeter.
D	Buffer is 0 – 24% of AA perimeter.

Submetric B: Average Buffer Width

Definition: The average width of the buffer adjoining the AA is estimated by averaging the lengths of eight straight lines drawn at regular intervals around the AA from its perimeter outward to the nearest non-buffer land cover or 250 m, whichever is first encountered. It is assumed that the functions of the buffer do not increase significantly beyond an average width of about 250 m. The maximum buffer width is therefore 250 m. The minimum buffer width is 5 m, and the minimum length of buffer along the perimeter of the AA is also 5 m. Any area that is less than 5 m wide and 5 m long is too small to be a buffer. See Table 6 above for more guidance regarding the identification of AA buffers.

Table 8: Steps to Estimate Buffer Width.
(use Worksheet 2 or aerial to prepare sketch)

Step 1	Draw eight straight transects 250 m in length perpendicular to the AA through the buffer area at regular intervals along the portion of the perimeter of the AA that has a buffer. These lines should not cross.
Step 2	Estimate the buffer width of each of the transects as they extend away from the AA. Record these lengths on worksheet 3 below.
Step 3	Calculate the average buffer width. Record this width on worksheet 3 below.

Worksheet 3: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A North	240m
B	250 m
C East	250 m
D	76 m
E South	40 m
F	64 m
G West	250 m
H	250 m
Average Buffer Width *Round to nearest integer*	178 m

Table 9: Rating for Average Buffer Width
(enter rating in Scoring Sheet)

Rating	Alternative States
A	Average buffer width is 190 – 250 m.
B	Average buffer width 130 – 189 m.
C	Average buffer width is 65 – 129 m.
D	Average buffer width is 0 – 64 m.

Figure 5. Example of the method used to estimate Buffer Width. Note that the width is based on the lengths of eight lines A-H that extend at regular intervals around the perimeter of the AA where buffer is present. If a portion of the perimeter of the AA does not have buffer that is at least 5 meters wide, do not place a line there.

Submetric C: Buffer Condition

Definition: The condition of a buffer is assessed according to the extent and quality of its vegetation cover, the overall condition of its substrate, and the amount of human visitation. Evidence of direct impacts (parking lots, buildings, etc.) by people are excluded from this metric and included in the Stressor Checklist. Buffer conditions are assessed only for the portion of the wetland border that has **already been identified as buffer in the previous step**. If there is no buffer, assign a score of D.

Table 10: Rating for Buffer Condition
(enter rating in Scoring Sheet)

Rating	Alternative States
A	Buffer for AA is dominated by native vegetation, has undisturbed soils, and is apparently subject to little or no human visitation.
B	Buffer for AA is characterized by native and naturalized vegetation, has no appreciable phytomass accumulation or invasive infestations, and has mostly undisturbed soils and is apparently subject to little or low impact human visitation.
C	Buffer for AA is characterized by non-native vegetation with little or no native component, or has appreciable phytomass accumulation or invasive infestations, or has a moderate degree of soil disturbance/compaction, or there is evidence of at least moderate intensity of human visitation.
D	Buffer for AA is characterized by barren ground or otherwise compacted or disturbed soils, or there is significant cover of invasive species, or there is evidence of very intense human visitation.

Attribute 2: Hydrology

Metric 1: Water Source

Definition: Water Sources directly affect the extent, duration, and frequency of saturated or ponded conditions within an Assessment Area. Water Sources include the kinds of direct inputs of water into the AA as well as any diversions of water from the AA. Diversions are considered a water source because they affect the ability of the AA to function as a source of water for other habitats while also directly affecting the hydrology of the AA. Natural, direct sources include rainfall, and ground water discharge. Examples of unnatural, direct sources include stormdrains that empty directly into the AA or into an immediately adjacent area.

To score this metric use site aerial imagery and any other information collected about the region or watershed associated with the vernal pool system the AA is located in to assess the water source in an area up to 2 km upstream of your AA (Table 11). If the watershed is smaller than 2km, assess only the area that is associated with the vernal pool system the AA is located in.

Table 11: Rating for Water Source
(enter rating in Scoring Sheet)

Rating	Alternative States
A	There is no indication that dry season conditions are substantially controlled by artificial water sources.
B	Freshwater sources that affect the dry season conditions of the AA are mostly natural, but also obviously include occasional or small effects of modified hydrology. Indications of such anthropogenic inputs include developed land or irrigated agricultural land that comprises less than 20% of the immediate vicinity.
C	Freshwater sources that affect the dry season conditions of the AA are primarily urban runoff, direct irrigation, pumped water or other artificial hydrology. Indications are developed land or irrigated agriculture that comprise more than 20 % of the immediate vicinity.
D	Natural, freshwater sources that affect the dry season conditions of the AA have been eliminated, or all wet season inflows have been impounded or diverted.

Metric 2: Hydroperiod

Definition: Hydroperiod is the characteristic frequency and duration of inundation or saturation of a wetland during a typical year. Vernal pools are ephemeral wetlands that form in shallow depressions underlain by bedrock or by an impervious, near-surface soil horizon. These depressions fill with rainwater and runoff during the winter and may remain inundated until spring or early summer, sometimes filling and emptying repeatedly during the wet season.

Table 12: Field Indicators of Altered Hydroperiod.

Direct Engineering Evidence	Indirect Ecological Evidence
Reduced Extent and Duration of Inundation or Saturation	
• Upstream spring boxes • Impoundments • Pumps, diversions, ditching that move water out of the wetland	• Evidence of aquatic wildlife mortality • Encroachment of terrestrial vegetation • Stress or mortality of hydrophytes • Compressed or reduced plant zonation
Increased Extent and Duration of Inundation or Saturation	
• Berms • Dikes • Pumps, diversions, ditching that move water into the wetland	• Late-season vitality of annual vegetation • Recently drowned riparian vegetation • Extensive fine-grain deposits

Table 13: Rating of Hydroperiod for Vernal Pool Systems.
(enter rating in Scoring Sheet)

Rating	Alternative States
A	Hydroperiod of the AA is characterized by natural patterns of filling, inundation, or saturation as well as natural patterns of drying or drawdown with no indication of hydro-modification. There are no artificial controls on the hydroperiod.
B	The filling, inundation, or saturation patterns in the AA are of greater magnitude or longer duration than would be expected under natural condition (or compared to comparable natural wetlands), but thereafter, the AA is subject to natural processes and patterns of drawdown or drying.
C	The patterns of filling, inundation or saturation of the AA as well as the patterns of drawdown or drying of the AA are naturalistic but controlled by unnatural processes due to hydromodification.
D	The patterns of filling, inundation or saturation of the AA as well as the patterns of drawdown or drying of the AA significantly deviate from natural patterns due to hydromodification.

Metric 3: Hydrologic Connectivity

Definition: Hydrologic Connectivity describes the ability of water to flow into or out of the wetland, or to inundate their adjacent uplands. It provides for the ecotone caused by the moisture gradient between the vernal pool. and its surrounding upland. For vernal pool systems, it is scored by assessing the degree to which hydrologic connectivity along the margin of the AA is restricted by unnatural features, such as levees and excessively high banks. **This metric applies to both within and immediately adjacent to the AA.**

Table 14: Rating of Hydrologic Connectivity for Vernal Pool Systems. (enter rating in Scoring Sheet)

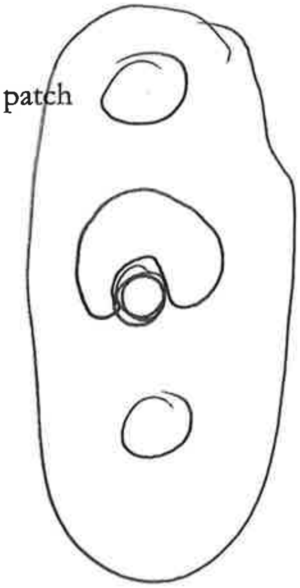
Rating	Alternative States
A	Rising water in the AA has unrestricted access to adjacent areas, without levees or other obstructions to the lateral movement of flood waters.
B	There are unnatural features such as levees or road grades that limit the amount of adjacent transition zone or the lateral movement of flood waters, relative to what is expected for the setting. But, the limitations exist for less than 50% of the boundary of the AA. Restrictions may be intermittent along margins of the AA, or they may occur only along one side of the AA. Flood flows may exceed the obstructions, but drainage back to the AA is obstructed.
C	The amount of adjacent transition zone or the lateral movement of flood waters is limited, relative to what is expected for the setting, by unnatural features, such as levees or road grades, for 50-90% of the AA. Flood flows may exceed the obstructions, but drainage back to the AA is obstructed.
D	The amount of adjacent transition zone or the lateral movement of flood waters is limited, relative to what is expected for the setting, by unnatural features, such as levees or road grades, for more than 90% of the AA.

Attribute 3: Physical Structure

Metric 1: Structural Patch Richness

Patch richness is the number of different obvious types of physical surfaces or features that may provide habitat for aquatic (including wetland) or riparian species. This metric is different from topographic complexity in that it addresses the number of different patch types, whereas topographic complexity helps evaluate the spatial arrangement and interspersion of the types. Physical patches can be natural or unnatural.

Worksheet 4: Structural Patch Type for Vernal Pool Systems.



Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for Presence
Adjacent shrub or tree cover	X
Animal mounds and burrows	X
Bare soil (minimum 3 m^2)	
Cobble and boulders	X
Complexly-shaped pools	X
Drainage branches (more than 1 drainage branch)	/
Islands	
Large individual pools	
Large swales	
Mima mounds	X
Patches of dense vegetation	X
Pool Cluster	X
Simply-shaped pools	X
Small individual pools	
Small swales	
Soil cracks	
Within Pool Mounds	
Total Possible	**17**
No. Observed Patch Types (enter here and use in Table 15)	10 8

Table 15: Rating of Structural Patch Richness.
(enter rating in Scoring Sheet)

Rating	Vernal Pool Systems
A	≥ 11
B	8 – 10
C	5 – 7
D	≤ 4

Patch Type Definitions for Vernal Pool Systems

<u>Adjacent shrub or tree cover</u>. These are patches of adjacent shrub or tree areas adjacent to pools. They provide shading, nutrient input, and potentially affect pool dry-down among other biogeochemical processes.

<u>Animal mounds and burrows</u> Many vertebrates make mounds or holes as a consequence of their foraging, denning, predation, or other behaviors. The resulting soil disturbance helps to redistribute soil nutrients and thus it influences plant species composition and abundance. To be considered a patch type there should be evidence that a population of burrowing animals has occupied the Assessment Area. A single burrow or mound does not constitute a patch.

<u>Bare soil.</u> Bare soil is any area at least $3m^2$ in size within a vernal pool system that has less than 5% cover of vegetation during the peak of the growing season. Rock outcrops do not qualify as bare soil.

<u>Cobble and boulders</u> Cobble and boulders are rocks of different size categories. The long axis of cobble ranges from about 6 cm to about 25 cm. A boulder is any rock having a long axis greater than 25 cm. Submerged cobbles and boulders provide abundant habitat for aquatic macroinvertebrates. Exposed cobbles and boulders provide roosting habitat for birds and shelter for amphibians. They contribute to patterns of shade and light and air movement near the ground surface that affect local soil moisture gradients, deposition of seeds and debris, and overall substrate complexity.

<u>Complexly-shaped pools</u> Vernal pool systems or complexes usually consist of many pools of different shapes. In general, pools can be separated into two shape classes; simply-shaped pools and complexly-shaped pools. Complexly-shaped pools do not resemble circles or ovals. They are much longer than wide, or they are kidney-shaped, or they vary in width in complex ways that are not well represented by either a circle or an oval.

<u>Drainage branches (more than 1 drainage branch).</u> Vernal pool systems usually consist of many pools that are interconnected by, or dispersed among, one or more shallow pathways of surface water flow called swales. In their downstream reaches, some swales develop obvious banks and beds and therefore can be called channels. The swales and/or channels that drain to a common place comprise a drainage network. If the drainage network consists of two or more swales and/or channels that are clearly confluent with each other (i.e., they are connected to, and contribute to the flow of, another swale or channel), then the network is considered to have more than one branch. There must be obvious overland flow (swales) to be considered a drainage branch.

Islands There are patches of upland vegetation located within pools and lying topographically above the maximum zone of pool inundation.

Large vernal pools Vernal pool systems or complexes usually consist of many pools of different sizes. For the purpose of assessing pool systems using CRAM, two pool size classes are recognized – large and small. Large pools are defined for the purposes of this patch type checklist as pools that are at least 3 times the size of the smallest pool in the AA.

Large swales Large swales transport water, but also generally contain wide, flat areas that pond similar to vernal pools (but are less well defined than those occupying the terraces). Large swales are fed by other large and small swales and are rarely directly connect to pools.

Mima mounds Mima mounds are elliptical mounds of soil, usually 1-3 meters tall, and uniformly distributed across a landscape. The sizes of areas between mounds is often very similar to the mound sizes, such that the landscape, as viewed from a few thousand feet above, resembles the surface of a golf ball. Vernal pools tend to form in the low areas between mima mounds.

Patches of dense vegetation (Juncus, Eleocharis, bunchgrasses) – Patches of vegetation in which one or several species have significantly higher vegetative cover in comparison with the remainder of the pool. These patches should be visually distinguishable.

Pool Cluster. Vernal pool systems or complexes usually consist of many pools of different sizes. Some pools are interconnected by shallow pathways of surface water flow called swales. In their downstream reaches, some swales develop obvious banks and beds and therefore can be called channels. The swales and/or channels that drain to a common place comprise a drainage network. Three or more vernal pools of any size that exist in the same drainage network compose a vernal pool cluster.

Simply-shaped pools Vernal pool systems or complexes usually consist of many pools of different shapes. In general, pools can be separated into two shape classes; simply-shaped pools and complexly-shaped pools. Simply-shaped pools resemble circles or ovals.

Small individual pools Vernal pool systems or complexes usually consist of many pools of different sizes. For the purpose of assessing pool systems using CRAM, two pool size classes are recognized. The small pools in a system are simply smaller than most other pools in the system. There is no maximum size of small pools.

Small swales Small swales are linear features that simply transport water between well defined pools or from pools to steam features.

Soil cracks Repeated wetting and drying of fine grain soil that typifies some wetlands can cause the soil to crack and form deep fissures that increase the mobility of heavy metals, promote oxidation and subsidence, while also providing habitat for amphibians and macroinvertebrates. Cracks must be a minimum of 1 inch deep to qualify.

Within Pool Mounds These are patches (of earth) located within pools and raised above the pool bottom at elevation that lies within the zone of maximum inundation. Mounds may be inundated periodically during the wet season or saturated by surrounding ponded water for sufficient duration to promote a dominance of hydrophytic vegetation characteristic of pool basins or edges.

Metric 2: Pool and Swale Density (Vernal Pool Systems ONLY)

One aspect of vernal pool system physical structure that emerges at the AA scale is the density of pools and swales, meaning their absolute percent cover across the AA. As density increases, the potential for each pool or swale to be hydrologically and ecologically interconnected also increases, as does the potential for density-independent disturbance and stress to be accommodated by the system as a whole.

Density is assessed by estimating the percent of each of four line transects that crosses swales or pools within the AA. These transect lines are the same as the "within the AA" segments of the transect lines used for the Aquatic Area Connectivity metric (see the Aquatic Area Connectivity metric of the Landscape and Buffer Attribute). The method for establishing the transect lines is also provided here.

On digital or hardcopy site imagery, identify the approximate center of the AA. In each of the four cardinal compass directions, draw a straight transect line from the center of the AA to the AA boundary. While viewing the site imagery at a scale of 1:1000 to 1:2000, estimate the percentage of each of these four transect lines inside the AA that passes through a pool or swale. Use worksheet 5 below to record these estimates.

Figure 6. Example of method to assess pool and swale density in a vernal pool system.

Worksheet 5: Pool and Swale Density for Vernal Pool Systems.

Percentage of Each Transect Line Crossing A Vernal Pool or a Vernal Swale	
Transect	Percent Crossing a Pool or Swale
North	40
South	50
East	60
West	80
Average value for all Four Transects ***Round to nearest integer***	58

Table 16: Rating for Pool and Swale Density for Vernal Pool Systems. (enter rating in Scoring Sheet)

Rating	Alternative States
A	An average of 31– 100 % of the transects crosses pools or swales.
B	An average of 21 – 30 % of the transects crosses pools or swales.
C	An average of 11 – 20 % of the transects crosses pools or swales.
D	An average of 0 – 10 % of the transects crosses pools or swales.

Metric 3: Topographic Complexity

Topographic complexity refers to the variety of elevations within a wetland due to micro- topographic features and elevation gradients. This metric is assessed for each of the 3-6 pools randomly selected from the Vernal Pool System. Cross sections of the individual pools are recorded in Worksheets 6a-6f below. Scores for each pool are then recorded in Worksheet 6g below based on the practitioners drawings, the indicators listed in Table 17, the scale-independent schematic profiles in Figure 7, and the ratings in table 18.

Table 17: Typical indicators of Macro- and Micro-topographic Complexity.

Type	Examples of Topographic Features
Vernal Pools and Pool Systems	soil cracks, "mima-mounds," rivulets between pools or along swales, cobble, plant hummocks, cattle or sheep tracks

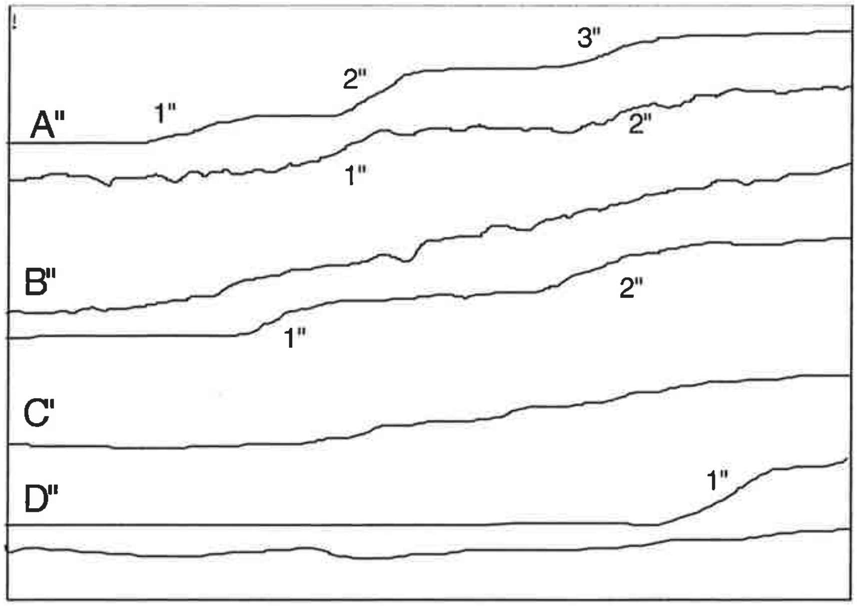


Figure 7: Scale-independent schematic profiles of Topographic Complexity. For vernal pool systems, the right end represents the lower margin of the upland matrix, slightly above the edge of a large or small vernal pool. The choice of indicative profile should be based on sketches along the 4 cardinal compass directions. In the uppermost profile, the numbers 1, 2, and 3 refer to separate apparent breaks in the topographic slope. In other profiles, either two, one, or no breaks in the slope are evident.

Sanders 1

Table 18: Rating Topographic Complexity for Vernal Pool Systems.
(enter results in Worksheet 6g below)

Rating	Alternative States
A	There are three obvious breaks in slope with or without abundant micro-topographic relief along most of the average profile. OR There are two breaks in slope with abundant micro-topographic relief.
B	There is essentially a single slope with abundant micro-topographic relief. OR There are two breaks in slope without abundant micro-topographic relief.
C	There is a single slope without abundant micro-topographic relief.
D	There is essentially no slope, with or without micro-topographic relief. OR There is a single slope that is unusually steep and short for a natural profile.

Worksheet 6g: Rating of Topographic Complexity for Vernal Pool Systems.

Replicate Number	**Replicate Score (A = 12; B = 9; C = 6; D = 3)**	
	Alpha.	Numeric
Replicate 1 - 30	C	6
Replicate 2 - 31	C	6
Replicate 3 - 32	C	6
Replicate 4		
Replicate 5		
Replicate 6		
Overall Average Score for All Pool Replicates ***Round to nearest integer*** **(enter here and use in Table 19)**		6

Table 19: Rating for Overall Topographic Complexity for Vernal Pool Systems.
(enter rating in Scoring Sheet)

Rating	Vernal Pool Systems
A	≥ 11
~~B~~	8 – 10
C	5 – 7
D	≤ 4

Attribute 4: Biotic Structure

Metric 1: Horizontal Interspersion and Zonation

Horizontal biotic structure refers to the variety and interspersion of plant "zones," plant monocultures or obvious multi-species association that are arrayed along gradients of elevation, moisture, or other environmental factors. Interspersion is essentially a measure of the number of distinct plant zones and the amount of shared edge between them.

This metric is assessed for each of the 3-6 pools randomly selected from the AA. Drawings of the individual pools are recorded in Worksheets 7a-7f below. Make special note of amount of shared edge. Scores for each pool are then recorded in Worksheet 7g below based on the practitioners drawings, the scale-independent images in Figure 8, and the narrative in Table 20.

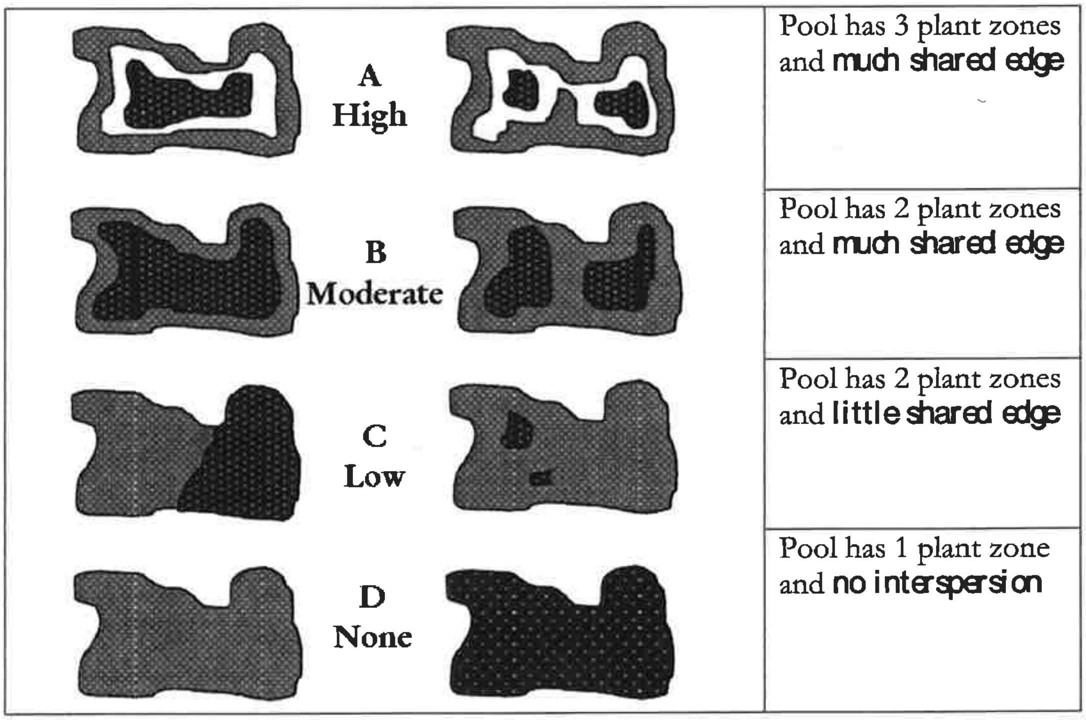


Figure 8: Degrees of interspersion of plant zones for Individual Vernal Pools. Each zone must comprise at least 5% of the pool area. The white area in this figure surrounding each pool represents the upland matrix; the orange area represents the marginal saturation zone. All pools, even as shown for score "D", therefore have at least 1 zone. It is helpful to assign names of plant species or associations of species to the colored patches and to make special note of amount of shared edge.

Sanders 1

Table 20: Rating of Horizontal Interspersion and Zonation of Plant Zones for Vernal Pools.
(enter results in Worksheet 7g below)

Rating	Alternative States
A	Pool has a high degree of plan-view interspersion.
B	Pool has a moderate degree of plan-view interspersion.
C	Pool has a low degree of plan-view interspersion.
D	Pool has essentially no plan-view interspersion.

Worksheet 7g: Rating of Horizontal Interspersion for Vernal Pool Systems.

Replicate Number	Replicate Score (A = 12; B = 9; C = 6; D = 3)	
	Alpha.	Numeric
Replicate 1 30	C	6
Replicate 2 31	B	9
Replicate 3 32	C	6
Replicate 4		
Replicate 5		
Replicate 6		
Overall Average Score for All Pool Replicates ***Round to nearest integer*** **(enter here and use in Table 21)**		7

Table 21: Rating for Horizontal Interspersion for Vernal Pool Systems.
(enter rating in Scoring Sheet)

Rating	Vernal Pool Systems
A	≥ 11
~~**B**~~	8 – 10
C	5 – 7
D	≤ 4

Metric 2: Plant Community

The Plant Community Metric is composed of three submetrics. The first two submetrics, Number of Co- dominant Species and Percent Invasion, are assessed for each of the 3-6 pools randomly selected from the AA. The individual pool scores are recorded in Worksheets 8a-6f. The third submetric, Endemic Species Richness, is not assessed for each replicate pool. Rather, a list of all vernal pool endemics is compiled for all replicate pools combined.

Submetric A: Number of Co-dominant Species

For the pool as a whole, all plant species that comprise at least 10% relative cover are considered to be dominant. Only living vegetation in growth position is considered in this metric. Dead or senescent vegetation is disregarded.

Submetric B: Percent Non-native

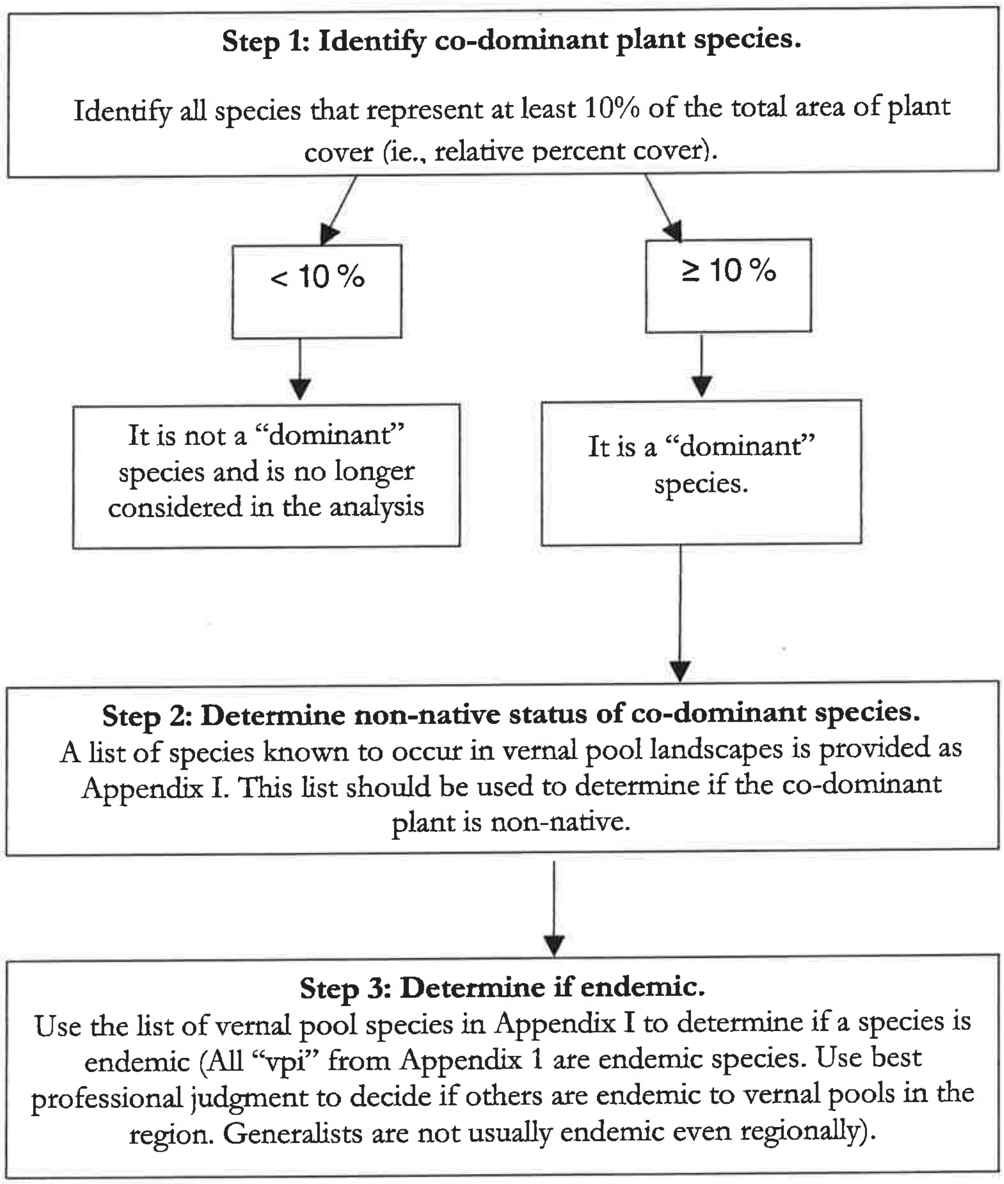
A list of native pool species is provided in Appendix I. Any species not on this list is considered to be non- native. However, this list is not exhaustive, and there may be native upland species occurring in a pool. Expertise is required to assure that species are correctly identified as native or non-native.

Submetric C: Endemic Species Richness

This submetric is based on the total number of co-dominant native plant species endemic to vernal pools that occur in the AA. All "vpi" from Appendix 1 are endemic species. Use best professional judgment to decide if others are endemic to vernal pools in the region. Generalists are not usually endemic even regionally. For Vernal Pool Systems, this metric is assessed for all the replicate pools combined.

30	31	32
Zeltnera	Dein fas ✓	Erod cic ✓
Dein fas ✓	Psilo unknown ten?	Dein. fas ✓
Nava hama *	Descham *	Bro orcutti
Brodia or	Logfia *	Lyth hysso
Hyper cha	Erodium cic ✓	Croton set.
Festuca myuros ✓	Zeldt nera ✓	Hypoch glab
Logia gallica	Lysimachia	~~Jun buffonius~~ Des. danth *
Lythrum hysopp	Lythrum	Fest. myuros
~~[illegible]~~ Deschampsia * bra	Festuca myuros	Logfia gallica ✓
Psilocarpa ~~tenellus~~ brev	Crot set	~~Brodia or~~
Deschampsia danthon	Navarrettia hamata	Psilo ~~brev~~ tenellus ? unknown *
Erodium cic ✓	Pseudo luteo alba	Lysimachia minimus
Juncus buffonius	Fest myuros ✓	
	~~Juncus buffo~~ Juncus buffonius	

Figure 9: Flow Chart to Determine Plant Dominance



Worksheet 8g: Plant Community Metric-

Calculation of Average Number of Co-dominants in all Replicate Pools.

Pool Replicate	Number of Co-dominants
Pool 1 -70	~~5~~ 3
Pool 2 -31	~~6~~ 4
Pool 3 -32	~~5~~ 3
Pool 4	
Pool 5	
Pool 6	
Average Number of Co-Dominants ***Round to nearest integer*** **(enter here and use in Table 22)**	~~5~~ 3.3

Table 22: Ratings for Number of Co-dominant Species (enter rating in Scoring Sheet)

Rating	Average number of Co-dominants
A	≥ 6
B	4 - 5
C	2 - 3
D	1

Worksheet 8h: Plant Community Metric – List of Unique Co-dominant Plant Species from all Vernal Pools Combined.

endemic (vpi) and ✓

Plant Name	Check if non-native	Check if in Appendix I
Deinandra fasciculatum		
~~Navarretia hamata~~		
Festuca myuros	X	
~~Deschampsia danthonioides~~		
Erodium cicutarium	X	
Logfia gallica	X	
Zeltnera venusta		
Total number of co-dominant species (A)	5	
Total number of co-dominant species that are non-native (B)	3	
Percent non-native **[(B)/(A) x 100] *Round to nearest integer*** **(enter here and use in Table 23)**	3/5×100 = 60	
Total number of co-dominant species that are endemic (enter here and use in Table 24)		0

Table 23: Ratings for Percent Non-native species. (enter rating in Scoring Sheet)

Rating	Percent Non-native
A	0 - 20%
B	21 - 33%
C	34 - 49%
D	≥ 50 %

Table 24: Ratings for VP Endemic Species Co-Dominants. (enter rating in Scoring Sheet)

Rating	VP Endemic Species Co-dominants
A	≥ 9
B	6 – 8
C	3 – 5
D	0 – 2

#30

Pool Replicate 1

Worksheet 6a: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1

W

E

Profile 2

S

N

Worksheet 7a: Sketch of Vernal Pool Interspersion.

Worksheet 8a: Co-dominant Plant Species in Vernal Pool

Note: A dominant species represents ≥10% relative cover.

Dinandra Fasc.
Erodium cic
~~Juncus Bufonius~~ / Desc.
Festuca Myoros

Dionandra Fac
Navarretia Lomata
~~Crete weed~~ Hypochaeris
Festuca myoros
~~UK #1~~ - Longia gallica
~~Callitriche~~ Zeltnera
Brodiaea orcutti
Juncus bufonius
Lythrum hyssop.
Wooly marbles (psilocarpus) ~~B. tene~~ Brev

Deschampsia DAN

#31

Pool Replicate 2

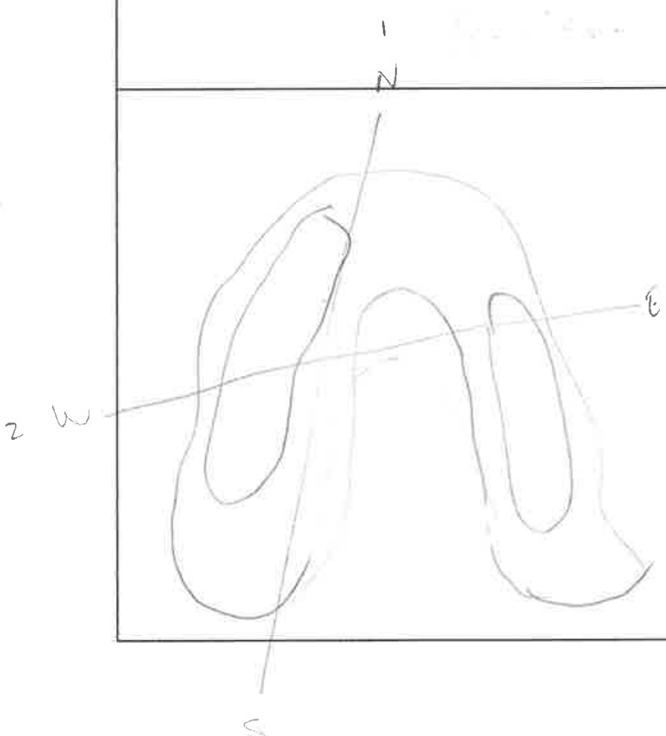
Worksheet 6b: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1

Profile 2

Worksheet 7b: Sketch of Vernal Pool Interspersion.



Worksheet 8b: Co-dominant Plant Species in Vernal Pool

Note: A dominant species represents ≥10% relative cover.

Zeltnera venusta
Downingia EK
Erodium cic
Festuca
~~Deschampsia dan~~

Downingia fac
Juncus Buf
~~crete weed~~ Hypochaeris
Conchalagua
Brodiaea orcuttii
Lythrum hyssop.
Festuca myuros
Croton Sp.
Navarretia hamata
Deschampsia

Pseudognaphalium luteoalbum
Psilocarpus brevissimus
Lythrum gal
Lysimachia mini
Psilocarpus tenellus

#32

Pool Replicate 3

Worksheet 6c: Sketches of Vernal Pool Profiles

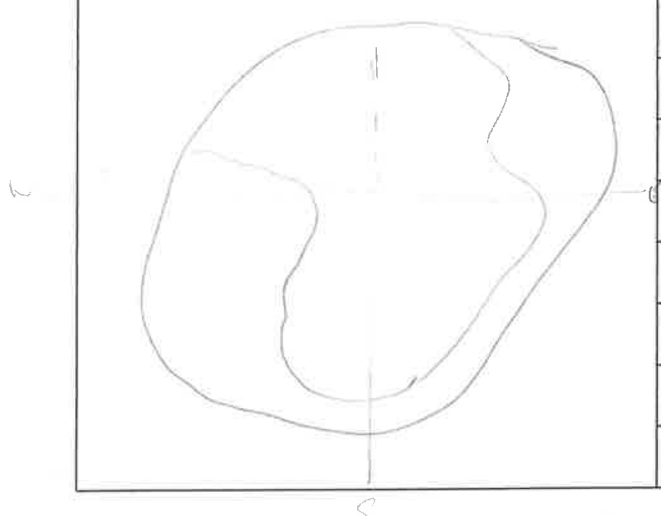
Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1

$\boxed{C=}$

Profile 2

Worksheet 7c: Sketch of Vernal Pool Interspersion.



Worksheet 8c: Co-dominant Plant Species in Vernal Pool

Note: A dominant species represents ≥10% relative cover.

Erodium Cic
Dianandra Fac
~~Deschampsia Dan~~
Lagtia gall
~~UWK #7~~

Dianandra Fac
Erodium Cic
Brodiaea orcuttii
Lythrum Hyssopifolia
Croton Setig.
Getc...al
Juncus bufonius

Pool Replicate 4

Worksheet 6d: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1
Profile 2

Worksheet 7d: Sketch of Vernal Pool Interspersion.	**Worksheet 8d: Co-dominant Plant Species in Vernal Pool** Note: A dominant species represents ≥10% relative cover.

Pool Replicate 5

Worksheet 6e: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1
Profile 2

Worksheet 7e: Sketch of Vernal Pool Interspersion.	**Worksheet 8e: Co-dominant Plant Species in Vernal Pool** Note: A dominant species represents ≥10% relative cover.

Pool Replicate 6

Worksheet 6f: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1
Profile 2

Worksheet 7f: Sketch of Vernal Pool Interspersion.	**Worksheet 8f: Co-dominant Plant Species in Vernal Pool** Note: A dominant species represents ≥10% relative cover.

Guidelines to Complete the Stressor Checklists

A stressor, as defined for the purposes of the CRAM, is an anthropogenic perturbation within a wetland or its environmental setting that is likely to negatively impact the condition and function of the CRAM Assessment Area (AA). A disturbance is a natural phenomenon that affects the AA.

There are four underlying assumptions of the Stressor Checklist: (1) deviation from the best achievable condition can be explained by a single stressor or multiple stressors acting on the wetland; (2) increasing the number of stressors acting on the wetland causes a decline in its condition (there is no assumption as to whether this decline is additive (linear), multiplicative, or is best represented by some other non-linear mode); (3) increasing either the intensity or the proximity of the stressor results in a greater decline in condition; and (4) continuous or chronic stress increases the decline in condition.

The process to identify stressors is the same for all wetland types. For each CRAM attribute, a variety of possible stressors are listed. Their presence and likelihood of significantly affecting the AA are recorded in the Stressor Checklist Worksheet. For the Hydrology, Physical Structure, and Biotic Structure attributes, the focus is on stressors operating within the AA or within 50 m of the AA. For the Buffer and Landscape Context attribute, the focus is on stressors operating within 500 m of the AA. More distant stressors that have obvious, direct, controlling influences on the AA can also be noted.

Table 25: Wetland disturbances and conversions.

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

Worksheet 9: Stressor Checklist.

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

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	X
Comments		
Site has limited fencing and is therefore accessed readily. Some homeless encampments are found onsite.		

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

Comments

Stinkwort (Dittrichia graveolens) is present within 50m of the AA.

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

Comments

Some mountain bike riding evident.

LEGEND

- Project Study Area
- SANDER Mitigation Site
- CRAM Assessment Area 1
- Aquatic Area Abundance Area - 30m
- Vernal Pools

Other Aquatic Resorces

- USGS NHD blue line streams
- NWI Wetlands
- Other Aquatic Resources Buffer

0 75 150 Meters

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG

Aquatic Area Abundance Map - Pure Water Facility Site CRAM Assessment

North City Pure Water Project

LEGEND

- Pure Water Project Study Area
- SANDER Mitigation Site
- CRAM Assessment Area 1
- Assessment Area Buffer - 250m
- Vernal Pools

0 25 50 Meters

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG

Buffer Map - SANDER Mitigation Site CRAM Assessment

North City Pure Water Project

LEGEND

- Pure Water Project Study Area
- SANDER Mitigation Site
- CRAM Assessment Area 1
- Vernal Pools

0 25 50 Meters

DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG

Pool and Swale Density Map - SANDER Mitigation Site CRAM Assessment

North City Pure Water Project

Scoring Sheet: Vernal Pool Systems

AA Name: Sanders #2					Date: 4/27/17	
Attributes and Metrics			Alpha.	Numeric	**Comments/Scores**	
Attribute 1: Buffer and Landscape Context (pg. 7-15)						
(A) Aquatic Area Abundance			A	12		
(B): *Percent of AA with Buffer*	Alpha.	Numeric				
	A	12				
(C): *Average Buffer Width*	B	9				
(D): *Buffer Condition*	C ~~B~~	6 ~~9~~				
Initial Attribute Score $= A + [D \times (B \times C)^{1/2}]^{1/2}$ (12, 9, 12, 9)				20 ~~22~~	**Final Attribute Score = (Initial Score/24) x 100**	~~90~~ 83
Attribute 2: Hydrology (pg. 16-18)						
Water Source			A	12		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12		
Initial Attribute Score= sum of metric scores			36		**Final Attribute Score = (Initial Score/36) x 100**	100
Attribute 3: Physical Structure (pg. 19-25)						
Structural Patch Richness			C	6		
Pool and Swale Density			C	6		
Topographic Complexity			~~B~~ C	~~9~~ 6		
Initial Attribute Score= sum of metric scores			~~21~~ 18		**Final Attribute Score = (Initial Score/36) x 100**	~~58~~ 50
Attribute 4: Biotic Structure (pg. 26-31)						
Horizontal Interspersion and Zonation			C	6		
	Alpha.	Numeric				
Plant Community submetric A: Number of Co-dominant species	C	6				
Plant Community submetric B: Percent Non Native	C	6				
Plant Community submetric C: Endemic Species Richness	D	3				
Plant Community Composition Metric *(numeric average of submetrics A-C)*				5		
Initial Attribute Score= sum of metric scores			11		**Final Attribute Score = (Initial Score/24) x 100**	46
Overall AA Score (Average of four Final Attribute Scores)					74	

Basic Information: Vernal Pool Systems

Assessment Area Name:	Sanders #2
Project Name:	Pure Water
Assessment Area ID #:	Sanders #2
Project ID #:	**Date:** 4/27/17

Assessment Team Members for This AA

SF; JT

AA Location:

Latitude: 32° 50.239 **Longitude:** 117° 8.750' **Datum:**

Wetland Category:

☒ Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

☐ entire wetland ☐ portion of the wetland

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

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

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration ☒ short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

☐ yes ☐ no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1	North	32° 50.245 N	117° 8.733 W	
2	2	South	32° 50.240 N	117° 8.742 W	
3	3	East	32° 50.232 N	117° 8.725 W	
4	4	West	32° 50.240 N	117° 8.755 W	
5					
6					

Comments:

Worksheet 1: Aquatic Area Abundance for Vernal Pool Systems.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	175 m = 35 %
South	116 m = 23 %
East	420 m = 84 %
West	110 m = 22 %
Average value for all Four Transects *Round to the nearest integer*	205 m = 41 %

Table 5: Rating for Aquatic Area Abundance for Vernal Pool Systems (enter rating in Scoring Sheet)

Rating	Alternative States
A	An average of 21 – 100 % of the transects pass through an aquatic feature of any kind.
B	An average of 11 – 20 % of the transects pass through an aquatic feature of any kind.
C	An average of 6 – 10 % of the transects pass through an aquatic feature of any kind.
D	An average of 0 – 5 % of the transects pass through an aquatic feature of any kind.

Worksheet 2: Percent of AA with Buffer

In the space provided below make a quick sketch of the AA, or on aerial the imagery, indicate where buffer is present, and record the total amount in the space provided.

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

Table 7: Rating for Percent of AA with Buffer.
(enter rating in Scoring Sheet)

Rating	Alternative States (not including open-water areas)
A	Buffer is 75 - 100% of AA perimeter.
B	Buffer is 50 – 74% of AA perimeter.
C	Buffer is 25 – 49% of AA perimeter.
D	Buffer is 0 – 24% of AA perimeter.

Submetric B: Average Buffer Width

Definition: The average width of the buffer adjoining the AA is estimated by averaging the lengths of eight straight lines drawn at regular intervals around the AA from its perimeter outward to the nearest non-buffer land cover or 250 m, whichever is first encountered. It is assumed that the functions of the buffer do not increase significantly beyond an average width of about 250 m. The maximum buffer width is therefore 250 m. The minimum buffer width is 5 m, and the minimum length of buffer along the perimeter of the AA is also 5 m. Any area that is less than 5 m wide and 5 m long is too small to be a buffer. See Table 6 above for more guidance regarding the identification of AA buffers.

Table 8: Steps to Estimate Buffer Width.
(use Worksheet 2 or aerial to prepare sketch)

Step 1	Draw eight straight transects 250 m in length perpendicular to the AA through the buffer area at regular intervals along the portion of the perimeter of the AA that has a buffer. These lines should not cross.
Step 2	Estimate the buffer width of each of the transects as they extend away from the AA. Record these lengths on worksheet 3 below.
Step 3	Calculate the average buffer width. Record this width on worksheet 3 below.

Worksheet 3: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	131 m
B	250 m
C	250 m
D	135m
E	80m
F	112m
G	250 m
H	150m
Average Buffer Width ***Round to nearest integer***	170 m

Table 9: Rating for Average Buffer Width
(enter rating in Scoring Sheet)

Rating	Alternative States
A	Average buffer width is 190 – 250 m.
B	Average buffer width 130 – 189 m.
C	Average buffer width is 65 – 129 m.
D	Average buffer width is 0 – 64 m.

Figure 5. Example of the method used to estimate Buffer Width. Note that the width is based on the lengths of eight lines A-H that extend at regular intervals around the perimeter of the AA where buffer is present. If a portion of the perimeter of the AA does not have buffer that is at least 5 meters wide, do not place a line there.

Submetric C: Buffer Condition

Definition: The condition of a buffer is assessed according to the extent and quality of its vegetation cover, the overall condition of its substrate, and the amount of human visitation. Evidence of direct impacts (parking lots, buildings, etc.) by people are excluded from this metric and included in the Stressor Checklist. Buffer conditions are assessed only for the portion of the wetland border that has **already been identified as buffer in the previous step**. If there is no buffer, assign a score of D.

Table 10: Rating for Buffer Condition
(enter rating in Scoring Sheet)

Rating	Alternative States
A	Buffer for AA is dominated by native vegetation, has undisturbed soils, and is apparently subject to little or no human visitation.
B	Buffer for AA is characterized by native and naturalized vegetation, has no appreciable phytomass accumulation or invasive infestations, and has mostly undisturbed soils and is apparently subject to little or low impact human visitation.
C	Buffer for AA is characterized by non-native vegetation with little or no native component, or has appreciable phytomass accumulation or invasive infestations, or has a moderate degree of soil disturbance/compaction, or there is evidence of at least moderate intensity of human visitation.
D	Buffer for AA is characterized by barren ground or otherwise compacted or disturbed soils, or there is significant cover of invasive species, or there is evidence of very intense human visitation.

Attribute 2: Hydrology

Metric 1: Water Source

Definition: Water Sources directly affect the extent, duration, and frequency of saturated or ponded conditions within an Assessment Area. Water Sources include the kinds of direct inputs of water into the AA as well as any diversions of water from the AA. Diversions are considered a water source because they affect the ability of the AA to function as a source of water for other habitats while also directly affecting the hydrology of the AA. Natural, direct sources include rainfall, and ground water discharge. Examples of unnatural, direct sources include stormdrains that empty directly into the AA or into an immediately adjacent area.

To score this metric use site aerial imagery and any other information collected about the region or watershed associated with the vernal pool system the AA is located in to assess the water source in an area up to 2 km upstream of your AA (Table 11). If the watershed is smaller than 2km, assess only the area that is associated with the vernal pool system the AA is located in.

Table 11: Rating for Water Source
(enter rating in Scoring Sheet)

Rating	Alternative States
A	There is no indication that dry season conditions are substantially controlled by artificial water sources.
B	Freshwater sources that affect the dry season conditions of the AA are mostly natural, but also obviously include occasional or small effects of modified hydrology. Indications of such anthropogenic inputs include developed land or irrigated agricultural land that comprises less than 20% of the immediate vicinity.
C	Freshwater sources that affect the dry season conditions of the AA are primarily urban runoff, direct irrigation, pumped water or other artificial hydrology. Indications are developed land or irrigated agriculture that comprise more than 20 % of the immediate vicinity.
D	Natural, freshwater sources that affect the dry season conditions of the AA have been eliminated, or all wet season inflows have been impounded or diverted.

Metric 2: Hydroperiod

Definition: Hydroperiod is the characteristic frequency and duration of inundation or saturation of a wetland during a typical year. Vernal pools are ephemeral wetlands that form in shallow depressions underlain by bedrock or by an impervious, near-surface soil horizon. These depressions fill with rainwater and runoff during the winter and may remain inundated until spring or early summer, sometimes filling and emptying repeatedly during the wet season.

Table 12: Field Indicators of Altered Hydroperiod.

Direct Engineering Evidence	Indirect Ecological Evidence
Reduced Extent and Duration of Inundation or Saturation	
• Upstream spring boxes • Impoundments • Pumps, diversions, ditching that move water **out of** the wetland	• Evidence of aquatic wildlife mortality • Encroachment of terrestrial vegetation • Stress or mortality of hydrophytes • Compressed or reduced plant zonation
Increased Extent and Duration of Inundation or Saturation	
• Berms • Dikes • Pumps, diversions, ditching that move water **into** the wetland	• Late-season vitality of annual vegetation • Recently drowned riparian vegetation • Extensive fine-grain deposits

Table 13: Rating of Hydroperiod for Vernal Pool Systems.
(enter rating in Scoring Sheet)

Rating	Alternative States
A	Hydroperiod of the AA is characterized by natural patterns of filling, inundation, or saturation as well as natural patterns of drying or drawdown with no indication of hydro-modification. There are no artificial controls on the hydroperiod.
B	The filling, inundation, or saturation patterns in the AA are of greater magnitude or longer duration than would be expected under natural condition (or compared to comparable natural wetlands), but thereafter, the AA is subject to natural processes and patterns of drawdown or drying.
C	The patterns of filling, inundation or saturation of the AA as well as the patterns of drawdown or drying of the AA are naturalistic but controlled by unnatural processes due to hydromodification.
D	The patterns of filling, inundation or saturation of the AA as well as the patterns of drawdown or drying of the AA significantly deviate from natural patterns due to hydromodification.

Metric 3: Hydrologic Connectivity

Definition: Hydrologic Connectivity describes the ability of water to flow into or out of the wetland, or to inundate their adjacent uplands. It provides for the ecotone caused by the moisture gradient between the vernal pool and its surrounding upland. For vernal pool systems, it is scored by assessing the degree to which hydrologic connectivity along the margin of the AA is restricted by unnatural features, such as levees and excessively high banks. **This metric applies to both within and immediately adjacent to the AA.**

Table 14: Rating of Hydrologic Connectivity for Vernal Pool Systems.
(enter rating in Scoring Sheet)

Rating	Alternative States
A	Rising water in the AA has unrestricted access to adjacent areas, without levees or other obstructions to the lateral movement of flood waters.
B	There are unnatural features such as levees or road grades that limit the amount of adjacent transition zone or the lateral movement of flood waters, relative to what is expected for the setting. But, the limitations exist for less than 50% of the boundary of the AA. Restrictions may be intermittent along margins of the AA, or they may occur only along one side of the AA. Flood flows may exceed the obstructions, but drainage back to the AA is obstructed.
C	The amount of adjacent transition zone or the lateral movement of flood waters is limited, relative to what is expected for the setting, by unnatural features, such as levees or road grades, for 50-90% of the AA. Flood flows may exceed the obstructions, but drainage back to the AA is obstructed.
D	The amount of adjacent transition zone or the lateral movement of flood waters is limited, relative to what is expected for the setting, by unnatural features, such as levees or road grades, for more than 90% of the AA.

Attribute 3: Physical Structure

Metric 1: Structural Patch Richness

Patch richness is the number of different obvious types of physical surfaces or features that may provide habitat for aquatic (including wetland) or riparian species. This metric is different from topographic complexity in that it addresses the number of different patch types, whereas topographic complexity helps evaluate the spatial arrangement and interspersion of the types. Physical patches can be natural or unnatural.

Worksheet 4: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for Presence
Adjacent shrub or tree cover	X
Animal mounds and burrows	X
Bare soil (minimum 3 m^2)	
Cobble and boulders	X
Complexly-shaped pools	X
Drainage branches (more than 1 drainage branch)	X
Islands	
Large individual pools	
Large swales	
Mima mounds	
Patches of dense vegetation	
Pool Cluster	
Simply-shaped pools	X
Small individual pools	
Small swales	X
Soil cracks	
Within Pool Mounds	X
Total Possible	17
No. Observed Patch Types (enter here and use in Table 15)	7

Table 15: Rating of Structural Patch Richness.
(enter rating in Scoring Sheet)

Rating	Vernal Pool Systems
A	≥ 11
B	8 – 10
C	5 – 7
D	≤ 4

Patch Type Definitions for Vernal Pool Systems

Adjacent shrub or tree cover. These are patches of adjacent shrub or tree areas adjacent to pools. They provide shading, nutrient input, and potentially affect pool dry-down among other biogeochemical processes.

Animal mounds and burrows Many vertebrates make mounds or holes as a consequence of their foraging, denning, predation, or other behaviors. The resulting soil disturbance helps to redistribute soil nutrients and thus it influences plant species composition and abundance. To be considered a patch type there should be evidence that a population of burrowing animals has occupied the Assessment Area. A single burrow or mound does not constitute a patch.

Bare soil. Bare soil is any area at least $3m^2$ in size within a vernal pool system that has less than 5% cover of vegetation during the peak of the growing season. Rock outcrops do not qualify as bare soil.

Cobble and boulders Cobble and boulders are rocks of different size categories. The long axis of cobble ranges from about 6 cm to about 25 cm. A boulder is any rock having a long axis greater than 25 cm. Submerged cobbles and boulders provide abundant habitat for aquatic macroinvertebrates. Exposed cobbles and boulders provide roosting habitat for birds and shelter for amphibians. They contribute to patterns of shade and light and air movement near the ground surface that affect local soil moisture gradients, deposition of seeds and debris, and overall substrate complexity.

Complexly-shaped pools Vernal pool systems or complexes usually consist of many pools of different shapes. In general, pools can be separated into two shape classes; simply-shaped pools and complexly-shaped pools. Complexly-shaped pools do not resemble circles or ovals. They are much longer than wide, or they are kidney-shaped, or they vary in width in complex ways that are not well represented by either a circle or an oval.

Drainage branches (more than 1 drainage branch). Vernal pool systems usually consist of many pools that are interconnected by, or dispersed among, one or more shallow pathways of surface water flow called swales. In their downstream reaches, some swales develop obvious banks and beds and therefore can be called channels. The swales and/or channels that drain to a common place comprise a drainage network. If the drainage network consists of two or more swales and/or channels that are clearly confluent with each other (i.e., they are connected to, and contribute to the flow of, another swale or channel), then the network is considered to have more than one branch. There must be obvious overland flow (swales) to be considered a drainage branch.

Islands There are patches of upland vegetation located within pools and lying topographically above the maximum zone of pool inundation.

Large vernal pools Vernal pool systems or complexes usually consist of many pools of different sizes. For the purpose of assessing pool systems using CRAM, two pool size classes are recognized – large and small. Large pools are defined for the purposes of this patch type checklist as pools that are at least 3 times the size of the smallest pool in the AA.

Large swales Large swales transport water, but also generally contain wide, flat areas that pond similar to vernal pools (but are less well defined than those occupying the terraces). Large swales are fed by other large and small swales and are rarely directly connect to pools.

Mima mounds Mima mounds are elliptical mounds of soil, usually 1-3 meters tall, and uniformly distributed across a landscape. The sizes of areas between mounds is often very similar to the mound sizes, such that the landscape, as viewed from a few thousand feet above, resembles the surface of a golf ball. Vernal pools tend to form in the low areas between mima mounds.

Patches of dense vegetation (Juncus, Eleocharis, bunchgrasses) – Patches of vegetation in which one or several species have significantly higher vegetative cover in comparison with the remainder of the pool. These patches should be visually distinguishable.

Pool Cluster. Vernal pool systems or complexes usually consist of many pools of different sizes. Some pools are interconnected by shallow pathways of surface water flow called swales. In their downstream reaches, some swales develop obvious banks and beds and therefore can be called channels. The swales and/or channels that drain to a common place comprise a drainage network. Three or more vernal pools of any size that exist in the same drainage network compose a vernal pool cluster.

Simply-shaped pools Vernal pool systems or complexes usually consist of many pools of different shapes. In general, pools can be separated into two shape classes; simply-shaped pools and complexly-shaped pools. Simply-shaped pools resemble circles or ovals.

Small individual pools Vernal pool systems or complexes usually consist of many pools of different sizes. For the purpose of assessing pool systems using CRAM, two pool size classes are recognized. The small pools in a system are simply smaller than most other pools in the system. There is no maximum size of small pools.

Small swales Small swales are linear features that simply transport water between well defined pools or from pools to steam features.

Soil cracks Repeated wetting and drying of fine grain soil that typifies some wetlands can cause the soil to crack and form deep fissures that increase the mobility of heavy metals, promote oxidation and subsidence, while also providing habitat for amphibians and macroinvertebrates. Cracks must be a minimum of 1 inch deep to qualify.

Within Pool Mounds These are patches (of earth) located within pools and raised above the pool bottom at elevation that lies within the zone of maximum inundation. Mounds may be inundated periodically during the wet season or saturated by surrounding ponded water for sufficient duration to promote a dominance of hydrophytic vegetation characteristic of pool basins or edges.

Metric 2: Pool and Swale Density (Vernal Pool Systems ONLY)

One aspect of vernal pool system physical structure that emerges at the AA scale is the density of pools and swales, meaning their absolute percent cover across the AA. As density increases, the potential for each pool or swale to be hydrologically and ecologically interconnected also increases, as does the potential for density-independent disturbance and stress to be accommodated by the system as a whole.

Density is assessed by estimating the percent of each of four line transects that crosses swales or pools within the AA. These transect lines are the same as the "within the AA" segments of the transect lines used for the Aquatic Area Connectivity metric (see the Aquatic Area Connectivity metric of the Landscape and Buffer Attribute). The method for establishing the transect lines is also provided here.

On digital or hardcopy site imagery, identify the approximate center of the AA. In each of the four cardinal compass directions, draw a straight transect line from the center of the AA to the AA boundary. While viewing the site imagery at a scale of 1:1000 to 1:2000, estimate the percentage of each of these four transect lines inside the AA that passes through a pool or swale. Use worksheet 5 below to record these estimates.

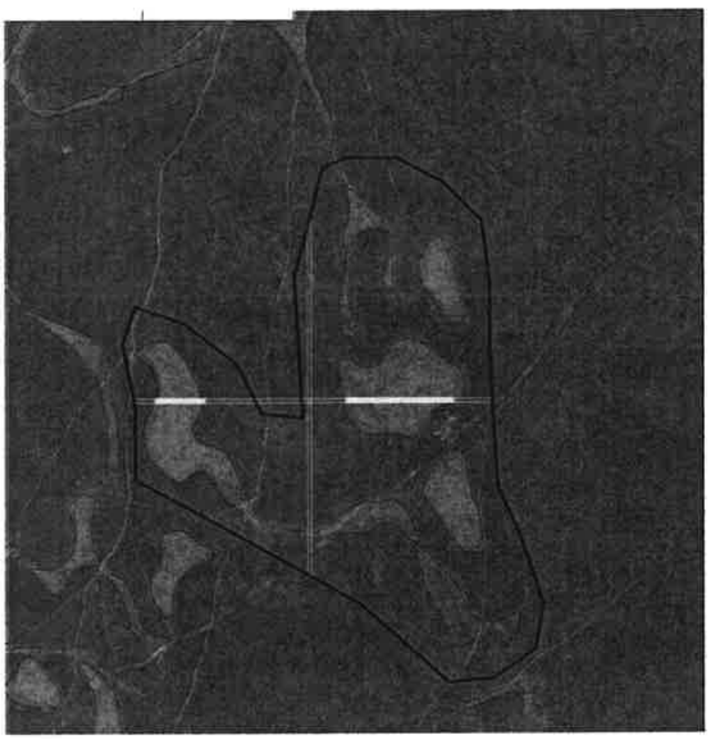


Figure 6. Example of method to assess pool and swale density in a vernal pool system.

Worksheet 5: Pool and Swale Density for Vernal Pool Systems.

Percentage of Each Transect Line Crossing A Vernal Pool or a Vernal Swale	
Transect	Percent Crossing a Pool or Swale
North	0%
South	0%
East	26%
West	48%
Average value for all Four Transects ***Round to nearest integer***	19%

Table 16: Rating for Pool and Swale Density for Vernal Pool Systems. (enter rating in Scoring Sheet)

Rating	Alternative States
A	An average of 31– 100 % of the transects crosses pools or swales.
B	An average of 21 – 30 % of the transects crosses pools or swales.
C	An average of 11 – 20 % of the transects crosses pools or swales.
D	An average of 0 – 10 % of the transects crosses pools or swales.

Metric 3: Topographic Complexity

Topographic complexity refers to the variety of elevations within a wetland due to micro- topographic features and elevation gradients. This metric is assessed for each of the 3-6 pools randomly selected from the Vernal Pool System. Cross sections of the individual pools are recorded in Worksheets 6a-6f below. Scores for each pool are then recorded in Worksheet 6g below based on the practitioners drawings, the indicators listed in Table 17, the scale-independent schematic profiles in Figure 7, and the ratings in table 18.

Table 17: Typical indicators of Macro- and Micro-topographic Complexity.

Type	Examples of Topographic Features
Vernal Pools and Pool Systems	soil cracks, "mima-mounds," rivulets between pools or along swales, cobble, plant hummocks, cattle or sheep tracks

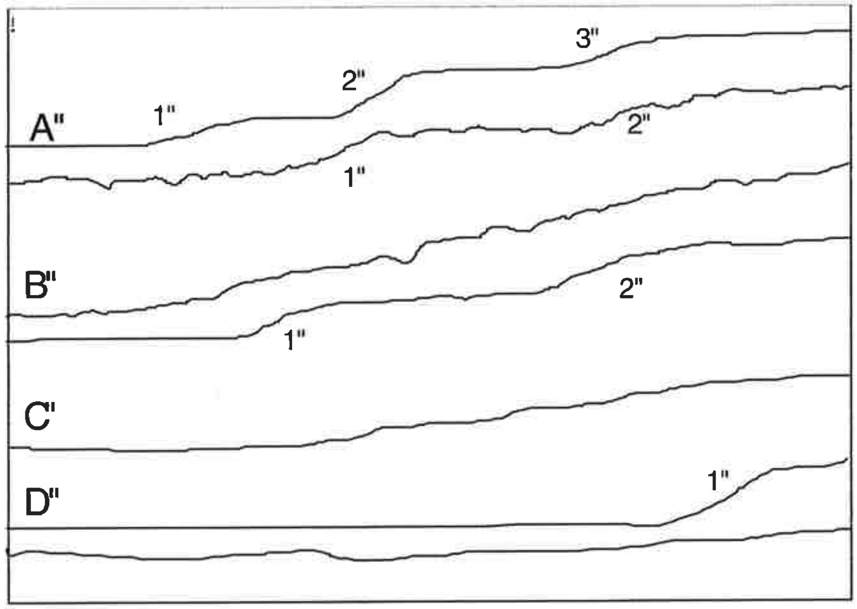


Figure 7: Scale-independent schematic profiles of Topographic Complexity. For vernal pool systems, the right end represents the lower margin of the upland matrix, slightly above the edge of a large or small vernal pool. The choice of indicative profile should be based on sketches along the 4 cardinal compass directions. In the uppermost profile, the numbers 1, 2, and 3 refer to separate apparent breaks in the topographic slope. In other profiles, either two, one, or no breaks in the slope are evident.

Table 18: Rating Topographic Complexity for Vernal Pool Systems. (enter results in Worksheet 6g below)

Rating	Alternative States
A	There are three obvious breaks in slope with or without abundant micro-topographic relief along most of the average profile. OR There are two breaks in slope with abundant micro-topographic relief.
B	There is essentially a single slope with abundant micro-topographic relief. OR There are two breaks in slope without abundant micro-topographic relief.
C	There is a single slope without abundant micro-topographic relief.
D	There is essentially no slope, with or without micro-topographic relief. OR There is a single slope that is unusually steep and short for a natural profile.

Worksheet 6g: Rating of Topographic Complexity for Vernal Pool Systems.

Replicate Number	**Replicate Score (A = 12; B = 9; C = 6; D = 3)**	
	Alpha.	Numeric
Replicate 1 -23	B	9
Replicate 2 22	B	9
Replicate 3 21	B	9
Replicate 4 20	C	6
Replicate 5 19	D	3
Replicate 6		
Overall Average Score for All Pool Replicates ***Round to nearest integer*** **(enter here and use in Table 19)**		7

Table 19: Rating for Overall Topographic Complexity for Vernal Pool Systems. (enter rating in Scoring Sheet)

Rating	Vernal Pool Systems
A	≥ 11
B	8 – 10
C	5 – 7
D	≤ 4

Attribute 4: Biotic Structure

Metric 1: Horizontal Interspersion and Zonation

Horizontal biotic structure refers to the variety and interspersion of plant "zones," plant monocultures or obvious multi-species association that are arrayed along gradients of elevation, moisture, or other environmental factors. Interspersion is essentially a measure of the number of distinct plant zones and the amount of shared edge between them.

This metric is assessed for each of the 3-6 pools randomly selected from the AA. Drawings of the individual pools are recorded in Worksheets 7a-7f below. Make special note of amount of shared edge. Scores for each pool are then recorded in Worksheet 7g below based on the practitioners drawings, the scale-independent images in Figure 8, and the narrative in Table 20.

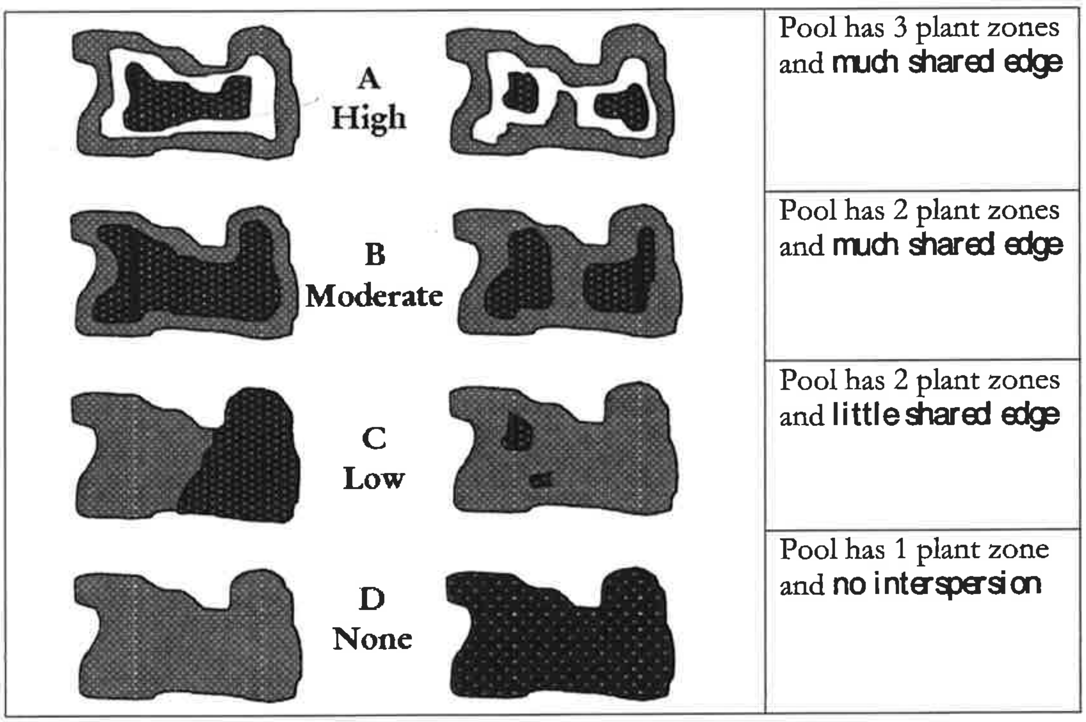


Figure 8: Degrees of interspersion of plant zones for Individual Vernal Pools. Each zone must comprise at least 5% of the pool area. The white area in this figure surrounding each pool represents the upland matrix; the orange area represents the marginal saturation zone. All pools, even as shown for score "D", therefore have at least 1 zone. It is helpful to assign names of plant species or associations of species to the colored patches and to make special note of amount of shared edge.

Table 20: Rating of Horizontal Interspersion and Zonation of Plant Zones for Vernal Pools. (enter results in Worksheet 7g below)

Rating	Alternative States
A	Pool has a high degree of plan-view interspersion.
B	Pool has a moderate degree of plan-view interspersion.
C	Pool has a low degree of plan-view interspersion.
D	Pool has essentially no plan-view interspersion.

Worksheet 7g: Rating of Horizontal Interspersion for Vernal Pool Systems.

Replicate Number	Replicate Score (A = 12; B = 9; C = 6; D = 3)	
	Alpha.	Numeric
Replicate 1 - 23	C	6
Replicate 2 - 22	C	6
Replicate 3 - 21	C	6
Replicate 4 - 20	C	6
Replicate 5 - 19	D	3
Replicate 6		
Overall Average Score for All Pool Replicates ***Round to nearest integer*** **(enter here and use in Table 21)**		5

Table 21: Rating for Horizontal Interspersion for Vernal Pool Systems. (enter rating in Scoring Sheet)

Rating	Vernal Pool Systems
A	≥ 11
B	8 – 10
C	5 – 7
D	≤ 4

Metric 2: Plant Community

The Plant Community Metric is composed of three submetrics. The first two submetrics, Number of Co- dominant Species and Percent Invasion, are assessed for each of the 3-6 pools randomly selected from the AA. The individual pool scores are recorded in Worksheets 8a-6f. The third submetric, Endemic Species Richness, is not assessed for each replicate pool. Rather, a list of all vernal pool endemics is compiled for all replicate pools combined.

Submetric A: Number of Co-dominant Species

For the pool as a whole, all plant species that comprise at least 10% relative cover are considered to be dominant. Only living vegetation in growth position is considered in this metric. Dead or senescent vegetation is disregarded.

Submetric B: Percent Non-native

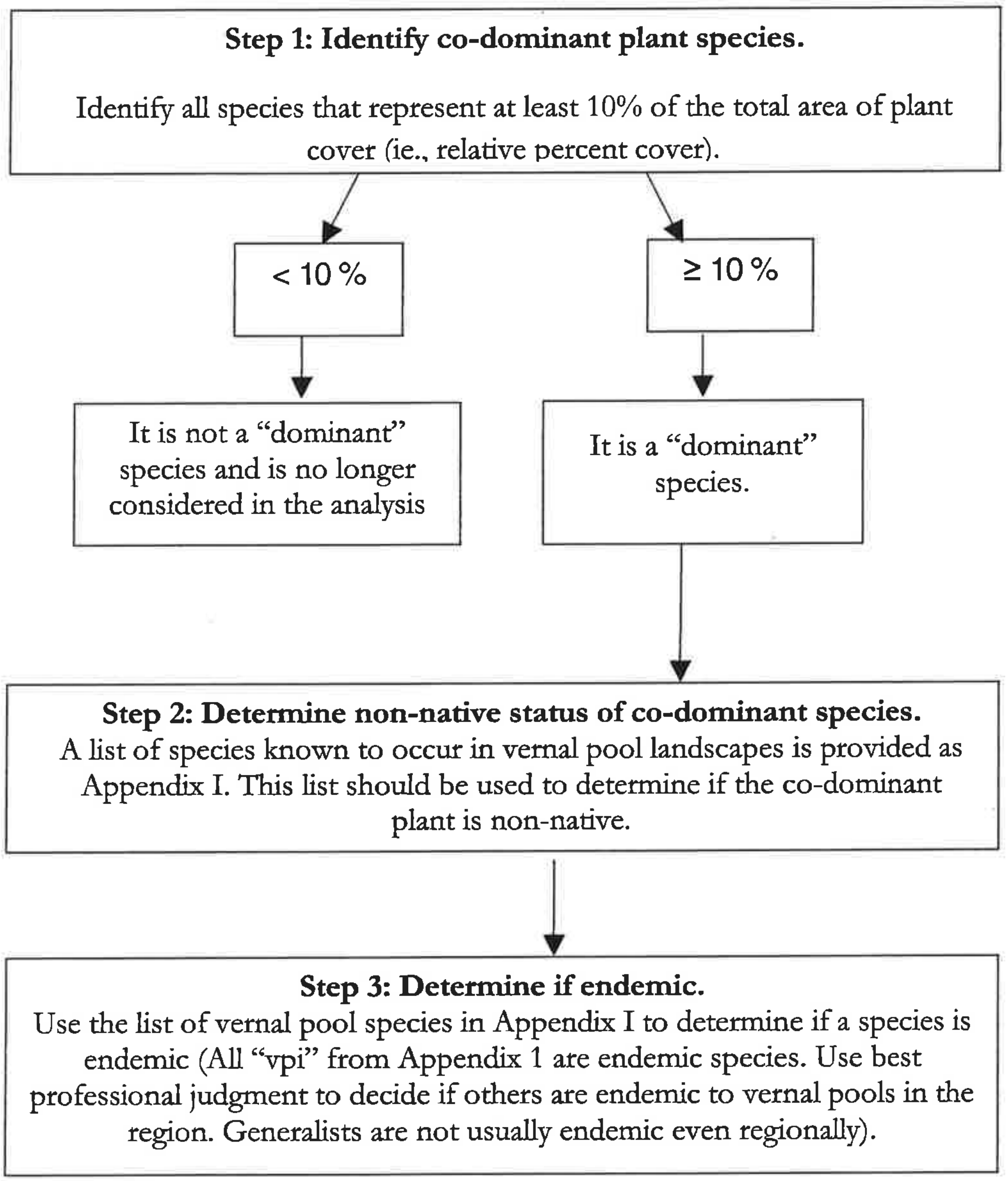
A list of native pool species is provided in Appendix I. Any species not on this list is considered to be non- native. However, this list is not exhaustive, and there may be native upland species occurring in a pool. Expertise is required to assure that species are correctly identified as native or non-native.

Submetric C: Endemic Species Richness

This submetric is based on the total number of co-dominant native plant species endemic to vernal pools that occur in the AA. All "vpi" from Appendix 1 are endemic species. Use best professional judgment to decide if others are endemic to vernal pools in the region. Generalists are not usually endemic even regionally. For Vernal Pool Systems, this metric is assessed for all the replicate pools combined.

23	22	21	20	19
[illegible]				

Figure 9: Flow Chart to Determine Plant Dominance



Worksheet 8g: Plant Community Metric-
Calculation of Average Number of Co-dominants in all Replicate Pools.

Pool Replicate	Number of Co-dominants
Pool 1 #23	3
Pool 2 # 22	4
Pool 3 # 21	3
Pool 4 # 20	2
Pool 5 # 19	2
Pool 6	
Average Number of Co-Dominants ***Round to nearest integer*** **(enter here and use in Table 22)**	3

Table 22: Ratings for Number of Co-dominant Species
(enter rating in Scoring Sheet)

Rating	Average number of Co-dominants
A	≥ 6
B	4 - 5
C	2 - 3
D	1

Worksheet 8h: Plant Community Metric – List of Unique Co-dominant Plant Species from all Vernal Pools Combined.

endemic
✓ (vpi)

Plant Name	Check if non-native	Check if in Appendix I
Erodium cicutarium	X	
Deinandra fasciculatum		
Lythrum hyssopifolium	X	
Lysimachia minima		
Juncus bufonius		
Total number of co-dominant species (A)	5	
Total number of co-dominant species that are non-native (B)	2	
Percent non-native [(B)/(A) x 100] *Round to nearest integer* (enter here and use in Table 23)	2/5 = 40%	
Total number of co-dominant species that are endemic (enter here and use in Table 24)		

Table 23: Ratings for Percent Non-native species. (enter rating in Scoring Sheet)

Rating	Percent Non-native
A	0 - 20%
B	21 - 33%
C	34 - 49%
D	≥ 50 %

Table 24: Ratings for VP Endemic Species Co-Dominants. (enter rating in Scoring Sheet)

Rating	VP Endemic Species Co-dominants
A	≥ 9
B	6 – 8
C	3 – 5
D	0 – 2

#23

Pool Replicate 1

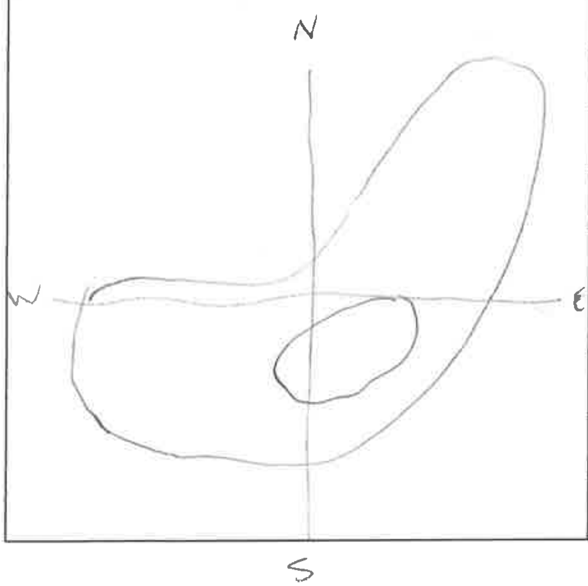
Worksheet 6a: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1

B= MODERATE

Profile 2

Worksheet 7a: Sketch of Vernal Pool Interspersion. B= MODERATE C = LOW	**Worksheet 8a: Co-dominant Plant Species in Vernal Pool** Note: A dominant species represents ≥10% relative cover.
	ERO CIC
	DIA FAC
	Lyth Hys

BRO ORC
DIA FAC
ERO CIC
PSI BRE
CRO SEG
Lyth Hys
Zanth Ven
Desch Dan

Lysemacia Min
Festuca My
Juncus Buf
Log thia

#22

Pool Replicate 2

Worksheet 6b: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

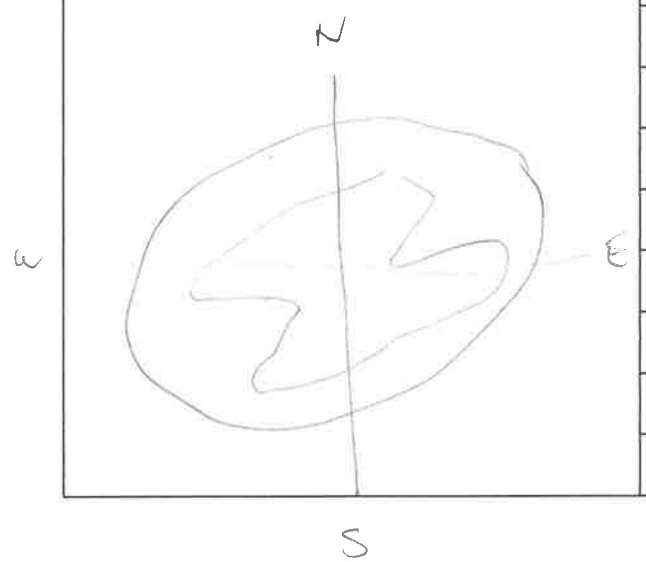
Profile 1

Profile 2

Worksheet 7b: Sketch of Vernal Pool Interspersion.

B: MODERATE

~~B: MODERATE~~



Worksheet 8b: Co-dominant Plant Species in Vernal Pool

Note: A dominant species represents ≥10% relative cover.

Lysimachia
Dianandra FAC
Ero Cic
Jun Buf

DIA FAC
ERO CIC
PSI BRE
JUN BUF
FES MYU
POLY MON
BLOOMERIA
Deschampsia Dan

Lythrum
Lysimachia MIN
NAVARRETIA Llemata

21

Pool Replicate 3

Worksheet 6c: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

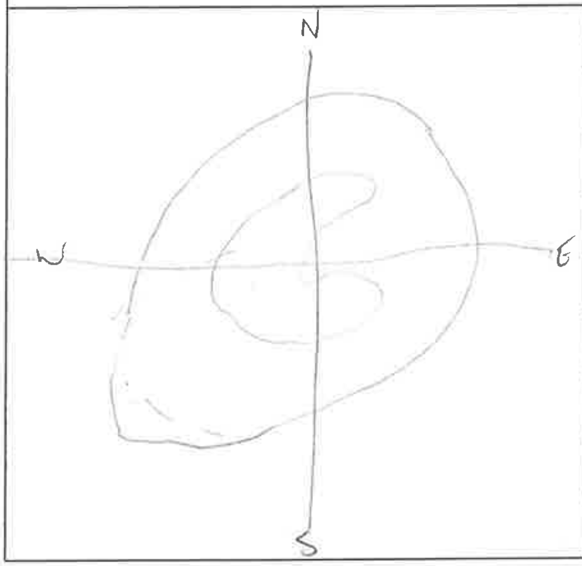
Profile 1

Profile 2

B= MODERATE

Worksheet 7c: Sketch of Vernal Pool Interspersion.

C=LOW



Worksheet 8c: Co-dominant Plant Species in Vernal Pool

Note: A dominant species represents ≥10% relative cover.

Ero Cic
Jun Buf
Lysimachia

EROCIC

CROSEL

Cotia gallica

Dianandra Fac

Ocmispaw GUBAR

Juncus Bof

Lyasmachia minolur

Distichum

#20

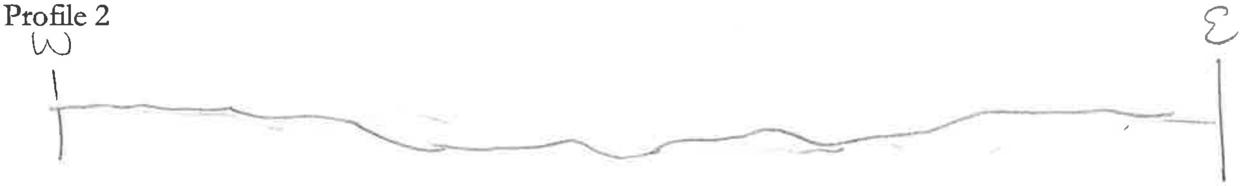
Pool Replicate 4

Worksheet 6d: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

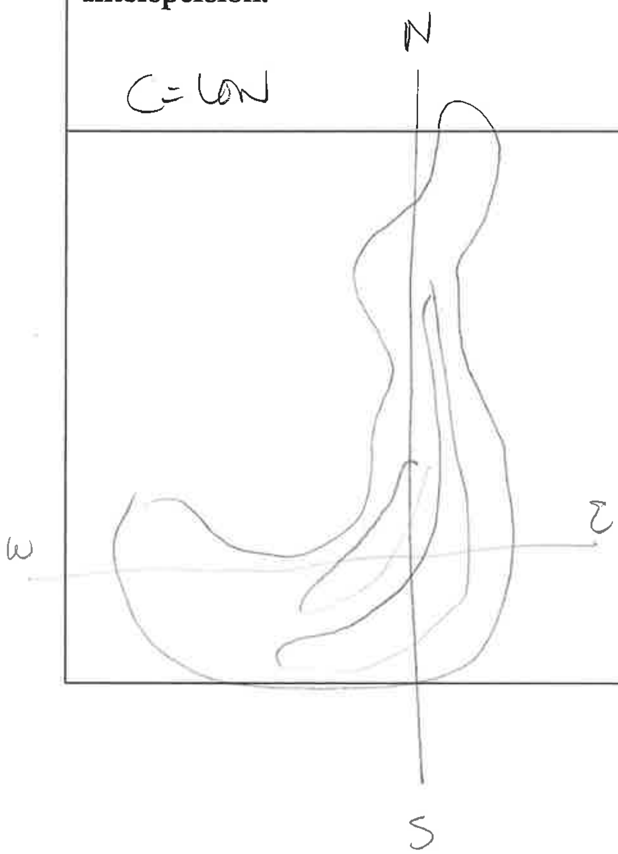
Profile 1

Profile 2



Worksheet 7d: Sketch of Vernal Pool Interspersion.

C=LON



Worksheet 8d: Co-dominant Plant Species in Vernal Pool

Note: A dominant species represents ≥10% relative cover.

ERO CIC
DIO FAC

EROCIC
DIST GRA
DIO FAC
Cyth llys
Castilla gall
psilocharpus teni
Festuca myuros

Hypochaeris gl

Pool Replicate 5 See reverse for #19

Worksheet 6e: Sketches of Vernal Pool Profiles

Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1
Profile 2

Worksheet 7e: Sketch of Vernal Pool Interspersion.	**Worksheet 8e: Co-dominant Plant Species in Vernal Pool** Note: A dominant species represents ≥10% relative cover.

Pool Replicate 6 #119

Worksheet 6f: Sketches of Vernal Pool Profiles

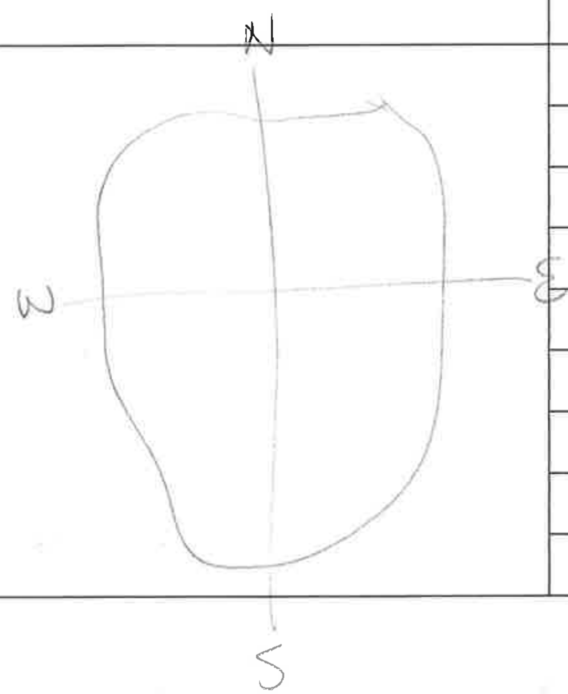
Along the long axis of the pool and perpendicular to the long axis across the middle, make a sketch of the profile of each of the six pools from its outside edge (1-3m landward or away from the saturated zone of the pool) to its deepest areas then back out to the outside margin. Try to capture the major breaks in slope and the intervening micro-topographic relief. Based on the sketches, choose a single profile from Figure 7 that best represents the pool overall.

Profile 1 S D = Poor N

Profile 2 W E

Worksheet 7f: Sketch of Vernal Pool Interspersion.

D = Poor



Worksheet 8f: Co-dominant Plant Species in Vernal Pool

Note: A dominant species represents ≥10% relative cover.

Ero Cic
Dis Fic

DiTR GRAV Nemis pm

DEI FAC

CRO Steg

psi Brc

Lyth Hys

Ero Cic

Deschm Dan

Guidelines to Complete the Stressor Checklists

A stressor, as defined for the purposes of the CRAM, is an anthropogenic perturbation within a wetland or its environmental setting that is likely to negatively impact the condition and function of the CRAM Assessment Area (AA). A disturbance is a natural phenomenon that affects the AA.

There are four underlying assumptions of the Stressor Checklist: (1) deviation from the best achievable condition can be explained by a single stressor or multiple stressors acting on the wetland; (2) increasing the number of stressors acting on the wetland causes a decline in its condition (there is no assumption as to whether this decline is additive (linear), multiplicative, or is best represented by some other non-linear mode); (3) increasing either the intensity or the proximity of the stressor results in a greater decline in condition; and (4) continuous or chronic stress increases the decline in condition.

The process to identify stressors is the same for all wetland types. For each CRAM attribute, a variety of possible stressors are listed. Their presence and likelihood of significantly affecting the AA are recorded in the Stressor Checklist Worksheet. For the Hydrology, Physical Structure, and Biotic Structure attributes, the focus is on stressors operating within the AA or within 50 m of the AA. For the Buffer and Landscape Context attribute, the focus is on stressors operating within 500 m of the AA. More distant stressors that have obvious, direct, controlling influences on the AA can also be noted.

Table 25: Wetland disturbances and conversions.

<table>
<tr><td>Has a major disturbance occurred at this wetland?</td><td>Yes</td><td colspan="2">No</td><td colspan="2"></td><td></td></tr>
<tr><td>If yes, was it a flood, fire, landslide, or other?</td><td>flood</td><td colspan="2">fire</td><td colspan="2">landslide</td><td>other</td></tr>
<tr><td>If yes, then how severe is the disturbance?</td><td colspan="2">likely to affect site next 5 or more years</td><td colspan="2">likely to affect site next 3-5 years</td><td colspan="2">likely to affect site next 1-2 years</td></tr>
<tr><td rowspan="4">Has this wetland been converted from another type? If yes, then what was the previous type?</td><td colspan="2">depressional</td><td colspan="2">vernal pool</td><td colspan="2">vernal pool system</td></tr>
<tr><td colspan="2">non-confined riverine</td><td colspan="2">confined riverine</td><td colspan="2">bar-built estuarine</td></tr>
<tr><td colspan="2">perennial saline estuarine</td><td colspan="2">perennial non-saline estuarine</td><td colspan="2">wet meadow</td></tr>
<tr><td colspan="2">lacustrine</td><td colspan="2">seep or spring</td><td colspan="2">playa</td></tr>
</table>

Worksheet 9: Stressor Checklist.

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

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

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

Comments

Stinkwort (Dittrichia graveolens) present in pools.

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

Comments

Mountain biking is evident onsite.

44906

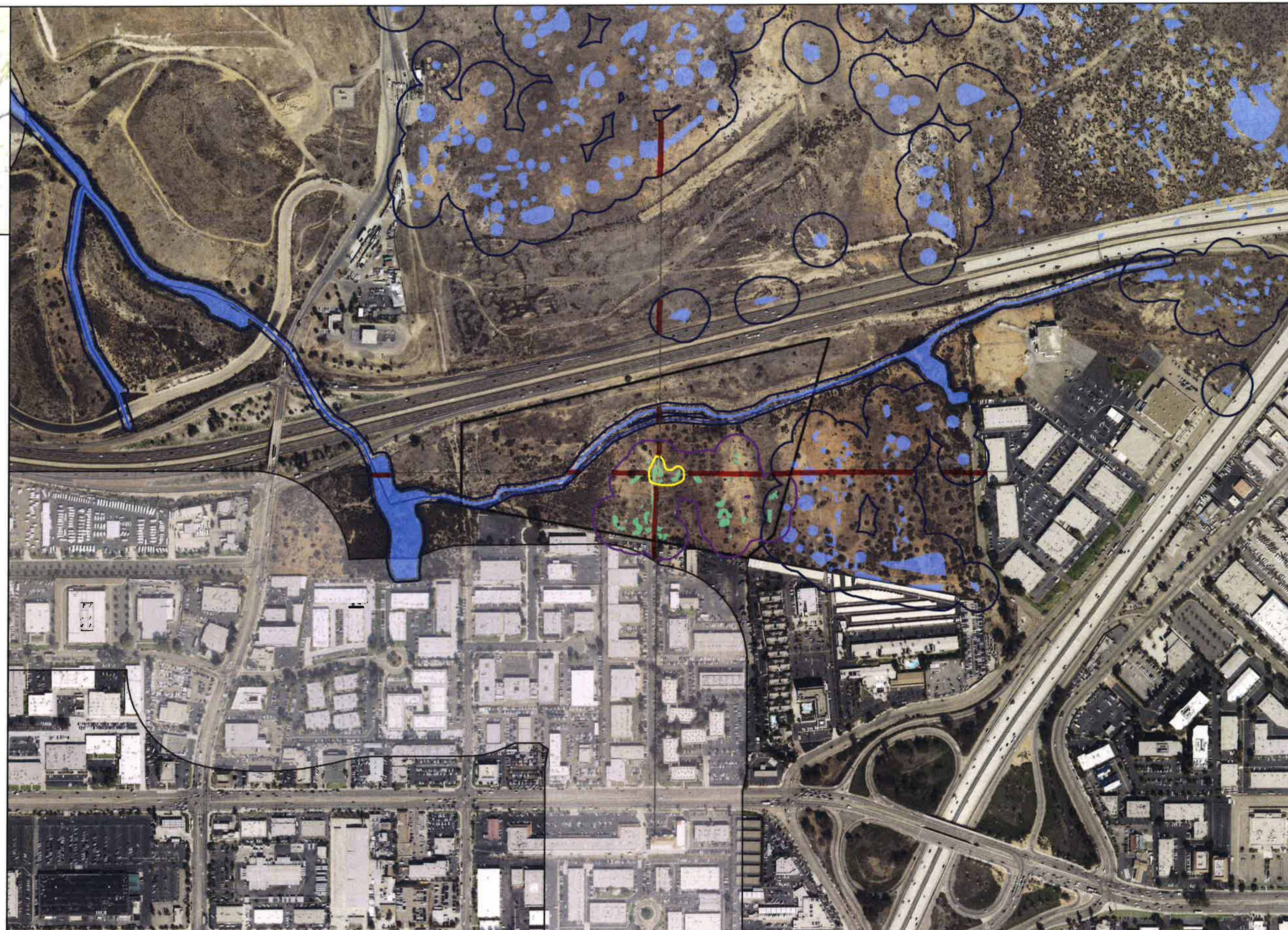
45275

366

LEGEND

- Project Study Area
- SANDER Mitigation Site
- CRAM Assessment Area 2
- Aquatic Area Abundance Area - 30m
- Vernal Pools
- USGS NHD blue line streams
- NWI Wetlands
- Aquatic Resources Buffer

0 75 150 Meters



DUDEK

SOURCE: City of San Diego 2016, 2017; SANDAG

Aquatic Area Abundance Map - Pure Water Facility Site CRAM Assessment

North City Pure Water Project

SOURCE: City of San Diego 2016, 2017; SANDAG

DUDEK

Buffer Map - SANDER Mitigation Site CRAM Assessment

North City Pure Water Project

LEGEND

- Pure Water Project Study Area
- SANDER Mitigation Site
- Vernal Pools
- CRAM Assessment Area 2

0 25 50 Meters

SOURCE: City of San Diego 2016, 2017; SANDAG

DUDEK

Pool and Swale Density Map - SANDER Mitigation Site CRAM Assessment

North City Pure Water Project

APPENDIX B

Indicator Species for Vernal Pools
(ACOE 1997; Bauder and McMillan 1998)

INDICATOR SPECIES FOR VERNAL POOLS
(USACE 1997; Bauder and McMillan 1998)

FLORAL LIST

Apiaceae
- *Eryngium aristulatum* var. *parishii*
- *Eryngium armatum*
- *Eryngium vaseyi*
- *Eryngium pendletonensis* sp. *nova* (*Pendleton*)
- *Eryngium* sp. *nova* (*San Quintin*)

Asteraceae
- *Belnnospermum nanum*
- *Hemizonia perennis*
- *Lasthenia glabrata* ssp. *coulteri*
- *Psilocarphus brevissiums*
- *Psilocarphus oregonus*
- *Psilocarphus tenellus*

Boraginaceae
- *Plagiobothrys acanthocarpus*
- *Plagiobothrys bracteatus*
- *Plagiobothrys stipitatus*
- *Plagiobothrys undulatus*
- *Plagiobothrys leptocladus*

Brassicaceae
- *Sibara virginica*
- *Lepidium latipes*

Callitrichaceae
- *Callitriche heterophylla*
- *Callitriche marginata*
- *Callitriche verna*

Campanulaceae
- *Downingia bella*
- *Downingia cuspidata*
- *Downingia concolor* var. *brevior*

Crassulaceae
- *Crassula aquatica*

Elatinaceae
- *Bergia texana*
- *Elatine californica*
- *Elatine chilensis*

Hydrophyllaceae
- *Nama stenocarpum*

Isoetaceae
- *Isoetes howellii*
- *Isoetes orcuttii*

Juncaginaceae
- *Lilaea scilloides*

Lamiaceae
- *Pogogyne abramsii*
- *Pogogyne nudiuscula*
- *Pogogyne douglasii*
- *Pogogyne serpylloides*

Limnanthaceae
- *Limnanthes gracilis* ssp. *parishii*

Malvaceae

- *Malvella leprosa*

Marsileaceae

- *Marsilea vestita*
- *Pilularia americana*

Onagraceae

- *Epilobium pygmaeum*

Plantaginaceae

- *Plantago bigelovii*

Poaceae

- *Alopecurus saccatus*
- *Deschampsia danthonioides*
- *Orcuttia californica*
- *Phalaris caroliniana*
- *Phalaris lemmonii*
- *Phalaris paradoxa*
- *Hordeum intercedens*

Polemoniaceae

- *Navarretia fossalis*
- *Navarretia prostrata*

Primulaceae

- *Centunculus minimus*

Ranunculaceae

- *Myosurus minimus*
- *Myosurus minimus* var. *apus*
- *Myosurus minimus* var. *filiformis*

Scrophulariaceae

- *Mimulus latidens*

Solanaceae

- *Petunia parviflora*

Verbenaceae

- *Verbena bracteata*

FAUNAL LIST

Anostraca

- *Branchinecta sandiegonensis*
- *Branchinecta lindahli*
- *Branchinecta lynchii*
- *Linderiella* sp.
- *Streptocephalus woottoni*

Cladocera

- *Alona* cf. *diaphana*
- *Ceriodaphnia dubia*
- *Daphnia magna*
- *Daphnia rosea*
- *Macrothrix hirsuticornis*
- *Moina micrura*
- *Scapholebris cf.rammneri*
- *Simocephalus* sp.

Chenopodiaceae

- *Atriplex coronata* var. *notatior*

Copepoda

- *Acanthocyclops robustus*
- *Acanthocyclops vernalis*

Cyperaceae

- *Eleocharis acicularis*
- *Eleocharis macrostachya*

Juncaceae

- *Juncus bufornius*

Lythraceae

- *Rotala ramosior*

Ostracoda

- *Bradleycypris* sp.
- *Cypria pustulosa*
- *Cypriconcha* sp.
- *Cypridopsis vidua*
- *Cypris pubera*
- *Cypris virens*
- *Eucypris* sp.
- *Herpetocypris* sp.
- *Heterocypris* sp.
- *Lymnocythere* sp.
- *Potamocypris* sp.
- *Prionocypris* sp.
- *Pseudoilcypris* sp.

Themidaceae

- *Brodiaea orcuttii*
- *Brodiaea terrestris* var. *kernensis*

APPENDIX S

Native Grassland Creation Mitigation Plan – Pueblo South

Conceptual Native Grassland Creation Mitigation Plan – Pueblo South for the North City Project, City of San Diego, California

Prepared for:

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SEPTEMBER 2017

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1 INTRODUCTION

The North City Project (Project) is the first phase of the Pure Water Program, which would produce 30 million gallons per day of potable recycled water for the Miramar Reservoir Alternative. The North City Project would expand the existing North City Water Reclamation Plant and construct an adjacent North City Pure Water Facility (NCPWF). An in-depth project description can be found in the Project's environmental impact report. This Native Grassland Creation Mitigation Plan (Plan) provides guidelines for native grassland creation to mitigate impacts to native grassland associated with Project construction.

1.1 Project Location

The Project would include a variety of facilities located throughout the central and coastal areas of San Diego County in the North City geographic area (Figures 1 and 2). The majority of proposed facilities for the North City Project would occur within developed land and/or along existing paved streets. The facilities were designed and sited to avoid and minimize impacts to biological resources to the extent feasible. A new pure water facility and three pump stations would be located within the City of San Diego. Pipelines would traverse a number of local jurisdictions, including the communities of University, Clairemont Mesa, and Linda Vista within the City of San Diego; the City of Santee; and the community of Lakeside in unincorporated San Diego County. Pipelines would also traverse federal lands within Marine Corps Air Station (MCAS) Miramar (Figure 2). Specifically, the Miramar Reservoir Alternative is within the Poway, La Jolla, and Del Mar U.S. Geological Survey 7.5-minute quadrangle maps.

1.2 Mitigation Site Location

The proposed Pueblo South native grassland creation mitigation site is located immediately east of Interstate 805, south of Nobel Drive, north of the LOSSAN/North County Transit District (NCTD) railroad tracks, and west of a San Diego Gas & Electric (SDG&E) powerline utility easement in the City of San Diego, California (Figure 3). The site's northern terminus coordinates are 32°52'4.84"N, 117°11'28.08"W and the southern tip coordinates are 32°51'56.6"N, 117°11'24.22"W.

1.3 Native Grassland Creation Goals and Mitigation Requirements

The goal of this plan is to provide native grassland restoration means and methods that will result in the creation of native grasslands to mitigate native grassland impacts from the Project.

Native grassland mitigation will be implemented in accordance with the San Diego Municipal Code, Land Development Code—Biology Guidelines and Landscape Regulations (City of San Diego

2012), the San Diego Municipal Code, Land Development Code—Landscape Standards (City of San Diego 2016), and the City of San Diego's Whitebook, 2015 edition (City of San Diego 2015). Mitigation will occur at a 2:1 (mitigation:impact) ratio, with at least a 1:1 ratio of native grassland creation, as outlined in Table 1. The remaining 1:1 will be mitigation of Tier I (likely SOC) within the MHPA (in-Tier at SANDER). Native grassland creation will include native grasses and wildflower species typical of native grasslands in the area, and native species inventoried at the native grassland impact and mitigation sites.

Native grassland creation areas will be subject to an initial 120-day plant establishment and warranty period (PEP), and thereafter be monitored and maintained for 5 years (60 months) or until the performance standards outlined herein are met.

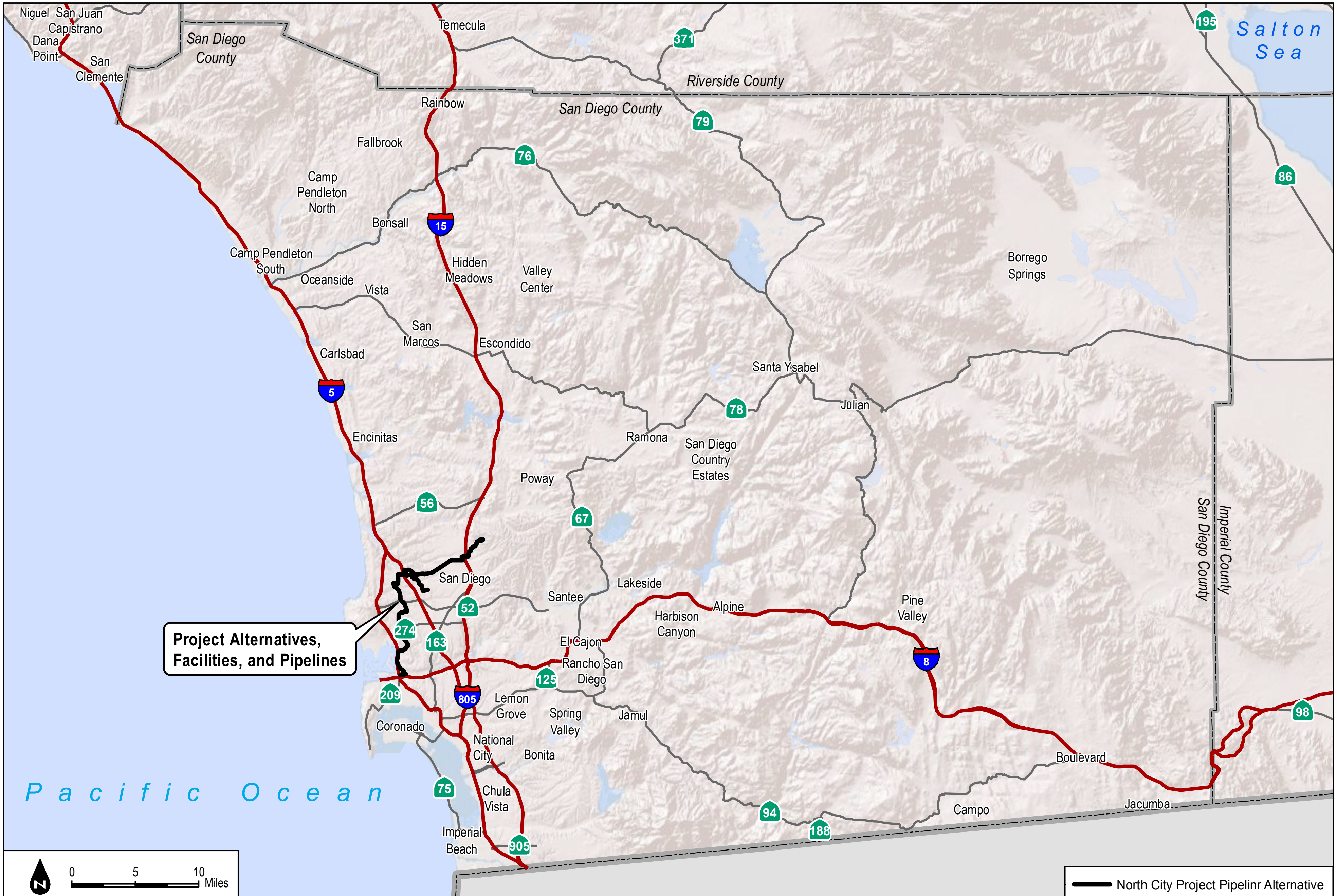
The quantity and location of native grassland impacts and corresponding mitigation are shown in Table 1.

Table 1
Permanent Impacts to Native Grasslands & Corresponding Mitigation – Miramar Reservoir Alternative

Impacted Vegetation Community/ Land Cover Type	Subarea Plan Designation	Impact Acreage Outside the MHPA	Mitigation				
			Outside MCAS Miramar		*Mitigation Type and Acreage**		
			Mitigation Ratio	*Mitigation Acres*	*Pueblo South - Native Grassland (in-kind)*	*SANDER - Scrub Oak Chaparral (in-tier)*	*Total*
Tier I – Rare Uplands							
Native Grassland – Cumulative Impacts	I	1.30	2:1	2.60	1.30/2.46**	1.30	2.60

* The total mitigation ratio for native grassland is 2:1, but 1:1 of the ratio will be mitigated by restoring native grassland at the Pueblo South site as specified in this Plan. The remaining 1:1 will be mitigated at SANDER as in-tier preservation of scrub oak chaparral.

** As a contingency to ensure that a minimum of 1.3 acres is achieved, the City is restoring a total of 2.46 acres of native grassland. If the contingency is not needed to meet the mitigation requirement, the City will have up to 1.16 acres of native grassland for other future projects.



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SOURCE: City San Diego 2016; ESRI 2016

FIGURE 1

Regional Map

North City Pure Water Project

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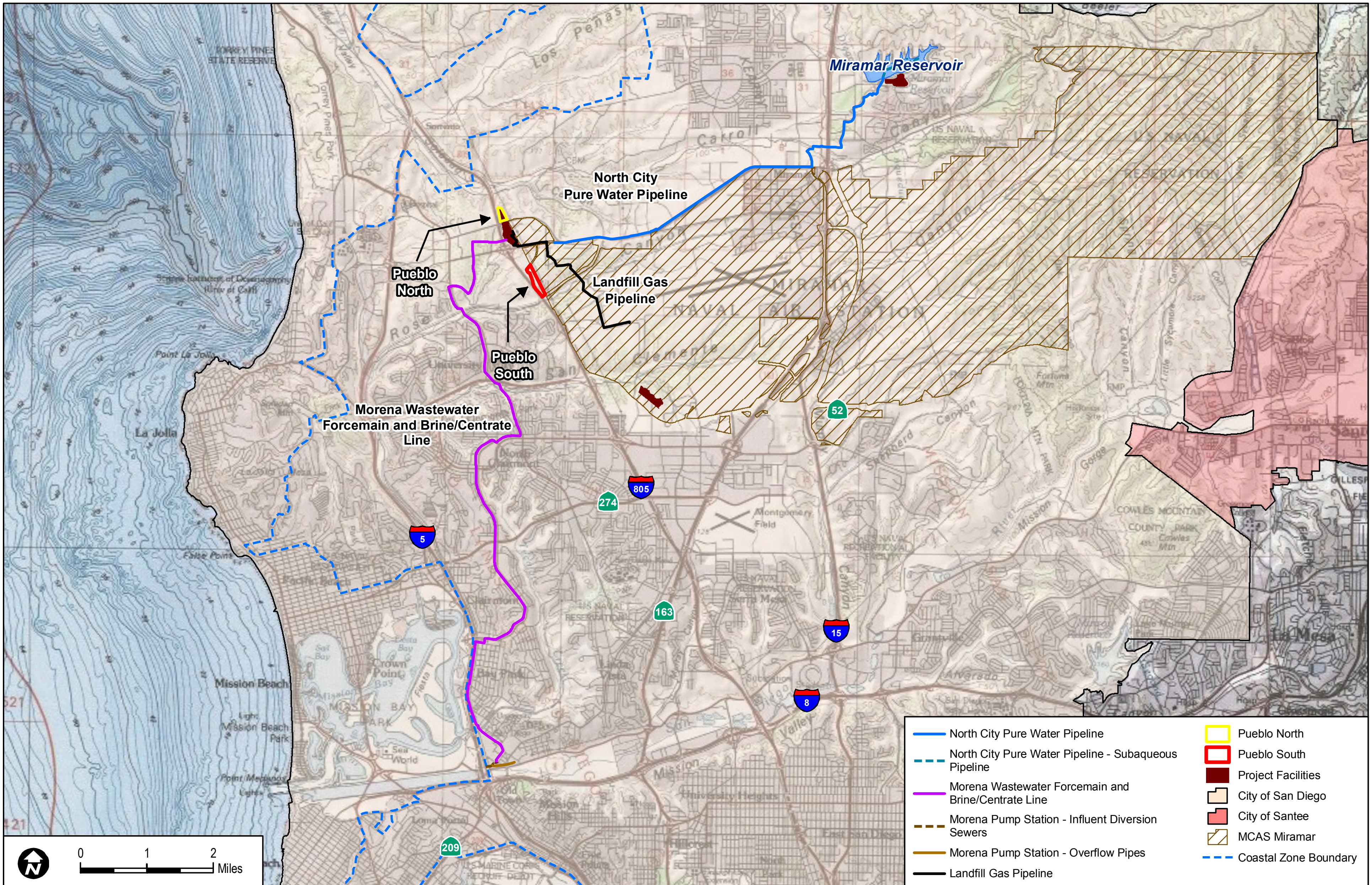

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SOURCE: USGS 7.5-Minute Series Del Mar, Poway, San Vicente Reservoir, La Jolla, La Mesa, El Cajon Quadrangles; City of San Diego 2016; CA Coastal Commission

FIGURE 2

Vicinity Map

North City Pure Water Project

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SOURCE: City San Diego 2016, 2017; SANDAG 2017

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FIGURE 3

Native Grassland Impact Map - Pueblo North

North City Pure Water Project

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2 EXISTING CONDITIONS

2.1 Project Site Existing Conditions

The North City Project is located within the lower Peninsular Ranges and the coastal plain, and west of the desert basin. Elevation ranges from approximately 10 feet to 1,080 feet above mean sea level (AMSL) within the North City Project Alternatives. Much of the Project area is gently sloping or relatively flat, with steeper areas around the reservoirs. The Coastal Plain region ranges in elevation from 0 feet AMSL to 600 feet AMSL, and includes characteristic features such as mesa tops, coastal benches, elevated marine terraces, and level floodplains of river valleys. The lower Peninsular Ranges foothills are characterized by rolling to hilly uplands and frequent narrow and winding valleys, and traversed by several rivers and drainages. A cumulative list of all vegetation communities and sensitive plant and wildlife species observed in the Project footprint area are included in the Biological Resources Report for the North City Project (BRR; Dudek 2017).

The native grassland habitat that will be impacted by the Project is on a location referred to as the Pueblo North site (Figures 2 and 3). The Pueblo North site is a vacant 10-acre City-owned lot across Eastgate Mall, where the NCPWF will be constructed. The NCPWF is one component of the overall North City Project.

The native grassland habitat at the Pueblo North (NCPWF) site is characterized by a sparse cover of purple needlegrass (*Stipa pulchra*), with abundant non-native species in the interstices between bunch grasses. The percentage cover of native species is low, but an area is considered native grassland by the City if there is 20% cover of native grassland species. Non-native species within the native grassland habitat consist primarily of wild oat (*Avena* spp.), non-native brome grasses (*Bromus* spp.), annual ryegrass (*Festuca perennis*), mustards (*Brassica* spp., *Hirschfeldia incana*), tocalote (*Centaurea melitensis*), and filaree (*Erodium* spp.). Native grasslands in southern California typically occur on fine-textured soils that are moist or wet in the winter and very dry during summer and fall. The soil type mapped in this area is classified as Redding gravelly loam, 2 to 9 percent slopes (USDA 2017; Bowman 1973). The typical profile for the Redding gravelly loam soil type is gravelly loam (0-15 inches) and a transition from gravelly clay loam to gravelly clay (15-30 inches) (USDA 2017). The Redding gravelly loam soil type also includes approximately 10% minor components (e.g., Olivenhain cobbly loam, Huerhuero loam, and Chesterton fine sandy loam), which can be inclusions within the overall mapped soil type (USDA 2017). Where native grassland occurs at the Pueblo North site, the soils are predominantly fine textured (i.e., higher proportion of silts and clays relative to sand).

2.2 Mitigation Site Existing Conditions

The proposed 2.46-acre Pueblo South native grassland mitigation site is located in the City of San Diego, east of Interstate (I-) 805, west of the MCAS Miramar and SDG&E powerline easement, south of Nobel Drive, and north of the LOSSAN/NCTD rail road tracks, at an elevation of approximately 332 feet AMSL.

The site slopes in a north to south aspect at approximately 2%, with side slopes that range between 15% and 25%. The soil Conservation Service maps indicate the areas is mostly Olivenhain cobbly loam (Ohf) soil with occurrences of Redding gravelly loam (RdC). See below for a summary of the soil properties.

The dominant vegetation community within the proposed creation area is non-native annual grassland with a preponderance of wild oat grasses (*Avena* spp.) and brome grasses (*Bromus* spp.). There are also broadleaf weeds present in lesser quantities, including black mustard (*Brassica nigra*), yellow star thistle (*Centaurea melitensis*), Italian thistle (*Carduus pycnocephalis*), filaree (*Erodium* spp.), annual clover (*Melilotus* spp.), and others. Other native species observed in the proposed mitigation area include fascicled tarplant (*Deinandra fasciculata*), charming centaury (*Zeltnera venusta*), toad rush (*Juncus bufonius*), a few scattered broom baccharis (*Baccharis sarothroides*), and a small patch of purple and foothill needlegrass (*Stipa pulchra; S. lepida*). The site vegetation was also mapped by Helix Environmental as non-native grassland (Helix 2016). Adjacent vegetation communities include Diegan coastal sage scrub, chamise chaparral, and non-native vegetation (ornamental/landscape plantings).

Soil Types at Pueblo South Native Grassland Mitigation Area

OhF—Olivenhain cobbly loam, 30% to 50% slopes

- Map Unit Setting
  - *National map unit symbol:* hbfd
  - *Elevation:* 100 to 600 feet
  - *Mean annual precipitation:* 14 inches
  - *Mean annual air temperature:* 63°F
  - *Frost-free period:* 290 to 330 days
  - *Farmland classification:* Not prime farmland

- Properties and Qualities
  - *Slope:* 30% to 50%
  - *Depth to restrictive feature:* About 10 inches to abrupt textural change
  - *Natural drainage class:* Well drained
  - *Runoff class:* Very high
  - *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
  - *Depth to water table:* More than 80 inches

RdC—Redding gravelly loam, 2% to 9% slopes

- Map Unit Setting
  - *National map unit symbol:* hbfy
  - *Elevation:* 100 to 1,500 feet
  - *Mean annual precipitation:* 14 to 25 inches
  - *Mean annual air temperature:* 61 to 63°F
  - *Frost-free period:* 230 to 320 days
  - *Farmland classification:* Not prime farmland
  - *Frequency of flooding:* None
  - *Frequency of ponding:* None
  - *Available water storage in profile:* Very low (about 1.3 inches)
- Properties and Qualities
  - *Slope:* 2% to 9%
  - *Depth to restrictive feature:* About 15 inches to abrupt textural change; 20 to 40 inches to duripan
  - *Natural drainage class:* Well drained
  - *Runoff class:* Very high
  - *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
  - *Depth to water table:* More than 80 inches

- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Very low (about 1.8 inches)

2.3 Regulatory Requirements

Integrated Natural Resources Management Plan

Because a portion of the North City Project crosses through MCAS Miramar lands, locations where it crosses MCAS Miramar land are subject to the regulations of the Integrated Natural Resources Management Plan (INRMP). However, native grassland impacts are entirely on land owned by the City of San Diego, and therefore the INRMP is not applicable to this mitigation plan.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits the take of any migratory bird or any part, nest, or eggs of any such bird. Under the MBTA, "take" is defined as pursue, hunt, shoot, wound, kill trap, capture, or collect, or any attempt to carry out these activities (16 U.S.C. 703 et seq.). Additionally, Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, requires that any project with federal involvement address impacts of federal actions on migratory birds with the purpose of promoting conservation of migratory bird populations (66 Federal Register 3853–3856). Executive Order 13186 requires federal agencies to work with the U.S. Fish and Wildlife Service to develop a memorandum of understanding. U.S. Fish and Wildlife Service reviews actions that might affect these species. For revegetation, this means that removal of weedy vegetation or other activities that disturb vegetation will need to take place outside of the migratory bird nesting season (February 1 through September 15) or be reviewed for nesting activity by a qualified wildlife biologist no more than 48 hours within 10 days prior to such work.

City of San Diego Biology Guidelines

The City of San Diego Development Services Department developed the Biology Guidelines presented in the Land Development Manual "to aid in the implementation and interpretation of the Environmentally Sensitive Lands Regulations (ESL), San Diego Land Development Code (LDC), Chapter 14, Division 1, Section 143.0101 et seq., and the Open Space Residential (OR-1-2) Zone, Chapter 13, Division 2, Section 131.0201 et seq." (City of San Diego 2016). The guidelines also provide standards for the determination of impact and mitigation under the California Environmental Quality Act (CEQA) and the California Coastal Act.

3 RESTORATION ROLES AND RESPONSIBLE PARTIES

The Project proponent is the City of San Diego Public Utilities Department located at 9192 Topaz Way, MS-901, San Diego, California 92123. The contact persons for the City are Mark Brunette and Summer Adleberg. They can be reached at 858.492.5070. The Project proponent is responsible for the implementation, maintenance, monitoring, and success of the revegetation program.

3.1 Restoration Team

Project Biologist

The Project biologist/habitat restoration specialist (PB) must be a qualified individual or firm with experience performing habitat restoration in Southern California. The PB must have a Bachelor of Science or higher degree in ecology, biology, botany, natural resources management, or a closely related field. The PB must be familiar with native plants and weed species. The PB will ensure the mitigation work is installed in accordance with this plan, the final grassland mitigation landscape construction documents, and the final environmental impact report. The PB will perform monitoring and reporting duties as outlined herein and in landscape construction documents (LCDs).

Landscape Architect

The landscape architect must be a registered landscape architect with a valid license issued by the California Architects Board, Landscape Architect's Technical Committee (LATC). The landscape architect will work closely with the PB in preparation of the LCDs, including site preparation, planting, seeding, irrigation, erosion control, notes, details, and specifications.

Revegetation Contractors

The revegetation installation contractor (RIC) and revegetation maintenance contractor (RMC) must be a qualified person or entity who holds a valid California landscape contractor's license, Class C-27, and has experience performing native habitat restoration installation and maintenance services with at least one similar project in Southern California. The contractor must be familiar with weeds and invasive species and have in-depth experience in controlling wildland weeds and invasive species within sensitive habitat areas. The contractor must have a Qualified Pesticide Applicator's License or have a Pesticide Applicators' Certificate issued by the Department of Pesticide Regulation. The RIC and RMC must provide verification of experience and provide copies of licenses upon request. The RIC will provide installation and 120-day PEP maintenance services. The RMC will provide revegetation maintenance services for 5 years following approval of the 120-day PEP. The City may opt to issue maintenance contracts annually.

Seed Suppliers

The native plant seed supplier must be located in Southern California region and have a valid Department of Agriculture Inspection Certificate. The seed supplier must have at least 2 years of verifiable experience growing, collecting, and storing native seed materials. The seed supplier must adequately store, test, and label all seed to indicate genus, species, and subspecies. The seed supplier must provide seed testing data indicated in the LCDs to the City upon request. All seed must be provided free of invasive weed species. The seed supplier must provide seed from origins indicated herein and per the LCDs and specifications. The seed supplier must abide by the California Seed Law requirements outlined by the California Department of Food and Agriculture (CDFA).

4 NATIVE GRASSLAND IMPLEMENTATION

Native grassland creation will be achieved through a process that includes site preparation, seed application, and maintenance. Site preparation will include delineating the mitigation area boundaries, removing trash and debris, clearing weeds and invasive species, de-compacting soils (where determined needed by the PB in consultation with the City), performing horticultural soil suitability testing, soil amending (if needed), installing a temporary on-grade irrigation system, and performing a grow and kill program. Upon completion of the site preparation work, the mitigation area will be seeded using the methods and species described below. Following seeding, the revegetation areas will be maintained by the RIC during the 120-day PEP and maintained by the RMC for 5 years following approval of the PEP. Each component of the implementation plan is outlined in detail below.

4.1 Rationale for Expecting Implementation Success

The selected site location for restoring native grassland was determined based on a review of current site conditions and historic aerial imagery. Current site conditions are described in Section 2.2, which indicate that the site currently supports non-native annual grassland and Olivenhain cobbly loam (Ohf) soil with occurrences of Redding gravelly loam (RdC).

As noted previously, native grasslands in southern California typically occur on fine-textured soils (i.e., higher proportion of silts and clays relative to sand) that are moist or wet in the winter and very dry during summer and fall. The soil type mapped in the proposed native grassland restoration site is the same as the soil type mapped in the impact area (e.g., Redding gravelly loam with Olivenhain cobbly loam components), which tends to include clay-dominated strata and inclusions. Site-specific soil tests indicated the presence of fine textured soils (ranging from 33% – 64% clay and silt). Based on this review, the soil appears suitable for establishing native grassland habitat.

Based on a review of aerial imagery, the site appears to have been disturbed in the late 1960s or early 1970s, and has remained disturbed habitat, now dominated by non-native annual grasses and broadleaf weeds (NETROnline 2017). Prior to disturbance, the site appears to have been primarily an herbaceous species dominated community (few shrubs are visible in the imagery). A few sparse native bunch grasses are present among the predominantly non-native community, indicating that the habitat is conducive to native grasses. Therefore, from a habitat perspective, native grassland is appropriate for the site.

Implementation of the native grasslands restoration includes a heavy focus on weed control to allow native species to adequately establish. Implementation also includes restoration techniques that provide site preparation (e.g., decompaction and imprinting) and supplemental watering to provide an ideal environment for seed germination and plant establishment. The use of local seed stock also provides assurance that the selected species are appropriate and adapted to expected site conditions.

The suitable site conditions coupled with the implementation program outlined below provides sufficient rationale for expecting implementation success.

4.2 Site Preparation

4.2.1 Site Access

Temporary construction access to the mitigation area shall be along paths pre-approved by the City in consultation with the PB. Access shall not incur impacts to environmentally sensitive habitat. Approved temporary construction access routes shall be demarcated with orange snow fencing or 5' long metal t-posts and yellow nylon rope, as deemed appropriate by the City and PB.

At this time the preferred access is from the SDG&E utility easement located along the eastern border of the site. There is a gate located along Nobel Drive that allows access down the existing utility access road. The City, and, or installation contractor will need to coordinate with the utility easement holder and process the necessary right of entry permits. A potential alternate access would be to enter the site from the northbound I-805 freeway/Nobel Drive off-ramp. This alternative would temporarily impact ornamental landscaping and would need to be coordinated with Caltrans. This alternative would require installing a lockable double access gate in the existing chainlike fence.

4.2.2 Mitigation Area Fencing

The mitigation area boundaries will be surveyed, staked, and reviewed by the PB and City. Boundary fencing will include 5-foot-long metal T-posts on the surveyed/staked and approved Project boundaries. T-posts will be installed at 10 feet on-center, with the bases set 12 inches into grade. T-posts will be set plumb and include a single strand of yellow nylon rope installed between T-posts.

4.2.3 Weed Control & Trash Removal

Prior to weeding, the PB will review the site with the RIC and mark out any native vegetation and/or wildflower populations to protect in-place. All weeding/vegetation clearing work will be performed outside of the migratory bird nesting season to the extent practical. If site clearing needs to be occur during the nesting season, a nesting bird survey will be conducted no more than 10 days beforehand to ensure there are no nesting birds present. Any active nests will be protected in accordance with the MBTA, and as directed by the PB in consultation with the City.

All weeds in the mitigation areas will be cut to grade with string trimmers or small mowing/ clearing equipment. Any perennial weeds will be treated with the appropriate systemic herbicide. Upon completion of weeding, bare mineral soil will be exposed. Any trash found on site will be removed. All weed slash and trash will be loaded into a roll-off bin or trucks, covered, and removed from the site. All weed slash and trash will be transported to a green waste recycling or landfill facility. Because the Project disturbs more than an acre of land it will require a Stormwater Pollution Prevention Plan (SWPPP) and a designated Qualified SWPPP Practitioner (QSP). The SWPPP and QSP will include erosion and sediment control measures necessary during construction and until final stabilization is achieved.

4.2.4 Soil Preparation

Following fence installation and weed and trash removal, the site will be cross-ripped to a depth of 8 inches. Cross-ripping will include multiple passes in varying, perpendicular directions. Ripping teeth will be spaced no more than 10 inches apart. Following soil ripping soil testing will be performed at 3-4 locations, as directed by the PB. While we do not anticipate the need for soil amending, if the soil test results indicate amending is necessary it will be performed as recommended by the soil testing laboratory and the PB's directions.

Slopes with a run:rise ratio equal to or greater than 6:1 will be track-walked upon completion of ripping work. Track-walking will be conducted up and down slope. The remainder of the site will be imprinted with a seed imprinter. Imprints will be made such that the long axis of the imprints is on-contour. Imprints shall make "v" formation with a minimum depth of 4 inches. Imprints will be offset to avoid the channelization of water.

Any debris brought to the surface by ripping will be removed from the mitigation area and disposed of at a landfill facility.

Imprinting work will be reviewed and approved by PB and City prior to installing the irrigation system and initiating the grow and kill program.

4.2.5 Irrigation

A temporary above-grade sprinkler irrigation system will be installed and used to germinate, grow, and kill the weeds as indicated in Section 4.1.5, below. Upon completion of the grow and kill program, irrigation will be used to facilitate native seed germination, seed survival, and seedling establishment.

The irrigation system will include a programmable solar or battery operated controller and master valve. Continuous pressure mainlines, ball valves, and remote control valves will be installed below grade. Lateral lines and sprinkler heads will be staked to grade. The above-grade components of the irrigation system will be removed once the mitigation effort has met the performance standards and deemed complete by City staff.

If an irrigation system is not feasible due to lack of, or distance to a water source, the grow and kill program outlined in Section 4.1.5 will be performed for 12 consecutive months (minimum), the seeding rate will be doubled, and seeding will only occur in fall or early winter (October 15-December 15).

4.2.6 Weed Grow and Kill Program

A grow and kill program will be implemented upon approval of the irrigation system installation work. During the grow and kill period the site shall be irrigated at least twice a week to wet the top one inch of soil in order to germinate the weed seed present in the site soil. Once the weeds have germinated and obtained an average height of 6 inches and before they begin to set seed, they shall be sprayed with an appropriate herbicide. This shall occur for at least 4 continuous months, and may be extended by the PB if there is evidence that the weed seed bank has not been depleted. Upon conclusion of the grow and kill program all weed slash and debris shall be removed from the site in order to expose bare mineral soil prior to seeding.

If the site is non-irrigated, the grow and kill program shall be performed for 12 continuous months. In this case the site will rely on natural rainfall to germinate the weeds. Weeds shall be controlled as indicated above. If it is a drought year the grow and kill program may be extended for an additional year, as determined by the PB in consultation with the City.

4.3 Seed Mix

The native grassland seed mix is provided in Table 2. Seed species were selected based on species inventoried at both the impact and mitigation sites, as well as species expected to occur within native grasslands habitat in the region. All seed materials shall have origins from cismontane San Diego County, unless approval is granted otherwise by the PB in coordination with City staff. Local collections may be necessary to obtain seed for some of the species in the seed mix. The PB, in coordination with the City, may make substitutions to the seed mix based on availability. The seed mixes have been designed to create habitat similar to those impacted and provide erosion control until the native grassland vegetation becomes established. Seeding will be scheduled to occur in the fall to the maximum extent practical to minimize water use and maximize germination rates and seedling survival. If the site ends up being non-irrigated it shall be seeded between October15 and December 15. The seeded area is shown on Figure 4.

Table 2
Native Grassland Seed Mix

Scientific Name	Common Name	Pure Live Seed (PLS)	Pounds per Acre	Total Pounds (2.55 acres)
Acmispon glaber	deerweed	24	0.5	1.3
Bromus carinatus	California brome	76	1.0	2.6
Croton setiger	doveweed	72	1.0	2.6
Cryptantha intermedia	common cryptantha	5	2.0	5.1
Deinandra fasciculata	fascicled tarplant	2.5	0.5	1.3
Eriophyllum confertiflorum	golden yarrow	22.32	1.0	2.6
Eschscholzia californica	California poppy	71	1.0	2.6
Festuca microstachys var. *microstachys*	small fescue	72	2.0	5.1
Gnaphalium californicum	California everlasting	2.5	0.5	1.3
Grindelia camporum	gumplant	20	1.0	2.6
Lasthenia californica	California goldfields	30	0.5	1.3
Lessingia filaginifolia	sand aster	0.08	2.0	5.1
Lupinus bicolor	pygmy lupine	78.4	2.0	5.1
Plantago erecta	dot-seed plantain	86.33	2.0	5.1
Sidalcea sparsifolia	checkerbloom	54	0.5	1.3
Sisyrinchium bellum	blue-eyed grass	71.25	3.0	7.7
Stipa lepida	foothill needlegrass	54	2.0	5.1
Stipa pulchra	purple needlegrass	42	10.0	25.5
Zeltnera venusta	charming centaury	54	1.0	2.6
		Total	**34.0**	**86.7**

4.4 Seed Installation

The PB shall review the site prior to, during, and after seeding work to help ensure conformance with this plan and final LCDs. The RIC shall submit to the PB and MMC the proposed seed materials at least 5 days prior to seeding. The PB shall verify that the seed mix meets the specified requirements. The revegetation areas shall be free of weeds and trash and have best management practices (BMPs) installed prior to seeding. The site will be hydroseeded using the seed mix in Table 2 along with the following hydroseed slurry mix following approval of the grow and kill program: wood fiber mulch at 2,000 lbs./acre, Aztac M-Binder (or approval equal), at 50 lbs./acre, starter fertilizer at label rates, and green dye. Seeding shall be performed such that the entire soil surface is covered with no bare mineral soil exposed. Due to potential access constraints, the hydroseeding truck may not have access directly to the restoration site, and would need to use hoses connected to the hydroseeding truck. Alternatively, if hydroseeding equipment cannot gain reasonable access to the site (e.g., within 1,000 feet), then the restoration area may be seeded using a calibrated "belly" spreader. Seed should be lightly scratched into the soil surface and covered with a pre-approved seed-topper to a depth of 1/8 inch.

4.5 Erosion Control

BMPs will be installed promptly after site preparation work (soil disturbance/vegetation clearing) is completed to provide interim (pre-native vegetation establishment) erosion control. Fiber rolls, silt fence, and or rock filled burlap gravel bags will be installed as necessary to prevent erosion. Fiber rolls will be biodegradable and encased in burlap material. They will be free of nylon/plastic netting and mesh and be certified free of noxious weeds. The location of the BMPs will be determined by the City, and, in accordance with the Project's SWPPP and QSP.

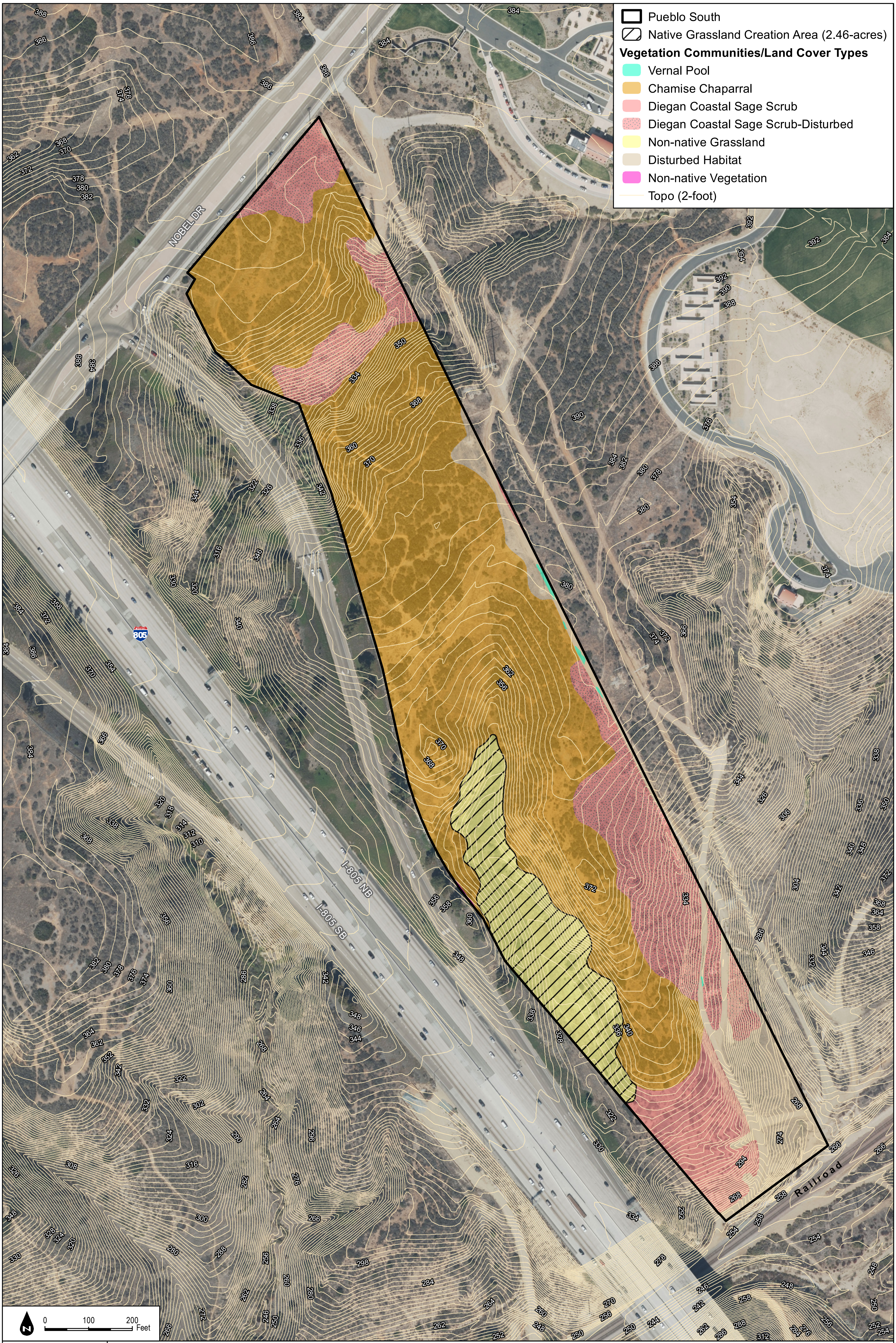
4.6 Restoration Schedule

An outline of the anticipated Project installation sequence and schedule is provided in Table 3. Site preparation work, irrigation system installation, BMP installation, and the weed grow and kill program will occur prior to seeding. Seed installation is best performed between October 15 and December 15 to maximize seed germination and minimize irrigation water usage. The 5-year biological monitoring and maintenance period will commence upon successful completion of the 120-day PEP.

Table 3
Revegetation Schedule

Task Description	Anticipated Work Period
Seed ordering	9–12 months prior to anticipated installation
Site preparation	Early-mid summer
Irrigation installation	Mid-late summer
Weed grow and kill program*	Late summer–fall
Seeding	Fall/early winter
120-day plant establishment & warranty period (PEP)	Commence upon approval of all installation work
60-month (5-year) maintenance and monitoring program	Commence upon successful completion of 120-day PEP

* If no irrigation system is provided, the grow and kill program shall continue for 12 months and the site shall be seeded in mid-late fall the following year.



SOURCE: City San Diego 2016, 2017; SANDAG 2017

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FIGURE 4

Native Grassland Creation Plan - Pueblo South

North City Pure Water Project

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5 RESTORATION MAINTENANCE AND MONITORING

This maintenance and monitoring section provides direction for maintenance and monitoring activities to be performed during the initial 120-day PEP and the 5-year maintenance and monitoring period. The 5-year maintenance period begins when the PB and City certify that the mitigation installation work and 120-day PEP have been completed in substantial conformance with this plan, the final LCDs, and applicable environmental documents.

5.1 120-Day Plant Establishment and Warranty Period

The RIC will begin the 120-day PEP, maintenance, and warranty period following completion and acceptance of the revegetation installation work. Maintenance during this time includes controlling weeds and invasive species, litter removal, watering as needed for healthy plant establishment, irrigation system maintenance and programming, boundary fence maintenance and repair, BMP maintenance and repair, and re-seeding any areas that fail to germinate. At a minimum, maintenance will be performed once every two weeks during the 120-day PEP. The RIC shall review the revegetation areas monthly with the PB. At the end of the 120-day PEP the contractor shall review the site with the City’s representative and PB. If all work has been completed as outlined herein and per the LCDs, the City will deem the PEP complete.

5.2 5-Year Maintenance Period

Following successful completion of the 120-day PEP, the RMC will maintain the revegetation areas for 5 continuous years. The contractor shall review the site with the PB and City representative at least once every six months. At the end of the 5-year maintenance period the mitigation area will be reviewed with the City and PB. If the mitigation/restoration maintenance work has been performed in accordance with this plan and the LCDs the City will provide an acceptance letter to the RMC. Any punch-list items must be corrected and accepted by the City prior to final approval.

5.2.1 Irrigation

Irrigation will be performed as-needed to germinate native seeds and establish them until they are acclimated to natural rainfall cycles (typically 1 to 3 years). The contractor will adjust the watering time and frequency as needed to ensure healthy growth while avoiding erosion and over-watering. The contractor will inspect the irrigation systems regularly and make any necessary repairs and adjustments, as required, for proper system operation. Once the seeds are established, the irrigation schedules will be reduced and/or terminated in consultation with the PB and City in order to provide evidence that the site is self-sustaining direct irrigation of the restoration area must be ceased at least 2 years prior to the end of the maintenance/monitoring period. The irrigation system will be removed once the restoration has been accepted as successful.

If a water source/point of connection for irrigation is not available supplemental watering may be provided by charging the irrigation system with a water-truck. A special water truck coupling station and hose would be needed in order for the water truck to couple to the irrigation system. The water truck would likely need to park on the utility easement road while charging the system. If this method is utilized seeding should take place in mid-late fall to the extent practical in order to take advantage of precipitation during the winter rainy season.

5.2.2 Weeding

Non-native plant species are common within the proposed restoration area. The predominant maintenance work effort will be related to management and control of non-native plant species. Weed control efforts will include a combination of physical removal, and/or herbicide applications where appropriate and legal according to herbicide restrictions. Any herbicide use shall be coordinated with the PB to ensure that desirable vegetation is not inadvertently damaged from herbicide overspray.

The majority of non-native species documented onsite are annuals; therefore, effective control will rely on minimizing seed production. Many of these species are ubiquitous, and complete control will not be feasible (e.g., filaree, rattail fescue). Further, some of these species may not pose a considerable threat to the establishment and successful function of the native grassland habitat (e.g., narrow-leaf cottonrose [*Logfia gallica*]). While maintenance efforts will attempt to address all non-native species, the focus of the weed control efforts shall be on those species that present the greatest threat to the success of the Project. Those species include those listed on the California Invasive Plant Council's (Cal-IPC) California Invasive Plant Inventory Database (Cal-IPC 2017) that have a moderate to high rating for threat to natural lands.

Weed control efforts should be conducted early in the growing season prior to seed set and dispersal. Thus, the maintenance visits will be closely spaced during the winter and early spring when the annual weed species are developing seed. Weed control efforts will likely be minimal in summer and fall when the annual weeds have died.

5.2.3 Trash and Debris Removal

During each site visit the RMC will remove any trash and debris that has accumulated in the mitigation area. Natural debris such as leaf drop will be left on site.

5.2.4 Boundary Fence Maintenance

During each site visit the RMC will perform fence repairs and maintenance if necessary.

5.2.5 Pest and Disease Control

Vertebrate pest control is not anticipated as part of this Project, nor are insect pests expected to be severe enough to warrant control. However, if an insect pest becomes significant enough to warrant control (i.e., threatens overall plant/habitat establishment), the contractor shall implement control methods utilizing the Integrated Pest Management methodologies. If plant diseases become a problem during the 5-year maintenance period the RMC shall notify the PB and City to determine the appropriate control measures. Herbivory problems such as loss of plant material from herbivores such as rabbits, deer and gophers shall be brought to the immediate attention of the PB and City to determine the appropriate control measures.

Pest and disease control will be conducted following all applicable laws, regulations, label directions, and safety precautions. Should the contractor require specific pest control recommendations, the contractor shall consult a licensed pest control adviser. The contractor shall provide reports of all pest control measures implemented at the site, including details of methods and materials used, such as pesticide applications. Copies of any written recommendations shall also be provided.

5.2.6 Vandalism, Site Protection and Access Control

The site is currently fenced off from the public so trespassing and vandalism is not likely to occur as long as the fence is kept in good repair and gates are kept locked. Signs may be posted around the perimeter of the mitigation area to inform people that the area is a mitigation site. The City will coordinate with the police department if needed to have trespassers and or homeless encampments removed from the area.

5.2.7 Remedial Work and Corrective Actions

The PB will make corrective recommendations, such as over-seeding of sparse areas, if needed to bring the restoration areas into compliance with the performance standards outlined herein.

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6 BIOLOGICAL MONITORING

Biological monitoring and reporting of the mitigation area will be performed as outlined below at the frequencies shown in Table 4. The monitoring program will begin with site preparation and habitat installation and continue until Project sign off, approximately 5 years following the completion of the 120-day PEP.

Table 4
Biological Monitoring Schedule

Activity	Frequency
Site Preparation/Installation	Daily
120-Day PEP	2x/Month
Year 1	Monthly
Years 2-3	Monthly February-July Every other month August-January
Years 4-5	Quarterly

6.1 Maintenance Monitoring

The PB will visit the mitigation area at the intervals shown in Table 4 above. Maintenance monitoring will assess weed control, erosion control, trash accumulation, and condition of Project fencing. A summary report will be submitted to the RIC and the City following each site visit. Remedial measures, if needed, will be included in the reports.

6.2 Biological Monitoring

Biological monitoring includes evaluating the status of seed germination, plant establishment, natural recruitment, plant survival, and habitat development. Biological monitoring is divided up into qualitative and quantitative monitoring.

6.2.1 Qualitative Monitoring

During scheduled monitoring visits, the PB will assess seed germination, plant establishment, and natural recruitment. Permanent photo viewpoints will be established so vegetation development and cover can be visually documented during the 5-year maintenance and monitoring period.

6.2.2 Quantitative Monitoring

Quantitative monitoring will include measuring the percent native and weed cover each year. Data will be recorded onto field forms and include percentage cover by native species, percent cover weed and invasive species, the percent bare ground, notes on surface condition (e.g., rock, sand, vegetative detritus), and overall species richness within the revegetation area boundaries. Point-intercept transects will be established to collect cover data at each 0.5 meter. The data will be used to determine percent native and weed cover, percent bare ground, and species richness relative to performance standards.

6.3 Reporting

Annual biological reports will be prepared by the PB to document the progress of the revegetation effort, including vegetation assessment data and a comparison of the results with the performance standards outlined herein. Each annual report will include photographs from key vantage points, and make remedial recommendations, if necessary to meet the annual performance standards. Annual reports will be submitted to the City each year.

7 PERFORMANCE STANDARDS/SUCCESS CRITERIA

The goal of the native grassland creation effort is to create a high-quality native grassland vegetation community that is self-sustaining and provides valuable habitat for native wildlife species. The performance standards indicated in Table 5 below have been established to define when the revegetation effort is judged successful and are based on the condition of the impacted site documented in the BRR.

Should the PB determine that any part of the mitigation program is not meeting the performance standards, corrective measures will be recommended in the annual report. Corrective measures may include, but are not be limited to reseeding, controlling pests, applying fertilizers or other soil amendments, or making adjustments to irrigation and maintenance practices.

Table 5
Annual Performance Standards/Success Criteria for Native Grassland Creation Areas

	Minimum Percent Native Cover	Minimum Percent Native Grasses	Maximum Percent Weed Cover	Maximum Percent Invasive Species*	Minimum Species Richness**
YEAR 1	10	5	30	10	6
YEAR 2	20	10	20	5	8
YEAR 3	30	15	10	5	10
YEAR 4	40	20	10	5	10
YEAR 5	50	20	10	0	10

* Cal-IPC Moderate and High listed invasive species
** Species richness shall include only native species

Completion of 5-Year Native Grassland Mitigation Program

Upon completion of 5-year maintenance and monitoring period the PB will prepare a final (Year 5) monitoring report indicating that the revegetation program is complete. The report will indicate that the mitigation area is in substantial conformance with the performance standards outlined herein. If the Project does not meet the performance standards, the PB will make recommendations to bring the Project into compliance, and the maintenance-and-monitoring period will continue until the performance standards are met.

The City's Public Utilities Department, Development Services Department, and Parks and Recreation Department will be notified of the completion of the restoration effort through submittal of a final (Year 5) monitoring report. The City departments noted above will discuss and provide confirmation that the mitigation project is complete.

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APPENDIX T

Mitigation and Avoidance Measure Summary Table

Mitigation Number	Mitigation Measure	Project Component	Location
MM-BIO-1a **Mitigation for Upland Impacts**	In order to off-set the permanent impacts to sensitive upland vegetation communities, 6.61 acres of mitigation would be required for the Miramar Reservoir Alternative and 8.14 acres of mitigation would be required for the San Vicente Reservoir Alternative. Mitigation would be provided through restoration and preservation of uplands at the SANDER Vernal Pool and Upland Mitigation Site. All mitigation would occur within the Multiple Species Conservation Program's (MSCP's) Multi-Habitat Planning Area (MHPA). Additionally, in order to satisfy the cumulative impacts requirement, 1.30 acres of native grassland creation would be conducted outside the MHPA for either alternative and a Native Grassland Creation Mitigation Plan – Pueblo South (Appendix S) would be implemented.	*Components Common to both Alternatives*	
		North City Pure Water Facility (NCPWF; includes the North City Pure Water Pump Station)	Entire facility
		San Vicente Reservoir Alternative	
		San Vicente Pipeline – Tunnel Alternative Terminus (San Vicente Pipeline – TAT)	Entire alignment
		San Vicente Pipeline – In-Reservoir Alternative Terminus (San Vicente Pipeline – IRAT)	Entire alignment
		San Vicente Pipeline – Marina Alternative Terminus (San Vicente Pipeline – MAT)	Entire alignment
		Mission Trails Booster Station (MTBS)	Entire facility
		San Vicente Pipeline - Repurposed Pipeline	At air and blow-off valve locations along the alignment
MM-BIO-1b **Mitigation for Vernal Pool Impacts**	In order to off-set permanent impacts to vernal pools, 0.75 acre of mitigation would be required for both Project Alternatives. Mitigation would be provided through restoration of vernal pools and adjacent uplands at the SANDER Vernal Pool and Upland Mitigation site, which is within the Vernal Pool Habitat Conservation Plan (VPHCP) hard line preserve. The SANDER Vernal Pool and Upland Mitigation Site within MHPA lands; therefore, mitigation would occur within the MSCP's MHPA and would be implemented in accordance with City/U.S. Army Corps of Engineers (ACOE)/California Department of Fish and Wildlife (CDFW)/Regional Water Quality Control Board (RWQCB) guidelines. The SANDER Vernal Pool and Upland Mitigation Plan (Appendix R) would be developed and implemented at the SANDER Vernal Pool and Upland Mitigation Site. Both upland vegetation, including in Tier mitigation, and vernal pool impacts would be mitigated at the SANDER site.	*Components Common to both Alternatives*	
		NCPWF	Vernal pools within the facility
MM-BIO-1c **Mitigation for Impacts to Jurisdictional Aquatic Resources**	In order to off-set permanent impacts to jurisdictional resources (excluding vernal pools), 1.12 acres of mitigation would be required for the San Vicente Reservoir Alternative. Mitigation would be provided at the SANDER Mitigation site (subject to the satisfaction of ACOE and RWQCB) or through allocation of credit at the San Diego River Mitigation Site subject to ACOE and RWQCB approval. All mitigation would occur within the MSCP's MHPA and is in accordance with City/ACOE/CDFW/RWQCB guidelines.	*San Vicente Reservoir Alternative*	
		San Vicente Pipeline – TAT	Impacts to open water and intermittent stream southeast of San Vicente Reservoir and north of Lake Vicente Drive
		San Vicente Pipeline – IRAT	Impacts to open water southwest and within San Vicente Reservoir
		San Vicente Pipeline – MAT	Impacts to open water southwest of San Vicente Reservoir
		San Vicente Pipeline - Repurposed Pipeline	Within impact areas near the Miramar National Cemetery and Marine Corps Air Station (MCAS) Miramar north of SR-52
MM-BIO-2 **Habitat Revegetation**	Habitat revegetation and erosion control treatments will be installed within temporary disturbance areas in native habitat, in accordance with the San Diego Municipal Code, Land Development Code—Biology Guidelines (City of San Diego 2012a) and the San Diego Municipal Code, Land Development Code—Landscape Standards (City of San Diego 2016b). A Conceptual Revegetation Plan (Appendix P) was prepared by a Qualified Biological or Restoration Specialist. Habitat revegetation will feature native species that are typical of the area, and erosion control features will include silt fence and straw fiber rolls, where appropriate. The revegetation areas will be monitored and maintained for 25 months to ensure adequate establishment and sustainability of the plantings/seedings. **Revegetation Plan(s) and Specifications:** 1. Landscape Construction Documents (LCD) shall be prepared on D-sheets and submitted to the City of San Diego Development Services Department, Landscape Architecture Section (LAS) for review and approval. LAS shall consult with Mitigation Monitoring Coordination (MMC) and obtain concurrence prior to approval of LCD. The LCD shall consist of revegetation, planting, irrigation and erosion control plans; including all required graphics, notes, details, specifications, letters, and reports as outlined below. 2. Landscape Revegetation Planting and Irrigation Plans shall be prepared in accordance with the San Diego Land Development Code (LDC) Chapter 14, Article 2, Division 4, the LDC Landscape Standards submittal requirements, and Attachment "B" (General Outline for Revegetation/ Restoration Plans) of the City of San Diego's LDC Biology Guidelines (April 2012). The Principal Qualified Biologist (PQB) shall identify and adequately document all pertinent	*Components Common to both Alternatives*	
		Morena Wastewater Forcemain and Brine/Centrate Line (Morena Pipelines)	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks
		NCPWF	Temporary impact to non-native grassland within the facility site
		Landfill Gas Pipelines (LFG Pipeline)	Entire Alignment
		Miramar Reservoir Alternative	
		North City Pure Water Pipeline (North City Pipeline)	West of Eastgate Mall and north of Miramar Rd; east of I-15 north of Pomerado Rd; south of Evans Pond; south of Miramar Reservoir
		San Vicente Reservoir Alternative	
		San Vicente Pure Water Pipeline (San Vicente Pipeline)	East of I-15 and south of Clairemont Mesa Blvd within disturbed coastal sage scrub; along Tierrasanta Blvd north of Mission Gorge Rd within coastal sage scrub and open water; along Mission Gorge Rd through Mission Trails Regional Park within non-native grassland; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd

Mitigation Number	Mitigation Measure	Project Component	Location
	information concerning the revegetation goals and requirements, such as but not limited to, plant/seed palettes, timing of installation, plant installation specifications, method of watering, protection of adjacent habitat, erosion and sediment control, performance/success criteria, inspection schedule by City staff, document submittals, reporting schedule, etc. The LCD shall also include comprehensive graphics and notes addressing the ongoing maintenance requirements (after final acceptance by the City). For areas where a water source is not available, irrigation can be completed by a water truck. Additionally, it is recommended that planting/seeding occur in the fall or early winter, to the maximum extent practical, in order to minimize the amount of water truck visits needed. 3. The Revegetation Installation Contractor (RIC), Revegetation Maintenance Contractor (RMC), PQB, and Grading Contractor (GC), where applicable shall be responsible to insure that for all grading and contouring, clearing and grubbing, installation of plant materials, and any necessary maintenance activities or remedial actions required during installation and the 120-day plant establishment period are done per approved LCD. The following procedures at a minimum, but not limited to, shall be performed: a. The RMC shall be responsible for the maintenance of the upland mitigation area for a minimum period of 120 days. b. At the end of the 120-day period the PQB shall review the revegetation area to assess the completion of the short-term plant establishment period and submit a report for approval by MMC. If the 120-day plant establishment period success criteria has not been met, an extension may be warranted at the discretion of the PQB. c. MMC would provide approval in writing to begin the 25-month maintenance and monitoring program. d. Existing indigenous/native species shall not be pruned, thinned or cleared in the revegetation/mitigation area. e. The revegetation site shall not be fertilized. f. The RIC is responsible for reseeding (if applicable) if weeds are not removed, within one week of written recommendation by the PQB. g. Weed control measures shall include the following: (1) hand removal, (2) cutting with power equipment, and (3) chemical control. Hand removal of weeds is the most desirable method of control and would be used wherever possible. h. Damaged areas shall be repaired immediately by the RIC/RMC. Insect infestations, plant diseases, herbivory, and other pest problems would be closely monitored throughout the 25-month maintenance period. Protective mechanisms such as metal wire netting shall be used as necessary. Diseased and infected plants shall be immediately disposed of off site in a legally-acceptable manner at the discretion of the PQB or Qualified Biological Monitor (City approved). Where possible, biological controls would be used instead of pesticides and herbicides.	San Vicente Pipeline – IRAT	Entire alignment
		San Vicente Pipeline – MAT	Entire alignment
MM-BIO-3 **Nesting Birds**	To avoid any direct impacts any species identified as a candidate, sensitive, or special status species in the MSCP or other local or regional plans, policies or regulations, or by the CDFW or USFWS, removal of habitat that supports active nests in the proposed area of disturbance should occur outside of the breeding season for these species (February 1 to September 15). If removal of habitat in the proposed area of disturbance must occur during the breeding season, the Qualified Biologist shall conduct a pre-construction survey to determine the presence or absence of nesting birds on the proposed area of disturbance. The pre-construction survey shall be conducted within 10 calendar days prior to the start of construction activities (including removal of vegetation). The applicant shall submit the results of the pre-construction survey to City Development Services Department for review and approval prior to initiating any construction activities. If nesting birds are detected, a letter report or mitigation plan in conformance with the City's Biology Guidelines and applicable state and federal law (i.e., appropriate follow up surveys, monitoring schedules, and construction barriers/buffers, etc.) shall be prepared and include proposed measures to be implemented to ensure that take of birds or eggs is avoided. The report or mitigation plan shall be submitted to the City for review and approval, and implemented to the satisfaction of the City. The City's MMC Section and Biologist shall verify and approve that all measures identified in the report or mitigation plan are in place prior to and/or during construction.	*Components Common to both Alternatives*	
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks and eucalyptus woodland within the alignment
		North City Water Reclamation Plant Expansion (includes NCPWF Influent Pump Station and North City Renewable Energy Facility) (NCWRP)	Areas of coastal sage-scrub and non-native grassland within the facility
		NCPWF	Entire facility
		LFG Pipeline	Entire alignment
		Metro Biosolids Center (MBC) Improvements	Sensitive vegetation within the facility
		Miramar Reservoir Alternative	
		North City Pipeline	Eucalyptus woodland within the alignment
		Miramar Water Treatment Plant (WTP)	Eucalyptus woodland within the facility
		Pure Water Dechlorination Facility (Dechlorination Facility)	Eucalyptus woodland within the facility
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd within disturbed coastal sage scrub; crosses the San Diego River

Mitigation Number	Mitigation Measure	Project Component	Location
			south of SR-52 and west of Santo Rd within non-native grassland and coastal sage scrub; along Mission Gorge Rd through Mission Trails Regional Park within coastal sage scrub; urban environments along Mission Gorge Rd within eucalyptus woodland; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd within eucalyptus woodland; along Mast Blvd north of Lakeside Baseball Park within coastal sage scrub and non-native grassland; along the San Diego River and crosses SR-67 within non-native grassland, coastal sage scrub, southern cottonwood-willow riparian forest, southern arroyo willow riparian forest, and eucalyptus woodland; along Moreno Ave south of San Vicente Reservoir within eucalyptus woodland, non-native grassland, coastal sage scrub, and coast live oak woodland
		San Vicente Pipeline – TAT	Entire alignment
		San Vicente Pipeline – IRAT	Entire alignment
		San Vicente Pipeline – MAT	Entire alignment
		MTBS	Entire facility
		San Vicente Pipeline - Repurposed Pipeline	At all air and blow-off valve locations along the alignment
MM-BIO-4a **Coastal California Gnatcatcher**	Prior to the preconstruction meeting, the Assistant Deputy Director (ADD) or MMC shall verify that the MHPA boundaries and the project requirements regarding the coastal California gnatcatcher, as specified below, are shown on the construction plans. No clearing, grubbing, grading, or other construction activities shall occur during the coastal California gnatcatcher breeding season (March 1 to August 15), until the following requirements have been met to the satisfaction of the ADD/MMC: 1. A Qualified Biologist (possessing a valid Endangered Species Act Section 10(a)(1)(a) Recovery Permit) shall survey those habitat areas within the MHPA that would be subject to construction noise levels exceeding 60 decibels [dB(A)] hourly average for the presence of the coastal California gnatcatcher. Surveys for coastal California gnatcatcher shall be conducted pursuant to the protocol survey guidelines established by the USFWS within the breeding season prior to the commencement of any construction. If coastal California gnatcatchers are present, then the following conditions must be met: a. Between March 1 and August 15, no clearing, grubbing, or grading of occupied coastal California gnatcatcher habitat shall be permitted. Areas restricted from such activities shall be staked or fenced under the supervision of a Qualified Biologist; and b. Between March 1 and August 15, no construction activities shall occur within any portion of the site where construction activities would result in noise levels exceeding 60 dB(A) hourly average at the edge of occupied coastal California gnatcatcher habitat. An analysis showing that noise generated by construction activities would not exceed 60 dB(A) hourly average at the edge of occupied habitat must be completed by a Qualified Acoustician (possessing current noise engineer license or registration with monitoring noise level experience with listed animal species) and approved by the ADD/MMC at least 2 weeks prior to the commencement of construction activities. Prior to the commencement of construction activities during the breeding season, areas restricted from such activities shall be staked or fenced under the supervision of a Qualified Biologist; or c. At least 2 weeks prior to the commencement of construction activities, under the direction of a Qualified Acoustician, noise attenuation measures (e.g., berms, walls) shall be implemented to ensure that noise levels resulting from construction activities would not exceed 60 dB(A) hourly average at the edge of habitat occupied by the coastal California gnatcatcher. Concurrent with the commencement of construction activities and the construction of necessary noise attenuation facilities, noise monitoring shall be conducted at the edge of the occupied habitat area to ensure that noise levels do not exceed 60 dB(A) hourly average. If the noise attenuation techniques implemented are determined to be inadequate by the Qualified Acoustician or Biologist,	*Components Common to both Alternatives*	
		Morena Pipelines	Coastal sage scrub within MHPA in Rose Canyon east of Genesee Rd and north of the railroad tracks and within San Clemente Canyon, just south of the SR-52 and east of Genesee Avenue.
		NCWRP	Coastal sage scrub within the MHPA south of Miramar Rd.
		LFG Pipeline	Coastal sage scrub within the MHPA south of Miramar Rd.
		Miramar Reservoir Alternative	
		North City Pipeline	Coastal sage scrub within the MHPA east of Eastgate Mall.
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	Within MHPA areas containing coastal sage scrub along the alignment: east of I-15 and south of Clairemont Mesa Blvd; crosses the San Diego River south of SR-52 and west of Santo Rd; along Mission Gorge Rd through Mission Trails Regional Park; urban environments along Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd; along Mast Blvd north of Lakeside Baseball Park; along the San Diego River and crosses SR-67; along Moreno Ave south of San Vicente Reservoir
		San Vicente Pipeline – IRAT	Within MHPA areas with coastal sage scrub along the alignment
		San Vicente Pipeline – MAT	Within MHPA areas with coastal sage scrub along the alignment

<table>
<tr><th>Mitigation Number</th><th>Mitigation Measure</th><th>Project Component</th><th>Location</th></tr>
<tr><td></td><td>then the associated construction activities shall cease until such time that adequate noise attenuation is achieved or until the end of the breeding season (August 16). Construction noise monitoring shall continue to be monitored at least twice weekly on varying days, or more frequently depending on the construction activity, to verify that noise levels at the edge of occupied habitat are maintained below 60 dB(A) hourly average or to the ambient noise level if it already exceeds 60 dB(A) hourly average. If not, other measures shall be implemented in consultation with the biologist and the ADD/MMC, as necessary, to reduce noise levels to below 60 dB(A) hourly average or to the ambient noise level if it already exceeds 60 dB(A) hourly average. Such measures may include, but are not limited to, limitations on the placement of construction equipment and the simultaneous use of equipment.
2. If coastal California gnatcatchers are not detected during the protocol survey, the Qualified Biologist shall submit substantial evidence to the ADD/MMC and applicable resource agencies which demonstrates whether or not mitigation measures such as noise walls are necessary between March 1 and August 15 as follows:
a. If this evidence indicates that the potential is high for coastal California gnatcatcher to be present based on historical records or site conditions, then Condition 1(a) shall be adhered to as specified above.
b. If this evidence concludes that no impacts to this species are anticipated, no mitigation measures would be necessary.</td><td></td><td></td></tr>
<tr><td rowspan="8">MM-BIO-4b
Coastal California Gnatcatcher</td><td rowspan="8">Ambient noise levels on MCAS Miramar, in particular in the vicinity of the airfield, exceed typical construction noise level. On MCAS Miramar construction noise levels are not anticipated to exceed ambient noise levels. Potential impacts associated with construction activities on MCAS Miramar would be mitigated through the following:
1. Qualified Biologist (possessing a valid federal Endangered Species Act (FESA) Section 10(a)(1)(a) Recovery Permit) shall conduct a pre-construction survey within suitable habitat. Between February 15 and August 31, no clearing, grubbing, or grading of occupied coastal California gnatcatcher habitat shall be permitted. Areas restricted from such activities shall be staked or fenced under the supervision of a Qualified Biologist; and
2. For potential impacts associated with construction noise; presence or absence of coastal California gnatcatcher would be determined by pre-construction surveys conducted by a Qualified Biologist adjacent to the Project area. Coastal sage scrub outside of the impact area would be flagged to protect it from construction equipment as directed by the Project Biologist. Between February 15 and August 31 no noise-generating construction activities that exceed ambient noise levels would occur in close proximity to occupied habitat. If necessary other measures shall be implemented in consultation with the Project Biologist as necessary, to reduce noise levels. Measures may include, but are not limited to, limitations on the placement of construction equipment and the simultaneous use of equipment.</td><td colspan="2">Components Common to both Alternatives</td></tr>
<tr><td>NCWRP</td><td>Coastal sage scrub adjacent to the facility within MCAS Miramar.</td></tr>
<tr><td>LFG Pipeline</td><td>Coastal sage scrub along the alignment within MCAS Miramar.</td></tr>
<tr><td>MBC Improvements</td><td>Coastal sage scrub within the facility within MCAS Miramar.</td></tr>
<tr><td colspan="2">Miramar Reservoir Alternative</td></tr>
<tr><td>North City Pipeline</td><td>Coastal sage scrub within MCAS Miramar south of Miramar Rd.</td></tr>
<tr><td colspan="2">San Vicente Reservoir Alternative</td></tr>
<tr><td>San Vicente Pipeline - Repurposed Pipeline</td><td>Coastal sage scrub impacted by air and blow-off valve locations along the alignment within MCAS Miramar</td></tr>
<tr><td rowspan="2">MM-BIO-5
Burrowing Owl</td><td rowspan="2">The following is a species-specific mitigation measure, required to meet MSCP Subarea Plan Conditions of Coverage. The mitigation measure would reduce potential impacts to burrowing owl and associated habitat located outside the MHPA (burrowing owl and associated habitat impacts within the MHPA must be avoided).
Prior to Permit or Notice to Proceed Issuance:
1. As this project has been determined to have burrowing owl occupation potential, the Permit Holder shall submit evidence to the ADD of the City's Entitlements verifying that a Biologist possessing qualifications pursuant to the "Staff Report on Burrowing Owl Mitigation," State of California Natural Resources Agency, California Department of Fish and Game (hereafter referred as CDFG 2012, Staff Report), has been retained to implement a burrowing owl construction impact avoidance program.
2. The Qualified Biologist shall attend the pre-construction meeting to inform construction personnel about the City's burrowing owl requirements and subsequent survey schedule.
Prior to Start of Construction:
1. The Permit Holder and Qualified Biologist must ensure that initial pre-construction/take avoidance surveys of the Project "site" are completed between 14 and 30 days before initial construction activities, including brushing, clearing, grubbing, or grading of the Project site; regardless of the time of the year. "Site" means the Project site and the area within a radius of 450 feet of the Project site. A report detailing the results of the surveys shall be submitted and approved by the Wildlife Agencies and/or City MSCP staff prior to construction or burrowing owl eviction(s) and shall include maps of the Project site and burrowing owl locations on aerial photos.
2. The pre-construction survey shall follow the methods described in CDFG 2012, Staff Report, Appendix D.</td><td colspan="2">San Vicente Reservoir Alternative</td></tr>
<tr><td>San Vicente Pipeline</td><td>North of the San Diego River and along Tierrasanta Blvd within coastal sage scrub (including disturbed), disturbed habitat, non-native vegetation, eucalyptus woodland, coast live oak woodland, and southern willow scrub; crosses the San Diego river at SR-52 north of Mission Gorge Rd within coastal sage scrub (including disturbed), disturbed habitat, non-native grassland, and coast live oak woodland; along SR-52 west of Carlton Oaks Dr within non-native vegetation, non-native grassland, and non-native woodland; north of SR-67 along Mast Blvd, along Moreno Ave south of San Vicente Reservoir within non-native grassland and general agriculture</td></tr>
</table>

Mitigation Number	Mitigation Measure	Project Component	Location
	3. 24 hours prior to commencement of ground-disturbing activities, the Qualified Biologist shall ~~verify~~ update and report results of preconstruction/take avoidance surveys. Verification shall be provided to the City's MMC Section. If results of the preconstruction surveys have changed and burrowing owl are present in areas not previously identified, immediate notification to the City and Wildlife Agencies shall be provided prior to ground disturbing activities. **During Construction:** 1. Best Management Practices shall be employed as burrowing owls are known to use open pipes, culverts, excavated holes, and other burrow-like structures at construction sites. Legally permitted active construction projects which are burrowing owl occupied and have followed all protocol in this mitigation section, or sites within 450 feet of occupied burrowing owl areas, should undertake measures to discourage burrowing owls from recolonizing previously occupied areas or colonizing new portions of the site. Such measures include, but are not limited to, ensuring that the ends of all pipes and culverts are covered when they are not being worked on, and covering rubble piles, dirt piles, ditches, and berms. 2. On-going burrowing owl detection—If burrowing owls or active burrows are not detected during the pre-construction surveys, Section "a" below shall be followed. If burrowing owls or burrows are detected during the pre-construction surveys, Section "b" shall be followed. Neither the MSCP Subarea Plan nor this mitigation section allows for any burrowing owls to be injured or killed outside or within the MHPA; in addition, impacts to burrowing owls within the MHPA must be avoided. a. **Post Survey Follow Up if Burrowing Owls and/or Signs of Active Natural or Artificial Burrows Are Not Detected During the Initial Pre-Construction Survey**. Monitoring the site for new burrows is required using the protocol in Appendix D of the Burrowing Owl Staff Report (CDFG 2012) for the period following the initial pre-construction survey, until construction is scheduled to be complete and is complete. (NOTE: Using a projected completion date (that is amended if needed) will allow development of a monitoring schedule which adheres to the required number of surveys in the detection protocol.) i. If no active burrows are found but burrowing owls are observed to occasionally (1–3 sightings) use the site for roosting or foraging, they should be allowed to do so with no changes in the construction or construction schedule. ii. If no active burrows are found but burrowing owls are observed during follow up monitoring to repeatedly (4 or more sightings) using the site for roosting or foraging, the City's MMC Section shall be notified and any portion of the site where owls have been sighted and that has not been graded or otherwise disturbed shall be avoided until further notice. iii. If a burrowing owl begins using a burrow on the site at any time after the initial pre-construction survey, procedures described in Section b must be followed. iv. Any actions other than these require the approval of the City and the Wildlife Agencies. b. **Post-Survey Follow Up if Burrowing Owls and/or Active Natural or Artificial Burrows are detected during the Initial Pre-Construction Survey.** Monitoring the site for new burrows is required using the protocol in Appendix D of the Burrowing Owl Staff Report (CDFG 2012) for the period following the initial pre-construction survey, until construction is scheduled to be complete and is complete. (NOTE: Using a projected completion date (that is amended if needed) will allow development of a monitoring schedule which adheres to the required number of surveys in the detection protocol.) i. This section (b) applies only to sites (including biologically defined territory) wholly outside of the MHPA; all direct and indirect impacts to burrowing owls within the MHPA SHALL be avoided. ii. If one or more burrowing owls are using any burrows (including pipes, culverts, debris piles etc.) on or within 300 feet of the proposed construction area, the City's MMC Section shall be contacted. The City's MMC Section shall contact the Wildlife Agencies regarding eviction/collapsing burrows and enlist the appropriate City biologist for on-going coordination with the Wildlife Agencies and the qualified consulting burrowing owls biologist. No construction shall occur within 300 feet of an active burrow without written concurrence from the Wildlife Agencies. This distance may increase or decrease, depending on the burrow's location in relation to the site's topography, and other physical and biological characteristics. 1. Outside the Breeding Season: If the burrowing owl is using a burrow on site outside the breeding season (i.e., September 1 – January 31), the burrowing owl may be evicted after the qualified burrowing owl biologist has determined via fiber optic camera or other appropriate device, that no eggs, young, or adults are in the burrow and written concurrence from the Wildlife Agencies for eviction is obtained prior to implementation.		

<table>
<tr><th>Mitigation Number</th><th>Mitigation Measure</th><th>Project Component</th><th>Location</th></tr>
<tr><td></td><td>2. During Breeding Season: If a burrowing owl is using a burrow on site during the breeding season (February 1 to August 31), construction shall not occur within 300 feet of the burrow until the young have fledged and are no longer dependent on the burrow, at which time the burrowing owls can be evicted. Eviction requires written concurrence from the Wildlife Agencies prior to implementation.
3. Survey Reporting During Construction: Details of construction surveys and evictions (if applicable) carried out shall be immediately (within 5 working days or sooner) reported to the City's MMC Section and the Wildlife Agencies and must be provided in writing (as by e-mail) and acknowledged to have been received by the required Wildlife Agencies and Developmental Services Department Staff member(s).
Post Construction:
1. Details of all the surveys and actions undertaken on site with respect to burrowing owls (i.e. occupation, eviction, locations etc.) shall be reported to the City's MMC Section and the Wildlife Agencies within 21 days post-construction and prior to the release of any grading bonds. This report must include summaries of all previous reports for the site; and maps of the Project site and burrowing owl locations on aerial photos.</td><td></td><td></td></tr>
<tr><td rowspan="8">MM-BIO-6
Riparian Birds</td><td rowspan="8">Prior to the preconstruction meeting, the Assistant Deputy Director (ADD) or MMC shall verify that MHPA boundaries and the Project requirements regarding the least Bell's vireo and southwestern willow flycatcher, as specified below, are shown on the construction plans.
No clearing, grubbing, grading, or other construction activities shall occur during the least Bell's vireo breeding season (March 15 to September 15) and southwestern willow flycatcher breeding season (May 1 to September 1) until the following requirements have been met to the satisfaction of the ADD/MMC:
1. A Qualified Biologist (possessing a valid Endangered Species Act Section 10(a)(1)(a) Recovery Permit) shall survey those habitat areas within the MHPA that would be subject to construction noise levels exceeding 60 decibels [dB(A)] hourly average for the presence of the least Bell's vireo and southwestern willow flycatcher. Surveys for least Bell's vireo and southwestern willow flycatcher shall be conducted pursuant to the protocol survey guidelines established by the USFWS within the breeding season prior to the commencement of any construction. If least Bell's vireo or southwestern willow flycatcher, are present, then the following conditions must be met:
a. Between March 15 to September 15 for least Bell's vireo, and May 1 to September 1 for southwestern willow flycatcher, no clearing, grubbing, or grading of occupied habitat shall be permitted. Areas restricted from such activities shall be staked or fenced under the supervision of a Qualified Biologist; and
b. Between March 15 to September 15 for least Bell's vireo, and May 1 to September 1 for southwestern willow flycatcher, no construction activities shall occur within any portion of the site where construction activities would result in noise levels exceeding 60 dB(A) hourly average at the edge of occupied habitat. An analysis showing that noise generated by construction activities would not exceed 60 dB(A) hourly average at the edge of occupied habitat must be completed by a Qualified Acoustician (possessing current noise engineer license or registration with monitoring noise level experience with listed animal species) and approved by the ADD/MMC at least 2 weeks prior to the commencement of construction activities. Prior to the commencement of construction activities during the breeding season, areas restricted from such activities shall be staked or fenced under the supervision of a Qualified Biologist; or
c. At least 2 weeks prior to the commencement of construction activities, under the direction of a Qualified Acoustician, noise attenuation measures (e.g., berms, walls) shall be implemented to ensure that noise levels resulting from construction activities would not exceed 60 dB(A) hourly average at the edge of habitat occupied by the least Bell's vireo and southwestern willow flycatcher. Concurrent with the commencement of construction activities and the construction of necessary noise attenuation facilities, noise monitoring shall be conducted at the edge of the occupied habitat area to ensure that levels do not exceed 60 dB(A) hourly average. If the noise attenuation techniques implemented are determined to be inadequate by the Qualified Acoustician or Biologist, then the associated construction activities shall cease until such time that adequate noise attenuation is achieved or until the end of the breeding season (August 16). Construction noise monitoring shall continue to be monitored at least twice weekly on varying days, or more frequently depending on the construction activity, to verify that noise levels at the edge of occupied habitat are maintained below 60 dB(A) hourly average or to the ambient noise level if it already exceeds 60 dB(A) hourly average. If not, other measures shall be implemented in consultation with the biologist and the ADD/MMC, as necessary, to reduce noise levels to below 60 dB(A) hourly average or to the ambient noise level if it already exceeds 60 dB(A) hourly average. Such measures may include, but are not limited to, limitations on the</td><td colspan="2">Components Common to both Alternatives</td></tr>
<tr><td>Morena Pump Station</td><td>San Diego River at Friars Rd</td></tr>
<tr><td>Morena Pipelines</td><td>Within riparian habitat near Mission Bay at W Morena Blvd and Tecolote Rd; San Clemente Canyon at SR-52; Rose Canyon Open Space Park and Nobel Dr</td></tr>
<tr><td>LFG Pipeline</td><td>Within riparian habitat associated with Rose Creek Canyon.</td></tr>
<tr><td>MBC</td><td>Within riparian habitat associated with San Clemente Canyon north of the MBC.</td></tr>
<tr><td colspan="2">San Vicente Reservoir Alternative</td></tr>
<tr><td>San Vicente Pipeline</td><td>San Clemente Canyon south of SR-52; Murphy Canyon at I-15; Mission Trails Regional Park along Mission Gorge Rd and at SR-52; San Diego River along Carlton Oaks Dr; San Diego River south of Mast Blvd; San Diego River at SR-67; south of San Vicente Reservoir at SR-67</td></tr>
<tr><td>San Vicente Pipeline - Repurposed Pipeline</td><td>At air and blow-off valve locations within riparian habitat in both San Clemente Canyon and the Veteran's Administration property at the Miramar National Cemetery</td></tr>
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Mitigation Number	Mitigation Measure	Project Component	Location
	placement of construction equipment and the simultaneous use of equipment. 2. If least Bell's vireo and/or southwestern willow flycatcher are not detected during the protocol survey, the Qualified Biologist shall submit substantial evidence to the ADD/MMC and applicable resource agencies which demonstrates whether or not mitigation measures such as noise walls are necessary between March 15 to September 15 for least Bell's vireo, and/or May 1 to September 1 for southwestern willow flycatcher, adherence to the following is required: a. If this evidence indicates that the potential is high for least Bell's vireo and/or southwestern willow flycatcher to be present based on historical records or site conditions, then Condition 1(a) shall be adhered to as specified above. b. If this evidence concludes that no impacts to this species are anticipated, no mitigation measures would be necessary.		
~~**MM-BIO-7**~~ ~~**Western Pond Turtle**~~	~~Since the Miramar Reservoir is maintained and operated as a drinking water reservoir and contains a warm water fishery, both of which create conditions that provide less than optimal habitat for western pond turtle, and because an adaptive management program for this species would be contradictory to these uses, the City prepared a trapping and relocation plan for this species (Appendix U). Relocation would be conducted in accordance with the plan and in consultation with the California Department of Fish and Wildlife (CDFW) with input from the U.S. Geological Survey and approval by the Development Services Department and by MSCP Planning. The relocation plan provides the methods for the trapping of western pond turtles and relocation to the most proximate suitable habitat that would not be affected by the proposed project.~~ ~~Specific trapping timing and methodology/recurrence intervals would be developed in consultation with CDFW and would be performed by a Qualified Biologist operating under an active California State Scientific Collecting Permit. However, trapping would be performed in late April through early August to remove egg-laying females from the reservoir prior to egg deposition, thus eliminating the potential for stranding of eggs or hatchlings.~~	~~*Miramar Reservoir Alternative*~~	
		~~North City Pipeline~~	~~Miramar Reservoir~~
MM-BIO-7~~8~~ **Vernal Pool Watershed**	There would be permanent indirect impacts within the PW36, VP697, and VP699 watersheds from air and blow-off valves associated with the San Vicente Pipeline - Repurposed 36-inch Recycled Water Line only if the San Vicente Reservoir Alternative is implemented. As required under the Integrated Natural Resources Management Plan (INRMP), mitigation for permanent indirect impacts from the San Vicente Reservoir Alternative to an occupied watershed (PW36, VP697, and VP699) within the Level I and Level V Management Areas (MAs) would include: enhancement of remaining portions of watershed (protection by temporary fencing or other means, enlarge another portion); monitoring of species in the feature may be necessary to document extent of actual impacts to threatened or endangered species; if impacts are documented to threatened or endangered species, then additional action would be required for indirect impacts to the threatened or endangered species by habitat enhancement, possibly elsewhere; and no work around the vernal pool during the rainy season or when ground is wet (about November 1 to June 1). The City typically applies a 100-foot-wide avoidance buffer surrounding wetland resources; however, the width of the buffer may be determined on a case-by-case basis depending on the need and value. Therefore, no work within a 100-foot buffer around the vernal pool during rainy season or when ground is wet (about November 1 to June 1), unless it is determined that a reduced buffer is more appropriate.	*San Vicente Reservoir Alternative*	
		San Vicente Pipeline – Repurposed 36-inch Recycled Water Line	At air and blow-off valve locations along the alignment within the watersheds of vernal pools PW36, VP697, and VP699.
MM-BIO-8~~9~~ **Wetland Permits**	The owner/permittee shall provide evidence that all required regulatory permits, such as those required under Section 404 of the federal Clean Water Act, Section 1600 of the California Fish and Game Code, and the Porter-Cologne Water Quality Control Act, has been obtained.	*Miramar Reservoir Alternative*	
		North City Pipeline	Placement of pipeline within the Miramar Reservoir
		Components Common to both Alternatives	
		NCPWF	Vernal pools within the facility
		Morena Pipelines	Impacts within Tecolote Creek
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	Along the San Diego River, crosses I-15, and along Clairemont Mesa Blvd within coastal sage scrub (including disturbed); along the San Diego River, crosses SR-52, north of Mission Gorge Rd within coastal sage scrub and non-native grassland; north of SR-52 along Carlton Oaks Dr within non-native grassland; east of SR-67 along Willow Rd within coastal sage scrub, non-native grassland, and open water
		San Vicente Pipeline – TAT	Open water impact areas
		San Vicente Pipeline – IRAT	Open water impact areas
		San Vicente Pipeline – MAT	Open water impacts areas

Mitigation Number	Mitigation Measure	Project Component	Location
		San Vicente Pipeline - Repurposed Pipeline	At air and blow-off valve locations within riparian habitat in both San Clemente Canyon and the Veteran's Administration property at the Miramar National Cemetery
MM-BIO-9~~10~~a **Qualified Biologist**	The owner/permittee shall provide a letter to the City's Mitigation Monitoring Coordination (MMC) section stating that a Project Biologist (Qualified Biologist) as defined in the City of San Diego Municipal Code, Land Development Code—Biology Guidelines (City of San Diego 2012a), has been retained to implement the project's biological monitoring program. The letter shall include the names and contact information of all persons involved in the biological monitoring of the project.	*Components Common to both Alternatives*	
		Morena Pump Station	Overflow pipe near San Diego River at Friars Rd
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks; Mission Bay at W Morena Blvd and Tecolote Rd; San Clemente Canyon at SR-52; Rose Canyon Open Space Park and Nobel Dr
		NCWRP	Coastal sage scrub within the facility
		NCPWF	Entire facility
		LFG Pipeline	Entire Alignment
		MBC Improvements	Sensitive vegetation within the facility
		Miramar Reservoir Alternative	
		North City Pipeline	West of Eastgate Mall and north of Miramar Rd within coastal sage scrub; east of I-15 north of Pomerado Rd within non-native grassland; south of Evans Pond within non-native grassland; south of Miramar Reservoir within non-native grassland, coastal sage scrub (including disturbed), coastal sage-chaparral transition, and southern mixed chaparral
		Miramar WTP	Coastal sage scrub within the facility
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd within coastal sage scrub; crosses the San Diego River south of SR-52 and west of Santo Rd within southern arroyo willow riparian forest; San Clemente Canyon south of SR-52 within coastal sage scrub; Murphy Canyon at I-15 within coastal sage scrub (including disturbed), non-native grassland, and southern arroyo willow riparian forest; San Diego River along Carlton Oaks Dr within coastal sage scrub; San Diego River south of Mast Blvd within non-native grassland and coastal sage scrub; along Mission Gorge Rd through Mission Trails Regional Park within coastal sage scrub; urban environments along Mission Gorge Rd; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd within southern willow scrub (including disturbed); along Mast Blvd north of Lakeside Baseball Park within non-native grassland and coastal sage scrub; north of the San Diego River and along Tierrasanta Blvd within non-native grassland and coastal sage scrub; along the San Diego River and crosses SR-67 within non-native grassland and coastal sage scrub; along Moreno Ave south of San Vicente Reservoir within coastal sage scrub
		San Vicente Pipeline – TAT	Entire alignment
		San Vicente Pipeline – IRAT	Entire alignment
		San Vicente Pipeline – MAT	Entire alignment
		MTBS	Entire facility
		San Vicente Pipeline - Repurposed Pipeline	At all air and blow-off valve locations along the alignment

Mitigation Number	Mitigation Measure	Project Component	Location
MM-BIO-9~~10~~b Preconstruction Meeting	The Qualified Biologist shall attend the preconstruction meeting, discuss the Project's biological monitoring program, and arrange to perform any follow up mitigation measures and reporting including site-specific monitoring, restoration or revegetation, and additional fauna/flora surveys/salvage.	*Components Common to both Alternatives*	
		Morena Pump Station	San Diego River at Friars Rd
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks; Mission Bay at W Morena Blvd and Tecolote Rd; San Clemente Canyon at SR-52; Rose Canyon Open Space Park and Nobel Dr
		NCWRP	Coastal sage scrub within the facility
		NCPWF	Entire facility
		LFG Pipeline	Entire alignment
		MBC Improvements	Sensitive vegetation within the facility
		Miramar Reservoir Alternative	
		North City Pipeline	West of Eastgate Mall and north of Miramar Rd; east of I-15 north of Pomerado Rd; south of Evans Pond; south of Miramar Reservoir
		Miramar WTP	Coastal sage scrub within the facility
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd; crosses the San Diego River south of SR-52 and west of Santo Rd; San Clemente Canyon south of SR-52; Murphy Canyon at I-15; San Diego River along Carlton Oaks Dr; San Diego River south of Mast Blvd; along Mission Gorge Rd through Mission Trails Regional Park; urban environments along Mission Gorge Rd; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd; along Mast Blvd north of Lakeside Baseball Park; north of the San Diego River and along Tierrasanta Blvd; along the San Diego River and crosses SR-67; along Moreno Ave south of San Vicente Reservoir
		San Vicente Pipeline – TAT	Entire alignment
		San Vicente Pipeline – IRAT	Entire alignment
		San Vicente Pipeline – MAT	Entire alignment
		MTBS	Entire facility
		San Vicente Pipeline - Repurposed Pipeline	At all air and blow-off valve locations along the alignment
MM-BIO-9~~10~~c Documentation	The Qualified Biologist shall submit all required documentation to MMC verifying that any special mitigation reports including but not limited to, maps, plans, surveys, survey timelines, or buffers are completed or scheduled per City Biology Guidelines, Multiple Species Conservation Program (MSCP), Environmentally Sensitive Lands Ordinance, project permit conditions; California Environmental Quality Act (CEQA); National Environmental Policy Act (NEPA); endangered species acts (federal Endangered Species Act and California Endangered Species Act); and/or other local, state or federal requirements.	*Components Common to both Alternatives*	
		Morena Pump Station	San Diego River at Friars Rd
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks; Mission Bay at W Morena Blvd and Tecolote Rd; San Clemente Canyon at SR-52; Rose Canyon Open Space Park and Nobel Dr
		NCWRP	Coastal sage scrub within the facility
		NCPWF	Entire facility
		LFG Pipeline	Entire alignment
		MBC Improvements	Sensitive vegetation within the facility
		Miramar Reservoir Alternative	
		North City Pipeline	West of Eastgate Mall and north of Miramar Rd; east of I-15 north of Pomerado Rd; south of Evans Pond; south of Miramar Reservoir

Mitigation Number	Mitigation Measure	Project Component	Location
		Miramar WTP	Coastal sage scrub within the facility
		Dechlorination Facility	Eucalyptus trees within the facility footprint.
		San Vicente Reservoir	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd; crosses the San Diego River south of SR-52 and west of Santo Rd; San Clemente Canyon south of SR-52; Murphy Canyon at I-15; San Diego River along Carlton Oaks Dr; San Diego River south of Mast Blvd; along Mission Gorge Rd through Mission Trails Regional Park; urban environments along Mission Gorge Rd; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd; along Mast Blvd north of Lakeside Baseball Park; north of the San Diego River and along Tierrasanta Blvd; along the San Diego River and crosses SR-67; along Moreno Ave south of San Vicente Reservoir
		San Vicente Pipeline – TAT	Entire alignment
		San Vicente Pipeline – IRAT	Entire alignment
		San Vicente Pipeline – MAT	Entire alignment
		MTBS	Entire facility
		San Vicente Pipeline - Repurposed Pipeline	At all air and blow-off valve locations along the alignment
MM-BIO-9~~10~~d Biological Construction Mitigation/Monitoring Exhibit	The Qualified Biologist shall present a Biological Construction Mitigation/Monitoring Exhibit (BCME), which includes the biological documents above. In addition, the BCME would include: restoration/revegetation plans, plant salvage/ relocation requirements (e.g., burrowing owl exclusions, etc.), avian or other wildlife surveys/survey schedules (including general avian nesting and U.S. Fish and Wildlife (USFWS) protocol), timing of surveys, wetland buffers, avian construction avoidance areas/noise buffers/barriers, other impact avoidance areas, and any subsequent requirements determined by the Qualified Biologist and the City Assistant Deputy Director (ADD)/MMC. The BCME shall include a site plan, written and graphic depiction of the Project's biological mitigation/monitoring program, and a schedule. The BCME shall be approved by MMC and referenced in the construction documents.	*Components Common to both Alternatives*	
		Morena Pump Station	San Diego River at Friars Rd
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks; Mission Bay at W Morena Blvd and Tecolote Rd; San Clemente Canyon at SR-52; Rose Canyon Open Space Park and Nobel Dr
		NCWRP	Coastal sage scrub within the facility
		NCPWF	Entire facility
		LFG Pipeline	Entire alignment
		MBC Improvements	Sensitive vegetation within the facility
		Miramar Reservoir Alternative	
		North City Pipeline	West of Eastgate Mall and north of Miramar Rd; east of I-15 north of Pomerado Rd; south of Evans Pond; south of Miramar Reservoir
		Miramar WTP	Coastal sage scrub within the facility
		Dechlorination Facility	Eucalyptus trees within the facility footprint.
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd; crosses the San Diego River south of SR-52 and west of Santo Rd; San Clemente Canyon south of SR-52; Murphy Canyon at I-15; San Diego River along Carlton Oaks Dr; San Diego River south of Mast Blvd; along Mission Gorge Rd through Mission Trails Regional Park; urban environments along Mission Gorge Rd; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd; along Mast Blvd north of Lakeside Baseball Park; north of the San Diego River and

Mitigation Number	Mitigation Measure	Project Component	Location
			along Tierrasanta Blvd; along the San Diego River and crosses SR-67; along Moreno Ave south of San Vicente Reservoir
		San Vicente Pipeline – TAT	Entire alignment
		San Vicente Pipeline – IRAT	Entire alignment
		San Vicente Pipeline – MAT	Entire alignment
		MTBS	Entire facility
		San Vicente Pipeline - Repurposed Pipeline	At all air and blow-off valve locations along the alignment
MM-BIO-9~~10~~e Construction Fencing	Prior to construction activities, the Qualified Biologist shall supervise the placement of orange construction fencing or equivalent along the limits of disturbance adjacent to sensitive biological habitats and verify compliance with any other project conditions as shown on the BCME. This phase shall include flagging plant specimens and delineating buffers to protect sensitive biological resources (e.g., habitats/flora & fauna species, including nesting birds) during construction. Appropriate steps/care should be taken to minimize attraction of nest predators to the site.	*Components Common to both Alternatives*	
		Morena Pump Station	San Diego River at Friars Rd
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks; Mission Bay at W Morena Blvd and Tecolote Rd within disturbed wetlands; Coastal sage scrub within Tecolote Canyon Natural Park; San Clemente Canyon at SR-52 within sensitive vegetation including coastal sage scrub (including disturbed), coast live oak woodland, and non-native grassland; Rose Canyon Open Space Park and Nobel Dr within coastal sage scrub (including disturbed)
		NCWRP	Coastal sage scrub within the facility
		NCPWF	Entire facility
		LFG Pipeline	Entire alignment
		MBC Improvements	Sensitive vegetation within the facility
		Miramar Reservoir Alternative	
		North City Pipeline	West of Eastgate Mall and north of Miramar Rd; east of I-15 north of Pomerado Rd; south of Evans Pond; south of Miramar Reservoir
		Miramar WTP	Coastal sage scrub within the facility
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd; crosses the San Diego River south of SR-52 and west of Santo Rd; San Clemente Canyon south of SR-52; Murphy Canyon at I-15; San Diego River along Carlton Oaks Dr; San Diego River south of Mast Blvd; along Mission Gorge Rd through Mission Trails Regional Park; urban environments along Mission Gorge Rd; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd; along Mast Blvd north of Lakeside Baseball Park; north of the San Diego River and along Tierrasanta Blvd; along the San Diego River and crosses SR-67; along Moreno Ave south of San Vicente Reservoir
		San Vicente Pipeline – TAT	Entire alignment, southeast of San Vicente Reservoir and north of Lake Vicente Dr
		San Vicente Pipeline – IRAT	Entire alignment, south, southwest and within San Vicente Reservoir
		San Vicente Pipeline – MAT	Entire alignment
		MTBS	Entire facility
		San Vicente Pipeline - Repurposed Pipeline	At all air and blow-off valve locations along the alignment

Mitigation Number	Mitigation Measure	Project Component	Location
MM-BIO-9~~10~~f **On-site Education**	Prior to commencement of construction activities, the Qualified Biologist shall meet with the owner/permittee or designee and the construction crew and conduct an on-site educational session regarding the need to avoid impacts outside of the approved construction area and to protect sensitive flora and fauna (e.g., explain the avian and wetland buffers, flag system for removal of invasive species or retention of sensitive plants, and clarify acceptable access routes/methods and staging areas).	*Components Common to both Alternatives*	
		Morena Pump Station	San Diego River at Friars Rd
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks; Mission Bay at W Morena Blvd and Tecolote Rd; San Clemente Canyon at SR-52; Rose Canyon Open Space Park and Nobel Dr
		NCWRP	Coastal sage scrub within the facility
		NCPWF	Entire facility
		LFG Pipeline	Entire alignment
		MBC Improvements	Sensitive vegetation within the facility
		Miramar Reservoir Alternative	
		North City Pipeline	West of Eastgate Mall and north of Miramar Rd; east of I-15 north of Pomerado Rd; south of Evans Pond; south of Miramar Reservoir
		Miramar WTP	Coastal sage scrub within the facility
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd; crosses the San Diego River south of SR-52 and west of Santo Rd; San Clemente Canyon south of SR-52; Murphy Canyon at I-15; San Diego River along Carlton Oaks Dr; San Diego River south of Mast Blvd; along Mission Gorge Rd through Mission Trails Regional Park; urban environments along Mission Gorge Rd; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd; along Mast Blvd north of Lakeside Baseball Park; north of the San Diego River and along Tierrasanta Blvd; along the San Diego River and crosses SR-67; along Moreno Ave south of San Vicente Reservoir
		San Vicente Pipeline – TAT	Entire alignment
		San Vicente Pipeline – IRAT	Entire alignment
		San Vicente Pipeline – MAT	Entire alignment
		MTBS	Entire facility
		San Vicente Pipeline - Repurposed Pipeline	At all air and blow-off valve locations along the alignment
MM-BIO-9~~10~~g **Biological Monitoring**	During construction, a Qualified Biologist would be present to assist in the avoidance of impacts to native vegetation, jurisdictional aquatic resources, sensitive plants and wildlife, and nesting birds. Specific biological monitoring and or mitigation measures for sensitive wildlife, sensitive vegetation communities, and jurisdictional aquatic resources are described further in the mitigation measures.	*Components Common to both Alternatives*	
		Morena Pump Station	San Diego River at Friars Rd
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks; Mission Bay at W Morena Blvd and Tecolote Rd; San Clemente Canyon at SR-52; Rose Canyon Open Space Park and Nobel Dr
		NCWRP	Coastal sage scrub within the facility
		NCPWF	Entire facility
		LFG Pipeline	Entire alignment
		MBC Improvements	Sensitive vegetation within the facility
		Miramar Reservoir Alternative	
		North City Pipeline	West of Eastgate Mall and north of Miramar Rd; east of I-15 north of Pomerado Rd; south of Evans Pond; south of Miramar Reservoir

Mitigation Number	Mitigation Measure	Project Component	Location
		Miramar WTP	Coastal sage scrub within the facility
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd; crosses the San Diego River south of SR-52 and west of Santo Rd; San Clemente Canyon south of SR-52; Murphy Canyon at I-15; San Diego River along Carlton Oaks Dr; San Diego River south of Mast Blvd; along Mission Gorge Rd through Mission Trails Regional Park; urban environments along Mission Gorge Rd; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd; along Mast Blvd north of Lakeside Baseball Park; north of the San Diego River and along Tierrasanta Blvd; along the San Diego River and crosses SR-67; along Moreno Ave south of San Vicente Reservoir
		San Vicente Pipeline – TAT	Entire alignment
		San Vicente Pipeline – IRAT	Entire alignment
		San Vicente Pipeline – MAT	Entire alignment
		MTBS	Entire facility
		San Vicente Pipeline - Repurposed Pipeline	At all air and blow-off valve locations along the alignment
MM-BIO-9~~10~~h **Cover Trenches**	General biological monitoring shall include verifying that the contractor has covered all steep-walled trenches or excavations overnight or after shift. If trenches or excavations cannot be covered, the monitor would verify that the contractor has installed exclusionary fencing (e.g., silt fence) around the trenches or excavation areas or installed ramps to prevent entrapment of wildlife (e.g., reptiles and mammals). If animals are encountered within any trenches or excavated areas, they would be removed by the biological monitor, if possible, or provided with a means of escape (e.g., a ramp or sloped surface) and allowed to disperse. In addition, the biological monitor would provide training to construction personnel to increase awareness of the possible presence of wildlife beneath vehicles and equipment and to use best judgment to avoid killing or injuring wildlife. The biological monitor would be available to assist with moving wildlife, if necessary.	*Components Common to both Alternatives*	
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks; Mission Bay at W Morena Blvd and Tecolote Rd; San Clemente Canyon at SR-52; Rose Canyon Open Space Park and Nobel Dr
		LFG Pipeline	Entire alignment
		Miramar Reservoir Alternative	
		North City Pipeline	West of Eastgate Mall and north of Miramar Rd; east of I-15 north of Pomerado Rd; south of Evans Pond; south of Miramar Reservoir
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd; crosses the San Diego River south of SR-52 and west of Santo Rd; San Clemente Canyon south of SR-52; Murphy Canyon at I-15; San Diego River along Carlton Oaks Dr; San Diego River south of Mast Blvd; along Mission Gorge Rd through Mission Trails Regional Park; urban environments along Mission Gorge Rd; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd; along Mast Blvd north of Lakeside Baseball Park; north of the San Diego River and along Tierrasanta Blvd; along the San Diego River and crosses SR-67; along Moreno Ave south of San Vicente Reservoir
		San Vicente Pipeline – TAT	Entire alignment
		San Vicente Pipeline – IRAT	Entire alignment
		San Vicente Pipeline – MAT	Entire alignment

Mitigation Number	Mitigation Measure	Project Component	Location
MM-BIO-9~~10~~i **Nighttime Construction**	To reduce impacts to nocturnal species in those areas where they have a potential to occur, nighttime construction activity within undeveloped areas containing sensitive biological resources would be minimized whenever feasible and shielded lights would be utilized when necessary. Construction nighttime lighting would be subject to City Outdoor Lighting Regulations per San Diego Land Development Code (LDC) Section 142.0740.	*Components Common to both Alternatives*	
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks; Mission Bay at W Morena Blvd and Tecolote Rd; San Clemente Canyon at SR-52; Rose Canyon Open Space Park and Nobel Dr
		Miramar Reservoir Alternative	
		North City Pipeline	West of Eastgate Mall and north of Miramar Rd; east of I-15 north of Pomerado Rd; south of Evans Pond; south of Miramar Reservoir
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd; crosses the San Diego River south of SR-52 and west of Santo Rd; San Clemente Canyon south of SR-52; Murphy Canyon at I-15; San Diego River along Carlton Oaks Dr; San Diego River south of Mast Blvd; along Mission Gorge Rd through Mission Trails Regional Park; urban environments along Mission Gorge Rd; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd; along Mast Blvd north of Lakeside Baseball Park; north of the San Diego River and along Tierrasanta Blvd; along the San Diego River and crosses SR-67; along Moreno Ave south of San Vicente Reservoir
MM-BIO-9~~10~~j **BMPs/Erosion/Runoff**	The City will incorporate methods to control runoff, including a Stormwater Pollution Prevention Plan (SWPPP) to meet National Pollutant Discharge Elimination System (NPDES) regulations or a batch discharge permit from the City. Implementation of stormwater regulations are expected to substantially control adverse edge effects (e.g., erosion, sedimentation, habitat conversion) during and following construction both adjacent and downstream from the study area. Typical construction best management practices (BMPs) specifically related to reducing impacts from dust, erosion, and runoff generated by construction activities would be implemented. During construction, material stockpiles shall be placed such that they cause minimal interference with on-site drainage patterns. This will protect sensitive vegetation from being inundated with sediment-laden runoff. Dewatering shall be conducted in accordance with standard regulations of the Regional Water Quality Control Board (RWQCB). An NPDES permit, issued by RWQCB to discharge water from dewatering activities, shall be required prior to start of dewatering. This will minimize erosion, siltation, and pollution within sensitive communities. Design of drainage facilities shall incorporate long-term control of pollutants and stormwater flow to minimize pollution and hydrologic changes.	*Components Common to both Alternatives*	
		Morena Pump Station	San Diego River at Friars Rd
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks; a concrete-lined channel north of the intersection of Morena Blvd and Tecolote Rd; San Clemente Canyon at Genesee and SR-52; Rose Canyon Open Space Park and Nobel Dr.
		NCWRP	Mule-fat scrub located immediately east of the facility
		NCPWF	Entire facility
		LFG Pipeline	Entire alignment
		MBC Improvements	Sensitive vegetation within the facility
		Miramar Reservoir Alternative	
		North City Pipeline	Sensitive habitat west of Eastgate Mall and north of Miramar Rd; east of I-15 north of Pomerado Rd; a non-vegetated channel along Via Pasar; work easement adjacent to Evans Pond; staging area south of Miramar Reservoir
		Miramar WTP	Coastal sage scrub within the facility
		Dechlorination Facility	Entire facility site
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd; crosses the San Diego River south of SR-52 and west of Santo Rd; San Clemente Canyon south of SR-52; Murphy Canyon at I-15; San Diego River along Carlton Oaks Dr; San Diego River south of Mast Blvd; along Mission Gorge Rd through Mission Trails Regional Park; urban environments along Mission Gorge Rd; within Critical Habitat that crosses SR-

Mitigation Number	Mitigation Measure	Project Component	Location
			52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd; along Mast Blvd north of Lakeside Baseball Park; north of the San Diego River and along Tierrasanta Blvd; along the San Diego River and crosses SR-67; along Moreno Ave south of San Vicente Reservoir
		San Vicente Pipeline – TAT	Entire alignment
		San Vicente Pipeline – IRAT	Entire alignment
		San Vicente Pipeline – MAT	Entire alignment
		MTBS	Entire facility
		San Vicente Pipeline - Repurposed Pipeline	At all air and blow-off valve locations along the alignment
MM-BIO-9~~10~~k **Toxics/Project Staging Areas/Equipment Storage**	Projects that use chemicals or generate by-products such as pesticides, herbicides, and animal waste, and other substances that are potentially toxic or impactive to native habitats/flora/fauna (including water) shall incorporate measures to reduce impacts caused by the application and/or drainage of such materials into the MHPA. No trash, oil, parking, or other construction/development-related material/activities shall be allowed outside any approved construction limits. Where applicable, this requirement shall be incorporated into leases on publicly owned property when applications for renewal occur. Provide a note in/on the CDs that states: "All construction-related activity that may have potential for leakage or intrusion shall be monitored by the Qualified Biologist/Owners Representative or Resident Engineer to ensure there is no impact to the MHPA."	*Components Common to both Alternatives*	
		Morena Pump Station	San Diego River at Friars Rd
		Morena Pipelines	Coastal sage scrub in Rose Canyon east of Genesee Rd and north of the railroad tracks; Mission Bay at W Morena Blvd and Tecolote Rd; San Clemente Canyon at SR-52; Rose Canyon Open Space Park and Nobel Dr
		NCWRP	Coastal sage scrub within the facility
		LFG Pipeline	Entire alignment
		MBC Improvements	Sensitive vegetation within the facility
		Miramar Reservoir Alternative	
		North City Pipeline	West of Eastgate Mall and north of Miramar Rd; east of I-15 north of Pomerado Rd; south of Evans Pond; south of Miramar Reservoir
		Miramar WTP	Coastal sage scrub within the facility
		San Vicente Reservoir Alternative	
		San Vicente Pipeline	East of I-15 and south of Clairemont Mesa Blvd; crosses the San Diego River south of SR-52 and west of Santo Rd; San Clemente Canyon south of SR-52; Murphy Canyon at I-15; San Diego River along Carlton Oaks Dr; San Diego River south of Mast Blvd; along Mission Gorge Rd through Mission Trails Regional Park; urban environments along Mission Gorge Rd; within Critical Habitat that crosses SR-52 north of Mission Gorge Rd; north of the San Diego River along Mission Gorge Rd; along Mast Blvd north of Lakeside Baseball Park; north of the San Diego River and along Tierrasanta Blvd; along the San Diego River and crosses SR-67; along Moreno Ave south of San Vicente Reservoir
		San Vicente Pipeline – TAT	Entire alignment
		San Vicente Pipeline – IRAT	Entire alignment
		San Vicente Pipeline – MAT	Entire alignment
		MTBS	Entire facility
		San Vicente Pipeline - Repurposed Pipeline	At all air and blow-off valve locations along the alignment

Mitigation Number	Mitigation Measure	Project Component	Location
MM-BIO-9l **Silt Fencing**	Covered projects shall require temporary fencing (with silt barriers) of the limits of project impacts (including construction staging areas and access routes) to prevent additional vernal pool impacts and prevent the spread of silt from the construction zone into adjacent vernal pools. Fencing shall be installed in a manner that does not impact habitats to be avoided. Final construction plans shall 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 shall cease until the problem has been remedied to the satisfaction of the City. Temporary construction fencing shall be removed upon project completion.	*Components Common to both Alternatives*	
		LFG Pipeline	Vernal pools located in MCAS Miramar including the features within Miramar National Cemetery, three other seasonally ponded features (OSPFs) (VP653, VP654, and VP656), three basins (VP657, VP1859, and VP2480), and vernal pool PW36.
		MBC Improvements	Vernal pool PW8.
		Miramar Reservoir Alternative	
		North City Pipeline	Vernal pools or road ruts (not assigned identifiers) in MCAS Miramar south of Miramar Road.
		San Vicente Reservoir Alternative	
		San Vicente Pipeline - Repurposed Pipeline	At OSPFs VP697 and VP699 and vernal pool PW36 located in MCAS Miramar.
MM-BIO-9m **Dust**	Impacts from fugitive dust that may occur during construction grading shall be avoided and minimized through watering and other appropriate measures.	*Components Common to both Alternatives*	
		LFG Pipeline	Vernal pools located in MCAS Miramar including the features within Miramar National Cemetery, three OSPFs (VP653, VP654, and VP656), three basins (VP657, VP1859, and VP2480), and vernal pool PW36.
		MBC Improvements	Vernal pool PW8.
		Miramar Reservoir Alternative	
		North City Pipeline	Vernal pools or road ruts (not assigned identifiers) in MCAS Miramar south of Miramar Road.
		San Vicente Reservoir Alternative	
		San Vicente Pipeline - Repurposed Pipeline	At OSPFs VP697 and VP699 and vernal pool PW36 located in MCAS Miramar.
MM-BIO-9n **Vernal Pool Biologist**	A qualified monitoring biologist that has been approved by the City shall be on site during Project construction activities to ensure compliance with all mitigation measures identified in the CEQA environmental document. The biologist shall be knowledgeable of vernal pool species biology and ecology. The biologist shall perform the following duties: a. Oversee installation of and inspect the fencing and erosion control measures within or upslope of vernal pool restoration and/or preservation areas a minimum of once per week and 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 by construction personnel. At a minimum, training shall include (1) the purpose for resource protection; (2) a description of the vernal pool species and their habitat(s); (3) the conservation measures that must be implemented during Project construction to conserve the vernal pool species, including strictly limiting activities, and vehicles, equipment, and construction materials to the fenced Project footprint to avoid sensitive resource areas in the field (i.e., avoided areas delineated on maps or on the Project site by fencing); (4) environmentally responsible construction practices as outlined in measures 5, 6, and 7; (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 (MMRP), the need to adhere to the provisions of FESA, and the penalties associated with violating FESA. d. Halt work, if necessary, and confer with the City to ensure the proper implementation of species and habitat protection measures. The biologist shall report any violation to the City within 24 hours of its occurrence. e. Submit regular (e.g., weekly) letter reports to the City during Project construction and a final report following completion of construction. The final report shall include as-built construction drawings with an overlay of habitat that was impacted and avoided, photographs of habitat areas that were avoided, and other relevant summary information documenting that authorized impacts were not exceeded and that general compliance with all conservation measures was achieved.	*Components Common to both Alternatives*	
		LFG Pipeline	Vernal pools located in MCAS Miramar including the features within Miramar National Cemetery, three OSPFs (VP653, VP654, and VP656), three basins (VP657, VP1859, and VP2480), and vernal pool PW36.
		MBC Improvements	Vernal pool PW8.
		Miramar Reservoir Alternative	
		North City Pipeline	Vernal pools or road ruts (not assigned identifiers) in MCAS Miramar south of Miramar Road.
		San Vicente Reservoir Alternative	
		San Vicente Pipeline - Repurposed Pipeline	At OSPFs VP697 and VP699 and vernal pool PW36 located in MCAS Miramar.

Mitigation Number	Mitigation Measure	Project Component	Location
MM-BIO-9o **Limits of Work**	The following conditions shall be implemented during Project construction: a. Employees shall strictly limit their activities, vehicles, equipment, and construction materials to the fenced Project footprint. b. The Project site shall be kept as clean of debris as possible. All food-related trash items shall be enclosed in sealed containers and regularly removed from the site. c. Disposal or temporary placement of excess fill, brush, or other debris shall be limited to areas within the fenced Project footprint.	*Components Common to both Alternatives*	
		LFG Pipeline	Vernal pools located in MCAS Miramar including the features within Miramar National Cemetery, three OSPFs (VP653, VP654, and VP656), three basins (VP657, VP1859, and VP2480), and vernal pool PW36.
		MBC Improvements	Vernal pool PW8.
		Miramar Reservoir Alternative	
		North City Pipeline	Vernal pools or road ruts (not assigned identifiers) in MCAS Miramar south of Miramar Road.
		San Vicente Reservoir Alternative	
		San Vicente Pipeline - Repurposed Pipeline	At OSPFs VP697 and VP699 and vernal pool PW36 located in MCAS Miramar.
MM-BIO-9p **Equipment Staging**	All equipment maintenance, staging, and dispensing of fuel, oil, coolant, or any other such activities shall occur in designated areas within the fenced Project impact limits. These designated areas shall 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 shall be shown on the construction plans. Fueling of equipment shall take place within existing paved areas greater than 100 feet from the vernal pools or their watersheds. Contractor equipment shall be checked for leaks prior to operation and repaired as necessary. A spill kit for each piece of construction equipment shall be on -site and must be used in the event of a spill. "No-fueling zones" shall be designated on construction plans.	*Components Common to both Alternatives*	
		LFG Pipeline	Vernal pools located in MCAS Miramar including the features within Miramar National Cemetery, three OSPFs (VP653, VP654, and VP656), three basins (VP657, VP1859, and VP2480), and vernal pool PW36.
		MBC Improvements	Vernal pool PW8.
		Miramar Reservoir Alternative	
		North City Pipeline	Vernal pools or road ruts (not assigned identifiers) in MCAS Miramar south of Miramar Road.
		San Vicente Reservoir Alternative	
		San Vicente Pipeline - Repurposed Pipeline	At OSPFs VP697 and VP699 and vernal pool PW36 located in MCAS Miramar.
MM-BIO-9q **Grading Activities**	Grading activities immediately adjacent to vernal pools shall 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 shall comply with the following: a. Grading shall occur only when the soil is dry to the touch both at the surface and 1 inch below. A visual check for color differences (i.e., darker soil indicating moisture) in the soil between the surface and 1 inch below indicates whether the soil is dry. b. After a rain of greater than 0.2 inch, grading shall occur only after the soil surface has dried sufficiently as described above, and no sooner than 2 days (48 hours) after the rain event ends. c. To prevent erosion and siltation from stormwater runoff due to unexpected rains, best management practices (i.e., silt fences) shall be implemented as needed during grading. d. If rain occurs during grading, work shall stop and resume only after soils are dry, as described above. e. Grading shall be done in a manner to prevent runoff from entering preserved vernal pools. f. If necessary, water spraying shall 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 shall be performed in a manner to minimize soil compaction (i.e., use the smallest type of equipment needed to feasibly accomplish the work).	*Components Common to both Alternatives*	
		LFG Pipeline	Vernal pools located in MCAS Miramar including the features within Miramar National Cemetery, three OSPFs (VP653, VP654, and VP656), three basins (VP657, VP1859, and VP2480), and vernal pool PW36.
		MBC Improvements	Vernal pool PW8.
		Miramar Reservoir Alternative	
		North City Pipeline	Vernal pools or road ruts (not assigned identifiers) in MCAS Miramar south of Miramar Road.
		San Vicente Reservoir Alternative	
		San Vicente Pipeline - Repurposed Pipeline	At OSPFs VP697 and VP699 and vernal pool PW36 located in MCAS Miramar.

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APPENDIX U~~V~~

Non-Listed Plant and Wildlife Species Occurring within Miramar Reservoir

APPENDIX <u>U</u>~~V~~
Non-Listed Plant and Wildlife Species Occurring within Miramar Reservoir

Species Group	Species Type	How the Species uses the Miramar Reservoir Resources	Potential to Occur within the Miramar Reservoir	Post-Implementation Analysis
		Birds		
Waterfowl - Dabblers	Mallard, American coot, Gadwall, Geese,	Bodies of standing water; typically forages at the surface and ducks head underwater to feed on plant material and occasionally aquatic insects, crustaceans, and other invertebrates; nests in vegetated habitat along the shore; wintering habitat includes reservoirs; migrating species	Present.	No anticipated change after the addition of purified water. These species include both residents and migrants and changes to habitat would not occur immediately. While, a reduction in the resident population is possible due to potentially reduced food resources, it is not anticipated. However, even with the addition of purified water, the reservoir would still provide suitable habitat for these species. Changes are not expected to affect the use of reservoir as a migration stop-over site.
Waterfowl - Divers	Merganser, Bufflehead, Cormorants, Grebes	Bodies of standing water; dives underwater to feed on fish, aquatic insects, crustaceans, and other invertebrates; nests in vegetated habitat along the shore; wintering habitat includes reservoirs; migrating species	Present	No anticipated change after the addition of purified water. These species include both residents and migrants and changes to habitat would not occur immediately. While a reduction in the population is possible due to potentially reduced food resources, it is not anticipated. The reduced nutrient supply otherwise provided from the untreated water may result in potential decreases in prey food sources, including zooplankton. However, even with the addition of purified water, the reservoir would still provide suitable habitat for these species. Changes are not expected to affect the use of reservoir as a migration stop-over site.
Wading Birds	Heron, Egret, Bittern	Large bodies of standing water; breeds in shoreline vegetated habitat; preys on fish, amphibians, reptiles, invertebrates, small mammals; some may be migratory	Present	No anticipated change after the addition of purified water. No change to vegetated habitat is anticipated and potential changes to food sources would not occur immediately. The fish community is not expected to change significantly; however, some reduction in abundance may occur for some species, although fish would still be available to support foraging wading birds. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in prey food sources, including zooplankton. However, even with the addition of purified water, the reservoir would still provide suitable habitat for these species.

Species Group	Species Type	How the Species uses the Miramar Reservoir Resources	Potential to Occur within the Miramar Reservoir	Post-Implementation Analysis
Birds of Prey	Osprey, Hawks, Northern Harrier	Nests in trees adjacent to water; Osprey feed on fish by diving feet first.	Present.	No anticipated change after the addition of purified water. No change to vegetated habitat is anticipated and potential changes to food sources would not occur immediately. The fish community is not expected to change significantly; however, some reduction in abundance may occur for some species, although fish would still be available to support occasional fishing by osprey. Osprey utilize a variety of fishing resources in the area, including smaller ponds, Lake Poway, and others. Adjacent trees which are capable of supporting raptor nests include adjacent non-native eucalyptus and other trees. These resources are not expected to be affected by the proposed project. Nesting resources would still be available for northern harrier.
Other Fishing Birds	Belted kingfisher	Occurs as a winter visitor and does not breed in the area. Forages on fish by perching over water bodies and diving to catch prey.	High potential to occur	No anticipated change after the addition of purified water. No change to vegetated habitat is anticipated and potential changes to food sources would not occur immediately. The fish community is not expected to change significantly; however, some reduction in abundance may occur for some species, although fish would still be available to support occasional fishing by kingfisher.
Song Birds	Common Yellow-throat, Song Sparrow, Red-winged Blackbird, Warblers, Vireos	Perches on vegetation adjacent to bodies of water; feeds on invertebrates	Moderate potential to occur.	No anticipated change after the addition of purified water. Habitat to support these species is expected to not be affected and will remain to support foraging, cover, and nesting opportunities.
Fish				
Catfish	*Ictalurus punctatus*[1]	Freshwater habitat; lays eggs in crevices protected from currents. Feeds on aquatic plants, other fish, decaying vegetation, fish eggs, and crayfish, as well as snails, aquatic insects, and minnows	Present.	This species is expected to remain after the addition of purified water, although a reduction in the population is possible due to potentially reduced food resources. No change to vegetated habitat is anticipated; however, the reduced nutrient supply otherwise provided from the untreated water may result in a decrease in prey food sources, including zooplankton, as the primary food source for larger prey. However, even with the addition of purified water, the reservoir would still provide suitable habitat for this species.

Species Group	Species Type	How the Species uses the Miramar Reservoir Resources	Potential to Occur within the Miramar Reservoir	Post-Implementation Analysis
Bass	*Micropterus salmoides floridanus*[1]	Freshwater habitat; migrates to deeper water in winter and moves to shallow water to feed. Feed on a wide variety of food sources including invertebrates, but feed primarily on fish, especially rainbow trout.	Present.	This species is expected to remain after the addition of purified water and little change in the population is anticipated due to the abundance of prey species, which are expected to remain in the reservoir.. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in some prey food sources (fish that feed primarily on phytoplankton and zooplankton and some other aquatic species). However, even with the addition of purified water, the reservoir would still provide suitable habitat for this species.
Trout	*Oncorhynchus mykiss*[2]	Freshwater habitat; feeds on aquatic insects, fish eggs, and terrestrial insects that fall into the water	Present. Stocked by CDFW	This species is expected to remain after the addition of purified water, since the reservoir is stocked by CDFW and would not be directly affected by the addition of purified water.
Bluegill	*Lepomis machrochirus*[1]	Freshwater habitat; finds shelter among aquatic plants; feeds on zooplankton, aquatic insects and small fish	Present.	This species is expected to remain after the addition of purified water although a reduction in the population is possible due to potentially reduced food resources. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in prey food sources, including zooplankton, small aquatic insects, and small fish. However, even with the addition of purified water, the reservoir would still provide suitable habitat for this species.
Sunfish	*Lepomis microlophus*[1]	Freshwater habitat; feeds on mollusks and snails	Present.	This species is expected to remain after the addition of purified water although a reduction in the population is possible due to potentially reduced food resources. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in food sources for mollusks (algae and dead organisms). However, even with the addition of purified water, the reservoir would still be suitable habitat for this species.

Species Group	Species Type	How the Species uses the Miramar Reservoir Resources	Potential to Occur within the Miramar Reservoir	Post-Implementation Analysis
Crappie	*Pomoxis nigromaculatus*[1]	Freshwater habitat; inhabit areas of no current, clear water, and cover from aquatic vegetation. Small fish mainly eat zooplankton and aquatic insects; larger fish mainly consume small crustaceans, insect larvae, pupae and fish, and large fish consume primarily minnows and sunfishes.	Present.	This species is expected to remain after the addition of purified water although a reduction in the population is possible due to potentially reduced food resources. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in prey food sources, including zooplankton, small aquatic insects, crustaceans, and small fish. However, even with the addition of purified water, the reservoir would still provide suitable habitat for this species.
Carp	*Cyprinus carpio*[1]	Freshwater habitat; feeds on aquatic plants, algae, mollusks, worms, fish, and eggs.	Present.	This species is expected to remain after the addition of purified water, although a reduction in the population is possible due to potentially reduced food resources. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in prey food sources, including mollusks and possibly algae. However, even with the addition of purified water, the reservoir would still provide suitable habitat for this species..
Goldfish	*Carassius auratus*[1]	Freshwater habitat; feeds on algae, zooplankton, aquatic plants, small fish, and insects.	Present.	This species is expected to remain after the addition of purified water, although a reduction in the population is possible due to potentially reduced food resources. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in aquatic plants, and prey food sources, including zooplankton and insects. However, even with the addition of purified water, the reservoir would still provide suitable habitat for this species.
Golden shiner	*Notemigonus crysoleucas*[1]	Freshwater habitat; feeds on zooplankton, mollusks, and insect larvae.	Present.	This species is expected to remain after the addition of purified water, although a reduction in the population is possible due to potentially reduced food resources. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in prey food sources, including zooplankton, mollusks, and insect larvae. However, even with the addition of purified water, the reservoir would still provide suitable habitat for this species.

Species Group	Species Type	How the Species uses the Miramar Reservoir Resources	Potential to Occur within the Miramar Reservoir	Post-Implementation Analysis
Threadfin shad	*Dorosoma petenense*[1]	Freshwater habitat; feeds on zooplankton and phytoplankton.	Present.	This species is expected to remain after the addition of purified water, although a reduction in the population is possible due to potentially reduced food resources. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in both phytoplankton and zooplankton. However, even with the addition of purified water, the reservoir would still provide suitable habitat for this species.
Mosquitofish	*Gambusia affinis*[2]	Freshwater habitat; feeds on zooplankton, algae, aquatic and terrestrial insects.	Present.	This species is expected to remain after the addition of purified water, although a reduction in the population is possible due to potentially reduced food resources. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in prey sources, including zooplankton, algae, and aquatic insects. However, even with the addition of purified water, the reservoir would still provide suitable habitat for this species.
Invertebrates				
Crustaceans	Crayfish[1]	Pest species. Freshwater habitat. Crayfish are considered detritivores or omnivores.	Present.	Crayfish are expected to remain after the addition of purified water, although a reduction in the population is possible due to potentially reduced food resources. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in the amount of detritus, aquatic insects, and algae available for consumption. However, even with the addition of purified water, the reservoir would still provide suitable habitat for this species.
Aquatic Macroinvertebrates	Aquatic insects	Freshwater habitat. Feed primarily on phytoplankton and zooplankton	Present.	Aquatic insects are expected to remain after the addition of purified water, although a reduction in the population is possible due to potentially reduced food resources. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in the amount of phytoplankton and zooplankton available for consumption. There may be ecological adaptations (e.g.,

Species Group	Species Type	How the Species uses the Miramar Reservoir Resources	Potential to Occur within the Miramar Reservoir	Post-Implementation Analysis
				changes in phytoplankton and zooplankton species composition) to sustain the ecosystem. However, even with the addition of purified water, the reservoir would still provide suitable habitat for these organisms.
Amphibian				
Frogs	American bullfrog[1]	Pest species. Inhabits permanent freshwater; reproduction is aquatic; tadpoles are found in shallow warm water; adults occupy vegetated shorelines	Present.	Not anticipated to change after the addition of purified water. No change to vegetated habitat is anticipated and potential changes to food sources would not occur immediately. There could be ecological adaptations to sustain the ecosystem.
Reptiles				
Turtles	Red-eared sliders[1]	Pest species. Freshwater habitat; lays eggs on land; feeds on aquatic plants, invertebrates, and crustaceans	Present.	Not expected to change after the addition of purified water. The reduced nutrient supply otherwise provided from the untreated water may result in a decrease in the numbers of invertebrates and crustaceans available for consumption, and prey food sources, including zooplankton. No change to vegetated habitat is anticipated and potential changes to food sources would not occur immediately. There could be ecological adaptations to sustain the ecosystem. However, even with the addition of purified water, the reservoir would still provide suitable habitat for this species.
Mammals	None	No mammal species are anticipated to be reliant on the reservoir, for purposes other than drinking water. Species would still be able to drink if needed.	N/A	There are no water-dependent mammal species, such as beaver, muskrat, or otter that occur in this area.
Plants				
Sedge Family	California bulrush *(Schoenoplectus californicus)*	Bogs and fens, marshes and swamps (montane lake margins)	Present.	This species will remain after the addition of purified water. No change to vegetated habitat is anticipated.. Changes to soil and habitat may occur over time. There could be ecological adaptations to sustain the ecosystem.

Species Group	Species Type	How the Species uses the Miramar Reservoir Resources	Potential to Occur within the Miramar Reservoir	Post-Implementation Analysis
Tamarisk Family	Tamarisk *(Tamarix ramosissima*)[1]	Washes, streambanks	Present.	This species will remain after the addition of purified water. No change to vegetated habitat is anticipated. . Changes to soil and habitat may occur over time. There could be ecological adaptations to sustain the ecosystem.
Sunflower Family	Mule fat (*Baccharis salicifolia*)	Riparian woodland, canyon bottoms, disturbed sites, often forming thickets	Present.	This species will remain after the addition of purified water. No change to vegetated habitat is anticipated. Changes to soil and habitat may occur over time. There could be ecological adaptations to sustain the ecosystem.
Willow Family	Willow sp. (*Salix* sp.)	Streamsides, marshes, seepage areas, washes, meadows	Present.	This species will remain after the addition of purified water. No change to vegetated habitat is anticipated.. Changes to soil and habitat may occur over time. There could be ecological adaptations to sustain the ecosystem.

Notes:

1 Non-native species.

2 Stocked purposefully for recreational fishing or mosquito control purposes.

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