Enhancement and Restoration of Maritime Succulent Scrub as Habitat for Western Burrowing Owl and Beach Goldenaster for the Beyer Park Development Project San Diego, California

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TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

FIGURES

TABLES

PHOTOGRAPHS

Acronyms

CDFW	California Department of Fish and Wildlife
City	City of San Diego
DSD	Development Services Department
MHPA	Multi-Habitat Planning Area
MMC	Mitigation Monitoring Coordination
MSCP	Multiple Species Conservation Program
PEP	Plant Establishment Period
Plan	mitigation and restoration plan
PWD	Public Works Department
SDZ ICR	San Diego Zoo Institute for Conservation Research
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 Introduction

The purpose of this mitigation and restoration plan (Plan) is to provide a guide for measures to mitigate for impacts to maritime succulent scrub and Diegan coastal sage scrub habitats during the construction of Beyer Park. Mitigation for both vegetation communities will be accomplished through the enhancement of adjacent maritime succulent scrub and disturbed maritime succulent scrub, and the restoration of disturbed areas to maritime succulent scrub. Occupied habitat for western burrowing owl and beach goldenaster individuals will be impacted during construction. This Plan will also serve as the mitigation plan for both western burrowing owl (*Athene cunicularia hypugaea*) and beach goldenaster (*Heterotheca sessiliflora* ssp. *sessiliflora*). As a result, artificial burrows and an earthen berm for western burrowing owls will be installed and enhancement and restoration of maritime succulent scrub determined to be occupied by western burrowing owl will be executed so that the mitigation areas will also serve as appropriate western burrowing owl habitat. The enhancement and restoration will also include installation of beach goldenaster individuals. This Plan includes a discussion of existing conditions, an implementation and maintenance plan, ecological performance standards, monitoring requirements, and details for long-term and adaptive management.

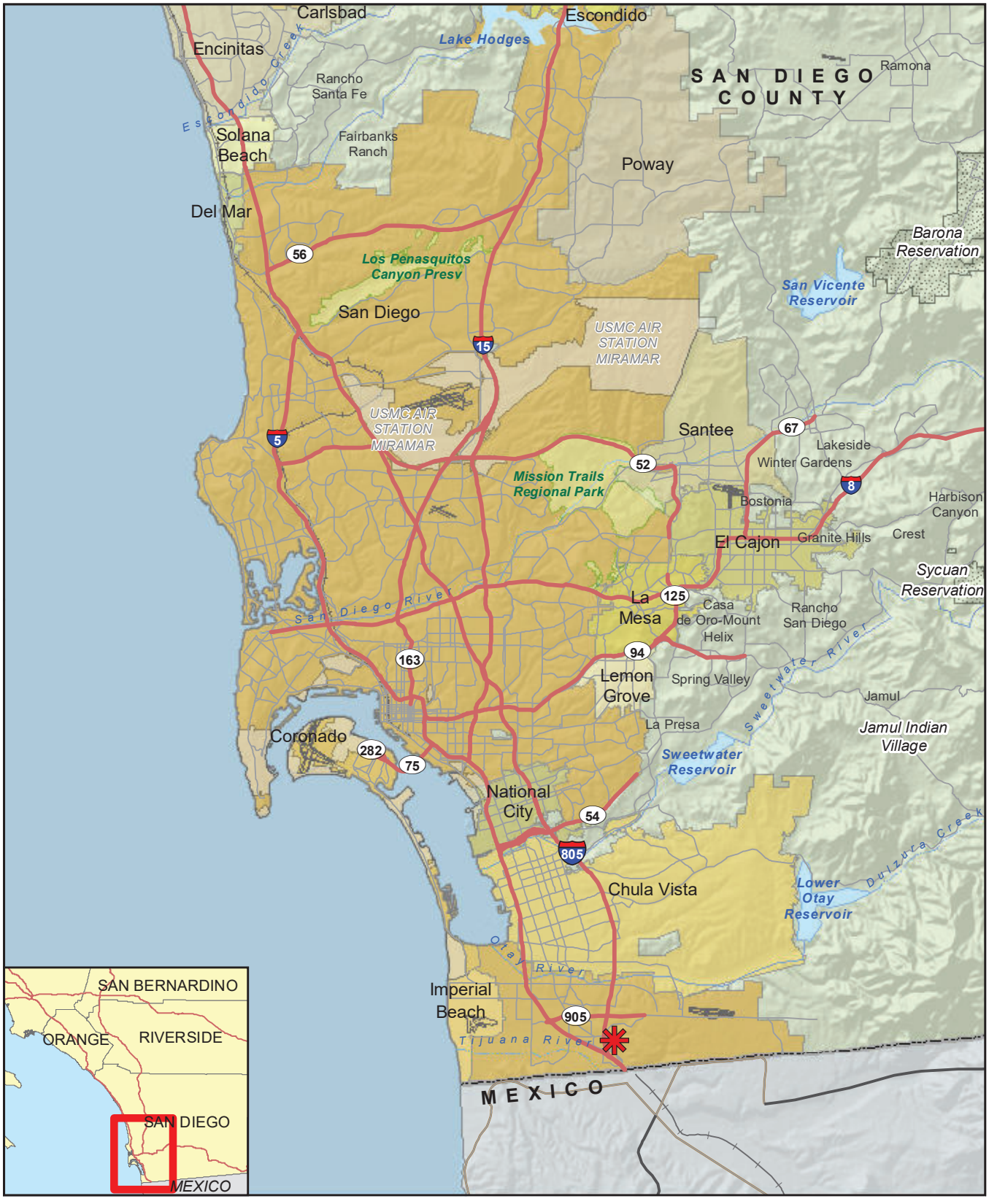
1.1 Project Location

The mitigation site is located on undeveloped City of San Diego (City) park land, southeast of the eastern terminus of Beyer Boulevard in the community of San Ysidro, city of San Diego (Figures 1–3). The mitigation site (site) is located immediately east of the Beyer Park development footprint. The mitigation site is found in the southeast quarter of Section 36, Township 18 South, Range 02 West, of the U.S. Geological Survey (USGS) 7.5-minute topographic map, Imperial Beach quadrangle (see Figure 2; USGS 1996). The mitigation site totals 14.12 acres and is situated on two parcels: Assessor Parcel Numbers 6380707100 and 6381701900 (Figure 4).

The mitigation site is situated within the City's Multiple Species Conservation Program (MSCP) Subarea Plan boundary. The majority of the site is located within the City's Multi-Habitat Planning Area (MHPA) boundary (see Figure 4).

1.2 Mitigation Requirements

The City proposes the Beyer Park Development Project (project), which entails development and operation of a new community park with turf sports fields, picnic/gathering spaces, trails, a children's play area, a skate park, a fitness area, a half basketball court, a dog park, a comfort station, and other associated amenities and facilities. Additional details of the park are included in the Biological Technical Report (RECON 2019).



Project Location

FIGURE 1
Regional Location

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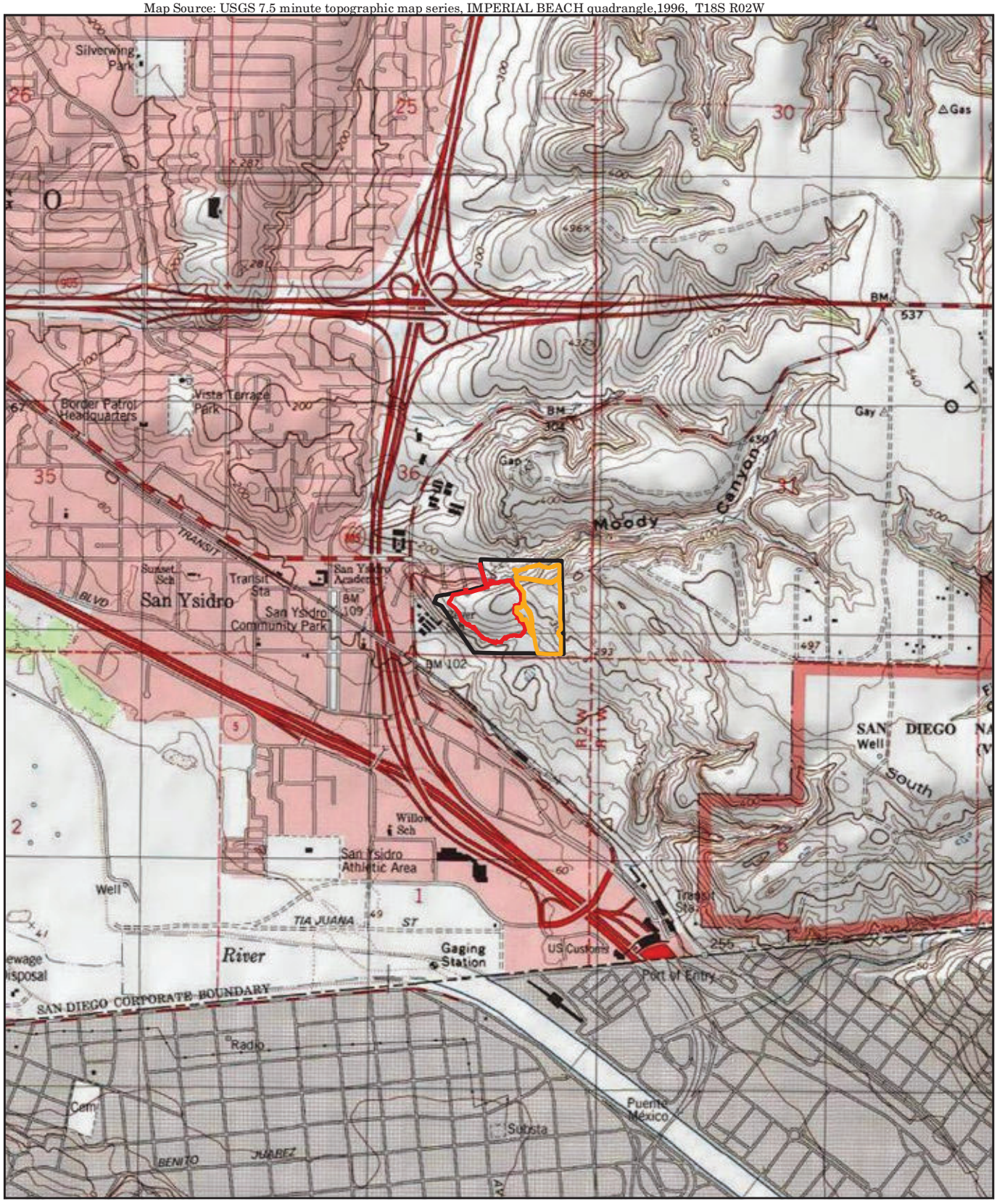
Map Source: USGS 7.5 minute topographic map series, IMPERIAL BEACH quadrangle,1996, T18S R02W



Project Boundary

Mitigation Site

Beyer Park Development Project

FIGURE 2

Project Location on USGS Map

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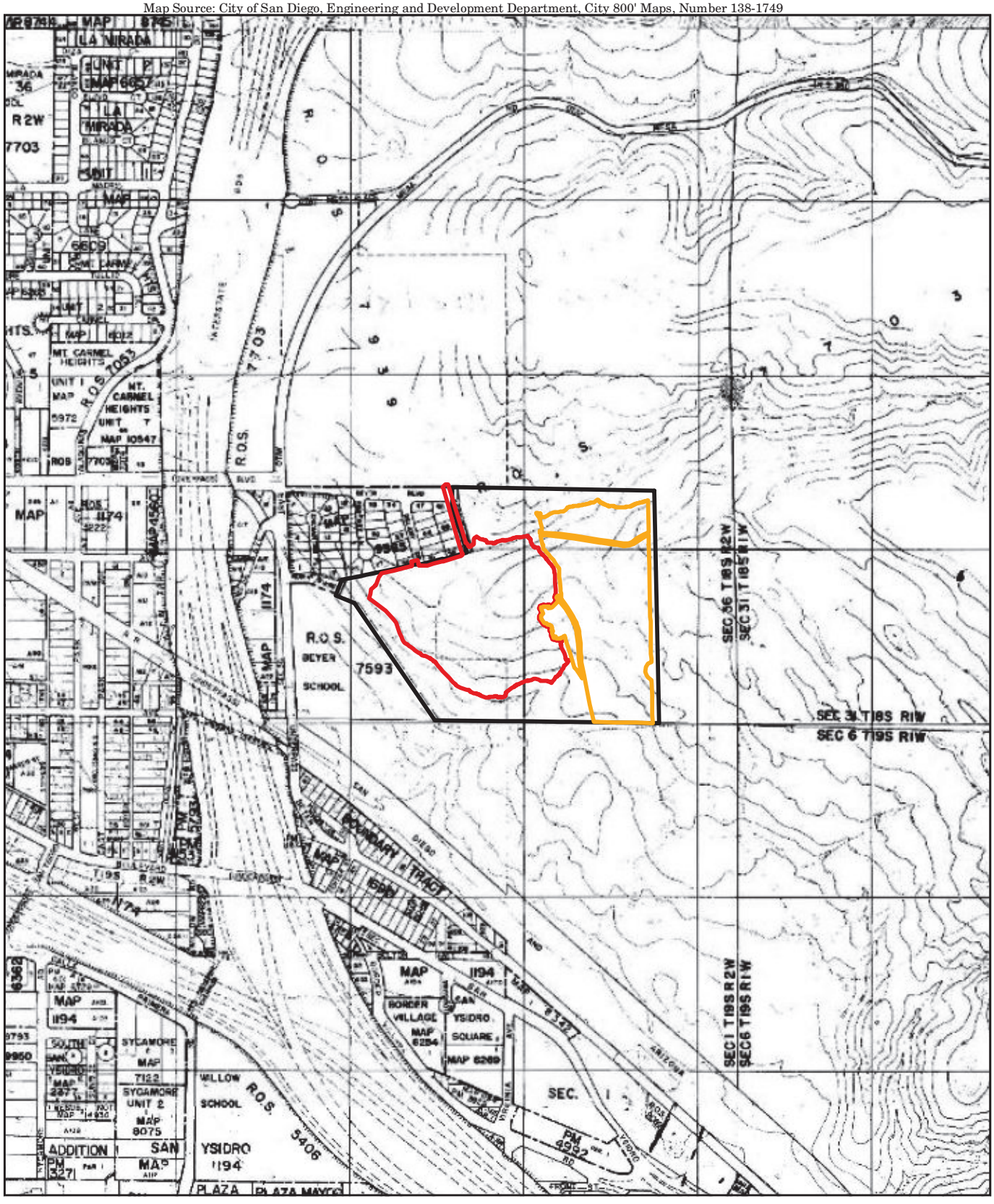
Map Source: City of San Diego, Engineering and Development Department, City 800' Maps, Number 138-1749



Project Boundary

Mitigation Site

Beyer Park Development Project

FIGURE 3

Project Location on City 800' Map

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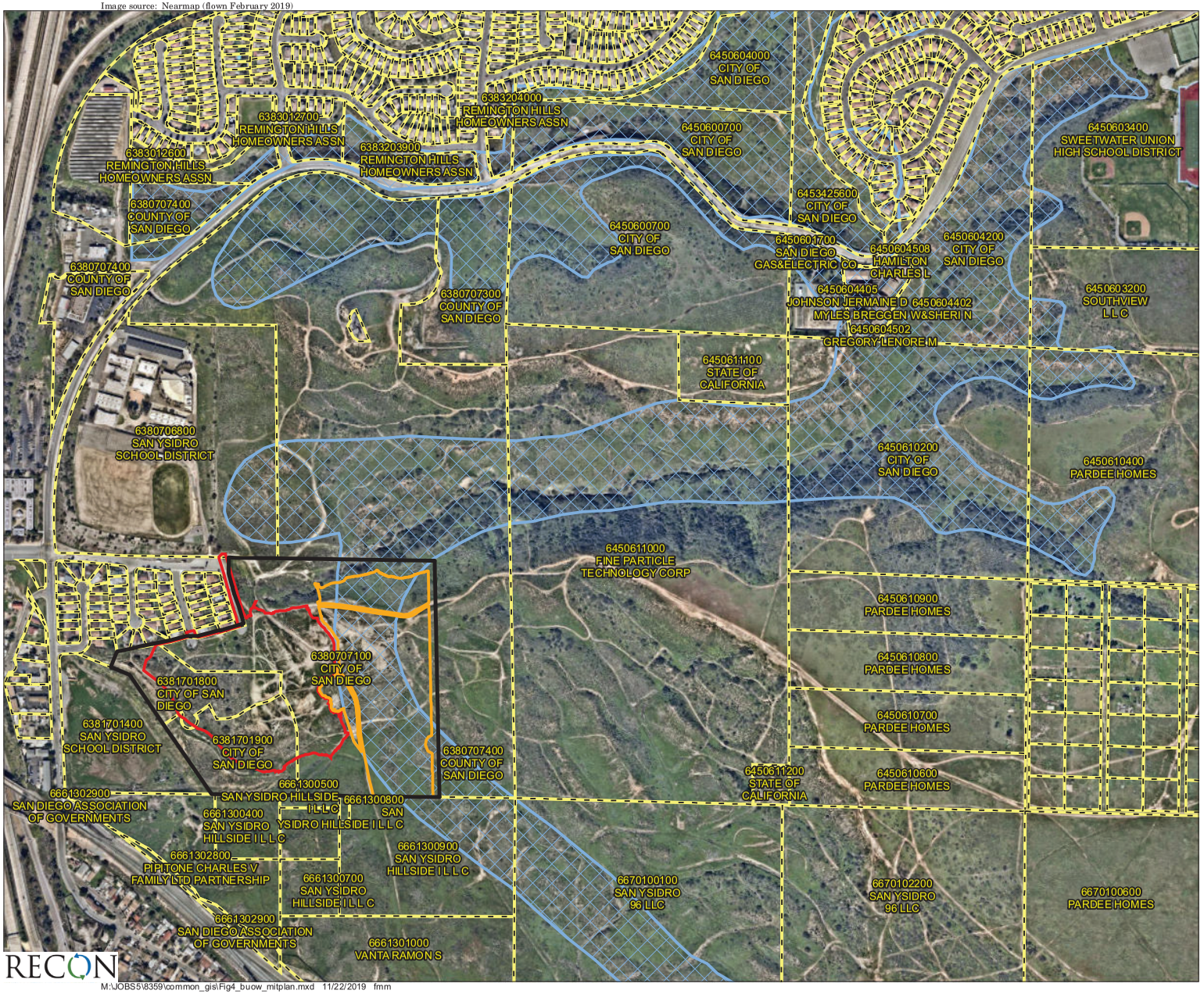


Project Boundary
Beyer Park Development Project
Mitigation Site
Parcels
City of San Diego MHPA

0 Feet 550

FIGURE 4
Project Location on Aerial Photograph

The project would result in direct impacts to 0.91 acre of maritime succulent scrub (Tier I), 4.86 acres of disturbed maritime succulent scrub (Tier I), 1.41 acres of Diegan coastal sage scrub (Tier II), and 4.29 acres of disturbed Diegan coastal sage scrub (Tier II; Table 1). These impacts would be mitigated through on-site mitigation: restoration of 3.70 acres of disturbed land and enhancement of 10.42 acres of maritime succulent scrub and disturbed maritime succulent scrub, for a total of 14.12 acres (Table 2).

Portions of the habitat that will be impacted by park construction have been determined to be occupied by burrowing owl and beach goldenaster individuals. Approximately 13.55 acres of occupied burrowing owl habitat (Table 3) will be impacted and requires mitigation of 10.42 acres of occupied burrowing owl habitat per mitigation requirements in Table 3 in the City's Land Development Code – Biology Guidelines (City of San Diego 2018a). The maritime succulent scrub that will be enhanced and restored for Tier I and II mitigation is also occupied burrowing owl habitat. Therefore, mitigation for occupied habitat will occur within the maritime succulent scrub enhancement/restoration areas described above. Up to 25 beach goldenaster individuals will be impacted and will be mitigated in-kind within the restoration area.

The mitigation for impacts to Tier I (maritime succulent scrub) and Tier II (Diegan coastal sage scrub) sensitive vegetation communities will be met through enhancement and restoration of maritime succulent scrub, a Tier I community. In addition, enhancement and restoring maritime succulent scrub habitat will also meet mitigation requirements for the following two sensitive species: western burrowing owl and beach goldenaster. The mitigation area encompasses the area within the MHPA but also incorporates adjacent lands outside of the MHPA to the east and southwest.

Table 1
Direct Impacts to Vegetation and Associated Mitigation

Vegetation Community by City of San Diego Tier	Direct Impacts to Vegetation-Outside MHPA (acres)	Mitigation Ratios		Required Mitigation (acres)		Proposed Enhancement (acres)	Proposed Restoration (acres)	Total Proposed Mitigation (acres)
		Inside the MHPA	Outside the MHPA	Preserved Inside the MHPA	Preserved Outside the MHPA			
Tier I								
Maritime succulent scrub	0.91	1:1	[redacted]	0.91	0	0.91	0	0.91
Disturbed maritime succulent scrub	4.86	1:1	[redacted]	4.86	0	4.86	0	4.86
Subtotal (Tier I)	*5.77*			*5.77*	*0*	*5.77*	*0*	*5.77*
Tier II[1]								
Diegan coastal sage scrub	1.41	1:1	[redacted]	1.41	0	1.41[1]		1.41
Disturbed Diegan coastal sage scrub	4.29	1:1	[redacted]	0.60	5.54	0.60	0	6.14
		[redacted]	1.5:1			2.64	0	
			1.5:1				2.90[2]	
Subtotal (Tier II)	*5.70*			*2.01*	*5.54*	*4.65*[1]	*2.90*[2]	*7.55*
Tier IV								
Disturbed land	5.05	0:1	0:1	0	0	0	0.80	0.80
Ornamental plantings	0	0:1	0:1	0	0	0	0	0
Other Land Cover Types								
Urban/Developed Land	0.64	0:1	0:1	0	0	0	0	0
Subtotal (Tier IV)	*5.69*			*0*	*0*	*0*	*0*	*0*
Subtotal (All Tiers)	*17.16*			*7.78*	*5.54*	*10.42*	*3.70*	*0*
Total	**17.16**			**13.32**		**10.42**	**3.70**[3]	**14.12**

[1]Tier II habitat will be mitigated with Tier I habitat. Due to surrounding MSS habitat it is likely that historically this habitat would have been MSS prior to routine disturbance.
[2]Restoration of Tier I maritime succulent scrub habitat will be accomplished through conversion of disturbed lands.
[3]An additional 0.8 acre of disturbed land will be restored in anticipation that some of the edge areas near the trails and roads may not achieve success criteria. Total mitigation will be 14.12 acres.

Table 2
Mitigation Summary

Mitigation Method	Fulfillment of Mitigation (acre)[1]
Restoration[1]	2.90
Enhancement[2]	10.42
Additional restoration of disturbed land[3]	0.80
TOTAL	**14.12**

[1]Restoration will consist of converting disturbed lands to Tier I maritime succulent scrub appropriate for burrowing owl foraging and nesting. Restoration and enhancement acreages combined meet the required mitigation for impacts to Tier I and Tier II habitats.
[2]Enhancement will be focused on improving maritime succulent scrub appropriate for burrowing owl foraging and nesting. Restoration and enhancement acreages combined meet the required mitigation for impacts to Tier I and Tier II habitats.
[3]An additional 0.80 acre of disturbed land will be restored in anticipation that some of the edge areas near the trails and road may not achieve success criteria. Total mitigation will be 14.12.

Table 3
Required and Proposed Mitigation for Burrowing Owl Impacts

Vegetation Community by City of San Diego Tier	Direct Impacts to Occupied BUOW Habitat- Outside MHPA (acres)	Mitigation Ratio[1]		Required Amount of Occupied Habitat to Fulfill Mitigation (acres)[2]	
		Inside the MHPA	Outside the MHPA	Inside the MHPA	Outside the MHPA
Tier I					
Maritime succulent scrub	0.20	1:1	2:1	0.20	0
Disturbed maritime succulent scrub	3.91	1:1	2:1	3.91	0
Tier II					
Diegan coastal sage scrub	0.18	1:1	1.5:1	0.18	0
Disturbed Diegan coastal sage	4.28	1:1	1.5:1	0.60	5.53
Tier IV					
Disturbed land	4.89	0:1	0:1	0	0
Ornamental plantings	0	0:1	0:1	0	0
Other Land Cover Types					
Urban/Developed Land	0.09	0:1	0:1	0	0
TOTAL	**13.55**			**10.42**	

[1]Mitigation ratios are consistent with Table 3 of the Land Development Code Biology Guidelines.
[2]10.42 acres of occupied habitat is required for mitigation. Any areas successfully preserved in excess of the required amount may be utilized by the City for burrowing owl mitigation.

During the biological surveys, it was determined that the project site had potential to support burrowing owl. This required that the guidelines outlined in the MSCP Subarea Plan Area Specific Management Directives be implemented (Appendix A of City of San Diego 1997). Table 4 and the section below outline those requirements and how this Plan will address those requirements.

Table 4 Area Specific Management Directives	
Area Specific Management Directives of the MSCP Subarea Plan	Proposed Action of Mitigation Plan
Conditions: During the environmental analysis of proposed projects, burrowing owl surveys (using appropriate protocols) must be conducted in suitable habitat to determine if this species is present and the location of active burrows.	During the habitat assessment it was determined that appropriate habitat was present within the project site due to the open nature of the vegetative structure, amount of disturbance, and presence of fossorial mammal burrows. The habitat mapped as suitable/occupied for the species is composed of open, low-growing maritime succulent scrub with patches of bare ground. In March and April of 2017, surveys were conducted in accordance with California Department of Fish and Wildlife (CDFW) breeding season survey guidelines (CDFW 2012). Burrowing owl sightings occurred on three separate occasions, four potential burrows were observed within the project site and one active burrow was observed east of the park development footprint, within the central west edge of the mitigation site. Burrowing owl sightings may represent the same individual. Based on the data, it is expected that at least one burrowing owl may utilize the site for wintering or transient stopovers during the wintering/non-breeding season (RECON 2017). The project site and active burrow are outside but adjacent to the MHPA. The proposed mitigation is partially within the MHPA.
If burrowing owls are detected, the following mitigation measures must be implemented: within the MHPA, impacts must be avoided; outside of the MHPA, impacts to the species must be avoided to the maximum extent practicable;	Construction of the park will impact 13.55 acres of occupied habitat outside of the MHPA.
any impacted individuals must be relocated out of the impact area using passive or active methodologies approved by the wildlife agencies;	Burrow exclusion and closure procedures are documented in this Plan in the event that potential burrows are observed within the mitigation site prior to park construction and restoration implementation. Pre-activity surveys will be conducted to determine the status of the burrowing owl on-site so that appropriate measures can be put in place. Passive methodologies will be employed to relocate the burrowing owl, if present, using a combination of burrow exclusion and creation of artificial burrows and an earthen berm within the adjacent land preserved for burrowing owl mitigation.
mitigation for impacts to occupied habitat (at the Subarea Plan specified ratio) must be through the conservation of occupied burrowing owl habitat or conservation of lands appropriate for restoration, management and enhancement of burrowing owl nesting and foraging requirements.	This Plan outlines the enhancement and restoration of occupied habitat through the creation of artificial burrows and an earthen berm to encourage nesting and enhancement and restoration of foraging habitat through vegetation management. In addition, the amount of enhancement and restoration of occupied habitat is done at the mitigation ratios set forth for the underlying sensitive vegetation and are shown in Table 1.
Management plans/directives must include: enhancement of known, historical and potential burrowing owl habitat;	The area to be enhanced/restored has been established as occupied habitat through several observations of a single burrowing owl and a potential active burrow during breeding season protocol surveys within the last three years. This Plan details how the habitat will be preserved and enhanced to support burrowing owl in the future, including the installation of an artificial burrowing owl cluster and an earthen berm in suitable habitat away from park operations.

Table 4
Area Specific Management Directives

Area Specific Management Directives of the MSCP Subarea Plan	Proposed Action of Mitigation Plan
management for ground squirrels (the primary excavator of burrowing owl burrows).	Ground squirrels are present within the mitigation site in high quantities and an earthen berm will be installed to further encourage their use of the site. Ground squirrel populations will be documented during annual assessment to ensure that there is not any drastic change in population.
Enhancement measures may include creation of artificial burrows and vegetation management to enhance foraging habitat.	Three artificial burrows and one earthen berm are planned for installation per this Plan. Enhancement of disturbed maritime succulent scrub, enhancement of existing maritime succulent scrub, and species-specific restoration (for burrowing owl) of disturbed habitat to maritime succulent scrub are outlined in this Plan to enhance foraging habitat.
Management plans must also include: monitoring of burrowing owl nest sites to determine use and nesting success;	A single burrowing owl was observed on-site during the breeding season protocol surveys completed in support of the biological technical report. No pairs or nesting was observed. However, this Plan requires monitoring for burrowing owl activity including nesting.
predator control;	It has been recommended in the biological technical report that tall structures installed within the park (light poles, etc.) feature roosting deterrents so that new perching areas are not created for predators.
establishing a 300 foot-wide impact avoidance area (within the preserve) around occupied burrows.	Passive methodologies will be employed to relocate any burrowing owl, if present, using a combination of burrow exclusion and creation of artificial burrows within the adjacent land preserved for burrowing owl mitigation. Proposed artificial burrow and earthen berm sites are planned for installation and will be located 300 feet or more from the project boundary.

The project would also result in impacts to 13.55 acres of burrowing owl occupied habitat. During surveys conducted in accordance with California Department of Fish and Wildlife (CDFW) breeding season survey guidelines (CDFW 2012), three burrowing owl observations occurred on separate occasions between March and April 2017 (these observations may represent the same individual). Based on the data, it is expected that at least one burrowing owl may utilize the site for wintering or transient stopovers during the wintering/non-breeding season (RECON 2017). The habitat mapped as suitable/occupied for the species is composed of open, low-growing maritime succulent scrub with patches of bare ground. Mitigation for these impacts would include installation of a cluster of three artificial burrows and one earthen berm to provide suitable habitat for at least one pair of western burrowing owl, restoration and enhancement of 14.12 acres of open maritime succulent scrub habitat, and a five-year maintenance and monitoring program.

Lastly, there would be impacts to up to 25 beach goldenaster individuals and mitigation is required to reduce these impacts to less than significant. Impacts to beach goldenaster would be mitigated through on-site restoration. Only one individual was relocated during two site visits in spring 2019. A pre-construction survey will be conducted prior to project implementation which may result in a revision to the number of individuals mitigated.

Per the City MSCP Subarea Plan Appendix A, this Plan includes enhancement of known, historical, and potential burrowing owl habitat; management for ground squirrels;

enhancement through artificial burrow and earthen berm installation and vegetation management; monitoring of burrowing owl use of the site during breeding and non-breeding seasons; and an implementation and maintenance plan designed to prevent predation of burrowing owls.

2.0 Existing Conditions

This section describes the existing physical and biological conditions of the areas within the proposed mitigation site and surrounding area. This includes a summary of land use, topographical features, soils, and hydrological features observed during biological surveys conducted between June 13, 2016, and August 7, 2017.

2.1 Physical Characteristics

2.1.1 Existing Land Use

The proposed mitigation site consists of undeveloped City land, with residential development approximately 500 feet to the northwest and County of San Diego (County) open space preserve to the east. The project footprint is west of the mitigation site. The mitigation site currently consists of maritime succulent scrub, disturbed maritime succulent scrub, and disturbed land (Figure 5). A large portion of the vegetation within the mitigation site has been subjected to recent and historic disturbance and unauthorized activity (e.g., off-highway vehicle use, pedestrian traffic, transient camps, trash dumping, and radio-controlled car running and course building).

2.1.2 Topography and Soils

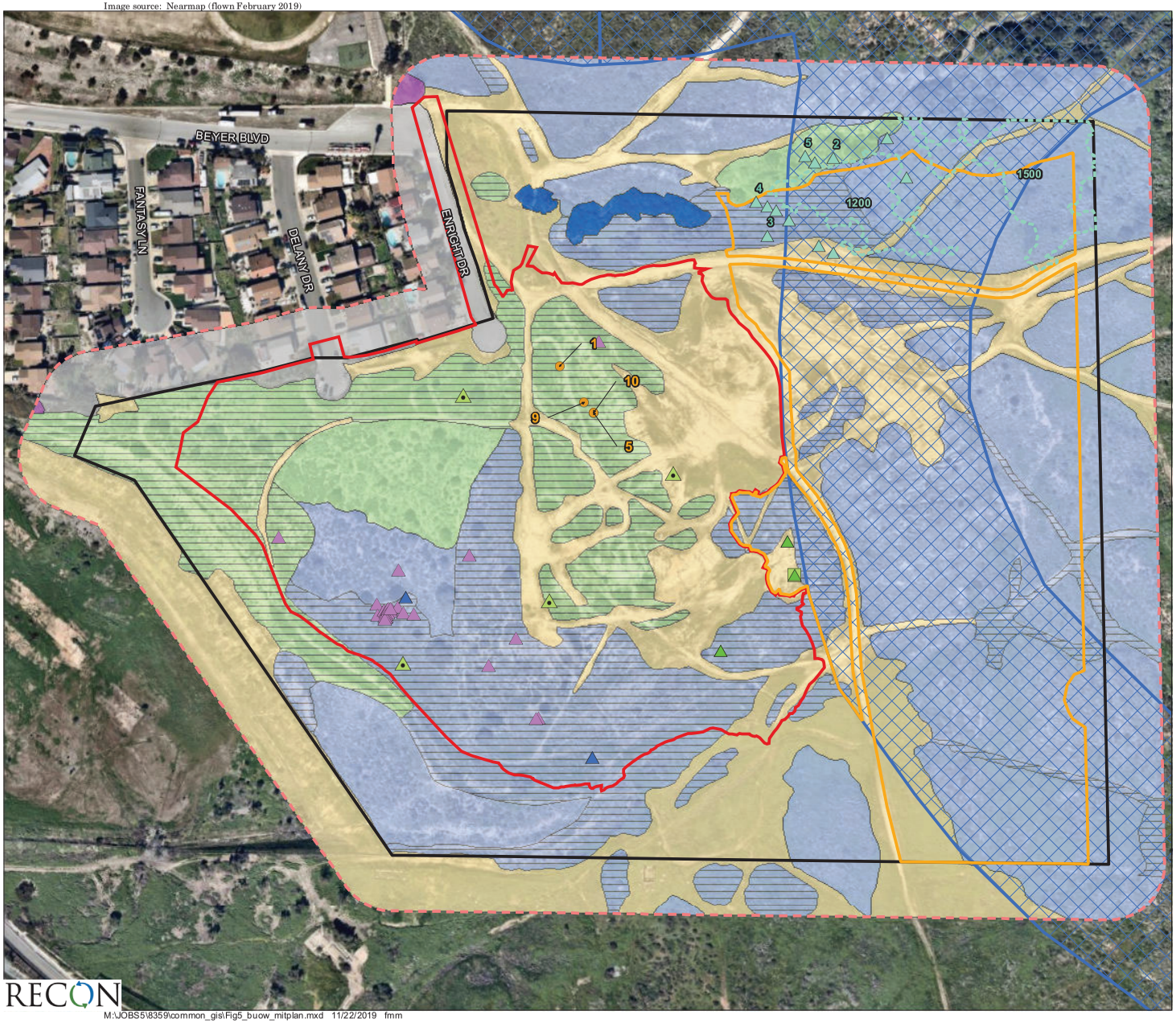
The mitigation site is characterized by north-, south-, and west-facing slopes with numerous wide, exposed terraces.

Two soil types occur within the mitigation site: Olivenhain cobbly loam, 9 to 30 percent slopes (ohE), in the south and Olivenhain cobbly loam, 30 to 50 percent slopes (ohF) in the north (Figure 6; U.S. Department of Agriculture 2017). Olivenhain cobbly loam soils formed in ancient cobbly and gravelly alluvium and are located on marine terraces and mesas. The topsoil is typically well-drained cobbly loam with a very cobbly clay subsoil. Low slopes tend to form mima mounds on the surface, whereas steeper areas are easy eroded and tend to form gullies and cut banks (Natural Resource Conservation Service 2015).

2.1.3 Hydrology

The mitigation site is located near the northern extent of the Tijuana River watershed. Moody Canyon, which contains an unnamed tributary of the Tijuana River, occurs just within the northern end of the mitigation site.

Image source: Nearmap (flown February 2019)



Project Parcels Boundary
Beyer Park Development Project
Mitigation Site
100-foot Survey Buffer
City of San Diego MHPA

Vegetation Communities/Land Cover Types

Mule Fat Scrub
Maritime Succulent Scrub
Disturbed Maritime Succulent Scrub
Disturbed Diegan Coastal Sage Scrub
Diegan Coastal Sage Scrub
Disturbed Land
Ornamental
Urban/Developed

Burrowing Owl Observation

Burrowing Owl with Active Burrow Observation
Burrowing Owl Observation
Potentially Suitable Burrow

MSCP Covered Species

Otay tarplant

Not MSCP Covered Species

Beach Goldenaster

Plants Recommended for Salvage

Fish-hook Cactus
San Diego Barrel Cactus

0 Feet 180

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FIGURE 5
Existing Biological Resources

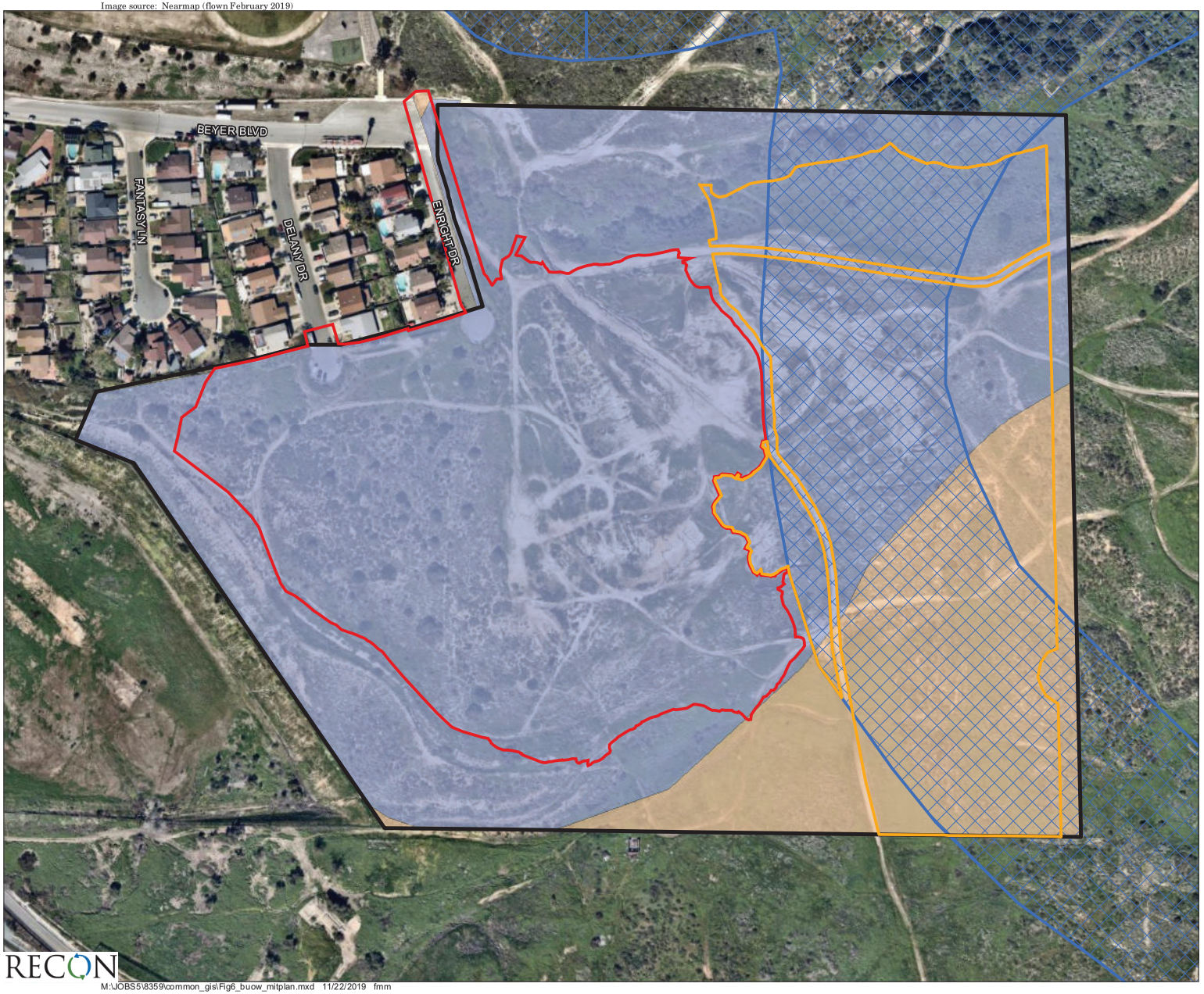


FIGURE 6

Project Location on Soils Map

2.2 Biological Conditions

There are three vegetation communities within the 14.12-acre mitigation site: maritime succulent scrub (8.30 acres), disturbed maritime succulent scrub (2.13 acres), and disturbed land (3.70 acres; see Figure 5).

Maritime succulent scrub is the dominant existing vegetation community within the mitigation site and is comprised of an open density of low growing shrubs. The maritime succulent scrub is dominated by San Diego bur-sage (*Ambrosia chenopodifolia*), jojoba (*Simmondsia chinensis*), cliff spurge (*Euphorbia misera*), coast prickly pear (*Opuntia littoralis*), California buckwheat (*Eriogonum fasciculatum*), San Diego viguiera (*Bahiopsis laciniata*), and California sagebrush (*Artemisia californica*). Otay tarplant (*Deinandra conjugens*) also occurs in the maritime succulent scrub found within the northern portion of the site. The species composition and general cover parameters in these undisturbed habitat areas was used as a guide in developing the restoration program throughout the mitigation site.

The disturbed maritime succulent scrub occurs throughout the mitigation site in areas that have been subjected to human-caused disturbance and non-native plant species invasion. The species composition is similar to the undisturbed stands of maritime succulent scrub. However, the overall vegetation density and height are lower, and there is a greater occurrence of non-native plant species including black mustard (*Brassica nigra*) and non-native grasses.

Disturbed land within the mitigation site consists of a complex of dirt roads and unauthorized pedestrian and off-road vehicle trails traversing the site, as well as a series of open areas characterized by exotic vegetation. The vegetated portions of disturbed land are dominated primarily by garland daisy (*Glebionis coronaria*) and Russian thistle (*Salsola tragus*), with scattered non-native grasses. The disturbed areas of the site also support evidence of fossorial mammal burrows.

2.3 Rationale for Expecting Success

2.3.1 Restoration Goals

The goals for this mitigation project are to restore, enhance, and maintain maritime succulent scrub habitat that is suitable for burrowing owl, beach goldenaster, and Otay tarplant (although mitigation for Otay tarplant is not a requirement of this project) (Photographs 1 through 5). Currently degraded areas will be improved through restoration to native maritime succulent scrub habitat suitable for burrowing owl foraging and nesting and beach goldenaster. Areas that currently support suitable burrowing owl habitat and Otay tarplant will be maintained to continue to support those species.

PHOTOGRAPH 1
Existing On-site Low-growing, Open Maritime Succulent Scrub Habitat to be Enhanced as Suitable Burrowing Owl Habitat, Central Portion of the Mitigation Site, Facing West, May 2019

PHOTOGRAPH 2
Existing On-site Disturbed Maritime Succulent Scrub Habitat to be Enhanced to Suitable Burrowing Owl Habitat, Central Portion of the Site Facing South, May 2019

PHOTOGRAPH 3
Trail Planned for Closure, Northern Portion of the Mitigation Site,
Facing East, May 2019

PHOTOGRAPH 4
Proposed Burrowing Owl Burrow Location, Facing Northeast,
May 2019

PHOTOGRAPH 5
Proposed Beach Goldenaster Mitigation Location, Facing Southeast,
May 2019

The restoration activities aim to restore and enhance maritime succulent scrub habitat as one contiguous patch of suitable wildlife habitat that is adjacent to additional habitat on County preserved land. Currently the site supports areas suitable for burrowing owl, including low-growing shrubs and open ground, and evidence of ground squirrel activity. The methods described in this Plan are intended to further enhance these areas and restore additional areas to maritime succulent scrub habitat that is suitable as western burrowing owl habitat.

2.3.2 Restoration Site Suitability

The proposed location of the mitigation site is immediately east of the project development site, dominated by existing maritime succulent scrub habitat, and within the area where western burrowing owls and burrows were observed during focused surveys and suitable habitat was mapped during the burrowing owl habitat assessment (Figure 7; RECON 2017). The beach goldenaster-designated restoration area was chosen based on the sandy, erodible soils found in this area, which are appropriate for beach goldenaster growth and establishment. The existing maritime succulent scrub habitat within the mitigation site is fragmented and contains evidence of anthropogenic impacts, through the presence of unauthorized trails used by pedestrians and vehicles. The restoration activities described in this Plan will remove the fragmentation and effects of the anthropogenic impacts to create one contiguous patch of maritime succulent scrub that is suitable for burrowing owl foraging and nesting. In addition, it is anticipated that restoration of the disturbed lands to native habitat and enhancement of the disturbed maritime succulent scrub will reduce the extent of non-native invasive plants and will increase the habitat quality of this vegetation community.

The proposed mitigation site is considered suitable maritime succulent scrub, burrowing owl, and beach goldenaster restoration; factors that support this assessment include:

1) located on City-owned lands within and adjacent to the MHPA;
2) current use of site by fossorial mammals;
3) adequate site access;
4) proximity to water source;
5) proximity to existing habitat east of the site with similar soils and topography;
6) presence of adjacent native scrub habitat;
7) avoidance of utility easements; and
8) outside any brush management zone.

Existing utility access roads occur near the proposed mitigation site (Figure 8); these roads will facilitate both short- and long-term maintenance access for restoration activities while their location is also far enough away from proposed owl burrow locations that the occasional vehicular traffic will not pose a risk to owls or wildlife. Once restored, long-term maintenance and management of the site will be executed by the City's Parks and Recreation Department as part of their Open Space management program. No utility easements are present within the mitigation site (mitigation credit is not allowed within any easements) and potential future development in adjacent areas was taken into consideration when identifying the mitigation site.

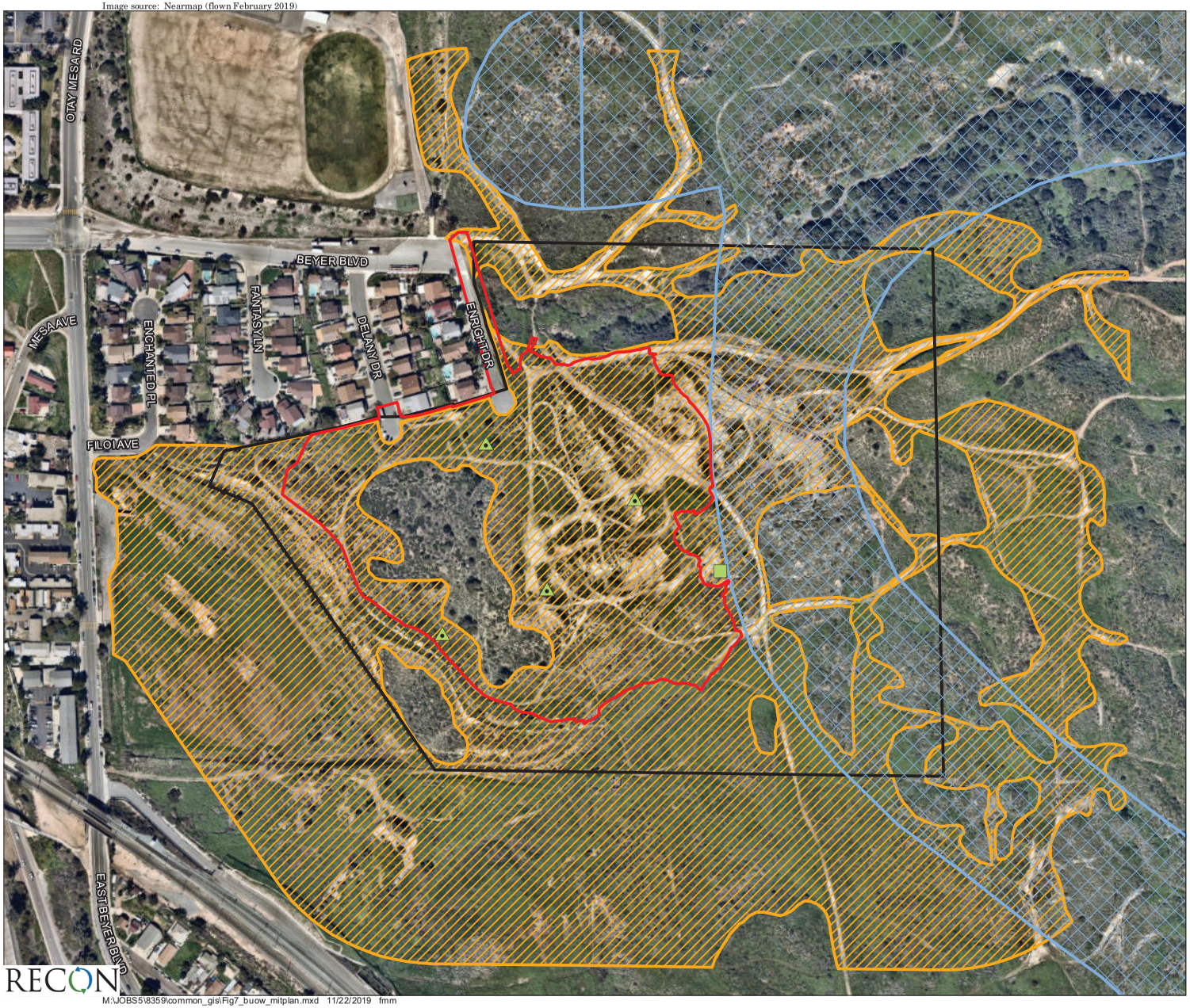


FIGURE 7
Project Location and Suitable Burrowing Owl Habitat

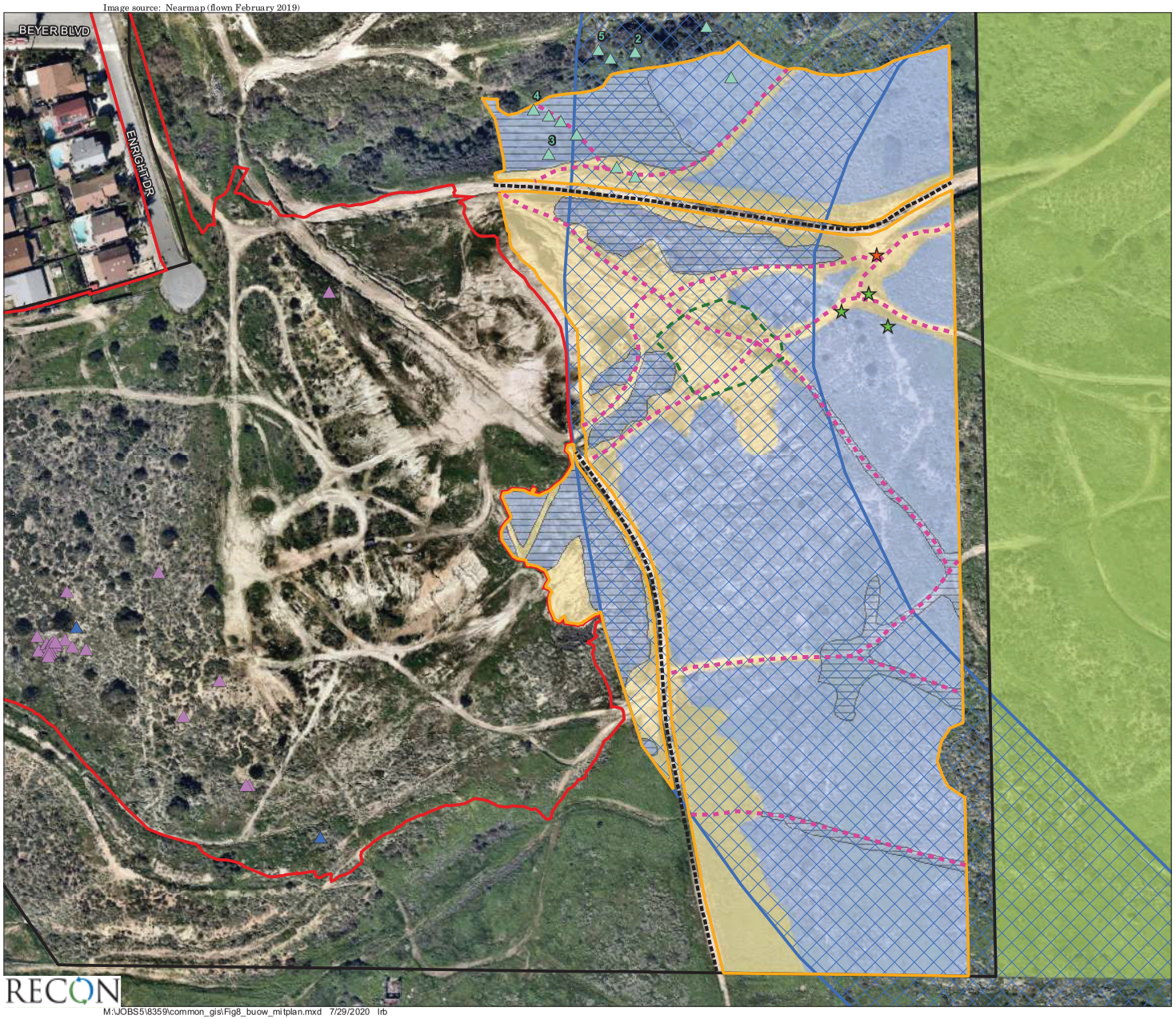


FIGURE 8
Proposed Mitigation Design

2.3.3 Restoration Viability

The viability of the proposed mitigation was assessed during the preparation of this Plan per the City's Land Development Code – Biology Guidelines (City of San Diego 2018a). The assessment included consideration of the site's connectivity to larger planned open space, the surrounding land uses, and sensitivity of maritime succulent scrub, western burrowing owl, and beach goldenaster to change. While the Beyer Park development will occur to the west of the mitigation site, land uses to the north, south, and east are largely planned as open space per the City's MHPA and County of San Diego preserve area (see Figure 4). The location of the restoration and enhancement adjacent to the larger open space preserve will reduce fragmentation of this sensitive vegetation community and increase viability and longevity of the habitat quality.

In preparing this Plan, the most current resources were utilized to develop a viable approach to mitigation for potential impacts to western burrowing owl. The San Diego Zoo Institute for Conservation Research (SDZ ICR) is a global leader in extinction research and their Recovery Ecology team works closely with local partners to help land managers protect western burrowing owl. Information regarding SDZ ICR's research can be found in their 2018 Project Report for burrowing owls (SDZ ICR 2018). The San Diego Natural History Museum's (SDNHM) research division, the Biodiversity Research Center of the Californias, is a leader in natural sciences for the scientific study of natural history, biological diversity, and evolution within southern California. Mr. Kevin Clark serves as the SDNHM's Director of Bioservices and has worked with burrowing owls conducting surveys and preparing management and mitigation plans for over 20 years.

The County of San Diego preserve area located immediately east of the mitigation site provides wildlife connectivity to the mitigation site and further suitable habitat for burrowing owls (Kevin Clark, pers. comm., May 15 and 29, 2019). Beyer Park will be located to the west; however, the proposed artificial burrows and berm were intentionally positioned towards the eastern side of the mitigation site, away from Beyer Park. Proposed burrow locations will provide a natural viewpoint for burrowing owls to observe foraging habitat within and adjacent to the mitigation site while the view of Beyer Park will be obstructed by natural topography. Burrow and berm locations are located within or adjacent to disturbed land to avoid impacts to existing native vegetation during mound creation.

The design of Beyer Park includes several modifications to preserve the adjacent mitigation site as suitable for burrowing owl. Modifications include a single row of tall shrubs along the park's eastern perimeter to obstruct view of the park by owls and the installation of perch exclusion devices on light posts.

Burrowing owl site fidelity was considered when assessing sensitivity of burrowing owls to change. The mitigation site includes the one active owl burrow previously observed and is within 1,000 feet of the potentially suitable burrows that were observed during focused surveys and the burrowing owl habitat assessment (RECON 2017). Burrowing owls that may return to the area can readily locate the mitigation site due to its proximity to the

impacted active and potential burrows. The pre-existing land use of the impact area and mitigation site included burrowing owl foraging with no documentation of breeding. The mitigation site was designed to encourage additional use of the site for winter foraging and breeding with the inclusion of artificial owl burrows and an earthen berm.

The artificial owl burrows recommended for installation are based on the most recent plans created by the SDZ ICR (2017). The berm specifications are based on the Resource Management Plan for the Turecek Off-site Mitigation Parcel (Alden 2019). The placement of the artificial burrows and earthen berm within the mitigation site was determined based on the recommendations included in the SDZ ICR's Burrowing Owl Conservation and Management Plan for San Diego County (SDZ ICR 2017) and through on-site consultation with Mr. Clark of the SDNHM. The intent is for the artificial burrows to provide a short-term temporary home for burrowing owls while the earthen berm will encourage California ground squirrel activity that results in providing long-term shelter for owls. Proposed artificial burrow locations are based on their location away from large populations of coast cholla (*Cylindropuntia prolifera*), which have been known to be used by wood rats to exclude owls from burrows, and from the proposed park to avoid inadvertent harassment of owls by park use. The proposed earthen berm location is between the trail to remain open and the proposed artificial burrow locations to provide further visual and noise barriers for owls.

2.4 Responsible Parties

2.4.1 Project Proponent and Financial Responsibility

The project proponent (City Public Works Department [PWD]) will be responsible for retaining (1) a qualified Restoration Specialist with over five years of experience monitoring habitat restoration to oversee the entire installation and monitoring of the mitigation program in coordination with City Development Services Department (DSD) staff and (2) a qualified installation/maintenance contractor with expertise in restoration of native habitat and artificial owl burrow installation and maintenance. Contact information for the City's PWD Project Manager is provided below:

Contact: Ms. Maya Mazon
City of San Diego
Public Works Department
525 B Street, Suite 750
San Diego, CA 92101
Office: 619-533-4620

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

2.4.2 Responsible Agencies

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

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

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

Contact: Ms. Gina Washington
City of San Diego
Parks and Recreation Department
Office: 858-538-8066
gwashington@sandiego.gov

2.4.3 Restoration Specialist

Overall supervision of the installation and maintenance of this restoration effort will be the responsibility of a Restoration Specialist with at least five years of maritime succulent scrub restoration and artificial burrowing owl burrow installation. The Restoration Specialist will oversee the efforts of the installation/maintenance contractor for the life of the restoration. Specifically, the Restoration Specialist will educate all participants about restoration goals and requirements; inspect plant material; directly oversee planting, seeding, weeding, installation of artificial owl burrows and the earthen berm, and other maintenance activities; and other maintenance activities; and conduct regular monitoring as well as annual assessments of the restoration effort. The Restoration Specialist will provide the PWD Project Manager and contractor with a written monitoring memo, including a list of items in need of attention. The Restoration Specialist will prepare and submit required reports annually.

2.4.4 Installation/Maintenance Contractor

The City PWD Project Manager will hire a qualified restoration contractor. Placement of soil for the earthen berm may be completed by the construction contractor using soil from the construction site. The contractor will be a firm holding a valid C-27 Landscape

Contracting License from the State of California, a valid Pest Control Business License, and a Qualified Applicator Certificate or Qualified Applicator License, with Category B, that will allow them to perform the required work for this restoration effort. The PWD Project Manager may change contractors at their discretion.

During the installation, the contractor will be responsible for initial weed control/dethatching, irrigation installation (if applicable), implementation of grow/kill cycles, mound creation, artificial burrow installation, earthen berm installation (as needed), barrier installation, and planting and seeding, as well as maintenance of the restoration site during the 120-day Plant Establishment Period (PEP) and five-year maintenance period.

Following installation, the contractor will submit marked up as-builts for all activities that occurred during implementation to the PWD Project Manager. The contractor will be held responsible for meeting the success criteria specified for the PEP until formal sign-off of the PEP has been obtained from the Restoration Specialist, PWD Project Manager, and City DSD staff.

Following formal sign-off of the PEP, the contractor will maintain the restoration areas for five years. During this period, the contractor will service the entire mitigation site according to the maintenance schedule (Section 4.0, below). Service will include, but not be limited to, weed control, irrigation maintenance, trash removal, watering, dead plant replacement, re-seeding, and pest and disease management. All activities conducted will be seasonally appropriate and approved by the Restoration Specialist and PWD Project Manager. The contractor will meet with the Restoration Specialist and PWD Project Manager at the site when requested and will perform all checklist items in a timely manner as directed.

2.4.5 Burrowing Owl Biologist

A qualified biologist with experience monitoring and surveying for burrowing owls will be required if work occurs during burrowing owl breeding season (February 1–August 31). The biologist will determine if burrowing owls are present and, if present, will work with restoration crews to direct work in a manner that avoids impacts to burrowing owls.

2.4.6 Native Plant Nursery

Seed collection and bulking, plant salvage and storage, and container plant propagation will be conducted by a nursery that specializes in native plants and contract seed collection and growing. The nursery will be responsible for providing brief updates on the progress of plant salvage, seed collection, and bulking activities to the Restoration Specialist and City PWD Biologist.

3.0 Implementation Plan

This section describes the design of the proposed mitigation and how it will be implemented. Implementation of the mitigation efforts would be conducted under the direction of the qualified habitat Restoration Specialist with close coordination with the City PWD Biologist and shall adhere to appropriate standards stated in the current City's "Whitebook" edition (City of San Diego 2018b or updated, as relevant). Seed collection should commence at least two seasons prior to the initiation of project impacts. All other mitigation activities would commence the first summer-fall season prior to, or concurrently with, construction. Activities that take place during the burrowing owl breeding season (February 1–August 31) would require the presence of a burrowing owl monitor. The timing of artificial burrow and earthen berm installation and burrowing owl exclusion would be closely timed with construction activities, coordinated with the City, and will include the surveys outlined in the Biological Technical Report (RECON 2019). The proposed mitigation design is shown on Figure 8.

3.1 Preliminary Design and Engineering

Mitigation would occur adjacent to the project site within the City-owned parcel. Mitigation would consist of improvements to maritime succulent scrub habitat through restoration and enhancement efforts. Restoration will occur on approximately 3.70 acres of disturbed lands. Disturbed land will be restored to maritime succulent scrub suitable for burrowing owl foraging and nesting through weed maintenance, container plant installation, and seeding. Decompaction of disturbed areas that are currently unauthorized trails or roads will occur, as needed. Enhancement will occur for approximately 2.13 acres of disturbed maritime succulent scrub. Disturbed maritime succulent scrub will be enhanced to maritime succulent scrub through weed maintenance. It is not anticipated that installation of container plants and/or seed will be necessary for the disturbed maritime succulent scrub areas. Approximately 8.30 acres of existing maritime succulent scrub will be further enhanced through minor weed maintenance only. All areas should be maintained as suitable burrowing owl habitat throughout the five-year maintenance and monitoring period, as described in Section 4.0. A figure depicting the suitable habitat present adjacent to the project site can be found in Figure 7. Areas not mapped as suitable habitat will be enhanced to create foraging habitat for burrowing owl. A figure depicting the mitigation site boundaries, and the enhancement and restoration areas can be found in Figure 8.

To further enhance the mitigation area, artificial owl burrows and an earthen berm will be installed, existing Otay tarplant populations will be preserved, and an area that supports beach goldenaster will be created (see Figure 8).

Within the mitigation site, a cluster of three artificial owl burrows and one earthen berm would be constructed and installed to provide habitat to support one breeding pair of western burrowing owls using the most up-to-date research. The site would support 14.12 acres of suitable western burrowing owl/maritime succulent habitat restored through dethatching, weed maintenance, native plant installation and hand seeding, barrier

construction, and continued maintenance and monitoring. Otay tarplant will be preserved by ensuring that the population will not be disturbed during enhancement and restoration activities. Beach goldenaster would be restored through seed collection, container plant installation, and seed bulking and dispersal. Implementation activities are described in Sections 3.3 and 3.4 and ongoing maintenance and monitoring activities are discussed in Section 4.0. For beach goldenaster, a pre-construction survey will be conducted to determine the number of individuals present at the time of the proposed project. Impacted beach goldenaster individuals will be mitigated in-kind through restoration. The results of this pre-construction survey may inform the number of beach goldenaster to planted.

If owl exclusion activities take place within burrowing owl breeding season (February 1 to August 31), additional precautions may be required and will be determined through discussion with the City PWD Biologist. Table 5 presents the order of occurrence for the proposed restoration activities and the months in which they are to occur but does not denote frequency.

Table 5
Restoration Implementation Activities Schedule

Order of Occurrence	Jan	Feb[1]	Mar[1]	Apr[1]	May[1]	Jun[1]	Jul[1]	Aug[1]	Sep	Oct	Nov	Dec
Pre-Construction												
1. Plant Salvage	X	X	X	X	X	X	X	X	X	X	X	X
2. Beach Goldenaster Seed Collection								X	X	X	X	
3. Beach Goldenaster Bulking									X	X	X	X
4. Mound Creation[2]									X	X		
5. Artificial Owl Burrow and Earthen Berm Installation[2]										X	X	
6. BUOW Exclusion/ Passive Relocation[2,3]									X	X	X	
7. Burrowing Owl Relocation[3]		X	X	X	X	X	X	X				
Site Preparation												
8. Barrier/Signage											X	X
9. Dethatching						X	X	X				
10. Irrigation System Installation[3]									X	X		
11. Grow/Kill Cycle	X	X	X	X	X							
Installation												
12. Plant Installation	X	X									X	X
13. Seeding	X	X										X

[1]BUOW breeding season
[2]Activities must occur prior to any ground disturbance or vegetation removal
[3]If needed

3.2 Pre-Construction Activities

Required pre-construction activities include native plant salvage; beach goldenaster survey, seed collection, bulking, and plant propagation; mound creation; artificial owl burrow and earthen berm installation; trail decompaction; and burrowing owl exclusion. These

activities would occur prior to the start of the construction of Beyer Park, in particular, mound creation and owl burrow installation must occur prior to construction to avoid potential significant impacts to burrowing owls. Restoration activities should occur in the order included in the following sections, although seasonal variability should be taken into consideration and the contractor's best professional judgment should be applied. Some activities may be conducted concurrently. The timing of all activities should be closely coordinated with the City PWD Biologist and Wildlife Agencies.

3.2.1 Native Plant Salvage

Native species indicative of maritime succulent scrub occurring within the impact area appropriate for salvage would be collected prior to construction activities (see Figure 5). Anticipated species to be salvaged include coast barrel cactus (*Ferocactus viridescens*) and fish-hook cactus (*Mammillaria dioica*). All plants would be salvaged from the ground using hand tools to remove the plant and root ball and the same methods would be applied for both species. The plants would be bare rooted, root trimmed, and the plants stored under shade cloth for one to three weeks, depending on weather conditions and season, to allow roots to callus. This will prevent to and encourage protective callus development on freshly exposed surfaces. Once the roots have callused, the barrel cactus and fish-hook cactus would be transplanted either within the mitigation site or into containers to be cared for at a local native plant nursery until the mitigation site is ready for plant installation. If plants require care for longer than six months, the nursery would provide quarterly (every three months) progress updates with photos to document plant health. Brief updates would be provided to the Restoration Specialist and City PWD Biologist.

3.2.2 Beach Goldenaster Seed Collection and Propagation

Beach goldenaster seed would be collected from the existing plant populations found within the impact area once the plants have set seed, likely between August and November but may vary based on seasonal weather patterns. Collected seed would be taken to an approved native plant nursery, rough cleaned, and stored until the fall. In the fall, when temperatures cool and conditions begin to favor native perennial plant germination, the seed would be sown into flats to germinate over the winter for container plant propagation and seed bulking. Individuals would be properly cared for through flowering and seed set and seed would be collected and rough cleaned. The bulking process would continue until adequate seed quantities are obtained to meet the project requirements, which may require several seasons (at least two) of bulking. In addition, 30 beach goldenaster container plants would be produced for installation within the mitigation site. The nursery would provide quarterly (every 3 months) progress updates with photos to document progress of the bulking activities to the Restoration Specialist and City PWD biologist.

3.2.3 Barriers

Concurrent with mound creation, temporary barriers will be installed at all unauthorized access point into the mitigation site to prevent unauthorized trespassing by people and vehicles. Barriers will not be installed at locations that will prohibit entrance into the site by maintenance or water trucks for the purposes of maintaining the mitigation site. Particular attention will be given to prohibit entrance into the site from the east and south by off-road vehicles. It is recommended that physical barriers (such as k-rails, orange environmental fencing, rocks, etc.) be installed if their removal at the end of the mitigation would not cause damage to native vegetation or owl burrows, as directed by the City PWD Biologist. Once grading is complete, signs would be installed to provide notice that the area is an ecological preserve, notify that trespassing is prohibited, and cite penalties for trespass violation including liability for repair of any damage to soil or biological resources within the barrier. Signs in both Spanish and English will be mounted at approximately 200-foot intervals around the mitigation site on metal t-posts or similar.

The mitigation site will be permanently fenced with three wire cable fencing or equivalent along the perimeter of the mitigation site. Vegetation will be strategically placed along the trails and at other strategic locations, to prevent unauthorized entry and to minimize vandalism. Protection of the mitigation site from human disturbance is essential for success. Of particular importance is protection of the mitigation site from pedestrians and off-road vehicles. Any permanent fencing would be installed in consultation with the City.

3.2.4 Mound Creation

Mound creation at the site would be implemented to create suitable topography for owl burrows. Mounds would be approximately 3 feet high to allow space for the burrow installation and to provide the owls a higher elevation relative to the surroundings for perching.

The mound creation would be conducted under the direction of the Restoration Specialist. Care would be taken during grading to avoid impacts to existing native plants. Areas that are to remain unaffected by mound creation activities would be marked prior to implementation. Grading and creation of the mounds would be done in a manner that removes or erases unauthorized trails and soil work will be done strategically to help visibly blend the unauthorized trails within the mitigation site in the approximate locations shown on Figure 8. The grading would be implemented using a small bulldozer. The equipment operator would also be experienced in habitat restoration work. The appropriate BMPs will be installed per the standards included in the current City's "Whitebook", as needed.

3.2.5 Trail Decompaction

Concurrent with mound and berm creation, trails to be closed will be decompacted, as needed. Areas where soil has become compacted from off-road-vehicle activity that may inhibit the planting and establishment of container plants will be targeted for decompaction. Trail decompaction would be conducted under the direction of the qualified

restoration specialist. Trail decompaction activities will be conducted in a manner that does not result in impacts to adjacent native vegetation or soil crusts. Trail decompaction will be accomplished using a small bulldozer with ripping tines, or similar. The appropriate BMPs will be installed per the standards included in the current City's "Whitebook", as needed.

3.2.6 Earthen Berm Installation

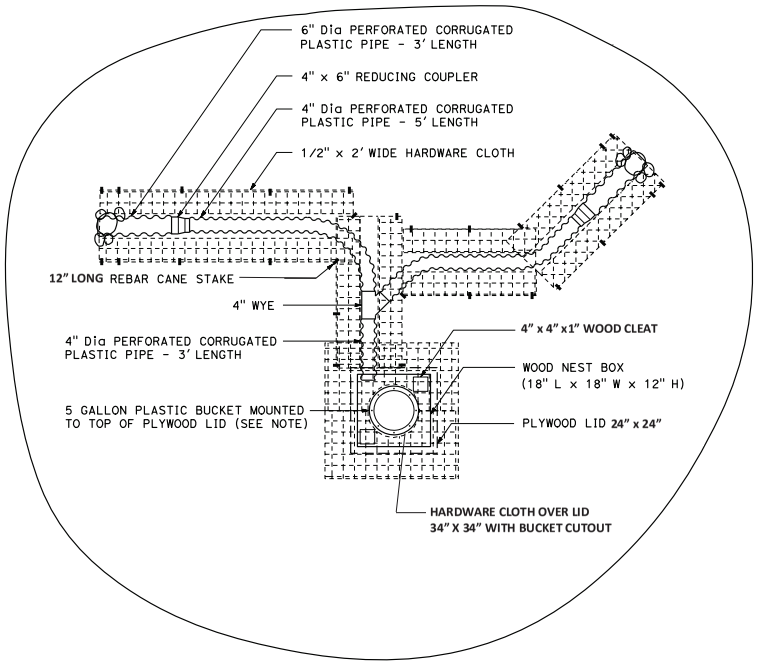
To encourage California ground squirrel use of the mitigation site and provide long-term shelter for burrowing owls, an earthen berm will be installed on the site (see Figure 8). The berm would be created using soil generated from trail decompaction or from the construction site. Soil would be free of cobble and other debris to facilitate ground squirrel use. The berm would be approximately 10 to 12 feet in width and 4 to 5 feet in height and will be placed within an existing trail closure location to further encourage the disuse of the trail. The berm is also located within proximity to proposed artificial burrow locations between an existing trail to remain open and the new burrows; which would also provide a noise and visual barrier for wildlife from the trail that will remain open to the north of the berm. The berm would be constructed and compacted for stability but not so compacted to preclude ground squirrel activity.

After berm construction, pilot burrow holes would be installed within the berm. The holes would be augured in to the top and sides of the berm in random but natural locations as directed by the Restoration Specialist and City PWD Biologist. The holes will be 6 to 8 inches in diameter and 1 to 2 feet in depth. The holes are intended to facilitate ground squirrel use and burrow creation within the berm. The holes will be at an approximate 15 degree angle from parallel to encourage squirrel use and to prevent the creation of pitfall traps for reptiles and small rodents.

3.2.7 Artificial Burrow Installation

To provide short–term temporary homes for burrowing owl, artificial owl burrows would be installed within the created mounds in the approximate locations shown on Figure 8. Burrows would be built and installed per the drawings shown in Figure 9. Figure 9 includes the artificial burrowing owl burrow design developed and modified by the SDZ ICR (SDZ ICR 2018). The artificial owl burrows would be constructed with wood boxes and plastic corrugated pipe and installed within the created mounds. Owl burrows would be installed per Figure 9 and in a manner that supports western burrowing owl use of the mounds, including but not limited to installing burrow entrances in appropriate locations for owl perching and installing entrances at angles that preclude rain runoff from entering burrows.

Map Source: San Diego Zoo Institute for Conservation Research



PLAN

Notes for artificial burrowing owl burrows:

Step 1.
- Use 3/4" pine for wood nest box. Use 3/4" plywood for nest box lid.
- Secure nest box walls with appropriate sized wood deck screws.
- Secure two cleats to lid positioned diagonally from each other with appropriate sized wood deck screws.
- Cleats can be constructed from 4" x 4" timber cut to 1" thickness.
- Position cleats at base of lid to keep lid from sliding off of nest box.
- Do not secure lid to nest box.

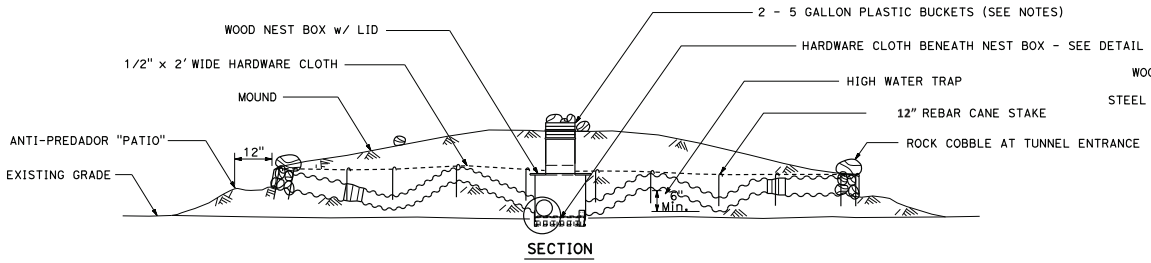
Step 2.
- Cut 4-1/2" diameter hole in wood nest box wall 2" from corner and 1" from bottom.
- Extend perforated corrugated plastic pipe into nest box 2" beyond interior wall.
- Secure pipe to wall with two appropriate sized wood deck screws.
- Place 1/4" of native soil in bottom of perforated corrugated plastic pipe the entire length of the pipe.

Step 3.
- All hardware cloth shall be 1/2" square mesh.
- Place hardware cloth (24" wide) over perforated corrugated plastic pipe prior to backfilling.
- Secure hardware cloth with 12" long cane stakes.

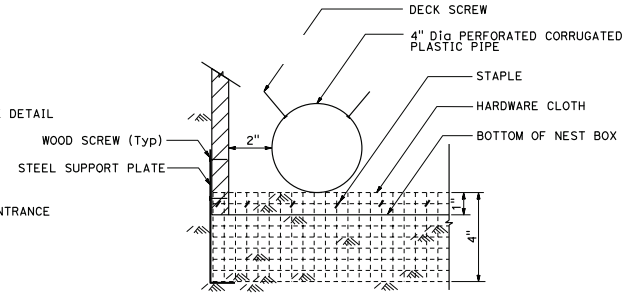
Step 4.
- Place hardware cloth beneath nest box as detailed. Secure hardware cloth to nest box walls with 1/2" long galvanized steel staples.
- Install four appropriate sized L-brackets at each corner of nest box to provide support for nest box and hardware cloth.
- Secure each L-bracket to outside wall of nest box with minimum of four appropriate sized wood screws.
- L-brackets should extend 3" beyond the bottom of the box.
- Cut a 26" square of hardware cloth to wrap over L-brackets to secure to box, per cross section.
- Place 4" of native soil in bottom of nest box on top of hardware cloth.

Step 5.
- Cut 8" diameter hole in center of nest box lid and 8" diameter hole in bottom of 5 gallon plastic bucket.
- Secure bucket to lid with appropriate sized wood screws.
- Install top lip of bucket level with finish grade of mound - adjust depth of wood nest box as necessary.
- Place hardware cloth over nest box lid. Overlap lid minimum 4" all sides.

Step 6.
- Place 2nd 5 gallon plastic bucket inside 1st bucket.
- Fill bucket with native soil to 3" from top.
- Install rocks (3" to 6" diameter) in top of bucket.
- Integral color of all 5 gallon plastic buckets shall blend with surroundings, as approved by the City of San Diego.



SECTION



HARDWARE CLOTH BENEATH NEST BOX

CROSS SECTION

ARTIFICIAL BURROWING OWL BURROW

NO SCALE

RECON

M:\JOBS5\8359\bio\graphics\BUOW_MitPlan\fig9.ai 07/17/2019 fmm

FIGURE 9

Artificial Burrowing Owl Burrow Plan

3.2.7 Burrowing Owl Exclusion

If burrowing owls are found on the site during the pre-construction surveys, any potentially impacted burrowing owl individuals must be relocated out of the impact area using passive or active methodologies approved by the Wildlife Agencies. Burrow exclusion is a method of passive relocation that precludes owls from re-entering burrows that they have exited. The method outlined below includes an approach recommended by the SDZ ICR and requires installing one-way doors at all burrow entrances to evict owls from burrows that may be impacted during construction and encourage them to move into the nearby artificial burrows. Burrowing owl exclusion would take place after the installation of the artificial burrows and outside of burrowing owl breeding season (February 1 to August 31). The following guidelines conform to the Staff Report on Burrowing Owl Mitigation (CDFW 2012).

Prior to exclusion, all potential burrows would be scoped and exclusionary, one-way doors installed. Exclusion should take place during the early morning or late afternoon hours when owls are typically active outside of their burrows. Exclusionary doors would be left in place for three or more days and burrows should be scope twice daily during the early morning or late afternoon hours after exclusionary door installation to ensure that owls have vacated the burrows. Once it has been determined through scoping and monitoring that owls are no longer occupying the burrow, the burrow would be collapsed using heavy equipment or hand tools.

For this mitigation project, it is anticipated that active burrowing owl relocation will not be required if project activities are timed appropriately. If active burrowing owl relocation is required, these activities will be determined through discussion with the City PWD Biologist.

3.3 Site Preparation Activities

Required site preparation activities include barrier installation, weed dethatching, irrigation system installation, and a grow-kill cycle. Site preparation activities would occur prior to or concurrent with the start of the construction of Beyer Park. Site preparation activities should occur in order listed in the following sections, although seasonal variability should be taken into consideration, the contractor's best professional judgment should be applied, and some activities may be conducted concurrently.

3.3.1 Dethatching

Prior to mound creation and outside of the burrowing owl breeding season (February 1 through August 30), crews familiar with native and non-native plants would remove the accumulated weedy thatch throughout the site using line trimmers and rakes.

Areas of black mustard and garland daisy within the restoration and enhancement areas, in particular, would be targeted for dethatching as these areas inhibit owl activity due to the tall structure of these species. Cut material would be raked into piles, removed from the

site, and taken to a landfill or put into a green waste dumpster for disposal. Removal of the thatch aides in creating space for mounds, preparing the site for container plant installation and hand seeding, and reducing future weed growth that may inhibit use of the site by burrowing owls.

3.3.2 Irrigation System Installation

A temporary aboveground irrigation system will be installed within areas planned to receive container plants in the disturbed maritime succulent scrub (enhancement areas/ trail closure areas) and disturbed areas (restoration areas) at the restoration contractor's discretion and with the approval of the City PWD Biologist. The irrigation system would be field fit to ensure adequate irrigation coverage to all installed container plants. In particular, the beach goldenaster mitigation area will be on a separate station to allow for this area to be irrigated at the specific duration and frequency as required to maintain the species without impacting the establishment of other vegetation as these plants may require longer periods of dry-out between watering events compared to other planted species. If a point of connection to a reliable water source is not available at the time of mitigation implementation, a water truck will be utilized to provide supplemental irrigation to container plants.

3.3.3 Grow-Kill Cycle

After installation of the irrigation system, the stations located within the disturbed areas would run for a period of approximately 30 days. At the end of the 30-day period, all weeds would be sprayed with the appropriate herbicide. Weeds would continue to be treated with herbicide every two weeks until weed germination is no longer observed to ensure adequate suppression of the weed seed bank. This process typically requires three rounds of herbicide treatment.

If an irrigation system is not installed and there is time available within the project schedule, a grow-kill cycle would be performed through one rain season. Weeds would be allowed to germinate from natural rainfall and killed once they reach the appropriate size (less than 6 inches in height and/or prior to setting seed) for herbicide treatment (City of San Diego 2018b). Supplemental water would not be applied. All weeds would be treated before flowering and setting seed.

3.4 Installation Activities

Required installation activities include maritime succulent scrub and beach goldenaster plant and seed installation. Installation activities would occur after site preparation activities are complete, although seasonal variability should be taken into consideration, the contractor's best professional judgment should be applied, and some activities may be conducted concurrently. Planting and seeding will occur in areas shown on Figure 8 as disturbed maritime succulent scrub, disturbed land, trails to be closed, and the beach goldenaster mitigation location.

3.4.1 Plant and Seed Installation

The maritime succulent scrub habitat would be planted after the installation of the owl burrows and after the first significant rain of the rain season. See Table 5 for the seeding and planting schedule. The mitigation site currently supports maritime succulent scrub, disturbed maritime succulent scrub, and disturbed habitats. Plant and seed installation will occur within the disturbed habitat areas, including within trails to closed. The restoration of native plant communities at the site would be based on a principle of re-establishing suitable soil conditions (i.e., mycorrhizal fungi); reintroduction of native shrub and herbaceous species; and native seed banks suitable for western burrowing owl foraging habitat.

Approximately 3.69 acres would be restored from disturbed habitat to maritime succulent scrub suitable for burrowing owl foraging through container plant installation and seeding.

The 2.13 acres of disturbed maritime succulent scrub and 8.30 acres of maritime succulent scrub to be enhanced on-site should not require container plant or seed installation but will be further enhanced by minor weed maintenance. All areas should be maintained as suitable burrowing owl habitat throughout the five-year maintenance and monitoring period, as described in Section 4.0.

The restoration techniques would include installing container stock grown from a local seed source and hand-broadcasting locally collected seed. All seed used for plant propagation would be collected from the vicinity of the mitigation site where feasible and as approved by the City PWD Biologist. All planting will be installed in a way that mimics natural plant distribution. Only lower growing species would be installed within 50 feet of the installed artificial owl burrows or earthen berm (see Figure 8).

The reestablishment of a fully diverse native community would rely on appropriate initial conditions and intensive weed control efforts. The container plant palette and seed mix for the maritime succulent scrub restoration that supports burrowing owl are listed in Tables 6 and 7. All plant material salvaged from the impact area shall be installed within the mitigation site.

The plant palette was designed to mimic the plant composition and structure of the current on-site maritime succulent scrub.

Table 6 Container Stock for the Maritime Succulent Scrub Restoration			
Scientific Name	Common Name	Size	Number per Acre[1]
Agave shawii	Shaw's agave	Rose-pot	50
Artemisia californica[2]	California sagebrush	1-gallon	50
Ambrosia chenopodiifolia	San Diego bur-sage	Rose-pot	80
Bahiopsis laciniata[2]	San Diego sunflower (viguiera)	1-gallon	50
Bergerocactus emoryi	Golden cereus	1-gallon	60
Distichlis spicata	Salt grass	Rose-pot	150
Echinocereus engelmannii	Strawberry hedgehog cactus	1-gallon	60
Eriogonum fasciculatum[2]	California buckwheat	1-gallon	70
Euphorbia misera[2]	Cliff spurge	1-gallon	40
Opuntia littoralis[2]	Coast prickly pear cactus	1-gallon or cuttings	60
Simmondsia chinensis[2]	Jojoba	1-gallon	80
		TOTAL	**750**

[1]Approximate number per acre to be adjusted for areas within existing native target vegetation.
[2]Not to be installed within 50 feet of artificial owl burrows or earthen berm.

Table 7 Seed Mix for the Maritime Succulent Scrub Restoration		
Scientific Name	Common Name	Pounds per Acre
Acmispon glaber	Deerweed	1.0
Ambrosia chenopodiifolia	San Diego bur-sage	1.0
Eriophyllum confertiflorum	Golden yarrow	2.0
Heterotheca sessiliflora ssp. *sessiliflora*	Beach goldenaster	TBD
Lasthenia californica	California goldfields	4.0
Plantago erecta	Dot seed plantain	4.0
	TOTAL	**12.0**

TBD = to be determined based on seed collection and bulking quantities as discussed in Section 3.3.2.

3.4.2 Beach Goldenaster Planting and Seed Dispersal

The 30 one-gallon beach goldenaster plants would be installed within the designated area within the maritime succulent scrub habitat. The designated area would be clearly marked with snow fencing to ensure protection of the plants. Fencing would be removed after Year 3 to prevent the establishment of visible boundaries between the beach goldenaster area and the maritime succulent scrub. Maintenance measures for this area will follow those outlined for the maritime succulent scrub but particular care (i.e., additional watering and weeding) may be required to maintain at least 25 individuals at the end of the mitigation (or fewer if this number is adjusted based on the results of the pre-construction survey). Beach goldenaster seed would also be distributed by hand within the designated beach goldenaster area and throughout the mitigation site in the areas identified in Figure 8. Seed would be scheduled for distribution in the fall/winter sometime following the first significant rain event of the season and immediately prior to a forecasted rain event (not more than 48 hours). The area would be lightly raked and the seed dispersed by hand.

3.5 As-Built Reporting

At the completion of implementation, the installation will be approved by the City DSD and PWD Biologist. The installation/maintenance contractor shall submit an as-built report that documents implementation activities and the dates they were completed. The report will include but not be limited to dates of on-site work, location of artificial owl burrows and earthen berm, location of the beach goldenaster designated area, final maritime succulent scrub plant and seed lists and quantities, and modifications to the mitigation site design that occurred through consultation with the Restoration Specialist and City PWD Project Manager. The report may be a brief letter report with photos of the final site design and figures with locations of site elements.

3.6 120-day Plant Establishment Period

The 120-day Plant Establishment Period (PEP) would begin once the implementation activities are approved by the City, likely once all container plants and native seed have been installed. The PEP shall last for 120 calendar days and shall consist of all maintenance activities and methods discussed in Section 4.0. Regular (at least once per week) qualitative monitoring will be conducted to assess native container plant establishment and non-native weed germination and make recommendations for maintenance activities, as needed. At the end of the PEP, any dead container plants would be replaced in kind and the site would be free of non-native weed species. Year 1 would begin after successful completion of the PEP and any required remedial container plant installation has been completed. At the completion of the PEP, the Restoration Specialist will prepare a letter report for submittal to the City to document activities conducted during the PEP and the site progress towards final success criteria.

4.0 Maintenance Plan

Regular maintenance of the mitigation site would be required during the five-year maintenance period to establish native container plants and control non-native weeds and will be conducted throughout the entire mitigation site. The need for weeding is expected to decrease substantially by the end of the maintenance period provided successful habitat restoration has been achieved. Weeding activities would include herbicide application, line trimming, and hand pulling, depending on the species and phenology of the weed encountered and their location within the mitigation site. Maintenance activities would also include watering of planted container stock, re-planting and re-seeding of native species, repair of fencing and signage, and trash removal. Maintenance activities would be performed consistent with the following and per the schedule in Table 8:

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

- Appropriate herbicides will be applied on all areas that have been dethatched. Herbicide will only be applied when wind speed is low and spray nozzles will be of a design to maximize the size of droplets. A wind speed of less than 5 miles per hour is recommended, however, best professional judgment should be exercised when spraying weeds to reduce the potential for drift of herbicide to non-target plants. Application of herbicide will not occur if rain is projected within 24 hours of the scheduled application.

- Weeds will be treated once they reach the appropriate size (less than 6 inches in height and/or prior to setting seed) for herbicide treatment (City of San Diego 2018b).

- A 10-foot buffer will be maintained between concentrations of any sensitive plant species during herbicide application.

- Weeds would only be removed by hand from within the beach goldenaster designated mitigation area.

- A 10-foot-wide weed maintenance buffer from the mitigation site boundary will be established around the mitigation site. The buffer will be maintained for non-native weeds to prevent the encroachment of weeds into the mitigation site.

- Watering of container plants would be conducted via an irrigation system, if installed, or water truck and hoses. Water would be done in a manner to mimic natural rainfall, at a frequency and duration to encourage deep root establishment, and prevent runoff.

- Artificial owl burrows would be checked and maintained annually. Burrows damaged by predators would be repaired immediately if unoccupied or, if occupied, outside the burrowing owl breeding season (February 1–August 30). At the end of each breeding season, the nest boxes and burrow entrances would be checked for debris or damage and necessary maintenance or repairs would be made.

- Replacement of container plants would be conducted, as needed. All dead plants will be replaced during years 1 and 2 after initial plant installation, unless their function has been replaced by natural recruitment.

- All fencing and signs would be checked and repaired as necessary.

- Trash in the mitigation areas would be removed as necessary.

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

- At the completion of the five-year maintenance period and prior to final sign-off, foot paths and access routes that may have developed within the site during maintenance and monitoring would be vertically mulched with brush and prickly pear cactus pads. This is only required in areas where the footpaths may encourage trespassing. If trespassing has not been problematic in these areas, no vertical mulching is required.

- Other site problems such as vehicle damage and erosion would be reported to the City Project Biologist with recommendations for remedial measures.

Table 8
Restoration Maintenance Schedule

Task	Year 1	Year 2	Year 3	Year 4	Year 5
Weed Control (Herbicide Treatment)	Monthly[1]	6 times per year[1]	4 times per year[1]	4 times per year	3 times per year
Watering	As needed	As needed	As needed	--	--
Supplemental Upland Planting/Seeding	Fall/Winter	Fall/Winter	--	--	--
Beach Goldenaster Seeding	Winter	Winter	Winter		
Artificial burrow/berm maintenance	As needed	As needed	As needed	As needed	As needed
Trash Removal	As needed	As needed	As needed	As needed	As needed
Barrier/Sign Maintenance	As needed	As needed	As needed	As needed	As needed
Footpath Vertical Mulching	--	--	--	--	As needed
[1]Minimum frequency					

5.0 Ecological Performance Standards

The performance standards used to determine successful mitigation will include the achievement of standards for maritime succulent scrub vegetation, beach goldenaster establishment, and suitable western burrowing owl habitat establishment. The achievement of these standards will be measured by native and non-native cover, plant species richness, burrowing owl use, and beach goldenaster presence. The performance standards discussed below have been developed to provide evidence that the restoration of the mitigation site has been successful at mitigating for beach goldenaster impacts and replacing and improving habitat for western burrowing owl breeding and foraging.

The target values for the maritime succulent scrub would ultimately be based on values appropriate to support owl foraging. In addition, the enhanced and restored areas on-site shall blend with the preserved areas on-site. An appropriate reference site will be determined by the Restoration Specialist in coordination with the City PWD Biologist. High quality maritime succulent scrub habitat appropriate for burrowing owl with the same southwestern exposure and soils is located adjacent to the mitigation area and can be used as a reference site.

Performance standards for enhancement areas (see Figure 8) will focus on control of non-native species. The goals will be for the maritime succulent scrub and disturbed maritime succulent scrub within the enhancement area to seamlessly blend together and to provide habitat for western burrowing owl. The performance standards for the restoration areas (see Figure 8) will focus on control of non-native species and obtaining native maritime

succulent scrub cover appropriate for this vegetation community and western burrowing owl.

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

5.1 Maritime Succulent Scrub Restoration Vegetation Performance Standards

The performance standards for the maritime succulent scrub habitat are based on establishing vegetation within the disturbed areas that replicate the open nature of the existing maritime succulent scrub habitat on-site and as compared to an appropriate reference site. In addition, absolute performance standards have been established for container plant survivorship, species richness, and weed abundance. As the maritime succulent scrub habitat will also serve as western burrowing owl foraging habitat, total native coverage should be appropriate to support burrowing owl use of the site. Absolute approximate yearly target values for the performance standards cover and species richness of maritime succulent scrub habitat that provides suitable burrowing owl habitat are presented in Table 9.

Table 9
Vegetation Performance Standards[1]
(percent)

Year	Native Shrub Species Cover	Native Herbaceous Species Cover	Species Richness[2]	Non-native Species Cover
1	10	5	12	• <5 • 0 Cal-IPC high or moderate species • 0 perennial species
2	20	10	13	• <5 • 0 Cal-IPC high or moderate species • 0 perennial species
3	30	15	14	• <5 • 0 Cal-IPC high or moderate species • 0 perennial species
4	40	20	15	• <5 • 0 Cal-IPC high or moderate species • 0 perennial species
5	40	20	15	• <5 • 0 Cal-IPC high or moderate species • 0 perennial species

Cal-IPC = California Invasive Plant Council
[1]Alternatively quantitative values may be compared to a reference site
[2]Number of different species

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

In addition to the performance standards included in Table 8, the standards listed below will also be evaluated and applied to the mitigation site. The mitigation site will be compared to an appropriate reference site with the potential to support burrowing owl as approved by the City PWD Biologist. The plant survivorship, vegetation cover, and species richness performance standards are as follows:

- Container plant survival shall be 80 percent of the initial plantings for year 1. After year 1, all dead plants will be replaced unless their function has been replaced by natural recruitment.
- At the end of the five-year monitoring program, the mitigation site will be compared to the reference site. The mitigation site will support 80 percent of the native shrub cover, native herbaceous cover, and native species richness as compared to the same values observed and recorded at the reference site during the same monitoring year.
- At the end of the monitoring program, restored burrowing owl foraging habitat will visibly blend in with the existing maritime succulent scrub habitat on-site and will not contain vegetative cover that precludes owl foraging.

5.1.2 Non-native Species Tolerance Performance Standard

The relative cover of all non-native species within the mitigation site will not exceed an absolute value of 5 percent and no California Invasive Plant Council List High or Moderate rated species will be present at the end of the five-year monitoring period. In addition, no non-native perennial species will be present.

5.2 Enhancement Areas Vegetation Performance Standards

The performance standards for the maritime succulent scrub enhancement areas will focus on the control of non-native species. The relative cover of all non-native species within the mitigation site will not exceed an absolute value of 5 percent and no California Invasive Plant Council List High or Moderate rated species will be present at the end of the five-year monitoring period. In addition, no non-native perennial species will be present (Table 10).

Table 10 Enhancement Areas Vegetation Performance Standards (percent)	
Year	Non-native Species Cover
1	• <5 • 0 Cal-IPC high or moderate species • 0 perennial species
2	• <5 • 0 Cal-IPC high or moderate species • 0 perennial species
3	• <5 • 0 Cal-IPC high or moderate species • 0 perennial species
4	• <5 • 0 Cal-IPC high or moderate species • 0 perennial species
5	• <5 • 0 Cal-IPC high or moderate species • 0 perennial species
Cal-IPC = California Invasive Plant Council	

5.3 Beach Goldenaster Performance Standards

At the end of the five-year monitoring period, a minimum of 25 beach goldenaster individuals should be present within the mitigation site. This number may be adjusted based on the results of the pre-construction survey. The 25 individuals can be present within the designated beach goldenaster area, individuals that germinated from seed distributed throughout the mitigation site, or from a combination of the two. In addition, during at least two of the monitoring years, a minimum of 25 individuals must have been observed setting seed. At least one of these years must occur outside of the years when supplemental watering is being applied to the plants (i.e., Years 4 or 5).

5.4 Burrowing Owl Performance Standards

At the end of the five-year monitoring period, western burrowing owls should be observed utilizing the mitigation site during two of the five monitoring years during either breeding or non-breeding season. Burrowing owl presence may be confirmed through focused non-protocol burrowing owl surveys or through incidental observations that may occur during routine qualitative and quantitative monitoring.

5.5 Photographic Documentation

A minimum of fifteen permanent photo points will be established within the mitigation site prior to the start of restoration activities. Representative photographs will be taken at the completion of implementation, completion of the PEP, and annually to visually document the progress of vegetation cover development over the monitoring period.

6.0 Monitoring Requirements

A minimum commitment of five years of monitoring of the mitigation site will be completed. Biological monitoring for performance standard goals will include vegetation monitoring, complete flora and fauna inventories, and photographic documentation. The monitoring schedule is presented in Table 11.

Table 11
Monitoring Schedule

Task	Year 1	Year 2	Year 3	Year 4	Year 5
Qualitative Monitoring	Once weekly for first 2 months; Once every other week for months 2–6; Monthly thereafter during the growing season (December-May)	Every other week during the growing season	Monthly during the growing season	Monthly during the growing season	Monthly during the growing season
Beach Goldenaster Monitoring	Once weekly for first 2 months; Once every other week for months 2–6; Monthly thereafter during the growing season (December-May)	Every other week during the growing season	Monthly during the growing season	Monthly during the growing season	Monthly during the growing season
Photograph Documentation	As-needed	Spring	Spring	Spring	Spring
Vegetation Monitoring (Quantitative)	Spring	Spring	Spring	Spring	Spring

[1]Time dependent on rainfall.

6.1 Maritime Succulent Scrub Vegetation Monitoring

It is anticipated that maritime succulent scrub habitat would become established within the five-year monitoring period, although full maturation of the community may take longer. Overall native cover (i.e., shrubs, herbaceous species) and species richness would be evaluated for the mitigation site and compared to the same data collected for the reference site. For the enhancement areas, overall non-native cover would be evaluated and compared to the reference site.

The native and non-native vegetation cover in the mitigation and reference sites would be measured using ocular estimates and line-intercept sampling method. Transects should be separated by restoration areas and enhancement areas. The line-intercept method involves the establishment of randomly placed transects to gather data to estimate native vegetation cover (i.e., shrub and herbaceous). Approximately two 10-meter transects will be sampled per acre with a representative number of transects placed in restored and enhanced areas. Plant species and growth form will be noted at every 0.5 meter. Vegetation coverage of the mitigation site should be similar to the reference site at the end of the five-year monitoring

period. Species richness would be determined by lists of all plant species present within the mitigation site.

The presence of non-native weed species would be monitored in the mitigation site. Information collected during qualitative monitoring visits would be used to schedule the maintenance crews to conduct weed maintenance activities. Ocular estimates and transect data would be used to quantify coverage of non-native species and compare to performance standards.

In addition, the mitigation site as a whole should blend together at the end of the monitoring period. The mitigation site should look like one contiguous patch of native vegetation.

6.2 Beach Goldenaster Monitoring

Counts of beach goldenaster individuals would be conducted annually throughout the mitigation site during the blooming period for this species, approximately March through June. The timing of these counts would be adjusted based on seasonal weather patterns and qualitative monitoring of the species phenology for that year. Total individuals at each stage of phenology would be recorded; seedling, vegetative, flowering, seeding. Counts would be separated into individuals observed in the beach goldenaster planting areas and other areas of the mitigation site.

6.3 Burrowing Owl Monitoring

Monitoring for western burrowing owl would be conducted by a biologist familiar with the behavior and natural history of the burrowing owl and consist of four surveys during each monitoring year, three surveys conducted during the non-breeding season (September 1 through January 31) and one conducted during the breeding season (February 1 through August 31) with at least two months between each survey. Surveys would be conducted in the morning or late afternoon when owls are active outside their burrows and timed with weeding activities and beach goldenaster monitoring.

Owl observance shall be marked in the field and approximately locations shall be included in annual reports. In addition, fossorial mammal activity shall be recorded during burrowing owl surveys and a description of their activity would be included in the annual reports.

6.4 Reporting

Annual reports that assess both the attainment of yearly interim and progress toward the final performance standards for the site would be submitted to the City PWD Biologist and Project Manager for dispersal to the appropriate stakeholders by December 1 of each year. The reports would also summarize the mitigation project's compliance with all applicable mitigation measures and permit conditions. A list of wildlife species observed using the mitigation site would be prepared and included in the annual reports. Species lists would be

compiled annually. A final monitoring report would be prepared and submitted to Wildlife Agencies for use in the notification of completion and final acceptance of the mitigation effort.

7.0 Long-term Management

The mitigation site mostly lies within the City MSCP's MHPA. After the successful restoration of maritime succulent scrub and beach goldenaster habitat suitable for western burrowing owl foraging and nesting, the site will be managed pursuant to the guidelines of the City MSCP. The site will be preserved in perpetuity as part of the City MSCP Program. Prior to the issuance of any construction permits or beginning any construction-related activity on-site, the City would provide the location of mitigation lands to the satisfaction of MSCP and the Wildlife Agencies.

The MSCP provides the requirements of the long-term management of the mitigation site with respect to ownership, long-term maintenance requirements (i.e., planting, weed control, barriers-fencing, lighting, drainage, signage-public information and education, trach removal), funding, prohibitions, corrective measures for unforeseen circumstances, monitoring, and responsible parties (i.e., City of San Diego).

In addition, long-term maintenance and monitoring of the approved mitigation land shall be conducted in accordance with the MSCP program by the City Parks and Recreation department. Funding for maintenance would occur through the operating budget for the management of Park and Recreation Open Space lands.

8.0 Adaptive Management Plan

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

Adaptive management measures to be implemented would include the utilization of qualitative data gathered in the field throughout the five-year monitoring period to assess the health and vigor of newly established habitat within the mitigation site. Following an event that causes damage to all or part of the mitigation sites, this data will be used in part to drive management considerations for the repair of the damaged areas. Achieving the key goals of the mitigation program and establishing self-sustaining native habitats will be the focus of all adaptive management decisions. Adaptive measures may include owl burrow repair, earthen berm and pilot hole maintenance, remedial plant installation, collection and dispersal of beach goldenaster seed, re-seeding of native shrubs and annuals, additional

weed control efforts, and others deemed appropriate through consultation with the City and Wildlife Agencies. Plant and seed installation may occur within the disturbed maritime succulent scrub areas as a measure to deter non-native cover and/or fill in bare areas as determined by the Restoration Specialist with approval of the PWD Project Manager.

If an interim performance standard is not met for any of the criteria in any year, or if the final performance standards are not met, the City will prepare an analysis of the cause(s) of failure and, if deemed necessary by the Wildlife Agencies, propose remedial actions for approval. If the site has not met a performance standard during the initial five-year period, the maintenance and monitoring obligations will continue until the Agencies deem the restoration successful or contingency measures are implemented. Restoration will not be deemed successful until at least two years after any contingency measures are implemented, as determined by the Wildlife Agencies.

9.0 Notification of Completion

If the final success criteria have been met at the end of the five-year monitoring program, notification of these events would be provided with the fifth-year report. If the final success criteria have not been met by the end of the five-year monitoring program, the fifth-year report would discuss the possible reasons and recommendations for remedial measures to cause the site to meet the criteria. If the mitigation site has not met the performance standards, the City's maintenance and monitoring obligations will continue, until the City Mitigation Monitoring Coordination (MMC) and PWD deem the mitigation program as successful or contingency measures must be implemented (see Section 8.0, Adaptive Management Plan).

Following achievement of the final success criteria and receipt of the final annual report to the City MMC and PWD, the City MMC will provide written approval of the completion of the mitigation effort.

10.0 References Cited

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