

Topock Project Executive Abstract

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<p>Brief Summary of attached document:</p> <p>The 2024 Topock Revegetation Year 2 Mitigation Monitoring Report summarizes project restoration plan requirements, provides the information on the number and species of sensitive trees and shrubs that were removed due to unavoidable construction impacts, as well as the number, species and locations of mitigation plantings, summarizes revegetation implementation activities, and provides the current status of the revegetation project during the second-year monitoring period. The report addresses revegetation maintenance and monitoring activities during Year 2, presents the results of annual quantitative monitoring of mitigation plantings and transplants, in addition to discussing adaptive management monitoring. The report also includes Year-2 photos from the photo monitoring.</p>	
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<p>Other requirements of this information?</p> <p>None.</p>	

Pacific Gas and Electric Company

Topock Revegetation Year 2 Mitigation Monitoring Report

January 2025

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January 2025

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Acronyms and Abbreviations

Arcadis	Arcadis U.S., Inc.
bgs	below ground surface
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CH2M Hill	CH2M Hill, Inc.
C/RAWP	Construction/Remedial Action Work Plan
DOI	United States Department of Interior
dS/m	deciSiemens per meter
DTSC	California Department of Toxic Substances Control
FEIR	Final Environmental Impact Report
FGL	Fruit Growers Laboratory
GIS	geographic information system
HDPE	high-density polyethylene
HNWR	Havasu National Wildlife Refuge
MDLT	Mojave Desert Land Trust
MMRP	Mitigation Monitoring and Reporting Program
O&M	operation and maintenance
PG&E	Pacific Gas and Electric Company
Project	Final Groundwater Remedy
PVC	polyvinyl chloride
Revegetation Project	Groundwater Remediation Revegetation Project
SEIR	Final Subsequent Environmental Impact Report
Site	designated revegetation areas
Tribes	Colorado River Indian Tribes, Chemehuevi Indian Tribe, Fort Mojave Indian Tribes, Hualapai Indian Tribe, and Cocopah Indian Tribe
TCS	Topock Compressor Station
UCCE	University of California Cooperative Extension
UHR	Upland Habitat Revegetation
USFWS	United States Fish and Wildlife Service

1 Introduction

Pacific Gas and Electric Company (PG&E) is implementing the final groundwater remedy (the Project) to address chromium in groundwater near the PG&E Topock Compressor Station (TCS) located in eastern San Bernardino County, 15 miles southeast of the City of Needles, California (Figure 1).

Construction of the Project began in October 2018 following the plans and procedures documented in the Construction/ Remedial Action Work Plan (C/RAWP; CH2M Hill, Inc. [CH2M Hill] 2015). In accordance with the C/RAWP, construction includes the installation of remedial wells and monitoring wells. The remedial action involves monitoring select wells to provide additional hydraulic data to update the conceptual site model, groundwater model, and design (C/RAWP Section 3.2.1.5).

The California Department of Toxic Substances Control (DTSC) is the state lead agency overseeing corrective actions at the TCS. Pursuant to the California Environmental Quality Act, DTSC had prepared and certified a final environmental impact report (2011 Groundwater Final Environmental Impact Report [FEIR]; AECOM 2011a, 2011b), which evaluated and prescribed mitigation measures to lessen the potential unavoidable environmental impacts associated with the final groundwater remedy.

DTSC also prepared and certified an addendum to the 2011 Groundwater FEIR (DTSC 2013), which evaluated the potential environmental impacts associated with implementation of the alternative freshwater source evaluation in the TCS Project area. In addition, DTSC prepared and certified a Final Subsequent Environmental Impact Report (SEIR; DTSC 2017), which focuses primarily on modifications to the groundwater remedy since the 2011 Groundwater FEIR and the 2013 addendum to the FEIR. Included in the certified SEIR is the Groundwater Mitigation Monitoring and Reporting Program (Groundwater MMRP; DTSC 2018), which outlines the requirements for mitigation of unavoidable direct impacts to plants associated with aesthetics and visual quality to key viewpoints, non-disturbed jurisdictional ephemeral waters, and plants of traditional cultural significance. Mitigation measures are detailed in the Groundwater MMRP Mitigation Measures AES-1 part (f), BIO-1a parts (a) and (b), and CUL-1a-5 (DTSC 2018). The full text of the mitigation measures is provided in Appendix A.

As a requirement of the three mitigation measures mentioned above, PG&E prepared the following three plans: Topock Compressor Station Groundwater Remediation Project Aesthetics and Visual Resources Revegetation Plan (CH2M Hill and E2 Consulting Engineers 2014a), Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (Appendix O to the C/RAWP [CH2M Hill and E2 Consulting Engineers 2014b]) and Topock Groundwater Remediation Project Mitigation and Monitoring Plan for Culturally Significant Plants (CH2M HILL and GANDA 2014).

The restoration and revegetation of the Project Area will be guided by and occur in accordance with the previously approved revegetation plans, which are addressed briefly in Section 1.2.1.

In addition, PG&E prepared the Havasu National Wildlife Refuge (HNWR) Habitat Restoration Plan (Appendix G to the C/RAWP [CH2M Hill and E2 Consulting Engineers 2015]) to comply with Paragraph 13(b) of the Consent Decree. Paragraph 13(b) of the Consent Decree required a Habitat Restoration Plan for unavoidable impacts to sensitive habitats under the jurisdiction of the United States Fish and Wildlife Service (USFWS), United States Army Corps of Engineers or the California Department of Fish and Game (now Department of Fish and Wildlife [CDFW]).

As stated in BIO-1a (b), "Implementation of these plans will be informed by the technical memorandum, *Assessment of Proposed Mitigation Planting Areas for Final Groundwater Remedy Impacts*, included as Appendix

V to the C/RAWP (CH2M Hill 2015b), which provides preliminary information on the condition within fourteen proposed mitigation planting areas.”

The revegetation plans specify revegetation success criteria; monitoring and reporting requirements; and adaptive management guidelines for salvage and replanting of trees, shrubs, and perennial species. In accordance with the habitat revegetation plans, removed mature trees in key viewpoints, riparian trees, or culturally significant plants (e.g., blue palo verde trees [*Parkinsonia florida*]) were replaced at a 3:1 ratio (i.e., planting three trees in revegetation areas for each tree removed during construction). The success criterion for mitigation plantings is a final minimum plant replacement ratio of 2.25:1 (75 percent overall survival rate) of mitigation plantings at the end of a minimum 5-year monitoring period.

The Groundwater Remediation Revegetation Project (the Revegetation Project) encompasses revegetation implementation and ongoing maintenance, monitoring, and reporting in designated revegetation areas (the Site, Figures 1 and 2). Restoration was implemented on October 8, 2022, and the post-revegetation implementation monitoring period began on October 9, 2022.

This Year 2 Topock Revegetation Mitigation Monitoring Annual Report summarizes the current status of the Revegetation Project during the second-year monitoring period (Year 2), revegetation maintenance and monitoring, and results of annual quantitative monitoring of mitigation plantings and revegetation areas. It also provides a review of current mitigation revegetation requirements. Year 2 monitoring activities were the same as Year 1 monitoring activities, but the monitoring frequency was reduced from monthly to every two to three months beginning in June 2024 and continuing through the end of the year.

1.1 Revegetation Year 2 Mitigation Monitoring Report Organization

This Topock Revegetation Year 2 Mitigation Monitoring Report is organized as follows:

- Section 1 provides an overview of approved revegetation plans, Project impacts and required mitigation, previously salvaged and transplanted plants, and revegetation goals.
- Section 2 presents details on mitigation plantings including descriptions of planting areas, plant types and sources, volunteer recruits, and salvaged and transplanted individuals.
- Section 3 summarizes the methods implemented for routine monthly revegetation assessments, annual quantitative monitoring, adaptive management monitoring, and reference sites assessments before planting and during Year 2.
- Section 4 summarizes the methods implemented for routine maintenance during Year 2.
- Section 5 summarizes the results of annual quantitative monitoring for mitigation plants in Year 2 including implementation of adaptive management strategies, a review of performance standards, and salvaged beavertail cactus survival.
- Section 6 provides a summary of maintenance carried out during Year 2 including details on repairs to revegetation infrastructure and results of continued invasive plant species abatement.
- Section 7 summarizes monitoring results and offers recommendations on subsequent revegetation for revegetation monitoring and maintenance.
- Section 8 provides a list of references cited throughout this report.

1.2 Background

This section summarizes the previously approved revegetation plans, Project impacts and required mitigation, salvaged and transplanted beavertail cactus, and revegetation goals.

1.2.1 Approved Revegetation Plans

As part of the final design submittal for the Project, revegetation plans were submitted to address impacts to plants that would occur during remedy construction. Each of these plans describes the specific mitigation measure or regulatory requirement driving the revegetation needs as well as the general approaches that would be implemented.

These plans specifically addressed plant impacts on HNWR lands (Appendix G to the C/RAWP, CH2M Hill and E2 Consulting Engineers 2015); within jurisdictional areas associated with waters of the U.S. and the State of California (Appendix O to the C/RAWP, CH2M Hill and E2 Consulting Engineers 2014b); for mature plants (Appendix N to the C/RAWP, CH2M Hill and E2 Consulting Engineers 2014a); and for ethnobotanically significant plants (Appendix H to the C/RAWP, CH2M Hill and GANDA 2014), which was submitted in compliance with the Cultural and Historic Properties Management Plan (U.S. Bureau of Land Management 2012).

The plans also specify on-site revegetation success criteria; monitoring and reporting requirements; and adaptive management guidelines for salvage and replanting of trees, shrubs, and perennial species.

In accordance with the habitat revegetation plans, removed mature trees in key viewpoints, riparian trees, or culturally significant plants (e.g., blue palo verde trees) must be replaced at a 3:1 ratio (i.e., planting three trees in revegetation areas for each tree removed during construction). The success criterion for mitigation plantings is a final minimum plant replacement ratio of 2.25:1 (75 percent overall survival rate) of mitigation plantings at the end of a minimum 5-year monitoring period. Adaptive management guidelines outline modifications to revegetation approaches, as appropriate, to provide for successful establishment of native vegetation and desired density of cover of plants. As required by the plans, the following adaptive management actions will be implemented if success criteria are not being met: weed control, irrigation modification, herbivory protection, and additional plantings. Annual mitigation monitoring reports will be submitted to DTSC, CDFW, and USFWS in January each year through 2027 for the duration of the required revegetation monitoring period or until performance targets are met.

1.2.2 Project Impacts and Required Mitigation

During site remediation construction between 2018 and 2022, a total of 220 native plants were removed including cacti, shrubs, and riparian trees (Table 1-1). PG&E avoided impacting sensitive plants or only minimally trimmed plants where possible. Sensitive plants were removed if avoidance was not possible.

In 2024, one additional honey mesquite (*Neltuma odorata* [*Prosopis glandulosa* var. *torreyana*]) was removed during groundwater remediation activities. This individual was not on HNWR property or within a CDFW jurisdictional waterway.

1.2.2.1 Transplantation Effort in 2018

Just before initiating the remedy construction in 2018, PG&E attempted to salvage and transplant plants within the anticipated construction footprint to a single, upland habitat transplant location. Salvage and transplantation of sensitive plants occurred primarily over two separate events in 2018: November 27 and 28 and December 19. A

total of four species encompassing 174 plants were salvaged and transplanted, including one upland cactus species, beavertail cactus (*Opuntia basilaris* var. *basilaris*, 10 individuals), and three species that typically inhabit desert wash and riparian habitats, blue palo verde (146 individuals), honey mesquite (16 individuals), and desert smoke tree (*Psoralea argophylla*, 5 individuals). Salvage and transplanting efforts followed protocols described in the revegetation plans. All the transplants were placed within the approximately 1.3-acre Upland Revegetation Area (UHR-1) located on the west side of National Trails Highway (Figure 2).

As of March 2021, seven of the upland beavertail cacti survived in the UHR-1 revegetation area, with all of the desert wash and riparian species dying in this location. Although PG&E followed the transplanting protocol, the transplantation methods for desert wash and riparian species were not successful. Transplant failure was due to a number of factors including (Strohl 2020):

- High transplant mortality may have resulted from many unsuitable (i.e., poor health status) plants that were transplanted. PG&E decided to transplant individuals with poor health in case they could potentially survive and if the transplant required little effort.
- Although revegetation plans recommended transplanting of individuals up to 6 feet tall, later research identified that plants less than 12 inches tall have better transplant success. Most individuals transplanted were more than 12 inches tall.
- The prescribed irrigation routine in the revegetation plans was probably not adequate for transplanted individuals.

Due to the high level of mortality observed during initial direct transplants efforts, PG&E decided the remaining remedy construction mitigation for additional plant removals would be addressed through replacement only using container plants. PG&E committed to replacing failed transplants with container plants. Table 1-1 identifies the failed transplanted individuals and sensitive plants that were not transplanted due to size limitations. It also includes any plants that were removed after the decision to no longer attempt transplantations.

1.2.2.2 Required Mitigation Plants

To mitigate for impacts to native cacti, shrubs, and riparian plant species, container plantings were propagated in 2021 and 2022 for outplanting in proposed revegetation areas at a 3:1 ratio (three mitigation plantings for each plant individual impacted) as shown in Table 1-2, plus 10 percent more container plantings of each species to allow for mortality and/or additional impacts, as shown in Table 2-1. Container planting implementation is described in Section 2.3.1.

An additional honey mesquite was removed during groundwater remediation activities in 2024 adjacent to the containment bay at the MW-20 Bench along National Trails Highway. This location is not on HNWR property or within a CDFW jurisdictional waterway, so a 2:1 mitigation ratio applies for impacts to this honey mesquite based on the Culturally Significant Plant Revegetation Plan (CH2M Hill and GANDA 2014).¹

¹ On November 25, 2024, PG&E requested approval by DTSC to use two existing honey mesquite mitigation plants as mitigation for this new impact. The two existing honey mesquite plants would be assigned from the extra 10 percent (7 mitigation plants) that had been added to the 66 required honey mesquite mitigation plants calculated at a 3:1 ratio in 2021. The request would increase the required mitigation plants to 68. The extra 10 percent total would not increase. DTSC approved this approach on January 14, 2025 in the routine Tuesday PG&E-Agencies call (Dan Bush *pers. comm.*). The additional total mitigation plants in the tables below have been adjusted to reflect this change.

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Table 1-1 Native Plants Impacted During Remediation

Scientific Name	Common Name	Total Plants Impacted
Riparian and Wash Species		
<i>Parkinsonia florida</i>	blue palo verde	163
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	23
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	5
<i>Psorothamnus spinosus</i>	desert smoke tree	8
<i>Senegalia greggii</i>	catclaw acacia	1
Upland Species		
<i>Atriplex polycarpa</i>	cattle saltbush, allscale	4
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	2
<i>Cylindropuntia echinocarpa</i>	silver cholla	6
<i>Lycium andersonii</i>	Anderson's desert thorn	1
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	3
Total Plants Impacted		216

Table 1-2 Required Native Mitigation Plantings

Scientific Name	Common Name	Total Plants Impacted	Total Plantings at 3:1 Mitigation Ratio
Riparian and Wash Species			
<i>Parkinsonia florida</i>	blue palo verde	163	489
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	23	68
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	5	15
<i>Psorothamnus spinosus</i>	desert smoke tree	8	24
<i>Senegalia greggii</i>	catclaw acacia	1	3
Upland Species			
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	4	12
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	2	6
<i>Cylindropuntia echinocarpa</i>	silver cholla	6	18
<i>Lycium andersonii</i>	Anderson's desert thorn	1	3
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	3	9
Total Plants		216	647

1.2.3 Revegetation Goals and Year 2 Monitoring Requirements

This section summarizes the goals for the Revegetation Project and the Year 2 monitoring requirements.

1.2.3.1 Revegetation Goals

The primary goals for establishing sustainable mitigation plantings of upland and riparian species at the Site include:

- Minimize disturbance to existing native vegetation on site.
- Restore and/or enhance healthy, self-sustaining upland vegetation and riparian and wash vegetation in suitable revegetation sites with the physical and biological characteristics of adjoining undisturbed colonies, allowing for biotic flows and exchange.

To achieve these goals, monitoring procedures, as described in this Year 2 Mitigation Monitoring Report, have been designed to conserve soil and reduce erosion, protect existing wildlife and native plants at the Site, and re-establish native species in areas that are self-sustainable and that reflect the characteristics of adjacent native vegetation. Specific techniques to meet these goals, as well as performance targets, monitoring requirements, and contingency plans, are provided in the sections below.

1.2.3.2 Year 2 Monitoring Requirements

The Year 2 monitoring program focused on periodic assessments of native plantings in mitigation planting areas and tracking progress in meeting the performance targets. Year 2 monitoring activities were the same as Year 1 monitoring activities, but the monitoring frequency was reduced from monthly to every two to three months beginning in June 2024 and continuing through the end of the year. A monitoring dataset was maintained for each visit that includes observations, as described in Section 3.1.

Annual quantitative sampling focuses on assessment of the survival and health of each mitigation plant and also includes documentation of species richness, photomonitoring, and variables that might affect successful completion of the Revegetation Project. These methods are detailed in Section 3.2.

The performance criterion for mitigation plants is: Mitigation plantings will exhibit 75 percent survival of required plantings. Survival of mitigation planting species that drop to less than a 2.25:1 mitigation ratio (number planted: number impacted, or 75 percent survival of mitigation plantings) will require remedial planting. If remedial planting is required, remedial plantings will be monitored for 5 years from the time of their initial planting.

The required mitigation plant numbers are presented in Table 1-2.

2 Revegetation Mitigation Plantings

PG&E prepared a Technical Memorandum titled Assessment of Proposed Mitigation Planting Areas for Final Groundwater Remedy Impacts (Appendix O to the C/RAWP [CH2M 2015]) in 2015. The goal of the memo was to identify suitable planting areas for the revegetation plantings within the Project Area. Fourteen proposed mitigation planting areas were selected for the revegetation plantings. In 2021, these proposed revegetation sites were assessed for revegetation planting suitability along with additional potential planting sites, as described in detail in the Topock Revegetation Year 1 Mitigation Monitoring Report (Arcadis 2024). In 2021, PG&E submitted Work Variance Request No. 11, which proposed the new mitigation planting areas mentioned above, to the United States Department of Interior (DOI) and DTSC for approval on January 10, 2022. PG&E received approval from DOI for the work variance request No. 11 on January 14, 2022 and from DTSC on January 19, 2022.

These six mitigation planting areas included two main locations:

- Floodplain mitigation planting areas—Areas 1 through 5; and
- One upland mitigation planting area—UHR-1.

2.1 Floodplain Mitigation Planting Areas (Area 1, Area 2, Area 3, Area 4, and Area 5)

The final floodplain mitigation planting areas include five contiguous planting areas with slightly different environmental features (Figure 3A).

Areas 1 and 2 are located east of the Remediation Project access road that bisects the floodplain from north to south. Area 1 is bordered to the north by the easement for the Burlington Northern Railroad bridge and to the south by a monitoring well access road and Area 2. A 15-foot-wide Transwestern gas pipeline bisects Area 1 from west to east. The Interstate 40 bridge is located near the southern perimeter of Area 1 and the northern perimeter of Area 2. Area 2 is bordered by marshlands to the south.

Areas 3, 4, and 5 are located west of the Remediation Project access road that bisects the floodplain mitigation planting areas. Area 3 is the southwestern most floodplain mitigation planting area and is located immediately south of the Interstate 40 bridge and associated infrastructure. A small wash drains from west to east within Area 3. Area 4 consists of a small area with compacted soils adjacent to and under the Interstate 40 bridge. Area 5 is the northwesternmost floodplain mitigation planting area and is located immediately north of the Interstate 40 bridge and associated infrastructure. A small wash drains from west to east within Area 5.

Areas 1 through 5 have a potentially high-water table because of their proximity to the Colorado River, particularly the two eastern areas (Area 1 and Area 2) adjacent to the river. Before revegetation implementation, vegetation cover by saltcedar was high in Areas 1 and 2 and lower in Areas 3 through 5 (Section 2.2.1.1); saltcedar takes up salts with deep roots and extrudes them in its leaves. The 2021 soil analysis data for Areas 1 through 5 indicated elevated levels of soluble salts and sodium absorption ratio values several to many times in excess of recommended values (Fruit Growers Laboratory [FGL] 2021a). After consultation with the director of the soil sampling laboratory (Ben Waddell at FGL), an intensive soil leaching effort was initiated as described in the Topock Revegetation Year 1 Mitigation Monitoring Report (Arcadis 2024).

2.2 Upland Mitigation Planting Area (UHR-1)

UHR-1 is an upland site dominated by naturally occurring creosote bush (*Larrea tridentata*) along with other associated native species. The soil in this area is rocky and compacted, with low soil moisture retention (Figure 3B). UHR-1 has served as a receiver site for salvaged beavertail cacti for the past 5 years (Sections 2.3.4 and 5.6).

2.3 Mitigation Plant Types and Sources

There are three types of mitigation plant sources for the Revegetation Project: container-grown plantings, volunteer recruits of individuals included in the required plant palette, and seeded areas (for honey mesquite only), as shown on Figures 4A through 4F.

2.3.1 Container Plantings

Site-collected seeds and cuttings were used to propagate the required mitigation container plants for native species impacted by the Project. The Mojave Desert Land Trust (MDLT) propagated and produced container plantings installed in the initial planting effort in 2022. Container plants for a small planting effort in 2024 were propagated by Las Vegas Nursery, as described in Section 3.3.

The required number of mitigation plants was calculated based on the number of impacted individuals multiplied by 3 to generate a 3:1 mitigation ratio (mitigation plantings: impacted plants prior to 2022), or 2:1 for the one plant impacted in 2024 (Section 1.2.2.2). The final number of mitigation plants encompassed the addition of 10 percent of the required total for each species to allow for potential mortality with the exception of the one honey mesquite plant impacted in 2024 (Table 2-1).

Table 2-1 Required Native Mitigation Plantings and Total Mitigation Plants

Scientific Name	Common Name	Total Plants Impacted	Total Plantings at Required Mitigation Ratio	Total Mitigation Plants (plus 10 percent of required total)
Riparian and Wash Species				
<i>Parkinsonia florida</i>	blue palo verde	163	489	538
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	23	68	73
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	5	15	17
<i>Psorothamnus spinosus</i>	desert smoke tree	8	24	26
<i>Senegalia greggii</i>	catclaw acacia	1	3	3
Upland Species				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	4	12	13
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	2	6	7
<i>Cylindropuntia echinocarpa</i>	silver cholla	6	18	20
<i>Lycium andersonii</i>	Anderson's desert thorn	1	3	3
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	3	9	10
Total Plants		216	647	710

An Arcadis biologist and specialists from the MDLT collected all seeds and cuttings on site in 2021 and 2022. No more than 25 percent of available seed was collected from any individual or population. No more than 25 percent of available cutting material was taken from any individual plant when cuttings were taken. Most species germinated or rooted soon after planting in appropriate media at the MDLT nursery. Before delivery for planting, container plants were housed outdoors in a shade house with shade cloth retracted 2 months before planting in fall 2022 to allow plantings to harden off.

Before plant delivery, root aphids were observed on nursery-grown honey mesquite plants at the MDLT nursery. Because there were many volunteer recruits of both honey mesquite and screwbean mesquite [*Strombocarpa* (*Prosopis*) *pubescens*] in floodplain planting areas before planting, volunteer recruits were selected as mitigation plants for these two species instead of container plantings. Also, with high number of recruits at the Site, adding container plants would have overcrowded the Site.

A total of 726 plants were installed (710 mitigation plants and 16 additional plants) or designated as mitigation plants from volunteer recruits in 2022. Sixty-nine plantings of upland species were installed in UHR-1. A total of 562 riparian and wash species mitigation container plants were planted during two planting events, and 95 volunteer recruits were selected as mitigation plants in the floodplain mitigation planting areas (Areas 1 through 5), for a total of 657 mitigation plants in the floodplain as of October 8, 2022.

Twenty-six beavertail cactus plantings were installed, although only 10 mitigation plants were required. The remaining 16 beavertail cactus plantings will serve as mitigation plants for potential future Project impacts to this species.

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Spring 2022 planting event: A total of 509 mitigation plants were installed during the spring planting event: 496 blue palo verde in Areas 1, 2, and 3; three catclaw acacia (*Senegalia greggii*) in Area 5; and 10 beavertail cacti in UHR-1.

Fall 2022 planting event: A total of 106 mitigation plants were installed during the fall planting event: 37 blue palo verde and 26 desert smoke tree individuals were planted in Areas 3 and 5. Forty-three plantings were installed in UHR-1 including cattle saltbush, also commonly known as allscale saltbush (*Atriplex polycarpa*), buckhorn cholla (*Cylindropuntia acanthocarpa*), silver cholla (*Cylindropuntia echinocarpa*), and Anderson's desert thorn (*Lycium andersonii*).

Table 2-2 provides a summary of container plantings installed in 2022.

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Table 2-2 Installed Container Plantings in 2022

Scientific Name	Common Name	Number of Mitigation Plants Required	Number of Plants Installed in Spring 2022	Number of Plants Installed in Fall 2022	Total Plants Installed in 2022
Riparian and Wash Species (Areas 1 through 5)					
<i>Parkinsonia florida</i>	blue palo verde	538	496	37	533
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	73	0	0	0
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	17	0	0	0
<i>Psoralea argemone</i>	desert smoke tree	26	0	26	26
<i>Senegalia greggii</i>	catclaw acacia	3	3	0	3
Upland Species (UHR-1)					
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	0	13	13
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	0	7	7
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	0	20	20
<i>Lycium andersonii</i>	Anderson's desert thorn	3	0	3	3
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	10	0	10
Upland Species Plantings in UHR-1 Subtotal		53	10	43	53
Riparian and Wash Species Plantings in Areas 1 through 5 Subtotal		657	499	63	562
All Species Plantings Total		710	509	106	615

2.3.2 Volunteer Recruits

Many natural volunteer recruits germinated from the pre-existing seedbank in the floodplain after the floodplain had been cleared of saltcedar, leached of high salts, fenced from herbivores, and irrigated. Native volunteer recruits appeared most frequently near irrigation emitters associated with mitigation plantings. Several summer monsoon rain events also contributed to natural recruitment. Because of the abundance of these volunteer recruits, and the overcrowding of recruits with mitigation plantings most of the Site, PG&E received agency approval to designate mesquite volunteer recruits (both honey mesquite and screwbean mesquite) as mitigation plants in lieu of the planned mesquite container plantings to meet the success criteria.

Five blue palo verde recruits were monitored and maintained as mitigation plants to offset mortality in the January 2023 baseline census.

During 2023 and 2024, additional volunteer recruits were monitored as mitigation plants as needed to offset mortality for the following species: honey mesquite, screwbean mesquite, blue palo verde, cattle saltbush, and Anderson's desert thorn.

The following criteria were used while selecting volunteer recruits for use as mitigation plantings:

- Volunteer recruits were at least 8 inches tall with vigorous growth.
- Volunteer recruits were at least 5 feet from another mitigation plant (stem to stem).
- Volunteer recruits were not crowded or likely to shade out another mitigation planting.
- Volunteer recruits did not exhibit notable pests, damage, or health concerns.
- Volunteer recruits were not located in low-lying areas of the Site that have or may have anoxic soil and where their long-term survival was questionable because of poor habitat suitability.
- Volunteer recruits were not growing where previously installed mitigation plantings were observed to be struggling or to have already died.

Total mitigation plants in January 2023, when a baseline census was completed, are summarized in Table 2-3, and surviving 2024 volunteer recruits are discussed in Section 5.

Each volunteer recruit received supplemental irrigation at the same time as the container plantings, with three 0.25-inch irrigation hoses installed around each volunteer recruit mitigation plant.

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Table 2-3 Total Mitigation Plants (Container Plants and Recruits) in January 2023 Baseline Census

Scientific Name	Common Name	Total Mitigation Plants Required	Total Container Plantings Installed in 2022	Total Recruits Designated as Mitigation Plants in January 2023	Total Mitigation Plants (Container and Recruits) in January 2023 Baseline Census
Floodplain Species (Areas 1 through 5)					
<i>Parkinsonia florida</i>	blue palo verde	538	533	5	538
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	73	0	73	73
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	17	0	17	17
<i>Psoralea argyrea</i>	desert smoke tree	26	26	0	26
<i>Senegalia greggii</i>	catclaw acacia	3	3	0	3
Upland Species (UHR-1)					
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	13	0	13
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	7	0	7
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	20	0	20
<i>Lycium andersonii</i>	Anderson's desert thorn	3	3	0	3
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	10	0	10
Upland Species (UHR-1) Subtotal		53	53	0	53
Riparian and Wash Species (Areas 1 through 5) Subtotal		657	562	95	657
All Species Total		710	615	95	710

2.3.3 Honey Mesquite Seeding Areas

Honey mesquite seeds were planted in designated areas to potentially augment the number of honey mesquite mitigation plants. Seeds used for planting were collected during the initial seed collection effort in 2021 and stored at the MDLT nursery. In January 2023, 276 honey mesquite seeds were sown at 44 locations within Areas 1, 2, 3, and 5. Approximately seven seeds, each pre-treated using scarification, were sown in 1-square-foot seeding areas at a depth of 0.25 inch at each of the locations. Irrigation was installed in 41 seeding locations using 0.25-inch irrigation tubes hooked to the master irrigation system and run at the same interval as the mitigation plantings. No irrigation was installed in three locations to assess germination response with lack of supplemental water.

Six honey mesquite mitigation plants resulted from the seeding effort in 2023, four in Area 2, and two in Area 5.

2.4 Mitigation Plants in Each Mitigation Planting Area – Baseline Census in January 2023

A summary of each mitigation planting area is provided below. The numbers and types of mitigation plants in each area are shown in Table 2-5. This information is from the baseline census conducted in January 2023 to verify the number of container plantings and volunteer recruits treated as mitigation plants.

At the time of planting in 2022, the location of all mitigation plants were recorded using hand-held devices (phones or tablets) coupled with global navigation satellite system (GNSS) receivers (Trimble® R1 or Juniper® Geodes) and with geographic information system (GIS) data collection applications (ESRI® ArcGIS FieldMaps). These data were verified in January 2023 to ensure accuracy. An individual geo-referenced point with a unique plant identification number was created in ArcGIS Field Maps for each mitigation plant (installed and volunteer recruits) with the following data (Figures 4A through 4F):

- Photograph
- Species;
- Planting type (e.g., installed or recruit);
- Date planted; and
- Mortality (alive or dead).

In addition, the following baseline monitoring data were collected and recorded using ESRI® ArcGIS Field Maps:

- Monitoring date;
- Plant health assessments;
- Height and width measurements;
- Vegetative and reproductive phenology (e.g., leaves, fruits);
- Herbivory issues;
- Evidence of disease;
- Salinity issues;
- Irrigation issues; and
- General notes.

Representative photographs of mitigation plants in each area are shown in Appendix B. Photographs taken at designated photo stations that show the mitigation planting areas before planting and in Year 2 are presented in Appendix C.

Area 1

Area 1, occurs in the floodplain area of the Site, was dominated by saltcedar before initiation of revegetation. It is relatively flat and underlain by silty and sandy soils depending on the location. Soil salinity measurements ranged between 36 and 240 deciSiemens per meter (dS/m) before soil leaching but dropped to 3.84 dS/m or less in March 2022 (Section 5.4.1). Stands of arrowweed (*Pluchea sericea*) grow throughout Area 1, and common reed formed large colonies along the eastern margin at the time of planting.

A total of 286 blue palo verde individuals were planted in Area 1 in March 2022. In addition, 20 volunteer honey mesquite and 10 screwbean mesquite volunteer recruits were monitored as mitigation plants along with the container plantings. There were 316 mitigation plants in Area 1 during the baseline census in January 2023 (Figure 4A).

Area 2

Area 2 is located in the floodplain area south of Area 1. It was previously dominated by saltcedar before the initiation of revegetation and is underlain by sandy and silty soils. Soil salinity measurements ranged between 150 and 596 dS/m before leaching but dropped to 10.4 dS/m or less in March 2022 (Section 5.4.1). Patches of arrowweed occurred along the eastern and southern boundaries, along with colonies of common reed, at the time of planting.

A total of 194 blue palo verde were planted in Area 2 in March 2022. In addition, 15 volunteer honey mesquite and five screwbean mesquite volunteer recruits were monitored as mitigation plants along with the container plantings. There were 214 mitigation plants in Area 2 during the baseline census in January 2023 (Figure 4B).

Area 3

Area 3 is located at the base of a small wash that descends from National Trails Highway from west to east down to the floodplain on the south side of the Interstate 40 bridge and associated infrastructure. A large naturally occurring blue palo verde tree occurs at the upper western edge of Area 3 native vegetation occurs on surrounding slopes. The soil in this area is a mix of sand, silt, gravel, and rock. Before leaching, soil salinity was relatively low in the western corner of Area 3 but reached 284 dS/m near the Interstate 40 bridge in the northeastern corner. After leaching in March 2022, all locations recorded soil salinity measurements of less than 7.98 dS/m (Section 5.4.1).

A total of 37 blue palo verde individuals were planted in Area 3 in March and October 2022, and five volunteer blue palo verde recruits were selected in October 2022 as mitigation plants. In addition, 18 volunteer honey mesquite and seven screwbean mesquite volunteer recruits were monitored as mitigation plants along with the container plantings. There were 62 mitigation plants in Area 3 during the baseline census in January 2023 (Figure 4C).

Area 4

Area 4 is located immediately adjacent to the footings under the Interstate 40 bridge. It was barren prior to planting in October 2022, when four separate small, fenced enclosures were installed that range in size from 31.3 to 100.3 square feet, each containing one blue palo verde container planting (Figure 4D). The soils in this location are mostly compacted.

Area 5

Area 5 is located at the base of a small wash that descends from National Trails Highway from west to east down to the floodplain on the north side of the Interstate 40 bridge and associated infrastructure. Native plants occur in the surrounding area, with soils in this area consisting of gravels and sands. Only one soil sampling location occurs at the southeastern end of Area 5 near the Interstate 40 bridge; salinity measurements reached 250 dS/m before leaching but dropped to 4.73 dS/m after leaching in March 2022 (Section 5.4.1).

Three catclaw acacia individuals were planted in Area 5 in March 2022. A total of 17 blue palo verde individuals and 19 desert smoke tree individuals were planted in October 2022. In addition, 20 volunteer honey mesquite and two screwbean mesquite volunteer recruits were monitored as mitigation plants along with the container plantings. There were 61 mitigation plants in Area 5 during the baseline census in January 2023 (Figure 4E).

UHR-1

UHR-1 is a rocky upland site located north of Areas 1-5 along the National Trails Highway and is dominated by naturally occurring creosote bush along with other associated native species such as cattle saltbush, beavertail cactus, buckhorn cholla, and silver cholla. The soil in this area is rocky and compacted, with low soil moisture retention.

Fifty-three mitigation plantings were installed in UHR-1 in 2022. These include 13 cattle saltbush individuals, seven buckhorn cholla individuals, 20 silver cholla individuals, three Anderson's desert thorn individuals, and 10 beavertail cactus individuals (Figure 4F).

Table 2-4 summarizes the number of mitigation plants by area including container plantings and recruits.

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Table 2-4 Total Mitigation Plants (Containers and Recruits) by Area in January 2023 Baseline Census

Scientific Name	Common Name	Total Container Plantings Installed in 2022	Total Recruits Designated as Mitigation Plants	Total Mitigation Plants (Container and Recruits) in January 2023 Baseline Census
Area 1				
<i>Parkinsonia florida</i>	blue palo verde	286	0	286
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	0	20	20
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	0	10	10
Area 2				
<i>Parkinsonia florida</i>	blue palo verde	194	0	194
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	0	15	15
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	0	5	5
Area 3				
<i>Parkinsonia florida</i>	blue palo verde	32	5	37
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	0	18	18
<i>Psoralea argyrea</i>	desert smoke tree	7	0	7
Area 4				
<i>Parkinsonia florida</i>	blue palo verde	4	0	4

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Scientific Name	Common Name	Total Container Plantings Installed in 2022	Total Recruits Designated as Mitigation Plants	Total Mitigation Plants (Container and Recruits) in January 2023 Baseline Census
Area 5				
<i>Parkinsonia florida</i>	blue palo verde	17	0	17
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	0	20	20
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	0	2	2
<i>Psoralea argemone</i>	desert smoke tree	19	0	19
<i>Senegalia greggii</i>	catclaw acacia	3	0	3
UHR-1				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	0	13
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	0	7
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	0	20
<i>Lycium andersonii</i>	Anderson's desert thorn	3	0	3
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	0	10
	Floodplain Species (Areas 1 through 5)	562	95	657
	Upland Species (UHR-1)	53	0	53
	Totals	615	95	710

2.5 Salvaged and Transplanted Beavertail Cactus

During the remedy project in 2018, three beavertail cactus individuals were transplanted near the construction area and died. As a result, nine beavertail cactus individuals were needed to mitigate for the loss of three beavertail cactus individuals at a 3:1 ratio. The addition of one more beavertail cactus, a 10 percent contingency, resulted in the need for a total of 10 beavertail cactus mitigation plants. Ten beavertail cactus mitigation plants were installed in UHR-1 in 2022, as described in Section 2.4.

During work associated with the remedy project between 2018 and 2022, 12 additional beavertail cactus individuals were salvaged and transplanted into UHR-1 (Table 2-4). Although these salvaged beavertail cacti are not part of the required Revegetation Program mitigation plans, they were monitored for health and survival in 2024 and are documented separately from the required mitigation plants.

When the irrigation system was installed in UHR-1 in 2022, the revegetation team installed three 24-inch DEEP DRIP Watering Stakes and three 0.25-inch irrigation hoses around each salvaged beavertail cactus to provide supplemental irrigation. Beavertail cactus transplants were then watered monthly during the drier and hotter months of the year. These salvaged plantings were monitored and tracked separately from other mitigation plantings during Year 2 monitoring events, with resulting data included in Section 5.6.

Table 2-4 Beavertail Cactus Salvaged and Transplanted in UHR-1 as of August 2022

Date of Transplanting	Total Individuals Salvaged and Transplanted	Total Individuals Alive (August 2022)
November and December 2018	7	7
2020 to 2021	2	2
April and August 2022	3	3
Total Salvaged and Transplanted Beavertail Cactus	12	12

3 Revegetation Monitoring Methods

Methods for routine monthly revegetation assessments and annual quantitative monitoring are summarized in this section.

3.1 Periodic Assessments

Mitigation planting areas were assessed monthly during spring in Year 2, with additional monitoring every 2 to 3 months during summer, fall, and winter. The mitigation planting areas were assessed for health and survival of mitigation plants, establishment of invasive plant species, and recruitment of new native plant species. These assessments have been crucial for implementation of adaptive management measures, a process in which the findings from direct monitoring provide the evidence and basis for response to problems with the revegetation effort.

Periodic data collection includes:

- Mitigation plant survival;
- Plant health summary (subsample of 10 mitigation plants in each mitigation planting area);
- Plant height and width (subsample of 10 mitigation plants in each mitigation planting area);
- Phenology (presence of leaves, flower buds, open flowers, and fruits in a subsample of 10 mitigation plants in each mitigation planting area);
- Inventory of the flora within planting areas (Appendix D);
- Wildlife usage (native species, herbivores, and other pests; inventory of species in Appendix E);
- Signs/quantity of pests or pathogens (e.g., sap, nodules, chewed leaves); and
- Soil moisture data collected adjacent to a subsample of plantings in each area to verify that all plantings are receiving adequate moisture.

3.1.1 Survival Census and Health Assessment

During all monitoring visits, a census of all dead mitigation plants in each area is conducted to determine survival percentages. In addition, the health of a subset of 10 mitigation plants in each of the six mitigation planting areas was assessed during each monitoring event using a modified index initially developed by Bainbridge et al. 2001:

- 0 = dead, stems brown and brittle with no green or purple;
- 1 = poor health, barely alive, stems still flexible with some green or purple;
- 2 = fair health, some green or purple on stem, a few green leaves;
- 3 = good health, green or purple stem and a number of green leaves; and
- 4 = excellent health, green or purple stem and green leaves, vigorous.

Site photographs document the progress of mitigation plant growth in each mitigation planting area and are taken during each monitoring visit (Appendix B).

3.1.2 Species Richness Data Collection

Observed plant species used in the planting palette (as well as all plant species found in a recognizable condition during Year 2 monitoring) were recorded in field notebooks, and new observations were photographed and positively identified with technical keys. A sample was collected for independent verification by a senior botanist, who then added observations to a table of plant species observed during periodic assessments (Appendix D). Nomenclature follows the second edition of *The Jepson Manual: Vascular Plants of California* (Baldwin et al. 2012) with online updates. A list of observed species compiled for each mitigation planting area allowed managers to assess native plant recruitment into mitigation planting areas as well as presence of invasive species and their potential source(s).

In addition, wildlife species were recorded during monitoring events to document ecosystem function. Wildlife observations resulted from searching for and identifying wildlife species' diagnostic signs including audible calls, prints, scat, nests, skeletal remains, burrows, and habitat features. When a wildlife species was observed, the name of the wildlife species was recorded in field notes along with date, name of biologist(s) making observation, location, number of individuals observed, habitat type and condition, and if feasible, photographs of species. Wildlife species observations were also documented in daily field reports that were completed at the end of each field day, and added to a table of wildlife species observed during periodic assessments (Appendix E). Because the herbivore-deterrent fencing prevents access to mitigation planting areas by many ground-dwelling animals, those observed around the fence perimeter were also documented.

Identifications were made using appropriate technical manuals and websites such as *Birds of the World* (Cornell 2024), *California Herps* (2024), field guides, and other resources. When accurate species identification was not possible, identification to genus or family was made using photographs and consultations with senior wildlife biologists.

3.1.3 Invasive Plant Species Assessments and Monitoring

The biologists survey all revegetation areas for non-native species during each monitoring event and document invasive plant observations using hand-held devices (phones or tablets) equipped with ESRI® ArcGIS Field Maps, a GIS data collection app, and a Trimble® R1 GNSS receiver. The information collected for each invasive plant species observation includes coordinates, mitigation planting area, invasive plant species, date observed, number of individuals or area covered by each invasive plant observation, treatment recommendation, and treatment method used in each location during invasive plant species treatment events.

3.1.4 Maintenance Assessments

The biologists survey all revegetation areas during monitoring events for maintenance issues associated with the irrigation system, herbivore exclusion fencing, and erosion control. The irrigation system is assessed for pipe breakage and damage, proper flow, and emitter placement throughout the Site. The herbivore exclusion fencing is inspected for damage due to wind, erosion, or wildlife, and monitoring includes a fence perimeter walk to assess potential wildlife entry above or below ground level. All signs of erosion are assessed and documented including natural flow paths and erosion associated with the irrigation system and/or storm events.

Topock remediation system operations and maintenance (O&M) staff inspect the Site for problems and make necessary repairs, including after rain events, to identify and address irrigation, fencing, or erosion concerns. These inspections generally occur weekly but may be scheduled more frequently if needed.

3.2 Annual Quantitative Monitoring

Annual quantitative monitoring was conducted between September 9 and 15, 2024 to evaluate the survival and health of mitigation plantings as well as to document species richness and variables that might affect successful completion of the Revegetation Project. Although the data collected during annual quantitative monitoring events are similar to periodic monitoring assessments, only the annual quantitative monitoring data are used to assess progress in meeting performance targets.

3.2.1 Survival Census and Health Assessment

All mitigation plants were assessed during the annual quantitative monitoring event. This included the following:

- Using hand-held devices coupled with GNSS receivers to locate every mitigation plant previously recorded in ESRI® ArcGIS Field Maps (container plantings, recruits, seeding areas) and to collect current data ArcGIS Field Maps;
- Estimating the number of recruits by species in each area that meet the criteria described in Section 2.3.2;
- Documenting locations of any removal/trimming of mitigation plants;
- Health assessment metrics:
 - Height and width in feet for each species within each area;
 - Phenology (presence of leaves, flower buds, open flowers, fruits);
 - Signs/quantity of pests or pathogens (e.g., sap, nodules, chewed leaves);
 - health of all mitigation plantings using a modified index initially developed by Bainbridge et al. 2001, with additional modifications to “3” based on field surveys:
 - 0 = dead, stems brown brittle with no green or purple (not included in health assessment, which only focused on surviving plants);
 - 1 = barely alive, stems still flexible with some green or purple (poor health);
 - 2 = stems flexible and containing living tissue, often with some green or purple on stems, with or without a few green leaves (fair health);
 - 3a = stems flexible and containing living tissue, often with green or purple stems and a number of green leaves, if present on the species (good health);
 - 3b = stems flexible and containing living tissue, often with leafless on a seasonal basis (good health);
 - 4 = healthy stems containing living tissue, green leaves (excluding cacti), vigorous (excellent health).
- Photo documentation of each mitigation planting.

3.2.2 Species Richness Data Collection

Observed plant species used in the planting palette (as well as all plant species found in a recognizable condition during Year 2 monitoring) were recorded in field notebooks, and new observations were photographed and positively identified with technical keys. A sample was collected for independent verification by a senior botanist, who then added observations to a table of plant species observed during periodic assessments in field notebooks, and new observations were photographed, positively identified with technical keys, and a sample was collected for independent verification by a senior botanist (Appendix D). Nomenclature follows the second edition of The Jepson Manual: Vascular Plants of California (Baldwin et al. 2012) as well as updates provided in the online

Jepson eFlora (Jepson Flora Project 2024). An observed species list for mitigation planting areas allowed managers to assess native plant recruitment into mitigation planting areas as well as presence of invasive species and their potential source(s).

During monitoring events, the revegetation areas were also surveyed for the presence of wildlife within the revegetation plantings areas (Appendix E). Wildlife observations resulted from searching for and identifying wildlife species' diagnostic signs including audible calls, prints, scat, nests, skeletal remains, burrows, and habitat features. When a wildlife species was observed, the name of the wildlife species was recorded in field notes along with date, name of biologist(s) making observation, location, number of individuals observed, habitat type and condition, and if feasible, photographs of species. Wildlife species observations were also documented in daily field reports that were completed at the end of each field day, and added to a table of wildlife species observed during periodic assessments (Appendix E). Because the herbivore-deterrent fencing prevents access to mitigation planting areas by many ground-dwelling animals, those observed around the fence perimeter were also documented.

Identifications were made using appropriate technical manuals and websites such as Birds of the World (Cornell 2024), California Herps (2024), field guides, and other resources. When accurate species identification was not possible, identification to genus or family was made using photographs and consultations with senior wildlife biologists.

3.2.3 Photo-monitoring

Thirteen photo-monitoring stations have been established in the mitigation planting areas. Photo-monitoring was conducted before planting in March 2022 and immediately after fall planting was complete in October 2022 (Appendix C). Photo-monitoring was conducted in September 2024 and will continue annually for another 3 years during the annual quantitative monitoring periods. Photographs are archived to document vegetation change and serve as a resource during adaptive management events.

The following methods and procedures are adapted from the U.S. Department of Agriculture's Photo Point Monitoring Handbook (Hall 2002).

The objectives of the photo-monitoring include:

- Document site conditions of mitigation planting areas before planting.
- Document changes in vegetation over time in the mitigation planting areas including natural recruitment of native plants.
- Document mitigation planting areas including vegetation changes over time as well as general qualitative documentation of plant cover and vegetation condition.

Photo-monitoring is conducted electronically using a smart phone or tablet with preloaded photo-monitoring data points in ArcGIS Field Maps. A Trimble® R1 or Juniper® Geode GNSS receiver is used to obtain sub-meter location accuracy. Photo-monitoring stations in mitigation planting areas are shown on Figures 5A and 5B.

At each photo-monitoring station, data collection includes the compass direction of the camera view in cardinal or ordinal directions (e.g., north, south, southwest) as well as plant species; percent vegetative cover; disturbance (if any), and commentary on general plant health, vegetation condition, and other variables. Subsequent photographs taken from the same photo-monitoring station will be taken in the same direction each time. During subsequent photo-monitoring events, the previous photographs at each photo-monitoring station are used as an example to create a comparable photograph that documents current conditions.

3.3 Adaptative Management

Adaptive management monitoring involves dynamically identifying and monitoring site and mitigation plant characteristics as changes or challenges arise. The following adaptive management actions were implemented during Year 2: replacement mitigation plantings for Anderson's desert thorn, soil sampling, and stress symptom monitoring.

3.3.1 Replacement Mitigation Plantings for Anderson's Desert Thorn

Three individual Anderson's desert thorn were planted in UHR-1 in 2022. All were dead by spring 2024. The compacted hard substrate where the Anderson's desert thorn were planted differs markedly from the gravels and sands found in wash locations where Anderson's desert thorn occurs naturally at the Topock site.

Ten Anderson's desert thorn container plantings were grown from seed, originally sourced from Searchlight, Nevada, sown at Las Vegas State Nursery in June 2024 and grown in 4-inch pots that were 10 inches deep. The 10 Anderson's desert thorn containers were picked up on November 17, 2024 for planting in Areas 3 and 5 in targeted locations adjacent to small washes. Two individuals were planted in Area 3, and eight individuals were planted in Area 5 between November 18 and 20, 2024. Irrigation for the new plantings is described in Section 4.1.

3.3.2 Soil Sampling

Soil sampling has been conducted at 18 locations beginning in 2021 to compile comparative data for such characteristics as nutrients, salinity, and permeability (Figure 6). Two soil sampling events were conducted in 2024: one in April and one in September. Before a soil sampling event, utility clearance and coordination with an archaeologist were completed.

For the April 2024 soil sampling event, soil sampling was conducted as follows. An approximately 8-inch-diameter hole was excavated to a depth of 12 inches using a narrow trenching shovel or auger. Each composite sample consisted of three cups of soil that was mixed in a bucket before placing the sample in a labeled Ziploc bag. All soil sample bags were labeled with the location ID, date, and sampling biologist name before being shipped to FGL in Santa Paula, California for comprehensive soil suitability testing and salinity testing.

In September 2024, two soil samples were taken in each of the 18 designated locations at different depths: one sample at 0 to 12 inches deep and the second sample at 12 to 24 inches deep. Each sample was bagged and labeled separately before sending to FGL in Santa Paula. Results are reported in Section 5.4.1.

3.3.3 Stress Symptom Monitoring

On July 25, 2023, during routine monthly monitoring, a biologist first observed the presence of sap and/or sap-containing nodules originating at the juncture between branches and the trunks of blue palo verde mitigation plants. Stress symptoms were also observed on a nearby naturally occurring blue palo verde tree. Observation of stress symptoms resulted in initiation of adaptive management to identify the cause(s) and the prevalence of these symptoms within the revegetation areas. With approval from PG&E, biologists contacted plant pathologists at the University of California Cooperative Extension (UCCE) Riverside Office. Plant pathologist Dr. Philippe Rolshausen visited the Topock revegetation Site on August 11, 2023 and collected plant tissue samples to determine whether a pathogen could be the cause of the symptoms.

After extensive analysis, Dr. Rolshausen provided the following summary of his assessment of stress symptoms in September 2023:

Symptomatic wood tissues were cultured on bacterial (nutrient agar) and fungal (potato dextrose agar and V8 agar) media. Bacteria and fungi recovered from tissues were identified by DNA sequencing of the 16S and ITS region, respectively. The fungus Aspergillus and bacterium Bacillus were recovered from all 3 trees and 2 branches samples. Those are not known to be causing disease in trees although little information is available in the scientific literature on Palo Verde. No known pathogenic bacteria and fungi were isolated from trunk and branch samples.

Dr. Rolshausen suggested that the sap may have been extruded after boring insect(s) created holes in the wood.

In 2024, blue palo verde plantings were monitored for the presence of sap or other stress symptoms, as described in Section 5.4.3.

3.4 Reference Sites

Reference sites were selected in early 2022 to provide comparative data between naturally occurring individuals of mitigation plant species

Reference sites were monitored at the time of mitigation planting (2022) and will be monitored in Years 3 (2025) and 5 (2027). Initial reference site monitoring was conducted on October 7 and October 8, 2022 at six locations.

Mitigation species present at each reference site were documented using hand-held devices (phones or tablets) equipped with ArcGIS Field Maps. An individual geo-referenced point with a unique plant identification number was created for each reference mitigation plant along with a photograph and the following data:

- Species;
- Date monitored;
- Mortality (alive or dead);
- Monitoring date;
- Plant health assessments (see Section 5.2 for description of health assessment classes);
- Height and width measurements;
- Vegetative and reproductive phenology (e.g., leaves, fruits);
- Herbivory issues if any;
- Evidence of disease if any;
- Salinity issues if any; and
- General notes.

In addition, associated plant species and site characteristics have been documented, and photographs have been taken of mitigation species and the reference site area.

A summary of mitigation plants observed at each reference site in 2021, along with associated species and site characteristics, is provided in the Topock Revegetation Year 1 Mitigation Monitoring Report (Arcadis 2024).

4 Revegetation Maintenance Methods

The Revegetation Manager verifies that native plant health and survival and invasive plant species abatement performance standards are met through site maintenance during the 5-year maintenance period. These maintenance activities include invasive plant species eradication, irrigation, herbivore exclusion, general site housekeeping and cleanup, and the general care and nurturing of plantings within the mitigation planting areas.

Site access for maintenance is on foot within mitigation planting areas. Wheelbarrows or equivalent are used to transport tools and other supplies within the mitigation planting areas.

4.1 Irrigation Operation and Maintenance

After container plant installation, each plant was irrigated once a week by slowly filling each DEEP DRIP Watering Stake to the top and letting it infiltrate into the surrounding soil for 2 hours. During irrigation events, DEEP DRIP Watering Stakes were checked to verify that the tubes were filling properly so that the resulting subsurface moisture encouraged development of deep roots.

At the time of planting, two drip emitters were placed inside separate DEEP DRIP Watering Stakes to encourage deep rooting. A third drip emitter was initially placed on the soil surface near the base of the plant to provide moisture to the rootball of the planting. As plants enlarged in size, the third surface emitter was moved into the third DEEP DRIP Watering Stake.

Irrigation events were suspended if more than 1 inch of precipitation fell in the preceding 7 days. Subsurface soil moisture was monitored with a Aquaterr EC-350 soil moisture probe monthly to quarterly, depending on rainfall. Soil moisture was measured next to a mitigation plant near 12 of the photo-monitoring stations.

The procedures described below were followed during irrigation events:

- Provide adequate moisture to the entire root zone of each mitigation plant.
- Operate the irrigation system in a manner that minimizes disturbance to mitigation plantings.
- Prevent erosion, damage to plants, runoff, or damage to existing or colonizing vegetation.
- Provide immediate attention and repairs to any irrigation activity that results in excess water flow in a given location (e.g., overflow out of the DEEP DRIP Watering Stakes, pipe breaks), as well as reporting issues and proposing maintenance solutions, to the Revegetation Manager.

In mid-2022 the irrigation system was adjusted due to soil sampling results that showed soil salinity rising for the first time since pre-planting leaching efforts. At that time, one of the drip emitters was placed on the surface beside the mitigation plant to facilitate additional leaching of surface salts, leaving two still in DEEP DRIP Watering Stakes for deep root watering.

In fall 2023, irrigation was reduced to one two-hour watering event every three weeks as the plants became established, but water was still needed for leaching away salts.

Daily water use in the floodplain was tracked. Irrigation was also tracked in UHR-1 until September 12, 2024, when the irrigation tank was removed, and irrigation was discontinued.

A major upgrade of the floodplain irrigation system was conducted between November and December 2024. This involved replacing existing PVC header pipe with steel, reusing the existing sand filter, and adding a new pressure-regulator for the entire floodplain water supply. Throughout the floodplain, all of the 3-inch PVC pipes (headers) were replaced with new 3-inch high-density polyethylene (HDPE) header pipe, which was selected because it is more tolerant of elevated summer temperatures and therefore will result in less maintenance. The

HDPE header pipe was connected to the existing 1-inch PVC pipe network that distributes water throughout the floodplain. At the same time, a change was made to water delivery to leach away salts from blue palo verde mitigation plants. This was done by adding two 360-degree radial sprayers attached to risers on either side of all blue palo verde plants in Areas 1 and 2, and the blue palo verde on the east side of areas 3 and 5. Each sprayer covers a 6-foot diameter area and is intended to mimic heavy winter rains but running once per month during the winter months.

As discussed in Section 3.3.1, ten Anderson's desert thorn container plantings were installed in Areas 3 and 5 between November 18 and 21, 2024. A new branch of the irrigation system with 2-inch HDPE was installed in Areas 3 and 5 to irrigate new plantings. Three 36-inch DEEP DRIP Watering Stakes were installed around each planting to encourage the development of deep root systems. The three DEEP DRIP Watering Stakes were configured in a triangle around the base of each planting and positioned approximately 14 to 16 inches from the stem of each planting. After stake installation, the three 0.25-inch irrigation hoses were each attached to a riser and terminated with a 2-gallon per hour emitter to drip on the soil surface. Two of these hoses will be placed in the DEEP DRIP Watering Stakes and closed with a DEEP DRIP Watering Stake cap after three months.

4.2 Herbivore-deterrent Fence Maintenance

The herbivore-deterrent fencing was repaired as needed during Year 2 to protect mitigation plantings. Metal re-bar "J" stakes were installed at the base of the fence to prevent access by small mammals such as desert cottontail rabbits (*Sylvilagus audubonii*). Steel baling wire was used for wire fence attachment after zip ties slowly deteriorated in extreme weather conditions.

Where monsoon rains caused significant water flow and erosion under fencing, gravel bags were installed to slow the flow of water during future rain events and to prevent small animals from accessing the mitigation planting area through the new openings.

4.3 Erosion Control Best Management Practices

Straw wattles were replaced on the east sides of Areas 1 and 2 after degradation by wildlife to prevent stormwater flow from transporting sediments from the mitigation planting areas to the Colorado River. Wattles were installed and secured with wooden stakes.

Erosion in narrow high-flow ephemeral channel areas in Areas 3 and 5 was controlled using 50-pound gravel bags in addition to wattles. After large rain events, the gravel bags generally required some adjustment to prevent small animal entry under the fence.

4.4 Invasive Species and Arrowweed Abatement Methods

Removal of Invasive plant species is required to deter their establishment in mitigation planting areas. A biologist conducted or oversaw abatement of invasive plant species which including providing guidance to contractors on correct species identification before abatement activities.

Invasive plant species were removed monthly in all mitigation planting areas as needed. The biologist pulled isolated invasive plant species during monitoring events if the number of individuals in a given location was small, and the invasive plants could be removed without tools or herbicide. For larger numbers of invasive plants a subcontractor removed the invasive plant species. The goal of invasive plant removal is to keep all mitigation planting areas free of invasive plant species during the maintenance period according to these specifications:

- Remove invasive plant species before reaching 4 inches in height or forming flower heads.

- Bag and remove invasive plant material from the Site during each invasive plant species abatement event.
- Bag and remove all parts of the invasive saltcedar, including resprouts and debris, from the Site during each weeding event, unless they are being monitored after herbicide application.

Two general invasive plant species treatment methods were employed to abate weeds: manual removal and herbicide application.

4.4.1 Manual Non-native Invasive Plant Species Removal

As Project biologists located weeds during monitoring events, they removed small colonies of weeds by hand, bagged the weeds, and removed them from the Site.

Larger weed infestations requiring mechanical removal methods, such as pulling, digging, or hoeing, were treated by a subcontractor. When possible, mechanical weed removal was conducted before weed flowering and seed set. All weeds subject to manual treatments were bagged and removed from the Site. All access within mitigation planting areas was on foot, and invasive plant species treatment crews adhered to previously disturbed corridors.

Some weeds (like Bermuda grass) have proved especially difficult to abate using manual removal alone because of their propensity to resprout from root fragments. For weeds like Bermuda grass, cardboard and mulch were used to cover the infestation to prevent light from reaching the plants, which eventually killed it. After the aboveground stems and leaves were pulled manually, the area was covered with two layers of cardboard placed on top of the infestation and extending 2 feet beyond it. Paving stones were placed on the cardboard to prevent it from blowing away, and then 6 inches of wood mulch was spread over the cardboard. The cardboard and mulch prevent the plant from getting any light and eventually kill it.

4.4.2 Herbicide Treatments (2021-2023)

Herbicides were used in the floodplain in 2021, 2022, and 2023 to treat common reed, giant reed, and saltcedar. During 2024, no herbicide was applied in mitigation planting areas; however, previously sprayed common reed was excavated to remove any living rhizomes.

All field herbicide application was monitored by a biologist. The biologist identified locations of target weeds prior to herbicide application. The biologist was present during the application of herbicides to assist with weed species identification and monitor sensitive species and mitigation planting locations.

A brief written weed management plan was submitted to PG&E to coordinate herbicide application by the PG&E licensed pesticide applicator. The licensed applicator provided PG&E and the Revegetation Manager with a description of any herbicide used at the Site including application rates and dilution, manufacturer's name, application equipment and methods, and a Safety Data Sheet for each herbicide intended for use. The information provided also included measures to protect workers and the public (e.g., signs, barriers, notifications), measures to avoid spraying native plants, measures to protect wildlife, measures to avoid discharge into river water, and a statement that the herbicide is approved by HNWR for use in the environment at the Site.

Nufarm Polaris® (active ingredient Imazapyr) was used for herbicide treatments. Polaris was mixed with bottled water, water-based non-toxic dye, and the surfactant Competitor. It was applied with a backpack sprayer.

The biologist and the licensed applicator for herbicide treatments implemented the following guidelines in conjunction with the weed management plan:

- Herbicides were not applied when wind speeds exceeded 8 miles per hour.
- Drift and overspray were prevented using air induction spray nozzles. In addition, the use of off-center spray nozzles kept the application locked on target weed species.

- A water-based, non-toxic dye was added to the herbicide to distinguish treated areas from untreated areas.
- Wildlife protection measures included use of non-toxic or least-toxic herbicides (as stated on the product label and Safety Data Sheet), scheduling application dates to avoid impacts to nesting wildlife and biological monitoring during all herbicide application events.
- Once the herbicide killed the target weeds, the dead plants were excavated, bagged, and removed from the Site to prevent them from eventually breaking off and blowing around the Site as vegetative propagules or spreading viable seeds.

4.4.3 Arrowweed Removal

Arrowweed was removed manually where it invaded mitigation planting sites. Because it is an important ethnobotanical species, PG&E coordinated with Tribal representatives and the Revegetation Manager to develop a removal approach. A biologist was present to oversee all weed abatement and assist the weed crew with differentiating target weeds from unintended targets including all work near arrowweed. Arrowweed was removed in the following situations using the following methods:

- Arrowweed plants and its rhizomes were removed using a two-step process if they occurred within a 3-foot radius of any mitigation plantings. First, a shovel was carefully used to cut roots and rhizomes below ground where they enter the mitigation plant rooting zone. Second, all arrowweed stems and rhizomes within 3 feet of plantings were removed and bagged for disposal off site.
- Arrowweed plants were cut at ground level and removed from the Site if they occurred within a 3- to 5-foot radius of a mitigation plant.
- Arrowweed that was cut or excavated was bagged and removed from the mitigation planting area to prevent it from resprouting or blowing around the Site. All arrowweed stems greater than 3 feet long were retained on site in an accessible location for retrieval and use by the Colorado River Indian Tribes, Chemehuevi Indian Tribe, Fort Mojave Indian Tribes, Hualapai Indian Tribe, and Cocopah Indian Tribe (Tribes).
- Within herbicide treatment areas, if arrowweed was observed growing close to weeds (e.g., saltcedar and common reed) where there was the potential to be impacted by overspray, the arrowweed was cut at ground level so that it could resprout later.

Before the initiation of work, the width of the corridor between the fences of Areas 1 and 2 was measured at multiple constriction points to help the contractor plan access. The floodplain revegetation irrigation system PVC pipes (3-inch and 1-inch) cross the Caltrans work area in several locations. Much of the pipe is covered with compacted soil to buffer the passage of trucks accessing the groundwater monitoring wells. Where soil bridging was not present or did not offer enough protection, the pipes were protected using sandbags and wood cribbing before work.

Herbivore exclusion fencing was temporarily removed in limited locations to facilitate access by the drill rig. Mitigation plants and all protected species were flagged and monitored while the fence was removed. At the end of each workday, temporary fencing was erected to prevent wildlife from entering the planting areas. After completion of the geotechnical boring, the herbivore exclusion fencing was replaced based on the original design including metal re-bar “J” stakes at the base of the fencing to prevent access by small mammals.

4.5 General Site Maintenance

The mitigation planting areas were routinely inspected and maintained in Year 2. These maintenance activities included trash cleanup, "Restoration Area" sign maintenance, and repair of fencing reflective tape. Trash accumulated quickly from Interstate 40 highway above the floodplain and was distributed by wind. Heat and wind caused the reflective tape on the herbivore exclusion fencing to degrade, which required cleanup and repair. Fence gates needed regular adjustments and repair to continue to operate correctly. Signage was maintained to properly identify the Site as a Habitat Revegetation Area. Site access for maintenance was on foot within mitigation planting areas. Wheelbarrows or equivalent were used to transport tools and other supplies within the mitigation planting areas.

5 Year 2 Revegetation Monitoring Results

The HNWR Habitat Restoration Plan (Appendix G to the C/RAWP [CH2M Hill and E2 Consulting Engineers 2015]), the Topock Groundwater Remediation Project Mitigation and Monitoring Plan for Culturally Significant Plants (Appendix A to Appendix H to the C/RAWP [CH2M Hill and GANDA 2014]), the Topock Compressor Station Groundwater Remediation Project Aesthetics and Visual Resources Protection and Revegetation Plan (Appendix N to the C/RAWP [CH2M Hill and E2 Consulting Engineers 2014a]), and the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (Appendix O to the C/RAWP [CH2M Hill and E2 Consulting Engineers 2014b]) specify on-site revegetation success criteria; monitoring and reporting requirements; and adaptive management guidelines for salvage and replanting of trees, shrubs, and perennial species.

In accordance with the habitat revegetation plans, removed riparian trees (e.g., blue palo verde trees) were replaced at a 3:1 ratio (i.e., planting three trees in revegetation areas for each tree removed during construction). The success criterion for mitigation plantings is a final minimum plant replacement ratio of 2.25:1 (75 percent overall survival rate) of mitigation plantings at the end of a minimum 5-year monitoring period.

Annual quantitative monitoring was conducted between September 9 and 15, 2024, and data analysis was complete by October 31, 2024. Periodic monitoring was conducted monthly during spring in Year 2, with monitoring every 2 to 3 months during summer, fall, and winter.

5.1 Mitigation Plant Survival

Mitigation planting areas include five floodplain mitigation planting areas (Areas 1 through 5) and one upland mitigation planting area (UHR-1). As described in Section 2, five mitigation plant species were initially installed in floodplain areas in 2022: blue palo verde, honey mesquite, screwbean mesquite, desert smoke tree, and catclaw acacia. Five species of mitigation plants were also planted in the upland mitigation planting area: cattle saltbush, buckhorn cholla, silver cholla, Anderson's desert thorn, and beavertail cactus. Volunteer recruits and seeded honey mesquite individuals were added as mitigation plants, as described in Section 2.3.2 and 2.3.3.

Mitigation plants were monitored in the six mitigation planting areas in Year 2, culminating in the Year 2 mitigation plant survival census in September 2024. All surviving individuals of mitigation plants were censused as described in Section 3.2.1 and summarized in Tables 5-1, 5-2, and 5-3. Volunteer recruits of the mesquite species were also counted along with surviving seeded honey mesquite (Table 5-4).

5.1.1 Mitigation Plants in Areas 1 through 5

A total of 616 surviving mitigation plants were censused in floodplain mitigation areas in September 2024. Floodplain mitigation plants include the five riparian and wash species included in the January 2023 baseline census presented in Table 2-5, along with volunteer recruits of cattle saltbush and Anderson's desert thorn. Cattle saltbush and Anderson's desert thorn appeared for the first time in floodplain mitigation areas in 2024, as well as the replacement mitigation plantings of Anderson's desert thorn.

Survival of riparian and wash plant species is 92.8 percent in 2024 (Table 5-1). Survival of floodplain mitigation plants, including volunteer recruits and new plantings of upland plant species, is 93.8 percent (Table 5-2). Survival of mitigation plants by area and species is detailed in Table 5-3.

5.1.1.1 Riparian and Wash Mitigation Plants in the Floodplain Mitigation Areas

Blue palo verde mitigation plants occur in all floodplain mitigation planting areas (Areas 1 through 5) in various quantities, with the majority in Areas 1 and 2. A total of 493 surviving blue palo verde mitigation plants were

documented in September 2024; a 91.6 percent survival rate. Blue palo verde mitigation plants originated primarily from container plantings as well as several volunteer recruits. Survival of blue palo verde averaged more than 84 percent in all mitigation planting areas and exceeded 100 percent in Area 3 due to the presence of blue palo verde recruits counted as mitigation plants in this area.

Honey mesquite mitigation plants occur in four floodplain mitigation planting areas (Areas 1, 2, 3, and 5), with the greatest number of individuals in Area 3. A total of 73 honey mesquite mitigation plants were monitored in Year 2, and in the September 2024 census, there were 73 surviving individuals (a 100 percent survival rate). Honey mesquite mitigation plants include mostly volunteer recruits and several individuals from seeding areas.

Screwbean mesquite mitigation plants occur in three floodplain mitigation planting areas (Areas 1, 2, and 5), with the greatest number of individuals in Area 1. A total of 17 screwbean mesquite mitigation plants were monitored in Year 2, and in the September 2024 census, there were 17 surviving individuals (a 100 percent survival rate). Screwbean mesquite mitigation plants consist entirely of volunteer recruits.

Desert smoke tree mitigation plants occur in two floodplain mitigation planting areas (Areas 3 and 5), both small washes draining into the lower floodplain area. The greatest number of desert smoke tree mitigation plants is in Area 5. A total of 24 surviving desert smoke tree mitigation plants were documented in the September 2024 census (a 92.3 percent survival rate). Desert smoke tree mitigation plants originated from container plantings.

Catclaw acacia mitigation plants occur in one floodplain mitigation planting area (Area 5), a small wash draining into the lower floodplain area. A total of three catclaw acacia mitigation plants were monitored in Year 2, and in the September 2024 census, there were three surviving individuals (a 100 percent survival rate). Catclaw acacia mitigation plants originated from of container plantings.

5.1.1.2 Upland Mitigation Plants in Floodplain Mitigation Areas (Areas 1, 3, and 5)

In spring 2024, several cattle saltbush recruits appeared in Area 3 midway up the wash, and three were documented as mitigation plants in April and May 2024. Both Area 3 and Area 5 include small washes that drain into the floodplain from west to east. Portions of these two areas are underlain by well-drained gravels and other wash substrates on the mid to upper slopes and are bordered by large rocks associated with the Interstate 40 bridge support structure.

In June 2024, one Anderson's desert thorn recruit appeared in gravelly soil in Area 1 near just north of the Interstate 40 bridge and was documented as a mitigation plant. In November 2024, 10 additional container plants of Anderson's desert thorn were planted in Area 3 and Area 5: two in Area 3 and eight in Area 5. Only three surviving mitigation plants of Anderson's desert thorn are required to meet performance targets, and the remaining individuals will be tracked but not reported. Three Anderson's desert thorn individuals will be monitored as mitigation plants in 2025.

With the addition of these new plantings, the survival rate for Anderson's desert thorn in 2024 is 100 percent.

5.1.2 Mitigation Plants in UHR-1

A total of 47 surviving mitigation plants were censused in UHR-1 in September 2024. Mean survival of upland mitigation plants in UHR-1 is 88.7 percent (Table 5-2).

A total of 13 cattle saltbush mitigation plants were monitored in Year 2, and in the September 2023 census, there were 10 surviving individuals (a 77 percent survival rate). As discussed in Section 5.1.1.2, three recruits of cattle saltbush were documented in Area 3 as mitigation plants in 2024 to compensate for the death of three cattle saltbush in UHR-1 in 2024, bringing the survival rate site-wide up to 100 percent. Cattle saltbush mitigation plants originated from of container plantings and recruits.

A total of seven buckhorn cholla mitigation plants were monitored in Year 2, and in the September 2024 census, there were seven surviving individuals (a 100 percent survival rate). Buckhorn cholla mitigation plants originated from container plantings.

A total of 20 silver cholla mitigation plants were monitored in Year 2, and in the September 2024 census, there were 20 surviving individuals (a 100 percent survival rate). Silver cholla mitigation plants originated from container plantings.

A total of three Anderson's desert thorn mitigation plants were monitored in Year 2, and in 2024 census, all three individuals in UHR-1 died. As discussed in Section 5.1.1.2, one recruit of Anderson's desert thorn was documented as a mitigation plant in 2024, along with 10 new plantings to compensate for the death of three Anderson's desert thorn in UHR-1 in 2024, bringing the survival rate site-wide up to 100 percent. Anderson's desert thorn mitigation plants originated from container plantings and one recruit.

A total of 10 required beavertail cactus mitigation plants were documented in September 2024, and in the September 2024 census, there were 10 surviving individuals (a 100 percent survival rate). Beavertail cactus mitigation plants originated from container plantings.

Mean survival of all mitigation plant species (93.4 percent) exceeds the required performance standard of 75 percent survival.

Topock Revegetation Year 2 Mitigation Monitoring Report

Table 5-1 Mitigation Plant Survival Summary

Scientific Name	Common Name	Total Required Mitigation Plants 2022 (Container and Volunteer Recruits)	Total Surviving Mitigation Plants 2024 (Including Container Plants, Volunteer Recruits, and Seeded Honey Mesquite)	Percent Survival in 2024
Riparian and Wash Species				
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	73	73	100%
<i>Parkinsonia florida</i>	blue palo verde	538	493	91.6%
<i>Psoralea argemone</i>	desert smoke tree	26	24	92.3%
<i>Senegalia greggii</i>	catclaw acacia	3	3	100%
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	17	17	100%
	Subtotal for Riparian and Wash Species	657	610	92.8%
Upland Species				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	13	100%
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	7	100%
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	20	100%
<i>Lycium andersonii</i>	Anderson's desert thorn	3	3	100%
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	10	100%
	Subtotal for Upland Species	53	53	100%
	Total	710	663	93.4%

Topock Revegetation Year 2 Mitigation Monitoring Report

Table 5-2 Mitigation Plant Survival Summary and Performance Targets by Planting Area

Scientific Name	Common Name	Total Number Required Mitigation Plants 2022 (Container and Volunteer Recruits)	Total Surviving Mitigation Plants 2024 (Including Container Plants and Volunteer Recruits)	Percent Survival in 2024	Survival Performance Target
Floodplain Mitigation Plants (Areas 1-5)					
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	--	3	100%	75%
<i>Lycium andersonii</i>	Anderson's desert thorn	--	3	100%	75%
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	73	73	100%	75%
<i>Parkinsonia florida</i>	blue palo verde	538	493	91.6%	75%
<i>Psoralea argemone</i>	desert smoke tree	26	24	92.3%	75%
<i>Senegalia greggii</i>	catclaw acacia	3	3	100%	75%
<i>Strombocarpa</i> [<i>Prosopis pubescens</i>]	screwbean mesquite	17	17	100%	75%
	Subtotal for Floodplain (Areas 1-5)	657	616	93.5%	

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Scientific Name	Common Name	Total Number Required Mitigation Plants 2022 (Container and Volunteer Recruits)	Total Surviving Mitigation Plants 2024 (Including Container Plants and Volunteer Recruits)	Percent Survival in 2024	Survival Performance Target
Upland Mitigation Plants in UHR-1					
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	10	77%	75%
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	7	100%	75%
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	20	100%	75%
<i>Lycium andersonii</i>	Anderson's desert thorn	3	0	0%	75%
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	10	100%	75%
	Subtotal for Upland Species	53	47	88.7%	
	Total	710	663	93.4%	75%

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Table 5-3 Mitigation Plant Survival by Area

Scientific Name	Common Name	Total Mitigation Plants 2022 (Container and Volunteer Recruits)	Total Surviving Mitigation Plants 2024 (Including Container Plants, Volunteer Recruits, and Plants in Seeded Areas)	Percent Survival 2024
Area 1				
<i>Lycium andersonii</i>	Anderson's desert thorn	0	1	100%
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	20	19	100%
<i>Parkinsonia florida</i>	blue palo verde	286	241	84.3%
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	10	10	100%
Area 2				
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	15	15	100%
<i>Parkinsonia florida</i>	blue palo verde	194	184	94.8%
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	5	5	100%
Area 3				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	0	3	100%
<i>Lycium andersonii</i>	Anderson's desert thorn	0	1	100%

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Scientific Name	Common Name	Total Mitigation Plants 2022 (Container and Volunteer Recruits)	Total Surviving Mitigation Plants 2024 (Including Container Plants, Volunteer Recruits, and Plants in Seeded Areas)	Percent Survival 2024
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	18	20	111.1%
<i>Parkinsonia florida</i>	blue palo verde	37	49	132.4%
<i>Psoralea argemonea</i>	desert smoke tree	7	6	85.7%
Area 4				
<i>Parkinsonia florida</i>	blue palo verde	4	4	100%
Area 5				
<i>Lycium andersonii</i>	Anderson's desert thorn	0	1	100%
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	20	19	95%
<i>Parkinsonia florida</i>	blue palo verde	17	15	88.2%
<i>Psoralea argemonea</i>	desert smoke tree	19	18	94.7%
<i>Senegalia greggii</i>	catclaw acacia	3	3	100%
<i>Stromboscarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	2	2	100%

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Scientific Name	Common Name	Total Mitigation Plants 2022 (Container and Volunteer Recruits)	Total Surviving Mitigation Plants 2024 (Including Container Plants, Volunteer Recruits, and Plants in Seeded Areas)	Percent Survival 2024
UHR-1				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	10	76.9%
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	7	100%
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	20	100%
<i>Lycium andersonii</i>	Anderson's desert thorn	3	0	0%
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	10	100%
	Total Mitigation Plants in Areas 1-5	657	616	96.2%
	Total Mitigation Plants in UHR-1	53	47	88.7%
	Totals	710	663	93.4%

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“Extra plants” are defined in one of two ways. In some cases, more individuals of a given mitigation species were installed as container plantings than the required number if the nursery provided excess plants. Alternatively, the annual census included volunteer recruits of a given mitigation species to provide a measure of reproductive vigor even if those recruits were not recorded as mitigation plants (Table 5-4).

In floodplain mitigation areas, there were eight extra Anderson’s desert thorn container plantings installed in 2024 (one in Area 3 and seven in Area 5), but no extra volunteer recruits. There were 217 extra screwbean mesquite volunteer recruits (10 in Area 1, 200 in Area 2, two in Area 3, and five in Area 5). There were two extra catclaw acacia container plantings installed in 2022, but no additional volunteer recruits. There were no extra volunteer recruits of blue palo verde, honey mesquite, or desert smoke tree.

In the upland mitigation area (UHR-1), there were four extra volunteer recruits of cattle saltbush, one extra container planting of silver cholla, and 16 extra beavertail cactus container plantings installed in 2022.

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Table 5-4 Mitigation Plant Survival by Area including Estimated Number of Volunteer Recruits and/or Extra Container Plantings Observed but Not Recorded or Monitored as Mitigation Plants

Scientific Name	Common Name	Total Mitigation Plants 2022 (Container and Recruits)	Total Surviving Mitigation Plants 2024 (Including Container Plants, Volunteer Recruits, and Plants in Seeded Areas)	Percent Survival 2024	Number of Volunteer Recruits and/or Extra Container Plantings that were not Recorded or Monitored as Mitigation Plants
Area 1					
<i>Lycium andersonii</i>	Anderson's desert thorn	0	1	100%	0
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	20	19	95%	0
<i>Parkinsonia florida</i>	blue palo verde	286	241	84.3%	0
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	10	10	100%	10
Area 2					
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	15	15	100%	0
<i>Parkinsonia florida</i>	blue palo verde	194	184	94.8%	0
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	5	5	100%	200
Area 3					
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	0	3	100%	0

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Scientific Name	Common Name	Total Mitigation Plants 2022 (Container and Recruits)	Total Surviving Mitigation Plants 2024 (Including Container Plants, Volunteer Recruits, and Plants in Seeded Areas)	Percent Survival 2024	Number of Volunteer Recruits and/or Extra Container Plantings that were not Recorded or Monitored as Mitigation Plants
<i>Lycium andersonii</i>	Anderson's desert thorn	0	1	100%	1
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	18	20	111.1%	0
<i>Parkinsonia florida</i>	blue palo verde	37	49	132.4%	0
<i>Psoralea argyrea</i>	desert smoke tree	7	6	85.7%	0
<i>Stromboscarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	0	0	--	2
Area 4					
<i>Parkinsonia florida</i>	blue palo verde	4	4	100%	0
Area 5					
<i>Lycium andersonii</i>	Anderson's desert thorn	0	1	100%	7
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	20	19	95%	0
<i>Parkinsonia florida</i>	blue palo verde	17	15	88.2%	0
<i>Psoralea argyrea</i>	desert smoke tree	19	18	94.7%	0
<i>Senegalia greggii</i>	catclaw acacia	3	3	100%	2

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Scientific Name	Common Name	Total Mitigation Plants 2022 (Container and Recruits)	Total Surviving Mitigation Plants 2024 (Including Container Plants, Volunteer Recruits, and Plants in Seeded Areas)	Percent Survival 2024	Number of Volunteer Recruits and/or Extra Container Plantings that were not Recorded or Monitored as Mitigation Plants
<i>Strombocarpa [Prosopis] pubescens</i>	screwbean mesquite	2	2	100%	5
UHR-1					
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	10	76.9%	4
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	7	100%	0
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	20	100%	1
<i>Lycium andersonii</i>	Anderson's desert thorn	3	0	0%	0
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	10	100%	16
	Total Upland Mitigation Plants	53	47	88.7%	
	Total Riparian/Wash Mitigation Plants	657	616	93.8%	
	Totals	710	663	93.4%	

5.2 Mitigation Plant Health Summary

During the annual survival census, a health assessment of each of the surviving required mitigation plants followed a modified Health Index initially developed by Bainbridge et al. 2001:

- 0 = dead, stems brown brittle with no green or purple (not included in health assessment, which only focused on surviving plants);
- 1 = poor health, barely alive, stems still flexible with some green or purple;
- 2 = fair health, stems flexible and containing living tissue, often with some green or purple on stems, with or without a few green leaves;
- 3a = good health, stems flexible and containing living tissue, often with green or purple stems and a number of green leaves, if present on the species;
- 3b = good health, stems flexible and containing living tissue, often with leafless on a seasonal basis; and
- 4 = excellent health, healthy stems containing living tissue, green leaves (excluding cacti) vigorous.

The Health Index ranking of 3 was modified because healthy plants that were leafless or losing leaves seasonally would have been classified as only in fair health (Health Index 2) based on the original ranking system.

5.2.1 Health Assessment Results

Results of the annual health assessment are presented in Table 5-5 and briefly summarized below by species.

A total of 616 mitigation plants were censused in floodplain mitigation areas in September 2024.

Riparian and wash species (mitigation plants in Areas 1 through 5). A total of 616 mitigation plants were censused in floodplain mitigation areas in September 2024, which included 610 riparian and wash species and six upland species. Mean survival of floodplain mitigation plants is 93.8 percent (Table 5-1), and survival by mitigation planting area is provided in Tables 5-2 and 5-3, as discussed in Section 5.1.

A summary of the September 2024 plant health assessment for the five riparian and wash species is provided below. Mean survival of riparian and wash mitigation plants is 92.8 percent.

Blue palo verde mitigation plants occur in all floodplain mitigation planting areas (Areas 1 through 5) in various quantities, with the majority in Areas 1 and 2. Most blue palo verde mitigation plants were in excellent health (Health Index 4 – 56.4 percent), followed by plants entering seasonal dormancy (Health Index 3a and 3b – 36.9 percent), for a total of 93.3 percent of blue palo verde in good to excellent health. A total of 22 blue palo verde individuals exhibited fair health (Health Index 2 – 4.5 percent), and 11 were in poor health (Health Index 1 – 2.2 percent). Blue palo verde individuals growing in soils with relatively high salinity in the northern portion of Area 1 and in compacted soils near access roads exhibited slow growth and poor health compared with plants in well-drained, less saline substrates.

Honey mesquite mitigation plants occur in four floodplain mitigation planting areas (Areas 1, 2, 3, and 5), with the greatest number of individuals in Area 1. Most honey mesquite mitigation plants were in excellent health (Health Index 4 - 96 percent) or good health (Health Index 3 – 4 percent).

Screwbean mesquite mitigation plants occur in three floodplain mitigation planting areas (Areas 1, 2, and 5), with the greatest number of individuals in Area 1. Screwbean mesquite mitigation plants were either in excellent health (Health Index 4 – 96 percent) or good health (Health Index 3a – 4 percent) for a total of 100 percent of mitigation plants in good to excellent health.

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Desert smoke tree mitigation plants occur in two floodplain mitigation planting areas (Areas 3 and 5), both small washes draining into the lower floodplain area. Most desert smoke tree mitigation plants were either in excellent health (Health Index 4 – 37.5 percent) or good health (Health Index 3a and 3b – 58.3 percent) with no major health issues, for a total of 95.8 percent of desert smoke tree in good to excellent health. No plants were in fair health (Health Index 2), and one was in poor health (Health Index 1 – 4.2 percent).

Catclaw acacia mitigation plants occur in one floodplain mitigation planting area (Area 5), a small wash draining into the lower floodplain area. All catclaw acacia mitigation plants were in excellent health (Health Index 4 – 33.3 percent) or good health (Health Index 3a – 66.7 percent). A total of 100 percent of mitigation plants in good to excellent health.

Upland Species (mitigation plants in UHR-1 and Area 1, 3, and 5). A total of 53 upland mitigation plants were documented in UHR-1, Area 1, Area 3, and Area 5 in Year 2. Mean survival of upland mitigation plants is 100 percent (Table 5-1). Of the five planted upland mitigation plant species, three are cactus species, all of which are stem succulents that lack leaves for almost the year, only producing rudimentary leaves on new growth in spring. Leafless cacti are generally categorized as being in excellent health, despite the lack of leaves, unless there is scarring or indications of poor health.

Cattle saltbush mitigation plants originated from container plantings and recruits in UHR-1 and Area 3, and at the time of the September quantitative health assessment. Most cattle saltbush mitigation plants were either in excellent health with foliage (Health Index 4 – 23.1 percent) or were entering or maintaining seasonal dormancy (Health Index 3a – 76.9 percent), for a total of 100 percent of cattle saltbush in good to excellent health.

Buckhorn cholla mitigation plants originated from container plantings. All buckhorn cholla mitigation plants were in excellent health (Health Index 4 - 100 percent).

Silver cholla mitigation plants originated from container plantings. Most silver cholla mitigation plants were in excellent health (Health Index 4 – 90 percent), with the remainder in good health (Health Index 3a – 10 percent) due to seasonal desiccation.

Anderson's desert thorn mitigation plants originated from container plantings and one recruit. All of the Anderson's desert thorn originating from container plantings were in good health (Health Index 4). The one recruit in Area 1 that has been documented as a mitigation plant was entering seasonal dormancy and was assessed as good health in September 2024.

Beavertail cactus mitigation plants originated from of container plantings. All beavertail cactus mitigation plants were in excellent health (Health Index 4 – 100 percent).

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Table 5-5 Plant Health Assessment Summary

Scientific Name	Common Name	Total Live Mitigation Plants	Number of Plants Ranked as '4'	Mean of Plants Ranked as '4'	Number of Plants Ranked as '3a'	Mean of Plants Ranked as '3a'	Number of Plants Ranked as '3b'	Mean of Plants Ranked as '3b'	Number of Plants Ranked as '2'	Mean of Plants Ranked as '2'	Number of Plants Ranked as '1'	Mean of Plants Ranked as '1'
Riparian and Wash Species												
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	73	70	96%	3	4%	0	-	0	-	0	-
<i>Parkinsonia florida</i>	blue palo verde	493	278	56.4%	38	7.7%	144	29.2%	22	4.5%	11	2.2%
<i>Psoralea argyrea</i>	desert smoke tree	24	9	37.5%	2	8.3%	12	50%	0	-	1	4.2%
<i>Senegalia greggii</i>	catclaw acacia	3	1	33.3%	2	66.7%	0	-	0	-	0	-
<i>Strombocarpa</i> [<i>Prosopis pubescens</i>]	screwbean mesquite	17	17	100%	0	-	0	-	0	-	0	-
Total Mitigation Plants	Riparian and Wash Species	610	375	61.5%	45	7.3%	156	25.6%	22	3.6%	12	2%
Upland Species												

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Scientific Name	Common Name	Total Live Mitigation Plants	Number of Plants Ranked as '4'	Mean of Plants Ranked as '4'	Number of Plants Ranked as '3a'	Mean of Plants Ranked as '3a'	Number of Plants Ranked as '3b'	Mean of Plants Ranked as '3b'	Number of Plants Ranked as '2'	Mean of Plants Ranked as '2'	Number of Plants Ranked as '1'	Mean of Plants Ranked as '1'
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	3	23.1%	10	76.9%	0	-	0	-	0	-
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	7	100%	0	-	0	-	0	-	0	-
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	18	90.0%	2	10.0%	0	-	0	-	0	-
<i>Lycium andersonii</i>	Anderson's thornbush	3	2	66.7%	0	-	1	33.3%	0	-	0	-
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	10	100%	0	-	0	-	0	-	0	-
Total Mitigation Plants	Upland Species	53	40	75.5%	12	22.6%	1	1.8%	0	-	0	-
Totals		663	415	62.6%	57	8.6%	157	23.7%	22	3.3%	12	1.8%

5.2.2 Height and Width Indicators of Growth

The height and width of mitigation plants were measured at the time of planting in 2022 and again in September 2024 (Tables 5-6a and 5-6b).

Riparian and wash mitigation plants

The mean height of blue palo verde individuals was 5.8 feet during Year 2, an increase of 2.7 feet since planting, with 18 plants reaching more than 10 feet. Blue palo verde often produce branches that result in plants being wider than they are tall. Mean width of blue palo verde averaged 6.3 feet in 2024, an increase of 2.8 feet since planting.

The mean height of honey mesquite individuals averaged 6.0 feet in Year 2, an increase of 2.2 feet since being designated as mitigation plants. Mean width of honey mesquite averaged 5.4 feet during Year 2, an increase of 1.9 feet since being designated as mitigation plants, and mitigation plants were as almost as wide as they were tall.

The mean height of screwbean mesquite individuals was 8.3 feet during Year 2, more than double of the average in 2022, when individuals were designated as mitigation plants, reflecting the rapid growth of this species in the floodplain. Mean width of screwbean mesquite increased 5.0 feet. In Year 2, and mitigation plants were as wide as they were tall. Screwbean mesquite exhibits greater salt tolerance than honey mesquite (Miyamoto et al. 2004) and grows more rapidly in the floodplain.

The mean height of desert smoke tree individuals was 4.0 feet during Year 2, an increase of 2.2 feet since planting, reflecting the rapid growth of this species in the washes associated with Areas 3 and 5. Mean width of desert smoke tree was 3.2 feet during Year 2, an increase of 1.8 feet in since planting, and mitigation plants were slightly taller than they were wide.

The mean height of catclaw acacia individuals was 4.6 feet during Year 2, an increase of 1.9 feet since planting, reflecting rapid growth of this species in Area 5. Mean width of catclaw acacia was 3.2 feet during Year 2, an increase of 2.1 feet since planting, and mitigation plants were taller than they were wide.

Upland mitigation plants

The mean height of cattle saltbush individuals was 2.0 feet during Year 2, an increase of 0.9 foot since planting in UHR-1, as well as including the recruits in Area 3. Mean width of cattle saltbush was 2.8 feet in Year 2. Mitigation plants were wider than they were tall and more than double the width at the time of planting.

The mean height of buckhorn cholla individuals was 1.0 foot during Year 2, an increase of 0.4 foot since planting in UHR-1. Mean width of buckhorn cholla was 0.8 foot during Year 2, an increase of 0.4 foot since planting, exhibiting the slow growth that is typical of cacti.

The mean height of silver cholla individuals appeared to decrease 0.1 foot during Year 2 in UHR-1, although the difference in height over the preceding year is likely attributed to sampling error. Mean width of silver cholla increased 0.2 foot since planting, exhibiting the slow growth that is typical of cacti.

The mean height of Anderson's desert thorn individuals was 0.7 feet, and mean width was 1.1 feet. Comparison data will be provided in the Year 3 mitigation monitoring report for this species.

The mean height of beavertail cactus individuals was 0.9 foot during Year 2, an increase of 0.2 foot since planting in UHR-1. The mean width of beavertail cactus was 1.4 feet during Year 2, double the average width since planting, and mitigation plants were wider than they were tall, which is typical of this species of cactus.

Table 5-6a Living Mitigation Plants Average Height by Species

Scientific Name	Common Name	Number of Living Mitigation Plants	Mean Height of Plants in Feet Measured during Initial Planting or Documentation as Mitigation Plant (2022)	Mean Height of Plants in Feet Measured during Year 2 Assessment (September 2024)
Riparian/Wash Species				
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	73	3.8	6.0
<i>Parkinsonia florida</i>	blue palo verde	493	3.1	5.8
<i>Psoralea argophylla</i>	desert smoke tree	24	1.8	4.0
<i>Senegalia greggii</i>	catclaw acacia	3	2.7	4.6
<i>Stromboscarpa</i> [Prosopis] <i>pubescens</i>	screwbean mesquite	17	3.0	8.3
Upland Species				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	1.1	2.0
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	0.6	1.0
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	0.9	0.8
<i>Lycium andersonii</i>	Anderson's thornbush	3	1.4	0.7
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	0.7	0.9
	Totals	663	1.9	3.4

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Table 5-6b Living Mitigation Plants Average Width by Species

Scientific Name	Common Name	Number of Living Mitigation Plants	Mean Width of Plants in Feet Measured during Initial Planting or Documentation as Mitigation Plant (2022)	Mean Width of Plants in Feet Measured during Year 2 Assessment (September 2024)
Riparian/Wash Species				
<i>Neltuma odorata</i> [<i>Prosopis glandulosa</i>]	honey mesquite	73	3.5	5.4
<i>Parkinsonia florida</i>	blue palo verde	493	3.5	6.3
<i>Psoralea argophylla</i>	desert smoke tree	24	1.4	3.2
<i>Senegalia greggii</i>	catclaw acacia	3	1.1	3.2
<i>Strombocarpa</i> [Prosopis] <i>pubescens</i>	screwbean mesquite	17	2.3	8.3
Upland Species				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	1.0	2.8
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	0.4	0.8
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	0.7	0.9
<i>Lycium andersonii</i>	Anderson's thornbush	3	0.8	1.1
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	0.7	1.4
	Totals	663	1.5	3.3

5.3 Native Species Richness in Revegetation Areas

All observed plant species found in mitigation planting areas in a recognizable condition during the second year of monitoring were recorded by species and mitigation area (Appendix D). Nomenclature follows the second edition of The Jepson Manual: Vascular Plants of California (Baldwin et al. 2012) with online updates (Jepson Flora Project 2024). A list of wildlife species observed is provided in Appendix E.

5.3.1 Native Species Richness in Mitigation Planting Areas 1-5

At the time of initial planting in March 2022, floodplain planting Areas 1-5 were mostly devoid of vegetation after saltcedar removal, with only seven native plant species present. By the end of Year 2, a total of 43 native vascular plant species were observed in Areas 1-5.

Six native tree species were observed in Areas 1-5 in 2024, including five planted species and one species that produced volunteer recruits in Areas 1 and 2: Fremont cottonwood (*Populus fremontii*).

Seven native shrub species were observed in Areas 1-5 in 2024, including seven mitigation species (blue palo verde, honey mesquite, screwbean mesquite, desert smoke tree, catclaw acacia, cattle saltbush, and Anderson's desert thorn) and other shrub species such as cheesebush (*Ambrosia salsola*) and sweetbush (*Bebbia juncea*). One shrub species in floodplain areas (arrowweed) is native but aggressively rhizomatous, resulting in competition for resources with native plantings (see Sections 3.1.3 and 4.4).

Thirty-six native herbaceous annual and perennial forbs and grasses appeared in Areas 1-5 in Year 2, providing direct evidence of the increased native plant species richness at the Site. These include both winter/early spring annuals such as Arizona lupine (*Lupinus arizonicus*), golden suncup (*Chylismia brevipes* subsp. *brevipes*), brittle spineflower (*Chorizanthe brevicornu* var. *brevicornu*), and summer annuals that appeared after monsoonal rains such as trailing windmills (*Allionia incarnata* var. *incarnata*) and scarlet spiderling (*Boerhavia coccinea*). Some native annuals were present in both spring and summer such as Spanish needles (*Palafoxia arida*), notch-leaved phacelia (*Phacelia crenulata* subsp. *ambigua*), and Emory's rock daisy (*Perityle emoryi*).

Prior to initial planting in March 2022, six native wildlife species were reported in floodplain planting Areas 1-5. During the past two years a total of 40 native wildlife species and 2 additional species with unknown nativity have been observed in floodplain mitigation planting areas, suggesting the enhanced functional value of native floodplain habitat and removal of saltcedar (Appendix D).

These included:

- Three native reptile species: western diamond-backed rattlesnake (*Crotalus atrox*), desert iguana (*Dipsosaurus dorsalis*), and western side-blotched lizard (*Uta stansburiana*);
- Eighteen native bird species including loggerhead shrike (*Lanius ludovicianus*), which, when nesting, is a CDFW species of special concern; black-tailed gnatcatcher (*Polioptila melanura*), which is on the CDFW Watch List; osprey (*Pandion haliaetus*); greater roadrunner (*Geococcyx californianus*); American kestrel (*Falco sparverius*); and hermit thrush (*Catharus guttatus*);
- Four native mammal species including striped skunk (*Mephitis mephitis*) and desert cottontail (*Sylvilagus audubonii*); and
- Thirteen native invertebrate species including the solitary honey-tailed striped sweat bee (*Agapostemon melliventris*), queen butterfly (*Danaus gilippus*), and gray hairstreak (*Strymon melinus*).

5.3.2 Native Species Richness in UHR-1

At the time of planting, the upland revegetation area UHR-1 supported five native species, including creosote bush (*Larrea tridentata*) and cattle saltbush. Three native cactus species were planted in UHR-1, and naturally occurring individuals of these cacti were present as well. By the end of Year 2, a total of 21 native vascular plant species were observed in UHR-1, including desert fiddleneck (*Amsinckia tessellata*), white easter bonnets (*Eriophyllum lanosum*), and oligomeris (*Oligomeris linifolia*).

Prior to initial planting in March 2022, five native wildlife species were reported in UHR-1. During the past two years a total of nine native wildlife species have been observed in UHR-1 (Appendix E). These include ash-throated flycatcher (*Myiarchus cinerascens*), lesser nighthawk (*Chordeiles acutipennis*), and killdeer (*Charadrius vociferus*).

5.4 Adaptative Management Monitoring Results

Adaptive management monitoring and planning in Year 2 included soil sampling for elevated salts and other nutrients, stress symptom monitoring, and Caltrans geotechnical boring monitoring.

5.4.1 Soil Sampling Results

Soil sampling was conducted on April 11 and September 10 and 11, 2024 at 18 locations within the floodplain area that had been previously sampled for soil salinity and periodically sampled for other soil nutrients. Table 5-7 presents the comparative soil salinity results for targeted soil sampling locations between September 2021 and September 2024 (FGL 2021a, 2022a, 2022b, 2022c, 2022d, 2022e, 2023, 2024). Soil sampling locations are presented on Figure 6, and a summary of 2024 results is shown on Figure 7.

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Table 5-7 Soil Salinity Data: 2021 through 2024

Soil Sampling Location	Area	Soil Salinity ¹ 9/22/2021 0-12" bgs ²	Soil Salinity ¹ 2/28/2022 0-12" bgs ²	Soil Salinity ¹ 3/24/2022 0-12" bgs ²	Soil Salinity ¹ 4/27/2022 0-12" bgs ²	Soil Salinity ¹ 6/15/2022 0-12" bgs ²	Soil Salinity ¹ 8/11/2022 0-12" bgs ²	Soil Salinity ¹ 7/27/2023 0-12" bgs ²	Soil Salinity ¹ 4/11/2024 0-12" bgs ²	Soil Salinity ¹ 9/11/2024 0-12" bgs ²	Soil Salinity (dS/m) ¹ 9/11/2024 12-24" bgs ²
C1	Area 1	66.00	47.00	3.84	6.74	9.99	6.57	24.20	45.9	19.70	13.40
C2	Area 1	91.00	107.00	1.67	5.13	7.46	6.40	25.20	37.1	42.10	12.20
C3	Area 1	36.50	1.63	0.00	--	3.76	2.88	34.90	5.72	5.73	11.70
C4	Area 2	150.00	70.40	10.40	16.60	32.90	4.03	7.58	67.5	134.00	38.00
C5	Area 3	4.18	2.53	0.00	--	1.02	2.09	1.30	0.43	1.60	1.64
C6	Area 2	--	21.20	44.10	66.70	10.20²	8.24	18.1	36.6	44.80	16.70
C7	Area 1	--	--	1.27	3.87	1.04	7.33	62.9	64.2	77.60	7.12
C8	Area 1	--	--	0.95	1.55	1.12	5.22	26.8	57.1	42.80	16.00
C9	Area 1	--	--	0.93	1.40	3.68	3.5	2.94	2.89	7.28	6.64
C10	Area 2	--	--	1.29	5.20	4.42	2.82	17.50	13.6	8.50	2.18
C11	Area 2	--	--	0.82	1.97	1.50	4.77	4.27	19.2	40.00	14.40
C12	Area 2	--	--	3.91	9.62	7.92	8.03	16.5	75.3	67.00	20.10
C13	Area 1	--	--	1.04	2.54	5.88	1.06	11.1	47.4	22.20	3.54
D1	Area 2	172.00	67.50	6.99	5.16	--	18.20	52.3	24.6	77.50	35.50

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Soil Sampling Location	Area	Soil Salinity ¹ 9/22/2021 0-12" bgs ²	Soil Salinity ¹ 2/28/2022 0-12" bgs ²	Soil Salinity ¹ 3/24/2022 0-12" bgs ²	Soil Salinity ¹ 4/27/2022 0-12" bgs ²	Soil Salinity ¹ 6/15/2022 0-12" bgs ²	Soil Salinity ¹ 8/11/2022 0-12" bgs ²	Soil Salinity ¹ 7/27/2023 0-12" bgs ²	Soil Salinity ¹ 4/11/2024 0-12" bgs ²	Soil Salinity ¹ 9/11/2024 0-12" bgs ²	Soil Salinity (dS/m) ¹ 9/11/2024 12-24" bgs ²
D2	Area 3	284.00	236.00	5.77	7.98	--	5.40	22.5	21.4	64.60	22.50
D3	Area 2	596.00	216.00	4.75	4.97	--	4.42	5.8	16.9	48.40	6.84
D4	Area 5	240.00	40.00	4.73	5.49	--	9.54	28.4	41.8	36.20	23.3
D5	Area 3	250.00	8.35	0.00	--	--	6.2	11.9	52.2	35.60	9.78

¹ deciSiemens per meter

² Inches below ground surface (bgs)

³ This soil sampling location was moved into Area 1 from a location to the north in June 2022

bold font = soil salinity results > 10 dS/m

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As summarized in Section 3.3.2, before initial planting in 2022, leaching of salts was required in Areas 1 through 5 to remove excess salts documented during soil sampling in September 2021. Leaching was initiated in early February 2022 after irrigation infrastructure was installed. By March 24, 2022, when the first planting event was complete, all of the soil sampling points inside the leaching area exhibited soil salinity measurements less than 11 dS/m, with a control site remaining at 44.1 dS/m. Soil salinity measurements remained below 10 dS/m through August 2022, except for the sample from D-1.

The July 2023 soil salinity data, however, indicated an increase in soil salinity during the subsequent 11 months at 16 locations, with soil salinity measurements exceeding 10 dS/m at 13 locations. Consultations in August 2023 with Ben Waddell, the director of FGL in Santa Paula, resulted in several follow-up actions.

- Placement of one of the three 0.25-inch irrigation hoses on the ground surface to facilitate leaching because all three hoses were placed in DEEP DRIP stakes after initial leaching to encourage deep root development (completed in November 2023);
- Initiation of a future irrigation event during rainfall to flush excess salts;
- Request by Ben Waddell to review potential salinity source data to evaluate potential external sources of elevated salinity. In September 2023, biologists provided Mr. Wadell with recent groundwater, surface water, and irrigation water salinity, conductivity, and ion data to aid in his evaluation of soil salinity data. After his review, Mr. Waddell stated that the irrigation water did not contain elevated salts, nor did monitoring wells suggest elevated salts comparable to the July 2023 soil salinity data. The previous presence of saltcedar in areas with elevated salinity may suggest that conditions will improve over time as further leaching occurs during rainfall and irrigation events if there is irrigation tubing on the soil surface (ongoing monitoring and data review); and
- Additional soil sampling in 2024 in soil surface layers (0 to 12 inches bgs) and at 12 to 24 inches bgs to monitor soil salinity and take corrective actions if needed.

In September 2024, two soil samples were taken in each of the 18 designated locations at different depths, one sample at 0 to 12 inches bgs and the second sample at 12 to 24 inches bgs. Each sample was bagged and labeled separately before sending to FGL.

Results of the September 2024 soil sampling effort indicated that 13 of 18 samples exhibited salinity above 20 dS/m at 0 to 12 inches bgs. The range of salinity at 0 to 12 inches bgs was 1.60 to 134 dS/m.

At 12 to 24 inches bgs, there were lower salinity levels compared with the soil surface in most samples. Seven of the 12- to 24-inch bgs sampling locations indicated salinity under 10 dS/m, with soil salinity ranging from 1.64 to 9.78 dS/m in locations that remained below 10 dS/m and from 11.70 to 38.00 dS/m for locations where soil salinity exceeded the recommended level.

Consultations in November 2024 with Ben Waddell resulted in several recommended follow-up actions.

- Removal of emitters from all DEEP DRIP stakes in Areas 1, 2, and 4 and in the eastern portion of Areas 3 and 5, except for the new Anderson's desert thorn plantings;
- Replacement of at least one and optimally two emitters per plant (depending on water pressure) with a 360° variable radius spray attachment to facilitate surface leaching for mitigation plants in Areas 1, 2, and 4 and in the eastern portion of Areas 3 and 5;
- Irrigation monthly during winter and periodically in late summer to emulate seasonal winter and monsoonal rainfall; and
- Additional soil sampling in 2025 to assess the effectiveness of the latest leaching effort.

5.4.2 Stress Symptom Monitoring Results

In 2023, some blue palo verde mitigation plants exhibited stress symptoms in the form of sap as detailed in Section 3.3.3.

During 2024, blue palo verde mitigation plants were monitored periodically and during the annual census for sap and for signs of boring insects that could be the cause of the stress response. Just less than 15 percent of blue palo verde mitigation plants were observed with signs of stress during the September annual census. Signs included holes in trunks and stems where dried sap was observed, peeling and crumbling bark around holes, and decaying stems. Only one plant was observed with sap. Of the 68 blue palo verde plants recorded with stress symptoms, only three were assessed at Health Rank 2; the remaining 65 plants were assessed as Health Ranks 4, 3a, or 3b.

5.4.3 Caltrans Monitoring Results

Caltrans conducted geotechnical borings between Areas 1 and 2 on November 4 through 13, 2024. This activity required driving a small drill rig through the access corridor designed for monitoring well access and wildlife passage. Specific access configuration and impact avoidance measures were implemented to protect the mitigation plantings and associated infrastructure including the following:

- Biological monitoring during drilling to ensure impact avoidance measures were effectively implemented;
- Temporary removal of sections of wire fencing to widen the access corridor when necessary;
- Installation of temporary fencing each night in areas where fencing had been temporarily removed;
- Installation of soil, sandbags, and cribbing to protect irrigation pipes and fencing sleeves from damage; and
- Installation of temporary fencing and flagging to prevent stockpiling and material storage in the mitigation planting areas.

An Arcadis biological monitor and a Caltrans biological monitor were present during all geotechnical boring activities. No mitigation plants were injured or harmed during the Caltrans geotechnical boring work.

One 3-inch PVC pipe broke during the mobilization of a skidsteer to the work location. Water had been turned off, and pipes were empty; therefore, no plants were unintentionally irrigated due to the breakage. The PVC pipe is being replaced as a part of a larger irrigation system upgrade (see Section 6.1 for details).

All crews, equipment, and construction material staging occurred in designated areas outside of the mitigation planting areas. All fencing was replaced after geotechnical borings were completed in the same fashion as the rest of the mitigation area fencing.

5.5 Performance Standards

The HNWR Habitat Restoration Plan (Appendix G to the C/RAWP [CH2M Hill and E2 Consulting Engineers 2015]), the Topock Groundwater Remediation Project Mitigation and Monitoring Plan for Culturally Significant Plants (Appendix A to Appendix H to the C/RAWP [CH2M Hill and GANDA 2014]), the Topock Compressor Station Groundwater Remediation Project Aesthetics and Visual Resources Protection and Revegetation Plan (Appendix N to the C/RAWP [CH2M Hill and E2 Consulting Engineers 2014a]), and Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (Appendix O to the C/RAWP [CH2M Hill and E2 Consulting Engineers 2014b]) specify on-site revegetation success criteria; monitoring and reporting requirements; and adaptive management guidelines for salvage and replanting of trees, shrubs, and perennial species.

In accordance with the habitat revegetation plans and Mitigation Measure BIO-1a, as detailed in the MMRP Exhibit 2 to the Statement of Decision and Resolution of Approval (DTSC 2018), removed riparian trees (e.g., blue palo verde trees) were replaced at a 3:1 ratio (i.e., planting three trees in revegetation areas for each tree removed during construction). The success criterion for mitigation plantings is a final minimum plant replacement ratio of 2.25:1 (75 percent overall survival rate) of mitigation plantings at the end of a minimum 5-year monitoring period.

In accordance with the habitat revegetation plans, the following performance standards and adaptive management are required for mitigation plantings:

Mitigation plantings shall exhibit 75 percent survival of required plantings. Survival of mitigation planting species that drop below a 2.25:1 mitigation ratio (number of plants planted: number of plants impacted, or 75 percent survival of mitigation plantings) will require remedial planting. Replacement plantings will be monitored for five years from the time of their initial planting.

Mean survival of all mitigation plant species (93.5 percent) exceeds the required performance standard of 75 percent survival.

5.6 Salvaged Beavertail Cactus Survival

Between 2018 and August 2022, 12 beavertail cactus individuals were salvaged from work areas and transplanted into UHR-1 (see Section 2.3.4). As of September 2024, all individuals of salvaged and transplanted beavertail cactus have survived (Table 5-8), exhibiting 100 percent survival.

Table 5-8 Salvaged Beavertail Cactus Survival

Date of Transplanting	Total Individuals Salvaged and Transplanted	Total Individuals Alive (September 2023)
November and December 2018	7	7
2020 to 2021	2	2
April and August 2022	3	3
Total Salvaged and Transplanted Beavertail Cactus	12	12

6 Year 2 Revegetation Maintenance Results

Revegetation maintenance included invasive plant species eradication, irrigation, herbivore exclusion, general site housekeeping and cleanup, and the general care and nurturing of plantings within the mitigation planting areas in Year 2.

Revegetation maintenance, including inspections and equipment operation, was conducted on the following dates:

2024

January – 12, 16-19, 23

February – 9, 20-23

March - 1, 18, 22,

April – 9-11, 19

May – 3, 13-16, 24, 31

June – 6, 12-14, 26

July – 3, 12, 25, 30, 31

August – 1, 2, 5, 15, 29

September – 10-15

October - 3, 10, 17, 24, 30, 31

November – 1, 4-8, 11-15, 18-22

December – 20

6.1 Irrigation Maintenance

During Year 2, irrigation maintenance involved operating, inspecting, repairing, and improving the irrigation system. The dates of irrigation maintenance are listed above.

The irrigation system in the floodplain was operated every 3 weeks from January 2024 through November 2024, except after significant rain events, when the irrigation system was generally not operated because adequate soil moisture was achieved. During all irrigation events, the system operated for 2 hours in all mitigation planting areas.

As discussed in Section 3.3.1, ten Anderson's desert thorn container plantings were installed in Areas 3 and 5 between November 18 and 21, 2024. A new branch of the irrigation system with 2-inch HDPE was installed in Mitigation Planting Areas 3 and 5 to irrigate new Anderson's desert thorn container plantings, as described in Section 4.1.

In November 2024, all irrigation emitters in Areas 1, 2, and 4 and in the eastern portion of Areas 3 and 5 that had been previously placed in DEEP DRIP stakes were moved to the soil surface, except for the new Anderson's desert thorn plantings. Two of the emitters for each blue palo verde plant was fitted with a 360° spray attachment to facilitate surface leaching of excess salts for mitigation plants in these areas.

In December 2024, after modifications to the floodplain irrigation system, watering frequency was reduced to every 4 to 6 weeks to emulate natural winter rainfall events and to leach salts from the soil. During these irrigation events, the system operated until the equivalent of 0.5 inch of water had fallen.

Additional irrigation maintenance activities included replacement of pipe couplings, bushings, valves, 0.25-inch flexible hose, and PVC pipe. Extreme seasonal heat at the Site resulted in the white PVC pipes turning black and bending, causing connections to loosen and leak.

A major upgrade of the floodplain irrigation system was conducted in November and December 2024, as described in Section 4.1.

New 0.25-inch hoses and emitters were added to one salvaged beavertail cactus in UHR-1 in January. Irrigation in UHR-1 occurred every 3 weeks from January 2024 through September 2024. Irrigation in this mitigation planting area was discontinued. In October 2024 the irrigation tank was removed from UHR-1 and stored at the Project construction material yard.

6.2 Fencing Maintenance

The following maintenance was performed during Year 2 to preserve the integrity of the herbivore exclusion fence:

- Seasonal extreme weather conditions caused the ultraviolet-resistant, heavy-duty zip ties, which held the wire fence to the fence posts, to slowly degrade and break. As broken zip ties are discovered, they are replaced with bailing wire.
- Routine monitoring of the fence perimeter was conducted to assess the fence for erosion or animal damage. A desert cottontail rabbit created a hole under the fence in Area 1. The cottontail rabbit was excluded from the mitigation planting area, and the hole in the fence was wired shut.

6.3 Erosion Control Best Management Practice Maintenance

Several heavy rain events during Year 2 caused sudden water flow under the wildlife exclusion fence on the west side of Areas 3 and 5. In some instances, this caused gravel bags to be pushed downgradient and required replacement to reduce the energy of water flow. Gravel bags were positioned to allow water to readily pass during smaller flow events. Considerable sediment was transported into Areas 3 and 5, which scoured natural channels in some areas and spread out in others.

Straw wattles placed between the Colorado River and east side of the Areas 1 and 2, were replaced to maintain effectiveness of this erosion control measure after rodents burrowed into the wattles.

6.4 Invasive Plant Species Abatement Results

Biologists or maintenance subcontractors conducted invasive plant species treatments during routine monitoring events. All invasive plant species treatment events are summarized in Table 6-1 and shown on Figures 8A and 8B.

Weeds pulled by biologists during monthly monitoring events generally consisted of small patches non-native species that could be easily removed by hand. Subcontractors treated large infestations of weeds subject to manual removal, as directed and monitored by Arcadis including removal of saltcedar seedlings, Russian thistle,

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Sahara mustard, puncturevine, and Bermuda grass. These weeds required a shovel, loppers, or a saw to remove. All weeds were bagged and removed from the Site for disposal.

Bermuda grass was excavated and covered with carboard and wood mulch in February, June, and September. This approach was successful at controlling the species.

Table 6-1 Invasive Plant Species Abatement Summary

Scientific Name	Common Name	California Invasive Plant Council Rating ^a	Area Name(s)	Abatement Type(s)	Date(s) of Abatement
<i>Brassica tournefortii</i>	Saharan mustard	high	Area 1, 2, 3, and 5	Pull	1/17/2024, 2/21/2024, 2/22/2024, 5/13/2024
<i>Chenopodium murale</i>	nettleleaf goosefoot	no rating	Area 1, 2, 3, 4 and 5	Pull	1/17/2024, 1/18/2024, 2/21/2024, 2/22/2024, 5/13/2024, 5/14/2024, 5/15/2024
<i>Cynodon dactylon</i>	Bermuda grass	moderate	Area 1, 2, 3 and 5	Dig, Pull	2/22/2024, 4/10/2024, 5/13/2024, 5/14/2024, 7/31/2024, 9/11/2024
<i>Festuca myuros</i>			Area 5	Pull	2/22/2024
<i>Hordeum murinum</i>	foxtail barley	moderate	Area 1 and 5	Pull	2/22/2024, 5/13/2024
<i>Kochia scoparia</i>	summer-cypress	limited	Area 1 and 2	Pull	5/13/2024, 6/12/2024
<i>Medicago sativa</i>	alfalfa	no rating	Area 2	Pull	4/10/2024
<i>Melilotus albus</i>	white sweetclover	no rating	Area 2	Pull	4/10/2024
<i>Oncosiphon pilulifer</i>	stinknet	high	Area 4 and 5	Pull	5/13/2024, 5/15/2024
<i>Phalaris minor</i>	little-seeded canary grass	no rating	Area 2 and 5	Pull	5/13/2024
<i>Phragmites australis</i>	common reed	no rating	Area 1 and 2	Dig, Pull	4/10/2024, 5/15/2024, 6/13/2024, 7/31/2024, 9/15/2024
<i>Polygonum argyrocoleon</i>	silversheath knotweed	no rating	Area 3 and 5	Pull	2/22/2024, 5/13/2024, 5/14/2024
<i>Salsola tragus</i>	Russian-thistle	limited	Area 2	Pull	5/14/2024, 6/12/2024,

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Scientific Name	Common Name	California Invasive Plant Council Rating ^a	Area Name(s)	Abatement Type(s)	Date(s) of Abatement
<i>Schismus barbatus</i>	Mediterranean grass	limited	Area 2, 3 and 5	Pull	2/20/2024, 2/21/2024, 2/22/2024 5/13/2024, 5/15/2024
<i>Sisymbrium irio</i>	London rocket	limited	Area 2, 4 and 5	Pull	2/21/2024, 2/22/2024
<i>Sonchus oleraceus</i>	sow-thistle	no rating	Area 1, 2, 4 and 5	Pull	2/22/2024, 5/13/2024, 5/14/2024
<i>Tamarix ramosissima</i>	saltcedar	high	Area 5	Dig	2/22/2024, 5/15/2024
<i>Tribulus terrestris</i>	puncturevine	occasional	Area 2	Pull	5/13/2024, 9/12/2024
<i>Washingtonia robusta</i>	Mexican fan palm	moderate	Area 5	Dig	11/20/2024

Note:

^a California Invasive Plant Inventory (California Invasive Plant Council 2024)

6.5 Arrowweed Abatement Results

Following the abatement methods detailed in Section 4.4.3, arrowweed was removed using a two-step process if it occurred within a 3-foot radius of any mitigation plantings or was cut at ground level and removed from the Site if it occurred within a 3- to 5-foot radius of a mitigation plant. Arrowweed that was cut or excavated was bagged and removed from the mitigation planting area so that it would not resprout or blow around the Site. The cuttings were offered to the Tribes and stored in a designated location for retrieval.

Table 6-2 Arrowweed Abatement Summary

Scientific Name	Common Name	Area Name(s)	Abatement Type(s)	Date(s) of Abatement
<i>Pluchea sericea</i>	arrowweed	Area 1, 2, 3, and 5	Pull, Dig, Cut	2/22/2024, 5/13/2024, 5/14/2024, 6/14/2024, 9/11/2024, 11/4/2024

7 Summary and Conclusion

A total of 663 surviving mitigation plants were censused in all mitigation planting areas in Year 2 (a survival rate of 93.4 percent).

A total of 610 surviving riparian and wash mitigation plants are present in floodplain mitigation Areas 1 through 5 in Year 2. Mean Year 2 survival of floodplain mitigation plants is 93.8 percent, well above the performance standard of 75 percent survival. A total of 53 surviving upland mitigation plants were censused in the upland mitigation area UHR-1 as well as in Areas 1, 3, and 5 in Year 2. Mean Year 2 survival of upland mitigation plants is 100 percent.

Mean survival of all mitigation plant species (93.4 percent) exceeds the required performance standard of 75 percent survival.

Mitigation plant species remained in good to excellent health in all areas, with only a few individuals in fair to poor health. A few blue palo verde individuals growing in soils with high salinity and/or compacted soils near access roads exhibited slow growth and poor health compared with plants in well-drained substrates, and these individuals were offset by new volunteer recruits of the same species that were growing vigorously. One desert smoke tree was also assigned a poor health assessment but may recover during the growing season.

At the time of initial planting in March 2022, floodplain planting Areas 1-5 were mostly devoid of vegetation after saltcedar removal, with only seven native plant species present. By the end of Year 2, a total of 43 native vascular plant species were observed in Areas 1-5. Prior to initial planting in March 2022, six native wildlife species were reported in floodplain planting Areas 1-5. During the past two years a total of 40 native wildlife species and 2 additional species with unknown nativity have been observed in floodplain mitigation planting areas.

At the time of planting, the upland revegetation area UHR-1 supported five native species. By the end of Year 2, a total of 21 native vascular plant species were observed in UHR-1. Prior to initial planting in March 2022, five native wildlife species were reported in UHR-1. During the past two years a total of nine native wildlife species have been observed in UHR-1.

Adaptive management included replacement mitigation plantings for Anderson's desert thorn, soil salinity sampling, and stress symptom monitoring. Soil sampling in September 2024 indicated an increase in soil salinity during Year 2 at surface levels. Consultations in November 2024 with Ben Waddell, the director of FGL in Santa Paula, resulted in several recommended follow-up actions that are currently being implemented.

Revegetation maintenance included invasive plant species eradication, irrigation, erosion control, herbivore exclusion, general site housekeeping and cleanup, and the general care and nurturing of plantings within the mitigation planting areas in Year 2.

The Topock Revegetation Project is on a positive trajectory to successfully revegetate the floodplain area and upland mitigation planting area with native species that provide cover, richness, structural diversity, and enhanced ecological functioning during each successive monitoring year. This Project is anticipated to continue to meet required performance standards in Year 5.

8 References

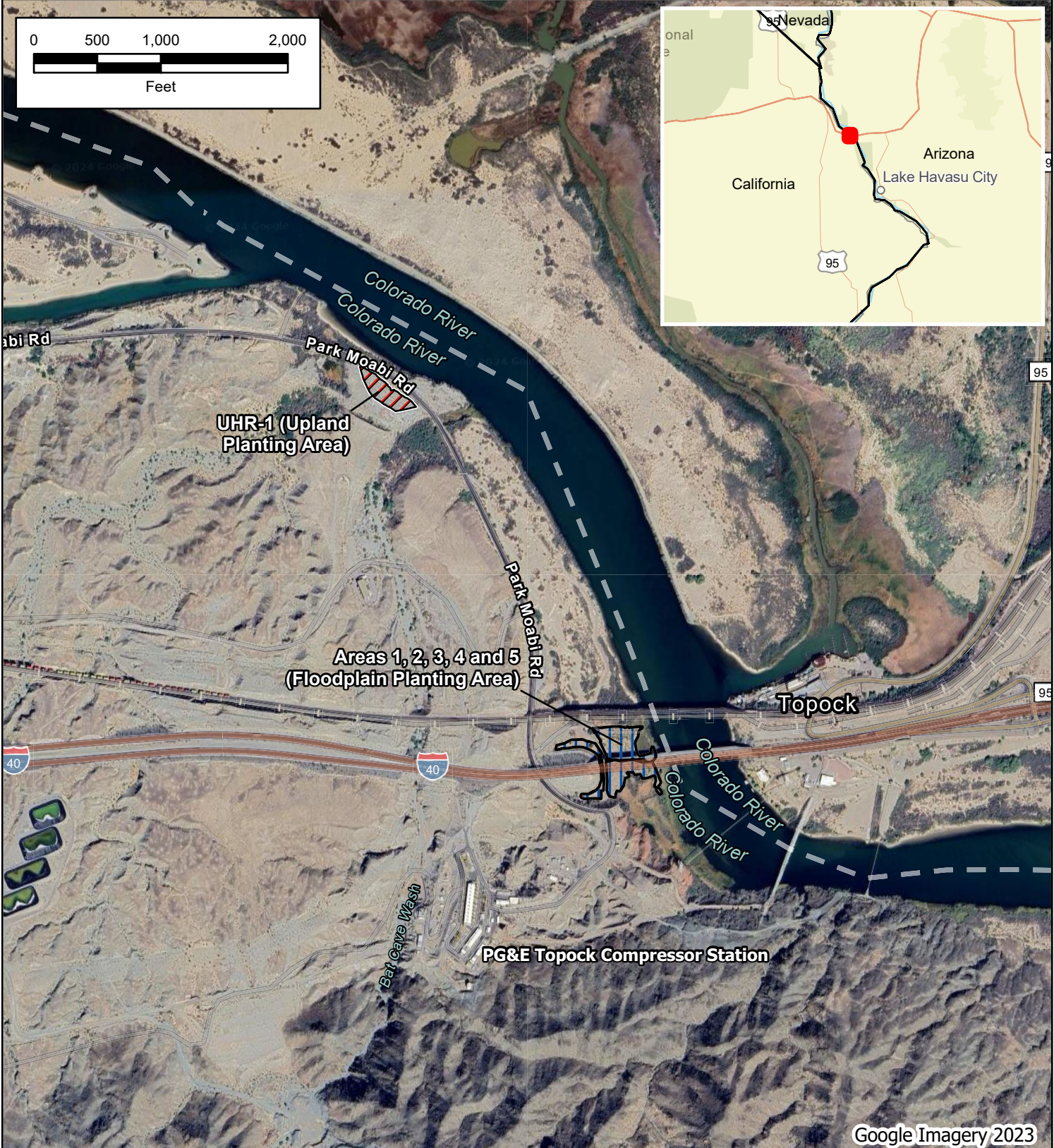
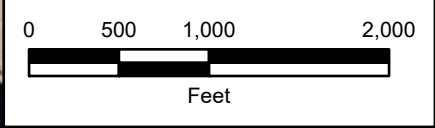
- AECOM. 2011a. Final Environmental Impact Report Volume 1 for the Topock Compressor Station Groundwater Remediation Project. Prepared for California Department of Toxic Substance Control, Sacramento, California. (SCH #2008051003). January.
- AECOM. 2011b. Final Environmental Impact Report Volume 2 for the Topock Compressor Station Groundwater Remediation Project. Prepared for California Department of Toxic Substance Control, Sacramento, California. (SCH #2008051003). January.
- Arcadis, U.S., Inc (Arcadis). 2024. Topock Revegetation Year 1 Mitigation Monitoring Report. January.
- Bainbridge, D.A., J. Tiszler, R. Macaller, and M.F. Allen. 2001. Irrigation and Mulch Effects on Desert Shrub Transplant Establishment. *Native Plants Journal*. 2:25-29.
- Baldwin, B.G., S. Boyd, B.J. Ertter, D.J. Keil, R.W. Patterson, T.J. Rosatti, and D.H. Wilken. 2012. *The Jepson Manual, Vascular Plants of California, Second Edition*. University of California Press. <https://ucjeps.berkeley.edu/eflora/>.
- California Herps. 2024. A Guide to the Amphibians and Reptiles of California. <http://www.californiaherps.com>.
- California Invasive Plant Council. 2024. California Invasive Plant Inventory. <https://www.cal-ipc.org/plants/inventory/>.
- CH2M Hill. 2015. Construction/Remedial Action Work Plan for the Final Groundwater Remedy. PG&E Topock Compressor Station, Needles, California. Prepared for Pacific Gas and Electric Company. November.
- CH2M Hill and E2 Consulting Engineers. 2014a. Topock Compressor Station Groundwater Remediation Project Aesthetics and Visual Resources Protection and Revegetation Plan. Appendix N to the Construction/Remedial Action Work Plan for the Final Groundwater Remedy. PG&E Topock Compressor Station, Needles, California. Prepared for Pacific Gas and Electric Company. September.
- CH2M Hill and E2 Consulting Engineers. 2014b. Topock Compressor Station Groundwater Remediation Project Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats. Appendix O to the Construction/Remedial Action Work Plan for the Final Groundwater Remedy. PG&E Topock Compressor Station, Needles, California. Prepared for Pacific Gas and Electric Company. September.
- CH2M Hill and E2 Consulting Engineers. 2015. Topock Compressor Station Groundwater Remediation Project, Havasu National Wildlife Refuge, Habitat Restoration Plan. Appendix G to the Construction/Remedial Action Work Plan for the Final Groundwater Remedy. PG&E Topock Compressor Station, Needles, California. Prepared for Pacific Gas and Electric Company. November.
- CH2M Hill and GANDA. 2014. Topock Groundwater Remediation Project Mitigation and Monitoring Plan for Culturally Significant Plants. Appendix A to the Cultural Impact Mitigation Program within Appendix H to the Construction/Remedial Action Work Plan for the Final Groundwater Remedy. PG&E Topock Compressor Station, Needles, California. Prepared for Pacific Gas and Electric Company. April.
- Cornell Lab of Ornithology and the American Ornithologists Union (Cornell). 2024. The Birds of the World Online. <https://birdsoftheworld.org>.
- California Department of Toxic Substance Control (DTSC). 2013. Topock Compressor Station Ground Water Remediation Project Environmental Impact Report Addendum No. 1 for Alternative Freshwater Source Evaluation Activities.

Topock Revegetation Year 2 Mitigation Monitoring Report

- DTSC. 2017. Final Subsequent Environmental Impact Report for the Pacific Gas and Electric Company Topock Compressor Station Final Ground Water Remediation Project Volume I and II (SCH#2008051003) prepared by ESA. December.
- DTSC. 2018. Topock Compressor Station Final Ground Water Remediation Project Draft Subsequent Environmental Impact Report: CEQA Findings of Fact and Statement of Overriding Considerations. Prepared by ESA. April
- DTSC. 2022. Subsequent Environmental Impact Report Addendum for the Modification of Replanting Areas for the Pacific Gas and Electric Company Topock Compressor Station Final Ground Water Remediation Project (SCH#2008051003). January.
- Fruit Growers Laboratory (FGL). 2021a. General Soil Analysis, September 2021. PG&E Topock. FGL Environmental Agricultural Analytical Chemists.
- FGL. 2021b. Email from B. Waddell, Director of Agricultural Services (FGL) to M. Carroll (Arcadis) re: Protocol for PG&E Topock Soil Leaching Effort (SP 2113657:014-0230).
- FGL. 2022a. General Soil Analysis, February 2022. PG&E Topock. FGL Environmental Agricultural Analytical Chemists.
- FGL. 2022b. General Soil Analysis, March 2022. PG&E Topock. FGL Environmental Agricultural Analytical Chemists.
- FGL. 2022c. General Soil Analysis, April 2022. PG&E Topock. FGL Environmental Agricultural Analytical Chemists.
- FGL. 2022d. General Soil Analysis, June 2022. PG&E Topock. FGL Environmental Agricultural Analytical Chemists.
- FGL. 2022e. General Soil Analysis, August 2022. PG&E Topock. FGL Environmental Agricultural Analytical Chemists.
- FGL. 2023. General Soil Analysis, July 2023. PG&E Topock. FGL Environmental Agricultural Analytical Chemists.
- FGL. 2024. General Soil Analysis, October 2024. PG&E Topock. FGL Environmental Agricultural Analytical Chemists.
- Hall, F.C. 2002. Photo Point Monitoring Handbook: Part A- Field Procedures. Prepared for U.S. Department of Agriculture. March.
- Jepson Flora Project (eds.). 2024. Jepson eFlora. Located at: ucjeps.berkeley.edu/eflora.
- Miyamoto, S., I. Martinez, M. Padilla, A. Portillo, and D. Ornelas. 2004. Landscape Plant Lists for Salt Tolerance Assessment. USDI Bureau of Reclamation. <http://thenoise.us/resources/TexasAMPlantSaltTolerance.pdf>
- Strohl, V. 2020. Status of the Transplantation Effort and Recommendations for Future Transplantation Efforts: Final Groundwater Remedy, Topock Compressor Station, California. Technical Memorandum. Pacific Gas & Electric Company. April.
- U.S. Bureau of Land Management. 2012. Cultural and Historic Properties Management Plan (CHPMP). Topock Remediation Project.



Figures

Path: T:\LEWAPGE_Topock\GEC\Pro\2024\2024_Year_2\11X17\Annual Report Figure 2024_Year_2_Figure_1_2_3A_3B_4A_4B_4C_4D_4E_4F_11X17.aprx\Figure



Google Imagery 2023

Legend

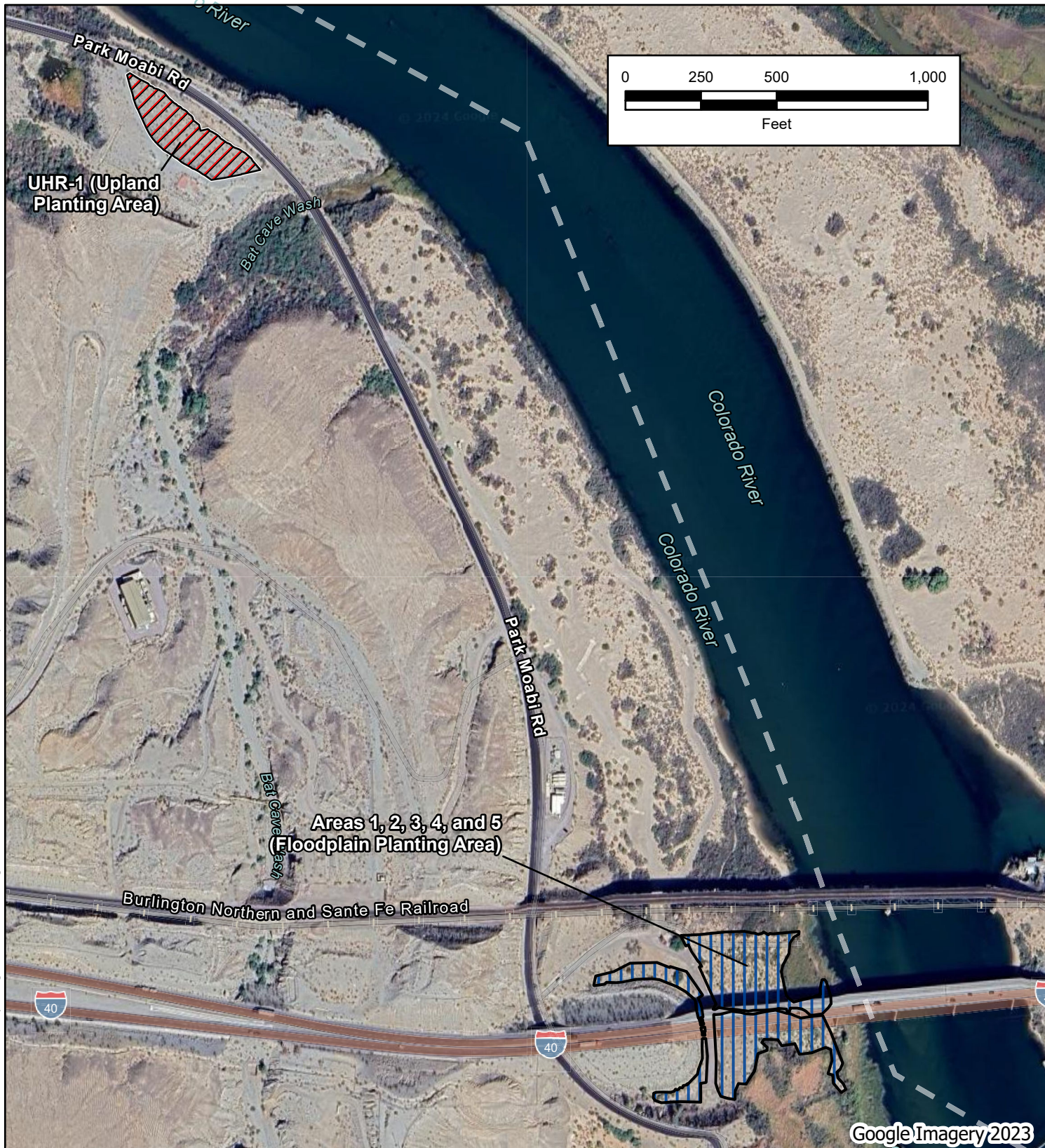
-  Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)
-  UHR-1 (Upland Planting Area)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

Site Location





FIGURE
1



Google Imagery 2023

Legend

-  Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)
-  UHR-1 (Upland Planting Area)

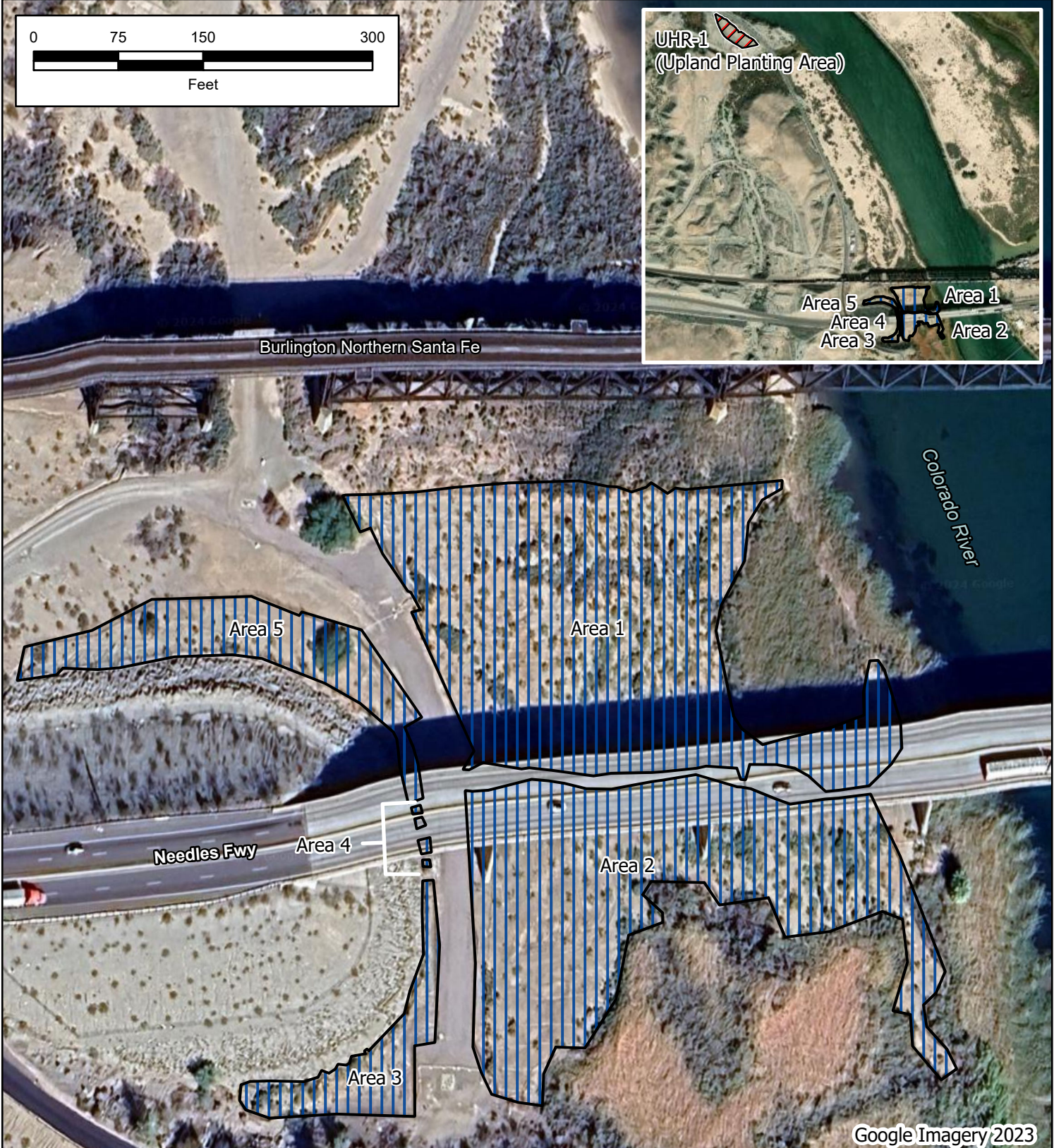
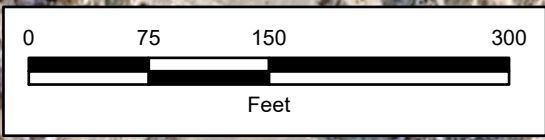
**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

Site Overview




FIGURE
2

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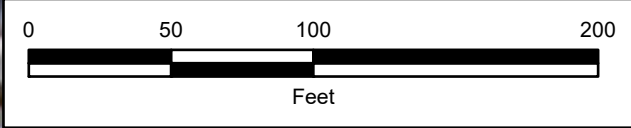
 Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)

Note: Planting areas reduced for 10' setback from TransWestern gas pipeline, BNSF ROW, and PG&E water pipelines. Actual planting of large trees may be set back 20' or more from TransWestern gas pipeline and other infrastructure to allow for setback of spreading and overhanging branches of planted trees.



**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

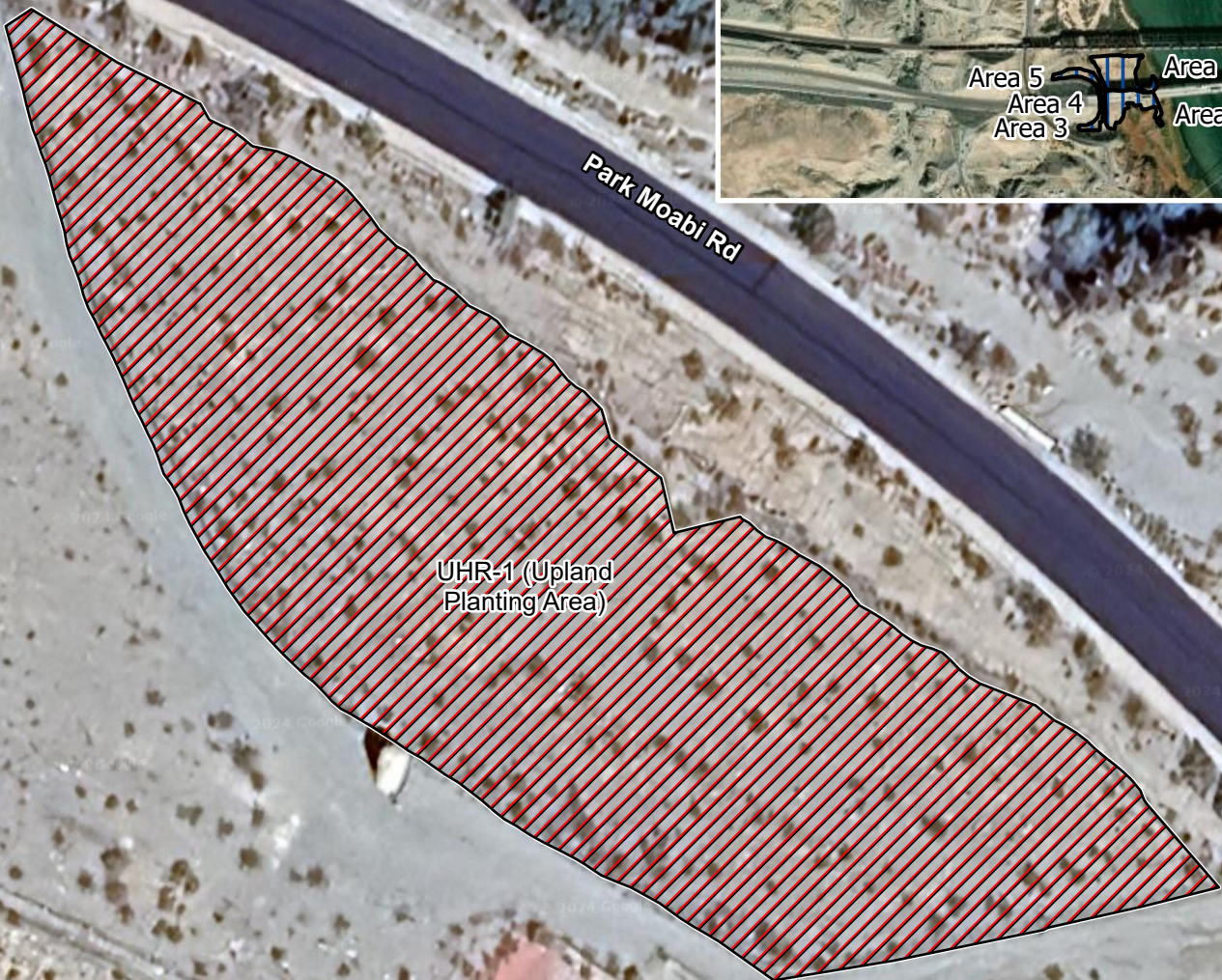
**Mitigation Planting Areas
in Floodplain**



Colorado River



Park Moabi Rd




UHR-1 (Upland Planting Area)

Google Imagery 2023

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Legend

 UHR-1 (Upland Planting Area)

Note: Planting areas reduced for 10' setback from TransWestern gas pipeline, BNSF ROW, and PG&E water pipelines. Actual planting of large trees may be set back 20' or more from TransWestern gas pipeline and other infrastructure to allow for setback of spreading and overhanging branches of planted trees.



**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

**Mitigation Planting
Area in UHR-1**



**FIGURE
3B**

Path: T:_ENV\PG&E_Topock\GEC\Pro\2024\2024_Year_2\11X17\Annual Report Figure



Google Imagery 2023

Legend

- Area 1
- Blue palo verde (Container Planting)
- ★ Honey mesquite (Volunteer Recruit)
- Screwbean mesquite (Volunteer Recruit)
- ▲ Anderson's desert thorn (Volunteer Recruit)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

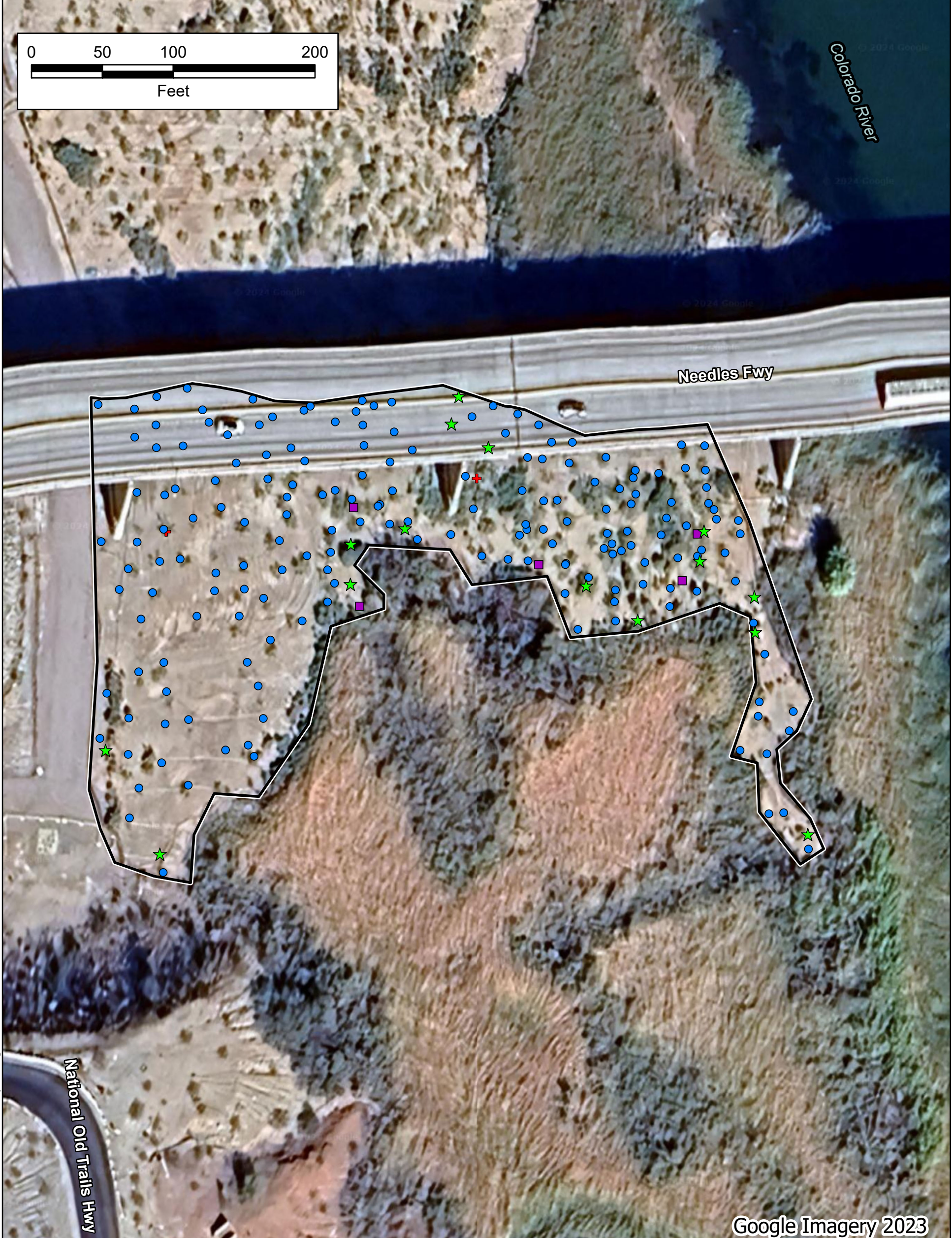
Mitigation Plants in Area 1



ARCADIS

**FIGURE
4A**

Path: T:_ENV\PG&E_Topock\GEC\Pro\2024\2024_Year_2\11X17\Annual Report Figure



Google Imagery 2023

Legend

- Area 2
- Blue palo verde (Container Planting)
- ★ Honey mesquite (Volunteer Recruit)
- Screwbean mesquite (Volunteer Recruit)
- ✚ Blue palo verde (Volunteer Recruit)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

Mitigation Plants in Area 2



ARCADIS

**FIGURE
4B**

Path: T:_ENV\PG&E_Topock\GEC\Pro\2024\2024_Year_2\11X17\Annual Report Figure



Google Imagery 2023

Legend

- Area 3
- Blue palo verde (Container Planting)
- ★ Honey mesquite (Volunteer Recruit)
- ▲ Desert smoke tree (Container Planting)
- △ Cattle saltbush (Volunteer Recruit)
- ⊕ Blue palo verde (Volunteer Recruit)
- ▲ Anderson's desert thorn (Container Planting)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

Mitigation Plants in Area 3



**FIGURE
4C**



Legend

- Area 4
- Blue palo verde (Container Planting)
- + Blue palo verde (Volunteer Recruit)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

Mitigation Plants in Area 4



**FIGURE
4D**

Path: T:_ENV\PGE_Topock\GEC\Pro\2024\2024 Year 2\11X17\Annual Report Figure



Legend

- Area 5
- Blue palo verde (Container Planting)
- ✚ Blue palo verde (Volunteer Recruit)
- ★ Honey mesquite (Volunteer Recruit)
- Screwbean mesquite (Volunteer Recruit)
- ▲ Desert smoke tree (Container Planting)
- Catclaw acacia (Container Planting)
- ▲ Anderson's desert thorn (Container Planting)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

Mitigation Plants in Area 5



**FIGURE
4E**

Path: T:_ENV\PG&E_Topock\GEC\Pro\2024\2024_Year_2\11X17\Annual Report Figure



Google Imagery 2023

Legend

- UHR-1 (Upland Planting Area)
- Buckhorn cholla (Container Planting)
- Silver cholla (Container Planting)
- Beavertail cactus (Container Planting)
- Beavertail cactus (Salvaged Planting)
- Cattle saltbush (Container Planting)

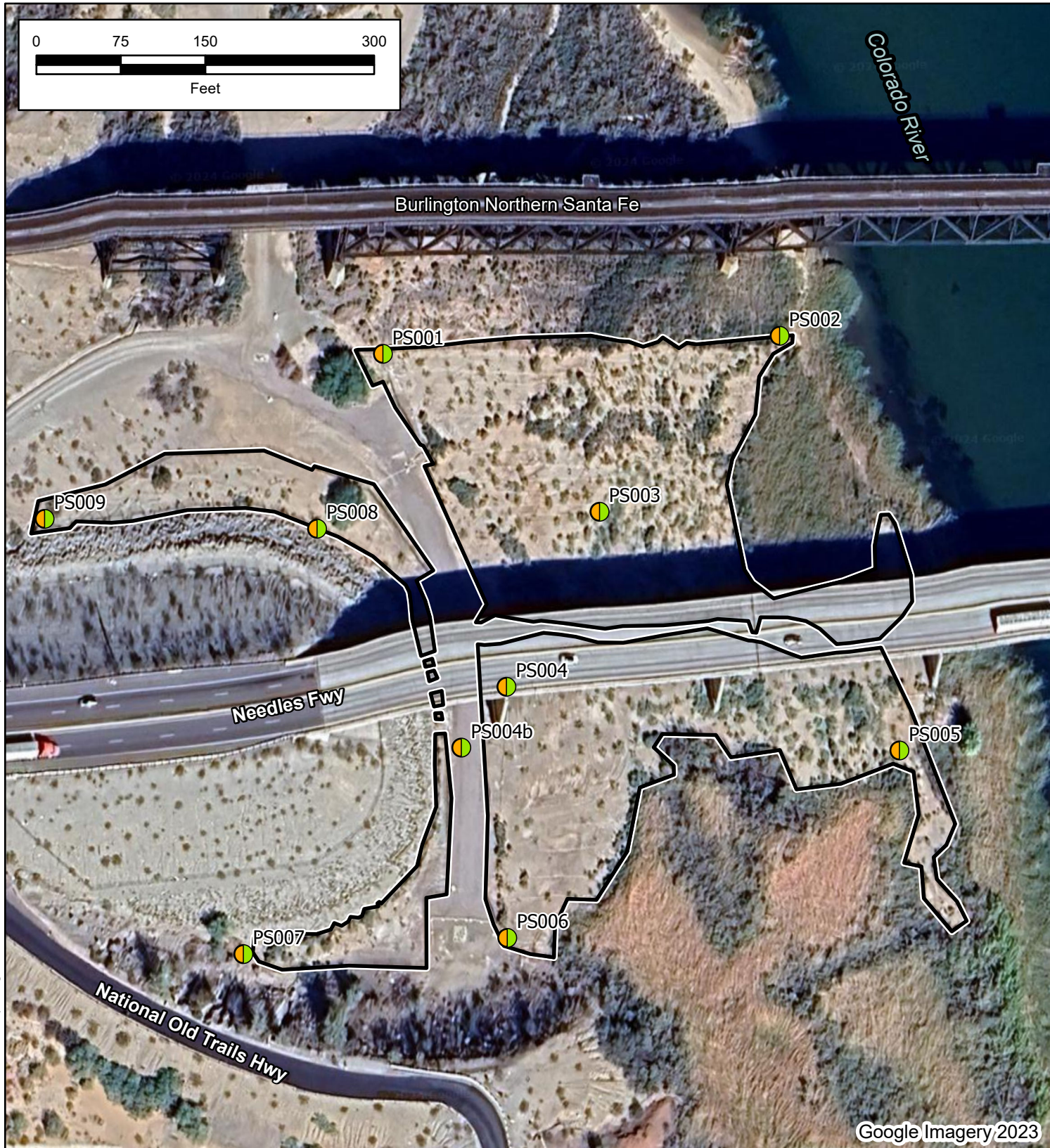
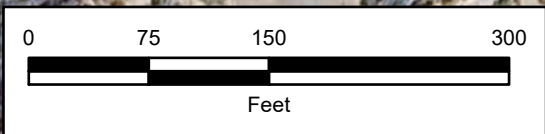
**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

Mitigation Plants in UHR-1



**FIGURE
4F**

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Legend

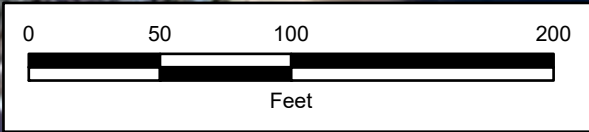
- Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)
- Photo Stations

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2 MITIGATION
MONITORING REPORT**



**Photo-monitoring Stations in
Floodplain Mitigation Planting Areas**



**FIGURE
5A**



Legend

-  UHR-1 (Upland Planting Area)
-  Photo Stations

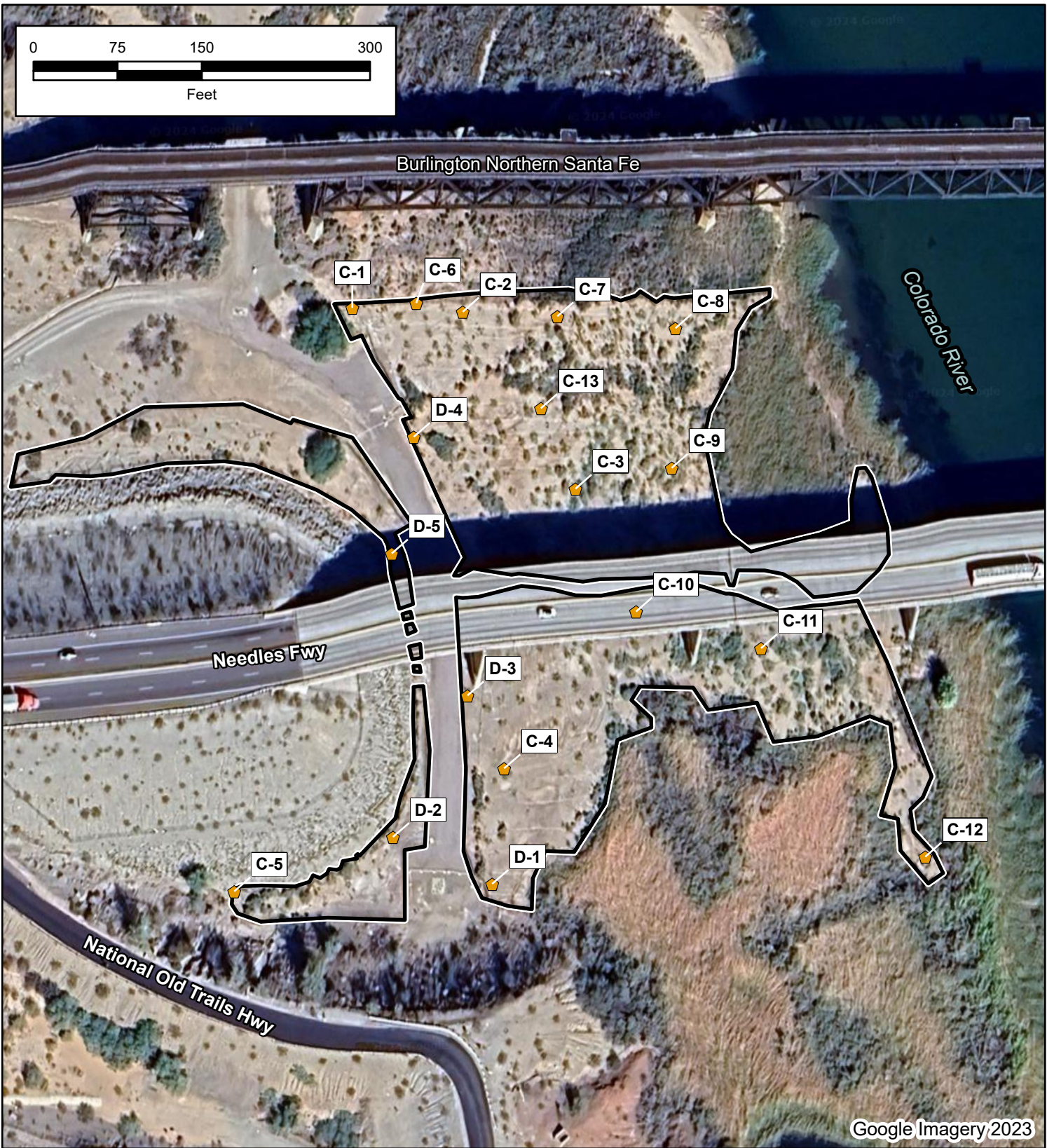
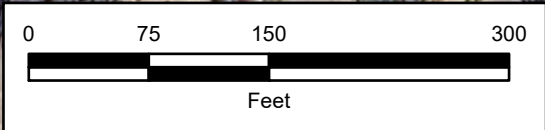
**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

**Photo-monitoring Stations in
UHR-1**



**FIGURE
5B**

Path: T:\ENW\PG&E_Topock\GEC\Pro\2024\2024_Year_2_5A_5B_6_7_8A_8B_9A_and_9B_11x17.aprx



Google Imagery 2023

Legend

- C-5** Soil Sampling Location Name
- Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)

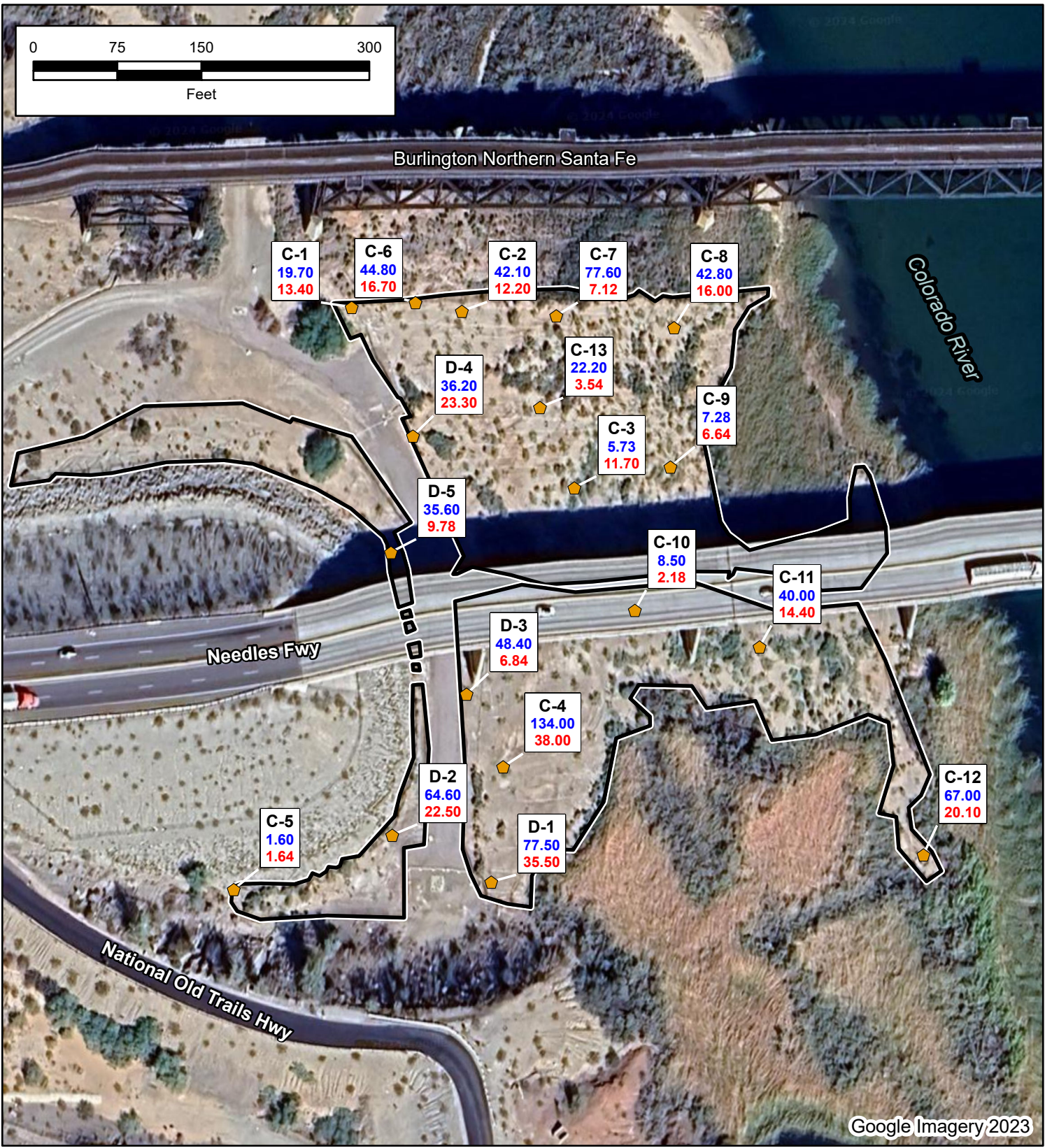
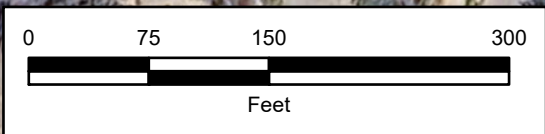
**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

Soil Sampling Locations







**FIGURE
6**

Path: T:\LEWAPGE_Topock\GEC\Pro\2024\Year_2\11X17\Annual Report Figure 2024_Year_2_5A_5B_6_7_8A_8B_9A_and_9B_11x17.aprx



Google Imagery 2023

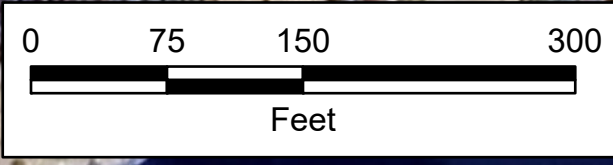
Legend

-  **C-5** Soil Sampling Location Name
-  September 2024 salinity measurements at 0-12 inches below ground surface (deciSiemens per meter)
-  September 2024 salinity measurements at 12-24 inches below ground surface (deciSiemens per meter)
-  Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

**Soil Sampling Results -
September 2024**





	Little-seeded canary grass		Mediterranean grass (<i>Schismus barbatus</i>)
	Saharan mustard (<i>Brassica tournefortii</i>)		Sow-thistle (<i>Sonchus oleraceus</i>)
	Nettleleaf goosefoot (<i>Chenopodium murale</i>)		Saltcedar (<i>Tamarix ramosissima</i>)
	Bermuda grass (<i>Cynodon dactylon</i>)		Puncture vine (<i>Tribulus terrestris</i>)
	Common reed (<i>Phragmites australis</i>)		London rocket (<i>Sisymbrium irio</i>)
	Silversheath knotweed (<i>Polygonum argyrocoleon</i>)		Arrowweed (<i>Pluchea sericea</i>)

Google Imagery 2023

Legend		Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)
Invasive Plant Species		Russian thistle (<i>Salsola tragus</i>)
		Mediterranean grass (<i>Schismus barbatus</i>)
		Sow-thistle (<i>Sonchus oleraceus</i>)
		Saltcedar (<i>Tamarix ramosissima</i>)
		Puncture vine (<i>Tribulus terrestris</i>)
		London rocket (<i>Sisymbrium irio</i>)
		Mexican fan palm
		White sweetclover

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

**Observed Invasive Plant Species and
Arrowweed Locations in Floodplain
Mitigation Planting Areas – Year 2**



ARCADIS | **FIGURE 8A**



Path: T:_ENV\PG&E_Topock\GEC\Pro\2024\2024_Year_2\11X17\Annual Report Figure



Legend

-  UHR-1 (Upland Planting Area)
-  Mediterranean grass (*Schismus barbatus*)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

**Observed Invasive Plant
Species Locations in UHR-1-
Year 2**





**FIGURE
8B**

Path: T:_ENV\PG&E_Topock\GEC\Pro\2024\2024_Year_2\11X17\Annual Report Figure



Legend

-  Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)
-  Arrowweed (*Pluchea sericea*)

All arrowweed stems and rhizomes removed within 3 feet of the center of mitigation plantings. All arrowweed plants cut at ground level within a 3-to 5-foot radius of the center of mitigation plants, with cut stems removed from the site.



**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

**Arrowweed Locations Planned for
Removal in Early 2025 in Floodplain
Mitigation Planting Areas**





**FIGURE
9A**

Path: T:_ENV\PG&E_Topock\GEC\Pro\2024\2024_Year_2\11X17\Annual Report Figure



Legend

-  UHR-1 (Upland Planting Area)
-  Mediterranean grass (*Schismus barbatus*)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 2
MITIGATION MONITORING REPORT**

**Invasive Plant Species Locations
Planned for Removal in Early 2025
in UHR-1**



**FIGURE
9B**

Appendix A

Applicable Project Mitigation Measures

Mitigation Measure Title	Mitigation Measure Description
Mitigation Measure AES-1: Substantial Adverse Effects on Scenic Vistas	(Groundwater FEIR Measure with Revisions). The proposed Project, including the Future Activity Allowance, shall be designed and implemented to adhere to the design criteria presented below: (f) The requirements of the Aesthetics and Visual Resources Protection and Revegetation Plan (C/RAWP Appendix N) shall be implemented throughout the construction, operation and maintenance, and decommissioning phases of the Project, including but not limited to replacement planting procedures (see Section 4.3), maintenance and adaptive management (see Section 5.2), and photo-monitoring (see Section 5.3). These measures apply to new Project components added as part of the Future Activity Allowance, should they be visible from Key View 5 or any of the other key views identified in the SEIR.
Mitigation Measure BIO-1a: No-net-loss of Jurisdictional Wetlands/Waters Function or Value (New Measure).	<p>Unavoidable direct impacts to jurisdictional areas shall be documented by a wetland specialists or Field Contact Representative (FCR) during implementation of the proposed Project. To document unavoidable direct impacts, the extent of work areas near jurisdictional areas shall be delineated in the field using GPS technology and pre- and post-impact conditions of jurisdictional areas documented with photographs. The nature of construction within work areas shall also be described, including the Project facilities installed, equipment utilized, and duration of construction activities. Documentation of unavoidable impacts shall be submitted to CDFW and DTSC to ensure adequate mitigation is provided consistent with the requirements below. Unavoidable direct impacts to non-disturbed jurisdictional ephemeral waters (estimated at up to approximately 1.61 acres including direct impacts resulting from planned facilities and additional facilities constructed under the Future Activity Allowance) shall be mitigated to ensure no-net-loss of function or value. Mitigation shall include both (a) and (b) detailed below. Mitigation for ground disturbance associated with restoration and enhancement activities shall not be required.</p> <p>a) In-place restoration of jurisdictional areas directly impacted by construction at a 1:1 ratio (i.e., 1 acre of restoration for each acre of direct impact to non-disturbed jurisdictional area) shall occur in accordance with the Havasu National Wildlife Refuge Habitat Restoration Plan (Appendix G to the C/RAWP (CH2M Hill 2015b)) and Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (Appendix O to the C/RAWP (CH2M Hill 2015b)). In-place restoration of areas directly impacted during construction will occur in two phases. The first phase will involve restoration within the areas directly impacted by construction where it will not interfere with continued operation and maintenance of the proposed Project (e.g., restoration of temporary construction work areas). The first phase of restoration shall begin within 1 year of completing construction. The second phase will involve restoration of areas that will be occupied by Project facilities to occur following decommissioning of the proposed Project. Restoration of jurisdictional areas following decommissioning of the proposed Project will be guided by a Final Habitat Restoration Plan (refer to Mitigation Measure BIO-1b).</p> <p>b) To address temporal loss of jurisdictional areas directly impacted by construction, PG&E shall provide compensatory mitigation at a minimum 2:1 ratio (2 acres of compensation for each acre of direct impacts to non-disturbed jurisdictional area). Compensatory mitigation to address temporal loss shall be agreed upon with CDFW prior to the start of construction, involve the same amount and quality of jurisdictional area(s) disturbed, and include one or more of the following approaches: 1) acquisition and preservation in perpetuity; 2) restoration; and/or 3) enhancement. Acquisition and preservation may include establishment of a conservation easement or purchase of credits from a CDFW- and/or USACE -approved mitigation banking program, or compliance with an applicable CDFW and/or USACE-approved in-lieu fee program. Restoration may include conversion of non-wetland habitat to functioning wetland habitat. Enhancement may include removal of non-native species in existing wetland habitat. As summarized in the technical memorandum, Assessment of Proposed Mitigation Planting</p> <p>Areas for Final Groundwater Remedy Impacts, included as Appendix V to the C/RAWP (CH2M Hill 2015b), PG&E has identified restoration areas within the historical floodplain of the Colorado River. The historical floodplain no longer functions as a riparian habitat with hydrologic connectivity to the river; therefore, restoration in the historical floodplain may qualify as compensatory mitigation to address temporal loss if hydrologic function can be restored. PG&E shall prepare a mitigation plan prior to the start of construction to specify methodology, criteria for meeting the 2:1 mitigation requirement, and monitoring and reporting for compensatory mitigation. The plan shall be subject to CDFW approval and in conformance with the identified performance standards, and submitted to DTSC, BLM, BOR, USFWS, DOI, Interested Tribes, and other appropriate landowners for review and comment within 60 days prior to finalization, as appropriate based on location of impacts.</p> <p>Restoration of jurisdictional areas within the Project Area shall be guided by the Havasu National Wildlife Refuge Habitat Restoration Plan (Appendix G to the C/RAWP [CH2M Hill 2015b]) and Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (Appendix O to the C/RAWP [CH2M Hill 2015b]), as approved by CDFW, USFWS, and DOI. Implementation of these plans will be informed by the technical memorandum, Assessment of Proposed Mitigation Planting Areas for Final Groundwater Remedy Impacts, included as Appendix V to the C/RAWP (CH2M Hill 2015b), which provides preliminary information on the condition within fourteen proposed mitigation planting areas. The habitat restoration plans also specify on-site restoration success criteria, monitoring and reporting requirements, and adaptive management guidelines for salvage and replanting of trees, shrubs, and perennial species. In accordance with the habitat restoration plans, removal of riparian trees (e.g., palo verde trees) shall be replaced at a 3:1 ratio (i.e., planting 3 trees in restoration areas for each tree removed during construction). The success criteria for mitigation plantings shall be a final minimum plant replacement ratio of 2.25:1 (75% overall survival rate) of mitigation plantings at the end of a minimum 5-year monitoring period. Adaptive management guidelines outline modifications to restoration approaches, as appropriate, to ensure successful establishment of native vegetation and desired density of cover of plants. As required by the plans, the following adaptive management actions shall be implemented if success criteria are not being met: weed control, irrigation modification, herbivory protection, and additional plantings.</p> <p>Reporting to DTSC, CDFW, and USFWS shall be completed within 90 days of completing each monitoring year.</p> <p>The habitat restoration plans also specify design and construction avoidance and minimization measures, including:</p> <ul style="list-style-type: none"> -Locating pipelines, wells, and staging and storage areas along roadways, pipeline rights-of-way, and other previously disturbed areas to avoid impacts to vegetation to the extent feasible. -Performing pre-activity surveys prior to ground disturbance to identify and demark with flagging, fencing, and/or signage areas of native vegetation and sensitive habitats in the immediate vicinity of the construction areas. -Providing construction workers with environmental awareness training regarding biological resources including sensitive species and habitats.

Appendix B

Photographs of Revegetation Implementation Activities



Photo: 1

Date:

September 14, 2024

Description:

Overview of Areas 1, 2, and 3 as seen from National Trails Highway facing north.

Location:

National Trails Highway south of Highway I-40.

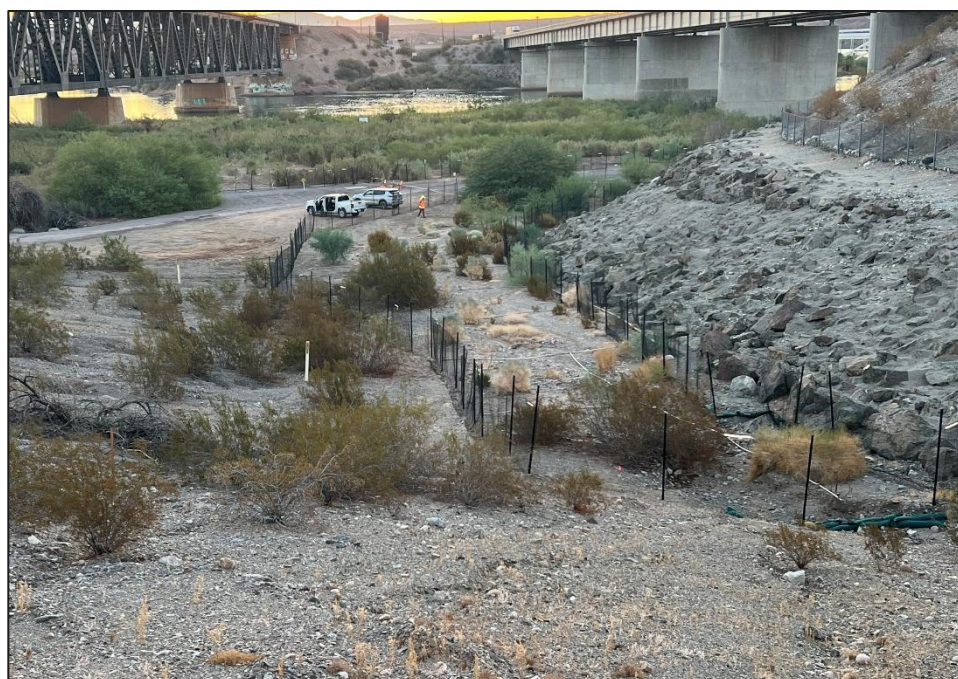


Photo: 2

Date:

September 14, 2024

Description:

Overview of Areas 1 (background) and 5 (foreground) as seen from National Trails Highway facing east.

Location:

National Trails Highway north of Highway I-40.



Photo: 3

Date:

September 14, 2024

Description:

Blue palo verde mitigation plant fruiting in Area 1.

Location:

Area 1



Photo: 4

Date:

September 11, 2024

Description:

Blue palo verde mitigation plants in Area 1 under I-40 bridge, estimated size during census was 8 feet tall by 11 feet wide.

Location:

Area 1



Photo: 5

Date:

May 15, 2024

Description:

Desert smoke tree in
Area 5.

Location:

Area 5



Photo: 6

Date:

May 15, 2024

Description:

Desert smoke tree flowering
in Area 5.

Location:

Area 5



Photo: 7

Date:

September 11, 2024

Description:

Large naturally recruit of honey mesquite, a mitigation plant in Area 1.

Location:

Area 1



Photo: 8

Date:

September 14, 2024

Description:

Flowering and fruiting screwbean mesquite mitigation plant in Area 5.

Location:

Area 5



Photo: 9

Date:

September 14, 2024

Description:

Naturally recruit of cattle spinach/allscale saltbush in Area 3.

Location:

Area 3



Photo: 10

Date:

November 19, 2024

Description:

Newly installed Anderson's desert-thorn in Area 5

Location:

Area 5



Photo: 11

Date:

September 14, 2024

Description:

Catclaw acacia mitigation plant occurring within a wash in Area 5.

Location:

Area 5



Photo: 12

Date:

September 15, 2024

Description:

Native, naturally-occurring alkali heliotrope flowering in Area 2.

Location:

Area 2



Photo: 13

Date:

April 15, 2024

Description:

Native annuals and perennials naturally occurring in Area 5.

Location:

Area 5



Photo: 14

Date:

September 14, 2024

Description:

Overview of UHR-1 facing northeast. Naturally-occurring creosote bush and mitigation plantings.

Location:

UHR-1



Photo: 15

Date:
May 17, 2024

Description:
Cattle spinach/allscale
saltbush mitigation plant.

Location:
UHR-1



Photo: 16

Date:
May 17, 2024

Description:
Silver cholla mitigation
plant.

Location:
UHR-1



Photo: 17

Date:
April 9, 2024

Description:
Buckhorn cholla mitigation
plant with new leaves and
flower buds.

Location:
UHR-1



Photo: 18

Date:
April 15, 2024

Description:
Beavertail cactus mitigation
plant in bloom.

Location:
UHR-1



Photo: 19

Date:

November 11, 2024

Description:

Black-trailed gnatcatcher perched on honey mesquite.

Location:

Area 1



Photo: 20

Date:

November 11, 2024

Description:

Loggerhead shrike perching just outside Area 2.

Location:

On the edge of Area 2.



Photo: 21

Date:
May 17, 2024

Description:
Desert iguana foraging
under creosotebush.

Location:
UHR-1



Photo: 22

Date:
September 14, 2024

Description:
Gray hairstreak utilizing
honey mesquite flowers in
Area 5.

Location:
Along the road between
Areas 5.

Appendix C

Photographs from Photo-Monitoring Stations

Appendix C – Photographs from Photo-monitoring Stations

Topock Revegetation Year 2 Monitoring Report

Pacific Gas and Electric Company



Photostation-001

View: East

Photo: 3/21/2022

Pre-planting

Located on the northwest corner of Area 1 below and south of railroad bridge



Photostation-001

View: East

Photo 9/15/2024

Year 2

Located on the northwest corner of Area 1 below and south of railroad bridge

Restoration Area 1 was planted with blue palo verde and supports high recruitment of screwbean mesquite. Cover by blue palo verde within the portion of this area is approximately 9%. Arrowweed is also present, with approximately 6% cover. Natural recruitment of screwbean mesquite and honey mesquite is high in Area 1, with cover by these species at approximately 5%. This area experiences ponding and visible salt crusts at the north end. This area was actively irrigated in 2024.

Appendix C – Photographs from Photo-monitoring Stations

Topock Revegetation Year 2 Monitoring Report

Pacific Gas and Electric Company



Photostation-002

View: Southwest

Photo: 3/21/2022

Pre-planting

Located on the northeast corner of Area 1 just west of the Colorado River



Photostation-002

View: Southwest

Photo 9/15/2024

Year 2

Located on the northeast corner of Area 1 just west of the Colorado River

Cover by blue palo verde within the portion of this area is approximately 5%. Arrowweed is very dense in this area (30% cover). A 6-foot-tall and 5-foot-wide screwbean mesquite mitigation plant has doubled in size since Year 1 and crowds the foreground. There is moderate screwbean recruitment in this section of Area 1, where its cover is approximately 5%. This area supports very sandy soils and experiences ponding, some anoxia, and visible salt crusts have formed, especially along the areas closest to the Colorado River.

Appendix C – Photographs from Photo-monitoring Stations

Topsoil Revegetation Year 2 Monitoring Report

Pacific Gas and Electric Company



Photostation-003

View: East

Photo: 3/21/2022

Pre-planting

Located in the center of Area 1 between the I-40 bridge and the railroad bridge



Photostation-003

View: East

Photo 10/31/2024

Year 2

Located in the center of Area 1 between the I-40 bridge and the railroad bridge

The greatest cover by mitigation plants in Area 1 occurs between the I-40 bridge and the railroad bridge: blue palo verde (25% cover), honey mesquite (7% cover), and screwbean mesquite (20% cover). This portion of Area 1 also supports large stands of arrowweed (25% cover). Volunteer mesquite mitigation plants tower over blue palo verde in this area, with some individuals reaching up to 14 feet tall and 11 feet wide.



Photostation-004

View: Southeast

Photo: 3/21/2022

Pre-planting

Located in Area 2 in the northwest corner under the I-40 bridge



Photostation-004

View: Southeast

Photo 9/14/2024

Year 2

Located in Area 2 in the northwest corner under the I-40 bridge

Area 2, like Area 1, was planted with blue palo verde and supports volunteer recruit mitigation plants of honey mesquite and screwbean mesquite. Cover in this section of Area 1 is dominated by blue palo verde (13% cover) with honey mesquite (3% cover) and screwbean mesquite (5% cover) mitigation plants. Arrowweed (10% cover) is scattered throughout this portion of Area 2.



Photostation-004b

View: Southeast

Photo: 3/21/2022

Pre-planting

Located between Area 2
and Area 4



Photostation-004b

View: Southeast

Photo 9/13/2023

Year 2

Located between Area 2
and Area 4

Area 4 consists of four separate enclosures, each with one planted blue palo verde. One blue palo verde recruit can be seen in the background to the far left. The blue palo verde plant in the enclosure to the left has doubled in size since Year 1.

Appendix C – Photographs from Photo-monitoring Stations

Topock Revegetation Year 2 Monitoring Report

Pacific Gas and Electric Company



Photostation-005

View: North

Photo: 3/21/2022

Pre-planting

Located in Area 2 near the eastern boundary south of the I-40 bridge.



Photostation-005

View: North

Photo 9/14/2024

Year 2

Located in Area 2 near the eastern boundary south of the I-40 bridge.

This portion of Area 2 supports tall blue palo verde and a dense stand of volunteer screwbean mesquite recruits. In this section of Area 2, cover by blue palo verde (15% cover) is similar to that of screwbean mesquite (12% cover), with lower cover by honey mesquite (4% cover). This portion of Area 2 supports high cover of arrowweed (18% cover).

Appendix C – Photographs from Photo-monitoring Stations

Topock Revegetation Year 2 Monitoring Report

Pacific Gas and Electric Company



Photostation-006

View: North

Photo: 3/21/2022

Pre-planting

Located in Area 2 near its western boundary in the southwest corner.



Photostation-006

View: North

Photo 9/14/2024

Year 2

Located in Area 2 near its western boundary in the southwest corner.

This portion of Area 2 supports blue palo verde (4% cover) and arrowweed (6% cover). Natural recruitment of screwbean and honey mesquite is relatively low in this portion of Area 2, with cover by these species at approximately 1%. This area experiences ponding and visible salt crusts are present.

Appendix C – Photographs from Photo-monitoring Stations

Topock Revegetation Year 2 Monitoring Report

Pacific Gas and Electric Company



Photostation-007

View: East

Photo: 3/21/2022

Pre-planting

Located in Area 3 at the western end



Photostation-007

View: Northeast

Photo 9/14/2024

Year 2

Located in Area 3 at the western end

Area 3 supports plantings of blue palo verde (5% cover) and desert smoke tree (3% cover), as well as honey and screwbean mesquite volunteer recruits (6% cover), and cattle spinach recruits (1% cover). In addition, Area 3 supports a dense stand of arrowweed (8% cover), and a range of native species, including Arizona lupine, alkali mallow, Emory's rock daisy, notch-leaved phacelia, and others. During rain events, Area 3 can experience energetic flows of water. A new photo direction was taken in 2024 due to large arrowweed individuals obscuring the view of mitigation plantings.

Appendix C – Photographs from Photo-monitoring Stations

Topock Revegetation Year 2 Monitoring Report

Pacific Gas and Electric Company



Photostation-008

View: Northwest

Photo: 3/21/2022

Pre-planting

Located in Area 5 along the southern perimeter



Photostation-008

View: Northwest

Photo 9/14/2024

Year 2

Located in Area 5 along the southern perimeter

Area 5 supports mitigation plantings of blue palo verde (2% cover), desert smoke tree (4% cover), and catclaw acacia (1% cover), as well as honey mesquite and screwbean mesquite mitigation plants originating from volunteer recruits (10% cover, including a large existing honey mesquite tree that occurs in this area, not shown in photo). Area 5 also supports mature naturally-occurring shrubs, including cheesebush, sweetbush, and creosote bush. Like Area 3, Area 5 experiences elevated water flow during heavy rain events.



Photostation-009

View: East

Photo: 3/21/2022
Pre-planting

Located in Area 5 near the
furthest west corner



Photostation-009

View: East

Photo: 9/14/2024
Year 2

Located in Area 5 near
the furthest west corner

This portion of Area 5 supports desert smoke tree (in mid foreground) and catclaw acacia mitigation plantings along with screwbean and honey mesquite recruits and naturally-occurring native shrubs such as creosote bush and cheesebush. Note the large cobble from right to center typical of desert washes.

Appendix C – Photographs from Photo-monitoring Stations

Topock Revegetation Year 2 Monitoring Report

Pacific Gas and Electric Company



Photostation-012

View: South

Photo: 3/21/2022

Pre-planting

Located in UHR-1 in the northernmost corner



Photostation-012

View: South

Photo: 9/14/2024

Year 2

Located in UHR-1 in the northernmost corner

UHR-1 supports upland mitigation plantings, including beavertail cactus (middle foreground), buckhorn cholla, silver cholla, and cattle saltbush (individual in the foreground). UHR-1 was not cleared prior to planting and continues to support a stand of mature creosote bush that has 28% cover.

Appendix D

Observed Plant Species in Mitigation Planting Areas

Appendix D
Observed Plant Species in Mitigation Planting Areas 2022 - 2024
Topock Revegetation Annual Report - Year 2
Pacific Gas and Electric Company



Scientific Name	Common Name	Native/Non-native	Area 1	Area 2	Area 3	Area 4	Area 5	UHR 1
Trees								
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	native	x	x	x		x	
<i>Parkinsonia florida</i>	blue palo verde	native	x	x	x	x	x	
<i>Populus fremontii</i>	Fremont cottonwood	native	x	x				
<i>Psoralea argemone</i>	desert smoketree	native			x		x	
<i>Senegalia greggii</i>	catclaw acacia	native					x	
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	native	x	x			x	
<i>Washingtonia robusta</i>	Mexican fan palm	non-native					x	
Shrubs								
<i>Ambrosia salsola</i>	cheesebush	native		x			x	
<i>Atriplex polycarpa</i>	allscale saltbush	native			x			x
<i>Baccharis sergiloides</i>	desert baccharis	native		x				
<i>Bebbia juncea</i>	sweetbush	native					x	
<i>Encelia farinosa</i>	brittlebush	native			x			
<i>Larrea tridentata</i>	creosote bush	native	x	x	x	x	x	x
<i>Lycium andersonii</i>	Anderson's thornbush	native	x		x		x	x
<i>Pluchea sericea</i>	arrowweed	native	x	x	x		x	
<i>Tamarix ramosissima</i>	salt-cedar	non-native	x	x	x	x	x	
Cacti								
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	native						x
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	native						x
<i>Cylindropuntia echinocarpa</i>	silver cholla	native						x
Herbaceous Species (annuals, herbaceous perennials, graminoids)								
<i>Allionia incarnata</i> var. <i>incarnata</i>	trailing windmills	native			x		x	
<i>Amaranthus albus</i>	pygmy amaranth, tumbleweed	non-native			x			
<i>Amaranthus palmeri</i>	Palmer's amaranth	native		x				
<i>Amsinckia tessellata</i>	desert fiddleneck	native						x
<i>Aristida adscensionis</i>	three-awn	native			x		x	
<i>Avena fatua</i>	wild oats	non-native					x	
<i>Bassia</i> (<i>Kochia</i>) <i>scoparia</i>	summer-cypress	non-native		x	x	x	x	
<i>Boerhavia coccinea</i>	scarlet spiderling	native		x			x	
<i>Boerhavia wrightii</i>	Wright's spiderling	native					x	
<i>Bouteloua barbata</i> var. <i>barbata</i>	sixweeks grama	native			x			
<i>Brassica tournefortii</i>	Saharan mustard	non-native		x	x	x	x	
<i>Bromus rubens</i>	red brome	non-native	x					
<i>Caulanthus lasiophyllus</i>	California mustard	native		x				
<i>Centaurea melitensis</i>	toçalote	non-native		x		x		
<i>Chenopodium murale</i>	nettleleaf goosefoot	non-native	x	x	x	x	x	
<i>Chylismia brevipes</i> subsp. <i>brevipes</i>	golden suncup	native	x	x	x	x	x	x
<i>Chorizanthe brevicornu</i> var. <i>brevicornu</i>	brittle spineflower	native			x		x	x
<i>Chorizanthe rigida</i>	devil's spineflower	native		x				x
<i>Croton setiger</i>	doveweed, turkey-mullein	native			x		x	
<i>Cryptantha maritima</i>	Guadalupe cryptantha	native			x	x	x	x
<i>Cryptantha micrantha</i> var. <i>micrantha</i>	purple-root cryptantha	native				x		
<i>Cryptantha nevadensis</i> var. <i>nevadensis</i>	rigid cryptantha	native			x			
<i>Cynodon dactylon</i>	Bermuda-grass	non-native	x	x	x	x	x	
<i>Dalea mollis</i>	silky dalea	native				x	x	
<i>Dalea mollissima</i>	silky dalea	native						x
<i>Datura wrightii</i>	jimson-weed	native					x	
<i>Descurainia pinnata</i>	tansy mustard	native				x		

Appendix D

Observed Plant Species in Mitigation Planting Areas 2022 - 2024

Topock Revegetation Annual Report - Year 2

Pacific Gas and Electric Company



Scientific Name	Common Name	Native/Non-native	Area 1	Area 2	Area 3	Area 4	Area 5	UHR 1
<i>Echinochloa colona</i>	jungle rice	non-native		x				
<i>Erigeron bonariensis</i>	flax-leaved fleabane	non-native		x				
<i>Eriogonum thomasi</i>	Thomas' wild buckwheat	native					x	x
<i>Eriogonum trichopes</i>	little desert buckwheat	native					x	x
<i>Eriophyllum lanosum</i>	white easter bonnets	native						x
<i>Euphorbia albomarginata</i>	rattlesnake weed	native					x	
<i>Euphorbia micromera</i>	Sonoran sandmat	native		x			x	
<i>Euphorbia polycarpa</i>	small-seeded sandmat	native		x	x	x	x	x
<i>Festuca microstachys</i>	small fescue	native			x		x	
<i>Festuca myuros</i>	rattail fescue	non-native				x	x	x
<i>Festuca octoflora</i>	sixweeks fescue	native						x
<i>Geraea canescens</i>	desert-sunflower	native	x		x		x	
<i>Gossypium hirsutum</i>	upland cotton	non-native	x					
<i>Heliotropium curassavicum</i> var. <i>oculatum</i>	alkali heliotrope	native	x	x				
<i>Hirschfeldia incana</i>	summer mustard	non-native		x				
<i>Hordeum murinum</i>	foxtail barley	non-native	x				x	
<i>Lactuca serriola</i>	prickly lettuce	non-native		x				
<i>Lepidium lasiocarpum</i> subsp. <i>lasiocarpum</i>	shaggyfruit pepperweed	native		x		x	x	x
<i>Linanthus jonesii</i>	Jone's linanthus	native					x	
<i>Lupinus arizonicus</i>	Arizona lupine	native	x	x	x	x	x	
<i>Lupinus sparsiflorus</i> subsp. <i>mohavensis</i>	Mojave lupine	native					x	
<i>Malacothrix glabrata</i>	desert dandelion	native			x		x	
<i>Malvella leprosa</i>	alkali mallow	native			x			
<i>Melilotus albus</i>	white sweetclover	non-native		x				
<i>Mentzelia c.f. albicaulis</i>	white-stemmed blazing star	native		x				
<i>Nicotiana obtusifolia</i>	desert tobacco	native			x		x	
<i>Oligomeris linifolia</i>	oligomeris	native						x
<i>Oncosiphon pilulifer</i>	stinknet	non-native					x	
<i>Palafoxia arida</i>	Spanish needle	native		x	x		x	x
<i>Perityle emoryi</i>	Emory's rock daisy	native		x	x	x		
<i>Phacelia crenulata</i> subsp. <i>ambigua</i>	notch-leaved phacelia	native		x	x		x	
<i>Phacelia distans</i>	common phacelia	native			x		x	
<i>Phragmites australis</i>	common reed	non-native	x	x				
<i>Phalaris minor</i>	little canarygrass	non-native		x			x	
<i>Physalis crassifolia</i>	thick-leaved groundcherry	native					x	
<i>Plantago ovata</i> subsp. <i>fastigiata</i>	desert plantain	native	x					x
<i>Polygonum argyrocoleon</i>	silversheath knotweed	non-native	x	x			x	
<i>Portulaca oleracea</i>	common purslane	non-native		x			x	
<i>Salsola tragus</i>	Russian-thistle	non-native	x	x	x	x	x	
<i>Salvia hispanica</i>	Mexican chia	non-native					x	
<i>Schismus barbatus</i>	Mediterranean grass	non-native	x	x	x	x	x	x
<i>Schoenoplectus californicus</i>	California bulrush	native		x				
<i>Senecio mohavensis</i>	Mojave groundsel	native			x			
<i>Sisymbrium irio</i>	London rocket	non-native					x	
<i>Solanum americanum</i>	American black nightshade	native		x				
<i>Sonchus oleraceus</i>	sow-thistle	non-native		x	x	x		
<i>Spergula arvensis</i>	corn spurrey	non-native			x			
<i>Stephanomeria pauciflora</i>	brownplume wirelettuce	native		x	x	x		
<i>Tidestromia suffruticosa</i> var. <i>oblongifolia</i>	honeysweet	native		x	x		x	
<i>Tribulus terrestris</i>	puncture vine	non-native	x	x	x		x	

Appendix E

Observed Wildlife Species in Mitigation Planting Areas

Appendix E
Observed Wildlife Species in Mitigation Planting Areas
Topock Revegetation Annual Report - Year 2
Pacific Gas and Electric Company

Scientific Name	Common Name	Native/Non-native	Area 1	Area 2	Area 3	Area 4	Area 5	UHR-1	Floodplain, No Specific Area
Birds									
<i>Accipiter cooperii</i>	Cooper's hawk	Native	x						
<i>Auriparus flaviceps</i>	verdin	Native							x
<i>Buteo jamaicensis</i>	red-tailed hawk	Native	x						
<i>Callipepla gambelii</i>	Gambel's quail	Native							x
<i>Cardellina pusilla</i>	Wilson's warbler	Native					x		
<i>Cathartes aura</i>	turkey vulture	Native			x			x	
<i>Catharus guttatus</i>	hermit thrush	Native	x						
<i>Catherpes mexicanus</i>	canyon wren	Native			x				
<i>Charadrius vociferus</i>	killdeer	Native						x	
<i>Chordeiles acutipennis</i>	lesser nighthawk	Native						x	
<i>Circus hudsonius</i>	northern harrier	Native						x	
<i>Falco sparverius</i>	American kestrel	Native							x
<i>Fulica americana</i>	American coot	Native		x					
<i>Geococcyx californianus</i>	greater roadrunner	Native	x	x	x		x		
<i>Hirundo rustica</i>	barn swallow	Native						x	
<i>Icterus bullockii</i>	Bullock's oriole	Native							x
<i>Icterus cucullatus</i>	hooded oriole	Native							x
<i>Lanius ludovicianus</i>	loggerhead shrike	Native					x		
<i>Megaceryle alcyon</i>	belted kingfisher	Native						x	
<i>Melospiza melodia</i>	song sparrow	Native	x						

Appendix E
Observed Wildlife Species in Mitigation Planting Areas
Topock Revegetation Annual Report - Year 2
Pacific Gas and Electric Company

Scientific Name	Common Name	Native/Non-native	Area 1	Area 2	Area 3	Area 4	Area 5	UHR-1	Floodplain, No Specific Area
<i>Melospiza aberti</i>	Abert's towhee	Native		x					
<i>Melospiza crissalis</i>	California towhee	Native	x						
<i>Myiarchus cinerascens</i>	ash-throated flycatcher	Native						x	
<i>Pandion haliaetus</i>	osprey	Native	x						
<i>Pelecanus erythrorhynchos</i>	American white pelican	Native							x
<i>Phainopepla nitens</i>	phainopepla	Native	x						
<i>Poliophtila caerulea</i>	blue-green gnatcatcher	Native	x	x					
<i>Poliophtila melanura</i>	black-tailed gnatcatcher	Native	x						
<i>Quiscalus mexicanus</i>	great-tailed grackle	Native	x	x		x	x		
<i>Sayornis nigricans</i>	black phoebe	Native						x	
<i>Spinus psaltria</i>	lesser goldfinch	Native	x						
<i>Streptopelia decaocto</i>	Eurasian collared-dove	Non-native							x
<i>Zenaidura macroura</i>	white-winged dove	Native	x						
<i>Zenaidura macroura</i>	mourning dove	Native						x	
<i>Zonotrichia leucophrys</i>	white-crowned sparrow	Native	x						
Mammals									
<i>Equus asinus</i>	wild burro	Non-native	x						
<i>Lepus californicus</i>	black-tailed jackrabbit	Native	x						
<i>Mephitis mephitis</i>	striped skunk	Native					x		
<i>Procyon lotor</i>	raccoon	Native		x					
<i>Sylvilagus audubonii</i>	desert cottontail	Native	x	x					
<i>Urocyon cinereoargenteus</i>	gray fox	Native		x					

Appendix E
Observed Wildlife Species in Mitigation Planting Areas
Topock Revegetation Annual Report - Year 2
Pacific Gas and Electric Company

Scientific Name	Common Name	Native/Non-native	Area 1	Area 2	Area 3	Area 4	Area 5	UHR-1	Floodplain, No Specific Area
Reptiles									
<i>Cnemidophorus sp.</i>	whip-tail lizard	Native	x	x					
<i>Crotalus atrox</i>	western diamond-backed rattlesnake	Native		x					
<i>Dipsosaurus dorsalis</i>	desert iguana	Native				x			
<i>Sceloporus occidentalis</i>	western fence lizard	Native					x		
<i>Sceloporus uniformis</i>	yellow-backed spiny lizard	Native			x				
<i>Uta stansburiana</i>	western side-blotched lizard	Native	x						
Invertebrates									
<i>Acmaeodera gibbula</i>	wood-boring beetle	Native	x						
<i>Agapostemon melliventris</i>	honey-tailed striped sweat bee	Native					x		
<i>Apis mellifera</i>	honeybee	Non-native			x				
<i>Apodemia sp.</i>	Metalmark butterfly	Native		x					
<i>Brephidium exilis</i>	western pygmy blue butterfly	Native	x						
Cicadoidea superfamily	cicada	Native	x						
<i>Coccinella sp.</i>	ladybird beetle	Native	x	x	x		x		
<i>Danaus gilippus</i>	queen butterfly	Native	x						
<i>Iris oratoria</i>	Mediterranean mantis	Native	x						
Lepidoptera order	caterpillar	Unknown	x						

Appendix E
Observed Wildlife Species in Mitigation Planting Areas
Topock Revegetation Annual Report - Year 2
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Scientific Name	Common Name	Native/Non-native	Area 1	Area 2	Area 3	Area 4	Area 5	UHR-1	Floodplain, No Specific Area
<i>Leptotes marina</i>	marine blue butterfly	Native	x						
<i>Mallodon dasystemus</i>	hardwood stump borer	Native	x						
Mutillidae suborder	golden colored velvet ant	Native	x						
<i>Pepsis thisbe</i>	Thisbe's tarantula-hawk wasp	Native				x	x		
<i>Schistocerca shoshone</i>	green bird grasshopper	Native	x						
<i>Strymon melinus</i>	gray hairstreak	Native	x						
Zygoptera suborder	blue damselfly and gray damselfly	Unknown	x						

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