

Topock Project Executive Abstract

<p>Document Title:</p> <p>Pacific Gas and Electric Company Topock Revegetation Year 3 Mitigation Monitoring Report</p> <p>Final Document? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		<p>Date of Document: January 26, 2026</p> <p>Who Created this Document?: (i.e. PG&E, DTSC, DOI, Other)</p> <p>PG&E</p>	
<p>Priority Status: <input type="checkbox"/> HIGH <input type="checkbox"/> MED <input checked="" type="checkbox"/> LOW</p> <p>Is this time critical? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		<p>Action Required:</p> <p><input checked="" type="checkbox"/> Information Only <input type="checkbox"/> Review & Comment</p> <p>Return to: _____</p> <p>By Date: _____</p> <p><input type="checkbox"/> Other / Explain:</p>	
<p>Type of Document:</p> <p><input type="checkbox"/> Draft <input checked="" type="checkbox"/> Report <input type="checkbox"/> Letter <input type="checkbox"/> Memo</p> <p><input type="checkbox"/> Other / Explain:</p>			
<p>What does this information pertain to?</p> <p><input type="checkbox"/> Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA)/Preliminary Assessment (PA)</p> <p><input type="checkbox"/> RCRA Facility Investigation (RFI)/Remedial Investigation (RI) (including Risk Assessment)</p> <p><input type="checkbox"/> Corrective Measures Study (CMS)/Feasibility Study (FS)</p> <p><input type="checkbox"/> Corrective Measures Implementation (CMI)/Remedial Action</p> <p><input type="checkbox"/> California Environmental Quality Act (CEQA)/Environmental Impact Report (EIR)</p> <p><input type="checkbox"/> Interim Measures</p> <p><input checked="" type="checkbox"/> Other / Explain: Annual Revegetation Mitigation Monitoring Report</p>		<p>Is this a Regulatory Requirement?</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If no, why is the document needed?</p>	
<p>What is the consequence of NOT doing this item? What is the consequence of DOING this item?</p> <p>The revegetation and report is required by the approved 2018 Final Subsequent Environmental Impact Report (SEIR). Not preparing this report constitutes non-compliance with the SEIR.</p>		<p>Other Justification/s:</p> <p><input type="checkbox"/> Permit <input type="checkbox"/> Other / Explain:</p>	
<p>Brief Summary of attached document:</p> <p>The 2025 Topock Revegetation Year 3 Mitigation Monitoring Report summarizes project restoration plan requirements, summarizes revegetation implementation activities, and provides the current status of the revegetation project during the third-year monitoring period. The report addresses revegetation maintenance and monitoring activities during Year 3 and presents the results of annual quantitative monitoring of mitigation plantings and revegetation areas. The report also includes tables, figures, and photologs.</p> <p>Written by: PG&E</p>			
<p>Recommendations:</p> <p>This report is for information only.</p>			
<p>How is this information related to the Final Remedy or Regulatory Requirements:</p> <p>The survey and this report fulfill the requirement of Mitigation Measures AES-1, BIO-1a, and Cul-1a-5 of the 2018 SEIR.</p>			
<p>Other requirements of this information?</p> <p>None.</p>			

Version 10

Legend

RFA/PA – RCRA Facility Assessment/Preliminary Assessment
RFI/RI – RCRA Facility Investigation/CERCLA Remedial Investigation (including Risk Assessment)
CMS/FS – RCRA Corrective Measure Study/CERCLA Feasibility Study
CEQA/EIR – California Environmental Quality Act/Environmental Impact Report

Pacific Gas and Electric Company

Topock Revegetation Year 3 Mitigation Monitoring Report

January 2026

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Acronyms and Abbreviations

Arcadis	Arcadis U.S., Inc.
CDFW	California Department of Fish and Wildlife
CH2M Hill	CH2M Hill, Inc.
Cornell	Cornell Lab of Ornithology and the American Ornithologists Union
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
GNSS	global navigation satellite system
HNWR	Havasu National Wildlife Refuge
MDLT	Mojave Desert Land Trust
MMRP	Mitigation Monitoring and Reporting Program
NOAA	National Oceanic and Atmospheric Administration
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
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."

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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. To simplify reporting, monitoring years are based on calendar years, with Year 1 including the period between October 9, 2022, and December 31, 2023.

This Year 3 Topock Revegetation Mitigation Monitoring Annual Report summarizes the current status of the Revegetation Project during the third-year monitoring period (Year 3), 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.

1.1 Revegetation Year 3 Mitigation Monitoring Report Organization

This Topock Revegetation Year 3 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 3.
- Section 4 summarizes the methods implemented for routine maintenance during Year 3.
- Section 5 summarizes the results of annual quantitative monitoring for mitigation plants in Year 3 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 3 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).

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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 (Dan Bush, *pers. comm.* January 15, 2025). The additional total mitigation plants in the tables below have been adjusted to reflect this change.

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> var. <i>torreyana</i>)	honey mesquite	23
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	5
<i>Psoralea arguta</i>	desert smoke tree	8
<i>Senegalia greggii</i>	catclaw acacia	1
Upland Species		
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	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> var. <i>torreyana</i>)	honey mesquite	23	68 ^a
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	5	15
<i>Psoralea arguta</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 saltbush	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

Note:

a. Before 2021, 22 honey mesquite individuals were impacted during remedy activities that required replacement at a 3:1 ratio for a total of 66 required replacement plants. In 2024, one additional honey mesquite was impacted that required a 2:1 replacement ratio (per CUL-1a-5: Appendix A). The total number of impacted plants as of 2024 is 23, with required mitigation plants totaling 68 (22 at 3:1 [=66] and 1 at 2:1 [=2]).

1.2.3 Revegetation Goals and Year 3 Monitoring Requirements

This section summarizes the goals for the Revegetation Project and the Year 3 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 3 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 3 Monitoring Requirements

The Year 3 monitoring program focused on periodic assessments of native plantings in mitigation planting areas and tracking progress in meeting the performance targets. Year 3 monitoring activities were the same as Year 1 and Year 2 monitoring activities, but the monitoring frequency was reduced from monthly in Year 1 to every two to three months in June of Year 2, then to periodic monitoring in Year 3: during January, April, May, July, September, and November. 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 Implementation

In 2015, 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]). 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 U.S., Inc. [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; 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 2.5 and 5.7).

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 described in the Topock Revegetation Year 1 Mitigation Monitoring Report (Arcadis 2024) and the Topock Revegetation Year 2 Mitigation Monitoring Report (Arcadis 2025).

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	Number of Mitigation Plants Required at 3:1 Mitigation Ratio	Number of Mitigation Plants at 3:1 Ratio Plus 10% Contingency
Riparian and Wash Species				
<i>Parkinsonia florida</i>	blue palo verde	163	489	538
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	23	68 ^a	73
<i>Strombocarpa</i> [<i>Prosopis</i>] <i>pubescens</i>	screwbean mesquite	5	15	17
<i>Psoralea argemone</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

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Scientific Name	Common Name	Total Plants Impacted	Number of Mitigation Plants Required at 3:1 Mitigation Ratio	Number of Mitigation Plants at 3:1 Ratio Plus 10% Contingency
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	3	9	10
Total Plants		216	647	710

Note:

a Before 2021, 22 honey mesquite individuals were impacted during remedy activities that required replacement at a 3:1 ratio for a total of 66 required replacement plants or 73 plants including the 10 percent contingency. In 2024, one additional honey mesquite was impacted that required a 2:1 replacement ratio (per CUL-1a-5: Appendix A). The total number of impacted plants as of 2024 is 23, with required mitigation plants totaling 68 (22 at 3:1 [=66] and 1 at 2:1 [=2]). The calculation of the 10 percent contingency is using the original 22 impacted plants at a 3:1 ratio and was not recalculated. The total number of mitigation plants being monitored is 73.

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.

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 cattle spinach and 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.

Table 2-2 Installed Container Plantings in 2022

Scientific Name	Common Name	Number of Mitigation Plants Required at 3:1 Mitigation Ratio	Number of Mitigation Plants at 3:1 Mitigation Ratio Plus 10% Contingency	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	489	538	496	37	533
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	68	73	0	0	0
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	15	17	0	0	0
<i>Psorothamnus spinosus</i>	desert smoke tree	24	26	0	26	26
<i>Senegalia greggii</i>	catclaw acacia	3	3	3	0	3
Upland Species (UHR-1)						
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	12	13	0	13	13
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	6	7	0	7	7
<i>Cylindropuntia echinocarpa</i>	silver cholla	18	20	0	20	20
<i>Lycium andersonii</i>	Anderson's desert thorn	3	3	0	3	3
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	9	10	10	0	10
Total Upland Species		48	53	10	43	53
Total Riparian and Wash Species Plantings in Areas 1 through 5		599	657	499	63	562
Total Species Plantings		647	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, 2024, and 2025, 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 2025 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.

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

Scientific Name	Common Name	Total Mitigation Plants Required at 3:1 Mitigation Ratio	Total Mitigation Plants Required at 3:1 Mitigation Ratio Plus 10% Contingency	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	489	538	533	5	538
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	68	73	0	73	73
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	15	17	0	17	17
<i>Psorothamnus spinosus</i>	desert smoke tree	24	26	26	0	26
<i>Senegalia greggii</i>	catclaw acacia	3	3	3	0	3
Upland Species (UHR-1)						
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	12	13	13	0	13
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	6	7	7	0	7
<i>Cylindropuntia echinocarpa</i>	silver cholla	18	20	20	0	20
<i>Lycium andersonii</i>	Anderson's desert thorn	3	3	3	0	3
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	9	10	10	0	10
Upland Species (UHR-1) Subtotal		48	53	53	0	53

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Scientific Name	Common Name	Total Mitigation Plants Required at 3:1 Mitigation Ratio	Total Mitigation Plants Required at 3:1 Mitigation Ratio Plus 10% Contingency	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
Riparian and Wash Species (Areas 1 through 5) Subtotal		599	657	562	95	657
All Species Total		647	710	615	95	710

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 2-4. 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:

- 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 3 are presented in Appendix C.

Area 1

Area 1 occurs in the floodplain area of the Site, which 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 (*Phragmites australis*) 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 (Arcadis 2024, 2025).

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 (Arcadis 2024, 2025).

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 (Arcadis 2024, 2025).

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 (Arcadis 2024, 2025). 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 (Arcadis 2024, 2025).

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

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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 (Arcadis 2024, 2025).

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

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> var. <i>torreyana</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> var. <i>torreyana</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> var. <i>torreyana</i>)	honey mesquite	0	18	18
<i>Psoralea arguta</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> var. <i>torreyana</i>)	honey mesquite	0	20	20
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	0	2	2
<i>Psoralea argyrea</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 saltbush	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 2-5). The salvaged beavertail cacti associated with the groundwater remedy were monitored for health and survival in 2025 and are documented separately from the required mitigation plantings (Table 2-5 and Section 5.7)

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.

Additional salvaged beavertail cacti transplanted after August 2022 are also discussed in Section 5.7.

Table 2-5 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 periodic revegetation assessments and annual quantitative monitoring are summarized in this section.

3.1 Periodic Assessments

Mitigation planting areas were assessed in 2025 during January, April, May, July, September, and November. 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 3 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 Lab of Ornithology and the American Ornithologists Union [Cornell] 2025), California Herps (2025), 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 13, 2025, 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 3 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 2025). 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 2025), California Herps (2025), 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 2025 and will continue annually for another 2 years during the annual quantitative monitoring events. 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 in the Topock Revegetation Year 1 Mitigation Monitoring Report (Arcadis 2024) and the Topock Revegetation Year 2 Mitigation Monitoring Report (Arcadis 2025).

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 3: soil sampling, soil leaching, and stress symptom monitoring.

3.3.1 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 as described in the Topock Revegetation Year 1 Mitigation Monitoring Report (Arcadis 2024) and the Topock Revegetation Year 2 Mitigation Monitoring Report (Arcadis 2025). Two soil sampling events were conducted in 2025, in April and September. Before a soil sampling event, utility clearance and coordination with an archaeologist were completed.

For the 2025 soil sampling events, soil sampling was conducted as follows. An approximately 8-inch-diameter hole was excavated to a depth of 12 inches using a post hole digger, metal bar, and hand trowel. If refusal was encountered at a depth of 6 inches or shallower, the hole was relocated and a new hole excavated. If refusal was encountered between 6 and 12 inches, soil was collected and depth at refusal was recorded. Soil collected at each location was first homogenized in a 5-gallon bucket before three cups of soil were collected into a 1-gallon Ziploc® bag. All soil sample bags were labeled with the location, identification number, date, and sampling biologist name before being shipped to FGL in Santa Paula, California, for comprehensive soil suitability testing and salinity testing. Results are reported in Section 5.4.1.

3.3.2 Soil Leaching

Elevated salt levels were documented during soil sampling in September 2021 (see Table 5-7 in Section 5). Before initial planting in early February 2022, soil leaching was conducted to remove excess salts in Areas 1 through 5 after irrigation infrastructure was installed. By March 24, 2022, when the first planting event was complete, all soil sampling points inside the leaching area exhibited soil salinity measurements less than 11 dS/m, with measurements at a control site remaining at 44.1 dS/m. Soil salinity remained below 10 dS/m through August 2022, except for the salinity in the sample from D1.

In 2023, soil salinity data from a July sampling event indicated an increase in soil salinity, 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.

- One of the three 0.25-inch irrigation hoses was placed on the ground surface to facilitate leaching because all three hoses were placed in DEEP DRIP® Watering Stakes after initial leaching to encourage deep root development (completed in November 2023).
- A future irrigation event was initiated during rainfall to flush excess salts.
- Ben Waddell requested to review the salinity data to evaluate potential external sources of elevated salinity. In September 2023, biologists provided Ben Waddell with recent groundwater, surface water, and irrigation water salinity, conductivity, and ion data to aid in his evaluation of the soil salinity data. After his review, Ben Waddell stated that the irrigation water did not contain elevated salts, nor did the water in the monitoring wells suggest elevated salt levels comparable to that of 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).

Consultations in November 2024 with Ben Waddell resulted in several actions conducted during the winter of 2024/2025:

- Removal of emitters from all DEEP DRIP® Watering Stakes in Areas 1, 2, and 4 and in the eastern portion of Areas 3 and 5, except for those at the new Anderson's desert thorn plantings;
- Replacement of two emitters per plant (depending on water pressure) with a 360-degree variable radius spray attachment to facilitate surface leaching for blue palo verde mitigation plants in Areas 1, 2, and 4 and in the eastern portion of Areas 3 and 5;
- Irrigation monthly during winter to emulate seasonal winter and monsoonal rainfall;
- Additional soil sampling in 2025 (Section 3.3.1) to assess the effectiveness of the 2024/2025 leaching effort; and
- Continued consultations with FGL after soil sampling and analysis.

In April and September 2025, one soil sample was taken in each of the 18 previously sampled designated locations at 0 to 12 inches below ground surface. Each sample was bagged and labeled separately before being sent to FGL for analysis.

3.3.3 Stress Symptom Monitoring

On July 25, 2023, during routine 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 naturally occurring blue palo verde trees. 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 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 2025, blue palo verde plantings were monitored for the presence of sap or other stress symptoms, as described in Section 5.4.2.

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 in Year 3 (2025) and will be monitored in Year 5 (2027) as described in the Topock Revegetation Year 1 Mitigation Monitoring Report (Arcadis

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2024). Initial reference site monitoring was conducted on October 7 and October 8, 2022, at six locations and again in January 2023 to collect additional data. 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 2022, along with associated species and site characteristics, is provided in the Topock Revegetation Year 1 Mitigation Monitoring Report (Arcadis 2024). A summary of mitigation plants and related observations in 2025 is provided in Section 5.5.

4 Revegetation Maintenance Methods

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

Site access for maintenance is on foot within fenced 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 initial container plant installation in 2022, each plant was irrigated once a week by slowly adding water to each DEEP DRIP® Watering Stake 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 each plant to provide moisture to the rootball of the planting. As plants enlarged in size and roots penetrated deeper in the soil, the third surface emitter was moved into the third DEEP DRIP® Watering Stake to encourage deep rooting.

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 native 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 emitters 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.

Irrigation water use in the floodplain and UHR-1 is tracked.

In November, 2024, a new branch of the irrigation system with 2-inch high-density polyethylene pipe was installed in Areas 3 and 5 to irrigate new Anderson's desert thorn 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. After an initial root

establishment period of 3 to 6 months, all three emitters were placed in the DEEP DRIP® Watering Stakes and closed with a DEEP DRIP® Watering Stake cap.

4.2 Herbivore-Deterrent Fence Maintenance

The herbivore-deterrent fencing was repaired as needed during Year 3 to protect mitigation plantings. Metal re-bar “J” stakes were installed as needed 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.

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. Due to continual herbivore damage to the straw wattles, they were replaced with a silt fence that was attached to the existing herbivore-deterrent fencing and keyed into a trench to prevent stormwater from flowing below the fence.

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 General Site Maintenance

The mitigation planting areas were routinely inspected and maintained in Year 3. The maintenance activities included trash cleanup, “Restoration Area” sign maintenance, and repair of fencing reflective tape. Trash accumulated quickly from the Interstate 40 highway above the floodplain and was distributed by the wind. Heat and wind caused the reflective tape on the herbivore-deterrent 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 equipment were used to transport tools and other supplies within the mitigation planting areas.

4.5 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 included providing guidance to contractors on correct species identification before abatement activities.

Invasive plant species were removed during monitoring events 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 using loppers or shovels. 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.

4.5.1 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 [*Cynodon dactylon*]) 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.

4.5.2 Herbicide Treatments (2021-2023)

Herbicides were used in the floodplain in 2021, 2022, and 2023 to treat common reed, giant reed, and saltcedar. During 2025, no herbicide was applied in mitigation planting areas; however, previously sprayed common reed was excavated to remove any living rhizomes.

4.5.3 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 their 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 also 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).

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- 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.

5 Year 3 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 13, 2025, and data analysis was complete by October 31, 2025. Periodic monitoring was conducted in January, April, May, July, September, and November in Year 3.

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.

Mitigation plants were monitored in the six mitigation planting areas in Year 3, culminating in the Year 3 mitigation plant survival census in September 2025. All surviving individuals of mitigation plants were censused as described in Section 3.2.1 and summarized in Tables 5-1a, 5-1b, 5-2a, 5-2b, and 5-3 and shown on Figures 4A through 4F. 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 584 surviving mitigation plants were censused in floodplain mitigation areas in September 2025. Floodplain mitigation plants include the five riparian and wash species included in the January 2023 baseline census presented in Table 2-4, along with volunteer recruits of cattle saltbush and Anderson's desert thorn and additional replacement mitigation plantings of Anderson's desert thorn.

Survival of riparian and wash plant species is 96.3 percent at a 3:1 mitigation ratio in 2025 (Table 5-1a). Survival of floodplain mitigation plants, including upland plant species, is 96.4 percent (Table 5-2a). Survival of riparian and wash plant species at a 3:1 mitigation ratio plus 10 percent contingency plantings is 88.9 percent in 2025 (Table 5-1b). Survival of floodplain mitigation plants at a 3:1 mitigation ratio plus 10 percent, including volunteer recruits and upland plant species, is 89.2 percent (Table 5-2b).

Survival of mitigation plants by individual planting 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 469 surviving blue palo verde mitigation plants were documented in September 2025, a 96.0 percent survival rate at a 3:1 mitigation ratio. Blue palo verde mitigation plants originated primarily from container plantings as well as several volunteer recruits. Survival of blue palo verde at a 3:1 mitigation ratio plus 10 percent contingency is 87.2 percent in 2025.

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 68 honey mesquite mitigation plants were monitored in Year 3, and in the September 2025 census, there were 68 surviving individuals (a 100 percent survival rate at a 3:1 mitigation ratio). Survival of honey mesquite at a 3:1 mitigation ratio plus 10 percent contingency is 100 percent in 2025.

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 15 screwbean mesquite mitigation plants were monitored in Year 3, and in the September 2025 census, there were 15 surviving individuals (a 100 percent survival rate at a 3:1 mitigation ratio). Survival of screwbean mesquite at a 3:1 mitigation ratio plus 10 percent contingency is 100 percent in 2025. 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 22 surviving desert smoke tree mitigation plants were documented in the September 2025 census (a 95.9 percent survival rate at a 3:1 mitigation ratio). Survival of desert smoke tree at a 3:1 mitigation ratio plus 10 percent contingency is 84.6 percent in 2025. 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 3, and in the September 2025 census, there were three surviving individuals (a 100 percent survival rate at a 3:1 mitigation ratio). Survival of catclaw acacia at a 3:1 mitigation ratio plus 10 percent contingency is 100 percent in 2025. Catclaw acacia mitigation plants originated from container plantings.

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

In 2025, all cattle saltbush individuals planted in UHR-1 in 2022 were dead. However, 13 cattle saltbush volunteers were recruited in Area 3 and Area 5 in April and May 2024, located in small washes that drain into the floodplain from west to east. These 13 cattle saltbush were documented as mitigation plants, with a 100 percent survival rate at a 3:1 mitigation ratio in September 2025. Survival of cattle saltbush at a 3:1 mitigation ratio plus 10 percent contingency is 100 percent in 2025.

In June 2024, one Anderson's desert thorn recruit appeared 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, but only three surviving mitigation plants of Anderson's desert thorn are required to meet performance targets. In September 2025, three Anderson's desert thorn survived (100 percent survival rate at a 3:1 mitigation ratio). Survival of Anderson's desert thorn at a 3:1 mitigation ratio plus 10 percent contingency is 100 percent in 2025.

5.1.2 Mitigation Plants in UHR-1

A total of 33 surviving mitigation plants were censused in UHR-1 in September 2025. Mean survival of remaining upland mitigation plants in UHR-1 is 100 percent (Table 5-2a and Table 5-2b).

A total of 13 cattle saltbush mitigation plants were monitored in Year 3 in UHR-1, and in the September 2025 census, there were no surviving individuals. Cattle saltbush mitigation plants in UHR-1 appeared to be dead during all monitoring events in 2025, so this species is not included in 2025 survival tables for UHR-1. As discussed in Section 5.1.1.2, 13 recruits of cattle saltbush were documented in Area 3 as mitigation plants in 2025 to compensate for the death of 13 cattle saltbush in UHR-1, bringing the survival rate for this species site-wide up to 100 percent.

A total of seven buckhorn cholla mitigation plants were monitored in Year 3, and in the September 2025 census, there were seven surviving individuals (a 100 percent survival rate). Survival of buckhorn cholla at a 3:1 mitigation ratio plus 10 percent contingency is 100 percent in 2025. Buckhorn cholla mitigation plants originated from container plantings.

A total of 20 silver cholla mitigation plants were monitored in Year 3, and in the September 2025 census, there were 20 surviving individuals (a 100 percent survival rate). Survival of silver cholla at a 3:1 mitigation ratio plus 10 percent contingency is 100 percent in 2025. Silver cholla mitigation plants originated from container plantings.

A total of 10 required beavertail cactus mitigation plants were documented in September 2025, and in the September 2025 census, there were 10 surviving individuals (a 100 percent survival rate). Survival of beavertail cactus at a 3:1 mitigation ratio plus 10 percent contingency is 100 percent in 2025. Beavertail cactus mitigation plants originated from container plantings.

Mean survival of all upland mitigation plant species (100 percent) exceeds the required performance standard of 75 percent survival.

Table 5-1a Mitigation Plant Survival Summary at 3:1 Mitigation Ratio Requirement

Scientific Name	Common Name	Total Number of Plantings at 3:1 Mitigation Ratio Requirement	2025 Total Surviving Mitigation Plants at the 3:1 Mitigation Ratio (Containers and Volunteer Recruits)	2025 Percent Survival of Required Plantings at 3:1 Mitigation Ratio
Riparian and Wash Species				
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite ^a	68	68	100%
<i>Parkinsonia florida</i>	blue palo verde	489	469	96%
<i>Psoralea argophylla</i>	desert smoke tree	24	22	95.9%
<i>Senegalia greggii</i>	catclaw acacia	3	3	100%
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	15	15	100%
Subtotal for Riparian and Wash Species		599	577	96.3%
Upland Species				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	12	12	100%
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	6	6	100%
<i>Cylindropuntia echinocarpa</i>	silver cholla	18	18	100%
<i>Lycium andersonii</i>	Anderson's desert thorn	3	3	100%
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	9	9	100%

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Scientific Name	Common Name	Total Number of Plantings at 3:1 Mitigation Ratio Requirement	2025 Total Surviving Mitigation Plants at the 3:1 Mitigation Ratio (Containers and Volunteer Recruits)	2025 Percent Survival of Required Plantings at 3:1 Mitigation Ratio
Subtotal for Upland Species		48	48	100%
Total		647	625	96.6%

Note:

^a Before 2021, 22 honey mesquite individuals were impacted during remedy activities that required replacement at a 3:1 ratio for a total of 66 required replacement plants or 73 plants including the 10% contingency. In 2024, one additional honey mesquite was impacted that required a 2:1 replacement ratio, for a total of two additional mitigation plants added to the total required mitigation for honey mesquite. Total impacted plants as of 2024 is 23, with required mitigation plants totaling 68 (22 at 3:1 [=66] and 1 at 2:1 [=2]). The calculation of the 10 percent contingency is using the original 22 impacted plants at a 3:1 ratio and was not recalculated. The total number of mitigation plants being monitored is 73.

Table 5-1b Mitigation Plant Survival Summary at 3:1 Mitigation Ratio Requirement Plus 10 Percent Contingency

Scientific Name	Common Name	Total Number of Required Mitigation Plants at 3:1 Ratio Plus 10% Contingency	2025 Total Surviving Mitigation Plants at 3:1 Ratio Plus 10% Contingency (Containers and Volunteer Recruits)	2025 Percent Survival of Required Plantings at 3:1 Mitigation Ratio Plus 10% Contingency Plantings
Riparian and Wash Species				
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite ^a	73	73	100%
<i>Parkinsonia florida</i>	blue palo verde	538	469	87.2%
<i>Psoralea arguta</i>	desert smoke tree	26	22	84.6%
<i>Senegalia greggii</i>	catclaw acacia	3	3	100%
<i>Stromboscarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	17	17	100%

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Scientific Name	Common Name	Total Number of Required Mitigation Plants at 3:1 Ratio Plus 10% Contingency	2025 Total Surviving Mitigation Plants at 3:1 Ratio Plus 10% Contingency (Containers and Volunteer Recruits)	2025 Percent Survival of Required Plantings at 3:1 Mitigation Ratio Plus 10% Contingency Plantings
Subtotal for Riparian and Wash Species		657	584	88.9%
Upland Species				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	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	637	89.7%

Note:

^a Before 2021, 22 honey mesquite individuals were impacted during remedy activities that required replacement at a 3:1 ratio for a total of 66 required replacement plants or 73 plants including the 10 percent contingency. In 2024, one additional honey mesquite was impacted that required a 2:1 replacement ratio, for a total of two additional mitigation plants added to the total required mitigation for honey mesquite. Total impacted plants as of 2024 is 23, with required mitigation plants totaling 68 (22 at 3:1 [=66] and 1 at 2:1 [=2]). The calculation of the 10 percent contingency is using the original 22 impacted plants at a 3:1 ratio and was not recalculated. The total number of mitigation plants being monitored is 73.

Table 5-2a Mitigation Plant Survival Summary at 3:1 Mitigation Ratio Requirement and Performance Targets in Floodplain and UHR-1

Scientific Name	Common Name	Total Number of Plantings at 3:1 Mitigation Ratio Requirement	Total Surviving Mitigation Plants at 3:1 Mitigation Ratio in 2025 (Container and Volunteer Recruits)	Percent Survival in 2025	Survival Performance Target
Mitigation Plants in the Floodplain (Areas 1–5)					
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	12	12	100%	75%
<i>Lycium andersonii</i>	Anderson's desert thorn	3	3	100%	75%
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	68	68	100%	75%
<i>Parkinsonia florida</i>	blue palo verde	489	469	95.9%	75%
<i>Psoralea arguta</i>	desert smoke tree	24	22	91.7%	75%
<i>Senegalia greggii</i>	catclaw acacia	3	3	100%	75%
<i>Strombocarpa (Prosopis) pubescens</i>	screwbean mesquite	15	15	100%	75%
Subtotal for Floodplain (Areas 1–5)		614	592	96.4%	
Upland Mitigation Plants in UHR-1					
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	6	6	100%	75%
<i>Cylindropuntia echinocarpa</i>	silver cholla	18	18	100%	75%
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	9	9	100%	75%
Subtotal for Upland Species		33	33	100%	
Total		647	625	96.6%	75%

Table 5-2b Mitigation Plant Survival Summary at 3:1 Mitigation Ratio Requirement plus Contingency and Performance Targets in Floodplain and UHR-1

Scientific Name	Common Name	Total Number of Required Mitigation Plants at 3:1 Ratio with 10% Contingency (Container and Volunteer Recruits)	Total Surviving Mitigation Plants 2025 (Container and Volunteer Recruits)	Percent Survival in 2025	Survival Performance Target
Mitigation Plants in the Floodplain (Areas 1–5)					
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	13	13	100%	75%
<i>Lycium andersonii</i>	Anderson's desert thorn	3	3	100%	75%
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	73	73	100%	75%
<i>Parkinsonia florida</i>	blue palo verde	538	469	87.2%	75%
<i>Psoralea argophylla</i>	desert smoke tree	26	22	84.6%	75%
<i>Senegalia greggii</i>	catclaw acacia	3	3	100%	75%
<i>Strombocarpa (Prosopis) pubescens</i>	screwbean mesquite	17	17	100%	75%
Subtotal for Floodplain (Areas 1–5)		673	600	89.2%	
Upland Mitigation Plants in UHR-1					
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	7	100%	75%
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	20	100%	75%
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	10	100%	75%

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Scientific Name	Common Name	Total Number of Required Mitigation Plants at 3:1 Ratio with 10% Contingency (Container and Volunteer Recruits)	Total Surviving Mitigation Plants 2025 (Container and Volunteer Recruits)	Percent Survival in 2025	Survival Performance Target
Subtotal for Upland Species		37	37	100%	
Total		710	637	89.7%	75%

Table 5-3 Total Surviving Mitigation Plants by Individual Planting Area

Scientific Name	Common Name	Total Surviving Mitigation Plants 2025 in Area (Container and Volunteer Recruits)
Area 1		
<i>Lycium andersonii</i>	Anderson's desert thorn	1
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	19
<i>Parkinsonia florida</i>	blue palo verde	222
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	10
Area 2		
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	15
<i>Parkinsonia florida</i>	blue palo verde	181
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	5
Area 3		
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	13
<i>Lycium andersonii</i>	Anderson's desert thorn	1
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	20
<i>Parkinsonia florida</i>	blue palo verde	48
<i>Psoralea arguta</i>	desert smoke tree	5

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Scientific Name	Common Name	Total Surviving Mitigation Plants 2025 in Area (Container and Volunteer Recruits)
Area 4		
<i>Parkinsonia florida</i>	blue palo verde	4
Area 5		
<i>Lycium andersonii</i>	Anderson's desert thorn	1
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	19
<i>Parkinsonia florida</i>	blue palo verde	14
<i>Psoralea arguta</i>	desert smoke tree	17
<i>Senegalia greggii</i>	catclaw acacia	3
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	2
UHR-1		
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7
<i>Cylindropuntia echinocarpa</i>	silver cholla	20
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10
Total Mitigation Plants in Areas 1–5		600
Total Mitigation Plants in UHR-1		37
Totals		637

Note:

1. Mitigation plantings installed as container plantings or volunteer recruits counted as mitigation plants

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“Extra plants” are defined in 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 133 extra screwbean mesquite volunteer recruits (55 in Area 1, 70 in Area 2, five in Area 3, and three in Area 5). There were six extra honey mesquite volunteer recruits (two in Area 1, three in Area 2, and one 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 or desert smoke tree. There were three extra cattle saltbush volunteer recruits in Area 3.

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

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 Surviving Mitigation Plants 2025 (Container Plants and Volunteer Recruits)	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	1	0
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	19	2
<i>Parkinsonia florida</i>	blue palo verde	222	0
<i>Strombocarpa (Prosopis) pubescens</i>	screwbean mesquite	10	55
Area 2			
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	15	3
<i>Parkinsonia florida</i>	blue palo verde	181	0
<i>Strombocarpa (Prosopis) pubescens</i>	screwbean mesquite	5	70
Area 3			
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	13	3
<i>Lycium andersonii</i>	Anderson's desert thorn	1	0

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Scientific Name	Common Name	Total Surviving Mitigation Plants 2025 (Container Plants and Volunteer Recruits)	Number of Volunteer Recruits and/or Extra Container Plantings that Were Not Recorded or Monitored as Mitigation Plants
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	20	0
<i>Parkinsonia florida</i>	blue palo verde	48	0
<i>Psoralea argophylla</i>	desert smoke tree	5	0
<i>Stromboscarpa (Prosopis) pubescens</i>	screwbean mesquite	0	5
Area 4			
<i>Parkinsonia florida</i>	blue palo verde	4	0
Area 5			
<i>Lycium andersonii</i>	Anderson's desert thorn	1	6
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	19	1
<i>Parkinsonia florida</i>	blue palo verde	14	0
<i>Psoralea argophylla</i>	desert smoke tree	17	0
<i>Senegalia greggii</i>	catclaw acacia	3	2
<i>Stromboscarpa (Prosopis) pubescens</i>	screwbean mesquite	2	3
UHR-1			
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	0

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Scientific Name	Common Name	Total Surviving Mitigation Plants 2025 (Container Plants and Volunteer Recruits)	Number of Volunteer Recruits and/or Extra Container Plantings that Were Not Recorded or Monitored as Mitigation Plants
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	1
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	16
Total Mitigation Plants in UHR-1		37	17
Total Mitigation Plants in Areas 1-5		600	150
Total Plants		637	167

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 600 mitigation plants at the required 3:1 mitigation ratio were censused in floodplain mitigation areas in September 2025, 584 riparian and wash plants and 16 upland mitigation plants.

Riparian and wash species (mitigation plants in Areas 1 through 5). A total of 584 riparian and wash species mitigation plants were censused in floodplain mitigation areas in September 2025. Mean survival of riparian and wash mitigation at the required 3:1 mitigation ratio is 96.4 percent (Table 5-1a). A summary of the September 2025 plant health assessment for the five riparian and wash species is provided below.

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 – 47.5 percent), followed by plants entering seasonal dormancy (Health Index 3a and 3b – 40.1 percent), for a total of 87.6 percent of blue palo verde in good to excellent health. A total of 45 blue palo verde individuals exhibited fair health (Health Index 2 – 9.6 percent), and 13 were in poor health (Health Index 1 – 2.8 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. Honey mesquite mitigation plants were in excellent health (Health Index 4 – 91.8 percent) or good health (Health Index 3 – 8.2 percent), for a total of 100 percent of mitigation plants in good to excellent health.

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 – 88.2 percent) or good health (Health Index 3a – 11.8 percent), for a total of 100 percent of mitigation plants in good to excellent health.

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 – 50 percent) or good health (Health Index 3a and 3b – 22.7 percent) with no major health issues, for a total of 72.7 percent of desert smoke tree in good to excellent health. Four plants were in fair health (Health Index 2 – 18.2 percent), and two were in poor health (Health Index 1 – 9.1 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 were in good to excellent health.

Upland Species (mitigation plants in UHR-1 and Area 1, 3, and 5). A total of 48 upland mitigation plants were documented in UHR-1, Area 1, Area 3, and Area 5 in Year 3. Mean survival of upland mitigation plants is 100 percent (Table 5-1a and 5-2b). 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 recruits in Areas 3 and 5 at the time of the September quantitative health assessment. Most cattle saltbush mitigation plants were either in excellent health with foliage (Health Index 4 – 69.2 percent) or were entering or maintaining seasonal dormancy (Health Index 3a – 30.8 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 – 85 percent), with the remainder in good health (Health Index 3a – 15 percent) due to seasonal desiccation.

Anderson's desert thorn mitigation plants originated from container plantings as well as one recruit. The majority of Anderson's desert thorn were in good health (Health Index 4 – 66.7 percent) or were entering or maintaining seasonal dormancy (Health Index 3b – 33.3 percent), for a total of 100 percent of Anderson's desert thorn in good to excellent health.

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

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> var. <i>torreyana</i>)	honey mesquite	73	67	91.8%	4	5.5%	2	2.7%	0	-	0	-
<i>Parkinsonia florida</i>	blue palo verde	469	223	47.5%	83	17.7%	105	22.4%	45	9.6%	13	2.8%
<i>Psoralea argophylla</i>	desert smoke tree	22	11	50%	0	-	5	22.7%	4	18.2%	2	9.1%
<i>Senegalia greggii</i>	catclaw acacia	3	1	33.3%	2	66.7%	0	-	0	-	0	-
<i>Stromboscarpa</i> (<i>Prosopis pubescens</i>)	screwbean mesquite	17	15	88.2%	2	11.8%	0	-	0	-	0	-
Total Riparian and Wash Species		584	317	54.3%	91	15.6%	112	19.2%	49	8.4%	15	2.6%

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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"
Upland Species												
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	13	9	69.2%	4	30.8%	0	-	0	-	0	-
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	7	100%	0	-	0	-	0	-	0	-
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	17	85.0%	3	15.0%	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 Upland Species		53	45	84.9%	7	13.2%	1	1.8%	0	-	0	-
Total Mitigation Plants		637	362	56.8%	98	15.4%	113	17.7%	49	7.7%	15	2.4%

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 during each monitoring year, including in September 2025 (Tables 5-6a and 5-6b).

5.2.2.1 Riparian and Wash Mitigation Plants

The mean height of blue palo verde individuals was 6.4 feet during Year 3, an increase of 3.3 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 2025, an increase of 2.8 feet since planting.

The mean height of honey mesquite individuals averaged 7.3 feet in Year 3, an increase of 3.5 feet since being designated as mitigation plants. Mean width of honey mesquite averaged 6.5 feet during Year 3, an increase of 3.5 feet since being designated as mitigation plants, and mitigation plants were almost as wide as they were tall.

The mean height of screwbean mesquite individuals was 9.5 feet during Year 3, more than double 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 averaged 8.9 feet during Year 3, an increase of 6.6 feet since being designated as mitigation plants. In Year 3, 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 4.5 feet during Year 3, an increase of 2.7 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 3.3 feet during Year 3, an increase of 1.9 feet in since planting, and mitigation plants were slightly taller than they were wide.

The mean height of catclaw acacia individuals was 4.8 feet during Year 3, an increase of 2.1 feet since planting, reflecting rapid growth of this species in Area 5. Mean width of catclaw acacia was 3.2 feet during Year 3, an increase of 2.1 feet since planting, and mitigation plants were taller than they were wide.

5.2.2.2 Upland Mitigation Plants

The mean height of cattle saltbush individuals was 2.3 feet during Year 3 in Areas 3 and 5. Mean width of cattle saltbush was 2.3 feet in Year 3. Mitigation plants were as wide as they were tall.

The mean height of buckhorn cholla individuals was 1.0 foot during Year 3, an increase of 0.4 foot since planting in UHR-1. Mean width of buckhorn cholla was 0.9 foot during Year 3, an increase of 0.5 foot since planting, exhibiting the slow growth that is typical of cacti.

The mean height of silver cholla individuals was 1.0 foot during Year 3, the same height as when it was planted in UHR-1. Mean width of silver cholla was 0.9 foot during Year 3, an increase of 0.2 foot since planting, exhibiting the slow growth that is typical of cacti.

The mean height of Anderson's desert thorn individuals was 2.3 feet, and mean width was also 2.3 feet.

The mean height of beavertail cactus individuals was 1.0 foot during Year 3, an increase of 0.3 foot since planting in UHR-1. The mean width of beavertail cactus was 1.4 feet during Year 3, 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 3 Assessment (September 2025)
Riparian/Wash Species				
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	73	3.8	7.3
<i>Parkinsonia florida</i>	blue palo verde	493	3.1	6.4
<i>Psoralea arguta</i>	desert smoke tree	24	1.8	4.5
<i>Senegalia greggii</i>	catclaw acacia	3	2.7	4.8
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	17	3.0	9.5
Upland Species				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	1.1	2.3
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	0.6	1.0
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	0.9	0.9
<i>Lycium andersonii</i>	Anderson's thornbush	3	1.4	2.3
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	0.7	1.0
Totals		663	1.9	4.0

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 3 Assessment (September 2025)
Riparian/Wash Species				
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	73	3.5	6.5
<i>Parkinsonia florida</i>	blue palo verde	469	3.5	6.3
<i>Psoralea argophylla</i>	desert smoke tree	22	1.4	3.3
<i>Senegalia greggii</i>	catclaw acacia	3	1.1	3.2
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	17	2.3	8.9
Upland Species				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	13	1.0	2.3
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	7	0.4	0.9
<i>Cylindropuntia echinocarpa</i>	silver cholla	20	0.7	0.9
<i>Lycium andersonii</i>	Anderson's thornbush	3	0.8	2.3
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	10	0.7	1.4
Totals		637	1.5	3.6

5.3 Native Species Richness in Revegetation Areas

All observed plant species found in mitigation planting areas in a recognizable condition during the third 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 2025). 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 3, a total of 62 native vascular plant species were observed in Areas 1-5.

Six native tree species were observed in Areas 1-5 in Years 1 through 3, including five planted species (blue palo verde, honey mesquite, screwbean mesquite, desert smoke tree, and catclaw acacia) and an additional 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 Years 1 through 3, including two mitigation species (cattle saltbush and Anderson's desert thorn) and other shrub species such as cheesebush (*Ambrosia salsola*), desert baccharis (*Baccharis sergiloides*), and sweetbush (*Bebbia juncea* var. *aspera*). 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 4.5).

Fifty-one native herbaceous annual and perennial forbs and grasses appeared in Areas 1-5 in Years 1 through 3, providing direct evidence of the increased native plant species richness at the Site. These include native annual grasses such as three-awn (*Aristida adscensionis*) and small fescue (*Festuca microstachys*); winter/early spring annuals such as Arizona lupine (*Lupinus arizonicus*), golden suncup (*Chylismia brevipes* subsp. *brevipes*), and brittle spineflower (*Chorizanthe brevicornu* var. *brevicornu*); and summer annuals that appear 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*), silky dalea (*Dalea mollissima*), 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 3 years a total of 61 native wildlife species have been observed in floodplain mitigation planting areas, an increase of 22 native wildlife species compared with Year 2, suggesting the enhanced functional value of native floodplain habitat and removal of saltcedar (Appendix E).

These included six native reptile species; 28 native bird species including loggerhead shrike (*Lanius ludovicianus*), which, when nesting, is a CDFW species of special concern; five native mammal species including striped skunk (*Mephitis mephitis*) and desert cottontail (*Sylvilagus audubonii*); and 22 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 plant 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 3, a total of 21 native vascular plant species were observed in UHR-1, including desert plantain (*Plantago ovata* subsp. *fastigiata*), little desert buckwheat (*Eriogonum trichopes*), and oligomeris (*Oligomeris linifolia*).

Prior to initial planting in March 2022, five native wildlife species were reported in UHR-1. During the past 3 years a total of 10 native wildlife species have been observed in UHR-1 (Appendix E). These include ash-throated flycatcher (*Myiarchus cinerascens*), lesser nighthawk (*Chordeiles acutipennis*), killdeer (*Charadrius vociferus*), and powdered dancer damselfly (*Argia moesta*). In 2025, a pair of lesser nighthawks nested within UHR-1, and the young fledged successfully.

5.4 Adaptive Management Monitoring Results

Adaptive management monitoring and planning in Year 3 included soil sampling for elevated salts and other nutrients, soil leaching, and stress symptom monitoring.

5.4.1 Soil Sampling and Leaching Results

During the winter and early spring 2024/2025, soil leaching was conducted to emulate natural rainfall and then was suspended from May until December. Soil sampling was conducted on April 30 and September 10, 2025, 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 2025 (FGL 2021, 2022a, 2022b, 2022c, 2022d, 2022e, 2023, 2024, 2025). Soil sampling locations and a summary of 2025 results are shown on Figure 5.

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Table 5-7 Soil Salinity Data: 2021 through 2025

Soil Sampling Location	Area Name	Soil Salinity ^{a,b} 9/22/2021	Soil Salinity ^{a,b} 2/28/2022	Soil Salinity ^{a,b} 3/24/2022	Soil Salinity ^{a,b} 4/27/2022	Soil Salinity ^{a,b} 6/15/2022	Soil Salinity ^{a,b} 8/11/2022	Soil Salinity ^{a,b} 7/27/2023	Soil Salinity ^{a,b} 4/11/2024	Soil Salinity ^{a,b} 9/11/2024	Soil Salinity ^{a,b} 4/30/2025	Soil Salinity ^{a,b} 9/10/2025
C1	Area 1	66.00	47.00	3.84	6.74	9.99	6.57	24.20	45.90	19.70	13.10	22.40
C2	Area 1	91.00	107.00	1.67	5.13	7.46	6.40	25.20	37.10	42.10	11.00	37.90
C3	Area 1	36.50	1.63	0.00	--	3.76	2.88	34.90	5.72	5.73	5.02	6.14
C4	Area 2	150.00	70.40	10.40	16.60	32.90	4.03	7.58	67.50	134.00	76.8	34.10
C5	Area 3	4.18	2.53	0.00	--	1.02	2.09	1.30	0.43	1.60	1.90	0.63
C6	Area 2	--	21.20	44.10	66.70	10.20^c	8.24	18.1	36.60	44.80	13.2	27.70
C7	Area 1	--	--	1.27	3.87	1.04	7.33	62.9	64.20	77.60	41.1	82.60
C8	Area 1	--	--	0.95	1.55	1.12	5.22	26.8	57.10	42.80	8.77	11.60
C9	Area 1	--	--	0.93	1.40	3.68	3.50	2.94	2.89	7.28	7.70	12.60
C10	Area 2	--	--	1.29	5.20	4.42	2.82	17.50	13.60	8.50	7.01	5.50
C11	Area 2	--	--	0.82	1.97	1.50	4.77	4.27	19.20	40.00	15.80	15.60
C12	Area 2	--	--	3.91	9.62	7.92	8.03	16.5	75.30	67.00	21.10	25.20
C13	Area 1	--	--	1.04	2.54	5.88	1.06	11.1	47.40	22.20	4.42	35.70
D1	Area 2	172.00	67.50	6.99	5.16	--	18.20	52.3	24.60	77.50	27.7	65.60
D2	Area 3	284.00	236.00	5.77	7.98	--	5.40	22.5	21.40	64.60	52.30	58.40

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Soil Sampling Location	Area Name	Soil Salinity ^{a,b} 9/22/2021	Soil Salinity ^{a,b} 2/28/2022	Soil Salinity ^{a,b} 3/24/2022	Soil Salinity ^{a,b} 4/27/2022	Soil Salinity ^{a,b} 6/15/2022	Soil Salinity ^{a,b} 8/11/2022	Soil Salinity ^{a,b} 7/27/2023	Soil Salinity ^{a,b} 4/11/2024	Soil Salinity ^{a,b} 9/11/2024	Soil Salinity ^{a,b} 4/30/2025	Soil Salinity ^{a,b} 9/10/2025
D3	Area 2	596.00	216.00	4.75	4.97	--	4.42	5.8	16.90	48.40	21.50	28.60
D4	Area 5	240.00	40.00	4.73	5.49	--	9.54	28.4	41.80	36.20	20.60	46.40
D5	Area 3	250.00	8.35	0.00	--	--	6.20	11.9	52.20	35.60	40.00	46.70

Notes:

^a Soil salinity is reported in dS/m.

^b Soil samples were collected from 0 to 12 inches below ground surface.

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

bold font = soil salinity results greater than 10 dS/m

A comparison of soil salinity levels in Areas 1 and 2 between September 2024 and September 2025 indicates that 11 samples out of 16 exhibited lower salinity in 2025 than in 2024. In contrast, samples in Areas 3 and 5 exhibited higher soil salinity levels in September 2025 compared with levels in September 2024.

A comparison of soil salinity levels between April 2025 and September 2025 reveals that most of the 16 samples exhibited higher salinity in September after several months without leaching, with only one sample exhibiting a sharp decrease in salinity and three other samples exhibiting a decrease of less than 2 dS/m. Soil salinity levels remained below 30 dS/m for all but two samples in Areas 1 and 2 in April 2025, after 5 months of leaching, whereas in September six samples exhibited soil salinity greater than 30 dS/m in Areas 1 and 2. Samples in Areas 3 and 5 showed salinity levels above 40 dS/m in both April and September, with higher levels in September. Only three samples reported salinity levels below 10 dS/m in September, contrasted with six samples with soil salinity below 10 dS/m in April. All of the locations near the access road had salinity levels greater than 22 dS/m in September 2025.

Soil salinity results suggest that leaching with the spray attachments in Areas 1 and 2 was effective in reducing soil salinity levels for most locations after several months of leaching, based on April 2025 data, especially those locations with well-drained substrates. Precipitation in water years 2023/2024 and 2024/2025 was similar in both years in the floodplain, 2.5 inches and 2.8 inches, respectively, suggesting that leaching was a key variable in reducing salinity levels (National Oceanic and Atmospheric Administration [NOAA] 2025).

5.4.2 Stress Symptom Monitoring Results

In 2025, some blue palo verde mitigation plants exhibited stress symptoms in the form of sap as detailed in Section 3.3.3. 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 sap stress response. Less than 4 percent of blue palo verde mitigation plants were recorded with signs of stress during the September annual census. Signs included oozing sap, dried sap, holes in trunks and stems where dried sap was observed, peeling and crumbling bark around holes, and decaying stems. Two plants were observed with fresh or oozing sap. Of the 17 blue palo verde plants recorded with stress symptoms, only 4 were assessed at Health Rank 2; the remaining 13 plants were assessed as Health Ranks 4, 3a, or 3b.

Stress symptoms were also observed on blue palo verde individuals outside of the revegetation areas and in the reference areas.

5.5 Reference Site Monitoring Results

Six reference sites were monitored at the time of mitigation planting (2022), in January 2023, and on September 12 and 13, 2025, in Year 3 (Figure 6). All 10 mitigation species planted in revegetation areas were documented in one or more reference sites. A summary of mitigation plants observed at each reference site in 2022, along with associated species and site characteristics, is provided in the Topock Revegetation Year 1 Mitigation Monitoring Report (Arcadis 2024). An additional visit to the six reference sites was made in January 2023, and several additional observations of mitigation species were made, such as Anderson's desert thorn in REF-3, REF-4, and REF-6.

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, plant health assessment, summary of vegetative and reproductive phenology, notations of herbivory issues, evidence of disease, and other notes. Appendix F provides photographs of the reference areas in Year 3.

The number of mitigation species observed at each reference site varied, depending on site conditions.

- Reference Site 1 (REF-1) supports eight mitigation species in a broad wash with sandy/silty soils and large cobble, rocks, and gravel.
- Reference Site 2 (REF-2) supports three mitigation species in a small wash with areas of abundant soil cracking.
- Reference Site 3 (REF-3) supports four mitigation species in a small area in a wash with sandy/silty soils and gravel and cobble.
- Reference Site 4 (REF-4) supports six mitigation species in a gravelly and rocky wash surrounded by rocky slopes that support upland species.
- Reference Site 5 (REF-5) supports one mitigation species adjacent to a waterway on the east side of the Colorado River in the HNWR.
- Reference Site 6 (REF-6) supports four mitigation species in rocky areas adjacent to mitigation plantings in UHR-1.

Each mitigation plant observed in 2022 and 2023 was revisited in 2025, along with newly observed individuals of mitigation plants in 2025. Survival of mitigation plants observed in 2022 and 2023 and revisited in 2025 is provided in Table 5-8a for all reference sites. Survival of mitigation plants observed in 2022 and 2023 and revisited in 2025 is provided by individual reference area in Table 5-8b.

Only three mitigation species at the six reference sites exhibited 100 percent survival between 2022 and 2025: catclaw acacia, buckhorn cholla, and beavertail cactus. Survival of individuals for the seven other mitigation species varies by species and location.

- Blue palo verde exhibited 84.6 percent survival for all reference sites, compared with 96 percent survival individuals in revegetation areas at a 3:1 mitigation ratio and 87.2 percent survival at a 3:1 mitigation ratio plus a 10 percent contingency.
- Honey mesquite exhibited 71.4 percent survival for all reference sites, compared with 100 percent survival individuals in revegetation areas at a 3:1 mitigation ratio and 100 percent survival at a 3:1 mitigation ratio plus a 10 percent contingency.
- Screwbean mesquite exhibited 66.7 percent survival for all reference sites, compared with 100 percent survival individuals in revegetation areas at a 3:1 mitigation ratio and 100 percent survival at a 3:1 mitigation ratio plus a 10 percent contingency.
- Desert smoke tree exhibited 88.9 percent survival for all reference sites, compared with 95.9 percent survival individuals in revegetation areas at a 3:1 mitigation ratio and 84.6 percent survival at a 3:1 mitigation ratio plus a 10 percent contingency.
- Cattle saltbush exhibited 45.5 percent survival for all reference sites, compared with 100 percent survival individuals in revegetation areas at a 3:1 mitigation ratio and 100 percent survival at a 3:1 mitigation ratio plus a 10 percent contingency.
- Anderson's desert thorn exhibited 50 percent survival for all reference sites, compared with 100 percent survival individuals in revegetation areas at a 3:1 mitigation ratio and 100 percent survival at a 3:1 mitigation ratio plus a 10 percent contingency.
- Silver cholla exhibited 75 percent survival for all reference sites, compared with 100 percent survival individuals in revegetation areas at a 3:1 mitigation ratio and 100 percent survival at a 3:1 mitigation ratio plus a 10 percent contingency.

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Although both cattle saltbush and Anderson's desert thorn currently exhibit 100 percent survival in revegetation areas, initial plantings of both species in UHR-1 died, and the reference site data indicate 45 to 50 percent mortality in natural sites during this period as well.

Survival of mitigation species was highest at Reference Sites 3 and 5, where all monitored individuals survived, and was lowest at Reference Site 6, where 65.2 percent of monitored individuals survived (Table 5-8b).

Table 5-8a Survival of Mitigation Species in Six Reference Areas

Scientific Name	Common Name	Reference Plants Monitored in 2022	Number of Reference Plants Monitored in 2022 Alive in 2025	Percent Survival in Reference Areas
Riparian and Wash Species				
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	7	5	71.4%
<i>Parkinsonia florida</i>	blue palo verde	13	11	84.6%
<i>Psoralea argophylla</i>	desert smoke tree	9	8	88.9%
<i>Senegalia greggii</i>	catclaw acacia	5	5	100%
<i>Strombocarpa</i> (<i>Prosopis</i>) <i>pubescens</i>	screwbean mesquite	3	2	66.7%
Totals and Percent Survival of Riparian and Wash Species		37	31	83.8%
Upland Species				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	11	5	45.5%
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	2	2	100%
<i>Cylindropuntia echinocarpa</i>	silver cholla	4	3	75%
<i>Lycium andersonii</i>	Anderson's desert thorn	6	3	50%
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	13	13	100%
Totals and Percent Survival of Upland Species		36	26	72.2%
Totals and Percent Survival of All Mitigation Species in Reference Areas		73	57	78.1%

Table 5-8b Survival of Mitigation Species in Six Reference Area by Site

Scientific Name	Common Name	Reference Plants Monitored in 2022	Number of Monitored Reference Plants (2022) Alive in 2025	Percent Survival in Reference Areas
Reference Area 1				
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	2	2	100%
<i>Cylindropuntia echinocarpa</i>	silver cholla	1	1	100%
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	1	1	100%
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	3	3	100%
<i>Parkinsonia florida</i>	blue palo verde	6	4	66.7%
<i>Psoralea argophylla</i>	desert smoke tree	9	8	88.9%
<i>Strombocarpa (Prosopis) pubescens</i>	screwbean mesquite	1	0	0%
<i>Senegalia greggii</i>	catclaw acacia	1	1	100%
Totals and Percent Survival Reference Area 1		24	20	83.3%
Reference Area 2				
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale saltbush	1	1	100%
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	6	4	66.7%
<i>Parkinsonia florida</i>	blue palo verde	2	2	100%
Totals and Percent Survival Reference Area 2		8	6	75%

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Scientific Name	Common Name	Reference Plants Monitored in 2022	Number of Monitored Reference Plants (2022) Alive in 2025	Percent Survival in Reference Areas
Reference Area 3				
<i>Lycium andersonii</i>	Anderson's desert thorn	2	2	100%
<i>Parkinsonia florida</i>	blue palo verde	5	5	100%
<i>Strombocarpa (Prosopis) pubescens</i>	screwbean mesquite	1	1	100%
<i>Senegalia greggii</i>	catclaw acacia	1	1	100%
Totals and Percent Survival Reference Area 3		9	9	100%
Reference Area 4				
<i>Cylindropuntia echinocarpa</i>	silver cholla	1	1	100%
<i>Lycium andersonii</i>	Anderson's desert thorn	2	1	50%
<i>Neltuma odorata</i> (<i>Prosopis glandulosa</i> var. <i>torreyana</i>)	honey mesquite	1	1	100%
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	1	1	100%
<i>Strombocarpa (Prosopis) pubescens</i>	screwbean mesquite	1	1	100%
<i>Senegalia greggii</i>	catclaw acacia	4	4	100%
Totals and Percent Survival Reference Area 4		10	9	90%

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Scientific Name	Common Name	Reference Plants Monitored in 2022	Number of Monitored Reference Plants (2022) Alive in 2025	Percent Survival in Reference Areas
Reference Area 5				
<i>Strombocarpa (Prosopis) pubescens</i>	screwbean mesquite	1	1	100%
	Totals and Percent Survival Reference Area 5	1	1	100%
Reference Area 6				
<i>Atriplex polycarpa</i>	cattle saltbush	10	5	50%
<i>Cylindropuntia echinocarpa</i>	silver cholla	2	1	50%
<i>Lycium andersonii</i>	Anderson's desert thorn	2	0	0%
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	9	9	100%
	Totals and Percent Survival Reference Area 6	23	15	65.2%
	Totals and Percent Survival All Reference Areas	68	55	80.9%

During the Year 3 reference site monitoring event, health assessment monitoring of a sample of surviving mitigation species was conducted, which followed a modified health index initially developed by Bainbridge et al. (2001), using the methods described in 3.1.1 for health assessments (Table 5-9).

- Most blue palo verde at reference sites were in excellent health (Health Index 4 – 66.7 percent), and the remaining plants were entering seasonal dormancy in good health (Health Index 3a and 3b – 33.3 percent), for a total of 100 percent of blue palo verde in good to excellent health.
- Many honey mesquite at reference sites were in excellent health (Health Index 4 – 40 percent), and the remaining plants were entering seasonal dormancy in good health (Health Index 3a and 3b – 60 percent), for a total of 100 percent of honey mesquite in good to excellent health.
- All screwbean mesquite at reference sites were in excellent health (Health Index 4 – 100 percent).
- Most desert smoke tree at reference sites were in excellent health (Health Index 4 – 75 percent), and the remaining plants were entering seasonal dormancy in good health (Health Index 3a and 3b – 25 percent), for a total of 100 percent of desert smoke tree in good to excellent health.
- A portion of catclaw acacia at reference sites were in excellent health (Health Index 4 – 20 percent), and the remaining plants were entering seasonal dormancy in good health (Health Index 3a and 3b – 80 percent), for a total of 100 percent of catclaw acacia in good to excellent health.
- Most cattle saltbush at reference sites were in excellent health (Health Index 4 – 40 percent), and a portion were entering seasonal dormancy in good health (Health Index 3a and 3b – 40 percent), for a total of 80 percent of cattle saltbush in good to excellent health. However, one-fifth of the sampled plants were in poor health (Health Index 1 – 20 percent).
- Two-thirds of Anderson's desert thorn at reference sites were entering seasonal dormancy in good health (Health Index 3a and 3b – 66.7 percent). The remaining one-third were in poor health (Health Index 1 – 33.3 percent).
- Many buckhorn cholla at reference sites were in excellent health (Health Index 4 – 50 percent), and the remaining plants were entering seasonal dormancy in good health (Health Index 3a and 3b – 50 percent), for a total of 100 percent of buckhorn cholla in good to excellent health.
- One-third of silver cholla at reference sites were in excellent health (Health Index 4 – 33.3 percent), and a portion were entering seasonal dormancy in good health (Health Index 3a and 3b – 33.3 percent), for a total of 66.6 percent of silver cholla in good to excellent health. However, a third of sampled plants were in poor health (Health Index 1 – 33.3 percent).
- One-third of beavertail cactus at reference sites were in excellent health (Health Index 4 – 33.3 percent), and one-third were entering seasonal dormancy in good health (Health Index 3a and 3b – 33.3 percent), for a total of 66.6 percent of beavertail cactus in good to excellent health. However, a 25 percent of beavertail cactus individuals exhibited fair health (Health Index 2 – 25 percent), and 8.3 percent were in poor health (Health Index 1 – 8.3 percent).

Table 5-9 Reference Site Health Assessment 2025 – All Reference Sites

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> var. <i>torreyana</i>)	honey mesquite	5	2	40%	1	20%	2	40%	0	-	0	-
<i>Parkinsonia florida</i>	blue palo verde	9	6	66.7%	0	-	3	33.3%	0	-	0	-
<i>Psoralea argophylla</i>	desert smoke tree	8	6	75%	0	-	2	25%	0	-	0	-
<i>Senegalia greggii</i>	catclaw acacia	5	1	20%	3	60%	1	20%	0	-	0	-
<i>Stromboscarpa pubescens</i>	screwbean mesquite	1	1	100%	0	-	0	-	0	-	0	-
Total Mitigation Plants for Riparian and Wash Species		29	16	55.2%	4	13.8%	8	27.6%	0	-	0	
Upland Species												
<i>Atriplex polycarpa</i>	cattle spinach, cattle saltbush, allscale	5	2	40%	2	40%	0	-	0	-	1	20%
<i>Cylindropuntia acanthocarpa</i>	buckhorn cholla	2	1	50%	0	-	1	50%	0	-	0	-

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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>Cylindropuntia echinocarpa</i>	silver cholla	3	1	33.3%	0	-	1	33.3%	0	-	1	33.3%
<i>Lycium andersonii</i>	Anderson's thornbush	3	0	-	0	-	2	66.7%	0	-	1	33.3%
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	12	4	33.3%	4	33.3%	0	-	3	25%	1	8.3%
Total Mitigation Plants for Upland Species		25	8	32%	6	24%	4	16%	3	12%	4	16%
Total Mitigation Plants for All Species		54	24	44.4%	10	18.5%	12	22.2%	3	5.6%	4	7.4%

5.6 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 (98.0 percent) exceeds the required performance standard of 75 percent survival.

5.7 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 2.5).

Between March 2023 and July 2025, an additional 12 beavertail cactus individuals were salvaged from work areas and transplanted. Of these salvaged individuals, 6 were associated with the remedy project (Table 5-10) and 6 were associated with construction areas associated with the Soil Non-Time Critical Remedial Action (Soil NTCRA, Table 5-11), a remedy project conducted by PG&E requiring soil excavation near the TCS (Jacobs 2022, 2025)

As of September 2025, all individuals of salvaged and transplanted beavertail cactus have survived (Tables 5-10 and 5-11), exhibiting 100 percent survival.

Table 5-10 Salvaged Beavertail Cactus Survival Associated with Groundwater Remedy Construction Activities

Date of Transplanting	Total Individuals Salvaged and Transplanted	Total Individuals Alive (September 2025)
November and December 2018	7	7
2020 to 2021	2	2
April and August 2022	3	3
March 2023 to July 2025	6	6
Total Salvaged and Transplanted Beavertail Cactus	18	18

Table 5-11 Salvaged Beavertail Cactus Survival Associated with NTCRA Construction Activities

Date(s) of Transplanting	Total Individuals Salvaged and Transplanted	Total Individuals Alive (September 2025)
March 2023 to August 2023	6	6
Total Salvaged and Transplanted Beavertail Cactus	6	6

6 Year 3 Revegetation Maintenance Results

Revegetation maintenance included invasive plant species eradication, irrigation operation and repair, herbivore-deterrent fencing inspection and repair, general site housekeeping and cleanup, and the general care and nurturing of plantings within the mitigation planting areas in Year 3.

Revegetation maintenance, including inspections and equipment operation, was conducted on the following dates in 2025:

- January – 2, 9, 16, 23, and 30;
- February – 6, 13, 20, and 25 through 28;
- March – 6, 13, 20, and 27;
- April – 3, 10, 17, 24, 29, and 30;
- May – 1, 8, 15, 22, and 29;
- June – 5, 12, 19, and 26;
- July – 3, 10-11, 15 through 17, and 24;
- August – 1, 7, 14, 21, and 28;
- September – 4, 9 through 13, 18, and 25;
- October – 2, 9, 16, 23, and 30;
- November – 6, 12, 13, and 20; and
- December – 4, 11, 18, and 30.

6.1 Irrigation Operations and Maintenance

During Year 3, irrigation maintenance involved operating, inspecting, repairing, and improving the irrigation system. The dates of irrigation maintenance are listed above.

The irrigation system for the Anderson's desert thorn (installed in November 2024) in Areas 3 and 5 was operated every week from January through June 2025, except after significant rain events, when the irrigation system was generally not operated because adequate soil moisture was achieved. From July to December, the irrigation system for Anderson's desert thorn was operated every 2 weeks, and all three emitters were placed into the three DEEP DRIP® Watering Stakes to encourage deep rooting. During irrigation events, the system operated for 2 hours in relevant mitigation planting areas.

Hand-watering of catclaw acacia plants in Area 5 was conducted every 2 weeks from May through September 2025. Two gallons of water were used to irrigate each plant in two ways: watering the soil around the base of the plants with 1.5 gallons of water and pouring the remaining 0.5 gallon of water into the three DEEP DRIP® Watering Stakes. From October to December catclaw acacia was irrigated every 2 weeks using the irrigation system, which was operated for 2 hours using emitters inside the three watering stakes.

To facilitate leaching, two 360-degree spray attachments were installed on 12-inch risers adjacent to blue palo verde plants to spray a 10-foot radius of water around each plant. Soil leaching sprayers were operated every 3 to 4 weeks from January through May and again in November and December to emulate natural winter rainfall events. Sprayers were operated in Areas 1, 2, and 4 and the eastern portion of Area 3 and 5, where soil salinity concentrations were generally higher (Figure 5). During these irrigation events, the system operated until the equivalent of 1.0 inch of water had "fallen," or approximately 2 hours.

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

In UHR-1, a water tank was installed to resume irrigation of the cattle saltbush mitigation plants and to initiate irrigation of newly transplanted salvaged beavertail cactus plants. The water tank was connected to the existing 0.25-inch PVC pipe system, and additional manifolds were added as needed to provide three surface emitters to each new salvaged beavertail cactus plant. Irrigation to the newly transplanted beavertail cactus plants was operated for 2 hours every week from May to October and then reduced to once a month through the end of December 2025. Irrigation of cattle saltbush was operated weekly for 2 hours from May to October 2025 and then terminated once it was clear the cattle saltbush mitigation plantings in UHR-1 were dead.

6.2 Fencing Maintenance

The following maintenance was performed during Year 3 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 were discovered, they were replaced with bailing wire, and the broken zip ties were collected and discarded.
- Routine monitoring of the fence perimeter was conducted to assess the fencing for erosion or animal damage.

6.3 Erosion Control Best Management Practice Maintenance

Erosion control best management practices were inspected regularly to confirm proper functioning. In February 2025, deteriorating straw wattles were removed from the eastern fence line in sections of Area 1 and 2 and were replaced with silt fence or, where silt fence could not be installed, new straw wattles. Arrowweed was cut at ground level as needed to install the silt fence, unless removal below the ground surface was necessary to “key in” the silt fence.

Natural bank erosion was observed in September 2025 at the west end of Area 5 along a small wash. Due to the threat of undercutting a catclaw acacia mitigation plant, the bank was protected in November 2025 by hand-placing approximately 1 cubic yard of natural rock along and up to the top of the banks. The rock added to Area 5 was surplus clean rock resulting from remediation efforts, which had been stored at the Soil Processing Yard.

6.4 Invasive Plant Species Abatement Results

Arcadis biologists and 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 Figure 7.

Weeds pulled by biologists during routine monitoring events generally consisted of small patches of 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 Saharan mustard (*Brassica tournefortii*), tocalote (*Centaurea melitensis*), stinknet (*Oncosiphon pilulifer*), common reed, Mediterranean grass (*Schismus barbatus*), London rocket (*Sisymbrium irio*), and Bermuda grass. In most cases, these weeds required a shovel or trowel for removal. All weeds were bagged and removed from the Site for disposal.

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 5	Pull	2/26/2025
<i>Centaurea melitensis</i>	toalote	moderate	Area 1	Dig	4/29/2025
<i>Cynodon dactylon</i>	Bermuda grass	moderate	Area 2	Pull	7/17/2025
<i>Oncosiphon pilulifer</i>	stinknet	high	Area 4 and 5	Pull	2/26/2025
<i>Phragmites australis</i>	common reed	no rating	Area 1 and 2	Dig, Pull	2/27/2025, 4/28/2025, 4/29/2025, 5/30/2025, 7/16/2025, 7/17/2025, 9/10/2025
<i>Schismus barbatus</i>	Mediterranean grass	limited	Area 3 and 5	Pull	2/26/2025, 2/27/2025, 5/30/2025
<i>Sisymbrium irio</i>	London rocket	limited	Area 5	Pull	2/26/2025

Note:

^a California Invasive Plant Inventory (California Invasive Plant Council 2025)

6.5 Arrowweed Abatement Results

Following the abatement methods detailed in Section 4.5.3, arrowweed was removed using a two-step process. If arrowweed occurred within a 3-foot radius of any mitigation plantings, it was dug up and removed. If it occurred within a 3- to 5-foot radius of a mitigation plant, it was cut at ground level and removed. 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 that were at least 3 feet long were offered to the Tribes and stored in a designated location for retrieval. Arrowweed treatment events are summarized in Table 6-2 and shown on Figure 7.

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, and 3	Pull, Dig, Cut	2/25/2025, 4/29/2025, 7/15/2025, 7/17/2025, 9/12/2025

7 Summary and Conclusion

A total of 625 surviving mitigation plants were censused in all mitigation planting areas in Year 3 (a survival rate of 96.6 percent at a 3:1 mitigation ratio). Survival of mitigation plantings at a 3:1 mitigation ratio plus 10 percent contingency is 89.7 percent, with 637 surviving individuals.

A total of 577 surviving riparian and wash mitigation plants are present in floodplain mitigation Areas 1 through 5 in Year 3. Mean Year 3 survival of floodplain riparian and wash mitigation plants is 96.3 percent at a 3:1 mitigation ratio, well above the performance standard of 75 percent survival. A total of 48 surviving upland mitigation plants were censused in the upland mitigation area UHR-1 as well as in Areas 1, 3, and 5 in Year 3. Mean Year 3 survival of upland mitigation plants is 100 percent at a 3:1 mitigation ratio.

Mean survival of all mitigation plant species at a 3:1 mitigation ratio (96.6 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.

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 3, a total of 62 native vascular plant species were observed in Areas 1-5, an increase from 43 native plant species in Year 2. Prior to initial planting in March 2022, six native wildlife species were reported in floodplain planting Areas 1-5. During the past 3 years, a total of 62 native wildlife species and four additional species with unknown nativity have been observed in floodplain mitigation planting areas, an increase from 40 native wildlife species and two unknown species in Year 2.

At the time of planting, the upland revegetation area UHR-1 supported five native species. By the end of Year 3, a total of 21 native vascular plant species were observed in UHR-1, matching Year 2 results. Prior to initial planting in March 2022, five native wildlife species were reported in UHR-1. During the past 3 years a total of 10 native wildlife species have been observed in UHR-1.

Adaptive management included soil salinity sampling, soil leaching, and stress symptom monitoring. A comparison of soil salinity levels in Areas 1 and 2 between September 2024 and September 2025 indicates that 11 samples out of 16 exhibited lower salinity in 2025 than in 2024. A comparison of soil salinity levels between April 2025 and September 2025 reveals that most of the 16 samples exhibited higher salinity in September after several months without leaching. Soil salinity results suggest that leaching with the spray attachments in Areas 1 and 2 was effective in reducing soil salinity levels for most locations after several months of leaching, based on April 2025 data. Precipitation in water years 2023/2024 and 2024/2025 was similar in the floodplain, 2.5 and 2.8 inches, respectively, suggesting that leaching was a key variable in reducing salinity levels (NOAA 2025).

Revegetation maintenance included invasive plant species abatement, 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 3.

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.

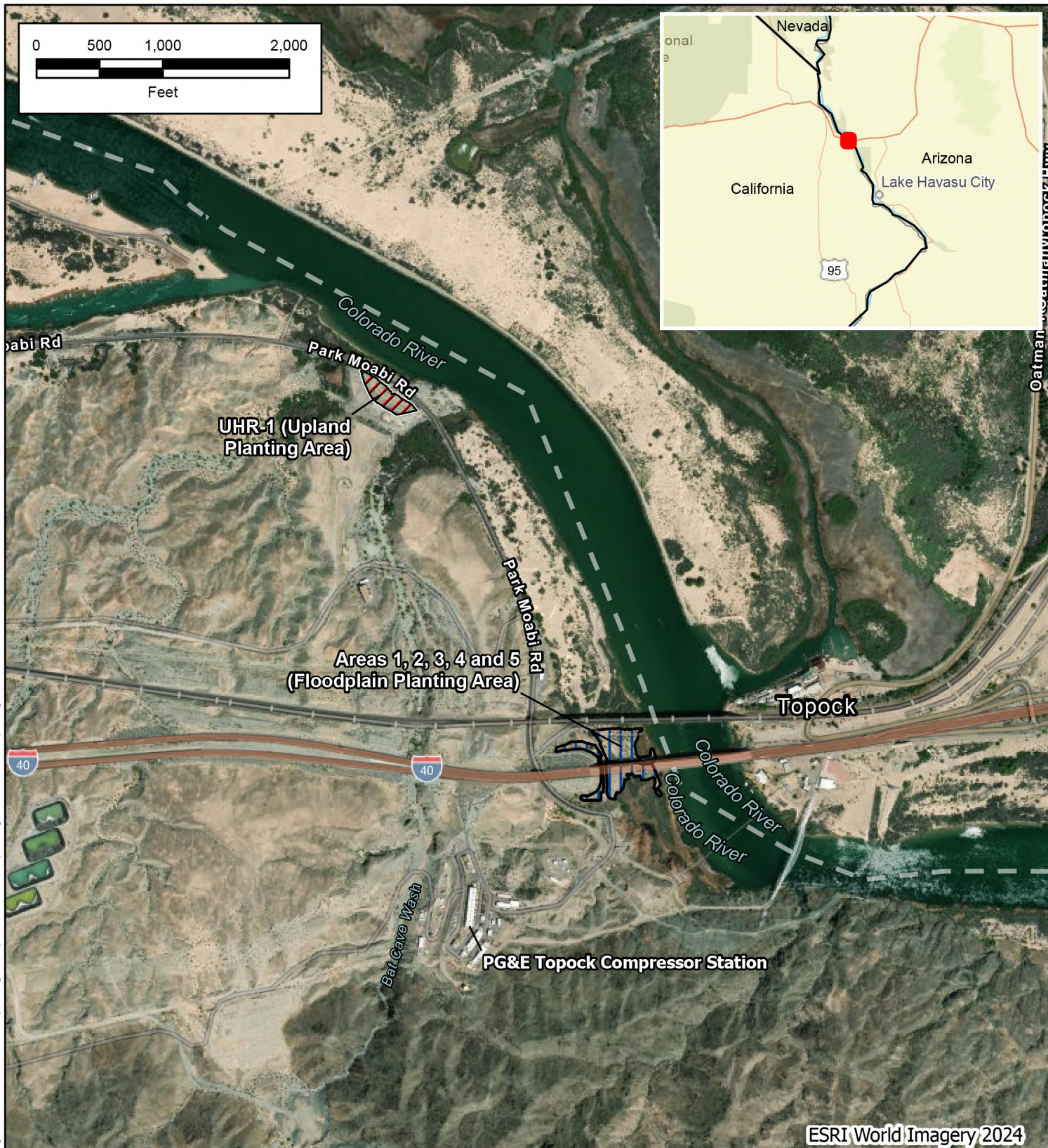
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Figures



Legend

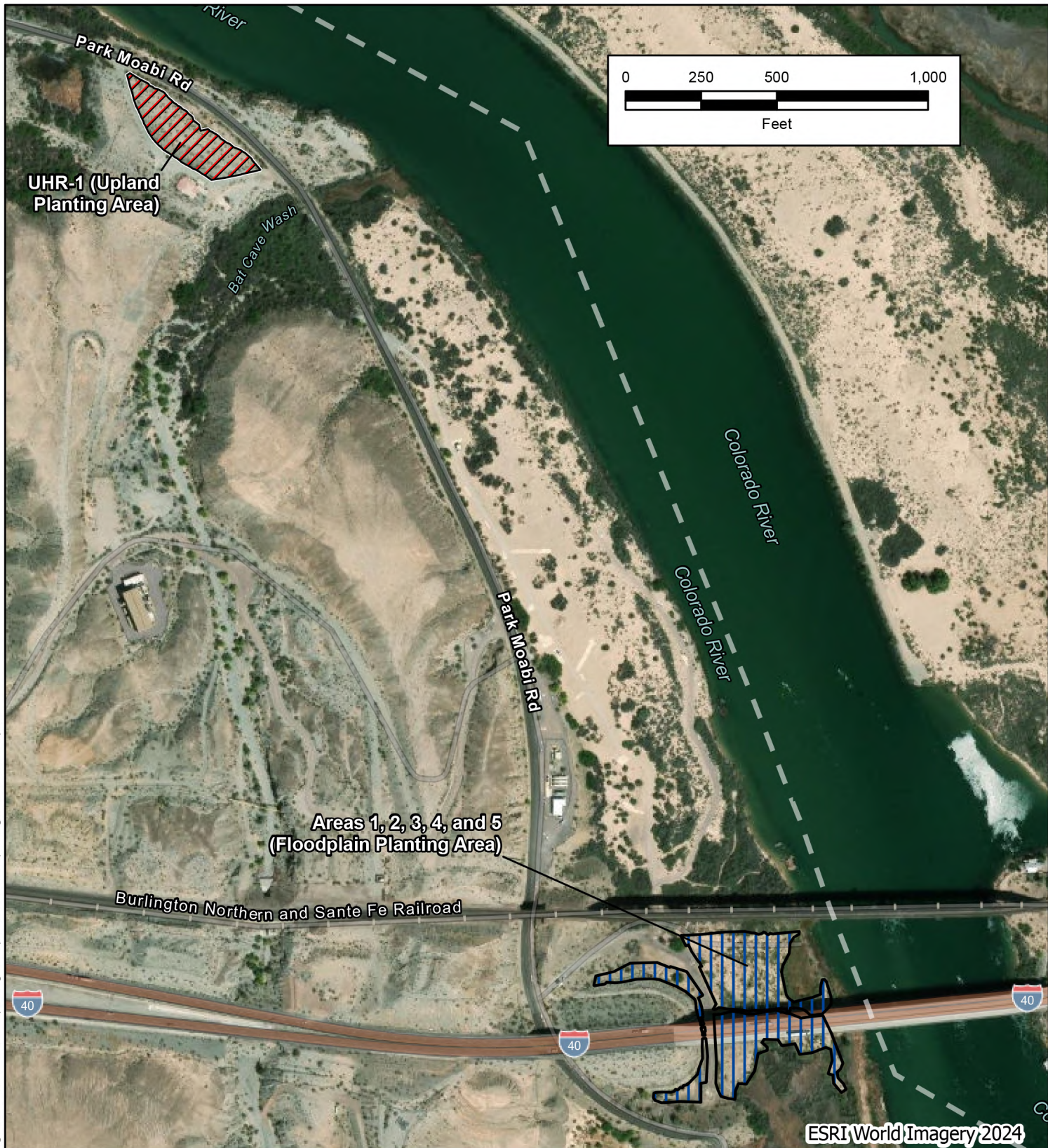
-  Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)
-  UHR-1 (Upland Planting Area)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 3
MITIGATION MONITORING REPORT**



Site Location



**FIGURE
1**



Legend

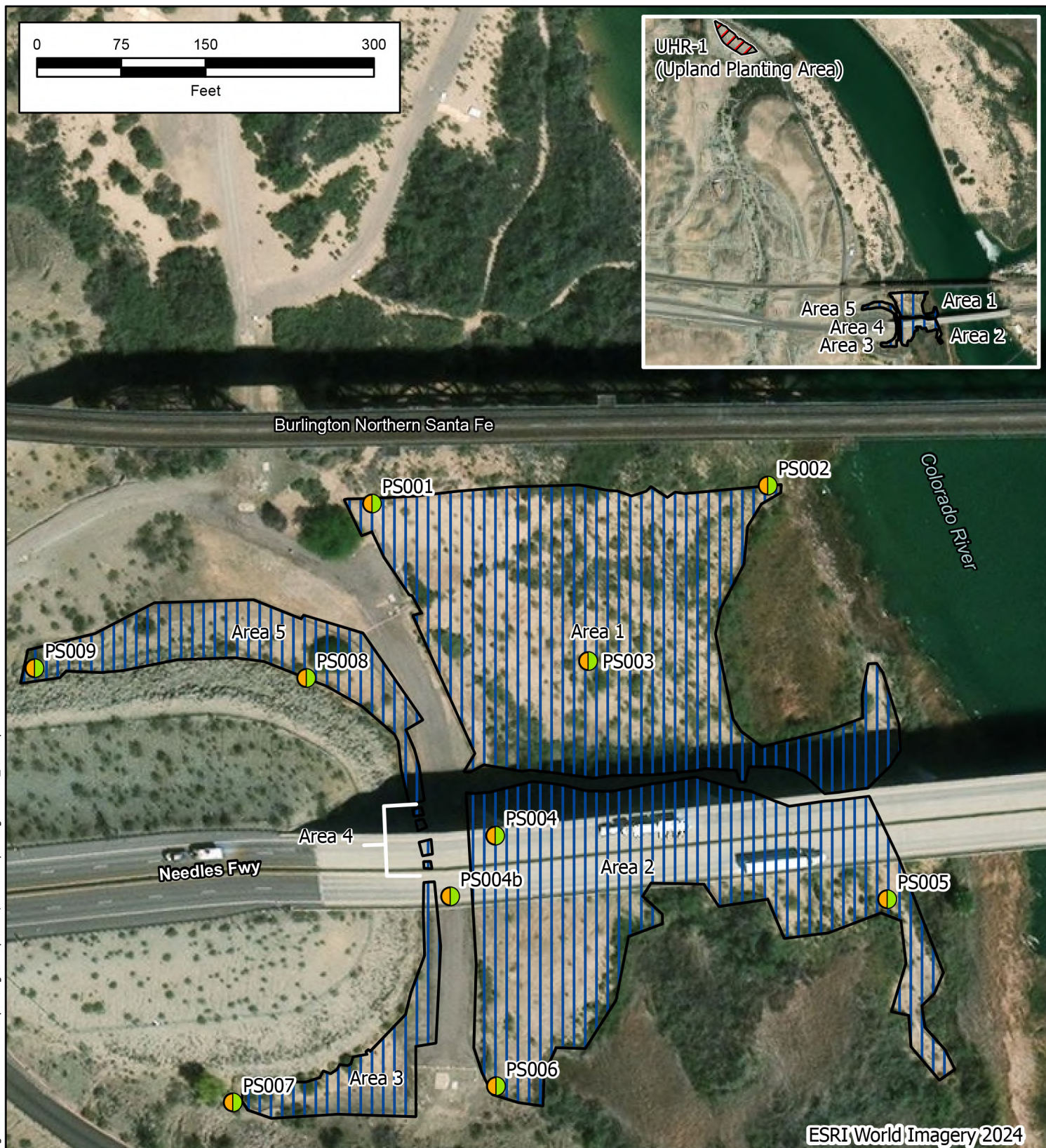
-  Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)
-  UHR-1 (Upland Planting Area)

PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA TOPOCK REVEGETATION YEAR 3 MITIGATION MONITORING REPORT


Site Overview



FIGURE
2



Legend

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

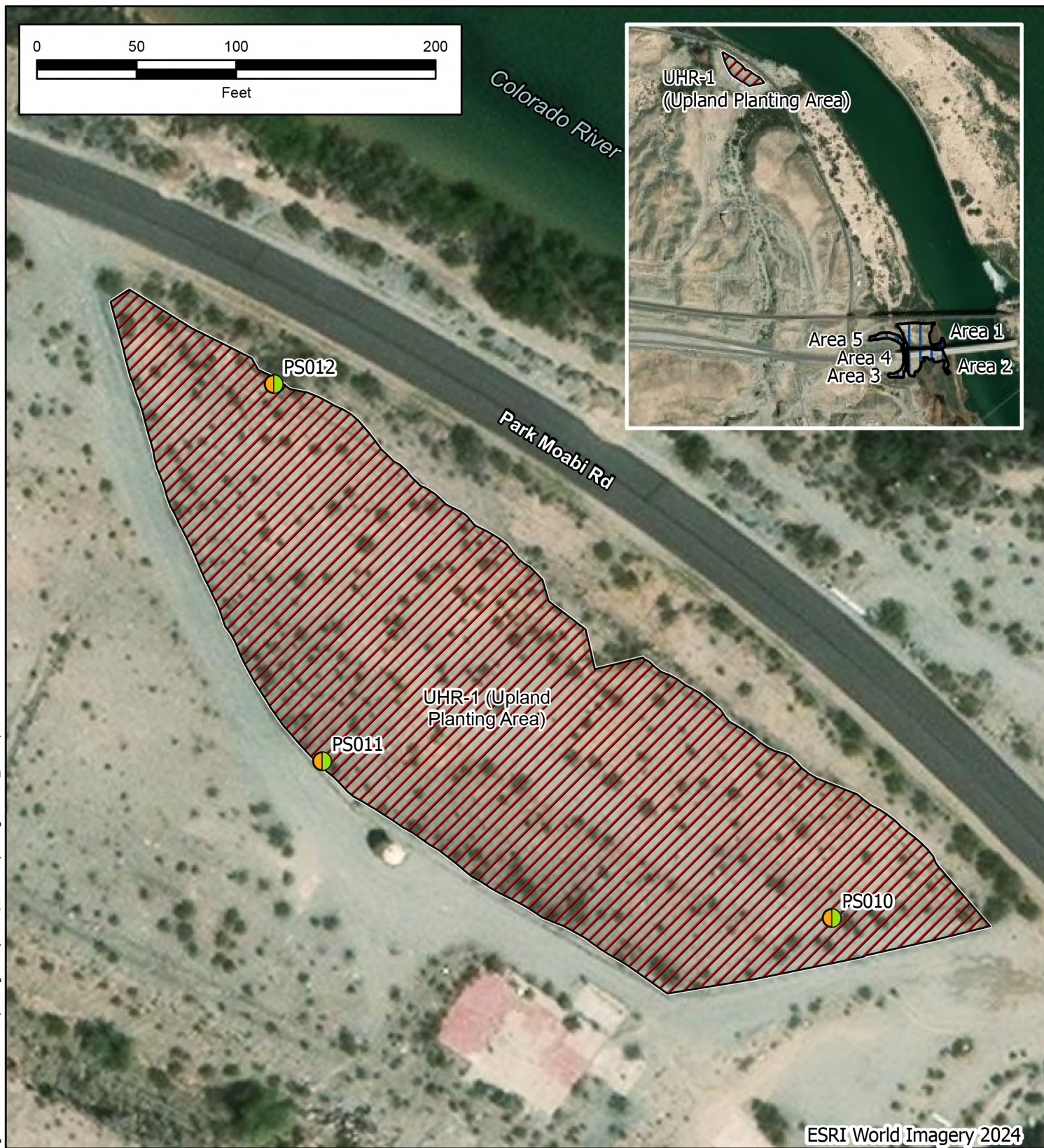
Note: Planting areas reduced for 10' setback from TransWestern gas pipeline, BNSF ROW, and PG&E water pipelines. Actual planting of large trees may be set back 20' or more from TransWestern gas pipeline and other infrastructure to allow for setback of spreading and overhanging branches of planted trees.

PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA TOPOCK REVEGETATION YEAR 3 MITIGATION MONITORING REPORT



Mitigation Planting Areas in Floodplain



FIGURE
3A



Legend

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

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 3
MITIGATION MONITORING REPORT**

**Mitigation Planting
Area in UHR-1**



 **ARCADIS**

**FIGURE
3B**

Path: T:_ENV\PG&E_Topock\GEC\Pro\2025\Revegetation Year 3 Annual Report Figures updates\Annual Report Figure 4A Mitigation Plants by Planting Area, Area 1



Legend <ul style="list-style-type: none">Area 1 (Revegetation Planting Area)☆ 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 3 MITIGATION MONITORING REPORT	
	Mitigation Plants in Area 1	
		FIGURE 4A

Path: T:_ENV\PG&E_Topock\GEC\Pro\2025\Revegetation Year 3 Annual Report Figures updates\Annual Report Figure 2025_ESRI.aprx



Legend <ul style="list-style-type: none">Area 2 (Revegetation Planting Area)Blue palo verde (Container Planting)Blue palo verde (Volunteer Recruit)Honey mesquite (Volunteer Recruit)Screwbean mesquite (Volunteer Recruit)	PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA TOPOCK REVEGETATION YEAR 3 MITIGATION MONITORING REPORT	
	Mitigation Plants in Area 2	
	 ARCADIS	FIGURE 4B

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Legend

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

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 3
MITIGATION MONITORING REPORT**

Mitigation Plants in Area 3



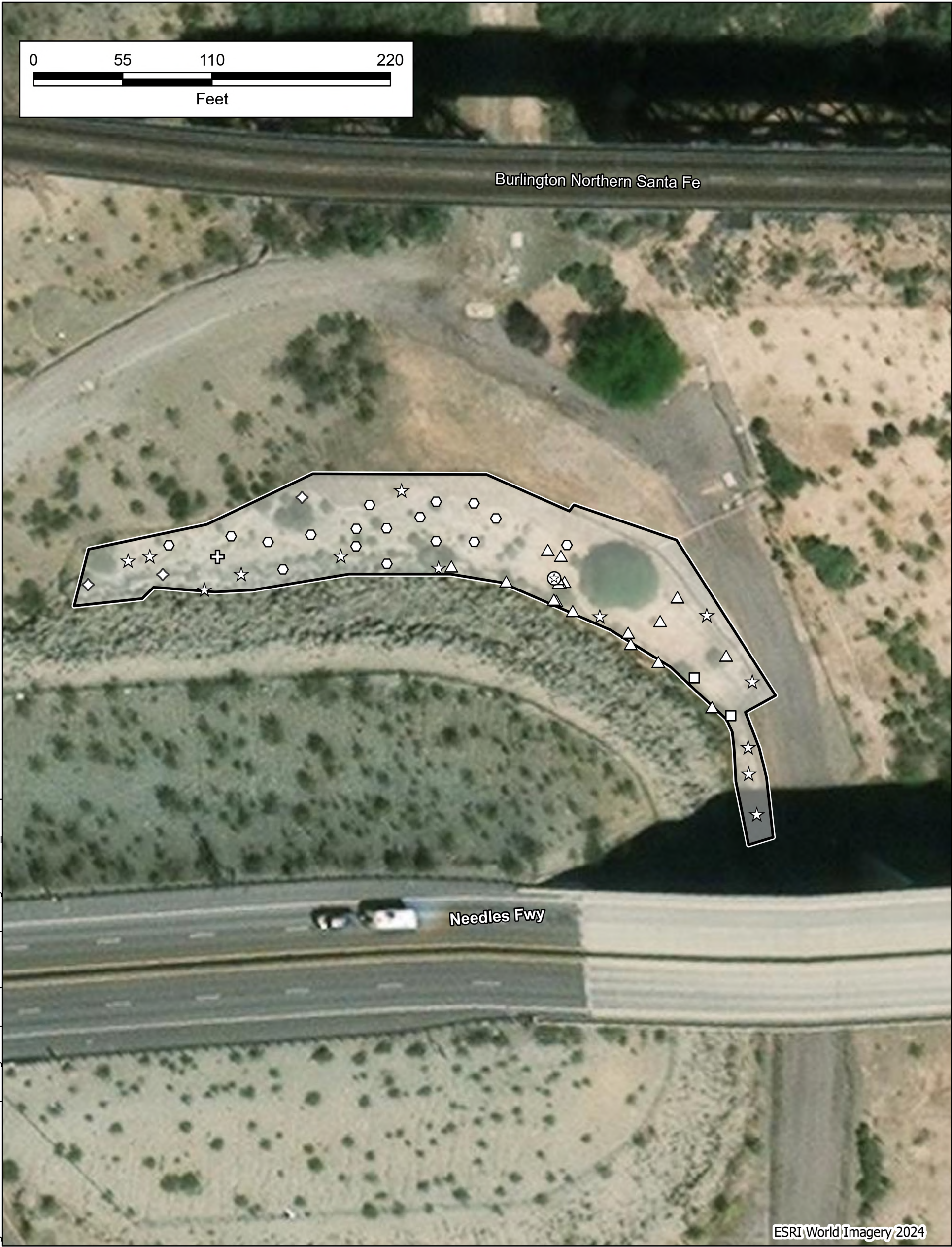
ARCADIS

**FIGURE
4C**



<div>Legend</div> <div><div><div></div>Area 4 (Revegetation Planting Area)</div><div><div>☆</div>Blue palo verde (Container Planting)</div><div><div>⊛</div>Blue palo verde (Volunteer Recruit)</div></div>	<div>PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA TOPOCK REVEGETATION YEAR 3 MITIGATION MONITORING REPORT</div>	
	<div>Mitigation Plants in Area 4</div>	
	<div><div><div>N</div><div></div></div></div>	<div><div><div></div>ARCADIS</div><div>FIGURE 4D</div></div>

Path: T:_ENV\PG&E_Topock\GEC\Pro\2025\Revegetation Year 3 Annual Report Figures updates\Annual Report Figure 2025_ESRI.aprx



Legend

- Area 5 (Revegetation Planting Area)
- ☆ 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 3
MITIGATION MONITORING REPORT**

Mitigation Plants in Area 5



**FIGURE
4E**

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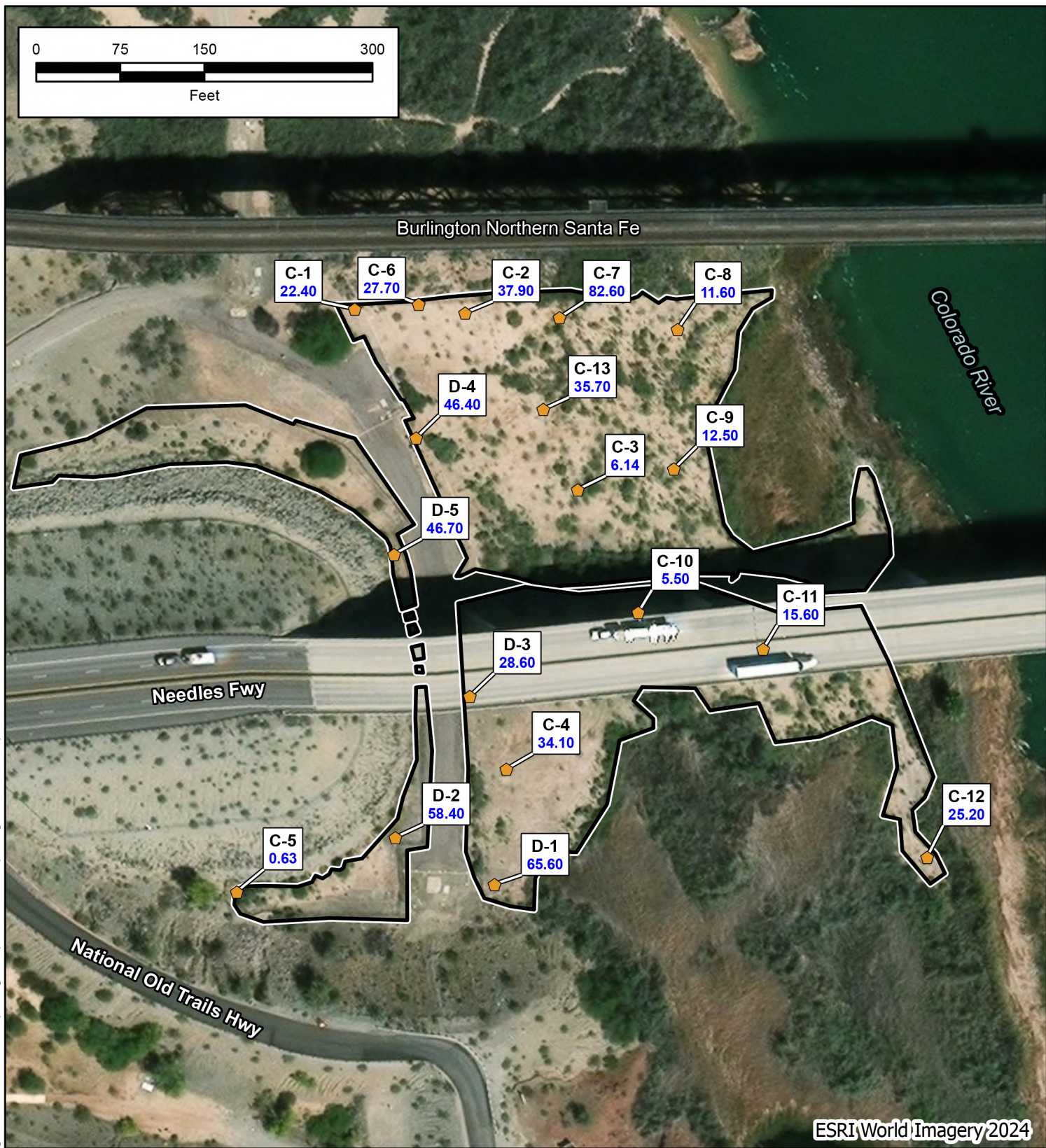
- UHR-1 (Upland Planting Area)
- Buckhorn cholla (Container Planting)
- Silver cholla (Container Planting)
- Beavertail cactus (Container Planting)
- Beavertail cactus (Salvaged Planting)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 3
MITIGATION MONITORING REPORT**



Mitigation Plants in UHR-1



**FIGURE
4F**



Legend

-  **C-5** Soil Sampling Location Name
September 2025 salinity measurements at 0-12 inches below ground surface
(dS/m)
1.60
-  Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)

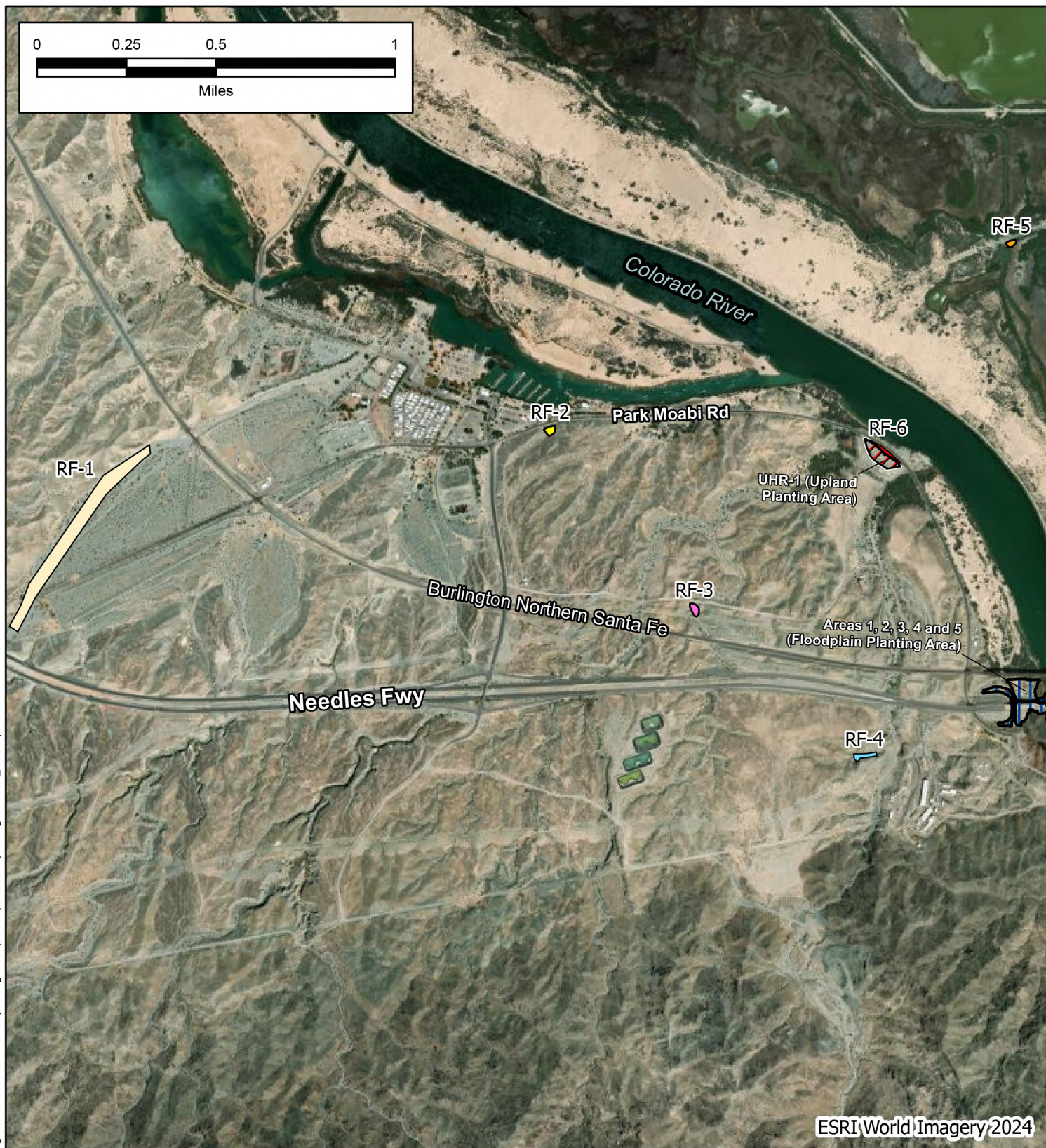
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA TOPOCK REVEGETATION YEAR 3 MITIGATION MONITORING REPORT

Soil Sampling Results -
September 2025



 **ARCADIS**

FIGURE
5



Legend

- RF-1
- RF-2
- RF-3
- RF-4
- RF-5
- RF-6
- UHR-1 (Upland Planting Area)
- Areas 1, 2, 3, 4, 5 (Floodplain Planting Area)

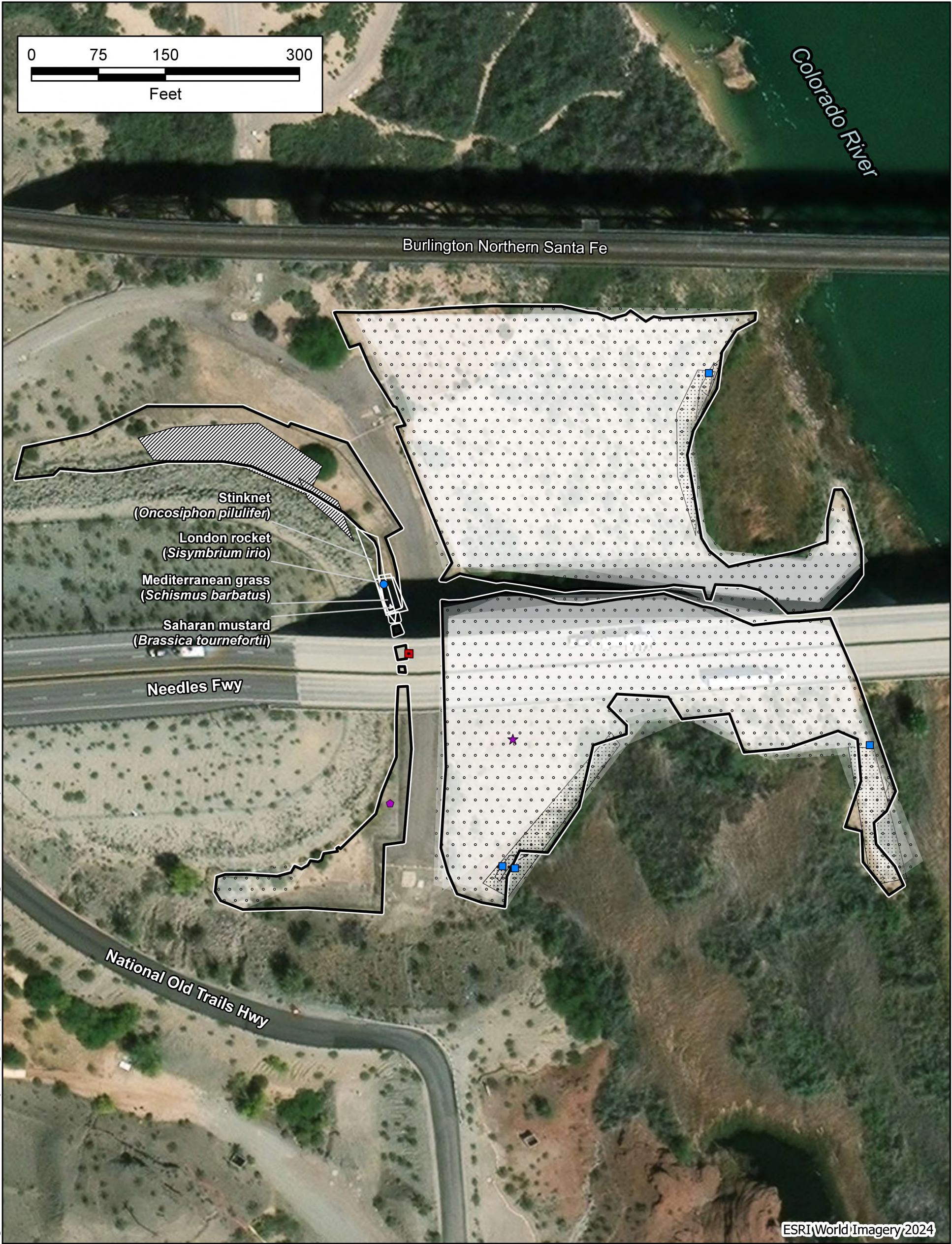
**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 3
MITIGATION MONITORING REPORT**

Reference Site Locations



**FIGURE
6**

Path: T:_ENV\PG&E_Topock\GEC\Pro\2025\Revegetation Year 3 Annual Report Figures updates\Annual Report Figure 2025_ESRI.aprx



Legend

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

Saharan mustard (*Brassica tournefortii*)

Bermuda grass (*Cynodon dactylon*)

Common reed (*Phragmites australis*)

Mediterranean grass (*Schismus barbatus*)

Tocalote (*Centaurea melitensis*)


Common reed (*Phragmites australis*)

Arrowweed (*Pluchea sericea*)

Mediterranean grass (*Schismus barbatus*)

**PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
TOPOCK REVEGETATION YEAR 3
MITIGATION MONITORING REPORT**

Locations where Invasive Plant
Species and Arrowweed were
Controlled in Floodplain Mitigation
Planting Areas – Year 3

 **ARCADIS**

**FIGURE
7**

Appendix A

Applicable Project Mitigation Measures

Mitigation Measure Title	Mitigation Measure Description
Mitigation Measure AES-1: Substantial Adverse Effects on Scenic Vistas	<p>(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:</p> <p>(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.</p>
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, 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 2025 Revegetation Activities



Photo: 1

Date:

September 12, 2025

Description:

Overview of Area 1 (background), Area 2 (foreground right), Area 3 (foreground left), and Area 4 (under bridge left) as seen from National Trails Highway. View is facing north.

Location:

National Trails Highway south of Highway I-40.



Photo: 2

Date:

February 28, 2025

Description:

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

Location:

National Trails Highway north of Highway I-40.



Photo: 3

Date:

September 12, 2025

Description:

Overview of Area 5
as seen from National
Trails Highway.
View is facing northeast.

Location:

National Trails Highway south
of Highway I-40.



Photo: 4

Date:

February 28, 2025

Description:

Two enclosures of Area 4.
View is facing southwest.

Location:

National Trails Highway north
of Highway I-40.



Photo: 5

Date:

September 12, 2025

Description:

Blue palo verde mitigation plant fruiting.

Location:

Area 1



Photo: 6

Date:

September 15, 2025

Description:

Blue palo verde mitigation plant with an estimated size of 12 feet tall and 11 feet wide.

Location:

Area 5

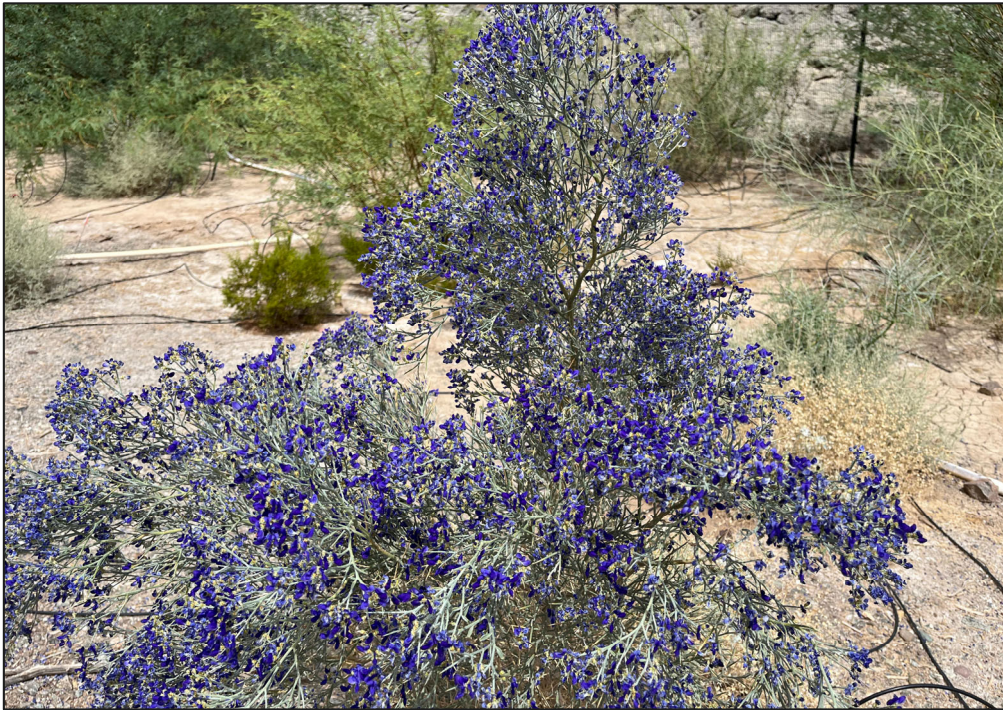


Photo: 7

Date:

May 29, 2025

Description:

Desert smoke tree mitigation plant in bloom.

Location:

Area 3



Photo: 8

Date:

September 12, 2025

Description:

Desert smoke tree fruiting.

Location:

Area 5



Photo: 9

Date:

September 12, 2025

Description:

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

Location:

Area 5



Photo: 10

Date:

September 9, 2025

Description:

Screwbean mesquite mitigation plant.

Location:

Area 5



Photo: 11

Date:

September 12, 2025

Description:

Natural recruit of cattle spinach/allscale saltbush.

Location:

Area 3



Photo: 12

Date:

September 12, 2025

Description:

Anderson's desert-thorn producing flowers.

Location:

Area 5



Photo: 13

Date:
July 15, 2025

Description:
Catclaw acacia mitigation plant.

Location:
Area 5



Photo: 14

Date:
February 28, 2025

Description:
Native tufted-haired cryptantha (*Cryptantha maritima* var. *pilosa*) in same location as where non-native summer cypress (*Bassia scoparia*) was previously growing and had been removed.

Location:
Area 3



Photo: 15

Date:

April 28, 2025

Description:

Native annuals and perennials naturally occurring in Area 5.

Location:

Area 5



Photo: 16

Date:

April 28, 2025

Description:

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

Location:

UHR-1



Photo: 17

Date:

September 11, 2025

Description:

Buckhorn cholla mitigation plant.

Location:

UHR-1



Photo: 18

Date:

February 28, 2025

Description:

Silver cholla mitigation plant.

Location:

UHR-1



Photo: 19

Date:

September 11, 2025

Description:

Beavertail cactus mitigation plants.

Location:

UHR-1



Photo: 20

Date:

March 24, 2025

Description:

Beavertail cactus mitigation plant in bloom.

Location:

UHR-1



Photo: 21

Date:

May 29, 2025

Description:

Great basin whiptail
(*Myiarchus cinerascens*)
crawling under arrowweed.

Location:

Area 1



Photo: 22

Date:

April 28, 2025

Description:

Ash-throated flycatcher
(*Myiarchus cinerascens*)
perching on fenceline.

Location:

Area 3



Photo: 23

Date:

September 12, 2025

Description:

Great-tailed grackle
(*Quiscalus mexicanus*) on
the herbivore-deterrent
fencing in Area 2

Location:

Area 2



Photo: 24

Date:

February 27, 2025

Description:

Digger bee (*Anthophora* sp.)
pollinating creosote bush in
Area 5.

Location:

Area 5



Photo: 25

Date:

September 10, 2025

Description:

Native white-lined sphinx caterpillar (*Hyles lineata*).

Location:

Area 5



Photo: 26

Date:

July 15, 2025

Description:

Native citrus cicada (*Diceroprocta apache*) on palo verde mitigation plant.

Location:

Area 1

Appendix C

Photographs from 2025 Photo-Monitoring Stations



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 9/12/2025
Year 3

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 10%. Arrowweed is also present, with approximately 12% cover. Natural recruitment of screwbean mesquite and honey mesquite is high in Area 1, with cover by these species at approximately 10%. This area also supports less than 1% cover of other native species such as honeysweet. This area was only partially irrigated from January to April in 2025 (Sections 3.3 and 5.4 in narrative).



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 9/12/2025
Year 3

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

Cover by blue palo verde within this portion of Area 1 is approximately 6%. Arrowweed is very dense (65% cover) along with moderate screwbean recruitment (5%) in this section of Area 1. This area supports very sandy soils and experiences ponding during rain events, though no visible anoxia or visible salt crusts were present at the time of photo-monitoring.



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 9/12/2025

Year 3

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 (22% cover). This central portion of Area 1 also supports dense stands of arrowweed (30% cover). Volunteer mesquite mitigation plants tower over blue palo verde in this area and have a dense overlapping canopy.



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 9/12/2025
Year 3

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 2 is dominated by blue palo verde (15% cover) with honey mesquite (3% cover) and screwbean mesquite (6% cover) mitigation plants. Arrowweed (12% cover) is scattered throughout this portion of Area 2.



Photostation-004b

View: West

Photo: 3/21/2022

Pre-planting

Located between Area 2
and Area 4.



Photostation-004b

View: Northwest

Photo 9/12/2025

Year 3

Located between Area 2
and Area 4.

Area 4 consists of four separate enclosures, with three living planted blue palo verde. One healthy blue palo verde recruit is located just outside of the enclosed areas to the west. The blue palo verde plant in the enclosure to the left has tripled in size since Year 1. Herbaceous growth consisting of native scarlet spيدرling and Emory's rock daisy is growing within one of the enclosures and covers 22% of Area 4.



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 9/12/2025

Year 3

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 (13% cover), with lower cover by honey mesquite (7% cover). This portion of Area 2 supports high cover of arrowweed (20% cover). Volunteer screwbean mesquite average 14 feet tall and tower over palo verde mitigation plants.



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 9/12/2025

Year 3

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 (15% 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%. Non-native common reed is also present along the southern fenceline of the restoration area with approximately 1% cover.



Photostation-007

View: East

Photo: 3/21/2022

Pre-planting

Located in Area 3 at the western end.



Photostation-007

View: Northeast

Photo 9/12/2025

Year 3

Located in Area 3 at the western end.

Area 3 supports plantings of blue palo verde (6% cover) and desert smoke tree (3% cover), as well as honey and screwbean mesquite volunteer recruits (6% cover) and cattle spinach recruits (3% cover). In addition, Area 3 supports a dense stand of arrowweed (10% cover) and a range of native species, including honeysweet and creosote bush. During rain events, Area 3 can experience energetic flows of water.



Photostation-008

View: Northwest

Photo: 3/21/2022

Pre-planting

Located in Area 5 along the southern perimeter.



Photostation-008

View: Northwest

Photo 9/12/2025

Year 3

Located in Area 5 along the southern perimeter.

Area 5 supports mitigation plantings of blue palo verde (4% 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 (12% 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 due to the wash that enters from the west.



Photostation-009

View: East

Photo: 3/21/2022

Pre-planting

Located in Area 5 near the
furthest west corner.



Photostation-009

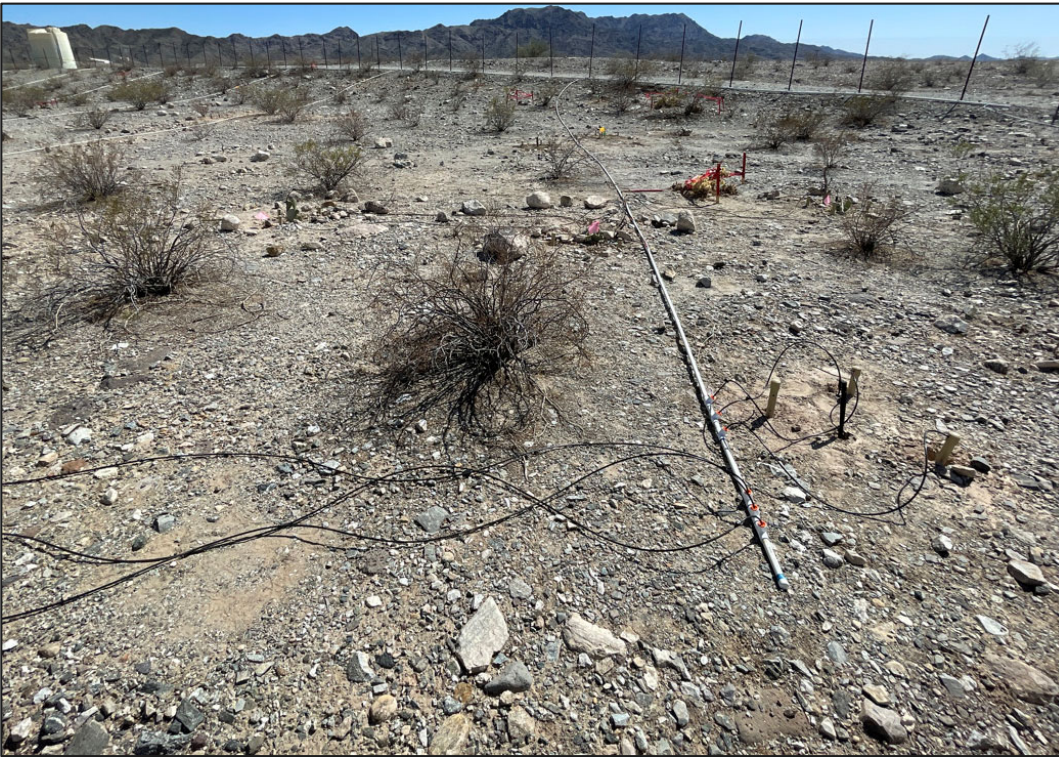
View: East

Photo: 9/12/2025

Year 3

Located in Area 5 near
the furthest west corner.

This portion of Area 5 supports palo verde, 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. The large cobble from right to center is typical of desert washes.



Photostation-012

View: South

Photo: 3/21/2022

Pre-planting

Located in UHR-1 in the northernmost corner.



Photostation-012

View: South

Photo: 9/12/2025

Year 3

Located in UHR-1 in the northernmost corner.

UHR-1 supports upland mitigation plantings, including beavertail cactus (middle foreground), buckhorn cholla, and silver cholla. UHR-1 was not cleared prior to planting and continues to support a stand of mature creosote bush that has 30% cover.

Appendix D

Observed Plant Species in Mitigation Planting Areas

Appendix D
Observed Plant Species in Mitigation Planting Areas
Topock Revegetation Annual Report - Year 3
Pacific Gas and Electric Company



Scientific Name	Common Name	Native/Non-native	A a r e 1	A a r e 2	A a r e 3	A a r e 4	A a r e 5	U H 1 R
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 argophylla</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	x				
<i>Bebbia juncea</i> var. <i>aspera</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	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				x	
<i>Capsella bursa-pastoris</i>	shepherd's purse	non-native					x	
<i>Caulanthus lasiophyllus</i>	California mustard	native		x				
<i>Centaurea melitensis</i>	toalote	non-native		x		x		
<i>Chaenactis stevioides</i>	esteve pincushion	native		x				
<i>Chenopodium murale</i>	nettleleaf goosefoot	non-native	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>Chylisma brevipes</i> subsp. <i>brevipes</i>	golden suncup	native	x	x	x	x	x	x
<i>Croton setiger</i>	doveweed, turkey-mullein	native			x		x	
<i>Cryptantha barbigera</i> var. <i>barbigera</i>	bearded cryptantha	native					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>Cryptantha pterocarya</i> var. <i>cycloptera</i>	Tucson 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	

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Pacific Gas and Electric Company



Scientific Name	Common Name	Native/Non-native	A a r e 1	A a r e 2	A a r e 3	A a r e 4	A a r e 5	U H 1 R
<i>Dalea mollissima</i>	silky dalea	native					x	x
<i>Datura wrightii</i>	jimson-weed	native					x	
<i>Descurainia pinnata</i>	tansy mustard	native				x		
<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	x
<i>Euphorbia polycarpa</i>	small-seeded sandmat	native	x	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	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			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	x
<i>Perityle emoryi</i>	Emory's rock daisy	native	x	x	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	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 3

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		x
<i>Geothlypis trichas</i>	common yellowthroat	Native	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	

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Topock Revegetation Annual Report - Year 3

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 melodia</i>	song sparrow	Native	x						
<i>Melozona aberti</i>	Abert's towhee	Native		x			x		
<i>Melozona crissalis</i>	California towhee	Native	x						
<i>Myiarchus cinerascens</i>	ash-throated flycatcher	Native			x			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		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>Zenaida asiatica</i>	white-winged dove	Native	x						x
<i>Zenaida 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>Felis catus</i>	domestic cat	Non-native	x						
<i>Lepus californicus</i>	black-tailed jackrabbit	Native	x						
<i>Mephitis mephitis</i>	striped skunk	Native					x		x

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Topock Revegetation Annual Report - Year 3

Scientific Name	Common Name	Native/Non-native	Area 1	Area 2	Area 3	Area 4	Area 5	UHR-1	Floodplain, No Specific Area
<i>Procyon lotor</i>	raccoon	Native		x					
<i>Sylvilagus audubonii</i>	desert cottontail	Native	x	x					
<i>Urocyon cinereoargenteus</i>	gray fox	Native		x					
Reptiles									
<i>Aspidoscelis tigris tigris</i>	Great Basin whiptail	Native	x	x					
<i>Crotalus atrox</i>	western diamond-backed rattlesnake	Native		x					
<i>Dipsosaurus dorsalis</i>	desert iguana	Native				x			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</i> sp.	metallic wood-boring beetle	Unknown			x				
<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		x		
<i>Apodemia</i> sp.	Metalmark butterfly	Native		x					
<i>Anthophora</i> sp.	common digger bee	Unknown					x		
<i>Argia moesta</i>	powdered dancer damselfly	Native						x	
<i>Brephidium exilis</i>	western pygmy blue butterfly	Native	x						

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Observed Wildlife Species in Mitigation Planting Areas

Topock Revegetation Annual Report - Year 3

Scientific Name	Common Name	Native/Non-native	Area 1	Area 2	Area 3	Area 4	Area 5	UHR-1	Floodplain, No Specific Area
<i>Chrysobothris octocola</i>	metallic wood-boring beetle	Native	x	x			x		
Cicadoidea superfamily	cicada	Native	x						
<i>Coccinella septempunctata</i>	seven-spotted lady beetle	Non-native	x	x	x		x		
<i>Danaus gilippus</i>	queen butterfly	Native	x						
<i>Diceroprocta apache</i>	citrus cicada	Native		x					
<i>Diogmites angustipennis</i>	prairie robber fly	Native					x		
<i>Flatormenis saucia</i>	planthopper	Native					x		
<i>Hemiargus ceraunus</i>	ceraunus blue butterfly	Native		x					
<i>Hyles lineata</i>	white-lined sphinx	Native					x		
<i>Iris oratoria</i>	Mediterranean mantis	Native	x						
Lepidoptera order	caterpillar	Unknown	x						
<i>Leptotes marina</i>	marine blue butterfly	Native	x						
<i>Mallodon dasystomus</i>	hardwood stump borer	Native	x						
Mutillidae suborder	golden colored velvet ant	Native	x						
<i>Neoscona oaxacensis</i>	western spotted orbweaver	Native		x					
<i>Pachydiplax longipennis</i>	blue dasher	Native		x					
<i>Pepsis thisbe</i>	Thisbe's tarantula-hawk wasp	Native				x	x		

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Observed Wildlife Species in Mitigation Planting Areas

Topock Revegetation Annual Report - Year 3

Scientific Name	Common Name	Native/Non-native	Area 1	Area 2	Area 3	Area 4	Area 5	UHR-1	Floodplain, No Specific Area
<i>Schistocerca shoshone</i>	green bird grasshopper	Native	x						
<i>Strymon melinus</i>	gray hairstreak	Native	x						
<i>Trimerotropis pallidipennis</i>	pallid-winged grasshopper	Native			x				
Zygoptera suborder	blue damselfly and gray damselfly	Unknown	x						

Appendix F

Photographs of Reference Areas in Year 3



RF-1 - PS028 (2025). Natural large wash supporting native mitigation plant species, including blue palo verde and desert smoke tree. Large blue palo verde (red arrows) dominate the northern section of RF-1. Native cover = 15%. View looking northeast.



RF-1 – PS028 (2025). Large wash with rocks, cobble, and gravel, with and large blue palo verde in foreground and more in the background. Other species in this reference area that are not visible include buckhorn cholla, honey mesquite, and catclaw acacia. Native cover = 10%. View looking southwest.



RF-1 – PS029 (2025). Large natural cobbly wash supporting native mitigation plant species, including blue palo verde, honey mesquite, catclaw acacia, desert smoke tree, and buckhorn cholla. Large desert smoke trees are present in the background. Native cover = 10%. View looking west.



RF-1 – PS029 (2025). The edge of a large cobbly wash supporting creosote bush and honey mesquite (center). Native cover = 10%. View looking east.



RF-2 - PS023 (September 13, 2025). Small natural wash supporting large honey mesquite, as well as seedlings and juveniles in a sandy cobble substrate (mid foreground). Native cover = 48%. View looking northwest.



RF-3 - PS024 (September 13, 2025). Natural wash supporting blue palo verde with a range of age classes (very large individual in the background and three smaller individuals in the middle). Catclaw acacia and Anderson's desert thorn also present. Native cover = 16%. View looking southeast.



RF-3 – PS025 (September 13, 2025). Wash on north side of road where Anderson's desert thorn is monitored. Native cover = 10%. View looking northeast.



RF-4 - PS027 (September 13, 2025). This reference area in Bat Cave Wash supports catclaw acacia and Anderson's desert thorn, with silver cholla and beavertail cactus occurring on slopes above the wash. Catclaw acacia is present in the foreground and background. Native cover = 23%. View looking southwest.



RF-4 – PS025 (September 13, 2025). Another view of Bat Cave Wash with catclaw acacia individuals along the wash and non-native Bermuda grass occurring under shrubs and along the slope edge. Native cover = 23%. View looking southeast.



RF-5 – PS030 (September 13, 2025). Reference site located at the edge of a tributary to the Colorado River within the Havasu National Wildlife Refuge supporting a range of wash, riparian, and upland species, including screwbean mesquite (in foreground). Native cover = 90%. View looking south.



RF-6 - PS020 (September 13, 2025). Reference site located adjacent to UHR-1, a rocky slope that supports mitigation plant species, including cattle spinach, beavertail cactus, and buckhorn cholla. Native cover = 33%. View looking southeast.

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