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Pacific Gas and Electric Company

NTCRA MITIGATION PLANTING WORK PLAN

Topock Compressor Station
Needles, California

March 12, 2026

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Appendix

Appendix A. Topock Compressor Station Groundwater Remediation Project, Havasu National Wildlife Refuge, Habitat Restoration Plan

Acronyms and Abbreviations

ARARs	applicable or relevant and appropriate requirements
Arcadis	Arcadis U.S., Inc.
CH2M Hill	CH2M Hill, Inc.
C/RAWP	Construction/Remedial Action Work Plan for the Final Groundwater Remedy
DOI	U.S. Department of the Interior
dS/m	deciSiemens per meter
DTSC	California Department of Toxic Substances Control
FEIR	Topock Groundwater Remediation Project Final Environmental Impact Report
FGL	Fruit Growers Laboratory
gph	gallons per hour
HNWR	Havasu National Wildlife Refuge
NTCRA	Soil Non-Time-Critical Removal Action
PAAs	Potential Action Areas
PG&E	Pacific Gas and Electric Company
PVC	polyvinyl chloride
RFI/RI	Resource Conservation and Recovery Act facility investigation and remedial investigation
Site	Pacific Gas and Electric Company Topock Compressor Station, located in eastern San Bernardino County, 15 miles southeast of the City of Needles, California
SEIR	Topock Groundwater Remediation Project Final Subsequent Environmental Impact Report
TBCs	To Be Considered
TCS	Topock Compressor Station
Tribes	Chemehuevi Indian Tribe, Cocopah Tribe, Colorado River Indian Tribes, Fort Mojave Indian Tribe, Fort Yuma Quechan Tribe, Hualapai Tribe, Twenty-nine Palms Band of Mission Indians, Yavapai-Prescott Indian Tribe
USFWS	U.S. Fish and Wildlife Service

1 Introduction

Pacific Gas and Electric Company (PG&E) completed a soil contamination removal action related to operations at the Topock Compressor Station (TCS), located in eastern San Bernardino County, 15 miles southeast of the City of Needles, California (the Site; Figures 1 and 2).

In 2021, the U.S. Department of the Interior (DOI) issued an action memorandum entitled Request for a Non-Time-Critical Soil Removal Action at Areas of Concern and Solid Waste Management Units, Pacific Gas and Electric Topock Compressor Station (DOI 2021a). The DOI's action memorandum, and corresponding e-mail sent on October 12, 2021 (DOI 2021b), directed PG&E to develop a work plan for a soil non-time-critical removal action (Soil NTCRA) at the Site and to initiate activities necessary to perform the Soil NTCRA and the actions specified in Section V of the memorandum. Section 4 of the approved Soil NTCRA Work Plan (Jacobs 2022) specifies activities to be performed for compliance with the identified applicable or relevant and appropriate requirements (ARARs) and other advisories, criteria, or guidance To Be Considered (TBCs) during implementation of the Soil NTCRA. An identified Federal Location-Specific ARAR, Item 25 of Table 4-1 of the Soil NTCRA Work Plan, requires PG&E to coordinate with the Havasu National Wildlife Refuge (HNWR) regarding the implementation of the HNWR Habitat Restoration Plan (CH2M Hill 2015s) for impacts to wildlife habitat on HNWR lands. This Work Plan was developed in coordination with DOI and the HNWR. Implementation of this Work Plan constitutes compliance with and documents the attainment of the Federal Location-Specific ARAR, Item 25 of Table 4-1 of the approved Soil NTCRA Work Plan.

The Soil NTCRA was conducted to address the release or substantial threat of a release of hazardous substances from the TCS to the HNWR or adjacent areas. As identified in Section V of the action memorandum (DOI 2021a), the selected removal action was Alternative 3 (Excavation, Mechanical Separation, Offsite Disposal of Fines, and Reuse of Coarse Material). Implementation of the Soil NTCRA began on July 25, 2022, and ended on May 20, 2024 (Jacobs 2025).

PG&E prepared a Biological Assessment (BA) for the Soil NTCRA project to support informal consultation for potential impacts to listed species that are protected under Section 7 of the Endangered Species Act (Jacobs 2021b). PG&E proposed General Measure 14, which requires the replacement of U.S. Bureau of Land Management sensitive plants such as honey mesquite (*Neltuma odorata*), blue palo verde (*Parkinsonia florida*), and catclaw acacia (*Senegalia greggii*). In addition, General Measure 21 addresses erosion control and other restoration approaches (Jacobs 2021b). The USFWS concurred with the determinations provided in the NTCRA BA, as documented in their letter dated May 26, 2022 (USFWS 2022).

During implementation of the Soil NTCRA, 29 protected plants were removed, including 17 honey mesquite, 4 blue palo verde, and 8 catclaw acacia individuals (Table 1).

This NTCRA Mitigation Planting Work Plan focuses exclusively on mitigation planting activities planned for the replacement of the honey mesquite, blue palo verde, and catclaw acacia that had been removed during the implementation of the Soil NTCRA. These mitigation planting activities will take place in two onsite mitigation planting areas: Bat Cave Wash and East Ravine. The site preparation methods, planting installation procedures, and the maintenance, monitoring, and reporting guidelines for these areas are described in detail in the following sections.

1.1 Regulatory Framework

The following section discusses plans and mitigation measures that will be guiding the mitigation planting work plan.

1.1.1 Summary of the HNWR Habitat Restoration Plan

PG&E is implementing the Final Groundwater Remedy to address chromium in groundwater near the PG&E TCS. 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 2015, PG&E prepared the HNWR Habitat Restoration Plan (which was originally included as Appendix G to the approved C/RAWP [CH2M Hill 2015] and is now included as Appendix A in this NTCRA Mitigation Planting Work Plan) to comply with Paragraph 13(b) of the Consent Decree. Paragraph 13(b) of the Consent Decree required a habitat restoration plan for impacts to sensitive habitats under the jurisdiction of the U.S. 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).

The HNWR Habitat Restoration Plan specifies success criteria; monitoring and reporting requirements; and adaptive management guidelines for the salvaging and replanting of trees, shrubs, and perennial species. In accordance with the plan, protected trees were replaced at a 3:1 ratio (i.e., three trees were planted in mitigation planting areas for each tree removed during construction). The success criterion for mitigation plantings is a 75 percent overall survival rate at the end of a minimum 5-year monitoring period. Upon agreement that the areas have met the success criterion, DOI will provide PG&E with written acceptance that the NTCRA revegetation requirement has been fulfilled.

1.1.2 NTCRA Regulatory Framework and General Measures

The nature and extent of soil contamination associated with the TCS, which is the focus of the Soil NTCRA, was evaluated as part of a Resource Conservation and Recovery Act facility investigation and remedial investigation (RFI/RI). The RFI/RI activities were conducted both within the TCS fence line and on adjacent land outside the TCS fence line.

The DOI and USFWS were the lead regulatory agencies that provided oversight of the environmental investigation and cleanup (Jacobs 2022). The DOI and USFWS evaluated the RFI/RI soil investigation data and determined that there were specific offsite areas where concentrations of constituents of potential concern significantly exceed background values or ecological and human health screening levels. These areas, referred to as potential action areas, were located within or adjacent to active desert washes subject to potential scouring during rain events that could move contamination toward the Colorado River or spread the contamination footprint over a larger area. Because of this potential threat to public health and the environment, DOI directed PG&E via the 2021 action memorandum to conduct the Soil NTCRA to address impacted soil in these potential action areas (DOI 2021a).

The Soil NTCRA was authorized pursuant to the response action authority of Section 104(a) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, in 42 United States Code Section 9604(a). Pursuant to Executive Order 12580, as amended, Section 104 authority was delegated to the Secretary of the Interior to address the release or substantial threat of a release of hazardous substances on or from a property under DOI's jurisdiction, custody, or control.

As mentioned above, PG&E prepared a BA for the Soil NTCRA project. The following is a list of the conservation measures that were implemented during implementation of the Soil NTCRA:

- **General Measure 14**—Palo verde, ocotillo, mesquite, catclaw acacia, and smoketree are considered sensitive by the U.S. Bureau of Land Management. To the extent practicable, these species will be avoided. No more than 20 percent of the tree canopy may be trimmed if avoidance is not possible. If avoidance and minimal trimming is not possible, these species will be replaced.

- **General Measure 21—**Where necessary, PG&E will restore disturbed areas in a manner that will assist in the reestablishment of biological values within the disturbed areas. Methods of such revegetation will include erosion control, planting with appropriate native shrubs, and scattering of bladed vegetation and rocks across the disturbed area, depending upon the appropriateness or effectiveness in a given area.

The activities associated with the Soil NTCRA mitigation planting areas will be guided by and occur in accordance with the HNWR Habitat Restoration Plan (Appendix A) previously approved as part of the ongoing groundwater remedy implementation, which is addressed briefly in Sections 1.1.1 and 1.3.1.

1.1.3 Coordination with Stakeholders

As part of the NTCRA mitigation planting planning, PG&E held and attended four stakeholder planning meetings. Stakeholders include PG&E, DOI, DTSC, the Tribes (listed below), and other local, state, and federal agencies:

- Chemehuevi Indian Tribe
- Cocopah Tribe
- Colorado River Indian Tribes
- Fort Mojave Indian Tribe
- Fort Yuma Quechan Tribe
- Hualapai Tribe
- Twenty-nine Palms Band of Mission Indians
- Yavapai-Prescott Indian Tribe

On January 24, 2023, the planning meeting included PG&E's presentation of a draft plan for onsite mitigation planting, discussion of mitigation ratios, and the suggestion of using offsite mitigation planting areas in Arizona. This meeting concluded with an agreement to evaluate onsite and offsite mitigation planting area options (discussed in detail in Section 1.4).

During the February 6, 2024 meeting, discussions included Soil NTCRA impacts and were focused on the offsite mitigation planting location options, as well as a proposed hybrid mitigation planting implementation option, in which PG&E would conduct implementation of the mitigation planting, and the Tribes would conduct the monitoring. Three potential offsite mitigation planting areas were discussed as well as requirements for selection of mitigation planting areas (discussed in Section 1.4).

During the meeting on July 19, 2024, PG&E and the stakeholders reviewed NTCRA requirements for replacing protected plant species, PG&E and the HNWR shared the initial review of the three offsite locations, wherein one site was identified as the preferred location (5-Mile Wash, Figure 1), the hybrid mitigation implementation models were further discussed, and the stakeholders agreed to a field review of the offsite and onsite proposed mitigation planting locations.

During the meeting on October 29, 2024, PG&E presented the field review of the onsite and offsite proposed mitigation planting locations. After discussion, the stakeholders preferred the onsite locations (see detailed discussion in Section 1.4). PG&E confirmed that the HNWR Habitat Restoration Plan, which includes ARARs for the Soil NTCRA remedy, would guide the mitigation planting, including success criteria. PG&E confirmed the onsite areas have sufficient space for mitigation plantings and agreed to prepare and present an NCTRA Mitigation Planting Plan proposal. The proposal was presented on December 3, 2025. This NTCRA Mitigation Planting Work Plan is a result of that proposal.

1.2 NTCRA Mitigation Planting Work Plan Organization

This NTCRA Mitigation Planting Work Plan is organized as follows:

- Section 1 introduces the project and provides the regulatory framework for the mitigation planting activities, as well as a summary of mitigation planting site selection criteria for successfully replanting impacted species and restoring biological values.
- Section 2 describes the two onsite mitigation planting areas.
- Section 3 provides the implementation schedule for the work outlined in this NTCRA Mitigation Planting Work Plan.
- Section 4 provides the mitigation planting goals and identifies who is responsible for achieving these goals.
- Section 5 addresses the site preparation required prior to planting.
- Section 6 details the container plant installation procedures.
- Section 7 summarizes the site maintenance activities.
- Section 8 provides the monitoring requirements, sampling protocols, performance criteria, and reporting requirements.
- Section 9 presents adaptive management options.
- Section 10 provides a list of references cited throughout this NTCRA Mitigation Planting Work Plan.

1.3 Background

This section summarizes the requirements outlined in the approved HNWR Habitat Restoration Plan (Appendix A) as applied to the Soil NTCRA work areas. Project impacts and required mitigation planting numbers are discussed.

1.3.1 Approved Mitigation Planting Plan

The HNWR Habitat Restoration Plan (Appendix A) was submitted to address impacts to plants during groundwater remedy construction. The approved plan described the general approaches that would be implemented for mitigation planting. It specifically addressed plant impacts on HNWR lands and provided details for success criteria; monitoring and reporting requirements; and adaptive management guidelines for salvage and replanting of trees, shrubs, and perennial species.

According to the approved HNWR Habitat Restoration Plan (Appendix A), protected trees must be replaced at a 3:1 ratio (i.e., three trees planted in mitigation planting areas for each tree removed during construction). The success criterion for mitigation plantings is a final 75 percent overall survival rate of mitigation plantings at the end of a minimum 5-year monitoring period. Modifications to the mitigation planting approaches are also provided in the adaptive management guidelines of the plan to provide for successful establishment of mitigation plants and desired density of cover of plants if the success criteria are not being met. These adaptive management actions include weed control, irrigation modification, herbivory protection, and additional plantings. Annual mitigation monitoring reports will be submitted to USFWS in January of each year during the required monitoring period for the duration of project or until performance targets are met.

1.3.2 Soil NTCRA Impacts and Required Mitigation

During Soil NTCRA, a total of 29 individuals of riparian species were removed, including 17 honey mesquite, 4 blue palo verde, and 8 catclaw acacia individuals. Table 1 summarizes the protected plant impacts by plant height.

Table 1 Protected Plants Impacted During Soil NTCRA Activities

Scientific Name	Common Name	Number of Impacted Plants Less Than 3 Feet Tall	Number of Impacted Plants Between 3 and 4 Feet Tall	Number of Impacted Plants Between 4 and 5 Feet Tall	Number of Impacted Plants Between 5 and 6 Feet Tall	Number of Impacted Plants Greater Than 6 Feet Tall	Total Plants Impacted
Neltuma odorata	honey mesquite	5	3	2	3	4	17
Parkinsonia florida	blue palo verde	3	0	0	0	1	4
Senegalia greggii	catclaw acacia	2	0	1	1	4	8
Total Number of Impacted Plants		**10**	**3**	**3**	**4**	**9**	**29**

To mitigate these impacts to protected plant species, container plantings will be installed in proposed mitigation planting areas. The number of plantings of each species will be calculated using a 3:1 ratio (three mitigation plantings for each impacted plant) plus 10 percent as a contingency for the potential mortality of some plantings (Table 2). Blue palo verde, honey mesquite, and catclaw acacia seeds were collected at the Site in September 2025 and will be used to propagate the container plants that will be installed in the proposed mitigation planting areas in fall 2026. Because an insufficient number of catclaw acacia seeds were collected, supplemental catclaw acacia seeds will be obtained from an approved nursery.

Table 2 Mitigation Plantings Proposed for Planting in Mitigation Planting Areas in 2026 at a 3:1 Mitigation Ratio Plus 10 Percent Contingency

Scientific Name	Common Name	Number of Impacted Plants	Number of Plantings at 3:1 Mitigation Ratio	Proposed Plantings at 3:1 Ratio Plus 10 Percent Contingency
Neltuma odorata	honey mesquite	17	51	56
Parkinsonia florida	blue palo verde	4	12	13
Senegalia greggii	catclaw acacia	8	24	27
Total Plants		**29**	**87**	**96**

1.4 Mitigation Planting Site Selection Criteria

Five proposed mitigation planting areas were assessed for suitability as mitigation planting sites: two onsite areas that had been disturbed during implementation of the Soil NTCRA as well as three offsite areas located outside of the groundwater remedy project area on HNWR lands in Arizona (Figure 1). Each of the proposed mitigation planting areas supported one or more target mitigation species (honey mesquite, blue palo verde, and catclaw

acacia), had sufficient soil moisture and well-draining substrates, contained sufficient space to support mature specimens of the target mitigation plantings, and provided sufficient access for mitigation planting implementation. These proposed mitigation planting sites were assessed for planting suitability based on the following criteria:

- Land ownership and legal site access;
- Nearby infrastructure, including irrigation water availability and electricity/power availability as well as an available staging area;
- Proximity to the TCS;
- Site conditions that would benefit from mitigation planting efforts (disturbance, presence of non-native invasive species, etc.);
- Suitable habitat, including native plant species presence, cover, density in adjacent non-disturbed native vegetation, and presence of one or more target mitigation species;
- A single offsite mitigation planting area to facilitate logistics of implementation, monitoring, and maintenance;
- Site size of at least ½ acre for approximately 96 plants with 20 feet between each mitigation planting;
- Fencing options to control herbivores;
- Planting areas with gentle, moderate, or gradual slopes;
- Suitable substrates, including drainage, texture, microtopography, nutrients, and sufficient soil moisture;
- Microsite conditions favorable to mitigation plant growth;
- Invasive weed species and abundance;
- Presence of sensitive resources (for example, burrows or biotic crusts);
- Potential for vandalism;
- Cultural concerns (as provided by the PG&E cultural resources team); and
- Stakeholder approval.

After careful review of the data collected during site selection process with the project stakeholders, two onsite mitigation planting areas, Bat Cave Wash and East Ravine, were selected for mitigation plantings (Figures 2 and 3). The proposed onsite mitigation planting areas overlap areas that were disturbed during the implementation of the Soil NTCRA and will provide direct mitigation planting of those areas. In addition, catclaw acacia already occurs in Bat Cave Wash, and honey mesquite and blue palo verde occur in East Ravine, attesting to suitable growing conditions in both locations. There are currently no invasive species in the proposed onsite mitigation planting areas, and the risk of vandalism is low due to their proximity to the TCS. These onsite locations are described further in Section 2.

Three offsite mitigation planting areas located outside of the groundwater remedy construction footprint were also assessed based on the selection criteria above: 5-Mile Landing, North Dike, and Catfish Paradise (Figure 1). Of the three, only 5-Mile Landing met the requirements for a suitable offsite mitigation planting area, but the advantages of the onsite locations, especially the ability to revegetate NTCRA disturbance areas onsite, absence of invasive species, and low potential for vandalism, outweighed further consideration of 5-Mile Landing as a mitigation planting area.

2 Mitigation Planting Areas

A total of 96 mitigation plantings will be propagated from honey mesquite, blue palo verde, and catclaw acacia seeds collected at the Site and supplemental catclaw acacia seeds provided by the nursery. These container plants will be planted in the designated mitigation planting areas (Bat Cave Wash and East Ravine) in fall 2026. The plantings will include 27 catclaw acacia to be planted within the Bat Cave Wash proposed mitigation planting area (Figure 4) and 56 honey mesquite and 13 blue palo verde to be planted within East Ravine proposed mitigation planting area (Figure 5).

General site characterization of the areas in Bat Cave Wash disturbed by the project was conducted on September 14, 2024, and one mitigation planting area was assessed for suitability to support plantings of catclaw acacia. General site characterization of the areas in East Ravine disturbed by the project was also conducted on September 14, 2024, and four proposed mitigation planting areas were assessed for suitability to support plantings of honey mesquite and blue palo verde (ER-A, ER-B, ER-C, and ER-D). On September 13, 2025, after the construction of the C18 pipeline in East Ravine, additional planting area characterization was conducted by experienced restoration ecologists, and the potential mitigation planting areas were refined.

On May 1, 2025, soil sampling was conducted within the Bat Cave Wash and East Ravine mitigation planting areas to assess such characteristics as nutrients, salinity, and permeability (Figures 6 and 7). Soil sampling locations were selected in each proposed planting subarea in representative substrates, depending on the size of the subarea. Prior to each soil sampling event, a utility investigation was conducted, and during sampling, an archaeologist was present monitoring all excavation activities. Each sample consisted of three cups of soil collected from the soil collected to a depth of up to twelve inches. A hole approximately 8 inches in diameter was dug using a clean, narrow trenching shovel and a post hole digger. Each soil core sample was placed into a clean bucket and thoroughly mixed before collecting the three cups of soil for analysis and placing it into a labeled bag. All bagged soil samples were labeled with the location identification, date, soil sampling depth, and sampling biologist name before being shipped to Fruit Growers Laboratory (FGL) in Santa Paula, California, for comprehensive soil suitability and salinity testing. If the soil at a location was too hard or compacted and there was refusal in the top 12 inches, the sampling location was moved to a nearby location within the same subarea. Geographic information system data were collected at all soil sample locations using ESRI ArcGIS Field Maps and a global navigation satellite system receiver.

Soil observations were documented by the field team during sampling at the Bat Cave Wash and East Ravine mitigation planting areas during the May 2025 soil sampling event, including qualitative soil moisture, presence of rocks or gravel, and depth and reason for refusal.

The following sections summarize the conditions in these two locations in 2024 and 2025 during site assessment.

2.1 Bat Cave Wash

A total of 27 catclaw acacia mitigation plantings are proposed for placement in Soil NTCRA disturbance areas in Bat Cave Wash due to the presence of existing catclaw acacias in this location. The proposed mitigation planting area was devoid of vegetation in September 2025 as a result of recent Soil NTCRA activities.

Bat Cave Wash is an ephemeral wash located in the Chemehuevi Mountains and drains from south to north into the Colorado River 0.7 mile north of the TCS on land owned by PG&E. Soil NTCRA project work areas were located along Bat Cave Wash approximately 0.05 miles west of the TCS in a wide area in the bottom of the wash. The substrate in the channel is a mix of cobble and sand, and where planting is proposed on banks and terraces, there is sand and silt intermixed with cobble and sand, along with backfill.

The dominant vegetation type in Bat Cave Wash is Catclaw Acacia (*Senegalia greggii*)—Cheesebush (*Ambrosia salsola*) Scrub along the wash bottom, especially near toes of slopes, with Creosote Bush Scrub (*Larrea tridentata*) in adjacent upland areas. A total of 27 catclaw acacia mitigation plantings are proposed for placement in Soil NTCRA disturbance areas in Bat Cave Wash. The proposed planting area was devoid of vegetation in September 2025 as a result of recent grading (Figure 4).

The proposed planting area is located on the east side of Bat Cave Wash at the toe of a steep (40 percent) west and northwest facing slope, where relatively loose and largely unvegetated mineral soil meets replaced rock on the wash bottom placed after remediation. Substrates in this area include silty sand to clay loam, with gravel/rock/stone making up the channel surface. Soil sampling results from five samples in Bat Cave Wash indicate low soil salinity (<10 deciSiemens per meter [dS/m]) in all five samples, with pH ranging from 7.8 to 8.4, typical of desert substrates and suitable for planting native plants (Figure 6, FGL 2025a, Ben Waddell, personal communication). Although chloride concentrations were rated as high in four of the five samples, the ratings are based on agricultural land usage and the chloride concentrations within Bat Cave Wash were typical of desert substrates and not an anticipated problem, according to Ben Waddell (personal communication).

An upstream portion of Bat Cave Wash was chosen as a reference area. There were many catclaw acacia individuals in this area, with approximately 40 percent of the total plants observed on the slope above the channel or at the toe of slopes, 30 percent at the edge of the channel in shade, and 30 percent in full sun, mostly growing in gravelly/cobble/stone surface substrates. However, some catclaw acacias were also growing on a sandy stream side bar, and catclaw acacia individuals were observed on both the east and west sides of the channel.

The most common plant species in Bat Cave Wash noted in September 2024 were catclaw acacia (3 percent cover), cheesebush (3 percent cover), sweetbush (*Bebbia juncea* var. *aspera*, 1 percent cover), Thomas' buckwheat (*Eriogonum thomasii*, 2 percent cover), white forget-me-not (*Cryptantha* species, 1 percent cover), brittle spineflower (*Chorizanthe brevicornu*, 1 percent cover), and on dry slopes, creosote bush (3 percent cover) and beavertail cactus (*Opuntia basilaris* var. *basilaris*, 1 percent cover*)*. The invasive non-native Mediterranean grass (*Schismus barbatus)* exhibited approximately 20 percent cover in proposed mitigation planting areas.

A relatively wide maintained gravel road from Park Moabi Road near the I-40 exit provides access to the Bat Cave Wash mitigation planting area. The proposed mitigation planting area is located approximately 200 feet below the TCS facility. Gravity-fed irrigation from water tanks is planned, as described further in Section 5. The potential for vandalism is anticipated to be relatively low due to proximity to the TCS.

2.2 East Ravine

A total of 56 honey mesquite and 13 blue palo verde mitigation plantings are proposed for placement in Soil NTCRA disturbance areas in East Ravine due to the presence of both species in this location.

East Ravine is an ephemeral wash located in the Chemehuevi Mountains that drains from west to east-northeast into the Colorado River 0.1 mile east of the TCS on land owned by HNWR and PG&E. Soil NTCRA project work areas were located approximately 0.1 mile from TCS in the bottom of the wash, which meanders between steep north-facing and south-facing slopes eastward toward the Colorado River, but due to natural and constructed berms, surface flow within the ravine does not typically reach the Colorado River. Substrates in the bottom of the wash are comprised of depositional silts, sands, and cobble that have been backfilled after Soil NTCRA work activities.

The floor of East Ravine is mainly unvegetated due to recent Soil NTCRA activities that removed most vegetation. A large honey mesquite occurs at the eastern end of East Ravine mitigation planting area near the TCS entrance. One large blue palo verde individual occurs at the east end of East Ravine and another at the west and upstream

end of the ravine. Creosote Bush Scrub (*Larrea tridentata* Shrubland Alliance) predominates in upland areas immediately adjacent to the ravine bottom. Due to the current presence of honey mesquite and blue palo verde and prior removal of blue palo verde for remediation work in East Ravine, four mitigation planting areas in project disturbance areas are proposed to support plantings of honey mesquite and blue palo verde, ER-A, ER-B, ER-C, and ER-D (Figure 5).

Two preexisting reference sites for the Topock mitigation planting project will be used to provide comparative data between naturally occurring individuals of mitigation plant species and those installed in East Ravine. RF-1, located on National Trails Highway near the PG&E Soil Processing Yard, and RF-3, located off of Park Moabi Road, will be used as a reference sites for blue palo verde. RF-2, located on National Trails Highway approximately 1.5 miles north of East Ravine, will be used as a reference site for honey mesquite.

The 10 most common plant species in East Ravine in September 2024 were honeysweet (*Tidestromia suffruticosa* var. *oblongifolia*, 2 percent cover), honey mesquite (1 percent cover), blue palo verde (1 percent cover), and on dry slopes, creosote bush (3 percent cover), beavertail cactus (1 percent cover*),* brittle spineflower (1 percent cover), devil's spineflower (*Chorizanthe rigida*, 1 percent cover), Spanish needles (*Palafoxia arida*, 1 percent cover), and Emory's rock daisy (*Perityle emoryi*, 1 percent cover). The invasive non-native Mediterranean grass (*Schismus barbatus)* exhibited approximately 4 percent cover in proposed mitigation planting areas.

A paved road just before the gate to the TCS from National Trails Highway provides site access to East Ravine mitigation planting areas. The proposed mitigation planting areas are located 200 feet below the TCS facility. Gravity-fed irrigation from water tanks is feasible, with a nearly flat 15x20-foot area located approximately 25 feet above the proposed BCW-A mitigation planting area along a dirt and gravel TCS access road. The potential for vandalism is anticipated to be relatively low due to proximity to the TCS.

A summary of the four proposed mitigation planting areas within East Ravine is provided below.

ER-A is located at the west end of East Ravine near the confluence of three smaller drainages that flow into a rock-lined constructed channel, before continuing eastwards. This rock-lined channel traverses the middle of the wash bottom, with a small (3-foot-wide) ledge on either bank. Substrates in the western end of ER-A are relatively loose cobble and sands. Soil sampling results from three samples in ER-A indicate soil salinity ranging from 1.2 to 15.8 dS/m, with pH ranging from 7.8 to 9.0, typical of desert substrates and suitable for planting (Figure 7, FGL 2025b, Ben Waddell, personal communication). Although chloride concentrations were rated as high in these samples, the ratings are based on agricultural land usage and the chloride concentrations within ER-A were typical of desert substrates and not an anticipated problem, according to Ben Waddell (personal communication).

Planting is proposed above the drainages and on both banks of the constructed channel close to waterflow but outside of the main channel in this portion of ER-A and would avoid a large, existing blue palo verde located east of the planting area.

Monitoring and extraction wells are installed nearby outside of ER-A.

ER-B is located east of ER-A on the south side of East Ravine and its access road. Substrates consist of compacted soil backfill. Soil sampling results from four samples in ER-B indicate soil salinity ranging from 2.1 to 9.5 dS/m, with pH ranging from 8.0 to 8.2, typical of desert substrates and suitable for planting (Figure 7, FGL 2025b, Ben Waddell, personal communication). Although chloride concentrations were rated as high in three of four samples, the ratings are based on agricultural land usage and the chloride concentrations within ER-B were typical of desert substrates and not an anticipated problem, according to Ben Waddell (personal communication).

Proposed plantings will be placed throughout ER-B.

ER-C is located on the south side of the access road in East Ravine located below and to the south of several monitoring wells in the central portion of East Ravine. No channel has formed in the bottom of East Ravine in this location, but water has flowed into a closed depression at the southeast end of ER-C, where a silt and clay layer has settled. Soil sampling results from three samples in ER-C indicate soil salinity ranging from 0.6 to 1.2 dS/m, with pH ranging from 8.2 to 8.7, typical of desert substrates and suitable for planting (Figure 7, FGL 2025b, Ben Waddell, personal communication). Chloride concentrations were also within normal ranges.

Proposed plantings will be placed throughout ER-C.

ER-D is located at the south side of the access road in East Ravine near its eastern terminus and also abuts a dirt road on the east side. The flow path crosses from the north side of the access road in East Ravine to the south side and then flows through mitigation planting area ER-D. Substrates consist of compacted soil backfill. A large honey mesquite is present just outside ER-D to the immediate west. Soil sampling results from two samples in ER-D indicate soil salinity ranging from 7.8 to 9.4 dS/m, with pH of 8.0 in both samples, typical of desert substrates and suitable for planting (Figure 7, FGL 2025b, Ben Waddell, personal communication). Although chloride concentrations were rated as high in the two samples, the ratings are based on agricultural land usage and the chloride concentrations within ER-D were typical of desert substrates and not an anticipated problem, according to Ben Waddell (personal communication).

Proposed plantings will be placed throughout ER-D but would avoid the existing honey mesquite.

3 Mitigation Planting Implementation Schedule

An overview of the steps required to implement this NTCRA Mitigation Planting Work Plan and the projected schedule is provided in this section. Final timing for mitigation planting activities will be subject to approval by PG&E and will depend on agency approval.

Seed of the three native species impacted by Soil NTCRA activities—honey mesquite, blue palo verde, and catclaw acacia—were collected onsite in September 2025 by Arcadis U.S., Inc. (Arcadis) biologists and will be delivered to a nursery in early 2026 for container plant propagation. Propagation of container plants is expected to take approximately nine months, with plants ready for installation in fall 2026.

The mitigation planting effort will be subject to five years of maintenance and monitoring and must achieve quantifiable performance standards to ensure successful establishment of plantings and weed removal. Plantings will be replaced and/or the NTCRA Mitigation Planting Work Plan will be altered if criteria are not met. If success criteria are not met after five years, monitoring and maintenance will continue on an annual basis until criteria are met.

The schedule for the mitigation planting program is identified by season (summer, fall, spring, winter) over a period of five years of monitoring. The first monitoring year commences on the date when all mitigation planting activities are complete and ends one year later (Year 1). Subsequent monitoring years (Years 2-5) will follow the same timeline, commencing at the end of Year 1 (or subsequent year) and terminating 12 months later.

Contingency actions and remedial measures are not specified in the schedule since they would occur at different times, and only on an as-needed basis. The timing of monitoring and maintenance activities may vary from year to year depending on seasonal and environmental conditions. Annual mitigation monitoring reports will be submitted to USFWS in January each year during the required monitoring period for the duration of project or until performance targets are met.

4 Mitigation Planting Goals

Mitigation planting activities that encompass planting of mitigation plantings resulting from impacts summarized in Section 1.3.2 in this NTCRA Mitigation Planting Work Plan are based on achieving the following goals:

- Minimize disturbance to existing native vegetation onsite
- Mitigate for the loss of protected plant species while restoring self-sustaining riparian and wash vegetation in suitable mitigation planting sites

To achieve these goals, this NTCRA Mitigation Planting Work Plan details the methods for establishing the required number of mitigation plantings in appropriate locations for ongoing survival and sustainability. The procedures described in the following sections have been designed to conserve soil and reduce erosion; protect existing wildlife and native plants at the Site; and reestablish native species in areas that are self-sustainable. Specific techniques to meet these goals, as well as, performance criteria, monitoring requirements, and contingency plans are provided in the following sections.

The entity responsible for implementation of this NTCRA Mitigation Planting Work Plan is PG&E, including mitigation planting site assessment (Section 2) and subsequent implementation of mitigation planting activities, as described in Sections 5 through 8. The party responsible for the maintenance and monitoring of mitigation planting areas is also PG&E.

5 Preparation of Mitigation Planting Areas

Preparation of mitigation planting areas encompasses site preparation, planting layout, access road and staging area demarcation and fencing (if needed), connections to a water and power source, irrigation infrastructure design and installation, herbivore-deterrent fencing installation, and initial weed abatement, where needed.

A total of 96 mitigation plantings of honey mesquite, blue palo verde, and catclaw acacia will be installed in appropriate sites for each species within Soil NTCRA disturbance areas in Bat Cave Wash and East Ravine, along with associated site preparation and infrastructure installation, as described below.

5.1 Site Preparation

The Soil NTCRA disturbance areas in Bat Cave Wash and East Ravine do not require additional site cleanup, however, soil decompaction may be necessary in some areas. Soil decompaction would be conducted using a small, tracked excavator and a bucket to carefully loosen compacted soil by gently lifting and fracturing soil, not digging. The goal would be to improve water filtration and root growth while minimizing surface disturbance.

5.2 Planting Layout

Ninety-six mitigation plantings are proposed for planting within the proposed mitigation planting areas in Bat Cave Wash and East Ravine. Mitigation plantings include 56 honey mesquite, 13 blue palo verde, and 27 catclaw acacia individuals.

Catclaw acacia individuals occur naturally in multiple locations in Bat Cave Wash and were impacted during Soil NTCRA work in this location. Mitigation plantings of catclaw acacia are proposed for planting in one mitigation planting area in Bat Cave Wash (Figures 4 and 8).

Honey mesquite and blue palo verde occur naturally in East Ravine and were impacted during Soil NTCRA work in this location. Mitigation plantings of honey mesquite and blue palo verde are proposed for planting in four mitigation planting areas in East Ravine (Figures 5 and 9).

5.2.1 Bat Cave Wash

Naturally occurring catclaw acacia in Bat Cave Wash tend to occur in well-drained substrates at the base of steep slopes on the margins of the main channel that gets scoured during flash flood events. One general planting location in Bat Cave Wash is proposed for 27 catclaw acacia plantings. This location includes the toe of a small slope just below and north of a paved access road leading to the TCS as well as an area to the east of the slope at the edge of a large, regraded channel (Figures 4 and 8).

Catclaw acacia plantings will be placed on approximately 8-foot or greater planting centers, resulting in each planted individual being approximately 16 feet or more apart. Proposed planting locations will be marked with a pin flag prior to planting.

5.2.2 East Ravine

Naturally occurring honey mesquite and blue palo verde are present in East Ravine in well-drained substrates where roots reach subsurface moisture. Four planting locations in East Ravine are proposed for 56 honey mesquite and 13 blue palo verde plantings (Figures 5 and 9). Honey mesquite and blue palo verde plantings will be placed on approximately 10-foot planting centers placed in random patterns to reflect natural conditions,

resulting in each planted individual being approximately 20 feet apart. Proposed planting locations will be marked with a pin flag prior to planting.

ER-A is located at the western end of the Soil NTCRA disturbance areas in East Ravine. Up to 21 honey mesquite and/or blue palo verde individuals could be planted in this location if plantings are set back at least 10 feet from the edge of the access road through the center of East Ravine to allow for future canopy growth.

ER-B is located on the south side of East Ravine near the center. Up to 24 honey mesquite and/or blue palo verde individuals could be planted in this location if plantings are set back at least 10 feet from the edge of the access road through the center of East Ravine.

ER-C is located on the south side of East Ravine in the center of the Soil NTCRA disturbance area. Up to 13 honey mesquite and/or blue palo verde individuals could be planted in this location if plantings are set back at least 10 feet from the edge of the access road through the center of East Ravine.

ER-D is located on the south side of East Ravine near the eastern terminus of the Soil NTCRA disturbance areas. Up to 11 honey mesquite and/or blue palo verde individuals could be planted in this location if plantings are set back at least 10 feet from the edge of the access road through the center of East Ravine.

5.3 Use of Existing Access Road

Site access will be confined to existing access routes used to service infrastructure or other site activities.

5.4 Power and Water Source

Access to water is required to irrigate new container plantings. A gravity-fed irrigation system is proposed to avoid the need for an electric or gas pump that could be vulnerable to vandalism due to the ruggedness of the planting sites. If approved, water tanks would be installed in Bat Cave Wash and East Ravine at higher elevation than the plantings and filled by water truck or similar means that allow for manual control of valves to irrigate plantings.

5.5 Irrigation System Design

All mitigation plantings will be provided with supplemental irrigation from a temporary drip irrigation system. Drip irrigation will be installed in the proposed onsite mitigation planting areas (Figures 8 and 9), with water supplied by water tanks filled by a water truck.

After the water tanks the irrigation system will consist of a 2-inch diameter high-density polyethylene main line, 1-inch diameter Schedule 40 polyvinyl chloride (PVC) laterals, and ¼-inch diameter ‘spaghetti’ tubing run to each plant. Three reducing tees will be placed along the 1-inch diameter laterals at container planting, where spaghetti tubing will connect. Where the high-density polyethylene pipe connects to the water tank and at each 1-inch diameter lateral an isolation ball valve will be installed to turn on the entire system (at the tank) and to isolate water to specific areas when area-specific watering is needed. Microvalves will be installed on each ¼-inch hose to control flow to each emitter.

For each mitigation plant, three 1-inch PVC tees will be installed with ¼-inch poly tubing adapters along laterals. Three ¼-inch spaghetti tubes will be connected to the irrigation manifold at the three ¼-inch poly tubing adapters to supply water to three 2.0 gallons per hour (gph) emitters. Three 2.0 gph emitters will be installed per plant. The ¼-inch spaghetti tubing will not exceed 20 feet in length to minimize head loss.

Each planting will use three 36-inch long DEEP DRIP watering stakes installed in a triangle around the base of each planting to help irrigation water reach and encourage deep rooting. Each DEEP DRIP watering stake will be placed 12-14 inches from the edge of the container plant center. Installation in compacted soil will likely require a 1¼-inch soil auger to create a pilot hole followed by using a rubber mallet to pound it into the pilot hole.

After stake installation, the top of each tube will be capped with a DEEP DRIP watering stake cap. A ¼-inch irrigation tube with a 2.0 gph emitter will be placed through the hole into the watering stake in one of the three DEEP DRIP watering stakes. Initially, the remaining two ¼-inch irrigation tubes with emitters will be placed aboveground so that the entire root ball receives supplemental irrigation after planting. The two surface emitters will be placed into the remaining DEEP DRIP watering stakes after three months to encourage the development of deep roots.

Materials for the irrigation system will include the use of excess parts not used for the existing mitigation planting projects onsite or materials may be upcycled from those projects, and new material may be acquired as required.

5.6 Utility Locate

Utility clearance requirements will be followed, including review of available utility maps, consultations with HNWR and PG&E to confirm the known location of utilities, and contracting Dig Alert and/or a private utility locating company to identify and mark underground utility lines. If utility locators find utilities within the proposed mitigation planting area, or require more information, alternate locations will be proposed to stakeholders for consideration.

5.7 Herbivore-Deterrent Fencing

Prior to planting, fencing will be installed around the perimeter of the proposed mitigation planting area to deter herbivory during plant establishment (Figures 8 and 9). The fence will consist of 6-foot-tall aboveground herbivore-deterrent fencing attached with bailing wire to 6-foot-tall metal posts set every 6 feet (14-Gauge PVC black vinyl coated metal welded wire garden fence with 1-inch x 3-inch openings or similar). Upon installation the fence will be curved out at the bottom to prevent smaller herbivore access. Thus, making the actual fence height 5 feet high. A visual barrier will be installed at the bottom of the fencing to allow better visualization for the roadrunner.

Fence post sleeves will be installed in the ground and the posts inserted into the sleeves. Fence post corners and gates will be supported with diagonal support poles, as needed, for added stability. Not including the gates, the bottom of the fencing will extend an extra 6 inches such that it lays on the outside of the fence line to discourage animals from burrowing under. Four rebar “J” stakes will be driven into the ground and secured at the bottom of the fence between each fence post. Attention will be paid to close small holes where rabbits could enter the mitigation planting site. The fencing system will be installed according to manufacturer’s instructions.

Personnel access gates, also 6 feet tall and made with a metal frame covered with fencing wire, will be installed in designated locations for site access. Animal deterrence features at each gate will include constructed hardware cloth ‘aprons’ attached to the bottom and sides of the fence or gate that eliminate gaps between the gate and the top of the soil in the entry location and the surrounding fence to prevent small animals, such as rodents, from entering the mitigation planting area. The wire aprons will be constructed from hardware cloth and cut to fit the openings, with an extra two-inch extension to overlap the adjacent fencing when the gate is closed.

All gates will have latches to hold them securely closed, and like all the fencing, able to sustain strong winds. Sandbags or gravel bags will be placed against the bottom of the gates if they do not seal tightly.

Materials for the herbivore-deterrent fencing will include a combination of excess parts not used during the existing mitigation planting projects onsite, upcycled fencing materials from those projects, and new material.

5.8 Initial Weed Abatement

Proposed mitigation planting areas were devoid of vegetation in September 2025 as a result of the Soil NTCRA removal action so initial weed abatement may be unnecessary prior to planting. The level of effort required for initial weed abatement will be assessed during the early phases of site preparation.

6 Container Plantings

A total of 96 container plantings will be installed in the preferred mitigation planting area (Table 3).

Seed of the three mitigation species—honey mesquite, blue palo verde, and catclaw acacia—were collected onsite in September 2025 by Arcadis biologists. No more than 25 percent of available seed was collected from any individual or population. Sufficient quantities of honey mesquite and blue palo verde seed were collected, but not enough seed was available on catclaw acacia individuals in September 2025. An approved nursery will provide supplemental catclaw acacia seed from their onsite sources to obtain required quantities of mitigation container plants.

All collected seed was dried and then stored in labeled paper bags in a rodent proof container with desiccant to keep seeds dry until delivery to the nursery for processing in early 2026. Seed will be accessioned, cleaned, and evaluated by nursery staff prior to sowing. Required quantities of seed will be sown at the nursery and grown in grown in 4-inch pots that are 10 inches deep. Details on germination media and treatments will be documented. Plants will be ready for planting once roots reach the bottom of the pots (six to nine months after sowing). Planting is anticipated to occur in fall (October) 2026 to allow for root development prior to seasonal increases in ambient temperatures in spring.

Table 3 provides the number of container plantings required for a 3:1 mitigation ratio plus a 10 percent contingency that allows for plant mortality.

Table 3 Proposed Container Plantings at the 3:1 Mitigation Ratio plus 10 percent Contingency

Scientific Name	Common Name	Proposed Plantings at 3:1 Mitigation Ratio Plus 10 Percent Contingency
Neltuma odorata	honey mesquite	56
Parkinsonia florida	blue palo verde	13
Senegalia greggii	catclaw acacia	27
Total Proposed Riparian Plantings		**96**

6.1 Container Planting

Plants will be placed in random patterns to reflect natural conditions. Plant locations will be placed on approximately 10-foot planting centers, or 20 feet apart, for honey mesquite and blue palo verde plantings and on 8-foot-planting centers, or 16 feet apart for catclaw acacia plantings.

Container plants will be installed using a shovel, auger, or similar tool that does not compact surrounding soil. Planting holes will be dug as deep as the container and up to twice as wide.

During planting, if dry soil is encountered in the planting hole, planting holes will be filled with water and allowed to drain completely before planting.

One teaspoon of mycorrhizal inoculant will be added to each planting hole or fill soil. Inoculant will consist of six pounds of AM 120 Desert Suite homogenized with 10 ounces of legume powder inoculant/powder rhizobia inoculant. The project biologist will place the inoculant in planting holes.

Each container plant will be carefully removed from its pot to minimize root disturbance and gently placed in planting holes such that the base of the plant (root collar) is level with the surrounding soil. The planting holes will be backfilled with the native soil from the hole so that the plant is level with adjacent ground. Large rocks or clods will not be used in the backfill soil. A small basin may be created with excess soil. Soil will be gently pressed around the plant, such that no air pockets exist between the planting and surrounding soil.

After planting, plantings will be thoroughly watered by hand (watered completely, letting water drain, then watering again) immediately after installation with hoses attached to irrigation main lines or a water truck. Each container plant will be watered within 2 hours of placement in planting hole.

Each plant will be checked after watering to ensure that it has received adequate water and to correct any soil settling during and after planting.

6.2 Data Collection

At the time of planting, the following data will be recorded:

- Species name;
- Planting type (e.g., installed or recruit);
- Date planted;
- Name of Biologist collecting data;
- Planting Location;
- Planting ID (georeferenced ID);
- Height;
- Vegetative a reproductive phenology (e.g., leaves, flowers, fruits);
- Herbivory issues;
- Plant health assessment at the time of installation;
- Evidence of disease;
- Evidence of plant stress;
- Noticeable salinity issues in the mitigation planting area;
- Irrigation notes; and;
- General notes.

7 Site Maintenance

Maintenance activities during the five-year maintenance period will be completed to ensure that native plant health and survival and weed abatement performance standards are met throughout the mitigation planting sites. These activities include weed control; replanting, if needed; irrigation; general site housekeeping and cleanup; and the general care and nurturing of plantings within the mitigation planting areas.

Native plants (shrubs, sub-shrubs, and herbaceous species) already exist in the mitigation planting areas. Care will be taken to avoid impacting these plants during activities.

7.1 Irrigation System Operation and Maintenance

As described above, all container plantings will receive deep watering upon planting. During the first month after planting, each planting will be irrigated twice a week by slowing filling one DEEP DRIP watering stake to the top, letting it infiltrate into the surrounding soil during 2 hours of irrigation operation. Initially each plant will need to be checked to ensure the Deep Drip watering stakes are filling properly. The two additional drip emitters will be added near the base of the plant to provide additional moisture to surface soil layers while the plant is young.

The aim of supplemental irrigation is to provide adequate soil moisture for the developing root systems of plantings to reach subsurface soil moisture typical of the species. Once the root system is well developed and the plant has adequate soil moisture to survive during hot dry periods, irrigation will cease.

During the second month after planting, irrigation frequency will decrease to once a week and all three emitters will be placed in the Deep Drip watering stakes to encourage deep rooting. Supplemental water will not be provided if greater than 1-inch of precipitation has fallen in the preceding 7 days.

During Years 2 and 3, irrigation frequency may taper to twice a month or less, depending on plant health and field data. By Year 4, irrigation will cease unless mitigation plantings show a notable decline in vigor and irrigation is required to prevent mortality and/or reduced vigor. Care will be taken to provide occasional deep waterings and not to overwater the plants. The need, frequency, and duration of watering will depend on current weather patterns and site-specific soil moisture conditions. Soils will be monitored with a soil moisture probe on a monthly to quarterly basis, depending on rainfall.

7.2 Weed Abatement

Invasive weeds have the potential to interfere with mitigation planting plant establishment and survival. All mitigation planting areas will be subject to weed abatement. The preferred weed abatement method where native species are present is the physical removal of weeds while carefully avoiding native species. Use of approved herbicides may be allowed for select species, but mechanical removal is preferred.

7.3 Herbivore-Deterrent Fence Maintenance

The herbivore-deterrent fencing may require occasional repair and/or modifications to ensure that mitigation plantings are protected from herbivores. The herbivore-deterrent fencing will remain in place for the duration of the Project and then be removed.

8 Mitigation Planting Monitoring and Reporting

A long-term monitoring and reporting program will be implemented to assess progress on completion of tasks, to ensure quality control, and to hasten implementation of corrective actions, as needed. A robust monitoring program greatly increases the overall success and cost effectiveness of a mitigation planting project. Monitoring Requirements

The monitoring program includes pre-project monitoring and post-implementation monitoring. Monitoring will assess establishment of native plantings in mitigation planting areas and progress in meeting established performance targets. A detailed monitoring log will be maintained for each visit that includes the specific task, date, monitoring details, and general conditions and observations (qualitative and colloquial observations should be included).

The primary monitoring periods are described below.

Monitoring will occur throughout the initial active phases of the mitigation planting project to ensure that this NTCRA Mitigation Planting Work Plan is implemented correctly. All implementation steps will be documented using electronic data collection tools as well as photographed from georeferenced locations.

Photo-monitoring stations will be established at selected locations throughout mitigation planting areas to document pre-planting conditions, mitigation planting establishment, natural recovery, and site conditions in mitigation planting areas. The following methods and procedure 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 prior to planting
- Document site conditions of mitigation planting areas prior to planting
- Document changes in vegetation over time in the mitigation planting areas, including natural regeneration and recovery of native plants
- Document conditions in mitigation planting areas, including vegetation changes over time as well as general qualitative documentation of plant cover and vegetation health.

Photo-monitoring will be conducted electronically using hand-held devices (phones or tablets) equipped with ESRI ArcGIS Field Maps or similar data collection, a geographic information system data collection app, and a global navigation satellite system receiver.).

Before planting, multiple photo-monitoring locations will be selected throughout the mitigation planting areas that will be used to document the pre- and post-construction and planting conditions. Additional photo-monitoring stations will be established at any reference plant community locations. Photo-monitoring locations will be mapped on figures that present aerial backgrounds with roads and other major landmarks labeled.

At each photo-monitoring location, data collection will include the compass direction of the camera view in cardinal directions (north, south, southwest, etc.), as well as plant species, ground cover, disturbance, health, vegetation condition, and other variables. Subsequent photographs taken from the same photo point will be taken in the same direction and approximate height each time. After the first photo-monitoring event is completed, maps, cardinal directions for each photo-monitoring location will be prepared and be used as the basis for subsequent photo-monitoring events at each location. For each additional photo-monitoring event, a description of the setting or conditions that are being documented and the photographs and additional information will be included in the annual report.

Photo-monitoring will occur before planting, as well as after planting is complete. Photo documentation will be taken for years 1, 2, 3, 4, and 5. Photographs will be appropriately archived in monitoring reports for use during post-decommissioning.

8.1.1 Routine Mitigation Planting Site Monitoring

The mitigation planting sites will be monitored and maintained monthly during the first year after planting, and monthly to quarterly thereafter. The mitigation planting areas will be carefully monitored for survival of native plantings, establishment of invasive weeds, and recruitment of new native and/or weed species. This monitoring is critical for adaptive management, a process in which the findings from direct monitoring provide the evidence and basis for rapid management change or support, as needed. Monitoring will guide possible implementation of contingency measures if necessary, such as wind protection, herbivore control, additional planting, and/or additional weed control.

Photographs will be taken from established photo points during each before and after planting and during Year 1, 2, 3, 4, and 5 then quantitative monitoring events. Photograph locations will be noted on figures submitted with each annual report.

Routine data collection will include:

- Plant survival
- Plant health
- Plant height
- Phenology (presence of leaves, flower buds, open flowers, fruits)
- Signs of new growth
- Signs of health issues
- Inventory of the flora within mitigation planting areas
- Evidence of wildlife usage (native species, herbivores, and other pests)
- Soil moisture data collected adjacent to a subsample of plantings in each area to ensure all plantings are receiving adequate moisture
- Other appropriate field data.

The health of a subset of mitigation plantings will be assessed during each monitoring event following a modified Health Index initially developed by Bainbridge et al. 2001:

- 0 = dead, stems brown brittle with no green or purple;
- 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 stem, with or without green leaves;
- 3a = good health, stems flexible and containing living tissue, often with green or purple stem and a number of green leaves, if present;
- 3b = good health, stems flexible and containing living tissue, often leafless on a seasonal basis, and;
- 4 = excellent health, healthy stems containing living tissue, green leaves (excluding cacti), vigorous.

The subset will include at least 10 plantings in each mitigation planting area.

Monitoring will continue for a minimum of five years from the date of mitigation planting site installation. Monitoring will also include at least three reference areas. The reference areas will be monitored prior to mitigation planting and in Year 3 to refine performance standards and to determine if a region-wide issue is affecting the mitigation planting success.

8.1.2 Annual Quantitative Monitoring and Performance Criteria

The mitigation planting sites will be monitored and measured annually in years 1, 2, 3 and 5 to determine the survival rate of mitigation planting plantings.

Survival Census: A baseline census at the completion of container plant installation will establish the quantities of mitigation plantings by species in each mitigation planting area. This baseline inventory will be utilized to assess survival in each mitigation planting area during each year of the mitigation effort. The annual survival census will be conducted at the same time each year. All plantings will be censused along with any native volunteer seedling recruits if the species was included in the planting palette (Table 3). During the census, the health of each planting will be assessed. Required mitigation container planting numbers are presented in Table 2.

As during routine monitoring events, the health of mitigation plantings will be assessed using a modified Health Index initially developed by Bainbridge et al. 2001:

- 0 = dead, stems brown brittle with no green or purple;
- 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 stem, with or without green leaves;
- 3a = good health, stems flexible and containing living tissue, often with green or purple stem and a number of green leaves, if present;
- 3b = good health, stems flexible and containing living tissue, often leafless on a seasonal basis, and;
- 4 = excellent health, healthy stems containing living tissue, green leaves (excluding cacti), vigorous.

Plant Species Richness: Observed plant species used in the planting palette as well as all plant species found in a recognizable condition during the biological monitoring will be recorded. Nomenclature will follow the second edition of *The Jepson Manual: Vascular Plants of California* (Baldwin et al. 2012) with online updates (Jepson Flora Project 2025). Maintenance of an observed species list will allow for assessment of invasive species as well as other species indicative of site conditions.

Wildlife Utilization: The presence of wildlife within the mitigation planting areas will be recorded. Identification of wildlife species will include diagnostic signs including audible calls, prints, scat, nests, skeletal remains, burrows, and habitat features. Wildlife behavior (e.g., foraging, perching, nesting, mating) will also be recorded to document how wildlife are using the mitigation planting areas.

Performance Criteria: Mitigation plantings will exhibit 75 percent survival of required plantings by species. Survival of any mitigation planting species that drops below a 75 percent survival of mitigation plantings will require remedial planting.

8.2 Reporting

Reporting is required for compliance with NTCRA Mitigation Planting Work Plan mitigation measures. Once mitigation planting implementation has been completed, an as-built report will be provided and subsequently,

yearly activities and monitoring will be documented in annual reports in Years 1, 2, 3, 4, and 5. Year 5 will also include the final report.

8.2.1 As-built Report

An as-built report will be prepared within 10 weeks of completion of planting in all mitigation planting areas. The planting palette and a summary of planting details will be provided, along with figures showing planting locations within each mitigation planting area.

8.2.2 Annual Reports

At the end of 'Year 1 (12 months after the completion of planting in all mitigation areas), a report will be prepared to document mitigation planting activities accomplished during the year. Subsequent annual reports will summarize monitoring data collected each succeeding year and compare results against the performance targets to evaluate mitigation planting success and to document relevant mitigation planting data. The annual reports will summarize quantitative measurements of mitigation planting plantings, as derived from sampling efforts. A comparison of mitigation planting sites to current status of reference sites will be included. The annual reports will include recommended maintenance activities and corrective measures, if needed, and specify when such measures will be implemented.

The first annual report will include specific information on the number, species, and locations of trees and shrubs that were removed or otherwise permanently affected during construction as well as the number, species, and locations of mitigation plantings, along with pre- and post-construction photographs from the plant impact locations and photographs of the mitigation planting areas. The first annual report will show photographs of the photo-monitoring points and necessary documentation to relocate the photo-monitoring stations in subsequent years.

Additional monitoring reports will be prepared following Years 2, 3, 4, and 5. These reports will include assessments of the mitigation planting areas, including the condition of the mitigation plantings, recruitment by planted species, discussion of any problems, and recommendations for adaptive management actions necessary to address the problems. These reports will include photographs and information from each of the photo-monitoring stations.

Monitoring reports will be submitted to USFWS in January each year for the duration of the required mitigation planting monitoring period or until performance targets are met.

9 Adaptive Management

Adaptive management involves learning from experience and modifying subsequent behavior in light of that experience. Data will be collected and analyzed throughout the monitoring period and the results used to modify (adapt) mitigation planting approaches, as appropriate, to ensure successful establishment of mitigation plant species. Maintenance and adaptive management will focus on the following areas: weed control, irrigation modification, herbivory protection, and mortality rates.

Mitigation plants by species, including volunteer recruits, that drop below 75 percent survival will require remedial planting.

Herbivory: Although protective fencing is planned around the mitigation planting areas, herbivore damage due to unanticipated sources such as insect infestations may occur. If herbivory is a significant problem, an active integrated pest management program may be developed.

Weeds: If weed infestations are threatening establishment of mitigation plantings or if new weed species are invading the area, the frequency and type of weed maintenance will be increased or modified. Weed problems will be addressed through removal and/or treatment of weeds depending on the species and the location.

Irrigation Schedule: As mentioned in Section 7.1, the need, frequency, and duration of watering will depend on current weather patterns and site-specific soil moisture conditions.

10 References

AECOM. 2011a. Final Environmental Impact Report Volume 1 for the Topock Compressor Station Groundwater Remediation Project. Prepared for California Department of Toxic Substances. January.

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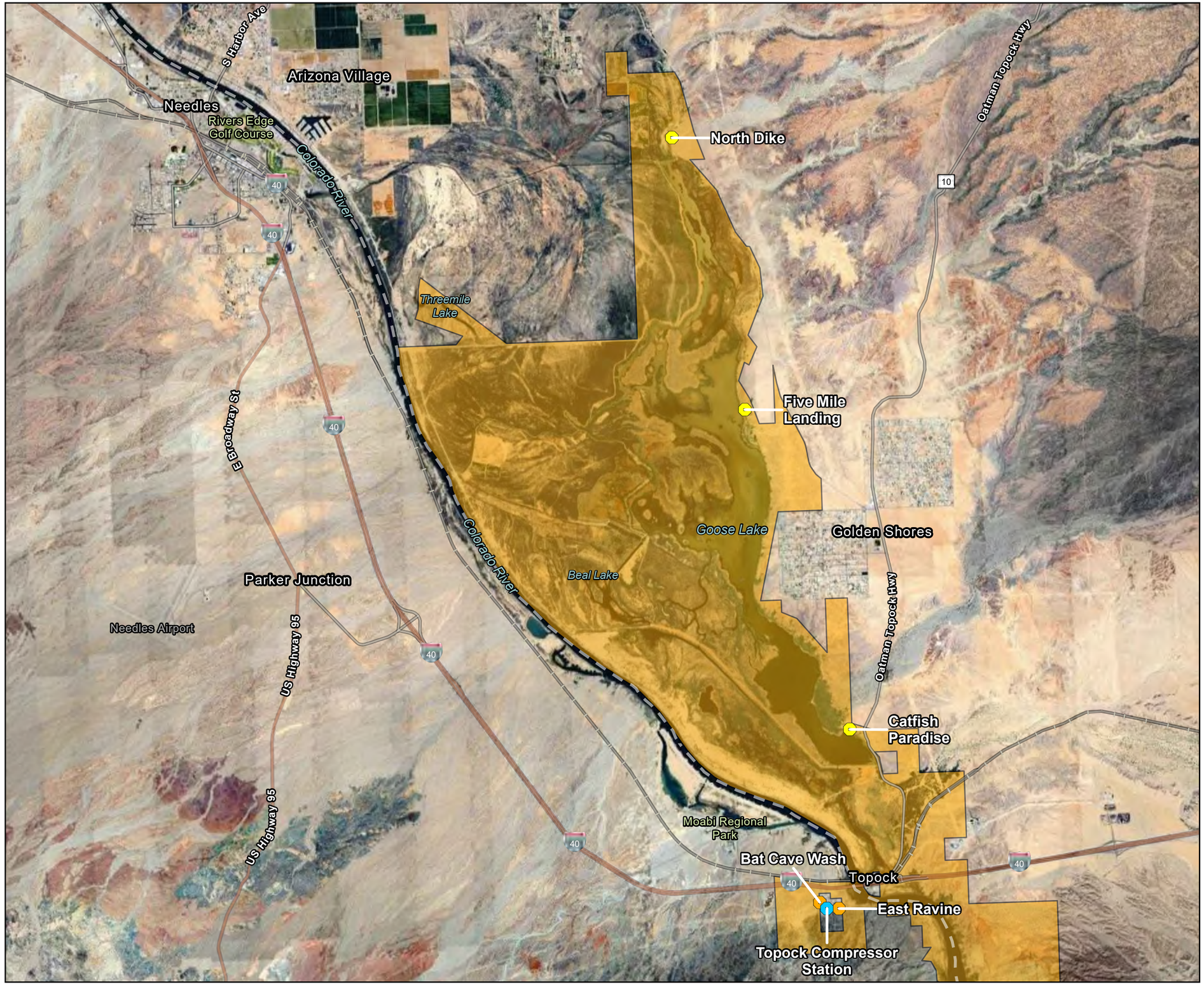
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Figures





Legend

- Potential Mitigation Planting Area
- Potential On-site Mitigation Planting Area
- Topock Compressor Station
- Havasu National Wildlife Refuge

NOTE:
1. World imagery dated April 15, 2024.

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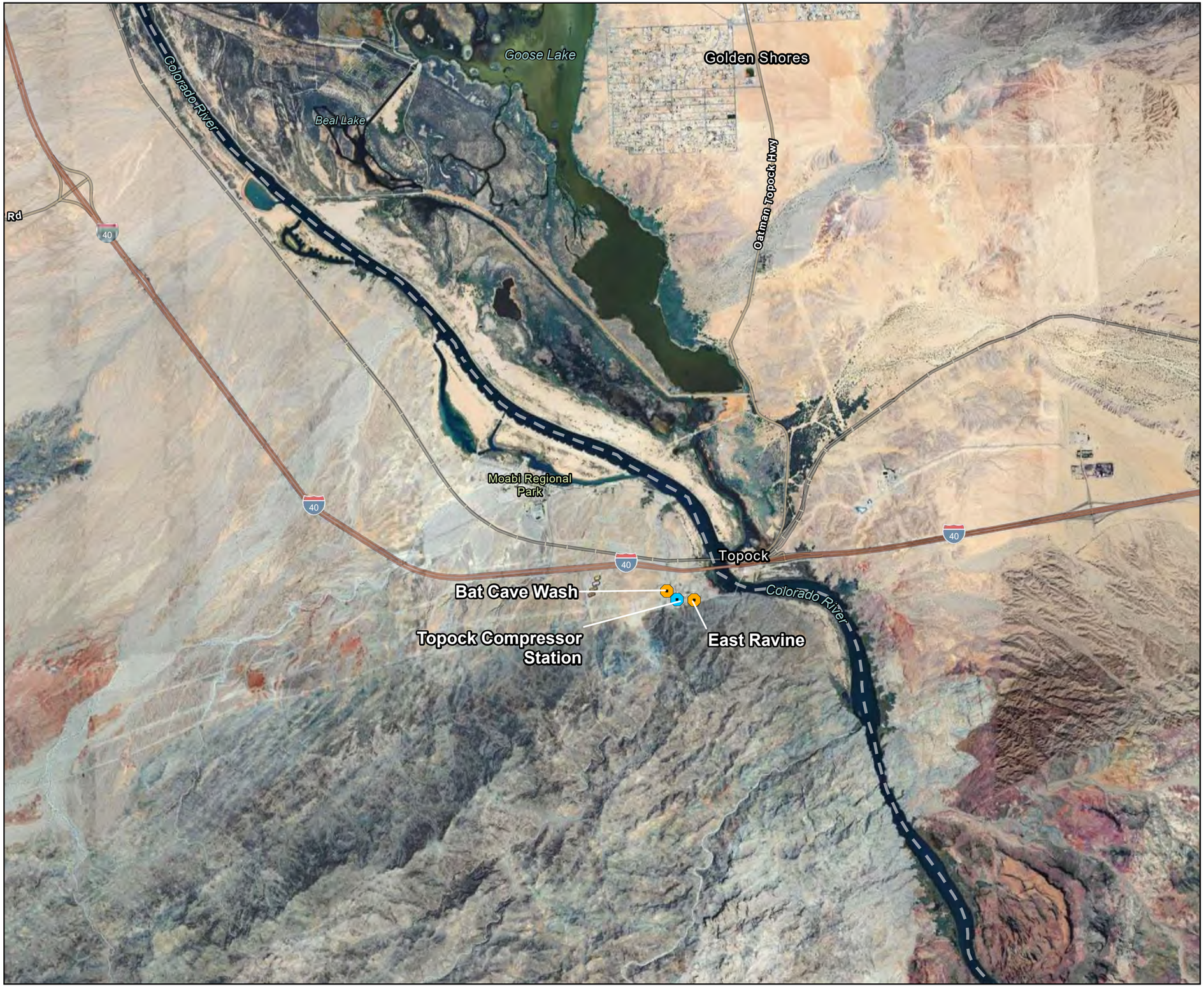
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
NTCRA MITIGATION PLANTING WORK PLAN

SITE LOCATION

ARCADIS

Figure
1

Last Saved By: mayyar7350 Name: Figure 1 Site Location
I:_ENVPGE_Topock\GEC\ARC_PRO\2025\Topock NTCRA figures_2025.aprx\Figure 1 Site Location 18-12-2025 09:04





Legend

- Mitigation Planting Area
- Topock Compressor Station

NOTE:
1. World imagery dated April 15, 2024.

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PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
NTCRA MITIGATION PLANTING WORK PLAN

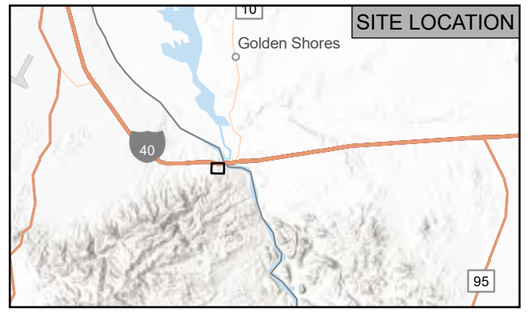
ONSITE LOCATIONS

ARCADIS

Figure **2**

Last Saved By: mayyar7350 Name: Figure 2 Onsite Locations
T:_ENVPGE_Topock\GEC\ARC_PRO\2025\Topock NTCRA figures_2025.aprx\Figure 2 Onsite Locations 18-12-2025 09:07





Legend

- Topock Compressor Station
- Access Road
- Mitigation Planting Area

NOTE:
1. World imagery dated April 15, 2024.
2. Final Access Road extent is not available.

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PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
NTCRA MITIGATION PLANTING WORK PLAN

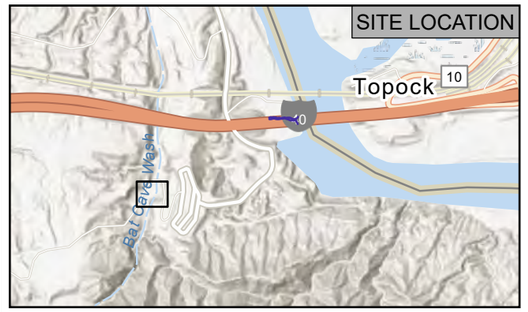
MITIGATION PLANTING AREA OVERVIEW

ARCADIS

Figure
3

Last Saved By: RDay Name: Figure 3 Revegetation Area Overview
T:_ENV\PGE_Topock\GEC\ARC_PRO\2025\Topock NTCRA figures_2025.aprx\Figure 3 Revegetation Area Overview 12/18/2025 9:34 PM





Legend

- Planting Area
- Mitigation Planting Area (Planting Area + 20-Foot Buffer for Canopy Growth)
- NTCRA Disturbance Area

NOTE:
1. World imagery dated April 15, 2024.

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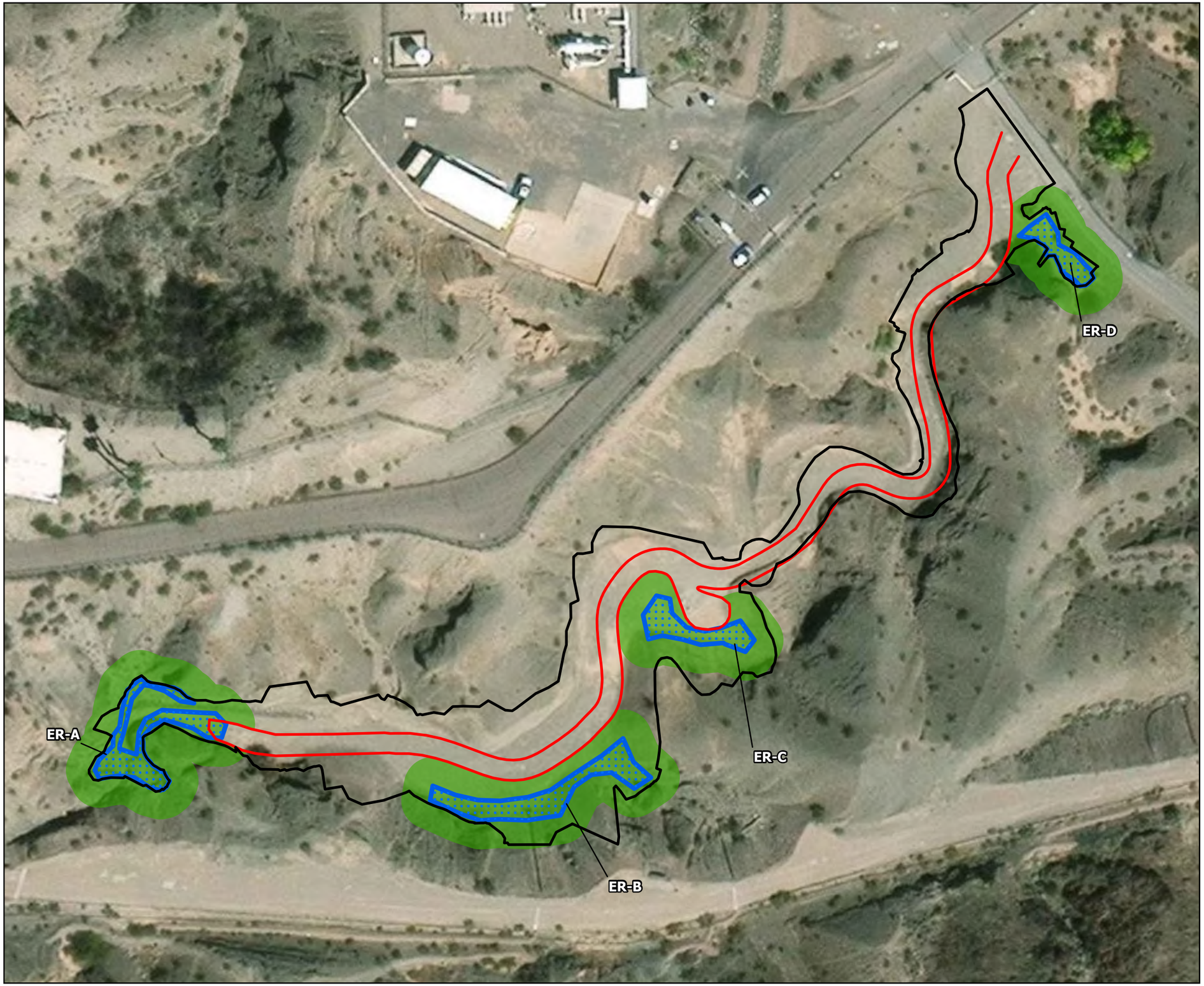
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
NTCRA MITIGATION PLANTING WORK PLAN

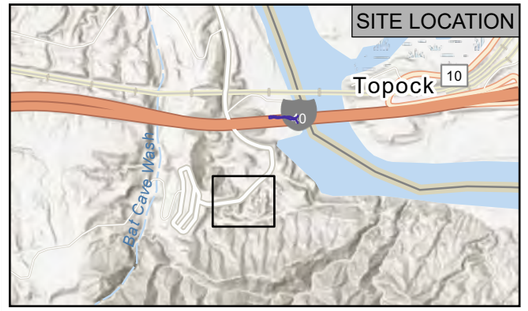
BAT CAVE WASH MITIGATION PLANTING AREA

ARCADIS

Figure
4

Last Saved By: RDay Name: Figure 4 Bat Cave Wash Revegetation Area
T:_ENV\PGE_Topock\GEO\ARC_PRO\2025\Topock NTCRA figures_2025.aprx\Figure 4 Bat Cave Wash Revegetation Area 12/18/2025 9:34 PM





Legend

- Planting Area
- Access Road
- Mitigation Planting Area (Planting Area + 20-Foot Buffer for Canopy Growth)
- NTCRA Disturbance Area

NOTE:
1. World imagery dated April 15, 2024.
2. Final Access Road extent is not available.

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PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
NTCRA MITIGATION PLANTING WORK PLAN

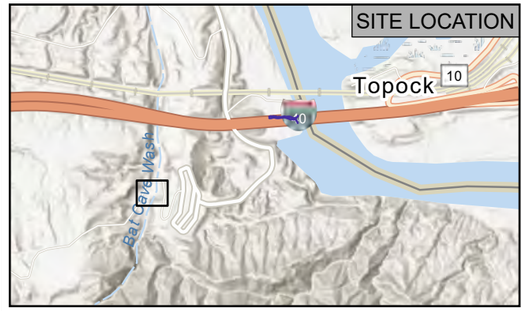
EAST RAVINE MITIGATION PLANTING AREA

ARCADIS

Figure 5

Last Saved By: RDay Name: Figure 5 East Ravine Mitigation Planting Area
T:_ENV\PGE_Topock\GEC\ARC_PRO\2025\Topock NTCRA figures_2025.aprx\Figure 5 East Ravine Mitigation Planting Area 12/18/2025 9:40 PM





Legend

- Soil Sampling Location
- Planting Area
- Mitigation Planting Area (Planting Area + 20-Foot Buffer for Canopy Growth)

NOTE:
1. World imagery dated April 15, 2024.

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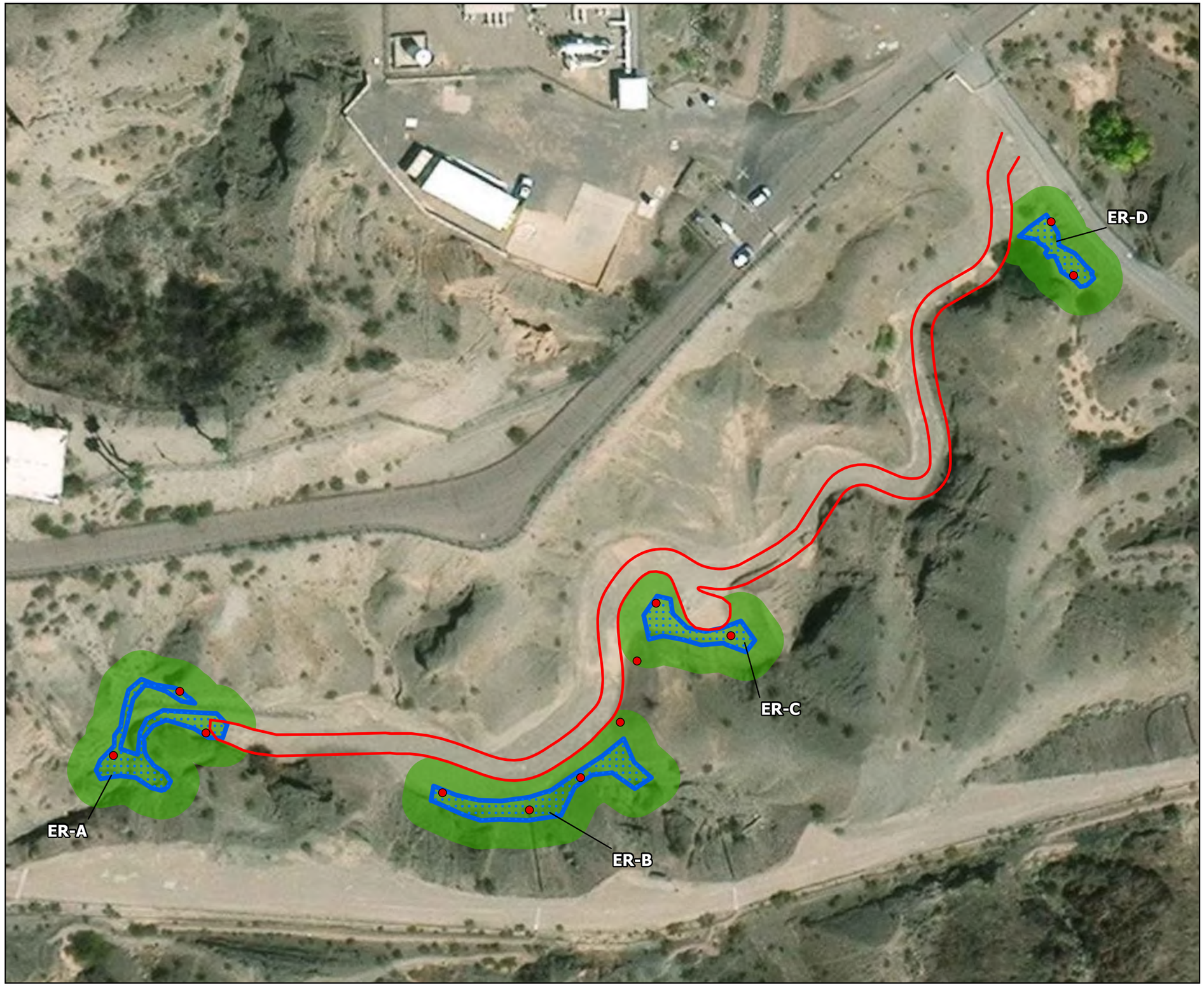
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
NTCRA MITIGATION PLANTING WORK PLAN

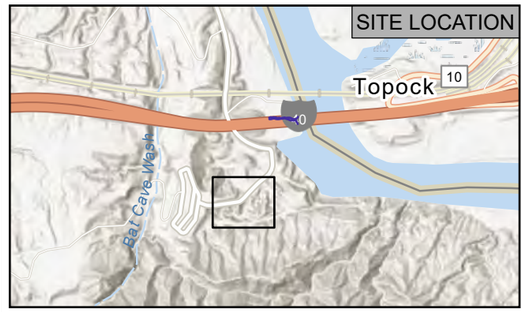
BAT CAVE WASH
SOIL SAMPLING LOCATIONS

ARCADIS

Figure
6

Last Saved By: mayar7350 Name: Figure 6 Bat Cave Wash Soil Sampling Locations
T:_ENV\PGE_Topock\GEC\ARC_PRO\2025\Topock NTCRA figures_2025.aprx\Figure 6 Bat Cave Wash Soil Sampling Locations 18-12-2025 10:47





Legend

- Soil Sampling Location
- Access Road
- Planting Area
- Mitigation Planting Area (Planting Area + 20-Foot Buffer for Canopy Growth)

NOTE:
1. World imagery dated April 15, 2024.
2. Final Access Road extent is not available.

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PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
NTCRA MITIGATION PLANTING WORK PLAN

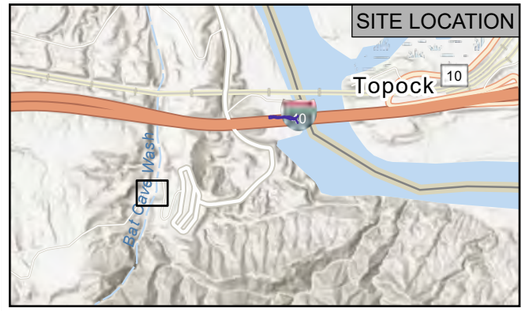
EAST RAVINE SOIL SAMPLING LOCATIONS

ARCADIS

Figure 7

Last Saved By: RDay Name: Figure 7 East Ravine Soil Sampling Locations
T:_ENV\PGE_Topock\GEC\ARC_PRO\2025\Topock NTCRA figures_2025.aprx\Figure 7 East Ravine Soil Sampling Locations 12/18/2025 9:34 PM





Legend

- Water Tank
- 1-inch Schedule 40 Polyvinyl Chloride (PVC)
- 2-inch High-Density Polyethylene (HDPE)
- Herbivory Deterrent Fencing (Exact Placement Based on Topography and Site Conditions)
- Planting Area
- Mitigation Planting Area (Planting Area + 20-Foot Buffer for Canopy Growth)

NOTES:
1. The 1/4-inch irrigation tubing is not pictured.
2. World imagery dated April 15, 2024.

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Feet

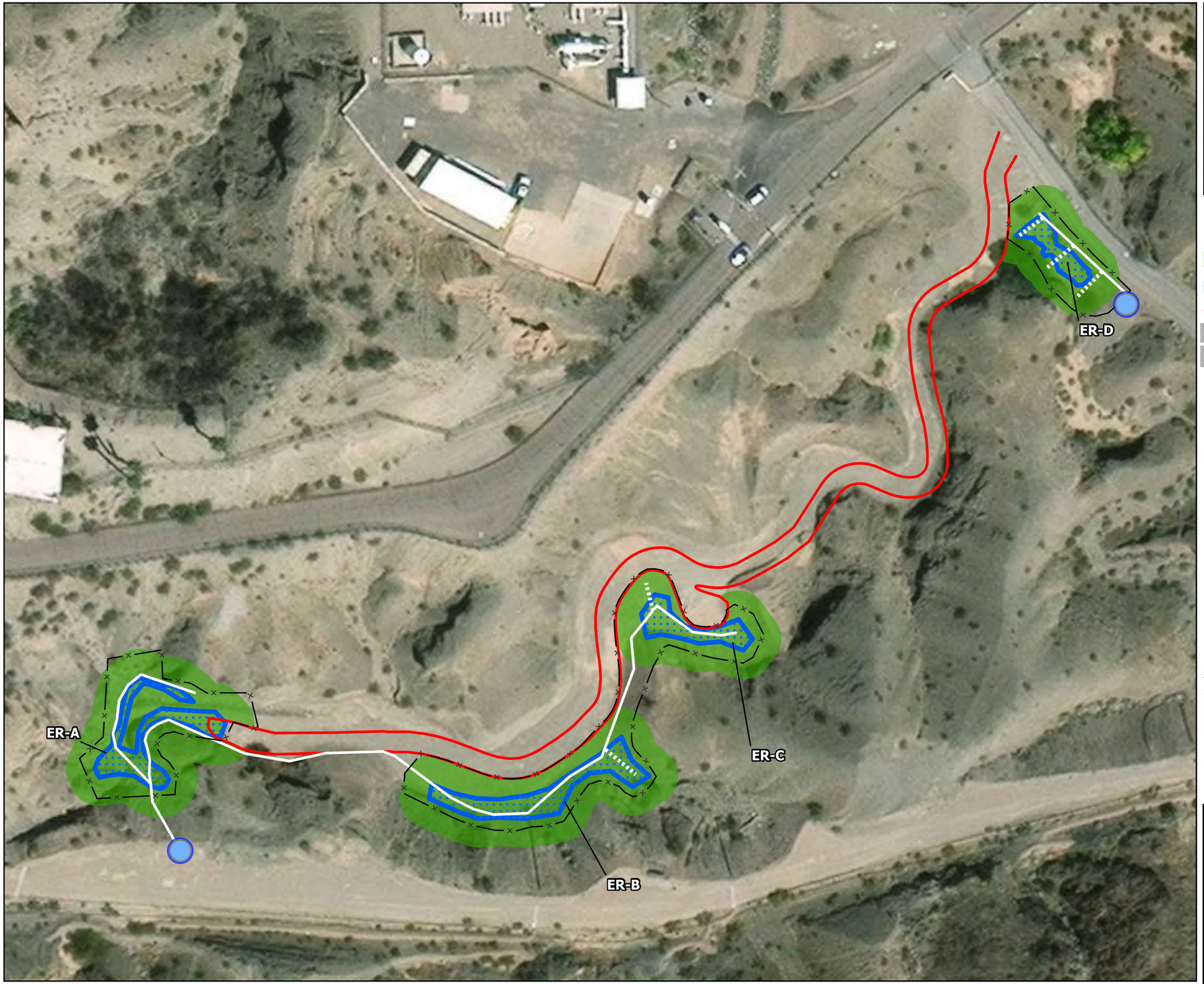
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
NTCRA MITIGATION PLANTING WORK PLAN

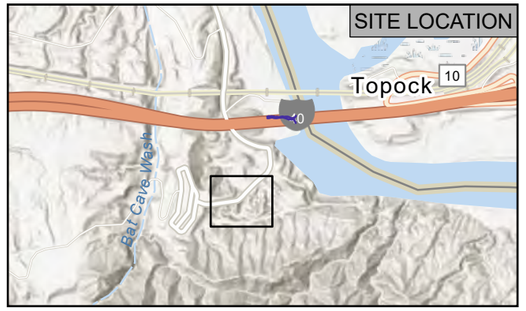
BAT CAVE WASH MITIGATION PLANTING IMPLEMENTATION LAYOUT

ARCADIS

Figure
8

Last Saved By: mayyar7350 Name: Figure 8 Bat Cave Wash Revegetation Implementation Layout
T:_ENV\PGE_Topock\GEO\ARC_PRO\2025\Topock NTCRA figures_2025.aprx\Figure 8 Bat Cave Wash Revegetation Implementation Layout 18-12-2025 11:10





Legend

- Water Tank
- Mitigation Planting Area (Planting Area + 20-Foot Buffer for Canopy Growth)
- Planting Area
- Access Road
- 2-inch High-Density Polyethylene (HDPE)
- 1-inch Schedule 40 Polyvinyl Chloride (PVC)
- Herbivory Deterrent Fencing (Exact Placement Based on Topography and Site Conditions)

NOTES:
1. The 1/4-inch irrigation tubing is not pictured.
2. World imagery dated April 15, 2024.
3. Final Access Road extent is not available.

N

0 50 100 Feet

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
NTCRA MITIGATION PLANTING WORK PLAN

EAST RAVINE MITIGATION PLANTING IMPLEMENTATION LAYOUT

ARCADIS

Figure 9

Last Saved By: RDay Name: Figure 9 East Ravine Revegetation Implementation Layout
T:_ENV\PGE_Topock\GEC\ARC_PRO\2025\Topock NTCRA figures_2025.aprx\Figure 9 East Ravine Revegetation Implementation Layout 12/18/2025 9:34 PM

Appendix A

Topock Compressor Station Groundwater Remediation Project, Havasu National Wildlife Refuge, Habitat Restoration Plan

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