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Attachment C Incidental Take Permit Applications

IP Perkins, LLC

Perkins Renewable Energy Project
CDFW Incidental Take Permit Application

February 2025

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PANORAMA
ENVIRONMENTAL, INC.

IP Perkins, LLC

Perkins Renewable Energy Project
CDFW Incidental Take Permit Application

February 2025

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Table of Contents

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

1 Introduction

1.1 Applicant

(2) Applicant's full name, mailing address, and telephone number(s).

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Applicant's Officer: Simon Ross, Chief Commercial Officer, IP Perkins, LLC, 9450 SW Gemini Drive, PMB #68743, Beaverton, OR 97008. Tel. (415) 971-0130, Email. simon@intersectpower.com

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1.2 Species to be Covered

(3) The common and scientific names of the species to be covered by the permit and the species' status under CESA

Western burrowing owl (*Athene cunicularia hypugaea*). On October 10, 2024, the western burrowing owl was approved as a candidate for listing as a protected species under the California Endangered Species Act (CESA). Candidates for listing are afforded the same protections as state-listed endangered or threatened species. CDFW will undertake a one-year review of the species' status before the California Fish and Game Commission makes a final decision on the listing.

1.3 Permit Coverage Period

Permit coverage is requested for a period of 52 to 54 years, or the total of construction, operations and maintenance, and decommissioning phases of the Project.

- Construction of the Project is anticipated to begin as early as January 2026 and extend to December 2027 for a duration of 24 months.

- Operations and Maintenance is expected to last for 50 years as that is the anticipated useful life of the facilities. Operations and Maintenance will start as soon as construction is complete.
- Decommissioning will commence at the end of the Project's useful life and last for two years, approximately December 2077 to December 2079, if the power from the facility is not sold to another buyer and/or repowered to increase plant efficiency. If the power is sold to another buyer and/or repowered to increase plant efficiency and the facilities continue to operate, then the permit term will not cover decommissioning and will end following the end of Operations and Maintenance.

1.4 Coverage Area

The area covered by the permit includes the area contained within the IP Perkins, LLC (IP Perkins, LLC) project boundary as shown below in Section 2 – Project Description.

1.5 Covered Activities

The activities requested for permit coverage include all activities associated with the construction, operations and maintenance, and decommissioning of the Project elements contained within the IP Perkins, LLC project boundary, as described in Section 2 – Project Description. These activities include the Project's solar panels, substation, Battery Energy Storage System (BESS), operations and maintenance facility, and other infrastructure.

1.6 Guide to the Permit Application

This application is filed for the proposed Perkins Renewable Energy Project (Project) in compliance with the requirements of the California Code of Regulations (CCR) Title 14 Section 783.4 and Section 2081(b) of California Fish and Game Code (FGC). The proposed Project has the potential to result in the incidental take of the state candidate western burrowing owl. The activity meets the following criteria for take of the western burrowing owl (FGC Section 2081[b]):

1. The take would be incidental to the otherwise lawful activity of project construction and/or operation (see Section 2 and Section 4 of this application)
2. Impacts to western burrowing owl would be minimized and fully mitigated as described in this application (see Section 6 of this application)
3. The measures required to minimize and fully mitigate the impacts of the take:
    a. Are roughly proportional in extent to the impact of the taking on the species (see Section 6 of this application)
    b. Maintain project objectives to the greatest extent possible; and
    c. Can be successfully implemented by the applicant (see Section 6 of this application)

4. Adequate funding will be provided to implement the required minimization and mitigation measures and monitoring compliance with and effectiveness of the measures (see Section 6 of this application)
5. Issuance of the permit will not jeopardize the continued existence of the western burrowing owl (see Section 6 of this application).

This application contains all the required contents of an ITP application as defined in CCR Title 14 Section 783.2. This application also follows guidance obtained from CDFW through recent coordination with CDFW staff. References to specific requirements for ITP applications are provided throughout this document, as appropriate. Table 1.6-1 provides a reader's guide to this permit application.

Table 1.6-1 Guide to Perkins Renewable Energy Project Incidental Take Permit Application

Application Requirement §783.2 (a)	Page
(1) The appropriate application fee.	N/A (CEC Opt-in Process)
(2) Applicant's full name, mailing address, and telephone number(s). If the applicant is a corporation, firm, partnership, association, institution, or public or private agency, the name and address of the person responsible for the project or activity requiring the permit, the president or principal officer, and the registered agent for the service of process.	1
(3) The common and scientific names of the species to be covered by the permit and the species' status under CESA.	30
(4) A complete description of the project or activity for which the permit is sought.	5
(5) The location where the project or activity is to occur or to be conducted.	33
(6) An analysis of whether and to what extent the project or activity for which the permit is sought could result in the taking of species to be covered by the permit.	33
(7) An analysis of the impacts of the proposed taking on the species.	34
(8) An analysis of whether issuance of the incidental take permit would jeopardize the continued existence of a species. A complete, responsive jeopardy analysis shall include consideration of the species' capability to survive and reproduce, and any adverse impacts of the taking on those abilities in light of: i. Known population trends; ii. Known threats to the species; and iii. Reasonably foreseeable impacts on the species from other related projects and activities.	36
(9) Proposed measures to minimize and fully mitigate the impacts of the proposed taking.	38**Error! Bookmark not defined.**
(10) A proposed plan to monitor compliance with the minimization and mitigation measures and the effectiveness of the measures.	48

Application Requirement §783.2 (a)	Page
(11) A description of the funding source and the level of funding available for implementation of the minimization and mitigation measures.	49
(12) Certification in the following language: I certify that the information submitted in this application is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to suspension or revocation of this permit and to civil and criminal penalties under the laws of the State of California.	4
(13) Documentation of CEQA compliance.	Will be provided after CEQA is complete

1.7 Certification

(12) Certification in the following language:
I certify that the information submitted in this application is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to suspension or revocation of this permit and to civil and criminal penalties under the laws of the State of California.

I certify that the information submitted in this application is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to suspension or revocation of this permit and to civil and criminal penalties under the laws of the State of California.

Signature ________________ Date March 11, 2025

Name of Representative: Simon Ross

Title: Chief Commercial Officer

IP Perkins, LLC

2 Project Description

(4) A complete description of the project or activity for which the permit is sought.

The IP Perkins, LLC proposes to construct, operate, and maintain the proposed Project. This section summarizes the proposed Project location, facilities, and construction, operations, and decommissioning activities for which permit coverage is being sought.

2.1 Project Overview

2.1.1 Purpose and Design

IP Perkins, LLC, an affiliate of Intersect Power, LLC, proposes to construct, operate, maintain, and decommission the Perkins Renewable Energy Project on public lands administered by the U.S. Bureau of Land Management (BLM) and Bureau of Reclamation (BOR), as well as private lands located southeast of El Centro in Imperial County, California (Figure 1). The proposed Project consists of utility-scale solar photovoltaic (PV) electrical generating and storage facility, including associated infrastructure, to generate and deliver renewable electricity to the statewide electricity transmission grid. The project will include a new project substation, operations and maintenance yard and facility, and 500 kV generation tie (gen-tie) line. The Project will interconnect to the existing San Diego Gas and Electric (SDG&E) Southwest Power Link (SWPL) 500 kV transmission line that traverses east–west 0.84 mile south of the Project site. The Project is expected to generate up to 1,150 megawatts (MW) of renewable energy using photovoltaic (PV) panels with up to 1,150 MW of storage.

The Project would be analyzed under California Environmental Quality Act (CEQA) and National Environmental Quality Act (NEPA). An Environmental Impact Report would be prepared with CEC as the CEQA lead agency under the CEC Opt-in Process expected to be published in 2025. The BLM is preparing an Environmental Assessment (EA) under NEPA also expected to be published in 2025. The Project will be consistent with the Desert Renewable Energy Conservation Plan (DRECP) Land Use Plan Amendment, and is undergoing federal ESA Section 7 consultation between the BLM and US Fish and Wildlife Service (USFWS). The BLM is seeking USFWS concurrence that the Project is covered under the DRECP Biological Opinion (USWFS 2016). The USFWS has developed an Activity Form for the streamlined DRECP concurrence process. BLM will submit the completed form to confirm USFWS concurrence.

The proposed Project site consists of a fenced area containing the solar plant, BESS, Project interconnection generation tie (gen-tie) line, Project substation, and operations and maintenance yard and facility. The Project would disturb up to approximately 5,826.9 acres of federal and private lands in Imperial County (Project footprint). The boundaries of the Project footprint's disturbance area are designed to meet the BLM California Desert Conservation Area (CDCA) Plan, as Amended[1].

2.1.2 Project Elements

Figure 2 shows the components for the entire Perkins Renewable Energy Project (i.e., including both the IP Perkins, LLC Project components [covered by this application] and the IP Perkins BAAH, LLC project components [covered under a separate application]). The main Project elements are discussed in the following subsections.

Solar Arrays

The solar facility would include approximately 3,100,000 solar panels. It is anticipated that the panels selected for the Project would be First Solar Series 7. The Series 7 panel utilizes First Solar's thin film technology. However, the ultimate decision for the panel types and racking systems would depend on market conditions at the time of procurement and environmental factors, including the recycling potential of the panels at the end of their useful lives. The chief fuel source for a solar energy field is solar energy.

Either mono-facial or bi-facial modules would be used, with a maximum height of approximately 10 feet at full tilt depending on topography and hydrology. Panel mounting systems that may be installed include either fixed-tilt or single-axis tracking technology, depending on the PV panels ultimately selected. Panels would be either mounted in a portrait orientation as single panels or mounted in a landscape orientation and stacked two high on a north–south oriented single-axis tracking system that would track the sun from east to west during the day. Panel faces would be minimally reflective, dark in color, and highly absorptive.

Structures supporting the PV panels would consist of steel piles (i.e., cylindrical pipes, H-beams, helical screws, or similar). The piles would typically be spaced 18 feet apart. The height of the piles above the ground would vary based on the racking configuration specified in the final design. For a single-axis tracking system, piles would typically be installed to a reveal height of approximately 4 to 6 feet above grade (minimum 1 foot clearance between bottom edge of panel and ground but could be higher to compensate for terrain variations and clearance for overland flow during stormwater events). For a fixed-tilt system, the reveal height would vary based on the racking configuration specified in the final design. Fixed-tilt arrays would be oriented along an east–west axis, with panels facing generally south.

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[1] The Desert Renewable Energy and Conservation Plan amendment to the CDCA Plan includes conservation and management actions that require avoidance of some special plant species and certain types of habitat.

Figure 1 Project Location and Surface Management Agency

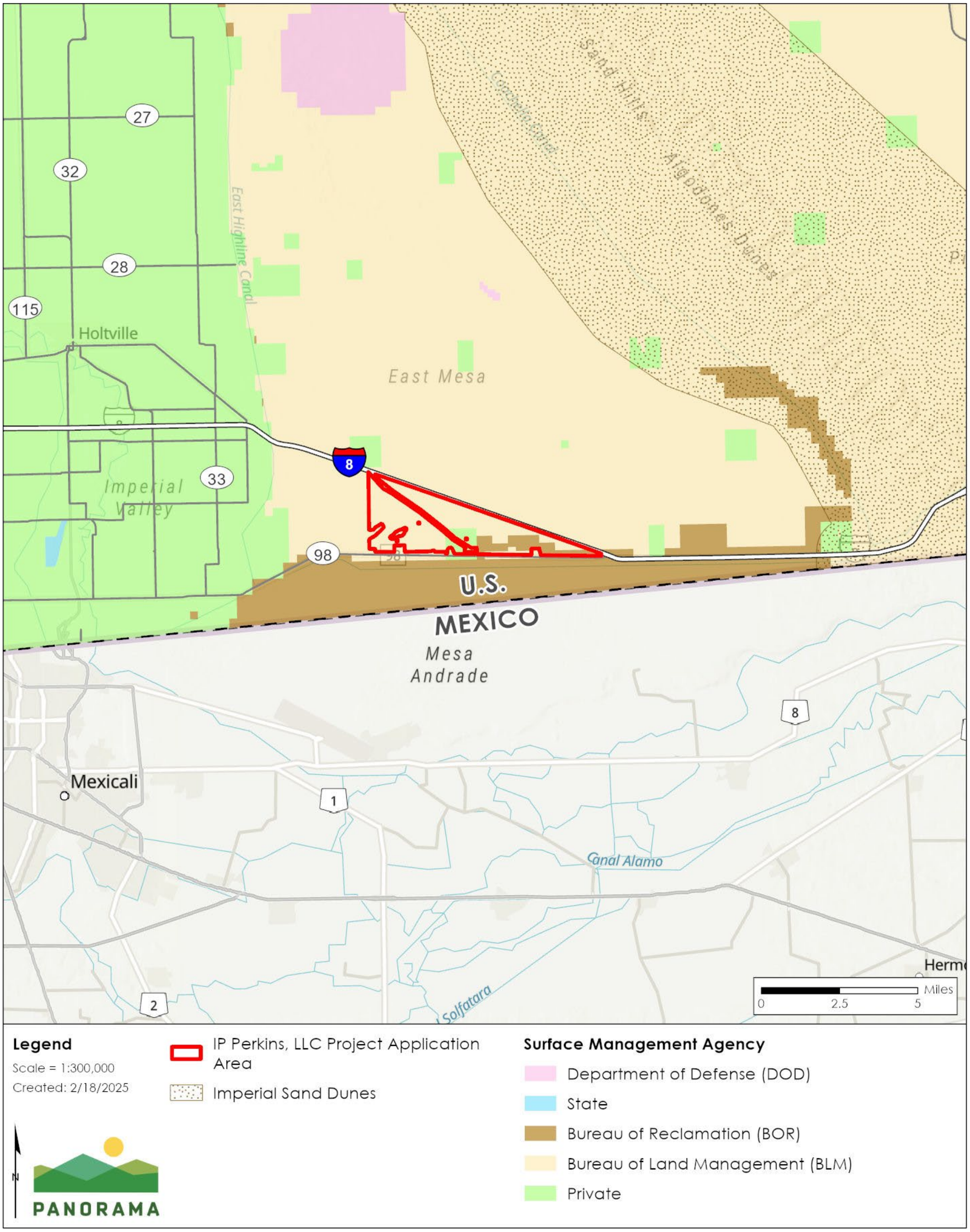
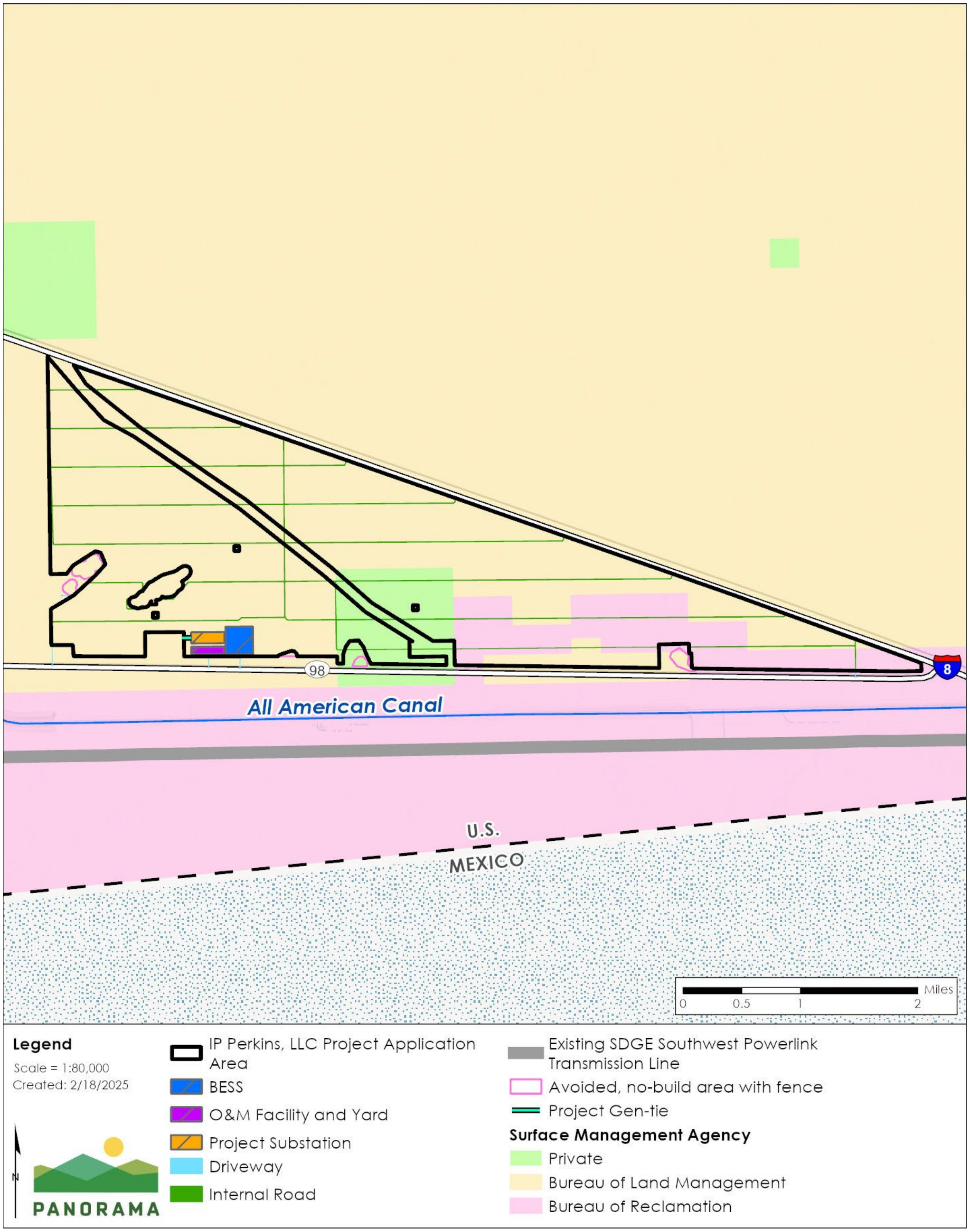


Figure 2 Project Elements Option 1



Tracking arrays would be oriented along a north–south axis, with panels tracking east to west to follow the movement of the sun. For fixed-tilt systems, the panels would be fixed at an approximate 20- to 60-degree angle or as otherwise determined necessary during final Project design.

Project Substation

The Project substation would transform or "step up" the voltage from 34.5 kV used in the medium voltage collector system throughout the site to 500 kV, the Project's interconnecting voltage. The Project substation would collect consolidated intermediate voltage cables from the medium-voltage collector system. Electrical transformers, switchgear, and related substation facilities would be designed and constructed to transform medium-voltage power from the Project's delivery system to the 500 kV SDG&E SWPL transmission system. The Project substation would be located either adjacent to the BAAH switchyard or at an optional location on the private land.

The Project substation would consist of up to eight large transformers, associated medium-voltage bus work and circuit breakers, and associated high-voltage circuit breakers and bus work. The substation would be surrounded by an up to 7-foot-high chain link fence topped with 1 foot of barbed wire. Transformers within the Project substation would be up to 45 feet tall by 40 feet wide on the longest side. The high-voltage circuit breakers would be approximately 25 feet tall by 20 feet wide on the longest side.

Operation and Maintenance Facilities

The operations and maintenance facilities would be designed for Project security, employee offices, and parts storage. The operations and maintenance facility would cover an area of approximately 10 acres and include the following components: two operations and maintenance office buildings (which may share a wall) each approximately 3,000 square feet and 15 feet at the tallest point, up to 16 storage connex boxes for spare parts covering a total area of approximately 7,500 square feet, laydown yards, and a parking area. The operations and maintenance office building would have a septic system and would be constructed on a concrete foundation. The water supply for the operations and maintenance facility is anticipated to be from an on-site groundwater well.

Battery Energy Storage System

The Project BESS would be capable of storing up to 1,150 MW of electricity for up to 4 hours and would be housed in electrical enclosures and buried electrical conduit. The BESS would either be located near the BAAH switchyard or on the private land.

Up to 5,000 individual BESS electrical enclosures measuring approximately 40 feet or 52 feet by 8 feet by 8.5 feet high would be installed on concrete foundations. The Project could use any commercially available battery technology, including but not limited to lithium-ion, lithium iron phosphate (LFP), nickel manganese cobalt (NMC), or nickel cobalt aluminum (NCA) batteries.

Battery systems would require air conditioners or heat exchangers and inverters. In addition, a water tank for emergency use is anticipated for each BESS unit/area. The size, final number, and location of water tanks for emergency use would be determined in accordance with California Fire Code (CFC) and in consultation with the local or State fire authorities.

The BESS would comply with the current CFC, which governs the code requirements to minimize the risk of fire and life safety hazards specific to BESS used for load shedding, load sharing, and other grid services (Chapter 12 section 1206 of the 2019 CFC). In accordance with the CFC, the battery enclosure and the site installation design are all required to be approved by the State fire authorities. State law also requires the preparation of a battery storage system-specific emergency response plan under SB 38 prior to operations.

A backup generator is expected to be required in case of an outage in substation distribution power. Fuel sources for these generators are anticipated to be either propane or diesel fuel.

Project Gen-tie Line and Route

The Project gen-tie line would connect the Project substation to the BAAH switchyard and would consist of steel structures. Steel support structures (H-frames and A-frames) for the gen-tie line would be up to 199 feet in height and would connect to and support high voltage aluminum bus duct and the high voltage transmission lines.

2.1.3 Construction

Solar Facility Construction

Site Preparation and Grading

The majority of the Project site would be mowed rather than cleared of vegetation. Mass grading of the Project site would not be needed for site preparation due to the relatively flat terrain. Spot grading would be employed for select solar array and storage facility components, including the BESS, and substation. Best management practices (BMPs), Project Design Features (PDFs), and DRECP Conservation and Management Actions (CMAs) (see Section 7) would be implemented during all grading, vegetation removal, and construction activities.

The BESS, operation and maintenance facility, and roads would require vegetation clearing, grading, and compaction. Inverter-transformer station locations would require light grubbing. Due to undulations within the Project site, some areas of grading would be needed within the solar arrays. Where solar site grading is necessary for discrete facilities or within the solar arrays, cut and fill would be balanced to the extent feasible. Some import and export of material would be necessary (refer to Table 2.1-1). Where excavation is required, most construction activities, including excavation for the PV arrays, transformer pads, and operations and maintenance facilities, would be limited to less than 6 feet in depth within the Project Site. However, some excavations, such as those undertaken for the installation of collector poles and substation piers may reach depths of 45 feet or more. The BESS foundation would require excavation up to a depth of 16 feet for piers.

Within the solar arrays that do not require grading, mowing and grubbing would be conducted to allow for construction access and installation. Mowing and grubbing involves surface removal of vegetation, including mechanical mowing and removal of larger vegetation by hand cutting/trimming to the ground surface. The intent is to leave root balls and seeds in place to allow for regrowth of native vegetation after construction. During mowing, collection of mowed vegetation would be considered for future mulching to minimize dust and soil erosion on portions of the site and enhance restoration. A qualified restoration biologist would determine where the collected mulching material should be applied.

Non-native vegetation would be removed to the extent feasible during the construction phase via manual and mechanical methods and herbicide application. Any non-native species found in the Project site that has not been evaluated for its potential to invade or alter surrounding natural lands would be considered a "weed" for purposes of the Restoration and Integrated Weed Management Plan implementation. Cutting, damaging, or uprooting microphyll woodland tree species would be avoided by Project design and BMPs, in accordance with the CMAs.

Table 2.1-1 Solar Facility Disturbance Details

Project Component	Cut/Fill Quantity	Type of Disturbance
Fenced solar facility with arrays and access roads	Balanced	Solar array areas to be mowed and grubbed to provide for construction access and installation
Inverter-transformer stations and electrical collection system	Balanced	Graded and backfilled to an elevation above surrounding grade to avoid flooding for inverter-transformer stations
BESS	54,466 cubic yards of import[a] material; excess soils from storm water basin excavations, if needed, to also be used	Graded and backfilled to an elevation above surrounding grade to avoid flooding
Operation and maintenance yard and facility	Balanced	Operation and maintenance site to be graded and compacted
Temporary parking and laydown	Balanced	Temporary parking and laydown areas to be graded and compacted

[a] Estimated base for the areas requiring import of material is assumed to require a 12-inch depth.

Temporary Materials Laydown, Staging, and Storage

Temporary parking, staging, and laydown areas needed during construction would be graded and compacted. Several staging areas would be established within the Project site boundaries for storing materials, construction equipment, and vehicles. The staging areas would be surveyed and monitored by qualified biologists, archaeologists, and tribal monitors, as appropriate.

Access Roads

The existing surface area of the access roads would be cleared and compacted using on-site, native materials and may be covered in aggregate for dust or erosion control. The design standard for the access roads within the solar arrays would be consistent with the amount and type of use they will receive.

Solar Array Installation

The steel piles (i.e., cylindrical pipes, H-beams, or similar) supporting the PV panels would be driven into the soil using pneumatic techniques, similar to a hydraulic rock hammer attachment on the boom of a rubber-tired backhoe excavator. The piles typically are spaced 10 feet apart and would be driven into the ground to a depth of 9 to 15 feet.

For single-axis tracking systems, following pile installation, the associated motors, torque tubes, and drivelines (if applicable) would be placed and secured. Some designs allow for PV panels to be secured directly to the torque tubes using appropriate panel clamps. For some single-axis tracking systems and for all fixed-tilt systems, a galvanized metal racking system, which secures the PV panels to the installed foundations, would then be field-assembled and attached according to the manufacturer's guidelines. A portion of the PV panel racking and modules may be assembled at staging areas.

Inverters, Transformers, Substation, and Electrical Collection System

The Project site electrical collection system would involve installation of inverter-transformer stations from which the medium voltage cabling collection system would lead to the Project substation. Electrical inverter-transformer stations would be delivered to locations around the Project site and placed on concrete pads or steel skids, which would be elevated as necessary with steel piles to allow for stormwater flow beneath the inverter structures. Concrete for foundations of the inverter-transformer stations and other electrical collection facilities would be brought on site from a regional batching plant.

Medium-voltage cabling would be installed either underground or, for the low-impact design portion of the Project, overhead along panel strings in a cable management system to avoid the need for underground cabling and trenching. Cables, if underground, would be installed using direct bury equipment and/or typical trenching techniques, which involves use of a rubber-tired backhoe excavator, trencher, or a "one-pass" machine that digs the trench and lays the cable in a single action to minimize construction activity. Shields or trench shoring would be temporarily installed for safety to brace the walls of the trench if required based on the trench depth. After the excavation, cable rated for direct burial would be installed in the trench, and the excavated soil would be used to fill the trench and compressed to 90- to 95-percent maximum dry density or in accordance with final engineering.

Battery Energy Storage System
The enclosures for the BESS would be delivered to the Project site and installed on concrete foundations designed for secondary containment, as appropriate.

Operation and Maintenance Facility
The operation and maintenance buildings would be placed on a concrete foundation. The operations and maintenance area would include storage connex boxes, a septic system, laydown area, parking, and a water tank(s). The parking area would be scraped, compacted, and graveled, where needed.

Groundwater Well Drilling
The new groundwater well(s), if installed, would be drilled via a drill rig. The type of drill rig would depend upon the soil and subsurface conditions.

Construction Traffic, Equipment, and Workforce Requirements
All equipment and materials for the Project's construction would be delivered by flatbed trailers and trucks. Typical equipment that would be used to construct the Project includes front loaders, graders, scrapers, backhoes, and drill rigs.

Truck traffic would travel on designated truck routes and major streets, ultimately accessing the Project site from driveways off SR 98. Project components would be assembled on site. Traffic congestion resulting from construction activities would be temporary and could occur along area roadways as workers commute and materials move to and from the Project site. Materials deliveries during construction would travel up to 150 miles one way from sources to the Project site. The peak and average truck equipment and workforce are included in the assumptions for the Air Quality Technical Report.

The on-site workforce would consist of laborers, craftsmen, supervisory personnel, supply personnel, and construction management personnel. The on-site workforce is expected to reach a peak of approximately 1,000 individuals, with an average construction-related on-site workforce of 700 individuals. In addition, an estimated 80 individuals would be required to deliver materials and equipment to the Project site. The workforce is anticipated to come primarily from Imperial County, CA and Yuma County, AZ.

Drones may be periodically used during construction to monitor construction progress and assist in construction management. The maximum drone operation height would be restricted to 300 feet. A Federal Aviation Administration (FAA) approved and Unmanned Aircraft System certified pilot would operate the drones. The drones used would be battery-powered Matrice 300 RTK or Matrice 200 series drones or similar and would perform the inspections between approximately 76 to 300 feet above ground level. Operating hours for inspections would be between the hours of 10:00 a.m. and 3:00 p.m.

Construction Schedule and Work Hours
Construction of the Project is anticipated to begin as early as January 2026 and extend to December 2027 for a duration of 24 months. Construction would occur in several phases

starting with mobilization, site preparation, solar array assembly, installation of electrical collection systems and, finally, testing and commissioning. After pre-construction surveys have been completed, the solar facility construction would begin with site preparation and construction of the Project solar site access roads, security fencing, temporary laydown yards, operation and maintenance building, parking area, and pad mounts for the transformers. Construction would continue with installation of on-site roads, construction of the Project substation, and assembly and installation of solar arrays and wiring. Commissioning of equipment would include testing, calibration of equipment, and troubleshooting. The Project substation equipment, inverters-transmission station, collector system, and solar arrays would be tested in advance of commercial operations. Upon completion of successful testing, the equipment would be energized.

Construction equipment would typically operate during daylight hours between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday for a maximum of 8 hours per day per piece of equipment, daily. Given daytime heat conditions, a portion of PV panel installation could occur at night during the summer, extending construction up to 24 hours per day. Night work can improve working conditions for construction personnel by reducing exposure to extreme heat and is a common practice in Imperial County. Night work may also occur when necessary to interconnect the Project with minimal outages (e.g. when necessary to complete transmission line stringing over existing power lines, it may be preferable to complete at night when the grid impacts of de-energizing existing power lines are lesser). Weekend construction work is not expected to be required but may occur on occasion, depending on scheduling considerations.

Pollution Prevention, Erosion, and Sediment Control

A Stormwater Pollution Prevention Plan (SWPPP) would be prepared by a qualified engineer or erosion control specialist and would be implemented before and during construction. The SWPPP would reduce potential impacts related to erosion and surface water quality during construction activities and throughout the lifespan of the Project. The SWPPP would include Project information and erosion and sediment control BMPs. The BMPs would include stormwater runoff quality control measures, management for concrete waste, fugitive dust control, and construction of perimeter silt fences, as needed. The SWPPP would include types and locations of erosion control BMPs to be implemented.

Construction Site Stabilization, Restoration, and Wildlife Monitoring

Following the completion of major construction, temporarily stockpiled topsoils would be spread within disturbed areas to be revegetated with native plant species for the operations phase pursuant to an approved Restoration and Integrated Weed Management Plan. This plan would describe the Applicant’s strategy to minimize adverse effects on native vegetation, soils, and habitat. Where necessary, native re-seeding or vertical mulching techniques would be used; however, it is anticipated that many species would regenerate post-construction due to preservation of desert vegetation during the construction phase. The Project Restoration and Integrated Weed Management Plan would be implemented during construction to ensure the control of non-native plant species under an approved Pesticide Use Proposal.

At the conclusion of restoration activities, and if determined beneficial by the U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW), and the BLM biologists, previously relocated plants and wildlife would be reintroduced to the Project site and monitored for safety and health.

Construction Water Supply and Use

During the 24-month construction timeframe, it is anticipated that a total of up to 1,000 acre-feet would be used for dust control and suppression (including truck wheel washing) and other construction activities during. Soil binders (e.g., FSB-100, Plas-Tex, Soil Sement, SRB-1000) would also be used along Project roadways to minimize water usage. During construction, restroom facilities would be provided by portable units to be serviced by licensed providers.

Water for dust control during construction would be sourced from up to four on-site groundwater wells. If on-site wells are not able to supply the full water quantity required for construction, the water supply would be supplemented from off-site local water purveyor(s) and trucked in from an off-site location up to 80 miles from the Project site (30 roundtrips per day maximum).[2]

Groundwater usage, both on and off site, would be metered daily and well testing conducted quarterly. Quarterly well testing would include wells dedicated to Project use, both on and off site, and selected monitoring wells.

Construction Waste Management

Disposal

No on-site waste disposal sites would be constructed. The Project would generate over an estimated 35 tons of solid waste (mostly concrete and scrap metal) during construction. Waste would be disposed of or recycled at the proper facilities, depending upon the type of waste. There are 11 active, permitted solid waste disposal and recycling facilities within a 50-mile radius of the Project site with a collective remaining capacity of over 15 million cubic yards.

Non-hazardous Waste

Non-hazardous construction waste generated by the Project would include excess concrete, excavated soil, scrap metal, wood, incidental office waste (e.g., paper, plastics), solar modules (i.e., glass, plastic, and metal), sanitary waste, and potable water. Construction sites would be kept in an orderly condition throughout the construction period by using approved enclosed refuse containers. Waste would be stored in a locked container within a fenced and secure temporary staging area. All refuse and trash would be removed from the site and disposed of in accordance with regulations. No open burning of construction trash would occur.

[2] 30 roundtrips assumes that all water supply would come from a(n) offsite source(s).

Construction materials would be sorted on-site throughout construction and transported to appropriate waste management facilities. Trucks and construction vehicles would be serviced at off-site facilities. Recyclable materials would be separated from non-recyclable items and stored until they could be transported to a designated recycling facility. Recycling would be completed in accordance with application California state requirements.[3] Wooden construction waste (such as wood from wood pallets) would be sold, recycled, or chipped and composted off site. Other compostable materials, such as vegetation, might also be composted off site if not maintained as mulch on site. Non-hazardous construction materials that cannot be reused or recycled would be disposed of at municipal or county landfills. All contractors and workers would be educated about waste sorting, appropriate recycling storage areas, and how to reduce landfill waste.

Hazardous Waste

Hazardous construction waste generated by the Project would include waste oil, oil filters, oil rags, solvents, fuels, welding materials, empty hazardous materials containers, spent batteries, and controlled substances. As regulated hazardous materials would be present on site, storage procedures would be dictated by the Hazardous Materials Management Plan and Spill Prevention Control and Countermeasures (SPCC) Plan that would be developed prior to construction. Spill prevention measures and secondary containment would be implemented as part of the Project where warranted; however, strict compliance under 40 CFR 112 or CWA Section 311 would not be required because there would be no discharges to waters of the U.S.

The use, storage, transport, and disposal of hazardous materials used in construction of the facility would be carried out in accordance with federal, State, and County regulations. No extremely hazardous substances (i.e., those governed pursuant to Title 40, Part 355 CFR are anticipated to be produced, used, stored, transported, or legally disposed of as a result of Project construction. Material Safety Data Sheets for all applicable materials present on-site would be made readily available to on-site personnel.

Hazardous waste and electronic waste would not be placed in a landfill but, rather, would be transported to a hazardous waste handling facility (e.g., electronic-waste recycling). Battery waste from construction vehicles and equipment would be recycled or disposed of in accordance with regulations.

Construction vehicles and equipment would be refueled on the Project site in designated refueling areas. Liquids would be stored in secured areas (fenced or locked buildings on the Project site). During construction, aboveground storage tanks would be used, monitored, and maintained in accordance with regulations to minimize risk of pollution from spills. During construction, all construction pickup trucks would be equipped with spill kits to clean up any

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[3] As of January 1, 2020, CALGreen requires covered projects to recycle and/or salvage for reuse a minimum 65 percent of the non-hazardous construction and demolition waste or meet a local construction and demolition waste management ordinance, whichever is more stringent.

accidental spills of fuels or lubricants. Should a spill of greater than 1 gallon occur on BLM or BOR lands, the El Centro Field Office or the Southern California Area Office, respectively, would be notified within 24 hours. All incidents would be properly recorded and addressed in accordance with relevant regulations and landowner requirements.

Construction Fire Prevention

Fire extinguishers and other portable fire-fighting equipment would be available on site as well as additional water that would be available for fire suppression at the primary construction staging area. Workers would receive training regarding fire suppression equipment available on site and what to do in the event of a fire ignition as part of the WEAP.

Locations of portable fire extinguishers would include, but not be limited to, hot work areas, flammable storage areas, and mobile equipment such as work trucks and other vehicles. Fire-fighting equipment would be marked conspicuously and be accessible. Portable equipment would be routinely inspected, as required by local and federal laws, ordinances, regulations, and standards, and replaced immediately if defective or needing charge.

During construction, standard defensible space requirements would be maintained surrounding any welding or digging operations.

Construction Power

Power would be supplied from temporary generators during construction.

Transmission Facility Construction

Overview

The transmission system components would require grading and excavation for installation and construction. Import of soil would be needed for several of the components, as detailed in Table 2.1-2.

Table 2.1-2 Transmission Facility Disturbance Details

Project Component	Cut/Fill Quantity	Type of Disturbance
Project Substation	32,266 cubic yards of import[a] material; excess soils from storm water basin excavations to also be used	Graded and backfilled to an elevation above surrounding grade to avoid flooding

[a] Estimated base for the areas requiring import of material is assumed to require a 12-inch depth.

Project Substation

The substation area would be excavated for the transformer equipment as well as the control building foundation and oil containment area. Because each of the substation transformers would contain mineral oil, the substation would be designed to accommodate an accidental spill of transformer fluid by the use of containment-style mounting. The site area for the substation would be graded and compacted to approximately level grade.

Foundation designs for the Project substation and Project dead end structures would likely consist of drilled piers, concrete slabs, pedestals with footers, and/or directly embedded poles. Foundations for the substation would likely be formed with plywood and reinforced with structural rebar depending upon the foundation type. Loading and design assumptions for foundations would be consistent with industry standards and County/State/federal design codes. Each of the dead-end structures within the fenced substation would require foundations excavated to a depth of 20 feet or more. The remaining area within the fenced substation area would be graveled to a maximum depth of approximately 12 inches.

2.1.4 Operation and Maintenance

Solar Facility Operation and Maintenance

Activities

Upon commissioning, the Project would enter the operational phase. The solar modules at the site would operate during daylight 365 days a year. Operational activities at the Project site would include the following:

- Maintaining safe and reliable solar generation
- Wildlife monitoring as required
- Security
- Responding to automated electronic alerts based on monitored data, including actual versus expected tolerances for system output and other key performance metrics
- Communicating with the BLM, CEC, customers, transmission system operators, and other entities involved in facility operations

The Project site maintenance program would be largely conducted on-site during daytime hours. Equipment repairs could take place in the early morning or early evening when the plant would be producing the least amount of energy. Maintenance activities would originate from the on-site operation and maintenance facility and yard.

Maintenance activities would include panel repairs; panel washing; maintenance of transformers, inverters, BESS, and other electrical equipment as needed; road and fence repairs; and vegetation and pest management. The Applicant would recondition roads up to approximately once per year, such as after a heavy storm event that may cause destabilization or erosion. Revegetation would be the primary strategy to control dust across the Project site. Soil binders would be used to control dust on roads and elsewhere on the solar facility site, as needed. On-site vegetation would be managed to ensure access to all areas of the site and reduce fire risk. On-site vegetation may be trimmed approximately once every 3 years, as needed. Weed management and control in accordance with an approved Restoration and Integrated Weed Management Plan would be performed quarterly.

Solar arrays would be washed as needed (up to four times each year) using light utility vehicles with tow-behind water trailers, as needed, to maintain modules for optimal electricity production. Periodic rainfall may be sufficient to remove light dust layers, which would reduce the manual washing of panels. No chemical agents would be used for typical panel washing; potential non-toxic cleaning solutions may be occasionally used. Guidance from the panel manufacturer would be followed.

No heavy equipment would be used during normal operation. Operation and maintenance vehicles would include trucks (pickup and flatbed), forklifts, and loaders for routine and unscheduled maintenance, and water trucks for solar panel washing. Large heavy-haul transport equipment may be brought to the solar facility infrequently for equipment repair or replacement.

Long-term maintenance schedules would be developed to arrange periodic maintenance and equipment replacement in accordance with manufacturer recommendations. PV panels are warrantied for 35 years or longer and are expected to have a life of 50 or more years, with a degradation rate of 0.5 percent per year. Moving parts, such as motors and tracking module drive equipment, motorized circuit breakers and disconnects, and inverter ventilation equipment, would be serviced on a regular basis, and unscheduled maintenance would be performed as necessary.

Drones may be used to perform annual thermal and visual inspections of the overhead medium voltage collector line structures. The maximum drone operation height would be restricted to 300 feet. For further detail on drone use, see Section 2.4.5 Transmission Facility Operation and Maintenance.

Operation and Maintenance Workforce and Equipment
Commercial operation of the Project is anticipated from December 2027 to December 2057. During operation and maintenance of the Project, up to 24 permanent staff could be on site at any one time for ongoing facility maintenance and repairs and would be supported by up to 5 additional office staff. On average, approximately 18 permanent staff would be on-site daily, up to 14 associated with PV and BESS operation. Security personnel would be available on call. The operation and maintenance staff would be sourced from nearby communities in Imperial County. The operation and maintenance buildings would house the on-site security monitoring equipment, including security camera feeds for monitoring the project 24 hours per day although these feeds can be monitored remotely as well. Drones could be used during operations for inspection purposes. Helicopters could be used during operations only for emergency maintenance purposes.

A Bird and Bat Conservation Strategy (Appendix B) has been prepared and provides methods and timing for monitoring of bird and bat injuries and mortalities at the solar facility. Drones with artificial intelligence-enabled computer vision may be used for bird and bat monitoring, with the approval of the wildlife agencies.

Non-native and Invasive Species Management

Based on the aridity of the Project site, the overall low densities of vegetation present, use of a seed mix conducive to site conditions[4] and on-site vegetation management during operation and maintenance, it is not likely that vegetation would encroach upon structures so that access would become impaired. However, noxious weeds and other non-native invasive plant species could create a fire hazard if allowed to become established, and invasive weeds could also become problematic from an ecological perspective. Weed control activities would be implemented within the Project limits consistent with the project Restoration and Integrated Weed Management Plan.

Weed control activities would include both mechanical and targeted herbicide control methods, as necessary. Mechanical control activities would include hand trimming with a chainsaw. Non-motorized trimmers would be used in the vicinity of sensitive wildlife.

Following construction, use of herbicides may be necessary as part of an integrated pest management strategy to control the spread of invasive weeds. Herbicide control on the Project would involve the targeted use of BLM-approved herbicides to control weed populations when manual control methods are not successful in managing the spread of invasive plants, but only as reviewed and approved by USFWS and BLM biologists. County regulations regarding weed control would also be reviewed and any specific requirements would be incorporated into the weed control plan. All weed control using herbicides and adjuvants would be conducted with chemicals approved by BLM in California (including manufacturer application rates and use). The process for treatments would be characterized in the Restoration and Integrated Weed Management Plan, followed by a Pesticide Use Proposal (PUP) for specific chemical treatments, both approved by the BLM. On private lands, County regulations would be met for any use of herbicides. Herbicides would be applied using backpack sprayers and foliar application. Aerial spraying and truck-mounted spray rigs would not be utilized.

Additional procedures and precautions would be taken for herbicide application as follows:

- Application dates would be intended to cover the lifetime of the Project, beginning during the construction phase, if needed.
- Treatments would be as needed, upon emergence of the target weed species during the growing season. Growing seasons are typically during the winter months (November to April) but may include the summer months (July to

[4] In accordance with the Restoration and Integrated Weed Management Plan to be prepared for the Project and reviewed and approved by the BLM, a restoration seed mix would be developed for the Project site that promotes local native plant species consistent with surrounding vegetation types. The seed mix would also be developed in consideration of operational constraints such as ground clearance at full panel tilt.

September) if summer rainfall is sufficient to germinate target weed species during those months.
- The total number of applications is dependent upon the extent of invasive plants within the Project site, but it is expected that early- and late-season emergence of invasive plant species would require two or more treatment periods. Treatment periods are defined as one round of treatment coverage for all sites.
- The primary invasive plant species to be targeted include Mediterranean grass, Saharan mustard, Russian thistle, and saltcedar. If additional invasive plant species are identified during monitoring, these would also be targeted for control efforts.
- Crew members who conduct weed treatment in the Project site would have extensive experience working around sensitive habitats and species. In addition, crews would be monitored by a restoration ecologist. Herbicides for weed control would be specifically applied to individual plants and not sprayed broadly across the Project site.
- Crews would work under the direct supervision of a licensed Certified Pesticide Applicator.
- Crews would adhere to strict application guidelines when applying herbicide during windy conditions to minimize drift and chemical contact with non-target vegetation or wildlife. Herbicide application would be suspended if winds are in excess of 10 miles per hour or if precipitation is occurring or imminent (predicted within the next 24 hours).

Operational Water Supply and Use

During the operation and maintenance phase, water would be required for panel washing and maintenance as well as for workforce facilities. During operation, the Project would require the use of approximately 50 acre-feet annually for panel washing (up to 4 times per year) and other uses. No wastewater would be generated during panel washing as water would be absorbed into the surrounding soil or would evaporate. Alternatively, waterless panel washing options would also be explored in coordination with regulatory agencies including the CEC, BLM, BOR, and Imperial County. Water for operations would be sourced from one of the up to four on-site groundwater wells near I-8 on the northern side of the Project site or from an off-site local water purveyor (maximum of 275 roundtrip truck trips per washing event).[5] Limited water would also be used for the operation and maintenance facility staff, including restrooms.

Groundwater usage would be monitored as described above.

[5] Assumes that each washing event requires ~10 acre-feet, each water truck holds 12,000 gallons and all water would come from an off-site source(s).

Operational Waste Management

Disposal

The Project would generate over an estimated 35 tons of solid waste during operations and maintenance. Waste would be disposed of or recycled at one or more of the 11 facilities within 50 miles of the Project site, depending upon the type of waste.

Non-hazardous Waste

Non-hazardous operational waste generated by the Project during operation would include concrete, general operation waste (e.g., paper, wood, glass, insulation, plastics, solid waste), potable water, sanitary waste, scrap metal, spent solar panels, spent transformer components, and spent switchyard equipment. All refuse and trash would be removed from the sites and disposed of in accordance with regulations.

Operational materials would be sorted on-site and transported to appropriate waste management facilities. Recyclable materials would be separated from non-recyclable items and stored until they could be transported to a designated recycling facility. The Project would employ third parties to manage appropriate handling and disposal of nonhazardous solid waste during operations and maintenance. Recycling would be completed in accordance with application California state requirements.

Hazardous Waste

Hazardous operational waste generated by the Project would include waste oil, oil filters, oily rags, solvents, empty hazardous materials containers, fuels, welding materials, spent solar panels, spent lead batteries, and controlled substances. The use, storage, transport, and disposal of hazardous materials used in operation and maintenance of the facility would be carried out in accordance with federal, State, and County regulations. No extremely hazardous substances (i.e., those governed pursuant to Title 40, Part 355 CFR) are anticipated to be produced, used, stored, transported, or legally disposed of as a result of Project operations.

Hazardous waste and electronic waste would not be placed in a landfill but, rather, would be transported to a hazardous waste handling facility (e.g., electronic-waste recycling). Battery waste from construction vehicles and equipment would be recycled or disposed of in accordance with regulations.

Operation Fire Prevention

Fire protection would be provided to limit risk of personnel injury, property loss, and possible disruption of the electricity generated by the Project. Fire protection would include minimizing flammable materials in the solar field through proper vegetation management.

Solar arrays and PV modules are fire-resistant as they are constructed largely out of steel, glass, aluminum, or components housed within steel enclosures. As the tops and sides of the panels are constructed from glass and aluminum, PV modules are not vulnerable to ignition from firebrands or from wildland fires. In a wildfire situation, the panels would be rotated and stowed in a panel-up position. The rotation of the tracker rows would be controlled remotely via a wireless local area network. All trackers could be rotated simultaneously in a hazard situation. Fire safety and suppression measures, such as smoke detectors and extinguishers, would be installed and available at the operations and maintenance facility, if required.

A Fire Management and Prevention Plan was prepared in coordination with the BLM to identify the fire hazards and response scenarios that may be required during operation of the solar facility. This includes information on response to accidents involving downed power lines or accidents involving damage to solar arrays and facilities. The plan includes measures to safeguard human life, prevent personnel injury, preserve property, and minimize downtime due to fire or explosion. Of concern would be fire-safe construction, reduction of ignition sources, control of fuel sources, availability of water, and proper maintenance of firefighting systems. This plan will be updated with any additional engineering and technology-specific requirements as the Project continues.

The Tesla megapack is an example of a battery storage technology that may be selected for the Project. The Tesla megapack does not include a built-in smoke, gas, or fire detection or suppression devices. Tesla products test to standards, including UL 1973, that ensure the battery modules are resistant to single cell thermal runaway propagation or otherwise must prove that a failed cell inside would not cause a fire outside the system. Each megapack battery module includes individually fused cells and dedicated power electronics that electrically and galvanically isolate the batteries from the common DC bus. The battery modules arrive pre-installed and do not connect live high voltage DC elements on site. Each battery module includes a built-in isolated DC-DC converter and an active fuse that provides protection in case of hazardous conditions. These features are controlled by the module's dedicated battery management system, as required by the California Fire Code, which ensures that the cells are operated within the approved limits. The battery management system monitors and balances cell voltages, currants, and temperatures. The system must transmit an alarm signal if potentially hazardous temperatures or other conditions such as short circuits, over voltage, or under voltage, are detected. If required by the relevant authority having jurisdiction, third-party multi-spectrum IR heat or flame detectors can be installed externally at the site-level.

Fire detection drawings for the BESS would be developed as detailed engineering continues. The BESS yard will have thermal detection cameras installed external to battery containers, strategically placed to detect fires. These cameras will be remotely monitored 24 x 7. The BESS equipment to be used shall be tested and proven to not need built-in smoke, gas or fire detection or suppression devices. The BESS equipment will be designed to mitigate an over-pressure event and deflagration through the use of over-pressure vents and a sparker system. These safety features will be tested to demonstrate effectiveness in protecting against deflagrations in a UL9540A large-scale fire testing where no explosion hazards should be observed (flying debris or explosive discharge of gases). The applicant will also prepare an emergency response plan for the BESS facility in compliance with SB 38.

Operational Power

Power would be supplied from an existing 12 kV IID transmission line approximately 725 feet (0.15 mile) south of the Project site.

Transmission Facility Operation and Maintenance

IP Perkins, LLC, would operate and maintain the Project substation and gen-tie line. Drones could be used during operations for inspection purposes in accordance with the Flight Operations Plan. Regular helicopter use is not expected during routine operations.

Drones may be used to perform annual thermal and visual inspections of the gen-tie line and overhead medium voltage collector line structures. The maximum drone operation heights would be restricted to 300 feet, which is higher than the maximum height of the gen-tie line structures. Annual visual inspections are required by the North American Electric Reliability Corporation FAC003-4 Transmission Vegetation Management and utilized for preventative maintenance to reduce risk of equipment malfunction or failure. Drone inspections would be performed once per year between September and November to avoid bird nesting season. A team of two Federal Aviation Administration (FAA) approved and Unmanned Aircraft System certified pilots would drive a truck on the gen-tie access roads as close to the inspection sites as is safe and feasible, park on the road, and begin the inspection. The drones used would be battery-powered Matrice 300 RTK or Matrice 200 series drones or similar and would perform the inspections between approximately 76 to 300 feet above ground level. Operating hours for inspections would be between the hours of 10:00 a.m. and 3:00 p.m. The drone pilots would work in pairs with one flying and one spotting for safety. The use of drones for gen-tie line infrastructure inspections would minimize the need for larger vehicles, such as bucket trucks. No ground disturbance would occur during drone use.

2.1.5 Project Termination, Rehabilitation, and Decommissioning

As the facility's equipment has a useful life estimated to be 50 years, at the end of the initial power purchase agreements' contract terms of approximately 10 to 25 years, the power from the facility would likely be sold to another buyer and/or repowered to increase plant efficiency. If the Project continues to operate, the long-term operations would be the same as described above.

At the end of the Project's useful life, the solar arrays, and appurtenant facilities would be decommissioned and dismantled. The Project's decommissioning phase is anticipated to occur from December 2057 to December 2059. Upon ultimate decommissioning, most Project components would be suitable for recycling or reuse, and Project decommissioning would be designed to optimize such salvage as circumstances allow and in compliance with all County, State, and federal laws and regulations as they exist at the time of decommissioning. Following removal of the aboveground and buried Project components, the site would be restored to pre-solar facility conditions, or such condition as appropriate in accordance with CEC, BLM, and BOR policy after decommissioning.

Decommissioning activities would require similar equipment and workforce as construction but would be less intensive. The following activities would be involved:

- Dismantling and removal of all above-ground equipment (i.e., PV panels, track units, transformers, inverters, Project substation, operations and maintenance buildings, etc.)
- Excavation and removal of all above-ground cables
- Removal of solar array posts
- Removal of primary roads (decompaction and removal of aggregate or gravel, if used)
- Break-up and removal of concrete pads and foundations
- Abandonment of groundwater well(s), if installed
- Removal of septic system and leach field
- Removal of 34.5 kV distribution lines
- Scarification of compacted areas
- Restoration of Project disturbance areas

Once removal of all Project equipment is completed, disturbed areas would be prepared for revegetation with the intent to minimize dust, erosion, and weed infestations. These measures are fully described in the Project's Decommissioning and Revegetation Plan and are summarized here. Successful revegetation of the site would involve returning vegetation and soils to their preconstruction conditions to the extent practicable. Revegetation would include restoring total vegetative cover and relative cover of native and nonnative plant species to levels observed in reference, undisturbed areas in the immediate site vicinity. Additionally, the soil surface would be stabilized to reduce dust and erosion to a degree at or below natural background levels and reduce cover of nonnative plants. A monitoring and maintenance plan would be implemented to evaluate the success of revegetated areas associated with the Project facilities, identify the need for adaptive management measures, and make a final determination regarding revegetation success to release IP Perkins, LLC and IP Perkins BAAH, LLC from further monitoring and revegetation actions. The plan would include quarterly and annual reporting for up to five years. The details of the monitoring and maintenance plan are included in the Project's Decommissioning and Revegetation Plan.

2.2 Project Location

(5) The location where the project or activity is to occur or to be conducted.

The Project site is located within BLM-administered land, private lands, and U.S. Bureau of Reclamation-administered lands in unincorporated Imperial County, California (Figure 1). Imperial County is located in southern California, in the southwestern portion of the Colorado Desert. The site is bounded by Interstate 8 (I-8) to the north and State Route 98 (SR 98) to the south. The area immediately to the west of the Project site is vacant natural land with farmland located 2.5 miles west of the Project site. The center of El Centro, California, is approximately 20 miles to the west and Mexicali, Mexico, is approximately 15 miles to the southwest. The All-American Canal is directly south of the Project site, parallel with SR 98.

The site is located in a region characterized by undeveloped desert and agricultural uses. The Imperial Valley, which is dominated by agricultural land, is located an estimated 2.5 miles west of the Project site. The Imperial Sand Dunes, the largest mass of sand dunes in California, is located approximately 9 miles east of the Project site. The entirety of the Project footprint within BLM-administered public land is designated Development Focus Area (DFA) under the DRECP and its associated Record of Decision (ROD). The private land within the Project site is designated Recreation/Open Space by the Imperial County General Plan and zoned Open Space/Preservation by the Land Use Ordinance of the County of Imperial, Division 5.

3 Listed or Candidate Species Status in the Project Site

3.1 Western Burrowing Owl Natural History, Distribution, and Habitat Requirements

The Western burrowing owl (*Athene cunicularia hypugaea*) inhabits arid lands throughout much of the western United States and southern interior of western Canada (Haug, Millsap, and Martell 1993). Suitable habitat for western burrowing owl includes open habitat with available burrowing opportunities, including agricultural fields (active and fallow), desert saltbush, ephemeral washes, ruderal areas, and creosote scrub.

Burrowing owls are unique among the North American owls in that they nest and roost in abandoned burrows, especially those created by ground squirrels, kit fox, desert tortoise, and other wildlife. Burrowing owls have a strong affinity for previously occupied nesting and wintering sites and will often return to previously used burrows, particularly if they had successful reproduction in previous years (Gervais, Rosenberg, and Comrack 2008). They generally depend on other species to dig suitable burrows for use but may also use anthropogenic surrogate burrows such as rubble piles or drainage pipes. If formerly occupied burrows are badly damaged or collapsed, burrowing owls cannot repair them and must seek alternate sites. The southern California breeding season (defined as the time from pair bonding of adults to fledging of the offspring) generally occurs from February to August, with peak breeding activity from April through July (Haug, Millsap, and Martell 1993).

In the Colorado Desert, burrowing owls generally occur at low densities in scattered locations, but they can be found in much higher densities near agricultural lands where rodent and insect prey tend to be more abundant (Gervais, Rosenberg, and Comrack 2008). Burrowing owls tend to be opportunistic feeders, and a large portion of their diet consists of beetles, grasshoppers, and other large arthropods. The consumption of insects increases during the breeding season (Haug, Millsap, and Martell 1993). Small mammals, especially mice and voles (*Microtus* and *Peromyscus* spp.) are important food items. Other prey animals include herpetofauna, young cottontail rabbits, bats, and birds such as sparrows and horned larks.

3.2 Habitat Conditions in the Project Site

The Project site is within the range of the western burrowing owl and provides abundant breeding, foraging, and overwintering habitat for the species. Burrowing owls commonly occupy desert scrub habitats, which cover the entirety of the Project site. The presence of burrows and several burrowing owl and sign within the Project site indicates that the habitat is suitable for burrowing owl. The site is far enough south in the western burrowing owl's range to have a climate warm enough to support overwintering as well as breeding. The remote nature of the site also lends itself to burrowing owl occupancy. Roads are present within and around the site, but burrowing owls are tolerant to roads and can be found occupying burrows located within road berms. Because of the presence of scrub vegetation and soils that are suitable for burrowing, the site should provide an appropriate food base for burrowing owl, including insects and small mammals and reptiles.

3.2.1 Vegetation Communities

The primary vegetation community within the Project site, making up nearly 99 percent of the site, is Mojave creosote bush scrub. The rest of the site is made up of alkali goldenbrush desert scrub. Both of these community types are appropriate habitat for burrowing owl, as described above. The vegetation communities in the Project site and their acreage are listed in Table 3.2-1 and are described in further detail below. Mapped vegetation communities are shown on Figure 3.

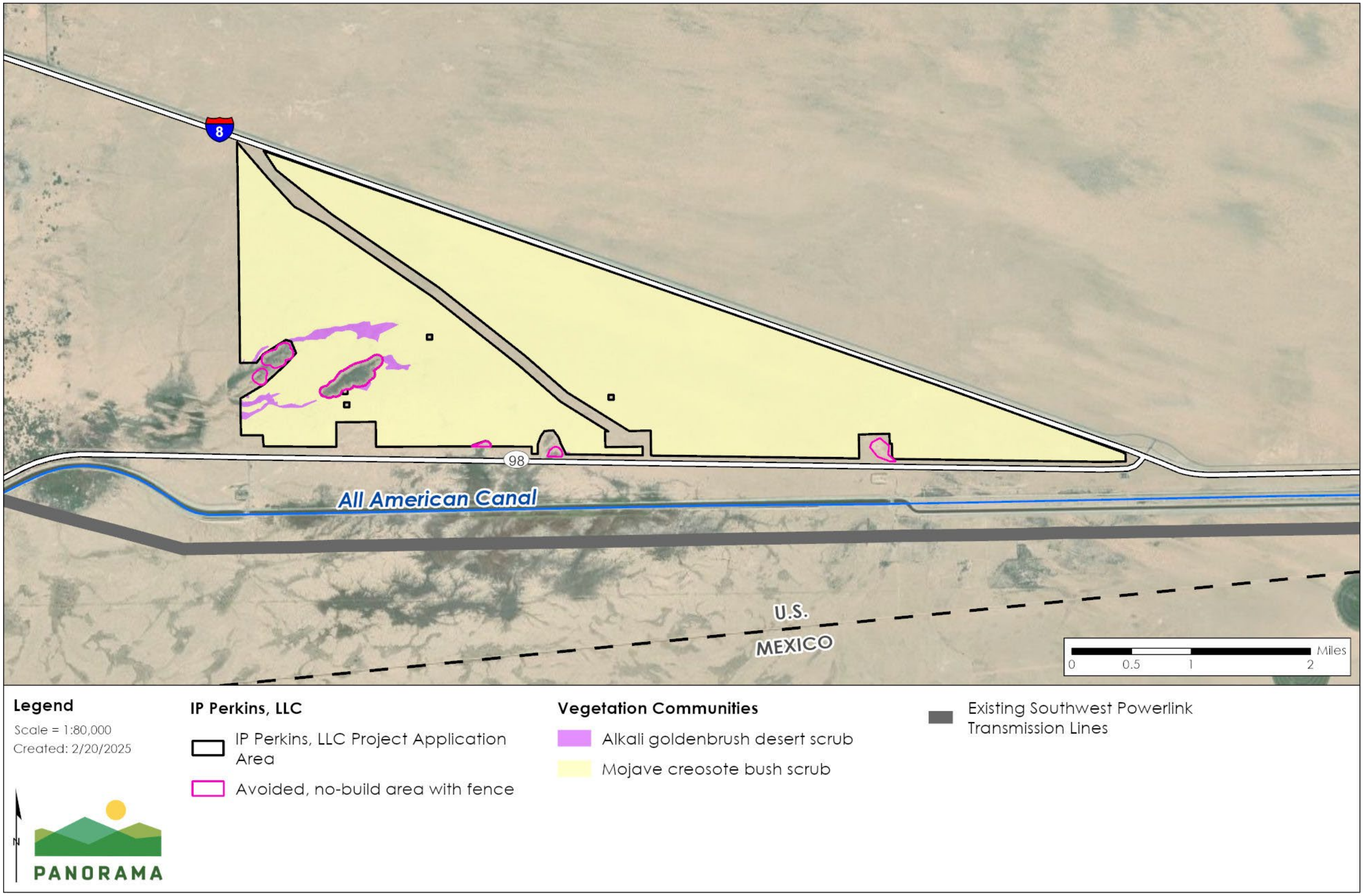
Table 3.2-1 Vegetation Communities Present in the Project Site

Vegetation/Land Cover Type	Disturbance acreage within Project Site
Alkali goldenbrush desert scrub	81.3
Mojave creosote bush scrub	5,664.3

Mojave creosote bush scrub. This vegetation community is the dominant vegetation community in the Project site and is suitable burrowing owl breeding, foraging, and overwintering habitat. It occurs on well-drained, secondary soils of slopes, fans, and valleys and is the basic creosote bush scrub habitat of the Colorado Desert (Holland 1986). On the Project site, shrubs are sparsely distributed and creosote either dominates the shrub canopy or co-dominates with white bursage. Emory's indigo (*Psorothmanus emoryi*), white bursage (*Ambrosia dumosa*), cheesebush (*Ambrosia salsola*), and ephedra (*Ephedra* spp.) occur in some areas with primarily an understory of annual plants.

Alkali goldenbush desert scrub (Mesquite thickets). Within the Project site, alkali goldenbush forms an open shrub layer (up to 35% cover). The tree layer, consisting of mesquite, is mostly sparse if present. Stands generally have low vegetation cover and may be sparse (<10% total vegetation). Sites are moist or seasonally dry flats and margins of intermittently saturated vegetated swales. Soils are variable and derived from alluvium and dune sand; textures include sand and loamy sand but include sites with finer-textured soil. Because the tree cover is sparse, this desert scrub community remains suitable habitat for burrowing owl.

Figure 3 Vegetation Communities



3.3 Western Burrowing Owl Occurrence in the Project Site

Focused surveys for burrowing owl were conducted in the spring of 2023 and 2024 (breeding season) and fall/winter of 2024 (non-breeding season). Individuals and active burrows were observed in locations spread throughout the majority of the Project site. Breeding season observations, shown on Figure 4, included seven live individuals (three of which were at a burrow) and 13 burrows with sign (pellets, whitewash, or feathers). Two carcasses were also found on-site. Non-breeding season observations, shown on Figure 5, included two live individuals, 47 burrows with sign, and two non-burrow locations with sign. Detailed survey methods and results are contained in the Project's Biological Resources Technical Report, which is provided in Appendix A.

Figure 4 Burrowing Owl Observations – Breeding Season Results

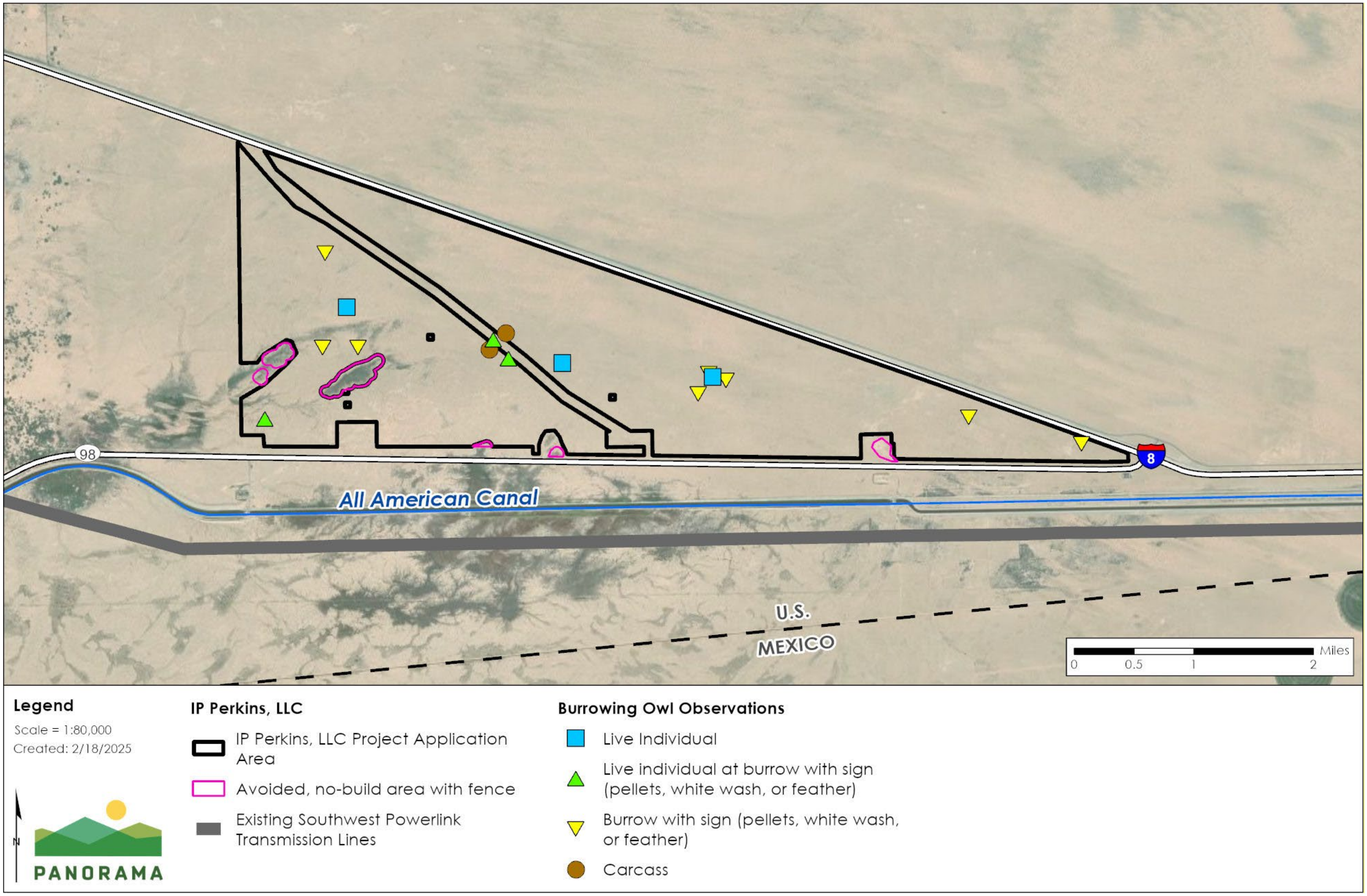
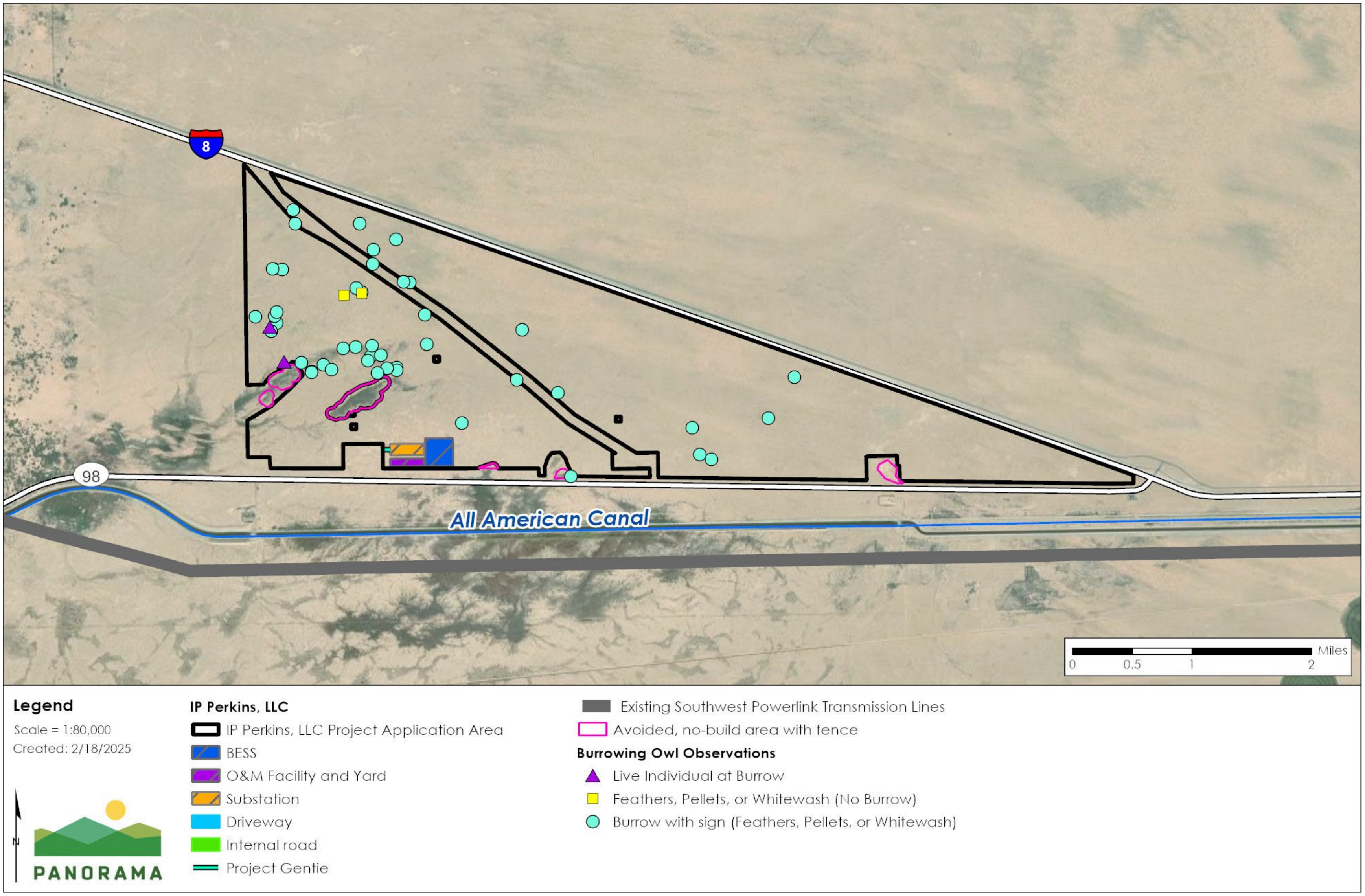


Figure 5 Burrowing Owl Observations – Non-Breeding Season Results



4 Anticipated Western Burrowing Owl Take

(6) An analysis of whether and to what extent the project or activity for which the permit is sought could result in the taking of species to be covered by the permit.

"Take," as defined in the California Fish and Game Code Section 86, is to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." To date, a minimum of nine western burrowing owls and 47 burrowing owl burrows have been documented on the Project site. Construction would occur in occupied burrowing owl habitat and could lead to take of these individuals. Desert burrowing owls or their burrows (nests) could be harmed during clearing or grading activities. Project activities could also cause direct mortality, injury, or harassment of burrowing owls or their burrows because of vehicle strikes. Other direct effects could include disruption of western burrowing owl behavior during construction or operation of facilities, disturbance by noise or vibrations from the heavy equipment, and injury or mortality from encounters with workers' or visitors' pets. Operation and maintenance of the facility would require panel washing approximately four times per year, and vegetation management, road maintenance, and erosion repair as needed. Maintenance workers driving to and from the Project site have the potential to injure or kill western burrowing owl if one were to occur on Project access roads.

The Applicant would implement measures to reduce the potential for incidental take of western burrowing owl during construction, operation, and decommissioning of the Project. A biological monitor would be on-site during construction to avoid direct injury or mortality of western burrowing owls, but it may become necessary to relocate one or more individuals from harm's way during construction. Relocation would become necessary if an occupied burrow is found within the active construction zone. Burrowing owl relocation would be conducted in accordance with the Project's Wildlife Protection and Translocation Plan, which is provided with this application as Appendix C. The method for relocation would be passive relocation, wherein a one-way door would be installed on the occupied burrow to evict the burrowing owl(s) without handling it. Biologists would ensure that enough suitable, unoccupied natural burrows are available in the off-site area for the evicted owl(s) to occupy. If there are not enough suitable burrows, artificial burrows would be constructed such that there would be a total of two suitable burrows for each burrowing owl evicted. Therefore, the Applicant requests authorization to take western burrowing owl for the purpose of constructing the Project within burrowing owl habitat, which would include evicting burrowing owl from the Project site and out of harm's way during construction and decommissioning activities. In addition, the Project has the potential for operation of the facility to require eviction of burrowing owl if one were occurring in an area where maintenance activities were required and there is the potential for operation to cause collisions with Project facilities.

4 ANTICIPATED BURROWING OWL TAKE

Pre-construction surveys for burrowing owls, possible burrows, and sign of owls (e.g., pellets, feathers, whitewash) will be conducted throughout each work area no more than 30 days prior to construction. If burrowing owls or active burrows are found within the solar facility, avoidance and setback distances will be implemented within the solar facility. Disturbance of owls or occupied burrows during the breeding season from February 1 through August 31 will be avoided. Unoccupied burrows will be excavated and filled in under the supervision of the Lead Biologist prior to site preparation. Passive relocation will occur only during the non-breeding season, generally September 1 to February 1, but will be adjusted during the late summer months (August and September) if breeding activities are not observed at any occupied burrows and as detailed in the Wildlife Protection and Translocation Plan (Appendix C).

Avoidance and minimization measures would be put into place to reduce potential for direct injury or mortality of western burrowing owl, including working outside of breeding and nesting season, having an on-site biological monitor during construction, limiting construction work to daylight hours, and maintaining slow vehicle speed limits (e.g., 25 miles per hour) on access roads and within the Project site. Wildlife protection measures and monitoring requirements that will be identified in detail in Section 7 (Minimization and Mitigation Measures) will minimize potential take of western burrowing owl. The Applicant does not anticipate lethal take during any phase of the Project. However, authorization to evict burrowing owls from burrows is requested due to the presence of burrowing owl in the area. Because 47 burrows were observed with sign of western burrowing owl and the Project would occur over a period of 50 years, it is assumed that up to 94 western burrowing owl could be evicted from the Project site during construction, operation, and decommissioning.

5 Impacts Analysis

(7) An analysis of the impacts of the proposed taking on the species.

Without mitigation or avoidance measures (presented in Section 7 [Minimization and Mitigation Measures]), development of the Project could cause mortality or injury to western burrowing owl present during construction or operations and maintenance (see discussion of take in Section 4). To date, nine individuals have been found on-site during biological surveys in areas planned for Project develop, suggesting that a minimum of nine individuals have the potential to experience take from the Project. The Project would involve the modification and/or removal of suitable and potentially occupied burrowing owl habitat, including potentially occupied nest burrows, overwintering burrows, and satellite burrows (shown on Figure 4).

Direct impacts to burrowing owl during construction could include injury or mortality from collisions with construction equipment and vehicles when individuals are flushed from cover during construction disturbance. Displaced individuals may then be unable to find adequate cover from predation or forage effectively in new, unfamiliar places. Additionally, there is potential for nests containing eggs or nestlings to be lost either due to crushing from construction machinery or from nest abandonment when parents flee the area. There is also potential for adults to be crushed within burrows since adults often flee to underground burrows for safety.

Individuals encountered during construction may be evicted from the Project site using one-way doors and burrow excavation to avoid direct mortality from the Project. There is abundant suitable habitat surrounding the Project site for relocation, and biologists will assess the availability of suitable natural replacement burrows in the off-site habitat area prior to eviction. If not enough natural burrows are present, then artificial burrows will be constructed. Studies have shown that adults can be successfully relocated, but nests have a high probability of failing in the first year following relocation if careful timing of the relocation is not taken into account (Doublet et al. 2023). So, while direct mortality of burrowing owl would be avoided through eviction from the site, the Project could result in lower reproductive success in the burrowing owl population during and in the year following construction. However, as shown by California Natural Diversity Database (CNDDB) occurrence records from the area (CNDDB 2023), the local population surrounding the Project site is strong and alternative habitat options are available. Therefore, a temporary reduction in reproductive success from a few mating pairs would have a minimal effect on the ability of the overall local population to survive and reproduce.

During operations and maintenance, Project facilities could cause direct impacts to burrowing owl through collisions with tall vertical structures and overhead electrical lines. Vertical open pipes or tubing could attract burrowing owl, which could become trapped inside. Uncovered water tanks or other water holding structures could attract burrowing owls that could subsequently become trapped within the water and drown. However, this risk would be minimized by covering exposed pipes and water sources and providing escape ramps when covering is not possible. Additionally, all transmission lines and above ground collection and distribution lines would be constructed according to Avian Power Line Interaction Committee (APLIC) guidelines to minimize the risk of burrowing owl collision with power line equipment. This may include anti-perching devices to discourage birds from perching or nesting on poles and permanent markers or bird flight diverters to visually warn birds of the presence of power lines. With mitigation, the impact of the proposed taking by the Project would not have a significant impact on the overall species population.

In addition to direct impacts, the Project would indirectly impact burrowing owl through a reduction of habitat. The Project would impact 5,745.6 acres of natural habitat, as shown in Table 3.3-1, all of which is burrowing owl habitat. The Project would mitigate for impacts to native vegetation and habitat at a 1:1 ratio. Therefore, indirect impacts to burrowing owl from the loss of habitat would not have a significant impact on the overall species population.

Table 3.3-1 Vegetation Communities and Land Cover Impacted by the Project

Vegetation/Land Cover Type	Amount Impacted by Project (acres)
Alkali goldenbrush desert scrub	81.3
Mojave creosote bush scrub	5,664.3[a]
Total	**5,745.6**

[a] 253.7 acres of Mojave creosote bush scrub would be within the fenceline but would be avoided to avoid cultural resources; 5,664.3 acres of Mojave creosote bush scrub would be within the development area for the solar facility.

6 Jeopardy Analysis

(8) An analysis of whether issuance of the incidental take permit would jeopardize the continued existence of a species. A complete, responsive jeopardy analysis shall include consideration of the species' capability to survive and reproduce, and any adverse impacts of the taking on those abilities in light of: (i) Known population trends; (ii) Known threats to the species; and (iii) Reasonably foreseeable impacts on the species from other related projects and activities.

Threats to burrowing owl include habitat loss due to development and agriculture, habitat becoming less suitable as burrow-digging mammals are lost and as disturbance by humans and domestic animals increases, pesticide exposure, invasive predators, and collisions with man-made objects. Population declines and range contractions have been documented in the United States and Canada since at least the late 1960s. In California, the species has been declining for decades and is nearly extirpated from all of coastal southern California (NatureServe 2024).

Project construction, operations and maintenance, and decommissioning could affect western burrowing owl in the Project site. Cumulative projects would have the potential to similarly impact the species where those projects' activities occur in its presence or habitat. The cumulative impact from the renewable energy projects proposed in the region is potentially significant. The Project's implementation of best management practices (BMPs), project design features (PDFs), and Conservation and Management Actions (CMAs), as detailed in Section 1 – Minimization and Mitigation Measures, and management plans and inclusion of compensatory habitat mitigation would avoid, minimize, or mitigate Project-specific impacts and the Project's contribution to cumulatively significant impacts on western burrowing owl to less than considerable. Based on the current status, environmental baseline for the Project site, effects of the proposed Project, and cumulative effects on borrowing owl, the proposed Project is not likely to jeopardize the continued existence of burrowing owl for the following reasons:

- The Applicant will implement numerous measures (see Section 7, Proposed Mitigation) to ensure that most burrowing owl are relocated out of the Project footprint and that injury and death of burrowing owl is minimized (i.e., clearance surveys, relocation, translocation, and employing qualified biologists).
- The Applicant will implement weed management and soil stabilization techniques to reduce the spread of invasive nonnative plants in the Project site.
- Given the small number of burrowing owl potentially affected by the Project, there is no information to indicate that development of the Project would appreciably reduce the burrowing owl population levels in the region.

- Few, if any, burrowing owl are likely to be injured or killed as a result of relocation.
- Though the Project would reduce the amount of available burrowing owl habitat, suitable habitat is available adjacent to the Project, and the Project would provide compensatory mitigation for impacted suitable habitat.

7 Minimization and Mitigation Measures

(9) Proposed measures to minimize and fully mitigate the impacts of the proposed taking.

This section lists the type of avoidance, minimization, and mitigation (i.e., biological resource protection) measures that would be included as part of the Perkins Renewable Energy Project. Implementation of these types of measures would be expected to minimize and offset potential adverse effects to western burrowing owl.

Mitigation measures are proposed to fully mitigate the project's impacts to western burrowing owls and their habitat, including any potential burrowing owl take, and compensate for habitat loss. Mitigation measures would also minimize the likelihood of harm or mortality to burrowing owls and other wildlife, and minimize, mitigate, or offset adverse habitat impacts such as erosion or weed infestations.

7.1 Avoidance and Minimization Measures

Project avoidance and minimization measures were developed as part of the Project's CEC Opt-In Application (Appendix D), Bird and Bat Conservation Strategy (Appendix B), and Wildlife Protection and Translocation Plan (Appendix C). The Project will also comply with the Conservation and Management Actions (CMAs) contained within the Land Use Plan Amendment (LUPA) for the Desert Renewable Energy Conservation Plan (DRECP); these measures are attached as Appendix E. The following mitigation measures will be implemented to avoid or minimize impacts to western burrowing owl. Mitigation measure titles match the titles in the Opt-In Application and the other plans.

7.1.1 Project Design Features

The following are the Project Design Features (PDFs) for Biological Resources from the CEC Opt-In Application. PDFs that apply to general biological resources and to western burrowing owl specifically are summarized below. Text not related to burrowing owl has been omitted. The full text of these measures may be found in the CEC Opt-In Application's Preliminary Best Management Practices and Project Design Features, which are attached to this application as Appendix D.

PDF BIO-1 Biological Monitoring

Monitoring to ensure conformance with conditions of approval, including effective protection and avoidance of biological resources, shall be implemented by the Applicant. During construction and decommissioning, the Applicant shall employ a biological monitoring team to oversee Project activities. Any activity that may impact vegetation, wildlife, and sensitive resources shall be monitored to ensure compliance with all mitigation measures for biological resources. The biological monitoring team will be approved by the BLM, BOR, CEC, CDFW, and USFWS and shall consist of a lead biologist and one or more biological monitor. The Lead Biologist, or during operations and maintenance, the Applicant's compliance manager, shall report regularly to the BLM, BOR, CEC, CDFW, and USFWS to document the status of compliance with biological mitigation measures.

PDF BIO-2 Worker Environmental Awareness Training

The Lead Biologist shall prepare and implement a Worker Environmental Awareness Program (WEAP). The Applicant shall be responsible for ensuring that all workers at the site receive WEAP training prior to beginning work on the Project and throughout construction and operations. The WEAP will include discussions of biological resources and their identification and protection as well as safety guidelines.

PDF BIO-3 Minimization of Vegetation and Habitat Impacts

Prior to construction activities, operations and maintenance, or decommissioning, authorized work areas shall be clearly delineated by the contractor. Construction activities shall minimize soil and vegetation disturbance to minimize impacts to soil and root systems. Upon completion of construction activities in any given area, all unused materials, equipment, staking and flagging, and refuse shall be removed and properly disposed of. Hazardous materials shall be handled, and spills or leaks shall be promptly corrected and cleaned up according to applicable requirements. Vehicles shall be properly maintained to prevent spills or leaks.

Low-Impact Site Preparation. Native vegetation shall be allowed to recover from rootstocks and seed bank wherever facilities do not require permanent vegetation removal within the perimeter fenceline of the solar facilities and under solar arrays. Vegetation height and density shall be managed as needed for operations and maintenance and fire safety, but vegetation management shall otherwise focus on maintaining habitat and soil conditions.

PDF BIO-5 Wildlife Protection

The Applicant shall undertake measures during construction and operations and maintenance to avoid or minimize impacts to wildlife. Implementation of all measures will be approved by BLM, BOR, CEC, CDFW, and USFWS. Measures will include wildlife avoidance, minimizing traffic impacts, minimizing lighting impacts, avoidance of toxic substances, minimization of noise and vibration impacts, prevention of entrapment and/or drowning of wildlife in water sources, excavations, or pipes, maintaining trash to reduce attraction to predators, avoiding bringing pets or firearms on-site, using wildlife exclusion materials to keep sensitive wildlife from entering worksites, restricting use of certain pesticides, and reporting dead or injured wildlife to USFWS and/or CDFW.

PDF BIO-6 Bird and Bat Conservation Strategy

The Applicant will implement the final Bird and Bat Conservation Strategy (Appendix B), developed in accordance with guidelines recommended by the USFWS, to avoid or minimize take of migratory birds that may nest on the site or may be vulnerable to collision with Project components. It describes the proposed Project components, summarizes baseline data regarding birds and bats in the Project vicinity; assesses potential risks to those species that could result from Project construction, operation, and decommissioning; and describes conservation measures to be implemented in order to minimize those risks.

PDF BIO-7 Loop-In Transmission and Gen-tie Lines

Loop-in transmission and gen-tie line support structures and other facility structures shall be designed in compliance with current standards and practices to discourage their use by raptors for perching or nesting. Mechanisms to visually warn birds shall be placed on loop-in transmission and gen-tie lines at regular intervals to prevent birds from colliding with the lines. To the extent practicable, the use of guy wires shall be avoided because they pose a collision hazard for birds and bats. Necessary guy wires shall be clearly marked with bird flight diverters to reduce the probability of collision. Shield wires shall be marked with devices that have been scientifically tested and found to significantly reduce the potential for bird collisions. Loop-in transmission and gen-tie lines shall maintain sufficient distance between all conductors and grounded components to prevent potential for electrocution of the largest birds that may occur in the area (e.g., golden eagle and turkey vulture). They shall utilize non-specular conductors and non-reflective coatings on insulators.

7.1.2 Wildlife Protection and Translocation Plan Measures

The following are the measures from the Project's Wildlife Protection and Translocation Plan (Appendix C) that apply to burrowing owl. Measures are summarized below; the full text of these measures may be found in the Wildlife Protection and Translocation Plan.

Burrow Monitoring and Excavation

Potentially occupied burrows or occupied burrows will be monitored prior to relocation efforts. Methods for monitoring potentially occupied burrows will include: noting and removing burrowing owl sign (feathers, whitewash, pellets); twice daily visits for 48 hours to check for new sign; and use of motion-activated game cameras to determine burrow occupancy. If a burrow is determined to be occupied, the appropriate exclusion buffer (see Table 7.1-1 below) will be used and passive relocation methods will be employed if timing is suitable. Burrows determined to be unoccupied will be excavated.

Only burrowing owl burrows (unoccupied and occupied) that will be directly impacted by construction activities will be excavated. Any unoccupied burrows located outside the construction activity zones will be left in their current condition. If there is an occupied burrow outside the Project footprint area but within the buffer distance, monitoring and avoidance of the burrow will be managed on a case-by-case basis in coordination with CDFW and USFWS, depending on the season, nature of nearby construction activities, and whether the construction site is fenced. If monitoring determines that the burrowing owl has left the site, then the burrow will be excavated and collapsed.

Exclusion Buffer

If an active burrowing owl burrow is detected within any Project disturbance area, or within a 150-meter buffer of the disturbance area, a 150-meter (500-foot) exclusion buffer will be maintained while the burrow remains active or occupied. The buffer may be reduced to 50 meters (160 feet) during the non-breeding season (September 1 to January 31). The size of the buffer may be adjusted based on the time-of-year, and level of disturbance in the area, after consultation with CDFW. Table 7.1-1 provides exclusion buffer guidelines for nesting sites (CDFW 2012); which may be adjusted in the field by the Lead Biologist, in consultation with agency personnel. The southern California breeding season (defined as the time from pair bonding of adults to fledging of the offspring) generally occurs from February to August, with peak breeding activity from April through July (Haug, Millsap, and Martell 1993).

Table 7.1-1 Buffer Distance (m) for Occupied Burrowing Owl Burrows Based on Time of Year and Level of Disturbance

	Buffer Distance (m) and Level of Disturbance[a]		
Time of Year	Low	Medium	High
4/1–8/15	200	500	500
8/16–10/15	200	200	500
10/16–3/31	50	100	500

[a] Levels of disturbance: Low =drive by, low use, once per week; Medium = 15 minutes to 2 hours of activity, less than 49 decibels, one or two passes per day; High = more than 2 hours of activity, more than 49 decibels. Source: Based on CDFW (2012); Scobie and Faminow (2000).

Passive Relocation

Passive relocation will occur only during the non-breeding season, generally September 1 to February 1, but will be adjusted during the late summer months (August and September) if breeding activities are not observed at any occupied burrows. Passive relocation is a technique to exclude burrowing owls from a project site by first, providing replacement burrows off site (if needed); collapsing all unoccupied burrows within the construction site; and finally installing a one-way door on the occupied burrow to evict the burrowing owl without handling it.

Artificial Burrows. Artificial burrows may be constructed off site to replace on-site burrows that may be removed for Project construction. Biologists will survey nearby public lands and private lands with site control to identify and inventory suitable unoccupied natural burrows that may be available. If two or more natural burrows are available for each burrowing owl to be evicted, no artificial burrows will be constructed. If fewer suitable natural burrows are available, then new artificial burrows will be constructed to provide a total of two suitable burrows for each burrowing owl to be evicted. All artificial burrows and mapped natural burrows will be monitored for burrowing owl use at least once per quarter throughout the construction phase of the Project; artificial burrows will be maintained or replaced as needed.

7.1.3 Best Management Practices

The following are the Ecological Best Management Practices (BMPs) from the Project's CEC Opt-In Application (Appendix D).

Staging Areas

- As practical, staging and parking areas shall be located within the Project site to minimize habitat disturbance in areas adjacent to the site. The project will comply with Land Use Plan Amendment (LUPA)-BIO-13.

Construction Activities

- Before beginning construction, delineate the boundaries of areas to be disturbed including roads, borings, soil testing sites, and pull and tensioning areas prior to any ground disturbance, and confine disturbances, project vehicles, and equipment to the delineated project areas. The project will comply with LUPA-BIO-13.

Construction

- To the extent practicable, work personnel shall stay within the ROW and/or easements. The project will comply with LUPA-BIO-13.

Traffic

- Existing access roads, utility corridors, and other infrastructure shall be used to the maximum extent feasible. The project will comply with LUPA-BIO-13.

Noise

- Noise reduction devices (e.g., mufflers) shall be employed to minimize the impacts on wildlife and special status species populations. Operators shall ensure that all equipment is adequately muffled and maintained in order to minimize disturbance to wildlife. The project will comply with LUPA-BIO-12.

Power lines

- Place low and medium voltage connecting power lines underground whenever possible. In certain circumstances, burial of the lines may be prohibitively expensive (for example in shallow bedrock areas) or may cause unacceptable impacts to wetland habitats and dependent species. Overhead lines may be acceptable:
  - if sited away from high bird crossing locations, such as between roosting and feeding areas or between lakes, rivers, and nesting areas; and/or
  - when the structures parallel tree lines or are otherwise screened so that collision risk is reduced. The project will comply with LUPA-BIO-16 and LUPA-TRANS-BIO-1.

Habitat

- To reduce the extent of habitat disturbance during construction and operation, existing access roads, utility corridors, and other infrastructure shall be used to the maximum extent feasible and foot and vehicle traffic through undisturbed areas shall be minimized. The project will comply with LUPA-BIO-13.
- Areas left in a natural condition during construction (e.g., wildlife crossings) shall be maintained in as natural a condition as possible within safety and operational constraints. The project will comply with LUPA-BIO-13.

- All pits and trenched shall contain wildlife escape ramps. All uncovered pipes shall be capped and/or covered at the end of each workday to prevent animals from entering the pipes. If a special status species is discovered inside a component, that component must not be moved or, if necessary, moved only to remove the animal from the path of activity, until the animal has escaped. The project will comply with LUPA-BIO-14.

Birds

- The Project should establish buffer zones and protection, mitigation, and monitoring plans for active nests detected during surveys. The project will comply with LUPA-BIO-IFS-2.

General Wildlife protection

- Implement general standards practices to protect federal and state special-status species. The project will comply with LUPA-BIO-14.
- Prior to any ground-disturbing activity, seasonally appropriate surveys shall be conducted by qualified biologists to ensure that important or sensitive species or habitats are not present in or near project areas. Habitats or locations to be avoided (with appropriately sized buffers) shall be clearly marked. The project will comply with LUPA-BIO-1.

Vegetation

- Project-specific vegetation management plans shall investigate possibilities of revegetating parts of the Project site. The project will comply with LUPA-BIO-7.

Herbicide Use

- Only herbicides with low toxicity to wildlife and nontarget native plant species shall be used, as determined in consultation with the BLM, BOR, CEC, and USFWS. The typical herbicide application rate shall be used rather than the maximum application rate, where effective. All herbicides shall be applied in a manner consistent with their label requirements and in accordance with guidance provided in the Final PEIS on vegetation treatments using herbicides (BLM 2007c). The project will comply with LUPA-BIO-11.

Reclamation

- Access roads shall be reclaimed when they are no longer needed. The project will comply with LUPA-BIO-7.
- All holes and ruts created by removal of structures and access roads shall be filled or graded. The project will comply with LUPA-BIO-7.
- While structures are being dismantled, care shall be taken to avoid leaving debris on the ground in areas in which wildlife regularly move. The project will comply with LUPA-BIO-13.
- The facility fence shall remain in place for several years to help reclamation (e.g., would preclude large mammals and vehicles from disturbing revegetation efforts). The project will comply with LUPA-BIO-7.

7.1.4 Desert Renewable Energy Conservation Plan Land Use Plan Amendment Consistency

In addition to the mitigation measures and BMPs listed above, the Project will comply with the CMAs contained within the LUPA for the DRECP. CMAs that apply to general biological resources and to western burrowing owl specifically are summarized below. Text not related to burrowing owl has been omitted. The full text of these measures may be found in the DRECP LUPA, which is attached as Appendix E.

LUPA-BIO-2 Biological Resources

Designated biologist(s) will conduct and oversee activity-specific required biological monitoring during pre-construction, construction, and decommissioning to ensure that avoidance and minimization measures are appropriately implemented and are effective.

LUPA-BIO-4 Seasonal Restrictions

For activities that may impact Focus and BLM Special Status Species, implement all required species-specific seasonal restrictions on preconstruction, construction, operations, and decommissioning activities.

LUPA-BIO-5 Worker Education

A worker education program will be provided to all workers for all activities, as determined appropriate on an activity-by-activity basis, during all phases of the project. The program will provide information on biological resources and their protection measures, reporting requirements, and legal implications.

LUPA-BIO-7 Restoration of Areas Disturbed by Construction Activities But Not Converted by Long-Term Disturbance

Restore areas affected by ground disturbance and/or vegetation removal that are not converted by long-term ground disturbance according to standards approved by BLM.

LUPA-BIO-8 General Closure and Decommissioning Standards

All activities that are required to close and decommission the site will specify and implement project-specific closure and decommissioning actions that meet the approval of BLM.

LUPA-BIO-12 Noise

Minimize noise impacts on Focus or BLM Special Status Species, using noise controls on equipment and minimizing activities that create noise above ambient levels in close proximity to those species and their suitable habitat.

LUPA-BIO-13 General Siting and Design

To the maximum extent practicable, site and design projects to avoid impacts to vegetation types, unique plant assemblages, climate refugia as well as occupied habitat and suitable habitat for Focus and BLM Special Status Species. Minimize the extent of project impacts, including the project footprint and light pollution.

LUPA-BIO-14 Biology: General Standard Practices
Implement general standard practices to protect Focus and BLM Special Status Species, such as avoiding feeding or harassing wildlife, avoiding bringing domestic pets on-site, checking construction materials for the presence of wildlife prior to use, using covers to prevent wildlife entrapment in trenches or excavations, and minimizing vegetation removal.

LUPA-BIO-15 Biology: General Standard Practices
Use state-of-the-art construction and installation techniques approved by BLM that minimize new site disturbance, soil erosion and deposition, soil compaction, disturbance to topography, and removal of vegetation.

LUPA-BIO-16 Activity-Specific Bird and Bat CMAs
For activities that may impact Focus and BLM sensitive birds, birds protected by the ESA and/or Migratory Bird Treaty Act of 1918, and bat species, implement appropriate measures as per the most up-to-date BLM state and national policy and guidance and data on birds and bats to avoid and minimize direct mortality of birds and bats.

LUPA-BIO-17 Activity-Specific Bird and Bat CMAs
For activities that may result in mortality to Focus and BLM Special–Status bird and bat species, a Bird and Bat Conservation Strategy (Appendix B) will be prepared with the goal of assessing operational impacts to bird and bat species and incorporating methods to reduce documented mortality. The strategy shall be approved by BLM in coordination with USFWS, and CDFW as appropriate.

LUPA-BIO-IFS-12 Burrowing Owl
If burrowing owls are present, a designated biologist will conduct appropriate activity-specific biological monitoring to ensure avoidance of occupied burrows and establishment of the 656 feet (200 meter) setback to sufficiently minimize disturbance during the nesting period on all activity sites, when practical.

LUPA-BIO-IFS-13 Burrowing Owl
If burrows cannot be avoided on-site, passive burrow exclusion by a designated biologist through the use of one-way doors or the most up-to-date agency BLM or CDFW specifications. Before exclusion, there must be verification that burrows are empty or the most up-to-date BLM or CDFW protocols. Confirmation that the burrow is not currently supporting nesting or fledgling activities is required prior to any burrow exclusions or excavations.

LUPA-BIO-IFS-14 Burrowing Owl
Activity-specific active translocation of burrowing owls may be considered, in coordination with CDFW.

LUPA-BIO-COMP-1 Compensation
Impacts to biological resources will be compensated using the standard biological resources compensation ratios specified elsewhere in the Plan. Compensation acreage requirements may be fulfilled through non-acquisition (i.e., restoration and enhancement), land acquisition (i.e., preserve), or a combination of these options.

LUPA-BIO-COMP-2 Compensation

Birds and Bats – The compensation for the mortality impacts to bird and bat Focus and BLM Special Status Species from activities will be determined based on monitoring of bird and bat mortality and a fee re-assessed every 5 years to fund compensatory mitigation. Compensation will be satisfied by restoring, protecting, or otherwise improving habitat or by non-restoration actions that reduce mortality risks to birds and bats.

7.2 Habitat Compensation

This section shows how the Applicant intends to fulfill the BLM DRECP and anticipated CDFW ITP requirements for compensatory mitigation associated with Project impacts to burrowing owl. Because the Project is located on lands designated as Development Focus Area (DFA) under the DRECP, it is subject to applicable DRECP CMAs (see section 7.1.4). The Project will comply with all applicable CMAs on both the public and private lands within the Project site and will provide compensatory mitigation in accordance with the mitigation rations included in CMA LUPA-BIO-COMP-1. The Project will also comply with LUPA-BIO-SVF-6 and avoid desert dry wash woodland with a 200-foot buffer except for minor incursions or where there is existing, intervening infrastructure. Table 7.2-1 shows the Project's impacts, required mitigation ratios, and compensatory mitigation acreage. Any other resources for which compensatory mitigation is required will be included in other Project documents.

Table 7.2-1 Compensatory Mitigaton

Vegetation/Habitat Type	Project Impact (acres or occupied owl burrows)	Mitigation Ratio	Compensatory Mitigation (acres)
Alkali goldenbrush desert scrub	81.3	1:1	81.3
Arrowweed scrub	0	1:1	0
Mojave creosote bush scrub	5,664.3	1:1	5,664.3
Tamarisk thickets	0	1:1	
Displacement of owls from occupied burrows	Up to 94 burrows (2x the number of burrows with sign observed on the Project site)	1.5 times 6.5 (9.75) acres per occupied burrow displaced by Project	Up to 916.5 acres[a]
Total	**5,745.6**	**-**	**5745.6**

Notes:

[a] The acreage for displacement of occupied burrows is nested within the total compensation acreage.

8 Mitigation Monitoring Plan

(10) A proposed plan to monitor compliance with the minimization and mitigation measures and the effectiveness of the measures.

A Mitigation Monitoring and Reporting Program would be prepared and implemented for the Perkins Renewable Energy Project as part of the CEC Decision.

9 Mitigation Funding Sources

(11) A description of the funding source and the level of funding available for implementation of the minimization and mitigation measures.

It is the financial obligation of IP Perkins, LLC to fund all mitigation that would be identified in the ITP. Additionally, DRECP CMA LUPA-COMP-1 requires compensation activities to be initiated or completed within 12 months from the time the resource impact occurs. The BLM will determine the activity or project-level timing of the compensation (i.e., initiated, completed, or a combination) based on the specific resources being impacted and the scope and content of the activity. A six-month extension may be authorized depending on the resources impacted and compensation due diligence of the Project developer.

10 CEQA Documentation

The EIR will be prepared by the CEC and is anticipated to be published in 2025.

11 References

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APPENDIX A

Biological Resources Technical Report

The Biological Resources Technical Report was uploaded as Attachment B to the Data Response Set #3 for the Perkins Renewable Energy Project in March 2025.

APPENDIX B

Bird and Bat Conservation Strategy

The Bird and Bat Conservation Strategy was uploaded as Attachment C.7 to the Data Response Set #2 for the Perkins Renewable Energy Project in October 2024.

APPENDIX C

Wildlife Protection and Translocation Plan

The Wildlife Protection and Translocation Plan was uploaded as Appendix M.4 to the Opt-in Application for the Perkins Renewable Energy Project in February 2024.

APPENDIX D

Preliminary Best Management Practices and Project Design Features

The Preliminary Best Management Practices and Project Design Features were uploaded as Appendix D.1 to the Opt-in Application for the Perkins Renewable Energy Project in February 2024.

APPENDIX E

Desert Renewable Energy Conservation Plan Land Use Plan Amendment Conservation and Management Actions

The Desert Renewable Energy Conservation Plan Land Use Plan Amendment Conservation and Management Actions was uploaded as Appendix D.2 to the Opt-in Application for the Perkins Renewable Energy Project in February 2024.

APPENDIX F

Compensation Plan

The Compensation Plan was uploaded as Attachment C.9 to the Data Response Set #2 for the Perkins Renewable Energy Project in October 2024.

IP Perkins BAAH, LLC

Perkins Renewable Energy Project

CDFW Incidental Take Permit Application

February 2025

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PANORAMA ENVIRONMENTAL, INC.

IP Perkins BAAH, LLC

Perkins Renewable Energy Project CDFW Incidental Take Permit Application

February 2025

Prepared for:
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c/o Intersect Power, LLC
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PANORAMA ENVIRONMENTAL, INC.

Table of Contents

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

1 Introduction

1.1 Applicant

(2) Applicant's full name, mailing address, and telephone number(s).

IP Perkins BAAH, LLC, 9450 SW Gemini Drive, PMB #68743, Beaverton, OR 97008.

Applicant's Officer: Simon Ross, Chief Commercial Officer, IP Perkins BAAH, LLC, 9450 SW Gemini Drive, PMB #68743, Beaverton, OR 97008. Tel. (415) 971-0130, Email. simon@intersectpower.com

Applicant's Agent: Camille Wasinger, Sr. Director, IP Perkins, LLC, 9450 SW Gemini Drive, PMB #68743, Beaverton, OR 97008. Tel. (303) 909-6393, Email. camille@intersectpower.com

Application prepared by: Emily Capello, Panorama Environmental, Inc., 717 Market Street, Suite 400 San Francisco, CA 94103 Contact: Emily Capello, (415) 312-8074, Email. emily.capello@panoramaenv.com

1.2 Species to be Covered

(3) The common and scientific names of the species to be covered by the permit and the species' status under CESA

Western burrowing owl (*Athene cunicularia hypugaea*). On October 10, 2024, the western burrowing owl was approved as a candidate for potential listing as a protected species under the California Endangered Species Act (CESA). Candidates for listing are afforded the same protections as state-listed endangered or threatened species. CDFW will undertake a one-year review of the species' status before the California Fish and Game Commission makes a final decision on the listing.

1.3 Permit Coverage Period

Permit coverage is requested for a period of 2 years, or the total of the construction phase of the Project. Construction of the Project is anticipated to begin as early as January 2026 and extend to December 2027 for a duration of 24 months. After completion of construction, ownership of the project facilities will be transferred to San Diego Gas & Electric (SDG&E), who will then be responsible for obtaining authorization for incidental take of burrowing owl in association with operations and maintenance of the facilities.

1.4 Coverage Area

The area covered by the permit includes the area contained within the IP Perkins BAAH, LLC (IP Perkins BAAH, LLC or Perkins BAAH, LLC) project boundary as shown below in Section 2 – Project Description.

1.5 Covered Activities

The activities requested for permit coverage include all activities associated with the construction of the Project elements contained within the IP Perkins BAAH, LLC project boundary, as described in Section 2 – Project Description. These activities include the breaker-and-a-half (BAAH) switchyard, loop-in transmission line, and associated infrastructure.

1.6 Guide to the Permit Application

This application is filed for the proposed Perkins Renewable Energy Project (Project) in compliance with the requirements of the California Code of Regulations (CCR) Title 14 Section 783.4 and Section 2081(b) of California Fish and Game Code (FGC). The proposed Project has the potential to result in the incidental take of the state candidate western burrowing owl. The activity meets the following criteria for take of the western burrowing owl (FGC Section 2081[b]):

1. The take would be incidental to the otherwise lawful activity of project construction and/or operation (see Section 2 and Section 4 of this application)
2. Impacts to western burrowing owl would be minimized and fully mitigated as described in this application (see Section 6 of this application)
3. The measures required to minimize and fully mitigate the impacts of the take:
    a. Are roughly proportional in extent to the impact of the taking on the species (see Section 6 of this application)
    b. Maintain project objectives to the greatest extent possible; and
    c. Can be successfully implemented by the applicant (see Section 6 of this application)
4. Adequate funding will be provided to implement the required minimization and mitigation measures and monitoring compliance with and effectiveness of the measures (see Section 6 of this application)
5. Issuance of the permit will not jeopardize the continued existence of the western burrowing owl (see Section 6 of this application).

This application contains all the required contents of an ITP application as defined in CCR Title 14 Section 783.2. This application also follows guidance obtained from CDFW through recent coordination with CDFW staff. References to specific requirements for ITP applications are provided throughout this document, as appropriate. Table 1.6-1 provides a reader's guide to this permit application.

Table 1.6-1 Guide to Perkins Renewable Energy Project Incidental Take Permit Application

Application Requirement §783.2 (a)	Page
(1) The appropriate application fee.	N/A (CEC Opt-in Process)
(2) Applicant's full name, mailing address, and telephone number(s). If the applicant is a corporation, firm, partnership, association, institution, or public or private agency, the name and address of the person responsible for the project or activity requiring the permit, the president or principal officer, and the registered agent for the service of process.	1
(3) The common and scientific names of the species to be covered by the permit and the species' status under CESA.	14
(4) A complete description of the project or activity for which the permit is sought.	5
(5) The location where the project or activity is to occur or to be conducted.	17
(6) An analysis of whether and to what extent the project or activity for which the permit is sought could result in the taking of species to be covered by the permit.	17
(7) An analysis of the impacts of the proposed taking on the species.	19
(8) An analysis of whether issuance of the incidental take permit would jeopardize the continued existence of a species. A complete, responsive jeopardy analysis shall include consideration of the species' capability to survive and reproduce, and any adverse impacts of the taking on those abilities in light of: i. Known population trends; ii. Known threats to the species; and iii. Reasonably foreseeable impacts on the species from other related projects and activities.	19
(9) Proposed measures to minimize and fully mitigate the impacts of the proposed taking.	23
(10) A proposed plan to monitor compliance with the minimization and mitigation measures and the effectiveness of the measures.	33
(11) A description of the funding source and the level of funding available for implementation of the minimization and mitigation measures.	34
(12) Certification in the following language: I certify that the information submitted in this application is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to suspension or revocation of this permit and to civil and criminal penalties under the laws of the State of California.	**Error! Bookmark not defined.**
(13) Documentation of CEQA compliance.	Will be provided after CEQA is complete

1.7 Certification

(12) Certification in the following language:
I certify that the information submitted in this application is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to suspension or revocation of this permit and to civil and criminal penalties under the laws of the State of California.

I certify that the information submitted in this application is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to suspension or revocation of this permit and to civil and criminal penalties under the laws of the State of California.

Signature: ______________________ Date: March 11, 2025

Name of Representative: Simon Ross

Title: Chief Commercial Officer

IP Perkins BAAH, LLC

2 Project Description

(4) A complete description of the project or activity for which the permit is sought.

The IP Perkins BAAH, LLC proposes to construct the proposed Project. This section summarizes the proposed Project location, facilities, and construction activities for which permit coverage is being sought.

2.1 Project Overview

2.1.1 Purpose and Design

IP Perkins BAAH, LLC, an affiliate of Intersect Power, LLC, proposes to construct the Perkins BAAH facilities and loop-in transmission lines on public lands administered by the U.S. Bureau of Land Management (BLM) and Bureau of Reclamation (BOR) located southeast of El Centro in Imperial County, California (Figure 1). The proposed Project consists of a high-voltage breaker-and-a-half switchyard (BAAH switchyard) and two 500 kilovolt (kV) loop-in transmission lines, each within a 200-foot-wide loop-in transmission corridor, that would be required to interconnect to the existing San Diego Gas and Electric (SDG&E) Southwest Power Link (SWPL) 500 kV transmission line that traverses east–west 0.84 mile south of the Project site.

The Project would be analyzed under California Environmental Quality Act (CEQA) and National Environmental Quality Act (NEPA). An Environmental Impact Report would be prepared with CEC as the CEQA lead agency under the CEC Opt-in Process expected to be published in 2025. The BLM is preparing an Environmental Assessment (EA) under NEPA also expected to be published in 2025. The Project will be consistent with the Desert Renewable Energy Conservation Plan (DRECP) Land Use Plan Amendment, and is undergoing federal ESA Section 7 consultation between the BLM and US Fish and Wildlife Service (USFWS). The BLM is seeking USFWS concurrence that the Project is covered under the DRECP Biological Opinion (USWFS 2016). The USFWS has developed an Activity Form for the streamlined DRECP concurrence process. BLM will submit the completed form to confirm USFWS concurrence.

2.1.2 Project Elem ents

Figure 2 shows the components for the Project that are covered under this application.

Breaker-and-a-Half Switchyard

A BAAH switchyard would be constructed to facilitate interconnection to the SDG&E SWPL 500 kV transmission line, which runs parallel to SR 98 just south of the Project site. A short gen-tie line would be constructed to connect the Project substation(s) to the BAAH switchyard. The

BAAH switchyard would consist of five 500 kV circuit breakers and associated disconnect switches, control shelters, and steel structural support. The BAAH switchyard would be surrounded by a chain link fence up to 7 feet high, topped with 1 foot of barbed wire. The BAAH switchyard and the 500 kV loop-in transmission lines would ultimately be owned and operated by SDG&E.

500 kV Loop-in Transmission Lines and Corridors

The Project would include two approximately 0.8-mile-long single-circuit 500 kV loop-in transmission lines located within two 200-foot-wide loop-in transmission corridors that connect the solar Project site to the existing SDG&E SWPL 500 kV transmission line. Each 500 kV loop-in transmission line would originate from the BAAH switchyard and continue south, with each phase of each transmission line terminating on a separate monopole (six total) to connect to the SDG&E SWPL 500 kV transmission line. The exact location of the 500 kV loop-in transmission lines and the associated corridors within the 2,000-foot-wide survey corridor would be determined based on engineering, resources, and existing utility corridor constraints in coordination with SDG&E, BOR, BLM, and California Public Utilities Commission (CPUC). The 2,000-foot-wide survey corridor allows for flexibility of placement within the corridor once additional resource surveys and constraints analysis have been completed.

The 500 kV loop-in transmission line structures would be monopole, lattice, or H-frame with an average height of 150 feet and a maximum height up to 199 feet. The 500 kV loop-in transmission line structures would have a weathered finish to minimize visual impacts. A total of approximately 16 support structures would be required for each 500 kV loop-in transmission line in addition to the dead-end structures, with the exact number of structures to be determined by the final alignment and design of the transmission lines. A three-phase, 500 kV bundled set of conductors would be strung along the structures, and the line would be equipped with a ground wire and a telecommunications fiber-optic cable. A new access road parallel to each 500 kV loop-in transmission line would be constructed. Spur roads off of the new access road would be constructed to access each of the 500 kV loop-in transmission line support structure sites.

Figure 1 Project Location and Surface Management Agency

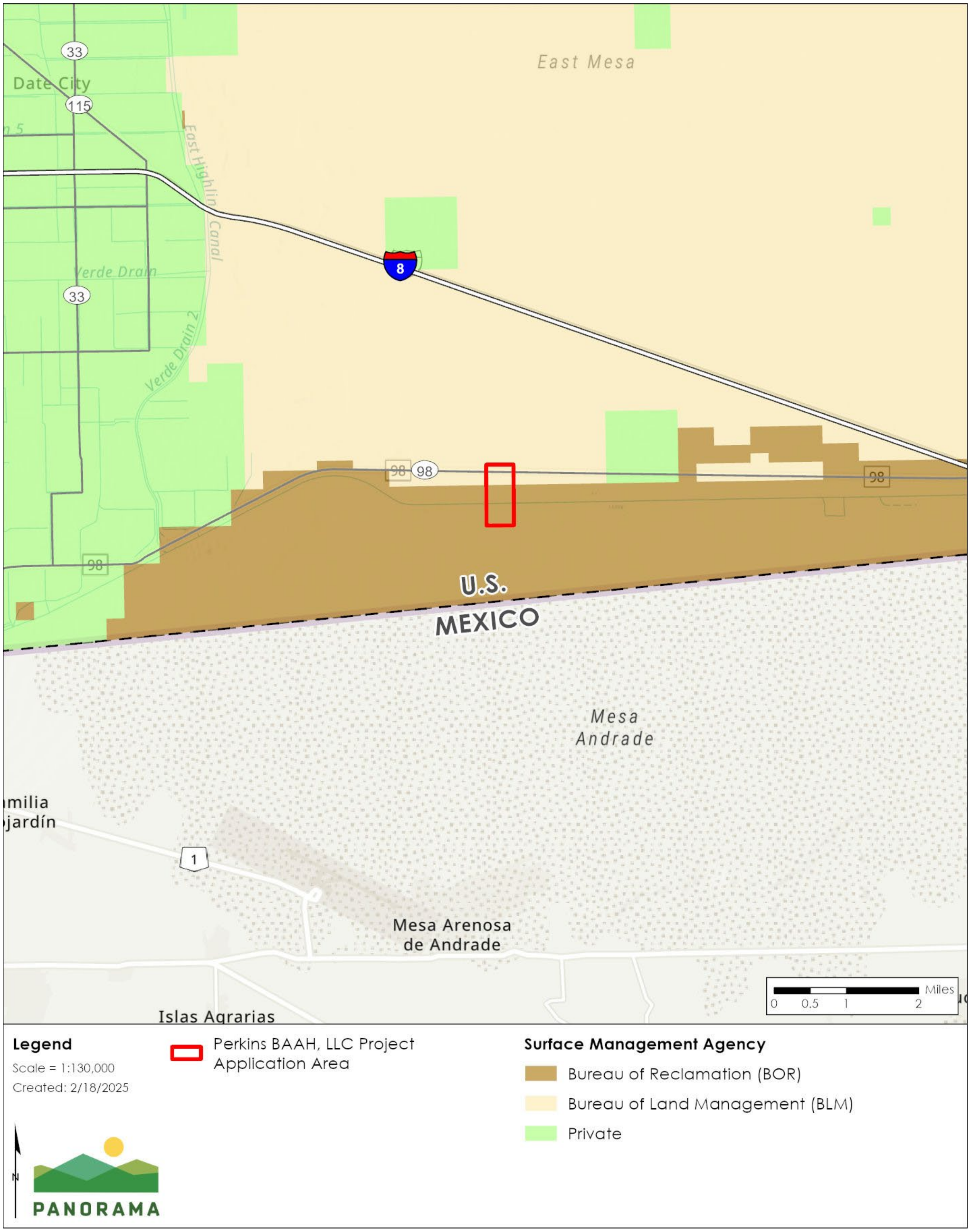
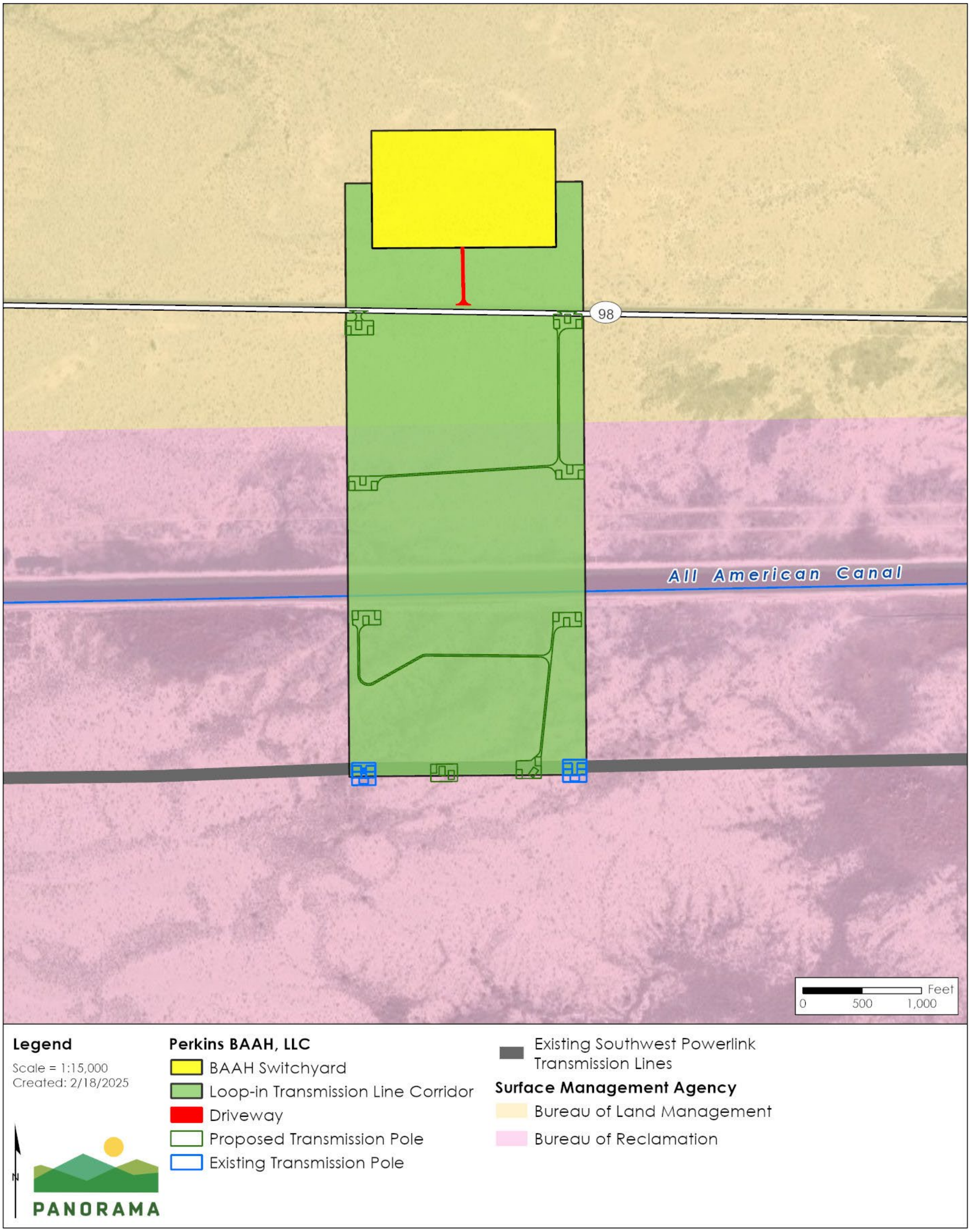


Figure 2 Project Elements



2.1.3 Construction

Transmission Facility Construction

Overview

The transmission system components would require grading and excavation for installation and construction. Import of soil would be needed for several of the components, as detailed in Table 2.1-1.

Table 2.1-1 Transmission Facility Disturbance Details

Project Component	Cut/Fill Quantity	Type of Disturbance
BAAH switchyard	88,732 cubic yards of import[a] material on BLM land; excess soils from storm water basin excavations to also be used; balanced, on BOR land	Graded and backfilled to an elevation above surrounding grade to avoid flooding
500 kV loop-in transmission lines	Balanced	Excavation for structure installation; grading for access roads

[a] Estimated base for the areas requiring import of material is assumed to require a 12-inch depth.

500 kV Loop-in Transmission Lines

The overhead 500 kV loop-in transmission line structure foundations would be excavated to a depth of 35 feet or more and may include concrete supports, depending on final engineering design. Disturbance within the two 200-foot loop-in transmission corridors would be limited to tower pads, access roads, and temporary pull and tensioning sites, with the exact disturbance to be determined based on the location of the two 500 kV loop-in transmission lines within the 2,000-foot survey corridor. The remainder of the corridors would not be disturbed. The 500 kV loop-in transmission lines would be constructed with monopoles, lattice towers, or H-frames and the dead-end structures using a three-pole design. Construction of the loop-in transmission line is anticipated to take up to 2 months. Helicopters may be used for the purpose of stringing and hanging bird diverters during the second half of construction for no more than a few days. A workforce of approximately 50 individuals would be involved in construction of the 500 kV loop-in transmission lines.

Breaker-and-a-Half Switchyard

The BAAH switchyard would be graded and compacted to an approximately level grade. Concrete pads would be constructed on site as foundations for BAAH switchyard equipment, and the remaining area would be graveled to a maximum depth of approximately 12 inches. Foundation designs of the BAAH switchyard would likely consist of drilled piers, concrete slabs, pedestals with footers, and/or directly embedded poles. Loading and design assumptions would be consistent with industry standards and County/State/federal design codes. A workforce of approximately 50 individuals would be involved in construction of the BAAH switchyard.

2.2 Project Location

(5) The location where the project or activity is to occur or to be conducted.

The Project site is located within BLM-administered land and U.S. Bureau of Reclamation-administered lands in unincorporated Imperial County, California (Figure 1). Imperial County is located in southern California, in the southwestern portion of the Colorado Desert. The site is bounded by Interstate 8 (I-8) to the north and State Route 98 (SR 98) to the south. The area immediately to the west of the Project site is vacant natural land with farmland located 2.5 miles west of the Project site. The center of El Centro, California, is approximately 20 miles to the west and Mexicali, Mexico, is approximately 15 miles to the southwest. The All-American Canal is directly south of the Project site, parallel with SR 98.

The site is located in a region characterized by undeveloped desert and agricultural uses. The Imperial Valley, which is dominated by agricultural land, is located an estimated 2.5 miles west of the site. The Imperial Sand Dunes, the largest mass of sand dunes in California, is located approximately 12 miles east of the Project site. There is no private land located within the Project site.

3 Listed or Candidate Species Status in the Project Site

3.1 Western Burrowing Owl Natural History, Distribution, and Habitat Requirements

The Western burrowing owl (*Athene cunicularia hypugaea*) inhabits arid lands throughout much of the western United States and southern interior of western Canada (Haug, Millsap, and Martell 1993). Suitable habitat for western burrowing owl includes open habitat with available burrowing opportunities, including agricultural fields (active and fallow), desert saltbush, ephemeral washes, ruderal areas, and creosote scrub.

Burrowing owls are unique among the North American owls in that they nest and roost in abandoned burrows, especially those created by ground squirrels, kit fox, desert tortoise, and other wildlife. Burrowing owls have a strong affinity for previously occupied nesting and wintering sites and will often return to previously used burrows, particularly if they had successful reproduction in previous years (Gervais, Rosenberg, and Comrack 2008). They generally depend on other species to dig suitable burrows for use but may also use anthropogenic surrogate burrows such as rubble piles or drainage pipes. If formerly occupied burrows are badly damaged or collapsed, burrowing owls cannot repair them and must seek alternate sites. The southern California breeding season (defined as the time from pair bonding of adults to fledging of the offspring) generally occurs from February to August, with peak breeding activity from April through July (Haug, Millsap, and Martell 1993).

In the Colorado Desert, burrowing owls generally occur at low densities in scattered locations, but they can be found in much higher densities near agricultural lands where rodent and insect prey tend to be more abundant (Gervais, Rosenberg, and Comrack 2008). Burrowing owls tend to be opportunistic feeders, and a large portion of their diet consists of beetles, grasshoppers, and other large arthropods. The consumption of insects increases during the breeding season (Haug, Millsap, and Martell 1993). Small mammals, especially mice and voles (*Microtus* and *Peromyscus* spp.) are important food items. Other prey animals include herpetofauna, young cottontail rabbits, bats, and birds such as sparrows and horned larks.

3.2 Habitat Conditions in the Project Site

The Project site is within the range of the western burrowing owl and provides breeding, foraging, and overwintering habitat for the species. Burrowing owls commonly occupy desert scrub habitats, which cover just over 96 percent of the Project area. Various sizes of mammal burrows have been documented on-site, indicating the soil in the Project site is suitable for burrow construction and occupied by burrowing mammals, an essential feature for burrowing owl breeding habitat. The site is far enough south in the western burrowing owl's range to have a climate warm enough to support overwintering. The remote nature of the site also lends itself to burrowing owl occupancy. Roads are present near the site, but burrowing owls are tolerant to roads and can be found occupying burrows located within road berms. Because of the presence of scrub vegetation and soils that are suitable for burrowing, the site should provide an appropriate food base for burrowing owl, including insects and small mammals and reptiles.

3.2.1 Vegetation Communities

Within the Project's impact areas, the primary vegetation community, making up just over 90 percent of the area, is Mojave creosote bush scrub. This vegetation community and the two other desert scrub communities within the impact areas are all suitable burrowing owl habitat, as described above. Tamarisk thickets, making up approximately four percent of the impact areas, are a forested habitat that is not suitable for burrowing owl. The vegetation types within the Project area and the acreage of each vegetation community are listed in Table 3.2-1 and are described in further detail below. Impacts to vegetation will only occur in the areas of the BAAH switchyard, proposed access roads, transmission poles and associated work pads, and pulling areas shown on Figure 3. The vegetation communities are also shown on Figure 3.

Table 3.2-1 Vegetation Communities Present in the Project Site

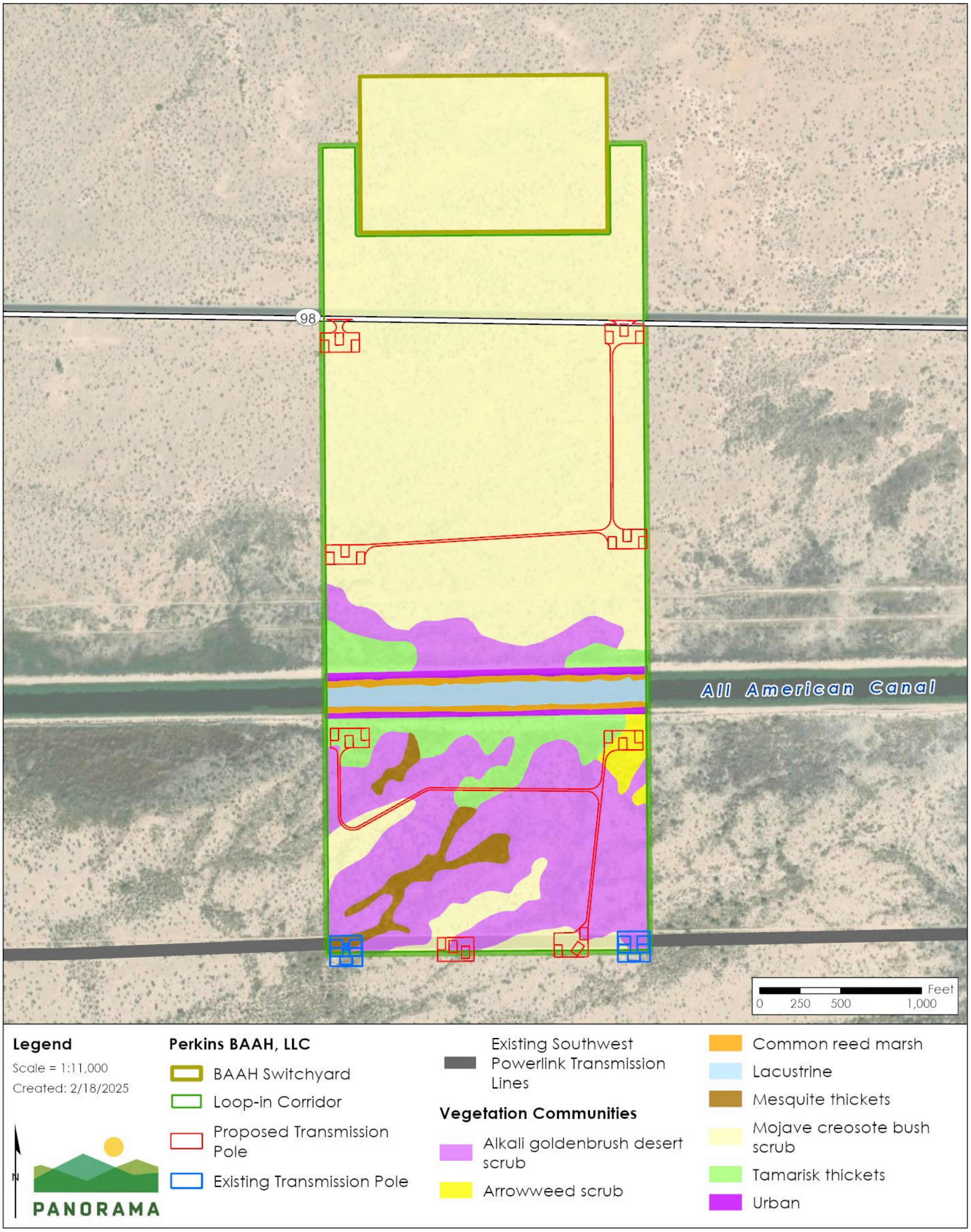
Vegetation/Land Cover Type	Acreage within Project Site
Alkali goldenbrush desert scrub	2.9
Arrowweed scrub	0.6
Mojave creosote bush scrub	54.7
Tamarisk thickets	2.3

Mojave creosote bush scrub. This vegetation community is the dominant vegetation community in the Project impact areas and is suitable burrowing owl breeding, foraging, and overwintering habitat. It occurs on well-drained, secondary soils of slopes, fans, and valleys and is the basic creosote bush scrub habitat of the Colorado Desert (Holland 1986). On the Project site, shrubs are sparsely distributed and creosote either dominates the shrub canopy or co-dominates with white bursage. Emory's indigo (*Psorothmanus emoryi*), white bursage (*Ambrosia dumosa*), cheesebush (*Ambrosia salsola*), and ephedra (*Ephedra* spp.) occur in some areas with primarily an understory of annual plants.

Alkali goldenbush desert scrub (Mesquite thickets). On the Project site, alkali goldenbush forms an open shrub layer (up to 35% cover). The tree layer, consisting of mesquite, is mostly sparse if present. Stands generally have low vegetation cover and may be sparse (<10% total vegetation). Sites are moist or seasonally dry flats and margins of intermittently saturated vegetated swales. Soils are variable and derived from alluvium and dune sand; textures include sand and loamy sand but include sites with finer-textured soil. Because the tree cover is sparse, this desert scrub community remains suitable habitat for burrowing owl.

3 LISTED SPECIES STATUS IN THE PROJECT SITE

Figure 3 Vegetation Communities



Arrowweed scrub. This vegetation community is characterized by arrowweed that is more than or equal to 2% of absolute cover with a sparse herbaceous layer of seasonal annuals. This vegetation is usually found near seasonally flooded washes and stream borders. Within the Project site, this vegetation community occurs only within a small portion of the transmission corridor bordering the southern edge of the All-American Canal. This community serves as habitat for burrowing owl.

Tamarisk thickets. Tamarisk thickets are a non-native/invasive vegetation community that consists of *Tamarix ramomissima* trees (or other *Tamarix* species) that form dense thickets along rivers and streams, around the banks of lakes and ponds or in areas that have shallow ground water. Soils become alkaline, which can often exclude other species becoming established. Within the Project site, this vegetation community occurs within the transmission line corridor north and south of the All-American Canal. Because of the dense tree cover, this vegetation community is not habitat for burrowing owl.

3.3 Western Burrowing Owl Occurrence in the Project Site

Focused surveys for burrowing owl were conducted in the spring of 2023 and 2024 (breeding season) and fall/winter of 2024 (non-breeding season). No evidence of burrowing owl presence, which includes individual owls, burrows with sign (pellets, whitewash, or feathers), or sign in a non-burrow location, was found on the Project site in either season. However, several burrowing owl occurrences were observed within 1 mile of the Project site in both the breeding (Figure 4) and non-breeding (Figure 5) seasons. The observations within 1 mile included live individuals and numerous burrows with sign. Detailed survey methods and results are contained in the Project's Biological Resources Technical Report, which is provided in Appendix A.

Figure 4 Burrowing Owl Observations – Breeding Season Results

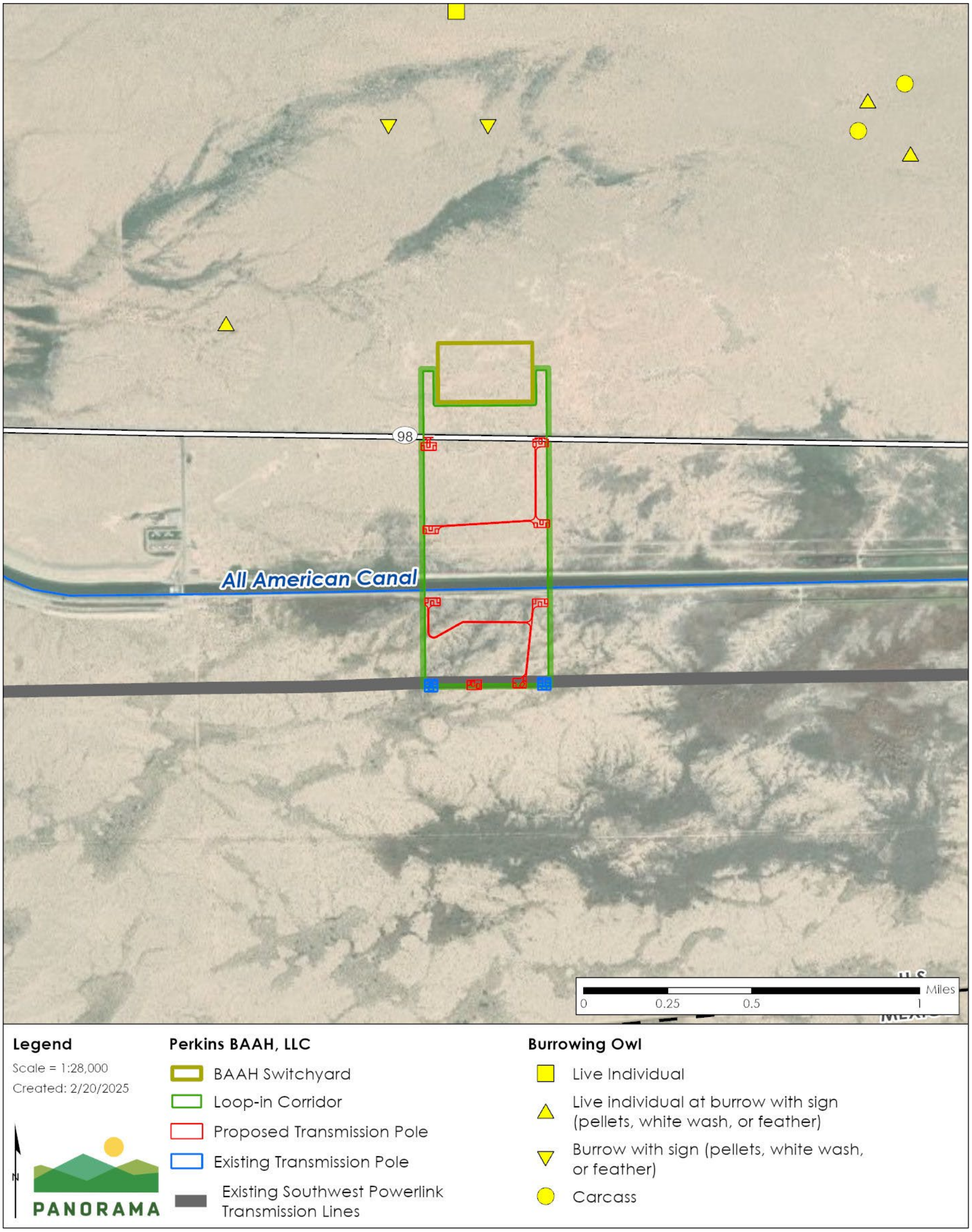
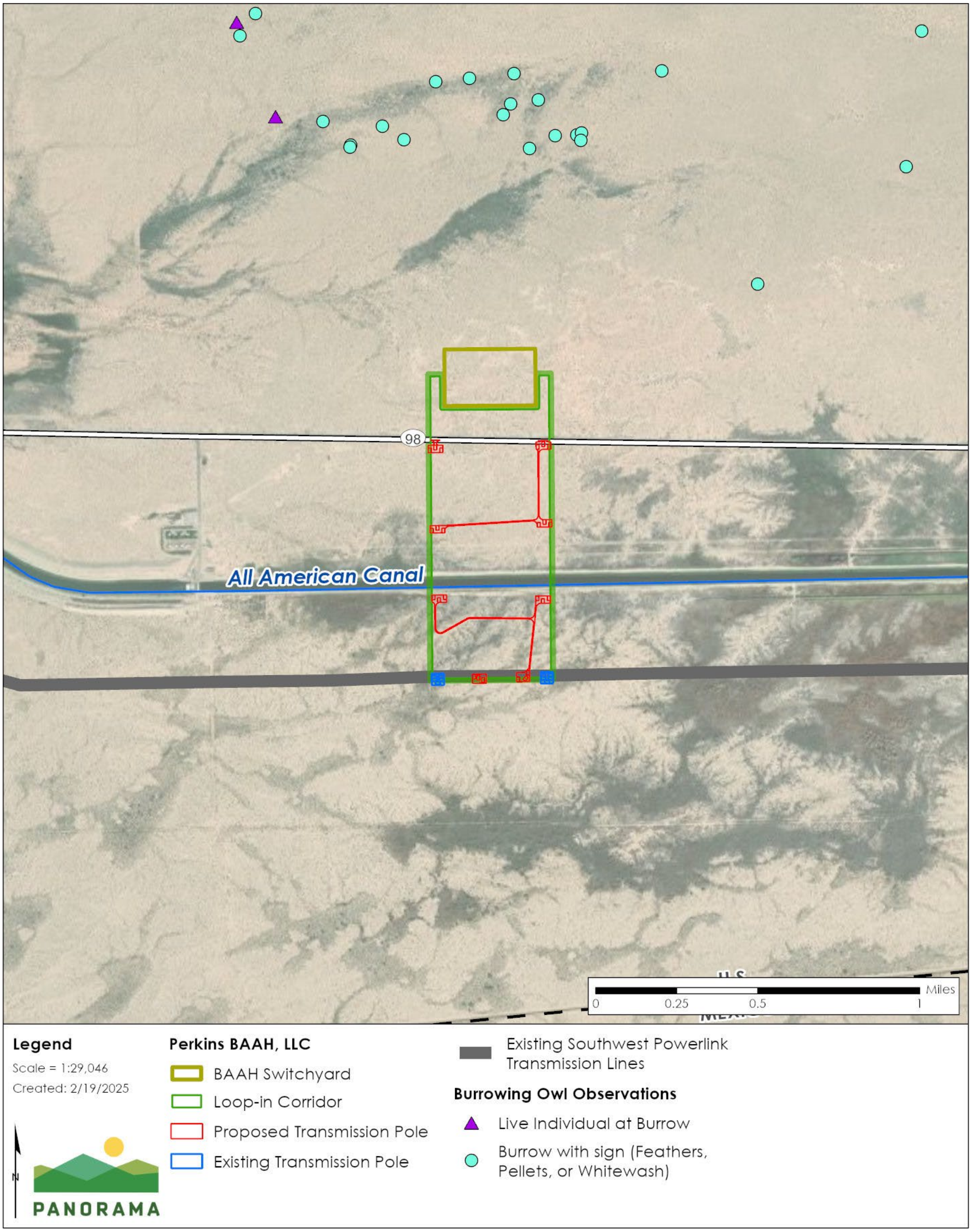


Figure 5 Burrowing Owl Observations – Non-Breeding Season Results



4 Anticipated Western Burrowing Owl Take

(6) An analysis of whether and to what extent the project or activity for which the permit is sought could result in the taking of species to be covered by the permit.

"Take," as defined in the California Fish and Game Code Section 86, is to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." To date, no western burrowing owls or their burrows or other sign have been documented on the Project site. However, the Project site is located in suitable burrowing owl habitat and burrowing owls and occupied burrows were documented in adjacent areas; therefore, it is possible that burrowing owls could move into the site prior to construction. If this happens, burrowing owls or their burrows (nests) could be harmed during clearing or grading activities. Project activities could also cause direct mortality, injury, or harassment of burrowing owls or their burrows because of vehicle strikes. Other direct effects could include disruption of western burrowing owl behavior during construction or operation of facilities, disturbance by noise or vibrations from the heavy equipment, and injury or mortality from encounters with workers' or visitors' pets.

The Applicant would implement measures to reduce the potential for incidental take of western burrowing owl during construction of the Project. A biological monitor would be on-site during construction to avoid direct injury or mortality of western burrowing owls, but it may become necessary to relocate one or more individuals from harm's way during construction. Relocation would become necessary if an occupied burrow is found within the active construction zone. Burrowing owl relocation would be conducted in accordance with the Project's Wildlife Protection and Translocation Plan, which is provided with this application as Appendix C. The method for relocation would be passive relocation, wherein a one-way door would be installed on the occupied burrow to evict the burrowing owl(s) without handling it. Biologists would ensure that enough suitable, unoccupied natural burrows are available in the off-site area for the evicted owl(s) to occupy. If there are not enough suitable burrows, artificial burrows would be constructed such that there would be a total of two suitable burrows for each burrowing owl evicted. Therefore, the Applicant requests authorization to take western burrowing owl for the purpose of constructing the Project within burrowing owl habitat, including evicting burrowing owl from the Project site and out of harm's way during construction activities.

Pre-construction surveys for burrowing owls, possible burrows, and sign of owls (e.g., pellets, feathers, whitewash) will be conducted throughout each work area no more than 30 days prior to construction. If burrowing owls or active burrows are found within the solar facility, avoidance and setback distances will be implemented within the solar facility. Disturbance of owls or occupied burrows during the breeding season from February 1 through August 31 will be avoided. Unoccupied burrows will be excavated and filled in under the supervision of the Lead Biologist prior to site preparation. Passive relocation will occur only during the non-breeding season, generally September 1 to February 1, but will be adjusted during the late summer months (August and September) if breeding activities are not observed at any occupied burrows and as detailed in the Wildlife Protection and Translocation Plan (Appendix C).

Avoidance and minimization measures would be put into place to reduce potential for direct injury or mortality of western burrowing owl, including working outside of breeding and nesting season, having an on-site biological monitor during construction, limiting construction work to daylight hours, and maintaining slow vehicle speed limits (e.g., 25 miles per hour) on access roads and within the Project site. Wildlife protection measures and monitoring requirements that will be identified in detail in Section 7 (Proposed Minimization and Mitigation Measures) will minimize potential take of western burrowing owl. The Applicant does not anticipate lethal take during any phase of the Project. However, it is possible that accidental take may occur. Therefore, the Applicant requests authorization for incidental take of one (1) western burrowing owl during construction.

5 Impacts Analysis

(7) An analysis of the impacts of the proposed taking on the species.

Without mitigation or avoidance measures (presented in Section 7 [Minimization and Mitigation Measures]), development of the Project could cause mortality or injury to western burrowing owl present during construction (see discussion of take in Section 4). To date, no individuals have been found on-site during biological surveys in areas planned for Project develop, but the site contains suitable habitat and burrowing owls and occupied burrows were documented in adjacent areas; therefore, it is possible for burrowing owls to move into the site prior to construction. The Project would involve the modification and/or removal of suitable burrowing owl habitat and potentially burrowing owl burrows if owls moved into the site prior to construction.

Direct impacts to burrowing owl during construction could include injury or mortality from collisions with construction equipment and vehicles when individuals are flushed from cover during construction disturbance. Displaced individuals may then be unable to find adequate cover from predation or forage effectively in new, unfamiliar places. Additionally, there is potential for nests containing eggs or nestlings to be lost either due to crushing from construction machinery or from nest abandonment when parents flee the area. There is also potential for adults to be crushed within burrows since adults often flee to underground burrows for safety.

Individuals encountered during construction may be evicted from the Project site using one-way doors and burrow excavation to avoid direct mortality from the Project. There is abundant suitable habitat surrounding the Project site for relocation, and biologists will assess the availability of suitable natural replacement burrows in the off-site habitat prior to eviction. If not enough natural burrows are present, then artificial burrows would be constructed. Studies have shown that adults can be successfully relocated, but nests have a high probability of failing in the first year following relocation if careful timing of the relocation is not taken into account (Doublet et al. 2023). So, while direct mortality of burrowing owl would be avoided through eviction from the site, the Project could result in lower reproductive success in the burrowing owl population during and in the year following construction. As shown by California Natural Diversity Database (CNDDB) occurrence records from the area (CNDDB 2023), the local population surrounding the Project site is strong and alternative habitat options are available. Therefore, a temporary reduction in reproductive success from a few mating pairs would have a minimal effect on the ability of the overall local population to survive and reproduce. With mitigation, the impact of the proposed taking by the Project would not have a significant impact on the overall species population.

In addition to direct impacts, the Project would indirectly impact burrowing owl through a reduction of habitat. The Project would impact 60.5 acres of natural habitat, as shown in Table 3.3-1, 58.2 acres of which is burrowing owl habitat. The Project would mitigate for impacts to native vegetation (58.2 acres) and habitat at a 1:1 ratio. Therefore, indirect impacts to burrowing owl from the loss of habitat would not have a significant impact on the overall species population.

Table 3.3-1 Vegetation Communities and Land Cover Impacted by the Project

Vegetation/Land Cover Type	Amount Impacted by Project (acres)
Alkali goldenbrush desert scrub	2.9
Arrowweed scrub	0.6
Mojave creosote bush scrub	54.7
Tamarisk thickets	2.3
Total	**60.5**

6 Jeopardy Analysis

(8) An analysis of whether issuance of the incidental take permit would jeopardize the continued existence of a species. A complete, responsive jeopardy analysis shall include consideration of the species' capability to survive and reproduce, and any adverse impacts of the taking on those abilities in light of: (i) Known population trends; (ii) Known threats to the species; and (iii) Reasonably foreseeable impacts on the species from other related projects and activities.

Threats to burrowing owl include habitat loss due to development and agriculture, habitat becoming less suitable as burrow-digging mammals are lost and as disturbance by humans and domestic animals increases, pesticide exposure, invasive predators, and collisions with man-made objects. Population declines and range contractions have been documented in the United States and Canada since at least the late 1960s. In California, the species has been declining for decades and is nearly extirpated from all of coastal southern California (NatureServe 2024).

Project construction could affect western burrowing owl in the Project site. Cumulative projects would have the potential to similarly impact the species where those projects' activities occur in its presence or habitat. The cumulative impact from the renewable energy projects proposed in the region is potentially significant. The Project's implementation of best management practices (BMPs), project design features (PDFs), and Conservation and Management Actions (CMAs), as detailed in Section 1 – Minimization and Mitigation Measures, and management plans and inclusion of compensatory habitat mitigation would avoid, minimize, or mitigate Project-specific impacts and the Project's contribution to cumulatively significant impacts on western burrowing owl to less than considerable. Based on the current status, environmental baseline for the Project site, effects of the proposed Project, and cumulative effects on borrowing owl, the proposed Project is not likely to jeopardize the continued existence of burrowing owl for the following reasons:

- The Applicant will implement numerous measures (see Section 7, Proposed Mitigation) to ensure that most burrowing owl are relocated out of the Project footprint and that injury and death of burrowing owl is minimized (i.e., clearance surveys, relocation, translocation, and employing qualified biologists).
- The Applicant will implement weed management and soil stabilization techniques to reduce the spread of invasive nonnative plants in the Project site.
- Given the small number of burrowing owl potentially affected by the Project, there is no information to indicate that development of the Project would appreciably reduce the burrowing owl population levels in the region.
- Few, if any, burrowing owl are likely to be injured or killed as a result of relocation.

- Though the Project would reduce the amount of available burrowing owl habitat, suitable habitat is available adjacent to the Project, and the Project would provide compensatory mitigation for impacted suitable habitat.

7 Minimization and Mitigation Measures

(9) Proposed measures to minimize and fully mitigate the impacts of the proposed taking.

This section lists the type of avoidance, minimization, and mitigation (i.e., biological resource protection) measures that would be included as part of the Perkins Renewable Energy Project. Implementation of these types of measures would be expected to minimize and offset potential adverse effects to western burrowing owl.

Mitigation measures are proposed to fully mitigate the project's impacts to western burrowing owls and their habitat, including any potential burrowing owl take, and compensate for habitat loss. Mitigation measures would also minimize the likelihood of harm or mortality to burrowing owls and other wildlife, and minimize, mitigate, or offset adverse habitat impacts such as erosion or weed infestations.

7.1 Avoidance and Minimization Measures

Project avoidance and minimization measures were developed as part of the Project's CEC Opt-In Application (Appendix D), Bird and Bat Conservation Strategy (Appendix B), and Wildlife Protection and Translocation Plan (Appendix C). The Project will also comply with the Conservation and Management Actions (CMAs) contained within the Land Use Plan Amendment (LUPA) for the Desert Renewable Energy Conservation Plan (DRECP); these measures are attached as Appendix E. The following mitigation measures will be implemented to avoid or minimize impacts to western burrowing owl. Mitigation measure titles match the titles in the Opt-In Application and the other plans.

7.1.1 Project Design Features

The following are the Project Design Features (PDFs) for Biological Resources from the CEC Opt-In Application. PDFs that apply to general biological resources and to western burrowing owl specifically are summarized below. Text not related to burrowing owl has been omitted. The full text of these measures may be found in the CEC Opt-In Application's Preliminary Best Management Practices and Project Design Features, which are attached to this application as Appendix D.

PDF BIO-1 Biological Monitoring

Monitoring to ensure conformance with conditions of approval, including effective protection and avoidance of biological resources, shall be implemented by the Applicant. During construction and decommissioning, the Applicant shall employ a biological monitoring team to oversee Project activities. Any activity that may impact vegetation, wildlife, and sensitive resources shall be monitored to ensure compliance with all mitigation measures for biological resources. The biological monitoring team will be approved by the BLM, BOR, CEC, CDFW, and USFWS and shall consist of a lead biologist and one or more biological monitor. The Lead Biologist, or during operations and maintenance, the Applicant's compliance manager, shall report regularly to the BLM, BOR, CEC, CDFW, and USFWS to document the status of compliance with biological mitigation measures.

PDF BIO-2 Worker Environmental Awareness Training

The Lead Biologist shall prepare and implement a Worker Environmental Awareness Program (WEAP). The Applicant shall be responsible for ensuring that all workers at the site receive WEAP training prior to beginning work on the Project and throughout construction and operations. The WEAP will include discussions of biological resources and their identification and protection as well as safety guidelines.

PDF BIO-3 Minimization of Vegetation and Habitat Impacts

Prior to construction activities, operations and maintenance, or decommissioning, authorized work areas shall be clearly delineated by the contractor. Construction activities shall minimize soil and vegetation disturbance to minimize impacts to soil and root systems. Upon completion of construction activities in any given area, all unused materials, equipment, staking and flagging, and refuse shall be removed and properly disposed of. Hazardous materials shall be handled, and spills or leaks shall be promptly corrected and cleaned up according to applicable requirements. Vehicles shall be properly maintained to prevent spills or leaks.

Low-Impact Site Preparation. Native vegetation shall be allowed to recover from rootstocks and seed bank wherever facilities do not require permanent vegetation removal within the perimeter fenceline of the solar facilities and under solar arrays. Vegetation height and density shall be managed as needed for operations and maintenance and fire safety, but vegetation management shall otherwise focus on maintaining habitat and soil conditions.

PDF BIO-5 Wildlife Protection

The Applicant shall undertake measures during construction and operations and maintenance to avoid or minimize impacts to wildlife. Implementation of all measures will be approved by BLM, BOR, CEC, CDFW, and USFWS. Measures will include wildlife avoidance, minimizing traffic impacts, minimizing lighting impacts, avoidance of toxic substances, minimization of noise and vibration impacts, prevention of entrapment and/or drowning of wildlife in water sources, excavations, or pipes, maintaining trash to reduce attraction to predators, avoiding bringing pets or firearms on-site, using wildlife exclusion materials to keep sensitive wildlife from entering worksites, restricting use of certain pesticides, and reporting dead or injured wildlife to USFWS and/or CDFW.

PDF BIO-6 Bird and Bat Conservation Strategy

The Applicant will implement the final Bird and Bat Conservation Strategy (Appendix B), developed in accordance with guidelines recommended by the USFWS, to avoid or minimize take of migratory birds that may nest on the site or may be vulnerable to collision with Project components. It describes the proposed Project components, summarizes baseline data regarding birds and bats in the Project vicinity; assesses potential risks to those species that could result from Project construction, operation, and decommissioning; and describes conservation measures to be implemented in order to minimize those risks.

PDF BIO-7 Loop-In Transmission and Gen-tie Lines

Loop-in transmission and gen-tie line support structures and other facility structures shall be designed in compliance with current standards and practices to discourage their use by raptors for perching or nesting. Mechanisms to visually warn birds shall be placed on loop-in transmission and gen-tie lines at regular intervals to prevent birds from colliding with the lines. To the extent practicable, the use of guy wires shall be avoided because they pose a collision hazard for birds and bats. Necessary guy wires shall be clearly marked with bird flight diverters to reduce the probability of collision. Shield wires shall be marked with devices that have been scientifically tested and found to significantly reduce the potential for bird collisions. Loop-in transmission and gen-tie lines shall maintain sufficient distance between all conductors and grounded components to prevent potential for electrocution of the largest birds that may occur in the area (e.g., golden eagle and turkey vulture). They shall utilize non-specular conductors and non-reflective coatings on insulators.

PDF BIO-8 Streambed and Watershed Protection

Prior to construction activities in jurisdictional waters of the State, the Applicant will obtain a Lake and Streambed Alteration Agreement (LSAA) from the CDFW. A Stormwater Pollution Prevention Plan (SWPPP) or SWPPP-equivalent document may also be required and shall be prepared by a qualified engineer or qualified individual, and shall be implemented before and during construction. The SWPPP shall include BMPs for stormwater runoff quality control measures, management for concrete waste, stormwater detention, watering for dust control, and construction of perimeter sediment controls, as needed.

7.1.2 Wildlife Protection and Translocation Plan Measures

The following are the measures from the Project's Wildlife Protection and Translocation Plan (Appendix C) that apply to burrowing owl. Measures are summarized below; the full text of these measures may be found in the Wildlife Protection and Translocation Plan.

Burrow Monitoring and Excavation

Potentially occupied burrows or occupied burrows will be monitored prior to relocation efforts. Methods for monitoring potentially occupied burrows will include: noting and removing burrowing owl sign (feathers, whitewash, pellets); twice daily visits for 48 hours to check for new sign; and use of motion-activated game cameras to determine burrow occupancy. If a burrow is determined to be occupied, the appropriate exclusion buffer (see Table 7.1-1 below) will be used and passive relocation methods will be employed if timing is suitable. Burrows determined to be unoccupied will be excavated.

Only burrowing owl burrows (unoccupied and occupied) that will be directly impacted by construction activities will be excavated. Any unoccupied burrows located outside the construction activity zones will be left in their current condition. If there is an occupied burrow outside the Project footprint area but within the buffer distance, monitoring and avoidance of the burrow will be managed on a case-by-case basis in coordination with CDFW and USFWS, depending on the season, nature of nearby construction activities, and whether the construction site is fenced. If monitoring determines that the burrowing owl has left the site, then the burrow will be excavated and collapsed.

Exclusion Buffer

If an active burrowing owl burrow is detected within any Project disturbance area, or within a 150-meter buffer of the disturbance area, a 150-meter (500-foot) exclusion buffer will be maintained while the burrow remains active or occupied. The buffer may be reduced to 50 meters (160 feet) during the non-breeding season (September 1 to January 31). The size of the buffer may be adjusted based on the time-of-year, and level of disturbance in the area, after consultation with CDFW. Table 7.1-1 provides exclusion buffer guidelines for nesting sites (CDFW 2012); which may be adjusted in the field by the Lead Biologist, in consultation with agency personnel. The southern California breeding season (defined as the time from pair bonding of adults to fledging of the offspring) generally occurs from February to August, with peak breeding activity from April through July (Haug, Millsap, and Martell 1993).

Table 7.1-1 Buffer Distance (m) for Occupied Burrowing Owl Burrows Based on Time of Year and Level of Disturbance

	Buffer Distance (m) and Level of Disturbance[a]		
Time of Year	Low	Medium	High
4/1–8/15	200	500	500
8/16–10/15	200	200	500
10/16–3/31	50	100	500

[a] Levels of disturbance: Low =drive by, low use, once per week; Medium = 15 minutes to 2 hours of activity, less than 49 decibels, one or two passes per day; High = more than 2 hours of activity, more than 49 decibels. Source: Based on CDFW (2012); Scobie and Faminow (2000).

Passive Relocation

Passive relocation will occur only during the non-breeding season, generally September 1 to February 1, but will be adjusted during the late summer months (August and September) if breeding activities are not observed at any occupied burrows. Passive relocation is a technique to exclude burrowing owls from a project site by first, providing replacement burrows off site (if needed); collapsing all unoccupied burrows within the construction site; and finally installing a one-way door on the occupied burrow to evict the burrowing owl without handling it.

Artificial Burrows. Artificial burrows may be constructed off site to replace on-site burrows that may be removed for Project construction. Biologists will survey nearby public lands and private lands with site control to identify and inventory suitable unoccupied natural burrows that may be available. If two or more natural burrows are available for each burrowing owl to be evicted, no artificial burrows will be constructed. If fewer suitable natural burrows are available, then new artificial burrows will be constructed to provide a total of two suitable burrows for each burrowing owl to be evicted. All artificial burrows and mapped natural burrows will be monitored for burrowing owl use at least once per quarter throughout the construction phase of the Project; artificial burrows will be maintained or replaced as needed.

7.1.3 Best Management Practices

The following are the Ecological Best Management Practices (BMPs) from the Project's CEC Opt-In Application (Appendix D).

Staging Areas

- As practical, staging and parking areas shall be located within the Project site to minimize habitat disturbance in areas adjacent to the site. The project will comply with Land Use Plan Amendment (LUPA)-BIO-13.

Construction Activities

- Before beginning construction, delineate the boundaries of areas to be disturbed including roads, borings, soil testing sites, and pull and tensioning areas prior to any ground disturbance, and confine disturbances, project vehicles, and equipment to the delineated project areas. The project will comply with LUPA-BIO-13.

Construction

- To the extent practicable, work personnel shall stay within the ROW and/or easements. The project will comply with LUPA-BIO-13.

Traffic

- Existing access roads, utility corridors, and other infrastructure shall be used to the maximum extent feasible. The project will comply with LUPA-BIO-13.

Noise

- Noise reduction devices (e.g., mufflers) shall be employed to minimize the impacts on wildlife and special status species populations. Operators shall ensure that all equipment is adequately muffled and maintained in order to minimize disturbance to wildlife. The project will comply with LUPA-BIO-12.

Power lines

- Place low and medium voltage connecting power lines underground whenever possible. In certain circumstances, burial of the lines may be prohibitively expensive (for example in shallow bedrock areas) or may cause unacceptable impacts to wetland habitats and dependent species. Overhead lines may be acceptable:
  - if sited away from high bird crossing locations, such as between roosting and feeding areas or between lakes, rivers, and nesting areas; and/or

- when the structures parallel tree lines or are otherwise screened so that collision risk is reduced. The project will comply with LUPA-BIO-16 and LUPA-TRANS-BIO-1.

Habitat

- To reduce the extent of habitat disturbance during construction and operation, existing access roads, utility corridors, and other infrastructure shall be used to the maximum extent feasible and foot and vehicle traffic through undisturbed areas shall be minimized. The project will comply with LUPA-BIO-13.
- Areas left in a natural condition during construction (e.g., wildlife crossings) shall be maintained in as natural a condition as possible within safety and operational constraints. The project will comply with LUPA-BIO-13.
- All pits and trenched shall contain wildlife escape ramps. All uncovered pipes shall be capped and/or covered at the end of each workday to prevent animals from entering the pipes. If a special status species is discovered inside a component, that component must not be moved or, if necessary, moved only to remove the animal from the path of activity, until the animal has escaped. The project will comply with LUPA-BIO-14.

Birds

- The Project should establish buffer zones and protection, mitigation, and monitoring plans for active nests detected during surveys. The project will comply with LUPA-BIO-IFS-2.

General Wildlife protection

- Implement general standards practices to protect federal and state special-status species. The project will comply with LUPA-BIO-14.
- Prior to any ground-disturbing activity, seasonally appropriate surveys shall be conducted by qualified biologists to ensure that important or sensitive species or habitats are not present in or near project areas. Habitats or locations to be avoided (with appropriately sized buffers) shall be clearly marked. The project will comply with LUPA-BIO-1.

Vegetation

- Project-specific vegetation management plans shall investigate possibilities of revegetating parts of the Project site. The project will comply with LUPA-BIO-7.

Herbicide Use

- Only herbicides with low toxicity to wildlife and nontarget native plant species shall be used, as determined in consultation with the BLM, BOR, CEC, and USFWS. The typical herbicide application rate shall be used rather than the maximum application rate, where effective. All herbicides shall be applied in a manner consistent with their label requirements and in accordance with guidance provided in the Final PEIS on vegetation treatments using herbicides (BLM 2007c). The project will comply with LUPA-BIO-11.

Reclamation

- Access roads shall be reclaimed when they are no longer needed. The project will comply with LUPA-BIO-7.
- All holes and ruts created by removal of structures and access roads shall be filled or graded. The project will comply with LUPA-BIO-7.
- While structures are being dismantled, care shall be taken to avoid leaving debris on the ground in areas in which wildlife regularly move. The project will comply with LUPA-BIO-13.
- The facility fence shall remain in place for several years to help reclamation (e.g., would preclude large mammals and vehicles from disturbing revegetation efforts). The project will comply with LUPA-BIO-7.

7.1.4 Desert Renewable Energy Conservation Plan Land Use Plan Amendment Consistency

In addition to the mitigation measures and BMPs listed above, the Project will comply with the CMAs contained within the LUPA for the DRECP. CMAs that apply to general biological resources and to western burrowing owl specifically are summarized below. Text not related to burrowing owl has been omitted. The full text of these measures may be found in the DRECP LUPA, which is attached as Appendix E.

LUPA-BIO-2 Biological Resources

Designated biologist(s) will conduct and oversee activity-specific required biological monitoring during pre-construction, construction, and decommissioning to ensure that avoidance and minimization measures are appropriately implemented and are effective.

LUPA-BIO-4 Seasonal Restrictions

For activities that may impact Focus and BLM Special Status Species, implement all required species-specific seasonal restrictions on preconstruction, construction, operations, and decommissioning activities.

LUPA-BIO-5 Worker Education

A worker education program will be provided to all workers for all activities, as determined appropriate on an activity-by-activity basis, during all phases of the project. The program will provide information on biological resources and their protection measures, reporting requirements, and legal implications.

LUPA-BIO-7 Restoration of Areas Disturbed by Construction Activities But Not Converted by Long-Term Disturbance

Restore areas affected by ground disturbance and/or vegetation removal that are not converted by long-term ground disturbance according to standards approved by BLM.

LUPA-BIO-8 General Closure and Decommissioning Standards

All activities that are required to close and decommission the site will specify and implement project-specific closure and decommissioning actions that meet the approval of BLM.

LUPA-BIO-12 Noise
Minimize noise impacts on Focus or BLM Special Status Species, using noise controls on equipment and minimizing activities that create noise above ambient levels in close proximity to those species and their suitable habitat.

LUPA-BIO-13 General Siting and Design
To the maximum extent practicable, site and design projects to avoid impacts to vegetation types, unique plant assemblages, climate refugia as well as occupied habitat and suitable habitat for Focus and BLM Special Status Species. Minimize the extent of project impacts, including the project footprint and light pollution.

LUPA-BIO-14 Biology: General Standard Practices
Implement general standard practices to protect Focus and BLM Special Status Species, such as avoiding feeding or harassing wildlife, avoiding bringing domestic pets on-site, checking construction materials for the presence of wildlife prior to use, using covers to prevent wildlife entrapment in trenches or excavations, and minimizing vegetation removal.

LUPA-BIO-15 Biology: General Standard Practices
Use state-of-the-art construction and installation techniques approved by BLM that minimize new site disturbance, soil erosion and deposition, soil compaction, disturbance to topography, and removal of vegetation.

LUPA-BIO-16 Activity-Specific Bird and Bat CMAs
For activities that may impact Focus and BLM sensitive birds, birds protected by the ESA and/or Migratory Bird Treaty Act of 1918, and bat species, implement appropriate measures as per the most up-to-date BLM state and national policy and guidance and data on birds and bats to avoid and minimize direct mortality of birds and bats.

LUPA-BIO-17 Activity-Specific Bird and Bat CMAs
For activities that may result in mortality to Focus and BLM Special–Status bird and bat species, a Bird and Bat Conservation Strategy (Appendix B) will be prepared with the goal of assessing operational impacts to bird and bat species and incorporating methods to reduce documented mortality. The strategy shall be approved by BLM in coordination with USFWS, and CDFW as appropriate.

LUPA-BIO-IFS-12 Burrowing Owl
If burrowing owls are present, a designated biologist will conduct appropriate activity-specific biological monitoring to ensure avoidance of occupied burrows and establishment of the 656 feet (200 meter) setback to sufficiently minimize disturbance during the nesting period on all activity sites, when practical.

LUPA-BIO-IFS-13 Burrowing Owl
If burrows cannot be avoided on-site, passive burrow exclusion by a designated biologist through the use of one-way doors or the most up-to-date agency BLM or CDFW specifications. Before exclusion, there must be verification that burrows are empty or the most up-to-date BLM

or CDFW protocols. Confirmation that the burrow is not currently supporting nesting or fledgling activities is required prior to any burrow exclusions or excavations.

LUPA-BIO-IFS-14 Burrowing Owl
Activity-specific active translocation of burrowing owls may be considered, in coordination with CDFW.

LUPA-BIO-SVC-6 Special Vegetation Features
Microphyll woodland will be avoided, except for minor incursions (defined as actions that cumulatively do not impact the conservation strategy of the DRECP). The Project would comply with this CMA, because the panel layout has been designated to avoid desert dry wash woodland (DDWW) with the exception of minor incursions or where there is existing inter¬vening infrastructure. See also LUPA-BIO-RIPWET-1, below.

LUPA-BIO-RIPWET-1 Riparian and Wetland Vegetation Type
The riparian and wetland vegetation types will be avoided to the maximum extent practicable except for allowable minor incursions with the specified setbacks.

LUPA-BIO-COMP-1 Compensation
Impacts to biological resources will be compensated using the standard biological resources compensation ratios specified elsewhere in the Plan. Compensation acreage requirements may be fulfilled through non-acquisition (i.e., restoration and enhancement), land acquisition (i.e., preserve), or a combination of these options.

LUPA-BIO-COMP-2 Compensation
Birds and Bats – The compensation for the mortality impacts to bird and bat Focus and BLM Special Status Species from activities will be determined based on monitoring of bird and bat mortality and a fee re-assessed every 5 years to fund compensatory mitigation. Compensation will be satisfied by restoring, protecting, or otherwise improving habitat or by non-restoration actions that reduce mortality risks to birds and bats.

7.2 Habitat Compensation

This section shows how the Applicant intends to fulfill the BLM DRECP and anticipated CDFW ITP requirements for compensatory mitigation associated with Project impacts to burrowing owl. Because the Project is located on lands designated as Development Focus Area (DFA) under the DRECP, it is subject to applicable DRECP CMAs (see section 7.1.4). The Project will comply with all applicable CMAs on both the public and private lands within the Project and will provide compensatory mitigation in accordance with the mitigation rations included in CMA LUPA-BIO-COMP-1. The Project will also comply with LUPA-BIO-SVF-6 and avoid desert dry wash woodland with a 200-foot buffer except for minor incursions or where there is existing, intervening infrastructure. The desert dry wash woodland impacts shown below in Table 7.2-1 represents the total of minor incursions made into this habitat type. Table 7.2-1 shows the Project's impacts, required mitigation ratios, and compensatory mitigation acreage.

Any other resources for which compensatory mitigation is required will be included in other Project documents.

Table 7.2-1 Compensatory Mitigation

Vegetation/Habitat Type	Project Impact (acres or occupied owl burrows)	Mitigation Ratio	Compensatory Mitigation (acres)
Alkali goldenbrush desert scrub	2.9	1:1	2.9
Arrowweed scrub	0.6	1:1	0.6
Mojave creosote bush scrub	54.7	1:1	54.7
Displacement of owls from occupied burrows	2	1.5 times 6.5 (9.75) acres per occupied burrow displaced by Project	19.5[a]
Total	**58.2**	-	**58.2**

Notes:

[a] The acreage for displacement of occupied burrows is nested within the larger mitigation acreage.

8 Mitigation Monitoring Plan

(10) A proposed plan to monitor compliance with the minimization and mitigation measures and the effectiveness of the measures.

A Mitigation Monitoring and Reporting Program would be prepared and implemented for the Perkins Renewable Energy Project as part of the CEC Decision.

9 Mitigation Funding Sources

(11) A description of the funding source and the level of funding available for implementation of the minimization and mitigation measures.

It is the financial obligation of IP Perkins, LLC to fund all mitigation that would be identified in the ITP. Additionally, DRECP CMA LUPA-COMP-1 requires compensation activities to be initiated or completed within 12 months from the time the resource impact occurs. The BLM will determine the activity or project-level timing of the compensation (i.e., initiated, completed, or a combination) based on the specific resources being impacted and the scope and content of the activity. A six-month extension may be authorized depending on the resources impacted and compensation due diligence of the Project developer.

10 CEQA Documentation

The EIR will be prepared by the CEC and is anticipated to be published in 2025.

11 References

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APPENDIX A

Biological Resources Technical Report

The Biological Resources Technical Report was uploaded as Attachment B to the Data Response Set #3 for the Perkins Renewable Energy Project in March 2025.

APPENDIX B

Bird and Bat Conservation Strategy

The Bird and Bat Conservation Strategy was uploaded as Attachment C.7 to the Data Response Set #2 for the Perkins Renewable Energy Project in October 2024.

APPENDIX C

Wildlife Protection and Translocation Plan

The Wildlife Protection and Translocation Plan was uploaded as Appendix M.4 to the Opt-in Application for the Perkins Renewable Energy Project in February 2024.

APPENDIX D

Preliminary Best Management Practices and Project Design Features

The Preliminary Best Management Practices and Project Design Features were uploaded as Appendix D.1 to the Opt-in Application for the Perkins Renewable Energy Project in February 2024.

APPENDIX E

Desert Renewable Energy Conservation Plan Land Use Plan Amendment Conservation and Management Actions

The Desert Renewable Energy Conservation Plan Land Use Plan Amendment Conservation and Management Actions was uploaded as Appendix D.2 to the Opt-in Application for the Perkins Renewable Energy Project in February 2024.

APPENDIX F

Compensation Plan

The Compensation Plan was uploaded as Attachment C.9 to the Data Response Set #2 for the Perkins Renewable Energy Project in October 2024.

Attachment D Revised Cultural Resources Section

Attachment D Revised Cultural Resources Section

4.3 Cultural Resources and Tribal Cultural Resources

This section discusses the potential effects of the Project on cultural resources and tribal cultural resources in the Project Application Area and vicinity. Section 4.3.1 describes the cultural resources environment that might be affected by the Project. Section 4.3.2 provides the research design used to guide the records and archival search and subsequent fieldwork phase of the cultural resource inventory. Section 4.3.3 presents an environmental analysis of construction and operation. Section 4.3.4 evaluates potential cumulative impacts on cultural resources. Section 4.3.5 presents mitigation measures that will be implemented to avoid construction impacts. Section 4.3.6 discusses the LORS applicable to the protection of cultural resources. Section 4.3.7 lists reference materials used in preparing this section.

This section is consistent with state regulatory requirements for cultural resources pursuant to the CEQA. Cultural resources include prehistoric and historic archaeological sites; districts; objects; standing historic structures, buildings, districts, and objects; and locations of important historic events. The study scope was developed according to the California Energy Commission's (CEC's) cultural resources guidelines, and it complies with *Rules of Practice and Procedure and Power Plant Site Certification Regulations* (CEC, 2023). Per CEC Data Adequacy requirements, Confidential Appendix N.1 provides the cultural resources technical report (CRTR), including names and qualifications of personnel who contributed to this study; archival research material consisting of a complete copy of the California Historical Resources Information System (CHRIS) literature search results that include maps showing the locations of previous cultural resources studies and resources and California Department of Parks and Recreation (DPR) 523 forms for previously recorded resources occurring within a records search area (one mile radius buffer around all Project facilities); copies of correspondence with the Native American Heritage Commission, Native American Groups, and local historical societies; a map showing the location of the study area and all identified cultural resources within the study area; DPR 523 forms for newly recorded and updated resources, and copies of all previous technical reports that are either partially or entirely located within 0.25 mile of the Project area.

In accordance with CEC Rules of Practice and Procedure & Power Plant Site Certification Regulations (CEC 2023) for assessing potential impacts on archaeological and architectural resources., Chronicle Heritage defined archaeological and architectural history study areas for the proposed Project. The archaeological study area for the purposes of the Opt-in Application, includes the Project site (fenced solar facility including the BESS, substation, gen-tie, and O&M yard) and a 200-foot buffer from the Project site; for the proposed loop-in transmission lines corridors, the study area includes the Project footprint with a 50-foot buffer. Based on CEC guidance for new solar plant and transmission line construction in rural settings, the architectural history study area includes all Project elements along with a 0.5-mile buffer. The archaeological study area encompasses approximately 6,640 acres and the architectural history study area is approximately 13,150 acres.

4.3.1 Affected Environment

The Project Application Area lies east of the city of El Centro and south of Interstate-8 near the United States – Mexico border in southeastern California. Several factors, including topography, available water sources, and biological resources, affect the nature and distribution of prehistoric, ethnographic, and historic-period human activities in an area. This background provides a context for understanding the nature of the cultural resources that may be identified within the region. Much of the information provided in the following sections has been adapted from a report compiled by Chronicle Heritage entitled *Cultural Resource Class I Study, Research Design, and Work Plan for the Perkins Renewable Energy Project, Imperial County, California* (Vyhmeister et al. 2024).

The Project Application Area lies in the Colorado Desert of Imperial County, the largest and most arid subdivision of the Sonoran Desert and one of the hottest and most arid environments in the United States. The Project Application Area is within the southern portion of a major physiographic and geologic feature of the Colorado Desert, the Salton Trough. The Salton Trough is an extensive topographic and structural depression extending from the Gulf of California about 130 miles northwest through the Coachella Valley to the summit of San Gorgonio Pass. The Gulf of California is separated from the trough by the roughly 11 meters tall (36 feet tall) delta of the Colorado River. The trough slopes gradually down to the north to about 226 feet below mean sea level (bmsl) at the Salton Sea, then rises gradually through the Coachella Valley.

Prehistoric Context

Schaefer (1994) was the first to develop a chronological sequence for the Colorado Desert area. The sequence he proposed strongly resembles the scheme in use for the San Diego region, while also incorporating archaeological information from the contiguous Mojave Desert region to the north. Schaefer's reliance on these two adjacent areas is in large part due to the well-defined cultural histories that have been developed for the Mojave Desert and San Diego regions. In contrast to these two areas, the basic culture history of the Colorado Desert region has not changed dramatically since pioneering archaeologist Malcolm Rogers (1939, 1945, 1966) published his initial impressions of the desert's chronology and cultural development. Consequently, understanding the early prehistory of the Colorado Desert region still relies heavily on comparisons with, and information derived from, both the San Diego region and the Mojave Desert areas.

Paleoindian Period

The earliest well-documented prehistoric sites in Southern California belong to the Paleoindian Period (ca. 12,000–10,000 Before Present[1] [B.P.]) during the Late Pleistocene. In the western

[1] Before Present is a timescale used mainly in archaeology, geology, and other scientific disciplines to specify when events occurred relative to the origin of practical radiocarbon dating in the 1950s.

United States, most evidence for the presence of Paleoindian peoples derives from finds of large, fluted spear and projectile points (Fluted-Point Tradition) found at sites associated with big game hunting. Paleoindian sites have been documented in places such as Clovis and Folsom in the Great Basin and the northern Desert Southwest area including the Mojave Desert (Moratto 1984:79–88). In the Mojave Desert, while absolute dating remains elusive, the Paleoindian Period is assumed to span approximately 12,000 to 10,000 B.P. (Sutton et al. 2007:234–236). Elsewhere in California, most of the evidence for the Fluted-Point Tradition derives principally from scattered isolated occurrences of fluted points that have been found (Dillon 2002; Rondeau et al. 2007). Isolated occurrences of fluted points have been observed in both the Colorado Desert (e.g., Davis et al. 1980:150; Kline 2014) and in the mountains of southern San Diego County (Kline and Kline 2007). Additional finds have been made to the south in Baja California (Des Lauriers 2008; Hyland and Gutierrez 1995).

The beginning of the San Dieguito Tradition or Complex, which is associated with artifact assemblages distinct from that of the Fluted Point Tradition, is also assumed to date to the Paleoindian Period. In California (Alta California), this tradition has been documented mostly in the coastal area of San Diego County (Carrico et al. 1993a; Rogers 1966; Warren 1966, 1967; Warren and True 1961), and to a lesser degree in the Mojave Desert (Sutton et al. 2007) and Colorado Desert (Rogers 1939, 1966; Schaefer 1994; Warren 1967). In the Mojave Desert, Sutton et al. (2007:236) assign the San Dieguito Complex to the early Archaic Period during the Early Holocene. Warren dates the San Dieguito Tradition as beginning circa 10,000 B.P. and ending sometime between 8500 and 7200 B.P. (Warren 1967, 1968:4; Warren et al. 1998; Warren and Ore 2011). This tradition is characterized by an artifact inventory consisting almost entirely of flaked stone biface and scraping tools, but lacking the distinctive fluted points associated with the Fluted-Point Tradition. The subsistence system or emphasis of the San Dieguito Tradition, while not yet entirely agreed upon, appears to have been oriented towards hunting rather than gathering, based on the predominance of primarily hunting-associated tools in recovered artifact assemblages (Warren 1967, 1968).

Evidence for the Fluted-Point Tradition in the general vicinity of the Project is minimal with only two isolated flute points having been identified in the Colorado Desert (Davis et al. 1980; Kline 2014) with a third point found in the mountains of San Diego County (Kline and Kline 2007). In contrast, the San Dieguito Tradition is relatively well-documented in the San Diego area. The most substantial evidence for this tradition derives from a stratified archaeological site, the C.W. Harris Site (CA-SDI-149/316/4935B), in western San Diego County along the San Dieguito River. The Harris Site formed the original basis upon which the San Dieguito Tradition was defined (Rogers 1939, 1966; Vaughan 1982; Warren 1966, 1967, 1968; Warren and True 1961). Diagnostic artifact types and categories associated with the San Dieguito Tradition include elongated bifacial knives, scraping tools, crescentics, and Silver Lake and leaf-shaped projectile points (Carrico et al. 1993a; Knell and Becker 2017; Rogers 1966; Vaughn 1982; Warren 1966, 1967; Warren and Ore 2011; Warren and True 1961). The C.W. Harris Site also provided the oldest calibrated radiocarbon date (9968 B.P.) found in association with a subsurface San Dieguito artifact assemblage (Warren et al. 1998; Warren and Ore 2011). Another slightly younger calibrated radiocarbon date of 9130 B.P. was also acquired from a San Dieguito-associated subsurface stratum at site CA-SDI-316 (Cooley 2013). Finally, possible evidence for the San Dieguito Tradition has been discovered at a site in the southern mountains of San Diego County; the site assemblage included complete, elongated bifacial knives, and projectile points that bear a strong resemblance to some of those recovered from the C.W. Harris Site (Pigniolo 2005).

Although Rogers (1939, 1966) has described occurrences of sites and artifacts attributable to the San Dieguito Complex in the Mojave and Colorado Desert areas, the ability to accurately determine the antiquity of these artifacts and sites by radiometric dating methods has proven to be problematic (Schaefer and Laylander 2007:247; Sutton et al. 2007:237; Warren 1967:179). Consequently, the radiometric dating of the artifacts and their context at the C.W. Harris Site has, for several decades, been the principal means of ascertaining the antiquity of these similar desert assemblages (Warren 1967). In the Mojave Desert area, the San Dieguito Complex has been largely subsumed under the Lake Mojave Complex (Sutton et al. 2007:236). Recently, calibrated radiocarbon dates from several Lake Mojave Complex associated sites have produced dates of similar antiquity to those from the C.W. Harris Site (Sutton et al. 2007:235) (i.e., ca. 10,000-9000 B.P.). In the Mojave Desert area, Lake Mojave Complex sites are frequently associated with glacial lakes that were still present at the end of the Pleistocene and the beginning of the Holocene. Such glacial-related lacustrine features were generally not present in the more southerly Colorado Desert area. However, given the discovery of Paleoindian Period and/or Lake Mojave Complex associated projectile points in the Salton Basin (Apple et al. 1997; Wahoff 1999), it is possible that this basin, too, may have been inundated, at least periodically, during this earlier period.

Archaic Period

The Archaic Period (ca. 10,000–1500 B.P.) encompasses the interval between the relatively cool/wet conditions of the early Holocene and the appearance of assemblages characteristic of the Late Prehistoric. The Archaic Period is generally differentiated from the earlier Paleoindian Period by a shift from hunting-focused subsistence systems to a more generalized economy with an increased focus on gathering and the use of grinding tools and seed-processing technology. Consequently, typical artifact assemblages in the Mojave Desert—where sites dating to the early Archaic Period are common—contain dart points, but with increasing quantities of ground stone tools (such as manos and metates) occurring into the middle and latter parts of the period. As with the Paleoindian Period, little archaeological evidence has yet been encountered in the Colorado Desert area that can be definitely attributed to the early part of the Archaic Period (i.e., from ca. 8500–4000 B.P.) (Schaefer 1994:64; Schaefer and Laylander 2007:247). Although evidence of early Archaic occupation in the Colorado Desert has long been minimal—as noted above for the Paleoindian Period—the discovery of Paleoindian Period and/or Lake Mojave Complex associated projectile points in the Salton Basin (Apple et al. 1997; Wahoff 1999) and at site CA-SDI-7074 in the mountains of southeastern San Diego County (Williams 2014), could change this paucity of evidence.

A possible early Archaic discovery in the Salton Basin occurred during an archaeological investigation at the Salton Sea Test Base (Apple et al. 1997; Wahoff 1999). This discovery consisted of an assemblage of large projectile points that were stylistically associated with early-Archaic-style projectile points in the Mojave Desert, including Pinto and Elko styles. Although archaeological investigations did not obtain any radiocarbon dates to verify the relative dating evidence, the styles of these points appear to be associated with the early Archaic Period. More recently, excavations at site CA-SDI-7074, in the eastern foothills of the Laguna Mountains, uncovered more than 100 subsurface thermal features, many of which were likely earth ovens associated with agave roasting activity (Williams 2014). Although radiocarbon dating indicated that most of these oven features date to the Late Prehistoric Period, five of the more deeply buried features were discovered to date between 9600 and 8590 B.P. These results not only indicate the use of agave as a food resource much earlier in time than was previously realized, but also suggest a reappraisal of the dating for the inception of the early Archaic Period in the area (Williams 2014:325). Additional evidence for an early to mid-Archaic Period use at the site includes the recovery of a single Elko-style projectile point (Williams 2014:151).

Limited evidence has been found for late Archaic (beginning ca. 4000 B.P.) occupation in the western Colorado Desert. One of the few studies that have documented use during this time was completed by Love and Dahdul (2002) in the northern Coachella Valley of the Salton Basin. The contexts of several sites in the Coachella Valley, some possibly associated with ancient stands of Lake Cahuilla, were radiocarbon dated to circa 3000-2000 B.P. (Love and Dahdul 2002; Schaefer and Laylander 2007:249). Other evidence for the late Archaic use in the area includes deposits found at the Indian Hill Rockshelter (CA-SDI-2537) in Anza-Borrego Desert State Park (McDonald 1992) and at another rock shelter in Tahquitz Canyon, near Palm Springs (Bean et al. 1995; Schaefer and Laylander 2007:247). The Indian Hill Rockshelter, until recently, was the oldest radiocarbon-dated archaeological site in the area. The site contained distinctive dart-sized projectile points, ground stone implements, rock-lined caches, and inhumations, one of which was radiocarbon dated to 4070±100 years B.P. (McDonald 1992; Schaefer 1994; Wilke and McDonald 1989). The rock shelter in Tahquitz Canyon, although lacking radiocarbon dates, exhibited an assemblage similar to that found in the Indian Hill Rockshelter (Bean et al. 1995; Schaefer and Laylander 2007:247).

Evidence for settlement patterning during the Archaic Period in the Colorado Desert area is minimal. However, some of the late Archaic sites in the Coachella Valley appear to have been in contexts associated with intermittent ancient stands of Lake Cahuilla (Love and Dahdul 2002). It seems likely, therefore, that this hydrological feature had a significant influence on settlement patterns in the western Colorado Desert during at least the late Archaic. Evidence of Archaic habitation at the Indian Hill and Tahquitz Canyon rockshelter sites indicate that adjacent mountain areas were also used by prehistoric groups during the middle to late Archaic.

Late Prehistoric/Protohistoric Period

The Late Prehistoric and Protohistoric periods are represented in this region by the Patayan Complex. These periods date from approximately 1500 B.P. until the American expansion into the area at the turn of the nineteenth century. The Protohistoric Period encompasses a protracted 300-year-long period of sporadic European exploration and colonization that had little effect on aboriginal lifeways in the Southern California deserts.

Compared to those shifts noted for the middle and late Archaic Period, the changes occurring at the onset of the Late Prehistoric Period were rather abrupt. The magnitude of these changes and the short period of time within which they took place seem to indicate a significant alteration in subsistence practices circa 1500–1300 B.P. The changes observed in the archaeological record in the San Diego area during the Late Prehistoric Period include: a shift in settlement patterning indicative of population increases; a shift from hunting using the atlatl and dart to using the bow and arrow; a reduced emphasis on shellfish gathering along some areas of the coast (possibly as a result of silting-in of the coastal lagoons); the introduction and production of pottery; an increase in storage of principal foodstuffs, such as mesquite, acorns, and piñon nuts; a shift in burial practices from inhumation to cremation; and, along the Colorado River, a change in economic and settlement patterns that involved subsistence expansion and the adoption of floodplain horticulture (Gallegos 2002; McDonald and Eighmey 1998; Schaefer 1994).

In the Coachella Valley and Salton Basin area, the Late Prehistoric Period is associated with the periodic infilling and emptying of Lake Cahuilla. This substantial hydrological feature is seen as recurrently altering the course of human settlement in the area during the period (Schaefer and Laylander 2007:250–251). During times of lake absence, settlement appears to have been characterized by the occupation of semi-sedentary villages along major water courses and around springs with adjacent montane areas seasonally occupied to exploit mesquite, acorns, and piñon nuts. Tahquitz Canyon in the mountainous area west of the Salton Basin has been documented as having been an important population center during the Late Prehistoric Period (Bean et al. 1995).

Schiffer and McGuire (1982:216–222) and Waters (1982a) used a chronology originally proposed by Rogers (1945) to divide the Late Prehistoric Period in the Colorado Desert area based on the progression or changes in development of ceramic types. Referring to the period as "Patayan" (instead of the term "Yuman," used by Rogers), three phases were defined that were correlated with fillings and desiccations of Lake Cahuilla. These phases include:

- **Patayan I** begins at approximately 1200 B.P. with the introduction of pottery into the Colorado Desert. Sites dating to this phase appear to be limited mostly to the Colorado River area.
- **Patayan II** coincides with an infilling of Lake Cahuilla around 950 B.P. As described previously, the lake covered much of the Imperial Valley and created an extensive lacustrine environment that is thought likely to have attracted people from the Colorado River area. New pottery types appear at this time as a result of local production along the lakeshore and technological changes in the Colorado River area. Subsequently, Lake Cahuilla experienced several fill/recession episodes before its final desiccation.
- **Patayan III** begins around 500 B.P. as the lake receded. Colorado Buff ware became the predominant pottery type during this time period across the Colorado Desert and along the Colorado River. Several Patayan II pottery types continue into the Patayan III (Waters 1982a, 1982b).

This chronological scheme has served as a useful tool for organizing archaeological assemblages in the area. However, Schaefer and Laylander (2007:252–253) noted that data obtained from more recent archaeological investigations highlight some serious discrepancies with its use (e.g., Hildebrand 2003).

As previously noted, the beginning of the Late Prehistoric Period in the San Diego County area is marked by the appearance of several new tool technologies and subsistence shifts in the archaeological record. Movements of people during the last two millennia can account for at least some of these changes. Yuman-speaking people have occupied the Gila and Colorado river drainages of what is now western Arizona at least 2000 years ago (Moriarty 1968); over time, these groups appear to have migrate westward through the Colorado Desert and the mountains of the Peninsular Ranges to the coast. An analysis by Moriarty (1966, 1967) of materials recovered from the Spindrift Site in La Jolla indicated a preceramic Yuman phase. Based on his analysis and a limited number of radiocarbon samples, Moriarty concluded that Yumans, lacking ceramic technology, penetrated and occupied what is now the San Diego coastline circa 2000 B.P. Subsequently, by approximately 1200–1300 B.P., ceramic technology diffused into the coastal area from the eastern deserts. Although these Yuman speakers may have shared cultural traits with the people occupying what is now eastern San Diego County before 2000 B.P., their influence is better documented throughout present-day San Diego County after 1300 B.P. with the introduction of small points, ceramics, Obsidian Butte obsidian from the Salton Basin, and the practice of cremation of the dead.

Two distinct archaeological complexes have been proposed for the Late Prehistoric Period in what is now San Diego County. The Cuyamaca Complex is based on analysis by True (1970) of archaeological excavations undertaken in the Cuyamaca Rancho State Park and analysis of archaeological collections at the San Diego Museum of Man. Using data from this study, True (1970) was able to define a Late Prehistoric Period Complex for southern San Diego County. This complex differs from the San Luis Rey Complex, which Meighan (1954) identified in the northern portion of the county. The two complexes are primarily differentiated by the presence or absence, or differences in the relative occurrence, of certain diagnostic artifacts in site assemblages. For example, Cuyamaca Complex sites generally contain both Cottonwood Triangular-style and Desert Side-notched arrow points, while Desert Side-notched points are quite rare or absent in San Luis Rey Complex sites (Pigniolo 2001). Other examples include use of Obsidian Butte obsidian, which is far more common in Cuyamaca Complex sites than in San Luis Rey Complex sites and ceramics. While ceramics are present during the Late Prehistoric Period throughout the region, pottery occurs earlier in time and appears to be somewhat more specialized in form at Cuyamaca Complex sites. Burial practices at Cuyamaca Complex sites are almost exclusively cremations, often in special burial urns for interment. In contrast, archaeological evidence from San Luis Rey Complex sites indicates use of both inhumation and cremation. Based on ethnographic data, it is now generally accepted that the Cuyamaca Complex is associated with the Yuman Diegueño/Kumeyaay and the San Luis Rey Complex with the Shoshonean Luiseño/Juaneño.

Compared to Archaic Period sites, Late Prehistoric Period sites attributable to the San Luis Rey or Cuyamaca complexes, while not absent, are less common in the near-coastal areas of the county. As noted by Gallegos (1995:200):

> "for San Diego County, there is temporal patterning, as the earliest sites are situated in coastal valleys and around coastal lagoons. Late Prehistoric Period sites are also found in coastal settings but are more common along river valleys and interior locations."

In contrast, numerous Late Prehistoric Period sites, attributable to the San Luis Rey or Cuyamaca complexes, have been identified in the inland foothill areas of the region (e.g., Carrico and Cooley 2005; Chace and Hightower 1979; Cooley and Barrie 2004; McCown 1945; McDonald et al. 1993; Raven-Jennings and Smith 1999; Willey and Dolan 2004).

Ethnographic Context

Schaefer (2006:21) has previously indicated that the location of the Project Application Area is in a boundary area of the traditional territories of two tribal groups, the Yuman-speaking Tipai (Kamia) to the south and the Shoshonean-speaking Cahuilla to the north (Schaefer 2006:21). Schaefer's use of the term "Tipai" has evolved in the literature, through time, as the one applicable to the people living in the area of eastern San Diego and Imperial counties. A third Yuman-speaking group, the Cocopah, also have ties to the Project Application Area.

The general early term applied for the Yuman-speakers in the area was "Diegueño," from the mission with which they came to be associated, the San Diego Mission de Alcalá. This term was later adopted by anthropologists (e.g., Kroeber 1925) and further divided into the southern and northern Diegueño. Subsequently, Shipek (1982) initiated the use of a Yuman language term, "Kumeyaay," for the people formerly designated as the Diegueño. According to Carrico (1998:V-3):

> "The linguistic and language boundaries as seen by Shipek (1982) subsume the Yuman speakers into a single nomenclature, the Kumeyaay, a name applied previously to the mountain Tipai or Southern Diegueño by Lee (1937), while Almstedt (1974:1) noted that 'Ipai applied to the Northern Diegueño with Tipai and Kumeyaay for the Southern Diegueño. However, Luomala (1978:592) has suggested that while these groups consisted of over 30 patrilineal clans, no singular tribal name was used and she referred to the Yuman-speaking people as 'Ipai/Tipai…"

Other researchers designated the Kumeyaay living north of the San Diego River as 'Ipai (Northern Diegueño) and those living south of the river and into Baja California as Tipai (Southern Diegueño) (Hedges 1975:71–83; Langdon 1975:64–70). Gifford (1931) designated the Kumeyaay living in the eastern San Diego and Imperial counties as the Kamia, who were distinguished by a desert orientation, with contacts and travel most frequently between eastern San Diego County and the Imperial Valley. This term has generally been replaced with the designation of eastern Kumeyaay or Tipai (Gifford 1931:2; Hedges 1975; Langdon 1975; Luomala 1978). Recently, however, Schaefer (2006:25) stated that:

> "The Kamia specifically were also directly related to the Tipai (southern Kumeyaay) of the mountains and coastal areas of San Diego County and northern Baja California. Their dialect, however, is closely related to the Cocopah and other delta Yumans"

According to Schaefer (2006:21), the Tipai (Kamia) and the Cahuilla "consider the cultural resources of the general area as part of their cultural and historical legacy." As such, both groups are described herein.

Cahuilla

The Cahuilla are a subgroup of the Takic family of the Uto-Aztecan stock and are therefore closely related linguistically to other "Shoshonean" speaking groups including the Gabrielino, Luiseño, and Serrano. These Takic-speaking groups are thought to represent a migration into the area occurring approximately 1500 B.P. (Schaefer 2006:21). According to Schaefer (2006:22):

> What role these Takic speakers had in the development of the Patayan pattern in the Colorado Desert remains unclear, although it may have been considerable. The ancestors of the Colorado River Yumans are most often identified as the source of ceramics, cremation practices, agriculture, some architectural forms, and some stylistic and symbolic representations. The Takic migrations may coincide with the introduction of bow-and-arrow technology, but no direct association can be made. They may have contributed specific hunter and gatherer techniques as well as cosmological and symbolic elements to the Patayan cultural system.

The diversity of Cahuilla territory reflects the range of environmental habitats in inland Southern California. Topographically, their territory ranged from the summit of the San Bernardino Mountains to the Coachella Valley and Salton Sink. Ecological habitats included the full range of mountains, valleys, passes, foothills, and desert areas. Villages were typically situated in canyons or on alluvial fans near water and food resources, and a village's lineage owned the immediately surrounding land (Bean 1978). Well-developed trails were used for hunting and travel between settlements. Village houses ranged from brush shelters to huts 15–20 feet long. Important plant foods exploited from the Cahuilla's diverse habitat included mesquite and screw beans, piñon nuts, and various cacti. Other important plant foods included acorns, various seeds, wild fruits and berries, tubers, roots, and greens. Women were instrumental in the collection and preparation of vegetal foods.

Cahuilla settlement and subsistence patterns were impacted by fill and recession episodes of Lake Cahuilla. When the lake was present, the desert area becoming a more productive resource area. Schaefer (2006:22) states that "Cahuilla mythology and oral tradition also indicate that when Lake Cahuilla dried up, it was the mountain people who resettled the desert floor. The time of Lake Cahuilla is also best documented in the oral traditions of the Cahuilla, both with regard to settlement patterns, song cycles, and the effects of Lake Cahuilla on patrilineal clan segmentation." According to Strong (1929:36), "the derivation of the term Cahuilla is obscure, and it is regarded by the Indians to be of Spanish origin."

The earliest Spanish contact with the Cahuilla may have been with the Juan Bautista de Anza expedition trips in 1774 and 1777. The route followed San Felipe Creek adjacent to Carrizo Creek and then through Borrego Springs, up into the San Jacinto Mountains (Pourade 1962:164; Schaefer 2006:23). The impact of the Spanish mission system and colonization was much less immediate and profound among the Cahuilla compared to Native American groups residing along the coast. It was not until 1819, after the establishment of the San Bernardino estancia and cattle ranch at San Gorgonio, that a more direct Spanish influence was felt. By 1823, members of the Romero Expedition documented that the Cahuilla at Toro were growing corn and melons and were already familiar with the use of horse and cattle, indicating a familiarity with Hispanic practices (Bean and Mason 1962).

During the Spanish Period and into the Mexican Period, political leadership became more centralized as Juan Antonio from the Mountain Cahuilla and Chief Cabazon in the desert emerged as central figures (Strong 1929). Juan Antonio's group played a significant role during the Mexican American War, siding with the Mexicans against the Luiseño who supported the American invasion (Phillips 1975). Along with the rise of powerful chiefs and political restructuring, Mexican language, clothing, and food were incorporated into traditional culture during this era.

With the 1848 signing of the Treaty of Guadalupe Hidalgo, the U.S. Government promised to preserve the liberty and property of the inhabitants of California. In 1952, a treaty was drafted to settle land rights issues for the Cahuilla (as well as Serrano and Luiseño). The treaty was never ratified by Congress and the best farming and grazing lands were claimed by Euro-American settlers. In addition, Executive Orders enacted in the 1960s and 1970s resulted in the establishment of reservations that substantially reduced Cahuilla land. The result of these orders created a checkerboard of 48 sections of reservation lands spread across the eastern edge of the Santa Rosa and San Jacinto mountains and the Coachella Valley (Cultural Systems Research, Inc. [CSRI] 1983). Although various modifications have occurred over time, this has remained the permanent home of the Cahuilla to date.

Tipai/Ipai (Kamia)/Kumeyaay

The Tpai-Iipai/Kumeyaay were also hunter-gatherers who seasonally altered between the mountainous western portions of their territories and the eastern desert areas to maximize resource exploitation. Similar to the Cahuilla, the lifeways of the Tpai-Iipai/Kumeyaay were impacted by the fill and recession of Lake Cahuilla. Schaefer (2006:26) states that "Lake Cahuilla figures prominently in the Kamia's origin myth (Gifford 1931:75–83) and except for the Cahuilla, represents the only other major recorded oral tradition regarding the ancient lake." The Tipai/Kamia were closely connected to the Quechan on the Colorado River and served as trading partners between the coastal and desert groups, using a travel route through the Mountain Springs Grade. These trading partners also were frequently politically allied against other groups to the north and south (Cook et al. 1997:9). The earliest Spanish contact may have been in 1785 by Pedro Fagés or during the Anza expedition journeys in 1774 and 1777 (Cook et al. 1997; Schaefer 2006). By this time, the Tpai-Iipai/Kumeyaay were hostile to the Spaniards and were in alliance with other groups, actively resisting Spanish rule in the area. In 1775, this resistance culminated in open revolt when tribal members from at least 14 local villages banded together and attacked, and burned, the Mission San Diego de Alcalá (Carrico 2008:32–33). The Tipai-Ipai/Kumeyaay continued to resist European and Anglo rule through the Mexican Period and into the American Period.

Although Mexico's governance of Alta California did not last long, it did help to cement the changes brought by the Spanish missionization and colonization of the area. One major alteration occurred in 1835 when the missions were secularized, and their large land holdings were made available to private citizens. Although some large grants of land were made prior to 1834, secularization of the mission's large grazing holdings ushered in the Rancho Era.

One impact was the dissolution of the mission as a residential and labor center for territorially disenfranchised Native Americans. Many mission neophytes had little option but to work on the new Mexican ranchos. Communities living farther from the ranchos were able to maintain their traditional lifeways for a bit longer. New ranches put new pressures on California's native populations, as grants were made in inland areas still occupied by the Kumeyaay, forcing them to acculturate or relocate farther into the backcountry. In rare instances, former mission neophytes were able to organize pueblos and attempt to live within the new confines of Mexican governance and culture. The most successful of these pueblos was the Pueblo of San Pasqual, located inland along the San Dieguito River Valley, founded by Kumeyaay who were no longer able to live at the Mission San Diego de Alcalá (Carrico 2008; Farris 1994).

During the American Period, railway systems began to connect the people and products of Southern California to the rest of the United States. Increased American settlement and claims on the land for residential, mining, agricultural, and ranching purposes in the second half of the nineteenth century meant that many remaining lands sustaining Native American populations were marked, surveyed, or even fenced as private, again changing the landscape of what are now San Diego and Imperial counties. Native American reservations were established, ostensibly to provide land for Native American populations, but these holdings made available only the poorest of subsistence lands and forced many indigenous peoples to adopt a more sedentary lifestyle, reliant on the Anglo economic system as an alternative to moving to reservations (Carrico 2008).

Quechan

According to Quechan oral tradition, their territorial range extended along the Colorado River from Blythe in the north to Mexico in the south. At the time of sustained European contact in the seventeenth century, the Quechan people numbered in the thousands. The largest concentration of Quechan traditionally lived at the confluence of the Colorado and Gila rivers, although they were strangely not reported in that area in 1540, when the Alacon and Diaz expeditions reached the confluence (Forbes 1965; Forde 1931). Nevertheless, in the following century, large Quechan villages existed in the area.

The Quechan economy was based on a combination of horticulture, fishing, and gathering. During the winter and spring, Quechan groups lived in seasonal village settlements located on terraces above the river floodplain. After the spring floods receded, small family groups dispersed to their agricultural plots along the river to plant crops. After the harvest in the fall, the Quechan gathered again in the large villages on the terraces, where stored agricultural foods, fishing, and limited gathering allowed them to live together through the winter (Bee 1983; Forde 1931). In all times but high flood, fishing in the Colorado River provided an important source of protein.

Numerous named villages were located along the terraces above the lower Colorado River flood zone. The village known as *Avi Kwotapai* was located on the west side of the Colorado River between Blythe and the Palo Verde Valley, and *Xenu mala vax* was on the east side of the river near present-day Ehrenberg (Bee 1982). Quechan and other Yuman-speaking groups report well-traveled trails that extend along the Colorado River, as well as trail networks between peaks and other significant landscape features (see discussions in Cleland and Apple 2003). Primary ethnographic sources for the Quechan include Bee (1983), Castetter and Bell (1951), and Forde (1931).

The contemporary Quechan community is concentrated in the lands of the Fort Yuma-Quechan Reservation and has its main headquarters in Fort Yuma, Arizona. The reservation is approximately 45,000 acres and is located along the lower Colorado River in both Arizona and California just north of the United States/Mexico border.

Cocopah

The Cocopah Indian Tribe, also known as the *Xawiłł Kwñchawaay* ("Those Who Live on the River"), *Kwapa*, or River People, is a federally recognized tribe located on the three-part Cocopah Indian Reservation in Arizona (Kelly 1977; Tisdale 1997; Wright and Hopkins 2016). This reservation has two sections on the Mexico-Arizona border, the first a short distance northwest of Yuma and the second to the south along the east bank of the Colorado River. The third section is off the river to the east near the city of Somerton. An additional group of Cocopah people resides west of the Mexico-Arizona border in Baja California in *ejidos* and *colonias* (Tisdale 1997).

The Cocopah are Yuman speakers that lived for centuries between the confluence of the Colorado and Gila Rivers, and the Colorado River delta in Mexico. Other Yuman speaking tribes that are closely related to the Cocopah include the Halyikwamai, Kumeyaay, and Kohuana (Golla 2011; Wright and Hopkins 2016).

The creation myths of the Cocopah tell of the existence of twin gods that emerged from beneath the water to create the earth, its creatures, things, and customs. However, much of the details of the Cocopah creation myth was not preserved in oral histories or their song cycles. This is due to their beliefs concerning death that prevent any direct mention of the deceased and because informants told ethnographers that they should not share stories that they had only heard, but not formally learned (Gifford 1933; Kelly 1977; Wright and Hopkins 2016).

Archaeological studies have suggested that the Cocopah migrated south from perhaps as far north as the Great Basin sometime between 3,000 and 2,000 years ago. They settled in the lower valleys of the Gila and Colorado rivers, residing there until they were forced south between A.D. 1400 and 1500 by other Yuman speakers who were displaced by the desiccation of Lake Cahuilla. While the Cocopah are hard to distinguish from other Yuman groups within the archaeological record, they associate themselves with the Patayan archaeological tradition. The Patayan Tradition is defined by traditions, lifeways, and material culture, such as household structures, funerary features, and pottery, which archaeologists have attributed to the Cocopah and other Yuman-speakers in the region (Alvarez de Williams 1983; Wright and Hopkins 2016).

Warfare was a common and important activity for the Cocopah that had spiritual origins reaching back to the time of their creation. The Quechan and the Mojave were considered hereditary enemies of the River People, as well as the Yavapai and the Chemehuevi. The Cocomaricopa, Xalychidom, and Akimel O'odham were considered allies (Alvarez de Williams 1983; Wright and Hopkins 2016).

The core of Cocopah traditional territory is within the lower Colorado River and Delta and was surrounded by a broader area that at times included the lower valleys of the Gila and Colorado rivers. However, their history of long-distance travel and trade gives cause to expand their area of concern significantly and they maintain a particular connection the Colorado River north of their territory and to the Great Bend area of the Gila River. These areas overlapped with other groups. For example, the Cocopah historically shared a fish and shellfish gathering area (Kwurksispeuwahan) with the Hia C'ed O'odham into the late 1920s (Wright and Hopkins 2016). The mountains surrounding their traditional territory are seen as the homes of deities, including Awikwame (Spirit Mountain/Newberry Peak, near Needles), Awikwil (near Laveen, south of Phoenix), Wii Shpa ("Eagle Mountain", Black Butte in Baja California, Sakupai (Mount San Jacinto), and Awichauwas ("Feather Mountain" near San Felipe in Baja California) (Gifford 1933; Wright and Hopkins 2016). Like other Yuman groups, they have narrative songs that connect oral histories with places in the landscape.

The Cocopah Tribe established their first constitution and a tribal council in 1964 under the Indian Reorganization Act. Between 1956 and 1985, the Cocopah gained legal access to more land, including an additional 4,800 acres through the Cocopah Land Acquisition Act which also annexed 61 acres near Yuma (North Reservation). Today, the reservation consists of three parcels amounting to 6,527 acres, of which 6,009 acres are trust land, which are located west, southwest, and south of Yuma, Arizona. In the 1970s and 1980s, the Cocopah Tribe began initiating economic development on their reservation through the installation of utilities, home construction, and infrastructure development (Tisdale 1997; Wright and Hopkins 2016). The Cocopah Reservation is located 13 miles south of Yuma, Arizona and is composed of the East, West, and North Reservation which border Arizona, California, and Mexico. There are now approximately 1,000 tribal members that live and work on or near the reservations.

During previous large-scale projects with significant environmental impacts, the Cocopah expressed concern for the lack of proper consideration of cultural resources. In particular, they stress the importance of considering the landscape as a whole rather than individual resources. They reference the significance of the deserts and mountains surrounding the Colorado River for prehistoric resource gathering, travel, and spiritual use, not only by the Cocopah, but also numerous other tribes in the region (Cocopah Indian Tribe 2024).

Historic Context

The history of the region is generally divided into Spanish (1769–1821), Mexican (1821–1846), and American (1846–present) periods. The Spanish Period is marked by the establishment of a mission and presidio on a hill overlooking San Diego Bay in July 1769. The Spaniards introduced European crops, cattle, and other livestock. The Mexican Period began in 1821 when Mexico achieved independence from Spain. During the 1820s, a small village began to form at the base of Presidio Hill that became the Pueblo of San Diego (present-day Old Town). The town served as a market center and port for numerous ranchos in the region that were chiefly employed in cattle raising for the exportation of hides and tallow. In 1846, San Diego was occupied by American troops and officially became part of the United States when the Treaty of Guadalupe Hidalgo formalized the transfer of territory from Mexico to the United States in 1848.

European contact with coastal southern California began as early as 1542, with the voyage of Juan Rodríguez Cabrillo. However, intensive interactions and contacts with interior areas only came after the establishment of the Spanish presidio and mission of San Diego in 1769. During the Spanish Period, exploratory probes into eastern San Diego County were made by Pedro Fagés and others, and the southern immigrant trail came into use by colonists from Sonora. Mission culture may have begun to impact Native culture on the western extreme of the Project Application Area.

In the 1800s, most travel from Arizona to San Francisco by Mexican soldiers, and later by American settlers, followed Anza's route, which is roughly 13 miles south of the Project Application Area in Mexico (NPS 2017). While the historic activity in the area during the early nineteenth century was limited primarily to travel with little settlement or resource exploitation, more intensive activity began in the 1820s, with the onset of limited placer mining in the eastern Colorado Desert. Early Spanish prospectors named the Cargo Muchacho ("loaded boy") Mountains after the gold they found there.

Mexico obtained independence from Spain in 1821. Soon thereafter, California's administrators began to shift their focus away from the Franciscan mission system and toward Hispanic lay settlement of the province. Avenues for foreign trade were opened, and private land grants became more numerous and extended farther inland from the coast.

During the Mexican American War of 1846–1848, California was occupied and subsequently annexed by the United States (U.S.). From the 1840s through the 1880s, the U.S. Cavalry established a series of camps and forts throughout Arizona, Nevada, and the California desert to protect settlers and immigrants from hostile tribes (Rice et al. 1996). Land ownership was complicated by this transition. The Treaty of Guadalupe-Hidalgo, signed in February 1848, obligated the U.S. Government to recognize legitimate land claims in Alta California. While Mexicans initially made up most of the population, the Gold Rush after 1849 stimulated large-scale immigration into the region. Despite large land holdings and a strong cattle industry, many Mexican landowners found themselves overextended when the northern California miners' demand for meat dwindled. To pay their taxes and bills, some were forced to offer up their lands at public auction (Garcia 1975:22). Small farmers had difficulty maneuvering through the process and acquiring land (Garcia 1975:16). Settlers increasingly squatted on land that belonged to Mexicans, citing their preemption rights, which was the tradition that squatters had the first opportunity to buy the unimproved, unclaimed land for a fair price before auction (Garcia 1975:22). Squatters increasingly challenged the validity of Spanish-Mexican claims through the Board of Land Commissioners created by the California Land Claim Act of 1851 (Garcia 1975:22-23). Most Californios did not retain their original land holdings by 1860, including Santiago Arguello, who was granted the former Mission San Diego land in 1846 and eventually lost $24,000 in property (Garcia 1975:24).

Following the establishment of forts throughout the area, the California desert region again opened for exploration and settlement. As part of an effort to establish a railroad route from St. Louis to the Pacific Ocean, the U.S. Government conducted a series of surveys between 1853 and 1855 to identify feasible routes. One of the railroad survey parties, led by Lieutenant R.S. Williamson, included a young geologist, William Phipps Blake, who was the first to identify the Salton Trough as an ancient lakebed (Cory and Blake 1915; Rice et al. 1996). It was during this time that the 1856 U.S. Government Land Office survey documented several historic trails within the region, as well as the Tipai settlement at San Sebastian Marsh (von Till Warren and Roske 1981; Warren et al. 1981).

By 1860, most of the land in San Diego region was unimproved farmland and some ranches (Garcia 1975:15). Settlement of the area occurred through homesteading primarily, which was authorized by the Homestead Act during the Civil War. The Timber Act, passed in 1873, also spurred settlement. It required a 10-year cultivation period of healthy trees. Some speculators and ranchers used this law as a way to obtain land for purposes other than what the patent stated. In the 1870s and 1880s, small farming communities were quickly established throughout San Diego County as settlers took up homestead claims on government land or small holdings purchased from real estate developers.

Significant economic development of the Colorado Desert region began in the 1870s and came to fruition in the early part of the twentieth century. Development was dependent largely on transportation and the availability of potable water. The first of these came in 1872 with the construction of the Southern Pacific Railroad from Los Angeles to present-day Indio, and eventually to Yuma. The early townsite of Indio, the midpoint between Los Angeles and Yuma, was created to provide living quarters for train crews and railroad workers. The first trains ran on May 29, 1876 (Pittman 1995:36). The Southern Pacific continued east, paralleling an 1857 road along the eastern side of the Salton Trough. Railroad stops were built at Walters (now called Mecca), Woodspur (Coachella), and Thermal, among others. The same large dunes that had hindered de Anza's expedition hindered construction of the railroad.

The Southern Pacific Railroad was finally forced to build along the eastern edge of what came to be known as the Imperial Sand Dunes. Railroad sidings in the area with names such as Glamis, Amos, and Ogilby developed into small company towns. The second Transcontinental Railroad was completed when the Southern Pacific and Atchison, Topeka, and Santa Fe Railroads were linked at Deming in New Mexico Territory on March 8, 1881, providing settlers relatively quick and easy access to the region. The citizens of Imperial Valley petitioned the Southern Pacific Company to build a branch line south, connecting the valley to the main Southern Pacific Railroad. In 1903, the line was completed from Old Beach (Niland) to Imperial. By 1904, the line had been extended to Calexico (Heath 1945). A branch line ran from El Centro to Seeley, connecting the Southern Pacific to the San Diego and Arizona Eastern Railroad (Farr 1918). The San Diego and Arizona Eastern Railroad ran from 1919 to 1983, connecting San Diego and Imperial Counties (Crawford 2010).

The completion of the railroad resulted in an unprecedented real estate boom for the city and county of San Diego. The population of San Diego swelled by 700 percent from 5000 in 1885 to 40,000 in 1889 (Hector et al. 2004:18). Most of the growth was concentrated in the coastal areas and adjacent inland valleys west of the present Project Application Area, but interior areas began to experience significant development during the first decade of the twentieth century, with the inauguration of an irrigation system tapping the waters of the Colorado River.

The County of Imperial was founded on August 15, 1907 from the eastern portion of San Diego County. It was the last county to be organized in California and measures 4,087 square miles in area (O'Dell 1957:8). Largely unoccupied by Euro-Americans through much of the early nineteenth century, the historic development of the western portion of the Imperial County has been influenced by three major water bodies. These include the Alamo River, Salton Sea, and the New River. All three landforms are the result of a manmade accident that occurred between 1905 and 1907.

The Alamo Canal, completed in 1901 by the California Development Company, was the first canal to serve Imperial County. By 1905, Imperial County had 80 miles of canals and 700 miles of distribution canals. Most of the water was redirected from Colorado River, providing water to 12 water districts that served Imperial Valley. During 1905 and 1906, a series of flash flood events on the Colorado River caused repeated breaches in the manmade levee system. As a result, the river changed course and most of its discharge flowed north until the levee system was finally repaired in early 1907. The result of these flood events was the formation of California's largest freshwater lake, the Salton Sea. Left on its own, the water in the Salton Sea would have eventually evaporated. But in 1928, Congress acted to designate the area as storage for wastes and seepage water from irrigated lands in Imperial Valley. Since then, the sea has been used mainly as a repository for agricultural wastewaters (Ponce 2005).

Prior to 1936, the water supply for the Imperial Valley was silt laden. The canal system quickly became clogged and dredging the system was difficult and expensive. The California Development Company did not have the financial resources to keep the system clear. As described above, construction of a new control gate in 1905, coinciding with unusually heavy floods, led the Colorado River to overflow its banks and flood the Imperial Valley. A total of 13,000 acres of irrigable land was destroyed as a result and an additional 30,000 acres left without a water supply. All crops were lost and by 1909, the California Development Company was bankrupted.

The Imperial Irrigation District (IID) was formed in 1911 under a state charter to acquire properties of the bankrupt California Development Company. By 1922, the IID had acquired 13 water companies and between 1930 and 1940, the All-American Canal (AAC) was built to replace the Alamo Canal (Dowd 1956:88). The AAC provided reliable water to the valley from the Colorado River and by 1942, became the sole source of imported water for the Imperial Valley. Today, approximately 1,667 miles of canals and laterals distribute irrigation water within IID's service area (Bureau of Reclamation n.d.).

4.3.2 Research Design for the Cultural Resources Inventory

A research design is an explicit statement of the theoretical and methodological approaches to be followed in a cultural resources study (OHP, 1990). Inventory studies, such as this one, rely on data from archaeological and historical resources visible on or above the ground surface with supplemental information provided by archival research and literature review (OHP, 1991). In such studies, the focus of the research design is to ensure the adequacy of the identification effort. Should any identified resources within the Project Application Area have sufficient age and integrity to warrant consideration for California Register of Historical Resources (CRHR) eligibility, then relevant research questions and data requirements may be posed to evaluate the significance of the resource and make recommendations regarding determinations of eligibility.

For the purposes of this study, four prehistoric research domains and one historic research domain were identified. Prehistoric research domain consists of: (1) Cultural chronology; (2) subsistence, settlement, and mobility; (3) lithic technology; and (4) trade and exchange. Agriculture and ranching are the historic research domains discussed in this study.

Cultural Chronology

Chronological information can be used to understand the trajectory and rate of cultural change and to establish relationships among sites at both a local and regional level. The oldest radiocarbon dates obtained in San Diego County indicate that the area has been occupied for over 9,000 years (Kyle et al. 1998; Warren and Ore 2011: Warren et al. 1998; Williams 2014). While such early dates are lacking for the western Colorado Desert, archaeologists Malcolm Rogers and Julian Hayden asserted that certain lithic assemblages found embedded in stable desert pavements were of great antiquity. The lack of sites with subsurface stratified deposits has precluded absolute dating methods for these types of sites. However, surface assemblages of biface projectile points stylistically associated with Early Archaic style projectile points in the Mojave Desert, including Pinto and Elko series, have been identified in the Salton Basin which may be indication of early use by prehistoric populations (Apple et al. 1997; Wahoff 1999). The further development and refinement of chronological sequences of prehistoric people in the western Colorado Desert region is an important research emphasis for the Project.

Chronology is of basic importance to any archaeological research endeavor because it provides a context for addressing many other research issues. Thus, the precision and accuracy of dates are critical because they form the baseline for the other research topics. For example, chronological data potentially can contribute to our understanding of the nature and timing of population movements in the area and can help to establish relationships among sites in the local or broader region. Chronological determinations may also assist in refining regional or local culture historical sequences.

Chronology building continues to be a major research emphasis in the western Colorado Desert. Most of the sites known in the region are surface sites consisting of small quantities of lithic and ceramic artifacts. As previously noted, stratified sites of any kind are very rare in the western Colorado Desert (Cleland and Apple 2003; Schaefer 1994). Thus, various factors have conspired to hinder the development of an adequate cultural chronology of the region.

One of the most important research goals of any prehistoric research program in the western Colorado Desert should be the refinement of the regional chronological framework. Any site that contains organic cultural remains suitable for radiocarbon dating could prove useful in this endeavor, as would any site with chronologically sensitive artifacts such as projectile points and ceramics. Beyond this general observation, key chronometric topics for the region are (1) the reliability of regional dating methods, (2) the earliest phases of human occupation of the region, (3) the poorly understood Archaic period occupation, and (4) a refinement of the regional ceramic sequence.

Absolute dating techniques are preferable to relative dating of diagnostic artifacts because absolute dating is an independent assessment of the age of the site. Radiocarbon dating is an extremely accurate and reliable method for establishing the age of organic materials (e.g., charcoal, wood, burned floral remains, bone, shell, organic-rich soil). Obsidian hydration is an alternative means of dating that can provide relatively reliable results, provided the source of the material is known and multiple samples are submitted to omit any outliers. Thermoluminescence dating of ceramics and fire-affected rock is a less common method for establishing absolute dates, but it can be effective and reliable when sample sizes are sufficiently large.

If there is no material appropriate for establishing absolute dates for a site, a relative chronology may be established by linking temporally diagnostic artifact types (e.g., projectile points, ceramics, shell beads, etc.) present at the site to the regional culture history. However, this latter relative dating method would be much less precise. Ideally, relative dating results from the site would support absolute dating results, so that ages obtained through radiocarbon, obsidian hydration, or thermoluminescence techniques can be used in conjunction with diagnostic time-marker artifacts to assess the overall age of a site.

The early- to middle-Holocene chronological sequences that are widely accepted for the Mojave Desert and southwestern Great Basin are largely based on changing projectile point forms, along with some other artifactual evidence, such as the increasing importance of stone milling technology, possible changes in the degree of formality in tools, and changing lithic raw material preferences. In contrast to the situation farther north, recognized middle-Holocene sites in the Colorado Desert are notably uncommon. Early- and middle-Holocene sites in the area are most likely to be recognized by diagnostic flaked lithic tools such as projectile points, as well as the absence of late prehistoric materials. When such sites are identified, finding appropriate strategies to arrive at absolute dates for such remains will be crucial.

The signature archaeological elements of Late Prehistoric occupations include human cremation (in place of inhumation), small projectile points (indicating the replacement of the atlatl and dart by the bow and arrow), and pottery. Well-dated sites in the Coachella Valley support the proposition that pottery was not widely used until ca. A.D. 1000, although the tradition is presumed to have been present on the Colorado River by ca. A.D. 500. One aspect to be considered in the introduction of ceramics is the attraction of Lake Cahuilla for groups living on the lower Colorado River; the lake undoubtedly afforded greater opportunity for cultural interaction, which may have included the sharing of Colorado River pottery and pottery traditions. Absolute dating of archaeological deposits that contain diagnostic Late Prehistoric remains, as well as late Holocene deposits that lack some, or all, of these diagnostic materials, will be the key to refining the regional chronology. Relative dating, for instance, based on intra-site vertical superposition or inter-site horizontal contrasts, may also shed light on the sequence in which the Late Prehistoric innovations occurred.

Site types that may be associated with this research domain include temporary camps and habitation sites, lithic scatters and flaking stations with obsidian or temporally diagnostic projectile points, ceramic scatters and pot drops, thermal features containing dateable organic materials or fire-affected rocks, and cremations or human remains.

Research Questions:

- When was the site used? Which cultural period (Paleoindian, Early or Late Archaic, Late Prehistoric/Protohistoric) or complex (San Dieguito, Pinto, Amargosa, Patayan) does the site represent? Does the site consist of single or multiple components?
- Is there chronological evidence to suggest intermittent use of the site or extended use over a period of time?
- Do the chronological data at the site contribute to our understanding of the relationships between different periods or phases within established cultural sequences, or between archaeological sites in this region?
- Taken as a group, do chronological data from the sites examined here suggest patterns in the prehistoric use of the area? Which periods are well-represented with available dates, and which are not represented at all?
- When did the changes in material culture that distinguish the Late Prehistoric period manifest themselves in the Project area? Did these changes appear simultaneously, or did their adoption span a period of several centuries, or even

longer? If the changes were not original, local innovations, from what direction(s) did they come?

It is anticipated that the types of data needed to address these questions will derive primarily from in-field analysis of surface artifacts that are temporally diagnostic, including projectile points, beads, milling tools, or pottery that has stylistic attributes. Degree of patination on lithic materials may also be indicative of age. Later sites within this period also show greater richness of the types and functions of lithic artifacts within their assemblages (Schaefer 2006). The presence of obsidian artifacts (i.e., Obsidian Butte materials) may also provide chronological information. If subsurface testing is required as part of the evaluation process, then radiocarbon samples (i.e., charcoal or other organic material) may be obtained that could be beneficial in addressing questions related to chronology.

Subsistence, Settlement, and Mobility

Environmental conditions influencing prehistoric use and occupation of the Project Application Area and surrounding regions changed over the millennia. Paleoenvironmental, paleobotanical, and geomorphologic investigations suggest that the climate, vegetation, and landscape of the Southern California region changed dramatically at the end of the Pleistocene, from wet and cool conditions to a drier and warmer regime. Schaefer (2006) has drawn attention to this variability as important in understanding changing land use in the western Colorado Desert. Paleoenvironmental reconstruction, based on data from adjacent desert areas, has suggested that the latest period of prehistory (circa 800–200 B.P.) was particularly prone to decadal to century-long variability in precipitation, with two particularly significant drought cycles occurring during the Medieval Climatic Anomaly (Jones et al. 1999; Stine 1994).

Human responses and adaptations to changing environmental conditions would most likely be evidenced in changes in subsistence and settlement practices. Subsistence and settlement systems of hunter-gatherer societies are flexible, ranging in a spectrum from “foragers” to “collectors,” with foragers primarily employing a strategy of movement of the group to resource patches, and collectors moving resources to residential areas (Binford 1980). Archaeological sites that exhibit a rich, diverse, and dense collection of artifacts and features can potentially be indicative of a more permanent habitation site. Archaeological sites with more limited material culture could indicate the location of a temporary or seasonal encampment or site. It is also important to note that the development of modern infrastructure (i.e., roads, gas lines, bridges, etc.) have altered the hydrographic features of the desert landscape. This may have the effect of obscuring the locations of prehistorically favorable washes that would have supported a variety of plant and animal resources. Researchers should consider these landscape alterations in examining prehistoric settlement and land use issues.

Beyond the depositional and cultural historical considerations, the recordation and excavation of sites potentially provides valuable information regarding prehistoric behaviors. Here, the focus is on elucidating aspects of the subsistence economy and settlement strategies on a seasonal basis. Such analyses provide a context to better understand the diet of the prehistoric inhabitants at a site, as well how they positioned themselves in relation to the biotic resource structure (plants, animals) on a seasonal basis. Understanding the season during which plant resources were ripe and available for processing can provide valuable information on settlement strategies. Such analyses provide clues to which resources were available and when the Project Application Area likely had the most food resources seasonally available. They also can provide an estimate as to where sites might fall in the overall settlement pattern or seasonal round.

The Project area may only encompass a small part of a prehistoric population's territory. As such, archaeological sites within the Project Application Area may only represent a portion of a much larger prehistoric settlement system.

Understanding settlement patterns will require chronological control to ascertain which sites were occupied during the same periods. In addition to preservation of faunal and botanical material (e.g., pollen or macrobotanical remains) that help to identify the local resource base, specialized studies of certain tool types provide important information useful for expanding on the subsistence strategies used at a site. For example, ground stone can be analyzed for the presence and variety of starches, phytoliths, pollen, and protein residues. These analyses potentially indicate whether ground stone tools (e.g., manos, metates, mortars) were used to process plants (e.g., seeds, roots, tubers) or animals, and provide insights about the past climate. Protein residue analysis conducted on chipped stone tools provides insights into the types of animals (usually identified to the family level, sometimes to the species level) a tool was used to process.

The Project is in an area that has been categorized as a resource procurement area for highly mobile desert groups and the more sedentary Colorado River populations. The Project Application Area lies approximately one mile east of the prehistoric shoreline of Ancient Lake Cahuilla (URSpatial 2015; Rockwell et al. 2022). According to current knowledge, the area was used most intensively in the Late Prehistoric and Protohistoric periods (Singer 1984). Nevertheless, archaeological research in the western Colorado Desert has only begun to address the use of low-yield desert pavement regions with few resources, minimal evidence of human habitation, and no nearby water (e.g., Flenniken and Spencer 2001; Singer 1984).

Site types in the vicinity that may relate to this research domain include temporary camps and habitation sites, lithic scatters and flaking stations, ceramic scatters and pot drops, cleared circles, rock rings, and thermal cobble features.

Research Questions:

- What was the function of the site? How are these functions evidenced by the artifact and features at the site (e.g., chipped stone, ground stone, bone tools, flaked stone tools with use wear, shell, unmodified faunal bone, or features such as hearths, storage pits, or burials)?
- What was the subsistence economy at the site, and did it change through time? Did it correlate with a specific season or seasons? Did the patterns of resource exploitation undergo significant changes during the prehistoric period, perhaps

becoming more or less intensive or extensive in response to demographic changes, shifts in the technologies available for their exploitation, or the scheduling demands of agriculture?

- What types of chipped stone artifacts are present at the site, and what cultural activities do these artifact types represent? Are the represented chipped stone types indicative of lithic tool manufacture, retouching, and/or use?
- If utilized flakes or utilized tools are present, what resources were processed with them?
- Does the site reveal evidence of intraregional interaction and/or mobility? Are artifacts of nonlocal material or type present at the site? If so, can the source of these materials be ascertained? What types of tools are made from exotic materials?
- Are patterns in site function discernable when contemporary sites are analyzed as a group? What resource procurement and mobility behaviors are suggested by this pattern? Which areas were a focus of sedentism and which were a focus of resource gathering?

Data requirements involve accurate mapping of all resources located, including point provenience mapping of loci, features, and diagnostic artifacts identified within sites. Documentation of artifact types and counts will support analysis of relative site richness, and specific constituents of artifact assemblages could allow sites to be interpreted and categorized by function. Additionally, any potential food remains, such as bone and shell, should be documented and species tentatively identified. Any potential stream channels noted should be mapped and analyzed for correlations with the locations of other resources.

Lithic Technology

Mobile hunter-gatherers and part-time agriculturalists organized the procurement, manufacture, and discard of flaked stone tools with regard to a number of factors: the relative availability and quality of toolstone within a territorial range; the intended tool functions; the extent and character of trade networks; the frequency and nature of residential moves; the organization of work groups; and the nature of labor division based on age, gender, and status (e.g., Bamforth 1990; Beck et al. 2002; Eerkens et al. 2007; Kelly, 1988). Therefore, the material remains of lithic tool production, use, refurbishment, and disposal aid in the understanding of more general questions regarding group territoriality, mobility, settlement patterns, social organization, and trade and exchange. For example, research suggests that highly mobile peoples often make new tools to replace broken or exhausted tools when they encounter high-quality toolstone (Kelly and Todd 1988). In doing so, they discard curated tools, often from distant sources, and create a concentration of tool-making debris.

Binford (1979) has described how lithic procurement could be “embedded” within the organization of basic subsistence strategies, being scheduled and accomplished at little cost while people were in the process of securing food resources. Embedded procurement can be contrasted to a “direct” strategy in which people made planned, specific trips to lithic source locations for the sole purpose of obtaining stone. The use of an embedded procurement strategy implies greater residential mobility and a lithic technology designed for portability and either flexibility or versatility (Kelly 1988), while direct procurement infers an importance of logistic mobility and a more diverse technology designed for reliability (Kelly 1983). Therefore, changes in toolstone procurement behavior may reflect a variety of social changes, including an intensified use of a more restricted territory, a reorganization of seasonal subsistence-related mobility, a change in social relationships between groups, or changes in the subsistence base such as the inclusion of horticulture.

Unlike most flaked stone tools, which are relatively lightweight and easily transported, ground stone tools are heavy. Mobile groups rarely carry ground stone tools with them as they move from camp to camp, preferring to leave the tools behind at habitation locales to which they intend to return (AECOM 2016). Thus, ground stone tools are often excellent indicators of relatively intensive or long-term habitation. In addition to studying ground stone tool use and disposition, archaeologists have also investigated the production of ground stone tools in the western Mojave Desert. In the study by Pendleton et al. (1986), a manufacturing area of ground stone artifacts was documented in the Chocolate Mountains north of the Project area. Located in an area containing extensive lava flows of mostly basalt, production appears to have focused on the manufacture of manos. Dozens of what appeared to be flaking stations were observed to be present that were characterized by large flakes and lozenge-shaped cores that were often found in a broken state.

The material being worked was almost exclusively vesicular basalt with angular cobbles of this same material functioning most often as the hammerstones used in the manufacturing process. It appeared that the time-consuming final stage of pecking and/or shaping the milling implements into final form likely occurred at home bases away from the quarries. A second ground stone manufacturing study was conducted in the eastern Colorado Desert adjacent to Colorado River (AECOM 2016). The study found that ground stone tools were nearly exclusively produced from cobbles obtained from alluvial fans and washes. Cobbles of volcanic, granitic, schist, or sandstone materials, which appear to have been selected because they had a natural tabular shape, were obtained for use as metates with the margins of some flaked by percussion, apparently not for shaping, but to reduce weight and increase their portability. This selection of naturally tabular materials and then the use of percussion flaking to further decrease their weight, suggests an importance for easier transport to facilitate the mobility of the groups using these tools.

Site types that may relate to this research domain include habitation sites with lithic production debris, quarry and lithic procurement sites, and lithic scatters and flaking stations.

Research Questions:

- Can remanufacture of earlier projectile point forms be identified in any recovered projectile points? If so, are such artifacts found in sufficient numbers to skew chronological data derived from projectile point styles?
- Does the lithic assemblage present at sites reflect material acquisition and initial reduction, or subsequent tool manufacture or reshaping?

- Do prehistoric sites identified in the Project area show a preference of locally accessible materials for the manufacturing or processing of lithic tools? If so, are there any sites that exhibit a combination of local and imported lithic material?
- Is it possible to determine site functionality based on the stages of lithic reduction, as determined by the analysis and documentation of debitage, tools, and other implements present?
- Can diagnostic lithic tools such as projectile points, bifaces, unifaces, or other such items be identified at prehistoric sites, and can these artifacts provide information regarding manufacturing techniques or technology that is believed to be of local origin? Are there diagnostic indicators of technological manufacture techniques or objects that might originate outside of the region and are therefore related to the importation of ideas? If imported, can the region of origin be identified?
- Is there a correlation between material selection and artifact function?
- Are different core reduction technologies apparent in the lithic assemblages examined? How are these related to the size and shape of the source materials chosen for reduction? What regional patterns of material exploitation are suggested by comparing contemporary assemblages across sites?
- Is there any evidence that scatters of flaked stone are the result of ritual activities?
- What types of flaked stone tools are present? Are the tools expedient types, suggesting that they were manufactured, used, and discarded on site, or were they curated types that were intended for later use elsewhere? What regional patterns of tool production and use are suggested by comparing contemporary assemblages across sites?
- Are ground stone implements present that may indicate repeated or relatively intensive habitation? Do the type and size of these implements provide evidence of the plants that were being processed or the seasons in which the area was occupied? What regional patterns of ground stone tool production and use are suggested by comparing contemporary assemblages across sites?

The data required to address these questions would be generated from the diagnostic stylistic attributes of flaked stone artifacts such as projectile points. Additionally, tallies of lithic artifacts by type would be required to assess the relative richness of assemblages at different sites. The reduction stage of each artifact should be noted so the relative prevalence of percussion reduction as opposed to pressure flaking can be analyzed. Additionally, the specific material that lithic items are made from should be documented.

Trade and Exchange

Lithic raw materials that may occur at sites in the Project Application Area may have been procured from distant quarry sources by travel or trade. For example, cryptocrystalline silicates (CCS) materials such as wonderstone are known to be present in bedrock sources nearby the Carrizo Creek region (Pigniolo 1995), or from a quarry source in Mexico (Apple et al. 1997; Pigniolo 1995; Schaefer and Laylander 2007). More distant CCS sources include gravels present along the Colorado River to the east (Singer 1984:42). A prehistoric quarry site CA-SDI-12377, located to the west in the mountain foothills of San Diego County, is a known source for a CCS material sometimes referred to as "Proctor Valley chert" (Carrico et al. 1993b).

Materials such as obsidian, while not immediately available locally, could have been obtained by limited travel to or trade from, the Obsidian Butte quarry source located along the southeastern margin of the Salton Sea. This source, however, was unavailable periodically when it was inundated by Lake Cahuilla. Obsidian originating from Eastern Sierran sources (e.g., Coso and Casa Diablo) could also be present at Project sites which would be indicative of an even more extensive trade network.

Ground stone tools were likely made mostly from local sources, either from sandstone slabs or from granitic rocks, likely available as cobbles eroded from the Peninsular Range Mountains. Soapstone (steatite) objects such as beads or arrow-shaft straighteners have possible sources in the Cuyamaca Mountains and/or Jacumba Valley, or they can come from more distant sources such as Santa Catalina Island.

Another raw material of importance was clay for ceramics. Ceramics made from clays sourced to the Salton Basin area have been documented at coastal sites to the west (Cooley and Barrie 2004:40) and the Colorado River area to the east (; Townsend 1986:195; Waters 1982b:565), an indication of travel and/or trade of these materials.

Thus, these toolstone and ceramic materials may come from both relatively local and more distant sources, suggesting local procurement and possible travel and/or trade to and from more distant locales.

Site types that may relate to this research domain include trails and sites with non-local toolstone, ceramic, and shell materials.

Research Questions:

- Are non-local obsidian and local CCS tools or debitage present that may provide evidence of long-distance trade or external relationships with other groups?
- Do the non-local sources of toolstone change through time, and/or is there an increasing emphasis on the use of local materials?
- Does the presence of other exotic materials, such as shell or steatite, illustrate these trade networks and the distances travelled?
- Are ceramics with vessel types or clays from non-local sources present in the sites that may be indicative trade long-distance trade or local relationship networks for such materials within the Colorado Desert and San Diego mountain areas?

For a site to be able to answer the above research questions and increase our understanding of past cultures or life ways, the site must contain non-local materials, including obsidian from identified sources and other exotic materials such as shell or ceramics. The artifacts would also need to be found in a datable context to address questions of change over time.

Agriculture and Ranching

California's agricultural economy boomed during the Gold Rush and expanded further in the late nineteenth century with the passage of the Homestead Act in 1862, the California Swamp and Overflow Act of 1874, and the Desert Land Act of 1877. Passage of these acts opened vast areas of public land to private citizens who were interested in developing the land for agriculture or livestock and allowed agriculture to develop in the Imperial Valley. The AAC provided reliable water to the Imperial Valley from the Colorado River and by 1942, became the sole source of imported area into the area.

Historic period use within the Project vicinity was initially associated with mining. Due to the remoteness and limited accessibility of resources, permanent settlements were few and far between. Despite this, the ever-prominent search for mineral wealth potentially hidden in the remote areas of California brought individuals, as well as more organized mining ventures, to the western Colorado Desert. Eventually, the construction of access routes, the establishment of a prosperous mining industry, and the development of essential utilities such as water and electricity during the late-nineteenth and early-twentieth centuries encouraged an increased settlement of the desert. Beginning in the late nineteenth century, the development of the valley for agriculture spurred settlement.

Site types and features potentially relevant to this research domain typically include historic-period camps, residential structures, and features of various kinds (including wells, fences, privies, ramps, and other features), and refuse scatters and dumps. To meet the significance criteria, such sites would need to have integrity and clear historical associations or contain important information that is not readily obtainable from archival sources or surface recordation.

Research Questions:

- What evidence of historical agriculture and ranching is present in the Project area?
- What evidence is available that can provide additional information related to the agricultural or ranching context and function of the site?
- What are the technological changes (e.g., horse-drawn, self-propelled) as well as the interrelated changes?
- How is the irrigation technology/history of this site unique to other area farmsteads? Did it rely on a well, pump, or canal delivery system?
- Do undisturbed historic-period deposits/features contain evidence of a specific social, ethnic, or economic group?
- Is there evidence of poverty, status, or wealth in the deposit?

The presence of an inventory of well-dated historic period artifacts would be required to address the types of agriculture and ranching performed in the area, as well as to examine variation in the social, ethnic, or economic makeup of the area's farmers and homesteaders. Creating such a dataset would be challenging since it is likely that most of the older agricultural, irrigation, and ranching equipment is gone, with only an occasional part or piece of equipment remaining. To address questions on the construction or maintenance of canal systems, archaeological remains of work camps, canal machinery, or other artifacts pertaining to canal construction or maintenance activities would need to be identified. Individual artifacts (e.g., imported fine porcelain, mass-produced items), associated faunal remains (e.g., comparison of the quality of the animal parts or species represented), and the refuse contained in privies or dumps may define the economic structure related to homesteading and contribute to this research issue. Recovered artifacts would probably need to be compared with local collections or relevant documentation. USGS historic maps, GLO township plat maps, BLM land patent records, master title plat maps, Historical Index data sheets and other archival documents may be required to address questions of land ownership, claims, and landscape modification.

Transportation

In the isolated desert region with limited water sources that makes up the Project Area, the success of human activity relied on the presence of transportation networks. The main route through the Imperial Valley today is the Interstate 8. In addition to established roads, numerous unpaved historical routes, some following prehistoric routes, are present throughout the Colorado Desert. Two-track roads, unimproved roads, and graded dirt roads often are the remnants of early wagon or automobile routes. Material culture associated with early routes is evident on the landscape as well. Historical debris from early travel across the desert is evident in the form of cans or other refuse associated with vehicle maintenance. Often, debris associated with early automobile use is found adjacent to modern roadways, which may indicate the age and historical use of the route through time.

Resource types that may relate to this theme include historical roads, paths, and railroads, as well as route-associated signage, pipes and utilities, and refuse deposits.

Research Questions:

- Do historic-period transportation sites or features (e.g., footpaths, wagon roads, or automobile roads) remain within the Project Area?
- How do transportation sites connect to areas beyond the Project Area, and what does that reveal about supply networks and travel within the region and to points outside the region?

Energy Transmission

Energy transmission development in the Imperial Valley, as a whole, has undergone significant evolution, marked by key milestones and evidence of technological progress since the 1800s. The late 19th and early 20th centuries saw significant growth in energy transmission infrastructure in Imperial County, driven primarily by the region's agricultural expansion and the need for water conveyance. This period witnessed the construction of irrigation canals and aqueducts, exemplified by remnants like irrigation ditches, diversion dams, and water control structures, that not only served to support regional agriculture, but also the expansion of hydroelectric power generation in the region. In the latter half of the 20th century, Imperial County became increasingly integrated into regional energy grids, with the construction of transmission lines/other utilities infrastructure connecting the region to nearby population centers.

Resource types that may relate to this theme include historical roads, canal features and associated debris, utilities infrastructure, and refuse deposits.

Research Questions:

- What evidence exists of energy transmission infrastructure in the Project Area?
- What are the technological changes?
- What evidence is available that can provide additional information related to the energy transmission context of the area?
- How do energy transmission sites throughout the area reflect or diverge from regional or national trends related to changing land use laws, environmental fluctuations, technological innovations, or other factors?

Recreation

Since the 1950s, Imperial County has been a destination for outdoor recreation, with popular activities ranging from off-roading to camping along existing waterways. Initiated in 1983, the BLM developed Long-Term Visitor Areas (LTVAs) as a solution to provide winter visitors to desert environments safe public land camping destinations while protecting the desert environments by promoting the use of these specifically designated areas (BLM 2024). Near the Project Area, one such designated area was designated from an existing camping spot, becoming the Tamarisk LTVA between State Route (SR) 98 and the All-American Canal. Historical debris in the form of cans or other refuse may indicate the age and historical use of the camp through time. Within and near the Project Area, Off-Highway Vehicle (OHV) use can be observed off existing roadways, including State Route 98 and Interstate 8, as well other previously recorded unpaved roads. Dating such use to an historic period would be unlikely outside such evidence that could be gathered from refuse scatters containing OHV equipment/machinery that could be tied to a specific chronology.

Resource types that may relate to this theme include historical roads, built-environment features such as foundations, and refuse deposits.

Research Questions:

- Do historic-period recreation sites or structural features (e.g., refuse scatters, roads, or foundations) remain within or near the Project Area?
- How may have recreational activities, based on archaeological and structural evidence, within or near the Project Area evolved over time?

Resource Definitions

The *Instructions for Recording Historical Resources* (OHP 1995) has adopted the National Register of Historic Places (NRHP) resource categories as a basis for the classification of California's historical resources. The NRHP categories that have been defined by the National Park Service (NPS 1990) include the following:

- **Building:** A building, such as a house, barn, church, hotel, or similar construction, is created principally to shelter any form of human activity. "Building" may also be used to refer to a historically and functionally related unit, such as a courthouse and jail or a house and barn.
- **Structure**: The term "structure" is used to distinguish from buildings those functional constructions made usually for purposes other than creating human shelter.
- **Object**: The term "object" is used to distinguish from buildings and structures those constructions that are primarily artistic in nature or are relatively small in scale and simply constructed. Although it may be, by nature or design, movable, an object is associated with a specific setting or environment.
- **Site:** A site is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archaeological value regardless of the value of any existing structure.
- **District:** A district possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development.

For the purposes of this study, a "site" is defined as a location that has material evidence of past life, activities, and culture. The California standard is to record any cultural resources over 45 years of age, despite the NRHP threshold of 50 years of age. In general, an archaeological site should exhibit at least one of the following:

- One or more features;
- Three or more artifacts in clear association within a 25 square meters (5 by 5 meters) area; or
- Fewer than three artifacts that have data potential or are "diagnostic" (i.e., fluted points).

Resources separated by more than 30 meters or located on different landforms will be recorded as distinct sites or as isolates, unless other indicators suggested a close association. Resources were recorded as isolates if they are composed of two or fewer artifacts, including collections of artifacts that can be retrofit into two or fewer artifacts.

Survey Methods

Archaeological Survey

The primary goal of a pedestrian survey is to identify and document cultural resources and analyze their cultural constituents. It was anticipated that the survey results would not only allow for the potential Project efforts to be better assessed but would also provide data to confirm or elaborate our current understanding of the prehistory and history of the region. From a management perspective, the ability of specific resources to address research questions is one of the criteria used to evaluate NRHP and CRHR eligibility, in addition to the integrity of the resources. Chronicle Heritage archaeologists conducted an intensive pedestrian surface survey and site inventory on January 10 and 11, 2024, from April 16, 2024 to July 19, 2024, and on October 10, 2024. The survey was directed and supervised by Matthew Tennyson (Principal Investigator). Earl Morales and William Huey served as Field Directors, both of which are listed on Chronicle Heritage's Cultural Resources Use Permit with the BLM California Statewide Office (Permit Numbers CA-21-22 and CA-24-20). Native American participants from the Fort Yuma Quechan Indian Tribe, Campo Band of Diegueno Mission Indians, Viejas Band of Kumeyaay Indians, Jamul Indian Village, and La Posta Band of Kumeyaay Indians accompanied the archaeologists on a rotating basis during the fieldwork effort. Such efforts included transecting with archaeologists in the pedestrian survey and assisting in the identification of prehistoric cultural resources. Tribal participation during the survey was implemented under the Tribal Participation Plan (Vyhmeister et al. 2024) developed by Applicant through coordination with tribes. Prior to the commencement of the survey, a fieldwork authorization was obtained from the BLM, El Centro Field Office.

Chronicle Heritage did not survey 334.7 ac of the 7,400-ac Project Area. Of these, 231.7 ac were inaccessible due to dense vegetation obscuring the ground surface and preventing crew passage. An additional 103 ac were excluded from the survey since no development would occur within this areadue to restrictions for preserving biologically sensitive areas where development is prohibited.

The Class III survey was conducted in accordance with BLM Manual Section 8110.2.21.C, the U.S. Secretary of the Interior's Standards and Guidelines for the Archaeology and Historic Preservation (48 Federal Register 44716) and the Work Plan for the Perkins Renewable Energy Project. Specifically, the archaeologists systematically examined the ground surface using transect widths of no more than 15 m (49 ft) and carefully inspected landforms with potential for or containing sensitive cultural resources, unusual contours, soil changes, distinctive vegetation patterns, features (e.g., road cuts, ditches, and stream cuts), and other potential cultural sites and markers. Survey crews, together with tribal participants, navigated the transects using georeferenced PDF maps on tablets using the Avenza mobile application and handheld global position system (GPS) units. Field iPads included all Project maps and relevant site forms. All resources were documented with Geode GNS3M GNSS and iSX-Blue data collector GPS units with submeter accuracy that were compatible with iPad-based ESRI Collector for ArcGIS web application via Bluetooth.

The Project Area was documented with digital photographs that included general views of the topography and vegetation density, and other images. A photograph log was maintained to include, at a minimum, photograph number, date, orientation, photograph description, and comments. The surveyor carefully inspected all areas likely to contain or exhibit sensitive cultural resources to ensure the discovery and documentation of visible, potentially significant cultural resources within the Project Area. In particular, the survey crew carefully inspected rocky outcroppings, creek banks, clearings, and other habitable flat spots.

All cultural materials and features of an eligible age were recorded during this survey in accordance with OHP guidelines (OHP 1995). Materials and features that could not be accurately dated in the field were also recorded. Historic-period indicators include objects, structures such as transmission poles, or concentrations of materials at least 45 years in age, such as domestic refuse (e.g., glass bottles, ceramics, toys, and cans), refuse from other pursuits such as agriculture (e.g., metal tanks, farm machinery parts, and horseshoes) or structural materials (e.g., nails, glass window panes, corrugated metal, wood posts or planks, and metal pipes and fittings). Prehistoric site indicators include concentrations of ceramics, flaked stone, or fire affected rock (FAR).

When artifacts were found during this survey, site boundaries were defined by surveying out in widening concentric circles until artifacts were no longer encountered. Artifacts or features that were within 5 m of each other or that were clearly related were combined into the same isolate or site. All sites were digitally recorded in the field directly into Survey123 on the iPad. After initially recording the location and boundary of each site or isolate, a separate crew would follow up with a more detailed assessment of site constituents and better boundary definition and artifact descriptions. This practice was exercised to allow the initial crew to complete the survey of the APE as efficiently and safely as possible.

Architectural Survey

Prior to conducting field work, historical aerial photographs and topographical maps were reviewed to determine which built environment resources are greater than 45 years of age and thus require evaluation for compliance with NHPA and CEQA. Chronicle Heritage Architectural Historians Scott Torres, M.A., and Andrew Rodriguez, M.A., conducted a field survey on May 1, 2024 of potential built environment resources within the APE, which included a visual inspection of the AAC Drop 4 Operator House Colony, the Tamarisk LTVA that is approximately 5.6 mi east of the Drop 4 hydroelectric station, and the Caltrans District 11 Midway Yard approximately 2 mi farther east from the Tamarisk LTVA, along with portions of SR 98 and I-8 that transect through the APE and the AAC. Torres and Rodriguez took digital photographs from the public right-of-way using an iPad mini pro version 6 of each building and associated landscape features within the APE. Field notes and a photograph log were made. Research was conducted in IID archives, newspapers.com, and other online sources. Public outreach letters were sent to solicit information from the public pertaining to built-environment resources. The results of the research informed the preparation of a historic context statement within which to evaluate the resources within the APE.

Resources Inventory

A cultural resources inventory, which included archival research and Native American Coordination were conducted for the Project. The study areas for the Project were determined in accordance with the latest CEC Rules of Practice and Procedure & Power Plant Site Certification Regulations (CEC 2023) for assessing potential impacts on archaeological and architectural resources. The results of the resource inventory are presented in the following sections. Figure 4.3-1 to Figure 4.3-3 shows the archaeological study area and architectural history study area. The archaeological study area includes the Project footprint encompassing the fenced solar facility plus a 200-foot buffer; for the proposed transmission line corridors, the study area includes the Project footprint with a 50-foot buffer. Based on CEC guidance for new power plant and transmission line construction in rural settings, the architectural history study area includes all Project elements along with an up to 0.5-mile buffer.

Archival Research

An initial record search for the Project was completed by Chronicle Heritage SOI-qualified archaeologist Paige Kohler at the SCIC at San Diego State University on April 20, 2022. The record search included the Project area and surrounding 1-mile-buffer. Due to subsequent changes in the Project's design, a supplemental SCIC records search was conducted by Paige Kohler on November 1, 2023. The objective of the record searches was to identify prehistoric and historic period cultural resources that have been previously documented in the Project area by prior cultural resource investigations.

As part of the cultural resources inventory, Chronicle Heritage staff also conducted archival research and examined historical maps and aerial images to characterize the developmental history of the Project area and surrounding area. A summary of the results of the record search and background research is provided below.

Sixty-five previous cultural resource investigations have been conducted in the record search area since 1977 (Table 4.3-1). These include 19 transmission line projects, 4 infrastructure projects, 2 transportation-related projects, 5 telecommunications projects, 13 water projects, 2 recreational projects, 10 regional cultural inventories, 2 security projects, 7 geothermal or geo-testing projects, and 1 study of unknown purpose. Forty-four of these studies intersect the Project Application Area.

Figure 4.3-1 Cultural Resource Study Areas (Map 1 of 3)

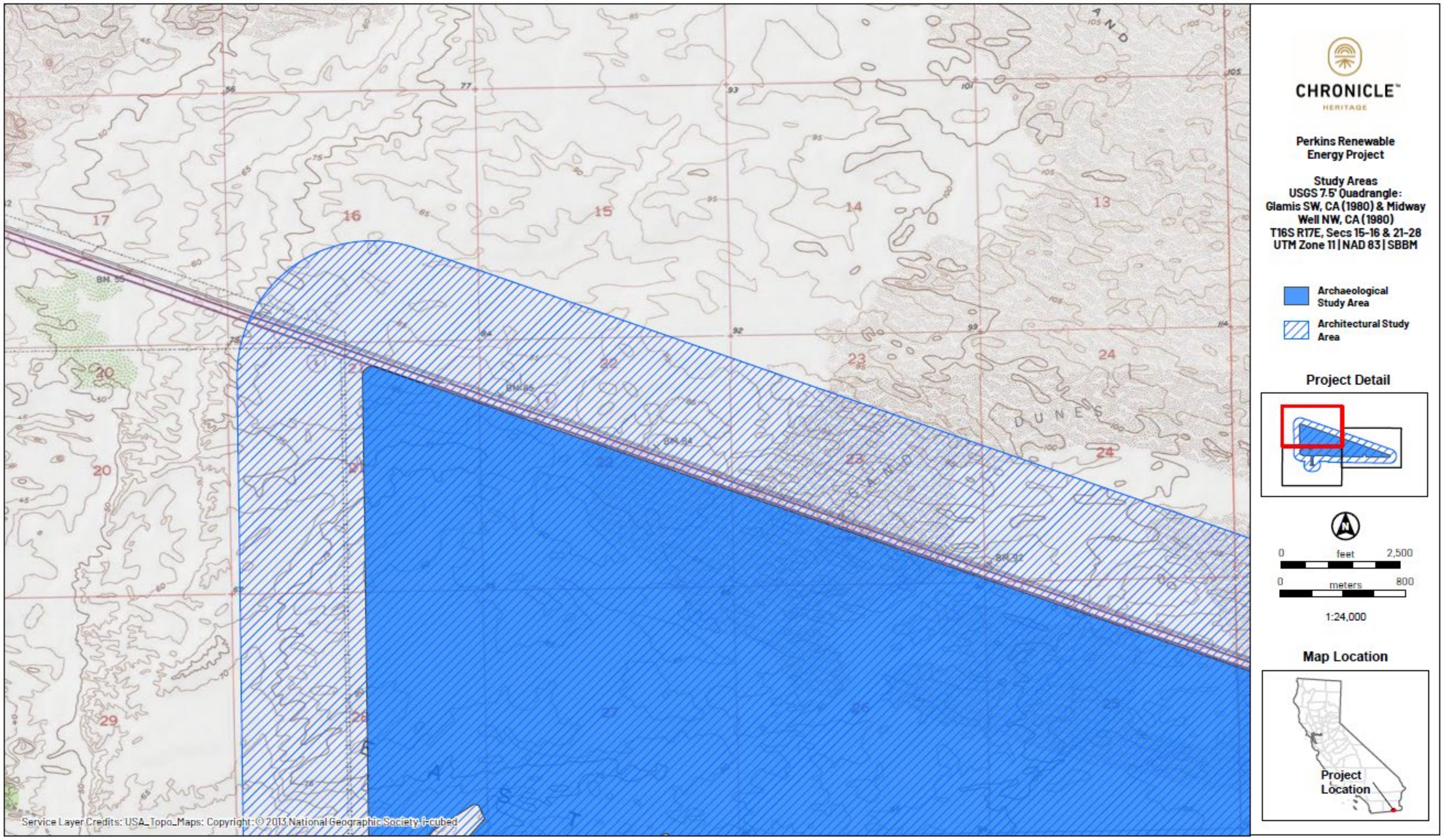

Figure 4.3-2 Cultural Resources Study Areas (Map 2 of 3)

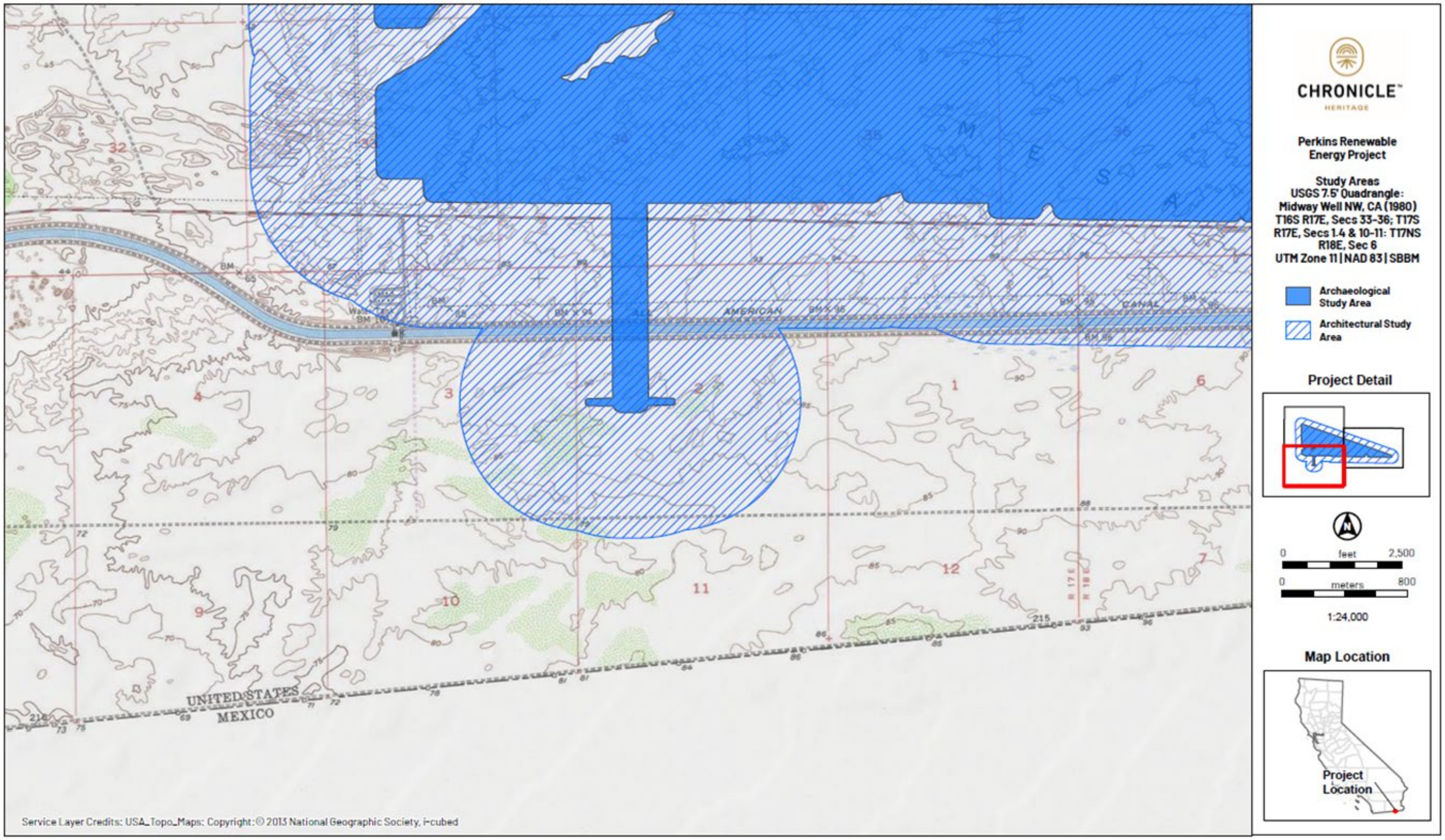

Figure 4.3-3 Cultural Resources Study Area (Map 3 of 3)

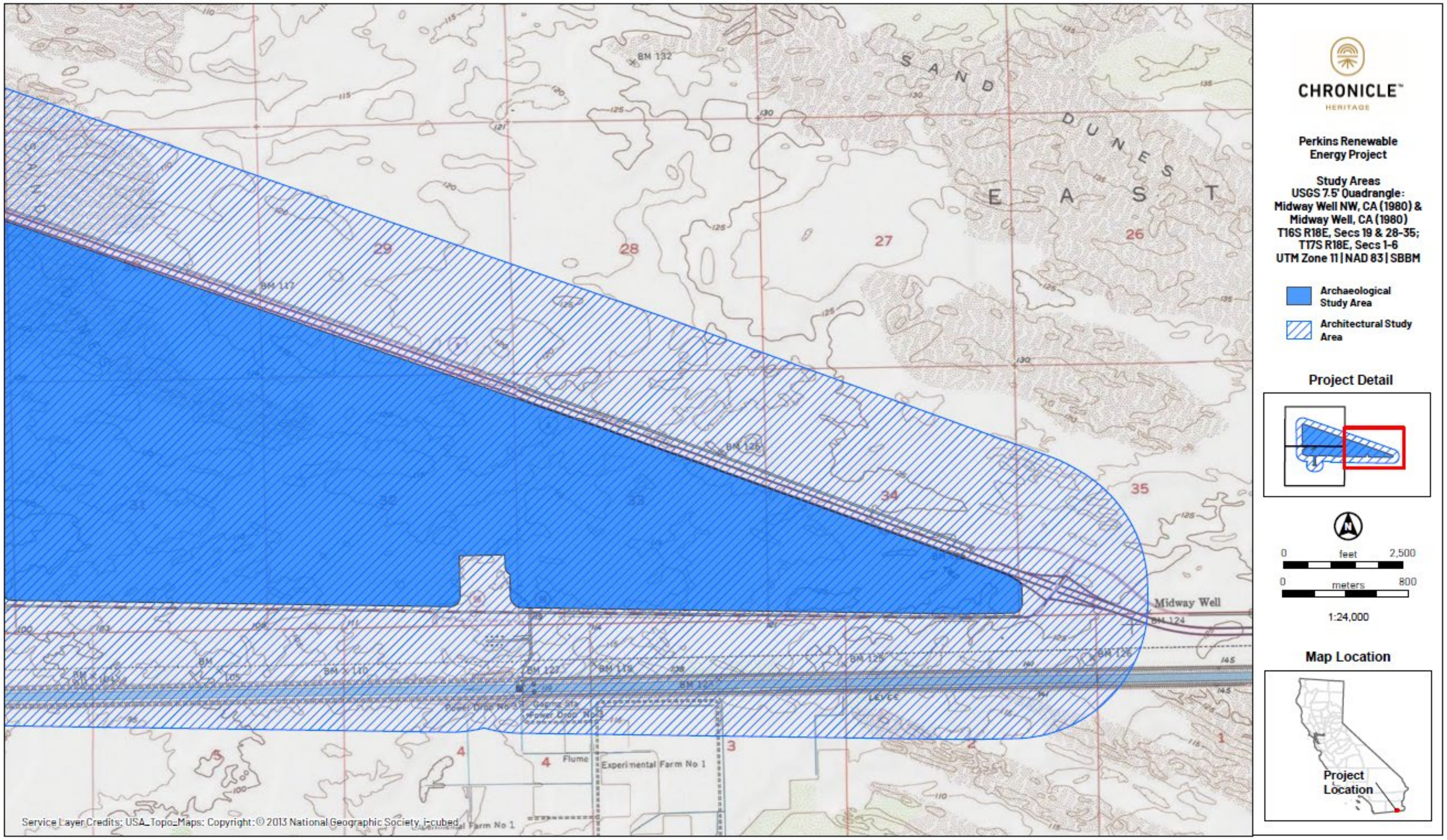

Table 4.3-1 Cultural Resources Reports within the Records Search Area

Report Authors	Title	Date	CHRIS Catalogue NADB Numbers
Ellis, Robert R. And Robert H Crabtree	Archaeological Impact Statement On East Mesa Areas 1 And 2, Imperial Valley, California	1974	IM-00010
Barker, Michael A	Preliminary Archaeological Assessment Of The East Mesa, Imperial County, California	1974	IM-00011
Atlantis Scientific	Draft Environmentanl Impact Report, Proposed 10 Mw Geothermal Power Plant, East Mesa Kgra Imperial Coutny (Republic Geothermal, Inc.)	1978	IM-00142
Eckhardt, William T.	Cultural Resource Inventory Of Areas Affected By Reject Stream Replacement Projects	1979	IM-00187
Eckhardt, William T.	Cultural Resource Inventory Of Areas Affected By Reject Stream Replacement Projects	1979	IM-00189
Walker, Carol, Charles Bull And Jay Von Werlhof	Cultural Resource Study Of A Proposed Electric Transmission Line From Jade To The Sand Hills, Imperial County, California	1979	IM-00199
Gallegos, Dennis	Class Ii Cultural Resource Inventory East Mesa And West Mesa Regions Imperial Valley, California, Volume I	1979	IM-00203
Davis, Emma Lou	Class Ii Cultural Resource Inventory East Mesa And West Mesa Regions Imperial Valley, California	1980	IM-00207
Von Werlhof, Jay And Karen Mcnitt	Archaeological Examinations Of The Republic Geothermal Field, East Mesa, Imperial County	1980	IM-00210
Bureau Of Land Management	Draft Environmental Assessment Record East Mesa Non-Competitive Leases For Geothermal Exploration/Development	1980	IM-00224
Walker, Carol, Charles Bull, And Jay Von Werlhof	Cultural Resource Study Of A Proposed Electric Transmission Line From Jade To The Sand Hills, Imperial County, California	1981	IM-00233
Bureau of Land Management	Aps/Sdg&E Interconnection Project - Supplement To The Draft Environmental Document	1981	IM-00235
Shackley, M. Steven	Phase Iii Archaeological Survey Of The Mountain Springs (Jade) To Sand Hills Portion Of The Aps/Sdg&E Interconnection Project 500 Kv Transmission Line	1982	IM-00279
Townsend, Jan	Southwest Powerlink Cultural Resources Management Plan - Volume Ii	1984	IM-00311
Townsend, Jan	Southwest Powerlink Cultural Resources Management Plan - Volume I	1984	IM-00313
Shackley, M. Steven	Volume Ii - Appendixes, Data Recovery On The Mountain Spring (Jade) To Sand Hills Segment: Southwest Powerlink Project	1984	IM-00316
Shackley, M. Steven	Archaeological Investigations In The Western Colorado Desert: A Socioecological Approach - Volume I	1984	IM-00319

Report Authors	Title	Date	CHRIS Catalogue NADB Numbers
Geo Operator Corporation	Plan Of Operation/Utilization East Mesa 37 Mw Geothermal Power Plant (Geo 2) East Mesa Known Geothermal Resource Area, Imperial County, California	1987	IM-00377
Gallegos, Dennis	Cultural Resource Survey And Testing For Geo'S East Mesa Geothermal Project Imperial County, California	1987	IM-00380
Westec Services, Inc.	Supporting Documentation Geo Operator Corportation'S East Mesa Geothermal Development Project (Geo 1 And Geo 2), Imperial County, California	1987	IM-00386
Gallegos, Dennis	Cultural Resource Inventory And Data Acquisition Program Geo'S East Mesa Geothermal Project Imperial County, California	1988	IM-00411
Gallegos, Dennis and Andrew Pigniolo	A Cultural Resource Inventory Of The Gem 2 Study Area, East Mesa, Imperial County, California	1989	IM-00419
Green, Eileen And Joan Middleton	Cultural Resource Overview, All-American Canal Lining Project, Final Report	1994	IM-00506
Schaefer, Jerry, Drew Pallette, and Collin O'Neill	A Cultural Resources Inventory And Evaluation Of The Imperial Irrigation District'S C-Line Pole Replacement Project, Imperial County, California	1998	IM-00530
Burkenroad, David	Phase One Regional Studies Aps/Sdg&E Interconnection Project Transmission System Environmental Study Cultural Resources: History	1979	IM-00536
Wirth Associates, Inc.	Phase One Regional Studies Aps/Sdg&E Interconnection Project Transmission System Environmental Study Cultural Resources: Archaeology	1979	IM-00537
Wirth Associates , Inc.	Proposed Workscope Phase Ii Cultural Resources Studies Aps-Sdg&E Transmission Interconnect Project, Miguel To Sand Hills, Sand Hills To Pvngs	1979	IM-00538
Cultural Systems Research, Inc.	Draft Archaeological Research Design And Data Recovery Program For Cultural Resources Within The Mountain Springs (Jade) To Sand Hills Portion Of The Aps/Sdg&E Interconnection Project 500Kv Transmission Line	1982	IM-00547
Bureau of Land Management	Cultural Resources Sensitivity Analysis of Nine Solar Energy Zones in Arizona, California, and Nevada. Unpublished report submitted to the Bureau of Land Management.	1982	IM-00586
CSRI	Mountain Springs (Jade) To Sand Hills Data Recovery Preliminary Report	1982	IM-00595
Schaefer, Jerry	A Cultural Resources Inventory And Evaluation Of The Imperial Irrigation District'S A3-Line Relocation Zone, Imperial County, California	1998	IM-00628

Report Authors	Title	Date	CHRIS Catalogue NADB Numbers
Schaefer, Jerry and Collin O'Neill	A Cultural Resources Inventory And Evaluation Of The Imperial Irrigation District'S A3-Line Relocation Zone, Imperial Valley, California, An Addendum To: A Cultural Resources Inventory And Evaluation Of The Imperial Irrigation District'S A3	1998	IM-00655
Schaefer, Jerry, et al.	A Cultural Resources Inventory And Evaluation Of The Imperial Irrigation District'S C-Line Pole Replacement Project Imperial County, California	1998	IM-00656
Bureau of Land Management	Southern Arizona Transmission Project Preliminary Draft Environmental Impact Statement, Draft Environmental Impact Report, Draft Plan Amendment, Deis/Deir/Dpa	1994	IM-00674
Dames & Moore	Southern Arizona Transimission Project Eis/Eir, Cultural Resources Inventory Report, Draft	1993	IM-00677
Welch, Pat	Lake Cahuilla Shoreline (East Mesa Segment) Area Of Critical Environmental Concern (Acec) Management Plan (Includes Acec 65, 66, 69, & 71)	1984	IM-00681
York, Andrew, Rebecca McCorkle Apple, Alex Kirkish, and Jackson Underwood	Overview And Cultural Resources Survey For The De Anza Natural Gas Pipeline, Appendices C And F	2000	IM-00703
Dominici, Debra A.	Archaeological Survey Report For The Proposed Imperial Safety Roadside Rest Project	1981	IM-00732
Romulus, Mark S.	Review Of Alamosa Pcs Site # 82502-017, County Of Imperial, California	2000	IM-00755
Imperial Irrigation District	Background Material On Experimental Farm At Drop 3: Contracts, Correspondence, Etc. 1947-1973	1973	IM-00786
Bureau Of Land Management	Report Of Investigations And Recommendations Pursuant To The State Protocol For Heritage And Cultural Resources (Section 106, National Historic Preservation Act)	2001	IM-00824
Schaefer, Jerry and Collin O'Neill	The All-American Canal: An Historic Properties Inventory And Evaluation	2001	IM-00829
Hangan, Margaret	Cultural Resources Inventory Report - Nepa 2000-55, Caca-42103 Hunter'S Alien Waters	2001	IM-00853
Buysse, Johnna and Brian F. Smith	Results Of An Archaeological Survey For The Border Remote Video Surveillance Project, El Centro Sector, Imperial County, California	2002	IM-00914
Buysse, Johnna, Mihael Tuma, and Brian F. Smith	Supplemental Archaeological Survey For The Border Remote Video Surveillance Project, El Centro Sector, Imperial County, California	2002	IM-00920
Caltrans	Historic Property Survey Report For Caltrans	2002	IM-00944

Report Authors	Title	Date	CHRIS Catalogue NADB Numbers
Schaefer, Jerry and Mark Giambastiani	A Class I Cultural Resources Inventory For The All-American Canal Lining Project	2004	IM-00974
AEI Consultants	Historic And Cultural Resources Assessment - Tamarisk Site, Tamarisk, Ca	2002	IM-00976
Underwood, Jackson	Archaeological Survey Of Four Rio-Tel Cellular Tower Locations: Tamarisk, Hawk 2E, Holtville, And Blu-In-Park Imperial County, California	2003	IM-00979
Schaefer, Jerry and Drew Pallette	A Cultural Resources Inventory And Evaluation Of The Imperial Irrigation District'S A3-Line Relocation Route, Imperial County, California - Addendum Ii (Draft)	1999	IM-01039
Schaefer, Jerry and Drew Pallette	A Cultural Resources Inventory And Evaluation Of The Imperial Irrigation District'S A3-Line Relocation Route, Imperial County, California - Addendum Ii (Final)	1999	IM-01040
YOST, Stephen W., Michael Mirro, Lori Rhodes, J. David ING, and Howard Higgins	Final Report On Cultural Resource Monitoring Along The Level (3) Long Haul Fiber Optic Running Line, San Diego, California To Yuma, Arizona, San Diego And Imperial Counties	2001	IM-01182
Bureau of Land Management	Imperial Sand Dunes Recreation Area Management Plan (Ramp)	2003	IM-01192
Bureau of Land Management	Final Environmental Impact Statement For The Imperial Sand Dunes Recreation Area Management Plan And Proposed Amendment To The California Desert Conservation Plan 1980	2003	IM-01193
Bureau of Land Management	Final Environmental Impact Statement/Environmental Impact Report And Proposed Land Use Plan Amendment - Volume I And Ii - North Baja Pipeline Expansion Project	2007	IM-01242
Bureau of Land Management	Draft Environmental Impact Statement/Environmental Impact Report And Draft Land Use Plan Amendment - Volumes I And Ii - North Baja Pipeline Expansion Project	2006	IM-01243
Ellis, Robert	Archaeological Impact Report On East Mesa - Area 1, Imperial Valley, California	1973	IM-01288
Wirth Associates, Inc	Aps/Sdg&E Interconnection Project Environmental Study Phase Ii Corridor Studies - Native American Cultural Resources Appendices	1980	IM-01306
Townsend, Jan	Southwest Powerlink Cultural Resources Management Plan (Draft)	1983	IM-01308
Wirth Associates, Inc	Aps/Sdg&E Interconnection Project (Phase Ii Corridor Studies) - Cultural Resources: Archaeology	1980	IM-01313

Report Authors	Title	Date	CHRIS Catalogue NADB Numbers
Shackley, Steven	Volume Ii - Phase Iii Archaeological Survey Of The Mountain Springs (Jade) To Sand Hills Portion Of The Aps/Sdg&E Interconnection Project 500 Kv Transmission Line Confidential Technical Appendices	1982	IM-01315
Schaefer, Jerry and Sherri Andrews	Class Ii And Iii Cultural Resources Inventory And Evaluation For The All-American Canal Lining Project, Imperial County, California	2005	IM-01377
Rayle, Christopher E. and Steve Swanson	A Class Iii Cultural Resources Survey For The Western Area Power Administration Drop 4-Knob Transmission Line, Imperial County, California	2017	IM-01678
Bandy, Matthew and Jim Railey	Cultural Resources Sensitivity Analysis of Nine Solar Energy Zones in Arizona, California, and Nevada. Unpublished report submitted to the Bureau of Land Management	2013	n/a

NADB = National Archaeological Database

Source: CHRIS South Central Coastal Information Center. See Appendix 5.3C for full bibliographic references.

The records search results indicated that 114 cultural resources have been previously recorded within 1 mile of the Project Application Area (Table 4.3-2). These include 77 prehistoric resources, 36 historic period resources, and 1 resource of unknown age. Thirty-one resources are mapped within the Project area including 20 prehistoric resources and 11 historic period resources. Ninety-one resources are mapped within the architectural study area including 64 prehistoric resources, 26 historic period resources, and 1 resource of unknown age.

Prehistoric resources include several archaeological sites and isolated artifacts. Prehistoric sites consist mostly of ceramic and/or lithic scatters, although several trail segments are also represented. Features and artifacts associated with trail sites include rock concentrations, cleared circles, single vessel scatters, ceramic scatters, and lithic scatters. Isolated artifacts consist of single or small numbers of ceramic and lithics artifacts.

Historic period resources consist of archaeological sites, structures, and isolated artifacts. Historic-era archaeological sites include debris scatters, road remnants, machinery remnants, and concrete and cobble masonry structures. The historic period object is a General Lands Office (GLO) survey marker. Historic period structures include the AAC, road segments, and transmission line corridors. Finally, isolates dating to the historic period consist of single or small numbers of metal cans, bottles and bottle fragments, a glass insulator, a metal license plate, a metal pail, and miscellaneous debris.

Table 4.3-2 Previously Recorded Resources within 1 Mile of the Perkins Renewable Energy Project Area

Primary Number	Trinomial	Type	Age	Description
P-13-000309	CA-IMP-9309	Site	Prehistoric	Trail, cleared circles
P-13-000312	CA-IMP-312	Site	Prehistoric	Sherd breakage lithic shop
P-13-000314	CA-IMP-314	Site	Prehistoric	Trail, rock concentrations, and ceramic scatter
P-13-000315	CA-IMP-315	Site	Prehistoric	Habitation debris and including ceramic sherds
P-13-001390	CA-IMP-1390	Site	Prehistoric	Ceramic scatter
P-13-001391	CA-IMP-1391	Isolate	Prehistoric	Ceramic sherd
P-13-001392	CA-IMP-1392	Site	Prehistoric	Ceramic scatter
P-13-001394	CA-IMP-1394	Isolate	Prehistoric	Ceramic sherd
P-13-003048	CA-IMP-3048	Site	Prehistoric	Ceramic scatter
P-13-003049	CA-IMP-3049	Isolate	Prehistoric	Orange chert flake
P-13-003050	CA-IMP-3050	Site	Prehistoric	Trail segments and ceramic scatters
P-13-003052	CA-IMP-3052	Site	Prehistoric	Ceramic scatter
P-13-003053	CA-IMP-3053	Site	Prehistoric	Trail segment and ceramic scatter
P-13-003054	CA-IMP-3054	Site	Prehistoric	Ceramic scatter
P-13-003055	CA-IMP-3055	Site	Prehistoric	Trail segment and ceramic scatter
P-13-003123	CA-IMP-3123	Site	Prehistoric	Ceramic scatter
P-13-003125	CA-IMP-3125	Site	Prehistoric	Lithic scatter consisting of 1 core and 1 flake
P-13-003126	CA-IMP-3126	Site	Prehistoric	Ceramic scatter
P-13-003128	CA-IMP-3128	Site	Prehistoric	Ceramic scatter
P-13-003129	CA-IMP-3129	Site	Prehistoric	Ceramic scatter
P-13-003130	CA-IMP-3130	Site	Prehistoric	Ceramic scatter
P-13-003131	CA-IMP-3131	Isolate	Prehistoric	Jasper core
P-13-003648	CA-IMP-3648H	Site	Historic	Trash dump
P-13-003649	CA-IMP-3649/H	Site	Historic	Communications site, two insulators connected by 15 feet of wire
P-13-003805	CA-IMP-3805	Isolate	Prehistoric	Rim sherd
P-13-003806	CA-IMP-3806	Isolate	Prehistoric	Chert flake

Primary Number	Trinomial	Type	Age	Description
P-13-003807	CA-IMP-3807H	Site	Historic	Two debris scatters, a link of stakes linked together by wire, remnants of a structure, and a hearth
P-13-003808	CA-IMP-3808	Site	Prehistoric	Ceramic scatter
P-13-003809	CA-IMP-3809	Site	Prehistoric	Ceramic scatter consisting of 2 pot sherds of Lower Colorado River Buff Ware
P-13-003810	CA-IMP-3810	Site	Prehistoric	Ceramic scatter consisting of 4 pot sherds of Lower Colorado River Buff Ware
P-13-003817	CA-IMP-3817	Site	Prehistoric	Trail with lithic scatter consisting of 2 cores
P-13-003821	CA-IMP-3821	Site	Prehistoric	Ceramic scatter consisting of 9 potsherds of Tumco Buff - Yuman II
P-13-003822	CA-IMP-3822	Site	Prehistoric	Ceramic scatter consisting of 4 potsherds of Lower Colorado River Buff Ware
P-13-003823	CA-IMP-3823	Isolate	Prehistoric	Two ceramic sherds
P-13-003824	CA-IMP-3824	Isolate	Prehistoric	Chalcedony core
P-13-004238	CA-IMP-4238	Site	Prehistoric	Ceramic scatter consisting of 30+ sherds of Colorado Buffware
P-13-004239	CA-IMP-4239	Site	Prehistoric	Ceramic scatter
P-13-004240	CA-IMP-4240	Isolate	Prehistoric	Single sherd of Colorado Buffware
P-13-004241	CA-IMP-4241	Isolate	Prehistoric	Single brown/black agate flake with a worked edge (scraper)
P-13-004242	CA-IMP-4242	Site	Prehistoric	Ceramic scatter
P-13-004243	CA-IMP-4243	Isolate	Prehistoric	Two isolated lithics - one porphyry chopper and 1 shaped granite stone
P-13-004399	CA-IMP-4399	Site	Prehistoric	Ceramic scatter consisting of 36 Tizon brownware sherds
P-13-004400	CA-IMP-4400	Site	Prehistoric	Ceramic scatter consisting of 16 sherds of Tizon brownware, several of which are smoke blackened
P-13-004401	CA-IMP-4401	Site	Prehistoric	Ceramic scatter consisting of 20-30 Tizon brownware sherds within a single locus (two loci present)

Primary Number	Trinomial	Type	Age	Description
P-13-004754	CA-IMP-4754	Site	Prehistoric	Two rock scatters (possible deflated cairns), and ceramic scatter
P-13-004755	CA-IMP-4755	Site	Prehistoric	Lithic scatter consisting of 3 cores, 3 primary flakes, and 2 secondary flakes
P-13-004756	CA-IMP-4756	Isolate	Prehistoric	Quartz flake
P-13-005514	CA-IMP-5514-I	Isolate	Prehistoric	Two ceramic rim fragments (retrofit)
P-13-006075	CA-IMP-6075-I	Isolate	Prehistoric	1 quartzite secondary flake with cobble cortex and 1 Salton Buff body sherd
P-13-007130	CA-IMP-7130H	Structure	Historic	All-American Canal
P-13-007885	CA-IMP-7684H	Site	Historic	Old vehicle parts consisting of pressed rounded fenders, rivetted fenders with running boards, gas tank, seat areas, wooden cushions between metal parts, and various metal parts
P-13-007887	CA-IMP-7887	Site	Prehistoric	Lithic scatter, ceramic scatter, charcoal
P-13-007888	CA-IMP-7687	Site	Prehistoric	Lithic scatter
P-13-007889	CA-IMP-7688	Site	Prehistoric	Sparse lithic scatter with 1 ground stone component
P-13-007890	CA-IMP-7689	Site	Prehistoric	Lithic scatter
P-13-007891	CA-IMP-7690	Site	Prehistoric	Lithic scatter
P-13-007893	CA-IMP-7692	Site	Prehistoric	Lithic scatter
P-13-007894	CA-IMP-7693	Site	Prehistoric	Lithic scatter
P-13-007897	CA-IMP-7696	Site	Prehistoric	Lithic scatter
P-13-007991	CA-IMP-7723	Site	Prehistoric	Lithic scatter
P-13-008325	CA-IMP-7818	Site	Prehistoric	Ceramic scatter
P-13-008326	CA-IMP-7819H	Site	Historic	Small trash dump containing domestic items
P-13-008519	CA-IMP-7950H	Site	Historic	Experimental Farm No. 1 (farm/ranch) foundation remnants
P-13-008776	CA-IMP-8245H	Site	Historic	Refuse scatter consisting of 1 Penzoil sign, three beer cans, and one headlamp bracket
P-13-008778	CA-IMP-8247	Site	Prehistoric	Ceramic scatter

Primary Number	Trinomial	Type	Age	Description
P-13-008934		Isolate	Historic	"Half pint" liquor bottle
P-13-008953	CA-IMP-8363H	Site	Historic	Refuse scatter consisting of various machinery remains
P-13-008981	CA-IMP-8366	Site	Prehistoric	Very light lithic scatter with short trail segment
P-13-008982	CA-IMP-8367	Site	Prehistoric	Short trail segment
P-13-011260		Isolate	Prehistoric	Two ceramic sherds
P-13-011261	CA-IMP-102595	Site	Historic	Refuse scatter
P-13-011311	CA-IMP-10279	Site	Prehistoric	Trail with lithics and ceramics.
P-13-011838	CA-IMP-10658	Site	Prehistoric	Ceramic scatter consisting of 21 buffware body sherds and 1 pecking stone
P-13-011933		Isolate	Prehistoric	Two ceramic body sherds (retrofit)
P-13-011935		Site	Prehistoric	Ceramic scatter
P-13-011942		Isolate	Historic	Cable associated with construction of the All-American Canal
P-13-011943	CA-IMP-10712	Site	Historic	Machinery dump
P-13-012749	CA-IMP-11190	Site	Historic	Trash dump
P-13-014627		Isolate	Historic	One broken colorless glass Kerr Mason canning jar and hinged tobacco can
P-13-014628		Isolate	Prehistoric	Single ceramic sherd broken into four pieces
P-13-014629		Isolate	Prehistoric	One Tumco Buff or Colorado Beige rim sherd (of possible water jar)
P-13-014630		Object	Historic	One 1915 General Land Office survey quarter-section marker
P-13-014631		Structure	Historic	Two discontinuous segments of California State Route 98 (SR 98)
P-13-014632		Structure	Historic	One electricity transmission distribution line (non-operational)
P-13-014633	CA-IMP-12238	Site	Prehistoric	Lithic scatter, ceramic scatter
P-13-014634	CA-IMP-12239	Site	Prehistoric	Lithic scatter
P-13-014635	CA-IMP-12240	Site	Prehistoric	Ceramic scatter and one lithic artifact

Primary Number	Trinomial	Type	Age	Description
P-13-014636	CA-IMP-12241	Site	Prehistoric	One discreet concentration of forty-eight Salton Buff ceramic sherds
P-13-014637	CA-IMP-12242	Site	Prehistoric	Fifteen Tumco Buff ceramic sherds
P-13-014639	CA-IMP-12244	Site	Prehistoric	Dense scatter of 37 possible Colorado Beige ceramic sherds
P-13-014640	CA-IMP-12245	Site	Historic	Refuse scatter
P-13-014641	CA-IMP-12246	Site	Prehistoric	Ceramic scatter
P-13-014642	CA-IMP-12247	Site	Prehistoric	Two concentrations of Colorado Beige ceramic sherds
P-13-014643	CA-IMP-12248	Site	Prehistoric	Dense scatter of 18 Tumco Buff ceramic sherds
P-13-014644	CA-IMP-12249	Site	Prehistoric	Two concentrations of Colorado Beige or Salton Buff ceramic sherds
P-13-014645	CA-IMP-12250	Site	Historic	Refuse scatter
P-13-014646	CA-IMP-12251	Site	Historic	Refuse scatter consisting of glass bottles, hole-in-cap cans, milled lumber, and a paint can
P-13-014647	CA-IMP-12252	Site	Historic	Refuse scatter containing sanitary cans, bullet casings, bailing wire, a glass bottle, and two vertical metal pipes
P-13-014648	CA-IMP-12253	Site	Prehistoric	Ceramic scatter containing Tumco Buff or Colorado Buff ceramic sherds
P-13-014649		Structure	Historic	Single pole utility
P-13-014650		Structure	Historic	One 8-mile segment of an unpaved road, appears part of original alignment of "Ocean-to-Ocean Highway"
P-13-017209	CA-IMP-12803	Site	Historic	Refuse scatter
P-13-017210	CA-IMP-12804	Site	Historic	Refuse scatter
P-13-017211		Isolate	Historic	Shattered glass Pepsi Cola bottle
P-13-017212		Isolate	Historic	Fragments of shattered glass clear bottle
P-13-018244		Isolate	Historic	Pail with lugs for wire handle
P-13-018245		Isolate	Unknown	Pile of chert cobbles
P-13-018247		Isolate	Historic	Small non-ribbed sanitary can

Primary Number	Trinomial	Type	Age	Description
P-13-018256		Isolate	Historic	Thin, shell clothing button
P-13-018273		Structure	Historic	Dirt road, once paved in the past, now called Wooden Pole Line Road
P-13-018274		Structure	Historic	Wooden Pole Power Lines
P-13-018275	CA-IMP-13267	Site	Historic	Low-density trash scatter
P-13-018278	CA-IMP-13270	Site	Historic	Trash scatter
P-13-018280	CA-IMP-13272	Site	Historic	Trash scatter consisting of a piece of SCA glass and 3 bullet casings

Native American Coordination

A Sacred Lands File (SLF) search request of the Project Area if Potential Effect (APE), Project Application Area with a 1 mile buffer, was sent to the Native American Heritage Commission (NAHC). A response from the NAHC was received on August 30, 2022. The response stated that sacred lands listed in the SLF are present in the search area. The NAHC also provided a list of Native American representatives who may have an interest in the Undertaking.

Information request letters to these individuals were sent on February 22 and 23, 2022, via the U.S. Postal Service and email. The letter requested information on cultural resources within the Perkins Renewable Energy Project site. A round of follow up calls were subsequently conducted on March 8, 2023, to those tribes and tribal contacts who had yet to respond to the letter request.

To date, the following responses have been received:

Ms. Erica Pinto of the Jamul Indian Village responded via email on February 23, 2023, and stated that that the Tribe defers to Tribes located in closer proximity to the Project area.

Ms. Jill McCormick, the Tribal Historic Preservation Officer for the Quechan Tribe of the Fort Yuma Reservation, responded via email on February 23, 2023, requesting additional maps to clarify the Project location. Once received, Ms. McCormick responded via email February 23, 2023, stating that the Project is within the traditional lands of the Tribe and requesting for a Quechan Tribal Cultural Monitor to accompany Project survey crews. Ms. McCormick responded again on March 8, 2023, stating that the Tribe will consult directly with the Lead Agency. In December 2023, Mr. Alan Hatcher, a Quechan Tribal Cultural Monitor, was retained by Chronicle Heritage to accompany the crew during archaeological surveys of Geotechnical Study Area.

Mr. Daniel Tsosie of Campo Band of Mission Indians responded via email to the BLM on September 26, 2023, expressing interest in the Tribe providing monitors to accompany archaeological monitors during cultural resources surveys.

The results of the NAHC SLF search, the list of contacts, a sample outreach letter, a contact/response matrix, and copies of correspondence will be provided later.

The BLM has conducted outreach to Native American Consulting Parties as part of the cultural resources DRECP package, which was sent on January 10, 2024. To date, responses have been received from the Jamul Indian Village. Ms. Lisa Cumper of the Jamul Indian Village responded on January 18, 2024, requesting to participate in archaeological surveys.

4.3.3 Impact Analysis

This section describes the environmental impacts of Project construction and operation.

Summary of Results

Archaeological Survey Results

Chronicle Heritage archaeologists conducted an intensive pedestrian Class III survey and site inventory which resulted in the location of 26 of a possible 30 previously recorded cultural resources and 1,015 newly recorded cultural resources (see Table 1 in Attachment 1). The newly recorded resources consist of 213 prehistoric sites, 217 historic-period sites, 1 multicomponent site, 82 prehistoric isolated artifacts, and 502 historic-period isolated artifacts. Ten cultural resources, nine sites and one isolate, are considered Historic Properties/Historic Resources and recommended eligible for inclusion in the NRHP/CRHR. The remaining resources are not considered eligible for inclusion in the NRPH/CRHR.

Architectural Survey Results

Chronicle Heritage conducted archival research and a pedestrian survey for the Drop 4 Operator House Colony, Tamarisk LTVA, Caltrans District 11 Midway Yard, SR 98, and I-8; a total of three properties and segments of two roads. Based on the information available for review and the survey of the properties greater than 50 years of age within the APE, Chronicle Heritage recommends that the Drop 4 Operator House colony is eligible for listing in the NRHP and CRHR as a contributing element to the AAC, which has been previously determined NRHP eligible as a historic district. Despite the vacancy and condition of certain vacant buildings, the Drop 4 Operator House Colony retains integrity of location, design, setting, materials, workmanship, feeling, and association. Because the Drop 4 Operator House Colony is connected to, and closely associated with, the early history of the AAC, it is a significant element of the AAC historic district. The other properties are not considered eligible for listing in the NRHP or CRHR.

Impact Evaluation Criteria

Appendix G, Environmental Checklist Form of the CEQA guidelines, addresses significance criteria with respect to cultural resources (PRC Sections 21000 et seq.). Appendix G (V)(a, b, d) indicates that an impact may be significant if the project will have the following effects:

- Cause a substantial adverse change in the significance of a historical resource
- Cause a substantial adverse change in the significance of an archaeological resource

- Disturb any human remains, including those interred outside formal cemeteries

Impacts and Mitigation Measures

Impact CUL-1:

The Project will cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5. (*Less than Significant)*

Construction and Operations

Project Site Components

As noted above, ten prehistoric resources were identified during the surveys of the Project site and recommended eligible for listing in the CRHR. The Project design has been modified to avoid disturbance in areas containing resources that are eligible for listing in the CRHR. As a result, the Project does not propose any direct, physical alteration to the ten resources because they would be avoided by the Project. The impact of the Project on the ten prehistoric resources would be less than significant impact.

The Drop 4 Operator House colony was surveyed and recommended eligible for the CRHR as a contributing element to the AAC.

A full list of surveyed and evaluated historic architectural resources can be found in the separate report for the AAC, *Historic Architecture Field Survey Report for the Proposed Perkins Renewable Energy Project, Imperial County, California* (Torres et al. 2024). The historic architectural survey found that only the AAC and associated Drop 4 Operator House Colony are eligible for listing in the NRHP and CRHR, and therefore, evaluated for potential effects pursuant to CEQA. Because the Drop 4 Operator House Colony is connected to, and closely associated with, the early history of the AAC, it is a contributing feature of the AAC historic district and is considered part of the *Historic Architecture Field Survey Report*and Class III study (Torres, et al., 2024). The proposed Project's construction, development, and maintenance does not propose any direct, physical alteration to the ACC or Drop 4, or its character-defining features and the Project would not impact the resource's ability to convey its significance. The Project site would be approximately 0.4 miles north of the AAC and Drop 4. The Project would introduce new visual elements to the setting; however, this would not impact the resource's ability to convey its significance. The setting of the AAC throughout its length has historically included other infrastructure such as transmission lines and has been continuously altered with construction of new transmission lines, roads, and bridges since its construction. Therefore, the impacts would be less than significant.

Breaker-and-a-Half Switchyard

No resources were identified within the BAAH switchyard site that were considered eligible for listing in the CRHR. The Drop 4 Operator House colony was surveyed and recommended eligible for the CRHR as a contributing element to the AAC. The BAAH switchyard is an estimated 0.9 miles from the Drop 4 Operator House colony. The BAAH would introduce a new visual element to the setting; however, this would not impact the resource's ability to convey its significance. The setting of the AAC throughout its length has historically included other infrastructure such as transmission lines and has been continuously altered with construction of new transmission lines, roads, and bridges since its construction. Therefore, the impacts would be less than significant.

Loop-in Transmission Line
No resources were identified within the loop-in transmission line that were considered eligible for listing in the CRHR. The Drop 4 Operator House colony was surveyed and recommended eligible for the CRHR as a contributing element to the AAC. The loop-in transmission line is an estimated 0.75 miles from the Drop 4 Operator House colony. The loop-in transmission line would introduce a new visual element to the setting; however, this would not impact the resource's ability to convey its significance. The setting of the AAC throughout its length has historically included other infrastructure such as transmission lines, including the existing 500 kV line to which the loop-in transmission line would interconnect. It has been continuously altered with construction of new transmission lines, roads, and bridges since its construction. Therefore, the impacts would be less than significant.

Impact CUL-2:
The project will cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5 (*Less than Significant*).

Construction and Operations
Project Site Components
Chronicle Heritage analyzed the NRHP and CRHR eligibility of all resources under Criteria A/1, B/2, C/3, and D/4. Nine prehistoric sites and one prehistoric isolate were recommended eligible for listing in the NRHP and/or CRHR under Criterion D/4. All ten archaeological resources are within designated avoidance corridors or avoidance areas and will not be impacted by construction or operations of the Project. This Project is expected to affect the integrity of setting for each historic property; however, this effect would not be significant. All ten recommended eligible archaeological resources are prehistoric, for which setting plays a minimal role in conveying significance under Criterion D/4. All properties recommended eligible would be considered significant no matter where they were on the landscape, and their setting would not affect this because the archaeological resources themselves are individually significant independent of the setting.

The Project area has a moderate to high sensitivity for buried prehistoric sites, with a potential for recent Holocene prehistoric buried material because of a) the presence of buried sites throughout the valley through the last 2,000 to 2,500 years when populations in the area were higher and b) the most recent high stand of Lake Cahuilla placed its shoreline relatively close (2.5 km) to the Project area, and c) the young age (< 100 years) of some East Mesa sand dunes may have recently buried older surfaces and cultural resources. There is a potential for more ancient prehistoric buried material because Terminal Pleistocene/Early Holocene shorelines are potentially present at unknown depths in the Project area and regional archaeological sites are associated with ancient shorelines of the lake. Without coring data, it is not possible to predict the basal depth of Holocene deposits; however, the presence of buried ceramic artifacts (less than 1,000 years old) within 40 cm of the surface in nearby sites on East Mesa (Schafer and

Andrews 2005) suggests that older material may be present at greater depths of over a meter. However, of the 23 sites tested during by Schafer and Andrews, 9 (roughly 40%) were positive for subsurface artifacts and most were encountered within the first 20 cm below surface (Schaefer and Andrews, 2005:55). The identified subsurface component across all 23 tested sites ranged between 0.71–3 percent of the overall site assemblage. The largest site encountered during this study consists of 700 or more ceramic sherds organized within at least 16 loci that span an area of 600 × 340 m (Schaefer and Andrews, 2005:55). This site was the most intensively sampled and five (0.71%) ceramic body sherds were identified during testing (Schaefer and Andrews, 2005:55). While this supports a moderate to high potential for subsurface artifacts in the Project Application Area, incidental depositional processes like bioturbation likely resulted in the burying of these artifacts. This suggests stratified deposits are unlikely to be encountered within the Project Application Area.

Buried alluvial and aeolian deposits are anticipated to be associated with more recent Holocene occupations and buried shallow lacustrine, nearshore, and shoreline deposits are anticipated to be associated with Archaic materials. Ground disturbing activities outside designated avoidance corridors could adversely impact previously unidentified archaeological resources such as those inadvertently discovered during Project construction. This would be considered a potentially significant impact. However, the incorporation of PDFs CUL-1 through CUL-6 (Appendix D of the original Opt-in Application) would reduce potentially significant impacts to known and inadvertently discovered archaeological resources to a less-than-significant level.

Breaker-and-a-Half Switchyard
No archaeological resources were identified within the BAAH switchyard site that were considered eligible for listing in the CRHR.

The BAAH area also has a moderate to high sensitivity for buried prehistoric sites. Impacts of the BAAH would be the same as the Project Site.

Loop-in Transmission Line
No archaeological resources were identified within the loop-in transmission line that were considered eligible for listing in the CRHR.

The loop-in transmission line area also has a moderate to high sensitivity for buried prehistoric sites. Impacts of the loop-in transmission line would be the same as the Project Site.

Impact CUL-3:

The Project will disturb any human remains, including those interred outside of dedicated cemeteries. (*Less than Significant*).

Construction and Operations

Project Site Components
There are no known formal cemeteries or human remains interred outside of formal cemeteries within the Project Area. However, ground disturbing activities have the potential to disturb

soils that could contain human remains. This creates the potential for encountering previously unidentified human remains during Project-related ground disturbance. PDF CUL-7 would require that construction be halted in the vicinity of discovery of human remains and work remain halted until avoidance or treatment of the human remains has commenced. Impacts to human remains, if any, would be less than significant.

Breaker-and-a-Half Switchyard
Impacts of the BAAH would be the same as the Project Site.

Loop-in Transmission Line
Impacts of the loop-in transmission line would be the same as the Project Site.

4.3.4 Cumulative Impacts
Impacts of the Project are cumulatively considerable if they have the potential to combine with other past, present, or reasonably foreseeable projects to become collectively significant. Impacts to cultural resources are typically specific to a given site or resource. This means potential cumulative impacts may exist if two or more projects occur in the same location. The geographic scope of potential cumulative cultural resource impacts is limited to the immediate vicinity of ground-disturbing activities that would occur during construction or operation. Moreover, all Cumulative Project proponents would be expected to comply with state law relating to cultural resources. Cumulative impacts to cultural resources are considered less than significant.

4.3.5 Proposed Best Management Practices, Project Design Features, Conservation Management Actions, and Mitigation Plans
As part of the Project, the Applicant and other entities involved in construction and operation, would implement BMPs, PDFs, and CMAs. The Applicant has also prepared mitigation plans as required by the BLM.

Project Site Components

Best Management Practices and Project Design Features
The Project would implement the following BMPs and PDFs related to cultural resources. See Appendix D.1 for the full language of the BMPs.

- PDF CUL-1 through PDF CUL-8 (Cultural Resources)

BAAH Switchyard
The same PDFs would apply to the BAAH switchyard.

Loop-In Transmission Line
The same PDFs would apply to the loop-in transmission lines.

4.3.6 Laws, Ordinances, Regulations, and Standards Compliance

The federal and state LORS that may apply to the Project related to cultural resources are summarized in Table 4.3-4 and Table 4.3-5, respectively. No local laws, ordinances, regulations, or standards for cultural resources are applicable to the Project.

Table 4.3-3 Federal Laws, Ordinances, Regulations and Standards

LORS	Applicability	Compliance
National Environmental Policy Act of 1969	Requires analysis of potential environmental impacts to cultural resources for federal undertakings that may have significant effect on human environment.	Will be addressed in the National Environmental Policy Act document
Section 106, National Historic Preservation Act (NHPA)	Applies if the project would require a federal permit (such as a PSD permit). The lead federal agency must take into account the effect of issuing the permit on significant cultural resources.	Will be addressed in the National Environmental Policy Act document
Desert Renewable Energy Conservation Plan (DRECP) Programmatic Agreement (PA)	Compliance with Section 106 of NHPA guided by DRECP as portions of Project area located within Imperial East Solar Energy Zone and DRECP Land Use Plan Amendment Development Focus Area	Will be addressed in the National Environmental Policy Act document
Archaeological Resources Protection Act (ARPA)	Establishes standards for permissible excavation and requirements for cooperation with federal agencies	Will be addressed in the National Environmental Policy Act document
Antiquities Act of 1906	Establishes penalties for persons who excavate or destroy cultural resources on federal land without permission from agency with jurisdiction over said land	Will be addressed in the National Environmental Policy Act document
Federal Land Policy Management Act	Applies to projects located on BLM-administered land	Will be addressed in the National Environmental Policy Act document
Native American Graves Protection and Repatriation Act (NAGPRA)	Applies should human remains be encountered on federal lands	Will be addressed in the National Environmental Policy Act document

Table 4.3-4 State Laws, Ordinances, Regulations and Standards

LORS	Applicability	Compliance
Warren-Alquist Act	Requires cultural resources be considered.	Addressed in Section 4.3 and cultural appendices.
California Environmental Quality Act (CEQA) Guidelines	Project construction may encounter archaeological and/or historical resources.	Addressed in Section 4.3 and cultural appendices.
California Health and Safety Code Section 7050	Construction may encounter Native American graves; coroner calls the NAHC.	Addressed in Section 4.3 and cultural appendices.
California Public Resources Code Section 5097.98	Construction may encounter Native American graves; NAHC assigns Most Likely Descendant	Addressed in Section 4.3 and cultural appendices.
California Assembly Bill 52	Requires consultation with California Native American tribes for projects that may affect tribal cultural resources.	Addressed in Section 4.3 and cultural appendices.

4.3.7 Agencies Contacted and Permits

The Native American Heritage Commission (NAHC) was contacted for the Perkins Solar Project in 2022. The NAHC provided a list of tribes which were contacted on behalf of the project. The NAHC list is provided as an attachment. Letters sent to the tribes and any responses have been provided to the CEC under confidentiality request.

Permits required to construct, operate, and maintain the project, including the BAAH, and loop-in transmission line, are summarized in Table E.2.

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Attachment 1 Cultural Resources in the Project Study Area

Table 1 Summary of Cultural Resources in Project Study Area

Primary Number or Temporary ID (22-0080)	Description	Type	Age	NRHP/CRHR Eligibility Recommendation
AS-003H	Refuse scatter	Site	Historic	Not Eligible
AS-005	Thermal feature	Site	Prehistoric	Not Eligible
AS-006	Ceramic scatter	Site	Prehistoric	Not Eligible
AS-007	Thermal feature	Site	Prehistoric	Not Eligible
AS-025	Ceramic scatter	Site	Prehistoric	Not Eligible
AS-026	Ceramic scatter	Site	Prehistoric	Not Eligible
AS-SV-001	Ceramic scatter	Site	Prehistoric	Not Eligible
AS-SV-002	Ceramic scatter	Site	Prehistoric	Not Eligible
AS-SV-009	Ceramic scatter	Site	Prehistoric	Criterion D/Criterion 4
AS-SV-010	Ceramic scatter	Site	Prehistoric	Not Eligible
AS-SV-011	Ceramic scatter	Site	Prehistoric	Not Eligible
AS-SV-013	Ceramic scatter	Site	Prehistoric	Criterion D/Criterion 4
AS-SV-017	Ceramic scatter	Site	Prehistoric	Not Eligible
AS-SV-020	Ceramic scatter	Site	Prehistoric	Not Eligible
AS-SV-021	Ceramic scatter	Site	Prehistoric	Not Eligible
AW-001	Ceramic scatter	Site	Prehistoric	Not Eligible
BC-001	Thermal feature	Site	Prehistoric	Not Eligible
BC-002	Thermal feature	Site	Prehistoric	Not Eligible
BC-003	Lithic scatter	Site	Prehistoric	Not Eligible
BC-013	Ceramic scatter	Site	Prehistoric	Not Eligible
BC-SV-002	Ceramic scatter	Site	Prehistoric	Not Eligible
BC-SV-003	Ceramic scatter	Site	Prehistoric	Not Eligible
BC-SV-004	Ceramic scatter	Site	Prehistoric	Not Eligible
BC-SV-005	Ceramic scatter	Site	Prehistoric	Not Eligible
BC-SV-010	Ceramic scatter	Site	Prehistoric	Not Eligible
BC-SV-013	Ceramic scatter	Site	Prehistoric	Not Eligible
BC-SV-014	Ceramic scatter	Site	Prehistoric	Not Eligible

CB-001H	1915 U.S. GLO survey marker	Site	Historic	Not Eligible
CB-002	Ceramic scatter	Site	Prehistoric	Criterion D/Criterion 4
CB-002H	1915 U.S. GLO survey marker	Site	Historic	Not Eligible
CB-003H	Refuse scatter	Site	Historic	Not Eligible
CB-004	Thermal feature	Site	Prehistoric	Not Eligible
CB-006	Lithic scatter	Site	Prehistoric	Not Eligible
CB-007H	Refuse scatter	Site	Historic	Not Eligible
CB-008H	Refuse scatter	Site	Historic	Not Eligible
CB-009H	Refuse scatter	Site	Historic	Not Eligible
CB-010H	Refuse scatter	Site	Historic	Not Eligible
CB-012	Thermal feature	Site	Prehistoric	Not Eligible
CB-013	Thermal feature	Site	Prehistoric	Not Eligible
CB-014	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-015	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-016	Thermal feature and ceramic scatter	Site	Prehistoric	Criterion D/Criterion 4
CB-017H	Refuse scatter	Site	Historic	Not Eligible
CB-018H	Refuse scatter	Site	Historic	Not Eligible
CB-019	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-020	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-021H	Refuse scatter	Site	Historic	Not Eligible
CB-022H	Refuse scatter	Site	Historic	Not Eligible
CB-023	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-025	Thermal feature	Site	Prehistoric	Not Eligible
CB-026	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-028	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-031H	Refuse scatter	Site	Historic	Not Eligible
CB-032H	Refuse scatter	Site	Historic	Not Eligible
CB-033H	Refuse scatter	Site	Historic	Not Eligible
CB-034H	Refuse scatter	Site	Historic	Not Eligible
CB-035H	Refuse scatter	Site	Historic	Not Eligible
CB-036H	Refuse scatter	Site	Historic	Not Eligible
CB-037H	Refuse scatter	Site	Historic	Not Eligible
CB-038H	Refuse scatter	Site	Historic	Not Eligible
CB-039H	Refuse scatter	Site	Historic	Not Eligible
CB-040H	Refuse scatter	Site	Historic	Not Eligible
CB-041H	Refuse scatter	Site	Historic	Not Eligible

CB-042H	Refuse scatter	Site	Historic	Not Eligible
CB-043H	Refuse scatter	Site	Historic	Not Eligible
CB-044H	Refuse scatter	Site	Historic	Not Eligible
CB-045H	Refuse scatter	Site	Historic	Not Eligible
CB-046H	Refuse scatter	Site	Historic	Not Eligible
CB-047H	Refuse scatter	Site	Historic	Not Eligible
CB-048H	Refuse scatter	Site	Historic	Not Eligible
CB-049H-A	Refuse scatter	Site	Historic	Not Eligible
CB-049H-B	Refuse scatter	Site	Historic	Not Eligible
CB-050H	Refuse scatter	Site	Historic	Not Eligible
CB-051H	Refuse scatter	Site	Historic	Not Eligible
CB-052-H	Ceramic scatter and historic-period refuse scatter -- 7 LCBW sherds and historic refuse	Site	Multicomponent	Not Eligible
CB-053H	Refuse scatter	Site	Historic	Not Eligible
CB-054H	Refuse scatter	Site	Historic	Not Eligible
CB-055H	Refuse scatter	Site	Historic	Not Eligible
CB-056H	Refuse scatter	Site	Historic	Not Eligible
CB-057H	Refuse scatter	Site	Historic	Not Eligible
CB-058H	Refuse scatter	Site	Historic	Not Eligible
CB-059H	Refuse scatter	Site	Historic	Not Eligible
CB-060H	1915 U.S. GLO survey marker	Site	Historic	Not Eligible
CB-061H	Refuse scatter	Site	Historic	Not Eligible
CB-062H	Refuse scatter	Site	Historic	Not Eligible
CB-063H	1915 U.S. GLO survey marker	Site	Historic	Not Eligible
CB-064H	Refuse scatter	Site	Historic	Not Eligible
CB-065H	Refuse scatter	Site	Historic	Not Eligible
CB-066H	Refuse scatter	Site	Historic	Not Eligible
CB-067H	Refuse scatter	Site	Historic	Not Eligible
CB-068H	Refuse scatter	Site	Historic	Not Eligible
CB-069H	Refuse scatter	Site	Historic	Not Eligible
CB-070H	Refuse scatter	Site	Historic	Not Eligible
CB-071H	1915 U.S. GLO survey marker	Site	Historic	Not Eligible
CB-072H	Refuse scatter	Site	Historic	Not Eligible
CB-073H	Refuse scatter	Site	Historic	Not Eligible
CB-074H	Refuse scatter	Site	Historic	Not Eligible

CB-075H	1915 U.S. GLO survey marker	Site	Historic	Not Eligible
CB-076H	Refuse scatter	Site	Historic	Not Eligible
CB-077H	Refuse scatter	Site	Historic	Not Eligible
CB-078H	Refuse scatter	Site	Historic	Not Eligible
CB-079H	Refuse scatter	Site	Historic	Not Eligible
CB-080H	Refuse scatter	Site	Historic	Not Eligible
CB-081H	Refuse scatter	Site	Historic	Not Eligible
CB-082H	Refuse scatter	Site	Historic	Not Eligible
CB-083H	Refuse scatter	Site	Historic	Not Eligible
CB-084H	Refuse scatter	Site	Historic	Not Eligible
CB-085H	Refuse scatter	Site	Historic	Not Eligible
CB-086H	Refuse scatter	Site	Historic	Not Eligible
CB-087H	Refuse scatter	Site	Historic	Not Eligible
CB-088H	Refuse scatter	Site	Historic	Not Eligible
CB-089H	Refuse scatter	Site	Historic	Not Eligible
CB-090H	Refuse scatter	Site	Historic	Not Eligible
CB-091H	Refuse scatter	Site	Historic	Not Eligible
CB-092H	Refuse scatter	Site	Historic	Not Eligible
CB-093H	Refuse scatter	Site	Historic	Not Eligible
CB-094H	Refuse scatter	Site	Historic	Not Eligible
CB-095H	1915 U.S. GLO survey marker	Site	Historic	Not Eligible
CB-096H	Refuse scatter	Site	Historic	Not Eligible
CB-097H	Refuse scatter	Site	Historic	Not Eligible
CB-098H	Well feature	Site	Historic	Not Eligible
CB-099H	Refuse scatter	Site	Historic	Not Eligible
CB-100H	Refuse scatter	Site	Historic	Not Eligible
CB-101H	Refuse scatter	Site	Historic	Not Eligible
CB-102H	Refuse scatter	Site	Historic	Not Eligible
CB-103H	Refuse scatter	Site	Historic	Not Eligible
CB-104H	Refuse scatter	Site	Historic	Not Eligible
CB-105H	Refuse scatter	Site	Historic	Not Eligible
CB-106H	Refuse scatter	Site	Historic	Not Eligible
CB-107H	Refuse scatter	Site	Historic	Not Eligible
CB-108H	Refuse scatter	Site	Historic	Not Eligible
CB-109H	1915 U.S. GLO survey marker	Site	Historic	Not Eligible
CB-110H	Refuse scatter	Site	Historic	Not Eligible

CB-111H	Well feature – uncapped well pipe with 1915 U.S. GLO survey marker	Site	Historic	Not Eligible
CB-112H	1915 U.S. GLO survey marker	Site	Historic	Not Eligible
CB-113H	Refuse scatter	Site	Historic	Not Eligible
CB-114H	Refuse scatter	Site	Historic	Not Eligible
CB-115H	Refuse scatter	Site	Historic	Not Eligible
CB-116H	Refuse scatter	Site	Historic	Not Eligible
CB-117H	Refuse scatter	Site	Historic	Not Eligible
CB-118H	Refuse scatter	Site	Historic	Not Eligible
CB-119H	Refuse scatter	Site	Historic	Not Eligible
CB-SV-005	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-007	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-008	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-011	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-013	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-014	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-016	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-017	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-026	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-028	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-029	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-032	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-033	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-034	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-035	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-036	Ceramic scatter	Site	Prehistoric	Not Eligible
CB-SV-038	Ceramic scatter	Site	Prehistoric	Not Eligible
CW-001	Ceramic scatter	Site	Prehistoric	Criterion D/Criterion 4
CW-001H	Refuse scatter	Site	Historic	Not Eligible
EM-001	Thermal feature	Site	Prehistoric	Not Eligible
EM-009	Ceramic scatter	Site	Prehistoric	Not Eligible
EM-010H	Refuse scatter	Site	Historic	Not Eligible
EM-012H	Refuse scatter	Site	Historic	Not Eligible
GB-001	Ceramic scatter	Site	Prehistoric	Not Eligible
GB-002	Lithic scatter	Site	Prehistoric	Not Eligible
GB-003H	Refuse scatter	Site	Historic	Not Eligible
GB-004	Ceramic scatter	Site	Prehistoric	Not Eligible

GB-005H	Refuse scatter	Site	Historic	Not Eligible
GB-006H	Refuse scatter	Site	Historic	Not Eligible
GB-007	Ceramic scatter	Site	Prehistoric	Not Eligible
GB-008H	Refuse scatter	Site	Historic	Not Eligible
GB-009H	Refuse scatter	Site	Historic	Not Eligible
GB-010H	Refuse scatter	Site	Historic	Not Eligible
GB-011	Ceramic scatter	Site	Prehistoric	Not Eligible
GB-012	Ceramic scatter	Site	Prehistoric	Not Eligible
GB-015	Ceramic scatter	Site	Prehistoric	Not Eligible
GB-016H	Refuse scatter	Site	Historic	Not Eligible
GB-017H	Refuse scatter	Site	Historic	Not Eligible
GB-018H	Refuse scatter	Site	Historic	Not Eligible
GB-019H	Refuse scatter	Site	Historic	Not Eligible
GB-021H	Refuse scatter	Site	Historic	Not Eligible
GB-022H	Refuse scatter	Site	Historic	Not Eligible
GB-023H	Refuse scatter	Site	Historic	Not Eligible
GB-024H	Refuse scatter	Site	Historic	Not Eligible
GB-025H	Refuse scatter	Site	Historic	Not Eligible
GB-026H	Refuse scatter	Site	Historic	Not Eligible
GB-027H	Refuse scatter	Site	Historic	Not Eligible
GB-028H	1915 U.S. GLO survey marker	Site	Historic	Not Eligible
GB-029H	Refuse scatter	Site	Historic	Not Eligible
GB-030H	Refuse scatter	Site	Historic	Not Eligible
GB-031H	Refuse scatter	Site	Historic	Not Eligible
GB-032H	Refuse scatter	Site	Historic	Not Eligible
GB-034H	Refuse scatter	Site	Historic	Not Eligible
GB-036H	Refuse scatter	Site	Historic	Not Eligible
GB-037H	Refuse scatter	Site	Historic	Not Eligible
GB-038H	1915 U.S. GLO survey marker and associated refuse scatter	Site	Historic	Not Eligible
GB-039H	1915 U.S. GLO survey marker and associated refuse scatter	Site	Historic	Not Eligible
GB-SV-004	Ceramic scatter	Site	Prehistoric	Not Eligible
GB-SV-007	Ceramic scatter	Site	Prehistoric	Not Eligible
GB-SV-011	Ceramic scatter	Site	Prehistoric	Not Eligible
GB-SV-013	Ceramic scatter	Site	Prehistoric	Not Eligible

GB-SV-015	Ceramic scatter	Site	Prehistoric	Not Eligible
GB-SV-018	Ceramic scatter	Site	Prehistoric	Not Eligible
IH-001H	Refuse scatter	Site	Historic	Not Eligible
IH-002	Ceramic scatter	Site	Prehistoric	Not Eligible
IH-002H	Refuse scatter	Site	Historic	Not Eligible
IH-003H	Refuse scatter	Site	Historic	Not Eligible
IH-005H	Refuse scatter	Site	Historic	Not Eligible
IH-042H	Refuse scatter	Site	Historic	Not Eligible
JL-001H	Refuse scatter	Site	Historic	Not Eligible
JL-002	Ceramic scatter	Site	Prehistoric	Not Eligible
JL-SV-003	Ceramic scatter	Site	Prehistoric	Not Eligible
JL-SV-004	Ceramic scatter	Site	Prehistoric	Not Eligible
JM-001	Ceramic scatter	Site	Prehistoric	Not Eligible
JM-002H	Well feature -- Well pipe and metal debris	Site	Historic	Not Eligible
JM-003H	1915 U.S. GLO survey marker and associated refuse scatter	Site	Historic	Not Eligible
JM-005	Thermal feature	Site	Prehistoric	Not Eligible
JM-005H	Refuse scatter	Site	Historic	Not Eligible
JM-006H	Refuse scatter	Site	Historic	Not Eligible
JM-007H	Refuse scatter	Site	Historic	Not Eligible
JM-009H	Refuse scatter	Site	Historic	Not Eligible
JRS-001	Ceramic scatter	Site	Prehistoric	Not Eligible
JRS-003	Ceramic scatter	Site	Prehistoric	Not Eligible
JRS-004H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JRS-005H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JRS-006H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JRS-007H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JRS-008H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JRS-009H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JRS-010H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JRS-011H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible

JRS-012H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JRS-013H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JRS-014H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JRS-015H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JRS-016H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
JS-004	Thermal feature	Site	Prehistoric	Not Eligible
JS-007	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-009	Thermal feature	Site	Prehistoric	Not Eligible
JS-011	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-013	Thermal feature	Site	Prehistoric	Not Eligible
JS-017	Thermal feature	Site	Prehistoric	Not Eligible
JS-025	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-026H	Refuse scatter	Site	Historic	Not Eligible
JS-027H	Refuse scatter	Site	Historic	Not Eligible
JS-028	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-030H	Refuse scatter	Site	Historic	Not Eligible
JS-031	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-033	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-034	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-SV-001	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-SV-004	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-SV-008	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-SV-009	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-SV-010	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-SV-015	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-SV-017	Ceramic scatter	Site	Prehistoric	Not Eligible
JS-SV-019	Ceramic scatter	Site	Prehistoric	Not Eligible
KR-001H	Refuse scatter	Site	Historic	Not Eligible
KR-SV-001	Ceramic scatter	Site	Prehistoric	Not Eligible
KR-SV-002	Ceramic scatter	Site	Prehistoric	Not Eligible
KR-SV-005	Ceramic scatter	Site	Prehistoric	Not Eligible
LC-001H	Refuse scatter	Site	Historic	Not Eligible
LC-004H	Refuse scatter	Site	Historic	Not Eligible
LC-SV-001	Ceramic scatter	Site	Prehistoric	Not Eligible
LC-SV-003	Ceramic scatter	Site	Prehistoric	Not Eligible

LC-SV-004	Ceramic scatter	Site	Prehistoric	Not Eligible
LC-SV-005	Ceramic scatter	Site	Prehistoric	Not Eligible
LC-SV-006	Ceramic scatter	Site	Prehistoric	Not Eligible
LR-001	Thermal feature	Site	Prehistoric	Not Eligible
LR-001H	Well feature -- Well pipe with "31" painted	Site	Historic	Not Eligible
LR-002	Thermal feature	Site	Prehistoric	Not Eligible
LR-002H	Well feature -- Well pipe with "30" painted	Site	Historic	Not Eligible
LR-003H	Refuse scatter	Site	Historic	Not Eligible
LR-004H	Well feature -- Well pipe with "23" painted	Site	Historic	Not Eligible
LR-005H	Two-track tarmac road -- 2 track tarmac	Site	Historic	Not Eligible
LR-006H	Refuse scatter	Site	Historic	Not Eligible
LR-007H	Refuse scatter	Site	Historic	Not Eligible
MHR-003H	Refuse scatter	Site	Historic	Not Eligible
MHR-004H	Refuse scatter	Site	Historic	Not Eligible
MHR-005H	Refuse scatter	Site	Historic	Not Eligible
MHR-007H	Refuse scatter	Site	Historic	Not Eligible
MHR-008H	1915 U.S. GLO survey marker and associated refuse scatter	Site	Historic	Not Eligible
MHR-009H	Refuse scatter	Site	Historic	Not Eligible
MHR-010H	1915 U.S. GLO survey marker and associated refuse scatter	Site	Historic	Not Eligible
MHR-011H	Refuse scatter	Site	Historic	Not Eligible
MHR-012H	Refuse scatter	Site	Historic	Not Eligible
MHR-013H	Refuse scatter	Site	Historic	Not Eligible
MKW-SV-002	Ceramic scatter	Site	Prehistoric	Not Eligible
MKW-SV-004	Ceramic scatter	Site	Prehistoric	Not Eligible
MKW-SV-005	Ceramic scatter	Site	Prehistoric	Not Eligible
MKW-SV-013	Ceramic scatter	Site	Prehistoric	Not Eligible
MS-002	Ceramic scatter	Site	Prehistoric	Not Eligible
MS-004-B	Thermal feature	Site	Prehistoric	Not Eligible
MS-005-B	Ceramic scatter	Site	Prehistoric	Not Eligible
MS-SV-002	Ceramic scatter	Site	Prehistoric	Not Eligible
MS-SV-003	Ceramic scatter	Site	Prehistoric	Not Eligible
MS-SV-010	Ceramic scatter	Site	Prehistoric	Not Eligible

MS-SV-013	Ceramic scatter	Site	Prehistoric	Not Eligible
MS-SV-019	Ceramic scatter	Site	Prehistoric	Not Eligible
MVC-002H	Refuse scatter	Site	Historic	Not Eligible
MVC-003	Ceramic scatter	Site	Prehistoric	Not Eligible
MVC-004H	Refuse scatter	Site	Historic	Not Eligible
MVC-005	Ceramic scatter	Site	Prehistoric	Not Eligible
MVC-006	Ceramic scatter	Site	Prehistoric	Not Eligible
MVC-007	Ceramic scatter	Site	Prehistoric	Not Eligible
MVC-008	Ceramic scatter	Site	Prehistoric	Not Eligible
MVC-009	Ceramic scatter	Site	Prehistoric	Not Eligible
MVC-SV-003	Ceramic scatter	Site	Prehistoric	Not Eligible
MVC-SV-011	Ceramic scatter	Site	Prehistoric	Not Eligible
MVC-SV-014	Ceramic scatter	Site	Prehistoric	Not Eligible
MVC-SV-015	Ceramic scatter	Site	Prehistoric	Not Eligible
MVC-SV-022	Ceramic scatter	Site	Prehistoric	Not Eligible
NO-001	Thermal feature	Site	Prehistoric	Not Eligible
NO-SV-002	Ceramic scatter	Site	Prehistoric	Not Eligible
NO-SV-003	Ceramic scatter	Site	Prehistoric	Not Eligible
NO-SV-004	Ceramic scatter	Site	Prehistoric	Not Eligible
NO-SV-005	Ceramic scatter	Site	Prehistoric	Not Eligible
NO-SV-006	Ceramic scatter	Site	Prehistoric	Not Eligible
NO-SV-007	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-003H	Refuse scatter	Site	Historic	Not Eligible
NP-004	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-004H	Refuse scatter	Site	Historic	Not Eligible
NP-005	Thermal feature	Site	Prehistoric	Not Eligible
NP-006	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-007	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-008	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-009	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-010H	Refuse scatter	Site	Historic	Not Eligible
NP-011H	Refuse scatter	Site	Historic	Not Eligible
NP-012H	Refuse scatter	Site	Historic	Not Eligible
NP-013H	Refuse scatter	Site	Historic	Not Eligible
NP-014H	Refuse scatter	Site	Historic	Not Eligible
NP-015H	Refuse scatter	Site	Historic	Not Eligible
NP-016H	Refuse scatter	Site	Historic	Not Eligible
NP-017H	Refuse scatter	Site	Historic	Not Eligible

NP-018H	Refuse scatter	Site	Historic	Not Eligible
NP-019H	Refuse scatter	Site	Historic	Not Eligible
NP-020H	Refuse scatter	Site	Historic	Not Eligible
NP-021H	Refuse scatter	Site	Historic	Not Eligible
NP-022H	Refuse scatter	Site	Historic	Not Eligible
NP-023H	Refuse scatter	Site	Historic	Not Eligible
NP-024H	1915 U.S. GLO survey marker and associated refuse scatter	Site	Historic	Not Eligible
NP-SV-007	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-SV-012	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-SV-014	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-SV-015	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-SV-016	Ceramic scatter	Site	Prehistoric	Criterion D/Criterion 4
NP-SV-017	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-SV-018	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-SV-019	Ceramic scatter	Site	Prehistoric	Not Eligible
NP-SV-020	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-001	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-005	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-006	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-007	Thermal feature	Site	Prehistoric	Not Eligible
SH-008	Thermal feature	Site	Prehistoric	Not Eligible
SH-010	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-011	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-012	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-013	Lithic scatter	Site	Prehistoric	Not Eligible
SH-014	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-015	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-016	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-017H	Refuse scatter	Site	Historic	Not Eligible
SH-018H	1959 U.S. Coast and Geodetic Survey marker and associated wood post	Site	Historic	Not Eligible
SH-019H	1959 U.S. Coast and Geodetic Survey marker and associated wood posts	Site	Historic	Not Eligible

SH-020H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
SH-021H	1959 U.S. Coast and Geodetic Survey marker	Site	Historic	Not Eligible
SH-022H	Refuse scatter	Site	Historic	Not Eligible
SH-SV-002	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-SV-003	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-SV-008	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-SV-009	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-SV-011	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-SV-012	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-SV-014	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-SV-016	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-SV-017	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-SV-019	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-SV-022	Ceramic scatter	Site	Prehistoric	Not Eligible
SH-SV-023	Ceramic scatter	Site	Prehistoric	Not Eligible
TMC-001	Ceramic scatter	Site	Prehistoric	Not Eligible
TMC-002	Thermal feature	Site	Prehistoric	Not Eligible
TMC-004	Ceramic scatter	Site	Prehistoric	Not Eligible
TMC-011	Ceramic scatter	Site	Prehistoric	Not Eligible
TMC-SV-009	Ceramic scatter	Site	Prehistoric	Not Eligible
TMC-SV-011	Ceramic scatter	Site	Prehistoric	Not Eligible
TMC-SV-013	Ceramic scatter	Site	Prehistoric	Not Eligible
TMC-SV-017	Ceramic scatter	Site	Prehistoric	Not Eligible
TMC-SV-023	Ceramic scatter	Site	Prehistoric	Not Eligible
TMC-SV-024	Ceramic scatter	Site	Prehistoric	Not Eligible
TMC-SV-026	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-001	Lithic scatter	Site	Prehistoric	Not Eligible
WH-024	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-034	Thermal feature	Site	Prehistoric	Not Eligible
WH-041H	1959 U.S. Coast and Geodetic Survey marker and associated lumber	Site	Historic	Not Eligible
WH-042H	1959 U.S. Coast and Geodetic Survey marker and associated lumber	Site	Historic	Not Eligible
WH-044H	1915 U.S. GLO survey marker and associated refuse scatter	Site	Historic	Not Eligible

WH-045H	U.S. Department of Interior survey marker and metal sign	Site	Historic	Not Eligible
WH-046H	1915 U.S. GLO survey marker and associated refuse scatter	Site	Historic	Not Eligible
WH-049H	1915 U.S. GLO survey marker and associated refuse scatter	Site	Historic	Not Eligible
WH-050H	Refuse scatter	Site	Historic	Not Eligible
WH-051H	1915 U.S. GLO survey marker	Site	Historic	Not Eligible
WH-052H	Well feature -- Capped well pipe	Site	Historic	Not Eligible
WH-053H	Refuse scatter	Site	Historic	Not Eligible
WH-054H	Refuse scatter	Site	Historic	Not Eligible
WH-055H	Well feature -- Uncapped well pipe	Site	Historic	Not Eligible
WH-056	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-057	Ceramic scatter	Site	Prehistoric	Criterion D/Criterion 4
WH-058	Ceramic scatter	Site	Prehistoric	Criterion D/Criterion 4
WH-059	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-060H	Refuse scatter	Site	Historic	Not Eligible
WH-061	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-062	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-063	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-064	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-065	Thermal feature	Site	Prehistoric	Not Eligible
WH-066	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-067	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-SV-003	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-SV-013	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-SV-014	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-SV-015	Ceramic scatter	Site	Prehistoric	Not Eligible
WH-SV-023	Ceramic Scatter	Site	Prehistoric	Not Eligible
BLM-001	Ceramic scatter	Site	Prehistoric	Not Eligible
BLM-002	Ceramic scatter	Site	Prehistoric	Not Eligible
BLM-003	Ceramic scatter	Site	Prehistoric	Not Eligible
BLM-004	Ceramic scatter	Site	Prehistoric	Not Eligible
P-13-003049	1 orange chert flake	Isolate	Prehistoric	Not Eligible
AH-ISO-001	1 LCBW ceramic body sherd	Isolate	Prehistoric	Not Eligible

AH-ISO-002	Debitage/ 1 brown jasper secondary "flake"	Isolate	Prehistoric	Not Eligible
AS-ISO-001	Chalcedony primary flake (4.5 × 4 × 2.5 cm)	Isolate	Prehistoric	Not Eligible
AS-ISO-002H	1 broken amber glass bottle	Isolate	Historic	Not Eligible
AS-ISO-003H	1 Amber glass bottle base Obear-Nester maker's mark	Isolate	Historic	Not Eligible
AS-ISO-007	1 Quartzite Hammerstone (4.5 × 5.3 × 2.4 cm)	Isolate	Prehistoric	Not Eligible
AS-ISO-008H	Historic car bell fragment	Isolate	Historic	Not Eligible
AS-ISO-014	1 white chert secondary flake	Isolate	Prehistoric	Not Eligible
AS-ISO-015	2 Mottled brown CCS primary flakes (refit)	Isolate	Prehistoric	Not Eligible
AS-ISO-019	Tested Cobble (split in 2 separate pieces)	Isolate	Prehistoric	Not Eligible
AS-ISO-022	Quartzite hammerstone (possible polishing on face)	Isolate	Prehistoric	Not Eligible
AS-ISO-023	2 LCBW body sherds, 1 loose, 1 partially buried	Isolate	Prehistoric	Not Eligible
AS-ISO-027	2 brown ware body sherds	Isolate	Prehistoric	Not Eligible
AS-ISO-028	Quartzite hammerstone	Isolate	Prehistoric	Not Eligible
AS-ISO-029H	Rotary opened oil can	Isolate	Historic	Not Eligible
AS-ISO-030H	Coffee can lid	Isolate	Historic	Not Eligible
AS-ISO-031	1 LCBW ceramic body sherd	Isolate	Prehistoric	Not Eligible
AS-ISO-032	1 LCBW rim sherd (straight/ direct, roughly flattened lip)	Isolate	Prehistoric	Not Eligible
AS-ISO-034H	1 Hole-in-top can, puncture vented	Isolate	Historic	Not Eligible
AS-ISO-035H	1 crushed cone top can	Isolate	Historic	Not Eligible
AS-ISO-036H	1 bimetal pull tab beverage can	Isolate	Historic	Not Eligible
AS-ISO-037H	1 broken colorless glass bottle base, Hazel Atlas	Isolate	Historic	Not Eligible
AS-ISO-038H	1 partially buried crushed tobacco can	Isolate	Historic	Not Eligible
AS-ISO-039H	1 Colorless glass bottle base, Latchford Glass Co.	Isolate	Historic	Not Eligible
AS-ISO-040H	1 crushed sanitary can	Isolate	Historic	Not Eligible
AS-ISO-041H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
AS-ISO-042H	1 crushed Church Key open sanitary can	Isolate	Historic	Not Eligible
AS-ISO-043H	1 small crushed sanitary can	Isolate	Historic	Not Eligible
AS-ISO-044H	1 crushed sanitary can	Isolate	Historic	Not Eligible
AS-ISO-045H	1 crushed sanitary can	Isolate	Historic	Not Eligible

AS-ISO-046H	2 crushed Church Key open cans	Isolate	Historic	Not Eligible
AS-ISO-047H	1 crushed Church Key open sanitary can	Isolate	Historic	Not Eligible
AS-ISO-048H	1 crushed sanitary can	Isolate	Historic	Not Eligible
AS-ISO-049H	1 crushed sanitary can	Isolate	Historic	Not Eligible
AS-ISO-050H	2 crushed Church Key open sanitary cans	Isolate	Historic	Not Eligible
AS-ISO-052H	1 crushed Church Key open sanitary can	Isolate	Historic	Not Eligible
AS-ISO-054H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
AS-ISO-056H	1 crushed sanitary can	Isolate	Historic	Not Eligible
AS-ISO-057H	1 crushed sanitary can	Isolate	Historic	Not Eligible
AS-ISO-060	1 Quartzite Hammerstone	Isolate	Prehistoric	Not Eligible
AS-ISO-061H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
AS-ISO-062H	1 crushed sanitary can	Isolate	Historic	Not Eligible
AS-ISO-063H	2 crushed cans	Isolate	Historic	Not Eligible
AS-ISO-064H	1 crushed sanitary can	Isolate	Historic	Not Eligible
AS-ISO-065H	1 crushed sanitary can	Isolate	Historic	Not Eligible
AS-ISO-068H	2 crushed Church Key open sanitary cans	Isolate	Historic	Not Eligible
AS-ISO-069H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
AS-ISO-070H	1 crushed rotary open sanitary can	Isolate	Historic	Not Eligible
AS-ISO-071H	1 crushed hole-in-top can	Isolate	Historic	Not Eligible
AS-ISO-077H	1 crushed oil can	Isolate	Historic	Not Eligible
AS-ISO-078H	1 crushed oil can	Isolate	Historic	Not Eligible
AS-ISO-080H	2 crushed bimetal pull-tab beer cans	Isolate	Historic	Not Eligible
AS-ISO-081H	2 crushed sanitary cans	Isolate	Historic	Not Eligible
AS-ISO-082H	1 meat can	Isolate	Historic	Not Eligible
AS-ISO-083H	1 bimetal pull-tab beer can with bullet holes	Isolate	Historic	Not Eligible
AS-ISO-084H	1 crushed sanitary can	Isolate	Historic	Not Eligible
AS-ISO-085H	1 crushed rotary open oil can	Isolate	Historic	Not Eligible
AS-ISO-086H	Concrete block engraved with letter "C", and broken amber glass bottle	Isolate	Historic	Not Eligible
AS-ISO-087H	1 crushed sanitary can with bullet holes	Isolate	Historic	Not Eligible

AS-ISO-088H	Concrete block engraved with letter "C"	Isolate	Historic	Not Eligible
AS-ISO-089H	1 crushed rotary open sanitary can	Isolate	Historic	Not Eligible
AS-ISO-090H	1 sanitary can	Isolate	Historic	Not Eligible
AS-ISO-091H	1 sanitary can	Isolate	Historic	Not Eligible
AS-ISO-092H	2 crushed cans. 1 bimetal pull tab beverage can, 1 sanitary can	Isolate	Historic	Not Eligible
AS-ISO-093H	2 crushed cans. 1 bimetal pull tab beverage can, 1 sanitary can	Isolate	Historic	Not Eligible
AS-ISO-094H	Concrete block lying on surface	Isolate	Historic	Not Eligible
AS-ISO-095H	1 intact bottle "Barq's" Owens-Illinois	Isolate	Historic	Not Eligible
AS-ISO-096H	1 crushed oil can	Isolate	Historic	Not Eligible
AS-ISO-097H	2 crushed cans. 1 bimetal pull tab beverage can, 1 sanitary can with bullet holes	Isolate	Historic	Not Eligible
AS-ISO-098H	1 Church Key open oil can	Isolate	Historic	Not Eligible
AS-ISO-099H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
AS-ISO-100H	Concrete block lying on surface	Isolate	Historic	Not Eligible
AS-ISO-101H	1 broken colorless glass jug, no maker's mark	Isolate	Historic	Not Eligible
AS-ISO-102H	1 amber glass bottle Owens-Illinois maker’s mark (1952)	Isolate	Historic	Not Eligible
AS-ISO-103H	1 condensed milk can	Isolate	Historic	Not Eligible
AS-ISO-104H	1 crushed Church Key opened sanitary can	Isolate	Historic	Not Eligible
AS-ISO-105H	2 crushed bimetal pull-tab cans	Isolate	Historic	Not Eligible
AS-ISO-106H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
AS-ISO-107H	1 partial sanitary can	Isolate	Historic	Not Eligible
AS-ISO-108H	2 Church Key open cans with bullet holes	Isolate	Historic	Not Eligible
AS-ISO-109H	1 tobacco can	Isolate	Historic	Not Eligible
AS-ISO-110H	1 rotary open oil can, 1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
AS-ISO-111H	1 sanitary can	Isolate	Historic	Not Eligible
AS-ISO-112H	1 Church Key open oil can	Isolate	Historic	Not Eligible

AS-ISO-113H	1 Church Key open oil can	Isolate	Historic	Not Eligible
AS-ISO-114H	1 rotary open sanitary can	Isolate	Historic	Not Eligible
AS-ISO-115H	1 broken colorless glass bottle with "CoD' maker's mark	Isolate	Historic	Not Eligible
AS-ISO-116H	1 hole-in-top can, 1 sanitary can	Isolate	Historic	Not Eligible
AS-ISO-117H	1 Church Key open oil can, 1 Church Key open sanitary can	Isolate	Historic	Not Eligible
AS-ISO-118H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
AS-ISO-119H	1 bimetal pull-tab beverage can, 1 sanitary can	Isolate	Historic	Not Eligible
AS-ISO-120H	2 crushed sanitary cans	Isolate	Historic	Not Eligible
AS-ISO-121H	1 bimetal pull-tab beverage can, 1 oil can	Isolate	Historic	Not Eligible
AS-ISO-122H	1 bimetal pull-tab beverage can, 1 Church Key open sanitary can	Isolate	Historic	Not Eligible
AS-ISO-123H	1 condensed milk can	Isolate	Historic	Not Eligible
BC-ISO-011	2 brown ware body sherds	Isolate	Prehistoric	Not Eligible
BC-ISO-012	1 LCBW body sherd	Isolate	Prehistoric	Not Eligible
CB-ISO-004	1 quartzite primary flake	Isolate	Prehistoric	Not Eligible
CB-ISO-018	1 LCBW straight/direct rim sherd	Isolate	Prehistoric	Not Eligible
CB-ISO-019	1 CCS core	Isolate	Prehistoric	Not Eligible
CB-ISO-020	2 LCBW body sherds	Isolate	Prehistoric	Not Eligible
CB-ISO-021	1 primary rhyolite shoulder flake	Isolate	Prehistoric	Not Eligible
CB-ISO-027	1 LCBW body sherd	Isolate	Prehistoric	Not Eligible
CB-ISO-030	1 beige CCS core	Isolate	Prehistoric	Not Eligible
CB-ISO-031	1 large LCBW body sherd	Isolate	Prehistoric	Not Eligible
CB-ISO-037	1 CCS secondary flake	Isolate	Prehistoric	Not Eligible
CB-ISO-039	2 LCBW body sherds	Isolate	Prehistoric	Not Eligible
CB-ISO-040	1 Brown CCS secondary flake	Isolate	Prehistoric	Not Eligible
CB-ISO-041H	1 knife opened hole-in-top can	Isolate	Historic	Not Eligible
CB-ISO-042	1 LCBW body sherd	Isolate	Prehistoric	Not Eligible
CB-ISO-043H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
CB-ISO-044H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible

CB-ISO-045H	1 large crushed automotive oil can	Isolate	Historic	Not Eligible
CB-ISO-047H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
EM-ISO-006H	Historic Mule shoe w/4 embedded shoe nails	Isolate	Historic	Not Eligible
EM-ISO-007	1 "low quality chert" tested cobble, 1 jasper secondary flake	Isolate	Prehistoric	Not Eligible
EM-ISO-009	1 Quartzite hammerstone. Pecking on one face, distal margin broken	Isolate	Prehistoric	Not Eligible
EM-ISO-010H	Turn-key opened sardine can	Isolate	Historic	Not Eligible
EM-ISO-011H	1 rotary opened sanitary can	Isolate	Historic	Not Eligible
EM-ISO-012H	Porcelain plate with maker's mark Lonsdale Royal Semi Porcelain England, and one crushed sanitary can.	Isolate	Historic	Not Eligible
EM-ISO-013H	1 crushed sanitary can	Isolate	Historic	Not Eligible
GB-ISO-001	1 large LCBW body/rim sherd	Isolate	Prehistoric	Not Eligible
GB-ISO-005	1 brown chert tested cobble	Isolate	Prehistoric	Not Eligible
GB-ISO-006	1 weathered jasper secondary flake	Isolate	Prehistoric	Not Eligible
GB-ISO-008	2 secondary brown chert flakes	Isolate	Prehistoric	Not Eligible
GB-ISO-009	1 CCS tested cobble	Isolate	Prehistoric	Not Eligible
GB-ISO-010	Quartzite hammerstone	Isolate	Prehistoric	Not Eligible
GB-ISO-012H	Historic refuse. baling wire, metal rods, milk glass bottle	Isolate	Historic	Not Eligible
GB-ISO-017	1 Brown CCS primary flake	Isolate	Prehistoric	Not Eligible
GB-ISO-019H	1 bayonet open hole-in-top can	Isolate	Historic	Not Eligible
GB-ISO-020H	1 possible paint can	Isolate	Historic	Not Eligible
GB-ISO-020H	1 Paint can	Isolate	Historic	Not Eligible
GB-ISO-021H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-024H	1 friction lid can	Isolate	Historic	Not Eligible
GB-ISO-025H	1 Church Key open sanitary can, 1 misc. can	Isolate	Historic	Not Eligible
GB-ISO-026H	2 crushed sanitary cans, and modern beer bottles	Isolate	Historic	Not Eligible
GB-ISO-027H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible

GB-ISO-028H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-029H	1 bimetal pull-tab beverage can, 1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-030H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-031H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-032H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-034H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-035H	1 broken coke bottle, Owens-Illinois maker's mark	Isolate	Historic	Not Eligible
GB-ISO-037H	1 crushed sanitary can	Isolate	Historic	Not Eligible
GB-ISO-038H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-039H	1 hole-in-top can	Isolate	Historic	Not Eligible
GB-ISO-040H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-041H	1 rectangular can with lid	Isolate	Historic	Not Eligible
GB-ISO-042H	1 rectangular meat can	Isolate	Historic	Not Eligible
GB-ISO-043H	1 metal bucket with bullet holes	Isolate	Historic	Not Eligible
GB-ISO-044H	1 hinge-top tobacco can	Isolate	Historic	Not Eligible
GB-ISO-045H	1 knife open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-046H	1 crushed sanitary can	Isolate	Historic	Not Eligible
GB-ISO-047H	1 deteriorating sanitary can	Isolate	Historic	Not Eligible
GB-ISO-049H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-050H	1 hinge top tobacco can	Isolate	Historic	Not Eligible
GB-ISO-051H	1 hinge top can with missing lid	Isolate	Historic	Not Eligible
GB-ISO-052H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-053H	1 hinge top can	Isolate	Historic	Not Eligible
GB-ISO-054H	1 crushed historic bucket	Isolate	Historic	Not Eligible
GB-ISO-055H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-056H	1 hinge top can	Isolate	Historic	Not Eligible
GB-ISO-057H	1 hole-in-top can	Isolate	Historic	Not Eligible
GB-ISO-058H	1 crushed sanitary can	Isolate	Historic	Not Eligible
GB-ISO-059H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-060	1 broken LCBW body sherd (5 pieces)	Isolate	Prehistoric	Not Eligible
GB-ISO-061H	1 hole-in-top can	Isolate	Historic	Not Eligible
GB-ISO-062H	1 cone-top can	Isolate	Historic	Not Eligible

GB-ISO-063H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-064H	1 glass screw lid bottle	Isolate	Historic	Not Eligible
GB-ISO-065H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-066H	1 amber glass beer bottle	Isolate	Historic	Not Eligible
GB-ISO-067H	1 metal lid	Isolate	Historic	Not Eligible
GB-ISO-068H	1 solarized glass bottle base fragment	Isolate	Historic	Not Eligible
GB-ISO-069H	2 hole-in-top cans	Isolate	Historic	Not Eligible
GB-ISO-070H	1 metal paint can	Isolate	Historic	Not Eligible
GB-ISO-071H	1 crushed can	Isolate	Historic	Not Eligible
GB-ISO-072H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-073H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-074H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-075H	1 crushed Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-076H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-077H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-078H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-079H	1 subsurface bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-080H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-081H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-082H	2 bimetal pull-tab beverage cans	Isolate	Historic	Not Eligible
GB-ISO-083H	1 rounded sardine can	Isolate	Historic	Not Eligible
GB-ISO-084H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-085H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-086H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-087H	1 colorless/frosted "Ball" maker's mark bottle base	Isolate	Historic	Not Eligible
GB-ISO-088H	1 colorless glass bottle base. Owens-Illinois maker's mark	Isolate	Historic	Not Eligible
GB-ISO-089H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-090H	1 crushed sanitary can	Isolate	Historic	Not Eligible
GB-ISO-091H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible

GB-ISO-092H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-093H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-094H	1 subsurface bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-095H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-096H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-097H	1 crushed bimetal pull-tab beverage can with bullet holes	Isolate	Historic	Not Eligible
GB-ISO-098H	1 knife open oil can with bullet holes	Isolate	Historic	Not Eligible
GB-ISO-099H	1 oil can	Isolate	Historic	Not Eligible
GB-ISO-100H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-101H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-102H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-103H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-104H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-105H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-106H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-107H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-108H	1 crushed tobacco can	Isolate	Historic	Not Eligible
GB-ISO-109H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-110H	1 meat can	Isolate	Historic	Not Eligible
GB-ISO-111H	1 paint can	Isolate	Historic	Not Eligible
GB-ISO-112H	1 small oil can	Isolate	Historic	Not Eligible
GB-ISO-113H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-114H	1 rotary open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-115H	1 pull-tab open meat can	Isolate	Historic	Not Eligible
GB-ISO-116H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-117H	1 pull-tab Budweiser can	Isolate	Historic	Not Eligible
GB-ISO-118H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-119H	1 Church Key open beverage can	Isolate	Historic	Not Eligible

GB-ISO-120H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-121H	1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible
GB-ISO-122H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-123H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-124H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-125H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
GB-ISO-126H	1 crushed rotary open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-127H	One rotary cut sanitary can, and one Church Key-opened sanitary can.	Isolate	Historic	Not Eligible
GB-ISO-128H	1 crushed sanitary can, 1 bimetal pull tab can	Isolate	Historic	Not Eligible
GB-ISO-129H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-130H	1 rotary open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-131H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-132H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
GB-ISO-133H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-134H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
GB-ISO-135H	1 sanitary can, and 1 Bimetal can that was crushed	Isolate	Historic	Not Eligible
GB-ISO-136H	One crushed sanitary can and one crushed pull back tab opened Bimetal can	Isolate	Historic	Not Eligible
GB-ISO-137H	2 bimetal pull-tab beverage cans	Isolate	Historic	Not Eligible
GB-ISO-138H	2 sanitary cans	Isolate	Historic	Not Eligible
GB-ISO-139H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-140H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
GB-ISO-141H	1 crushed sanitary can	Isolate	Historic	Not Eligible
GB-ISO-142H	1 sanitary can	Isolate	Historic	Not Eligible
GB-ISO-143H	1 key wind sardine can	Isolate	Historic	Not Eligible
GB-ISO-144H	2 small crushed sanitary cans	Isolate	Historic	Not Eligible
GB-ISO-145H	1 crushed sanitary can, 1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible

GB-ISO-146H	1 crushed sanitary can	Isolate	Historic	Not Eligible
GB-ISO-147H	1 crushed oil can	Isolate	Historic	Not Eligible
GB-ISO-148H	1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible
GB-ISO-149H	2 bimetal pull-tab cans	Isolate	Historic	Not Eligible
GB-ISO-150H	1 bimetal pull-tab beer can	Isolate	Historic	Not Eligible
GB-ISO-151H	1 crushed Church Key open sanitary can, 1 bimetal pull-tab can	Isolate	Historic	Not Eligible
GB-ISO-152H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
GB-ISO-153H	2 crushed bimetal pull-tab beverage cans	Isolate	Historic	Not Eligible
GB-ISO-154H	1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible
IH-ISO-001H	1 knife punched sanitary can	Isolate	Historic	Not Eligible
IH-ISO-002	1 mottled brown CCS tested cobble (5.4 × 4.2 × 2.2 cm)	Isolate	Prehistoric	Not Eligible
IH-ISO-002H	1 paint can	Isolate	Historic	Not Eligible
IH-ISO-003	1 CCS tested cobble (6.6 × 4.3 × 2.5 cm)	Isolate	Prehistoric	Not Eligible
IH-ISO-003H	1 crushed sardine can, 1 crushed rotary open sanitary can	Isolate	Historic	Not Eligible
IH-ISO-004H	1 crushed tobacco can	Isolate	Historic	Not Eligible
IH-ISO-005H	1 colorless glass bottle base. Maker's mark "8 inside of a diamond"	Isolate	Historic	Not Eligible
IH-ISO-006H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-007H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-008H	2 sanitary cans, 1 crushed	Isolate	Historic	Not Eligible
IH-ISO-009H	1 large buried sanitary can	Isolate	Historic	Not Eligible
IH-ISO-010H	1 crushed large rectangular oil can	Isolate	Historic	Not Eligible
IH-ISO-011H	1 rotary open sanitary can, 1 crushed hole-in-top can	Isolate	Historic	Not Eligible
IH-ISO-012H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-013H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-014H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-015H	1 hole-in-top can	Isolate	Historic	Not Eligible
IH-ISO-016H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-017H	1 amber glass bottle, broken in 3 pieces	Isolate	Historic	Not Eligible
IH-ISO-018H	5 amethyst glassware fragments	Isolate	Historic	Not Eligible

IH-ISO-019H	1 crushed sanitary can, 1 rectangular lid sardine can	Isolate	Historic	Not Eligible
IH-ISO-020H	1 rectangular sardine can	Isolate	Historic	Not Eligible
IH-ISO-021H	1 crushed sanitary can, 1 rectangular lid sardine can	Isolate	Historic	Not Eligible
IH-ISO-022H	metal personal care nail file	Isolate	Historic	Not Eligible
IH-ISO-023H	1 metal can lid	Isolate	Historic	Not Eligible
IH-ISO-024H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-025H	Amethyst glass	Isolate	Historic	Not Eligible
IH-ISO-026H	1 sardine can, 1 automotive oil can	Isolate	Historic	Not Eligible
IH-ISO-027H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-028H	1 crushed sardine can	Isolate	Historic	Not Eligible
IH-ISO-029H	1 crushed paint can	Isolate	Historic	Not Eligible
IH-ISO-030H	1 crushed hole-in-top can	Isolate	Historic	Not Eligible
IH-ISO-031H	1 crushed hole-in-top can	Isolate	Historic	Not Eligible
IH-ISO-032H	1 hole-in-top can	Isolate	Historic	Not Eligible
IH-ISO-033H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-034H	1 broken green glass bottle	Isolate	Historic	Not Eligible
IH-ISO-035H	1 intact tobacco can	Isolate	Historic	Not Eligible
IH-ISO-036H	1 crushed rotary open sanitary can	Isolate	Historic	Not Eligible
IH-ISO-037H	1 crushed bimetal can	Isolate	Historic	Not Eligible
IH-ISO-038H	1 large crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-039H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
IH-ISO-040H	2 crushed sanitary cans	Isolate	Historic	Not Eligible
IH-ISO-041H	1 knife open sanitary can	Isolate	Historic	Not Eligible
IH-ISO-043H	porcelain fragments	Isolate	Historic	Not Eligible
IH-ISO-044H	1 crushed rotary opened sanitary can	Isolate	Historic	Not Eligible
IH-ISO-045H	1 crushed hole-in-top can	Isolate	Historic	Not Eligible
IH-ISO-046H	1 crushed sardine can	Isolate	Historic	Not Eligible
IH-ISO-047H	1 crushed knife open sanitary can	Isolate	Historic	Not Eligible
IH-ISO-048H	1 rotary open hole-in-top can	Isolate	Historic	Not Eligible
IH-ISO-049H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-050H	1 rotary open sanitary can	Isolate	Historic	Not Eligible
IH-ISO-051H	1 small crushed rotary open sanitary can with lid	Isolate	Historic	Not Eligible

IH-ISO-052H	1 crushed knife open beverage can	Isolate	Historic	Not Eligible
IH-ISO-053H	1 crushed key strip open meat can and lid	Isolate	Historic	Not Eligible
IH-ISO-054H	1 buried complete colorless glass bottle	Isolate	Historic	Not Eligible
IH-ISO-055H	1 ribbed rotary open sanitary can	Isolate	Historic	Not Eligible
IH-ISO-056H	1 knife cut opened crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-057H	Solarized glass bottle fragments	Isolate	Historic	Not Eligible
IH-ISO-058H	2 hole in top cans. smaller one inserted inside the other both rotary opened	Isolate	Historic	Not Eligible
IH-ISO-059H	1 tobacco can with lid	Isolate	Historic	Not Eligible
IH-ISO-060H	1 intact amber glass bottle	Isolate	Historic	Not Eligible
IH-ISO-061H	1 bullet hole riddled beverage can in situ	Isolate	Historic	Not Eligible
IH-ISO-062H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-063H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
IH-ISO-064H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-065H	1 crushed rotary open sanitary can	Isolate	Historic	Not Eligible
IH-ISO-066H	1 crushed Church Key open sanitary can	Isolate	Historic	Not Eligible
IH-ISO-067H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
IH-ISO-068H	1 crushed sanitary can, 1 beverage can	Isolate	Historic	Not Eligible
IH-ISO-069H	1 crushed tobacco can	Isolate	Historic	Not Eligible
IH-ISO-070H	1 bimetal pull-tab PEPSI can	Isolate	Historic	Not Eligible
IH-ISO-071H	1 crushed bimetal pull-tab PEPSI can	Isolate	Historic	Not Eligible
IH-ISO-072H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
IH-ISO-073H	1 crushed ribbed beverage can	Isolate	Historic	Not Eligible
IH-ISO-074H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-075H	1 crushed spray paint can	Isolate	Historic	Not Eligible
IH-ISO-076H	2 crushed sanitary cans	Isolate	Historic	Not Eligible
IH-ISO-077H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-078H	1 crushed Church Key open beverage can	Isolate	Historic	Not Eligible
IH-ISO-079H	2 crushed sanitary cans	Isolate	Historic	Not Eligible

IH-ISO-080H	1 crushed can	Isolate	Historic	Not Eligible
IH-ISO-081H	1 crushed can	Isolate	Historic	Not Eligible
IH-ISO-082H	2 crushed sanitary cans	Isolate	Historic	Not Eligible
IH-ISO-083H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
IH-ISO-084H	1 crushed can	Isolate	Historic	Not Eligible
IH-ISO-085H	1 crushed Church Key open can	Isolate	Historic	Not Eligible
IH-ISO-086H	1 bimetal pull-tab can, 1 steel pull-tab cab	Isolate	Historic	Not Eligible
IH-ISO-087H	1 crushed Church Key open can	Isolate	Historic	Not Eligible
IH-ISO-088H	1 crushed sanitary can	Isolate	Historic	Not Eligible
IH-ISO-089H	1 intact pull-tab can	Isolate	Historic	Not Eligible
IH-ISO-090H	1 glass jar	Isolate	Historic	Not Eligible
IH-ISO-091H	1 crushed can	Isolate	Historic	Not Eligible
IH-ISO-092H	1 buried Church Key open can	Isolate	Historic	Not Eligible
JL-ISO-002	1 Large LCBW body sherd (15.4 × 12.7 × 0.7 cm)	Isolate	Prehistoric	Not Eligible
JM-ISO-000H	1 sanitary can	Isolate	Historic	Not Eligible
JM-ISO-008H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
JM-ISO-010H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
JM-ISO-011H	1 crushed tobacco can	Isolate	Historic	Not Eligible
JM-ISO-012H	1 crushed sanitary can	Isolate	Historic	Not Eligible
JM-ISO-013H	Misc metal piece with 3 drill holes	Isolate	Historic	Not Eligible
JM-ISO-014H	1 crushed tobacco can	Isolate	Historic	Not Eligible
JM-ISO-015H	1 complete Owens-Illinois amber bottle	Isolate	Historic	Not Eligible
JM-ISO-016H	1 U-Hitch with threaded pin	Isolate	Historic	Not Eligible
JM-ISO-017H	Misc steel	Isolate	Historic	Not Eligible
JM-ISO-018H	1 crushed sanitary can	Isolate	Historic	Not Eligible
JM-ISO-019H	1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible
JM-ISO-020H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
JM-ISO-021H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
JM-ISO-022H	1 crushed sanitary can, 1 large crushed rectangular oil can	Isolate	Historic	Not Eligible
JM-ISO-023H	1 crushed bimetal pull tab can	Isolate	Historic	Not Eligible

JM-ISO-024H	2 crushed bimetal pull-tab cans	Isolate	Historic	Not Eligible
JM-ISO-025H	1 crushed sanitary can	Isolate	Historic	Not Eligible
JM-ISO-026H	1 crushed sanitary can	Isolate	Historic	Not Eligible
JM-ISO-027H	1 crushed Church Key-opened beverage can	Isolate	Historic	Not Eligible
JM-ISO-028H	1 crushed sanitary can	Isolate	Historic	Not Eligible
JM-ISO-029H	1 crushed sanitary can and 1 crushed meat tin	Isolate	Historic	Not Eligible
JM-ISO-030H	1 crushed Church Key-opened beverage can	Isolate	Historic	Not Eligible
JM-ISO-031H	1 intact amber glass Owens-Illinois bottle (6-5/8 in tall and 2-1/2 diameter)	Isolate	Historic	Not Eligible
JM-ISO-032H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
JM-ISO-033H	2 Church Key-opened beverage cans (intact)(4-5/16 tall-2-3/16 diameter)	Isolate	Historic	Not Eligible
JM-ISO-034H	1 bimetal pull tab beverage can (intact. 4-3/8 tall by 2-3/4 diameter)	Isolate	Historic	Not Eligible
JM-ISO-035H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
JM-ISO-036H	1 mostly buried bimetal can	Isolate	Historic	Not Eligible
JM-ISO-037H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
JM-ISO-038H	1 crushed bimetal pull-tab can, 1 crushed oil can	Isolate	Historic	Not Eligible
JM-ISO-039H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
JM-ISO-040H	1 crushed ribbed sanitary can	Isolate	Historic	Not Eligible
JM-ISO-041H	1 crushed bimetal beverage can	Isolate	Historic	Not Eligible
JM-ISO-042H	1 crushed sanitary can	Isolate	Historic	Not Eligible
JM-ISO-043H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
JM-ISO-044H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
JM-ISO-045H	1 oil can	Isolate	Historic	Not Eligible
JM-ISO-046H	1 crushed sanitary can, 1 crushed steel pull-tab beverage can	Isolate	Historic	Not Eligible
JM-ISO-047H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
JM-ISO-048H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible

JM-ISO-049H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
JM-ISO-050H	1 bimetal pull-tab can, 1 Church Key open beverage can	Isolate	Historic	Not Eligible
JM-ISO-051H	1 sanitary can	Isolate	Historic	Not Eligible
JM-ISO-052H	1 crushed bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
JS-ISO-003	2 LCBW body sherds	Isolate	Prehistoric	Not Eligible
JS-ISO-012	1 Chalcedony tested cobble (4 × 2.8 × 2.5 cm)	Isolate	Prehistoric	Not Eligible
JS-ISO-022	1 mottled brown CCS tertiary flake (2.8 × 2.1 × 0.8 cm)	Isolate	Prehistoric	Not Eligible
JS-ISO-023	1 quartz tested cobble	Isolate	Prehistoric	Not Eligible
JS-ISO-024	1 large LCBW body sherd (16.4 × 12.3 × 0.6 cm)	Isolate	Prehistoric	Not Eligible
JS-ISO-032	2 LCBW body sherds	Isolate	Prehistoric	Not Eligible
KR-ISO-004	1 large LCBW body sherd (14.4 × 9.7 × 0.6 cm)	Isolate	Prehistoric	Not Eligible
LC-ISO-002H	Solarized glass bottle fragments	Isolate	Historic	Not Eligible
LC-ISO-007	1 mottled brown CCS secondary flake (6.4 × 4.2 × 1.7 cm)	Isolate	Prehistoric	Not Eligible
LR-ISO-001H	1 crushed sanitary can	Isolate	Historic	Not Eligible
LR-ISO-002H	1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-003H	1 sanitary can	Isolate	Historic	Not Eligible
LR-ISO-004H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-005H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
LR-ISO-006H	1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-007H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
LR-ISO-008H	1 crushed sanitary can	Isolate	Historic	Not Eligible
LR-ISO-009H	1 oil can	Isolate	Historic	Not Eligible
LR-ISO-010H	1 sanitary can	Isolate	Historic	Not Eligible
LR-ISO-011H	2 bimetal pull-tab beverage cans (4-3/4 tall by 2-5/8 diameter)	Isolate	Historic	Not Eligible
LR-ISO-011H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
LR-ISO-012H	1 sanitary can	Isolate	Historic	Not Eligible

LR-ISO-013H	1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-014H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
LR-ISO-015H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-016H	1 crushed bimetal can	Isolate	Historic	Not Eligible
LR-ISO-017H	1 bimetal pull-tab PEPSI can	Isolate	Historic	Not Eligible
LR-ISO-018H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-019H	1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-020H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-021H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-022H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
LR-ISO-023H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-024H	1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-025H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-026H	1 crushed key strip open meat can	Isolate	Historic	Not Eligible
LR-ISO-027H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
LR-ISO-028H	1 Church Key open ribbed sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-002H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
MHR-ISO-003H	1 bimetal pull-tab open can	Isolate	Historic	Not Eligible
MHR-ISO-004H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-005H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-006H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-007H	1 paint can	Isolate	Historic	Not Eligible
MHR-ISO-008H	1 knife open sardine can	Isolate	Historic	Not Eligible
MHR-ISO-009H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-010H	1 knife punctured oil can	Isolate	Historic	Not Eligible
MHR-ISO-010H	1 knife punctured oil can	Isolate	Historic	Not Eligible
MHR-ISO-011H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
MHR-ISO-012H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-013H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-014H	1 Church Key open beverage can	Isolate	Historic	Not Eligible

MHR-ISO-015H	1 gallon oil can	Isolate	Historic	Not Eligible
MHR-ISO-016H	1 hole-in-top can	Isolate	Historic	Not Eligible
MHR-ISO-017H	1 rotary open oil can	Isolate	Historic	Not Eligible
MHR-ISO-018H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-019H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-020H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-021H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-022H	1 meat can	Isolate	Historic	Not Eligible
MHR-ISO-023H	1 pour spout fuel can	Isolate	Historic	Not Eligible
MHR-ISO-024H	2 rotary open sanitary cans	Isolate	Historic	Not Eligible
MHR-ISO-025H	1 rotary open sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-026H	1 rectangular can with threaded cap	Isolate	Historic	Not Eligible
MHR-ISO-027H	1 bimetal DR PEPPER pull-tab can	Isolate	Historic	Not Eligible
MHR-ISO-028H	1 bimetal BUDWEISER pull-tab can	Isolate	Historic	Not Eligible
MHR-ISO-029H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-030H	1 aerosol can	Isolate	Historic	Not Eligible
MHR-ISO-031H	1 rotary open hole-in-top can	Isolate	Historic	Not Eligible
MHR-ISO-032H	1 rotary open sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-033H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-034H	1 Church Key open bimetal can	Isolate	Historic	Not Eligible
MHR-ISO-035H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-036H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-037H	1 fuel can	Isolate	Historic	Not Eligible
MHR-ISO-037H	1 bimetal pull-tab DR PEPPER can	Isolate	Historic	Not Eligible
MHR-ISO-038H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
MHR-ISO-040H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
MHR-ISO-041H	1 knife punctured sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-042H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible

MHR-ISO-043H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
MHR-ISO-044H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
MHR-ISO-045H	1 unopened beverage can	Isolate	Historic	Not Eligible
MHR-ISO-046H	1 knife puncture coffee can	Isolate	Historic	Not Eligible
MHR-ISO-047H	1 key wind sardine can	Isolate	Historic	Not Eligible
MHR-ISO-048H	1 key wind sardine can	Isolate	Historic	Not Eligible
MHR-ISO-049H	1 rotary open sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-050H	porcelain fragments	Isolate	Historic	Not Eligible
MHR-ISO-051H	porcelain fragments	Isolate	Historic	Not Eligible
MHR-ISO-052H	porcelain fragments	Isolate	Historic	Not Eligible
MHR-ISO-053H	1 broken amber glass bottle	Isolate	Historic	Not Eligible
MHR-ISO-054H	1 bottle base (Ball maker's mark)	Isolate	Historic	Not Eligible
MHR-ISO-055H	1 crushed sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-056H	1 crushed sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-057H	2 crushed rotary open sanitary cans	Isolate	Historic	Not Eligible
MHR-ISO-058H	1 buried sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-059H	1 key wind sardine can	Isolate	Historic	Not Eligible
MHR-ISO-060H	1 spout top fuel can	Isolate	Historic	Not Eligible
MHR-ISO-061H	1 crushed rectangular can	Isolate	Historic	Not Eligible
MHR-ISO-062H	1 knife cut sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-063H	2 sardine cans. 1 key wind open, 1 knife cut	Isolate	Historic	Not Eligible
MHR-ISO-064H	1 knife cut sanitary can	Isolate	Historic	Not Eligible
MHR-ISO-065H	1 crushed Church Key open sanitary can	Isolate	Historic	Not Eligible
MKW-ISO-001	1 large LCBW neck transition sherd (0.5 cm thick)	Isolate	Prehistoric	Not Eligible
MKW-ISO-003	1 fire clouded LCBW body sherd (10 × 7 × 0.6 cm)	Isolate	Prehistoric	Not Eligible
MKW-ISO-006H	1 historic car bell fragment	Isolate	Historic	Not Eligible
MKW-ISO-007	2 LCBW sherds. 1 neck, 1 rim (0.7 cm thick)	Isolate	Prehistoric	Not Eligible
MKW-ISO-008	1 LCBW body sherd (3.8 × 3.9 × 0.4 cm)	Isolate	Prehistoric	Not Eligible
MKW-ISO-011	2 LCBW body sherds (0.5-0.8 cm thickness)	Isolate	Prehistoric	Not Eligible

MS-ISO-006	2 LCBW rim sherds, slightly recurved ((1)5.2 cm (2)2.2 cm, (1)4.3 cm (2)1.9 cm, (1)0.5 cm (2)0.5 cm)	Isolate	Prehistoric	Not Eligible
MS-ISO-007	2 LCBW body sherds ((1)2.4 cm (2)2.6 cm, (1)1.7 (2)2.4, 0.5 cm thick)	Isolate	Prehistoric	Not Eligible
MS-ISO-008	1 LCBW body sherd (5.1 × 3.9 × 0.6 cm)	Isolate	Prehistoric	Not Eligible
MS-ISO-009	1 intact neck and incised mouth of canteen	Isolate	Prehistoric	Criterion D/Criterion 4
MS-ISO-014	2 LCBW body sherds (1 sherd broken into 2)(0.5-0.6 cm thickness)	Isolate	Prehistoric	Not Eligible
MS-ISO-017	1 large LCBW body sherd (15.5 × 13 × 0.5 cm)	Isolate	Prehistoric	Not Eligible
MVC-ISO-002	1 large LCBW basal sherd with stucco (16 × 10 × 0.8 cm)	Isolate	Prehistoric	Not Eligible
MVC-ISO-012	1 atypical ceramic sherd, intentionally shaped round (6.4 × 6 × 0.5 cm)	Isolate	Prehistoric	Not Eligible
MVC-ISO-013	1 large LCBW body sherd (13.5 × 11.1 × 0.8 cm)	Isolate	Prehistoric	Not Eligible
MVC-ISO-017	2 LCBW body sherds (0.6 cm thick)	Isolate	Prehistoric	Not Eligible
MVC-ISO-024	1 recurved LCBW rim sherd (7.5 × 6.1 × 0.4 cm)	Isolate	Prehistoric	Not Eligible
NO-ISO-001	1 small quartzite hammerstone/ 1 lateral margin battering (3 × 3 × 1 cm)	Isolate	Prehistoric	Not Eligible
NP-ISO-002H	1 colorless glass "NEHI" bottle	Isolate	Historic	Not Eligible
NP-ISO-021	2 LCBW body sherds	Isolate	Prehistoric	Not Eligible
NP-ISO-022	1 LCBW body sherd broken into 2 pieces (3.2 × 2.4 × 0.6 cm)	Isolate	Prehistoric	Not Eligible
NP-ISO-023H	2 bimetal pull-tab cans	Isolate	Historic	Not Eligible
NP-ISO-024H	2 crushed sanitary cans	Isolate	Historic	Not Eligible
NP-ISO-025H	2 crushed beverage cans	Isolate	Historic	Not Eligible
NP-ISO-027H	Two crushed Church Key cans	Isolate	Historic	Not Eligible
NP-ISO-028H	1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible
NP-ISO-029H	1 crushed bimetal pull-tab can	Isolate	Historic	Not Eligible
NP-ISO-030H	1 crushed Church Key open can	Isolate	Historic	Not Eligible

NP-ISO-031H	1 crushed pull-tab beverage can	Isolate	Historic	Not Eligible
NP-ISO-032H	1 crushed sanitary can	Isolate	Historic	Not Eligible
NP-ISO-033H	2 crushed bimetal pull-tab beverage cans	Isolate	Historic	Not Eligible
NP-ISO-034H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
NP-ISO-035H	Concrete block engraved with letter "C"	Isolate	Historic	Not Eligible
NP-ISO-036H	Colorless glass fragments Owens-Illinois maker's mark	Isolate	Historic	Not Eligible
NP-ISO-037H	1 crushed Church Key open sanitary can	Isolate	Historic	Not Eligible
NP-ISO-038H	1 crushed sanitary can	Isolate	Historic	Not Eligible
NP-ISO-038H	2 sanitary cans. 1 crushed	Isolate	Historic	Not Eligible
NP-ISO-039H	1 crushed sanitary can. 1 crushed pull-tab can	Isolate	Historic	Not Eligible
NP-ISO-040H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
NP-ISO-041H	1 Church Key open sanitary can	Isolate	Historic	Not Eligible
NP-ISO-042H	1 crushed sanitary can	Isolate	Historic	Not Eligible
NP-ISO-043H	1 crushed bimetal beverage can	Isolate	Historic	Not Eligible
NP-ISO-044H	1 crushed bimetal beverage can	Isolate	Historic	Not Eligible
NP-ISO-045H	1 crushed sanitary can	Isolate	Historic	Not Eligible
NP-ISO-046H	1 crushed sanitary can	Isolate	Historic	Not Eligible
NP-ISO-047H	1 crushed rotary open sanitary can	Isolate	Historic	Not Eligible
NP-ISO-049H	1 Church Key open beverage can	Isolate	Historic	Not Eligible
NP-ISO-050H	1 oil can with screw cap	Isolate	Historic	Not Eligible
NP-ISO-051H	crushed can	Isolate	Historic	Not Eligible
NP-ISO-052H	1 crushed tobacco can	Isolate	Historic	Not Eligible
NP-ISO-053H	1 deteriorating sanitary can	Isolate	Historic	Not Eligible
P-13-014627	1 colorless Kerr mason canning jar	Isolate	Historic	Not Eligible
P-13-014628	1 ceramic sherd broken into 4 pieces	Isolate	Prehistoric	Not Eligible
P-13-014629	1 LCBW rim sherd	Isolate	Prehistoric	Not Eligible
SH-ISO-006	2 LCBW body sherds	Isolate	Prehistoric	Not Eligible
SH-ISO-020	2 LCBW body sherds (4.3 × 3.2 × 0.4 cm)	Isolate	Prehistoric	Not Eligible

SH-ISO-021	1 beige quartzite hammerstone (5 × 4.5 × 3 cm)	Isolate	Prehistoric	Not Eligible
SH-ISO-023H	porcelain fragments	Isolate	Historic	Not Eligible
SH-ISO-026H	1 rotary open sanitary can	Isolate	Historic	Not Eligible
SH-ISO-027H	1 hinge lid tobacco can	Isolate	Historic	Not Eligible
SH-ISO-028H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
SH-ISO-029H	1 bimetal pull-tab beverage can	Isolate	Historic	Not Eligible
TMC-ISO-014	1 jasper tested cobble	Isolate	Prehistoric	Not Eligible
TMC-ISO-021	2 LCBW body sherd (largest sherd 7.5 × 7 × 0.6 cm)	Isolate	Prehistoric	Not Eligible
TMC-ISO-022	1 quartzite tested cobble, 1 flake removal (6 × 5.5 × 4 cm)	Isolate	Prehistoric	Not Eligible
TMC-ISO-025	1 brown primary chert flake (4.2 × 2 × 1.6 cm)	Isolate	Prehistoric	Not Eligible
TMC-ISO-027	2 LCBW body sherds	Isolate	Prehistoric	Not Eligible
TMC-ISO-028	1 tertiary CCS flake (5.5 × 3.3 × 1 cm)	Isolate	Prehistoric	Not Eligible
WH-ISO-006	1 CCS tested cobble (3.5 × 1.5 cm)	Isolate	Prehistoric	Not Eligible
WH-ISO-007	1 quartzite hammerstone with associated flake (6.3 × 6 × 3 cm)	Isolate	Prehistoric	Not Eligible
WH-ISO-010	1 LCBW body sherd	Isolate	Prehistoric	Not Eligible
WH-ISO-016	2 weathered chert tertiary flakes ((1)5.3 cm (2)3.8 cm, (1)3.9 cm (2)2.1 cm, (1)0.7 cm (2)0.6 cm)	Isolate	Prehistoric	Not Eligible
WH-ISO-022	2 LCBW rim sherds ((1)8.9 cm (2)8.4 cm, (1)5.2 cm (2)7.2 cm, 0.6 cm)	Isolate	Prehistoric	Not Eligible
WH-ISO-030H	1 bimetal, 1 steel pull-tab cans	Isolate	Historic	Not Eligible
WH-ISO-031H	1 bimetal pull-tab can	Isolate	Historic	Not Eligible
WH-ISO-032H	1 tobacco can	Isolate	Historic	Not Eligible
WH-ISO-033H	1 hole-in-top can	Isolate	Historic	Not Eligible
WH-ISO-035H	1 rotary open sanitary can	Isolate	Historic	Not Eligible
WH-ISO-036H	1 Church Key open oil can, 1 hole-in-top can	Isolate	Historic	Not Eligible
WH-ISO-037H	1 hole-in-top can	Isolate	Historic	Not Eligible
WH-ISO-038H	1 hole-in-top can	Isolate	Historic	Not Eligible
WH-ISO-039H	1 sanitary can	Isolate	Historic	Not Eligible
WH-ISO-039H	1 crushed hole-in-top can	Isolate	Historic	Not Eligible

WH-ISO-040H	1 rotary open sanitary can	Isolate	Historic	Not Eligible

Sacred Lands File & Native American Contacts List Request

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95501
(916) 373-3710
(916) 373-5471 – Fax
nahc@nahc.ca.gov

Information Below is Required for a Sacred Lands File Search

Project: East Mesa Solar

County: Imperial

USGS Quadrangle
Name: Glamis SW, Midway Well NW, Midway Well CA

Township: ______ Range: ______ Section(s): Multiple TRS; See attached map

Company/Firm/Agency:
PaleoWest Archaeology

Contact Person: Paige Kohler

Street Address: 3990 Old Town Avenue, Suite C304

City: San Diego Zip: 92110

Phone: (805) 588-4186 Extension: ______

Fax: ______

Email: pkohler@paleowest.com

Project Description:
The proposed East Mesa Solar Project is west of El Centro and south of Interstate-8 (I-8) in Imperial County, California. The Project encompasses two development areas and an approximately one-mile-long electric transmission generation tie-line that will connect to existing transmission line structure.

☑ Project Location Map is attached

PALEO WEST

East Mesa Solar Project
Project Location

USGS 7.5' Quadrangle:
Glamis SW, Ca (1980) &
Midway Well NW, Ca (1980)
T16S R17E, Secs 13-17 & 20-29
UTM Zone 11 | NAD 83 | SBBM

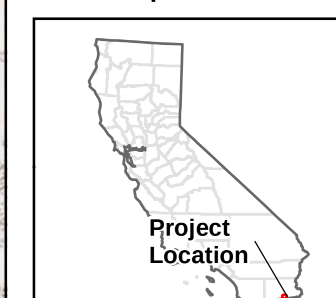
Project Area
One Mile RS Buffer

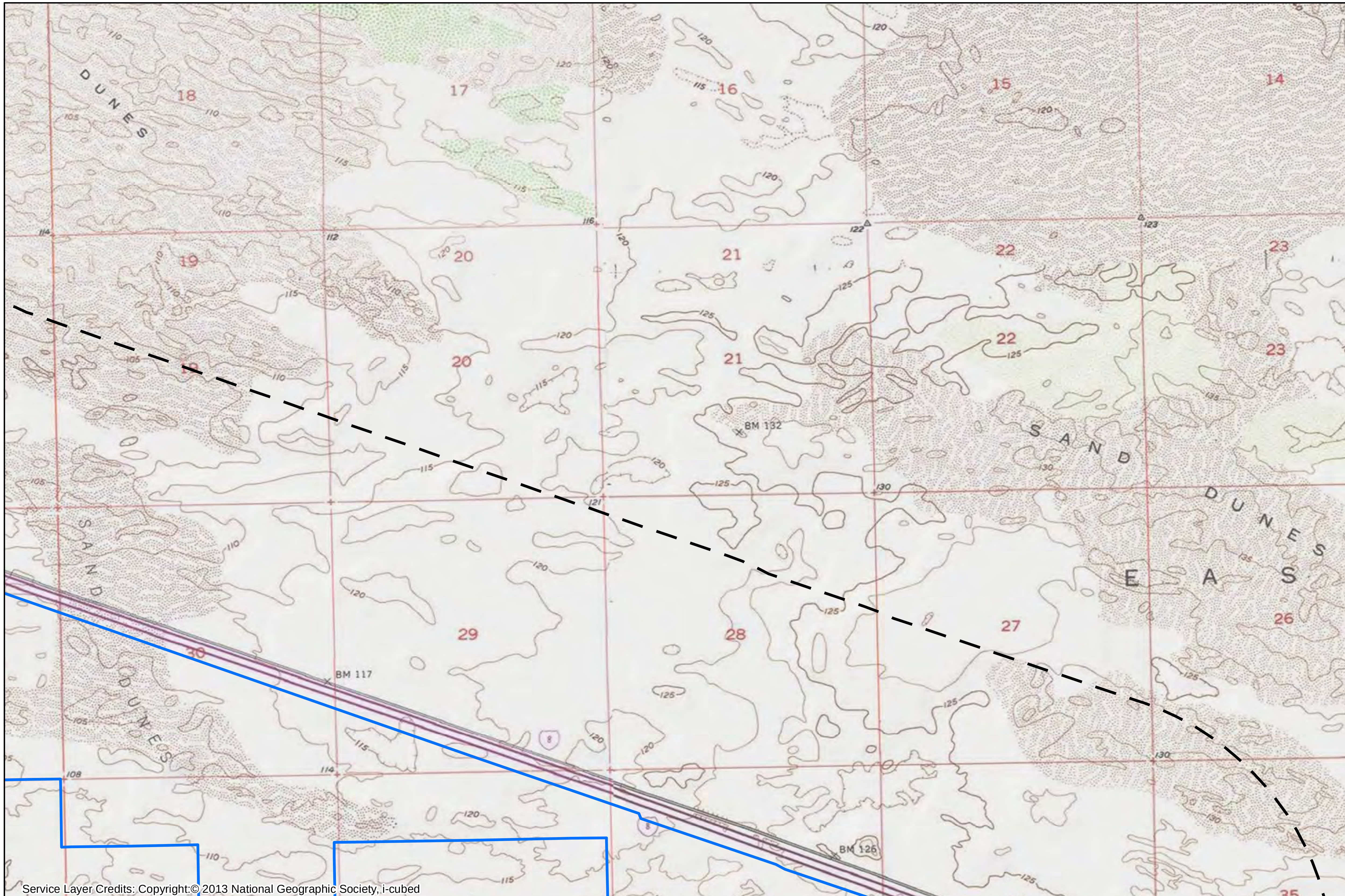
For Official Use Only.
Public Disclosure of Archaeological Site Locations is Prohibited
(54 USC 307103)

N

0 feet 2,500
0 meters 800
1:24,000

Map Location





PALEO WEST

East Mesa Solar Project
Project Location

USGS 7.5' Quadrangle:
Midway Well NW, Ca (1980) &
Midway Well, Ca (1980)
T16S R18E, Secs 19-20 & 26-35
UTM Zone 11 | NAD 83 | SBBM

Project Area

One Mile RS Buffer

For Official Use Only.
Public Disclosure of Archaeological Site Locations is Prohibited
(54 USC 307103)

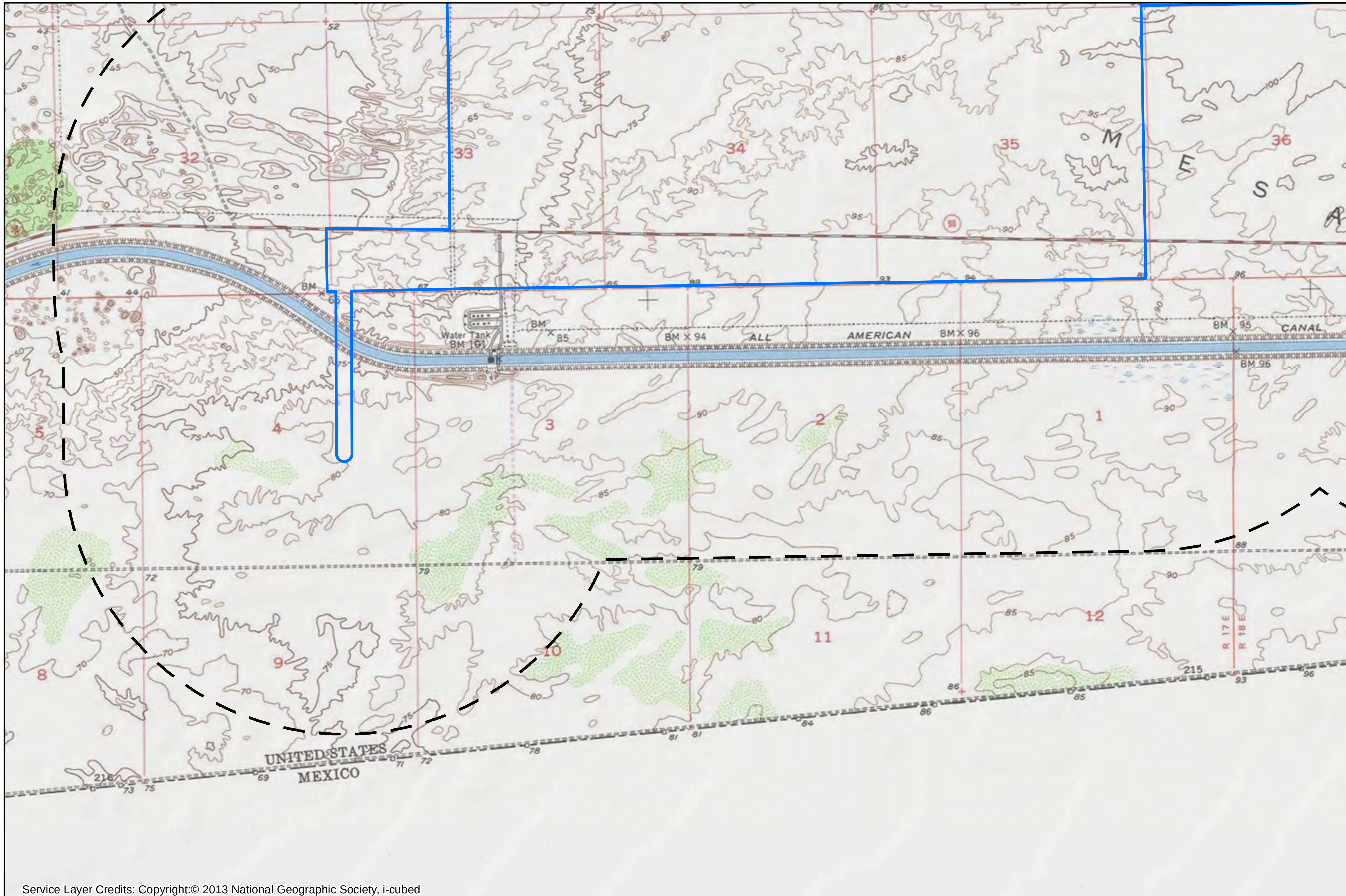
N

0 feet 2,500

0 meters 800

1:24,000

Map Location



PALEO WEST

East Mesa Solar Project
Project Location

USGS 7.5' Quadrangle: Midway Well NW, Ca (1980)
T16S R17E, Secs 32-36; T17S R17E, Secs 1-4 & 8-10; T16S R17E, Sec 16
UTM Zone 11 | NAD 83 | SBBM

Project Area

One Mile RS Buffer

For Official Use Only.
Public Disclosure of Archaeological Site Locations is Prohibited
(54 USC 307103)

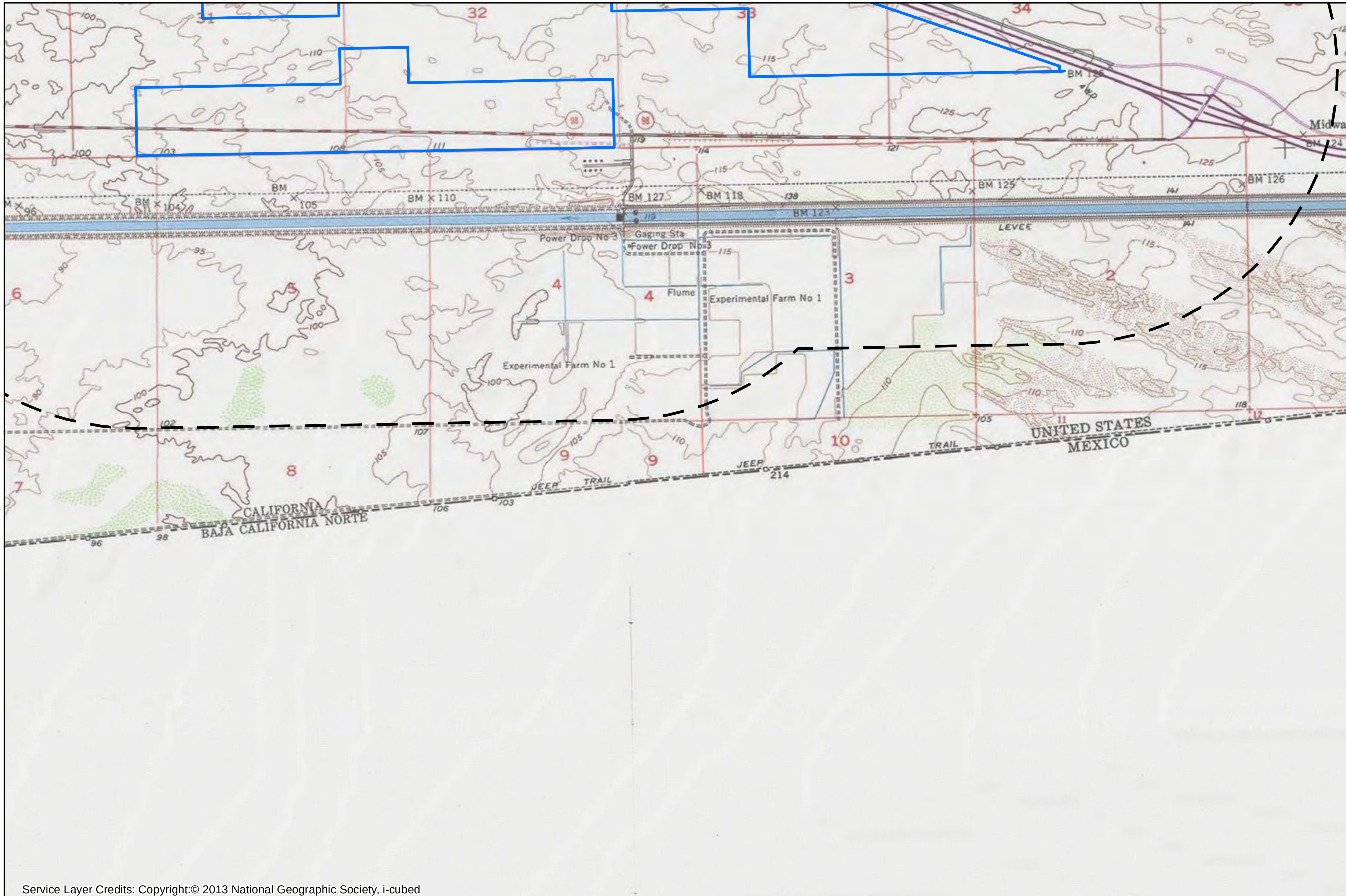
N

0 feet 2,500

0 meters 800

1:24,000

Map Location



PALEO WEST

East Mesa Solar Project
Project Location

USGS 7.5' Quadrangle: Midway Well NW, Ca (1980) & Midway Well, Ca (1980)
T16S R17E, Sec 36; T16S R18E, Secs 31-35; T17S R18E, Secs 1-6
UTM Zone 11 | NAD 83 | SBBM

Project Area

One Mile RS Buffer

For Official Use Only.
Public Disclosure of Archaeological Site Locations is Prohibited
(54 USC 307103)

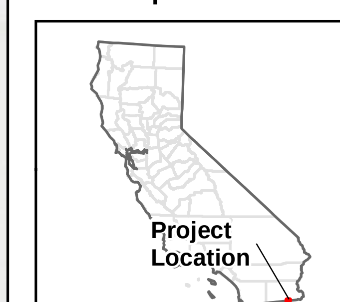
N

0 feet 2,500

0 meters 800

1:24,000

Map Location



STATE OF CALIFORNIA Gavin Newsom, *Governor*

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento, California 95691
(916) 373-3710
nahc@nahc.ca.gov

August 29, 2022

Paige Kohler
PaleoWest Archaeology

Via Email to: pkohler@paleowest.com

Re: East Mesa Solar Project, Imperial County

Dear Ms. Kohler:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information submitted for the above referenced project. The results were positive. Please contact the Torres-Martinez Desert Cahuilla Indians on the attached list for information. Please note that tribes do not always record their sacred sites in the SLF, nor are they required to do so. A SLF search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with a project's geographic area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites, such as the appropriate regional California Historical Research Information System (CHRIS) archaeological Information Center for the presence of recorded archaeological sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. Please contact all of those listed; if they cannot supply information, they may recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our lists contain current information.

If you have any questions or need additional information, please contact me at my email address: Pricilla.Torres-Fuentes@nahc.ca.gov.

Sincerely,

Pricilla Torres-Fuentes

Pricilla Torres-Fuentes
Cultural Resources Analyst

Attachment

Native American Heritage Commission
Native American Contact List
Imperial County
8/29/2022

Barona Group of the Capitan Grande
Raymond Welch, Chairperson
1095 Barona Road — Diegueno
Lakeside, CA, 92040
Phone: (619) 443 - 6612
Fax: (619) 443-0681
counciloffice@barona-nsn.gov

Campo Band of Diegueno Mission Indians
Ralph Goff, Chairperson
36190 Church Road, Suite 1 — Diegueno
Campo, CA, 91906
Phone: (619) 478 - 9046
Fax: (619) 478-5818
rgoff@campo-nsn.gov

Ewiiaapaayp Band of Kumeyaay Indians
Robert Pinto, Chairperson
4054 Willows Road — Diegueno
Alpine, CA, 91901
Phone: (619) 368 - 4382
Fax: (619) 445-9126
ceo@ebki-nsn.gov

Ewiiaapaayp Band of Kumeyaay Indians
Michael Garcia, Vice Chairperson
4054 Willows Road — Diegueno
Alpine, CA, 91901
Phone: (619) 933 - 2200
Fax: (619) 445-9126
michaelg@leaningrock.net

Iipay Nation of Santa Ysabel
Clint Linton, Director of Cultural Resources
P.O. Box 507 — Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 803 - 5694
clint@redtailenvironmental.com

Iipay Nation of Santa Ysabel
Virgil Perez, Chairperson
P.O. Box 130 — Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 765 - 0845
Fax: (760) 765-0320

Inaja-Cosmit Band of Indians
Rebecca Osuna, Chairperson
2005 S. Escondido Blvd. — Diegueno
Escondido, CA, 92025
Phone: (760) 737 - 7628
Fax: (760) 747-8568

Jamul Indian Village
Erica Pinto, Chairperson
P.O. Box 612 — Diegueno
Jamul, CA, 91935
Phone: (619) 669 - 4785
Fax: (619) 669-4817
epinto@jiv-nsn.gov

Jamul Indian Village
Lisa Cumper, Tribal Historic Preservation Officer
P.O. Box 612 — Diegueno
Jamul, CA, 91935
Phone: (619) 669 - 4855
lcumper@jiv-nsn.gov

Kwaaymii Laguna Band of Mission Indians
Carmen Lucas,
P.O. Box 775 — Kwaaymii Diegueno
Pine Valley, CA, 91962
Phone: (619) 709 - 4207

La Posta Band of Diegueno Mission Indians
Gwendolyn Parada, Chairperson
8 Crestwood Road — Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
LP13boots@aol.com

La Posta Band of Diegueno Mission Indians
Javaughn Miller, Tribal Administrator
8 Crestwood Road — Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
jmiller@LPtribe.net

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed East Mesa Solar Project, Imperial County.

Native American Heritage Commission
Native American Contact List
Imperial County
8/29/2022

Manzanita Band of Kumeyaay Nation
Angela Elliott Santos, Chairperson
P.O. Box 1302 — Diegueno
Boulevard, CA, 91905
Phone: (619) 766 - 4930
Fax: (619) 766-4957

Mesa Grande Band of Diegueno Mission Indians
Michael Linton, Chairperson
P.O Box 270 — Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 782 - 3818
Fax: (760) 782-9092
mesagrandeband@msn.com

Quechan Tribe of the Fort Yuma Reservation
Jill McCormick, Historic Preservation Officer
P.O. Box 1899 — Quechan
Yuma, AZ, 85366
Phone: (760) 572 - 2423
historicpreservation@quechantribe.com

Quechan Tribe of the Fort Yuma Reservation
Manfred Scott, Acting Chairman Kw'ts'an Cultural Committee
P.O. Box 1899 — Quechan
Yuma, AZ, 85366
Phone: (928) 750 - 2516
scottmanfred@yahoo.com

San Pasqual Band of Diegueno Mission Indians
John Flores, Environmental Coordinator
P. O. Box 365 — Diegueno
Valley Center, CA, 92082
Phone: (760) 749 - 3200
Fax: (760) 749-3876
johnf@sanpasqualtribe.org

San Pasqual Band of Diegueno Mission Indians
Allen Lawson, Chairperson
P.O. Box 365 — Diegueno
Valley Center, CA, 92082
Phone: (760) 749 - 3200
Fax: (760) 749-3876
allenl@sanpasqualtribe.org

Sycuan Band of the Kumeyaay Nation
Kristie Orosco, Kumeyaay Resource Specialist
1 Kwaaypaay Court — Kumeyaay
El Cajon, CA, 92019
Phone: (619) 445 - 6917

Sycuan Band of the Kumeyaay Nation
Cody Martinez, Chairperson
1 Kwaaypaay Court — Kumeyaay
El Cajon, CA, 92019
Phone: (619) 445 - 2613
Fax: (619) 445-1927
ssilva@sycuan-nsn.gov

Torres-Martinez Desert Cahuilla Indians
Cultural Committee,
P.O. Box 1160 — Cahuilla
Thermal, CA, 92274
Phone: (760) 397 - 0300
Fax: (760) 397-8146
Cultural-Committee@torresmartinez-nsn.gov

Viejas Band of Kumeyaay Indians
Ernest Pingleton, Tribal Historic Officer, Resource Management
1 Viejas Grade Road — Diegueno
Alpine, CA, 91901
Phone: (619) 659 - 2314
epingleton@viejas-nsn.gov

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed East Mesa Solar Project, Imperial County.

Native American Heritage Commission
Native American Contact List
Imperial County
8/29/2022

Viejas Band of Kumeyaay Indians
John Christman, Chairperson
1 Viejas Grade Road
Alpine, CA, 91901
Phone: (619) 445 - 3810
Fax: (619) 445-5337

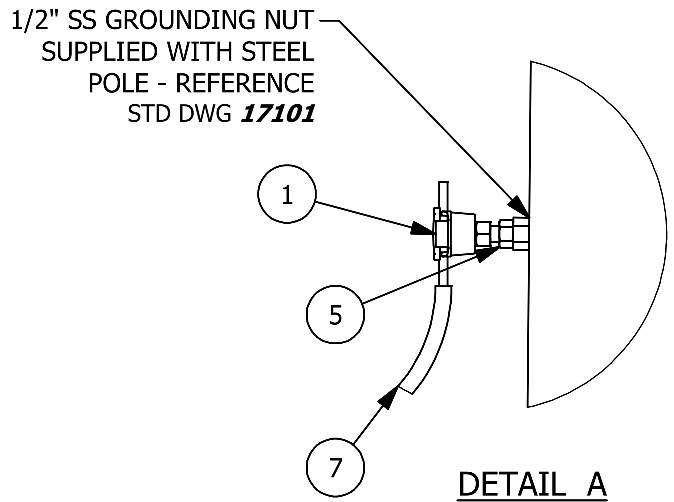
Diegueno

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

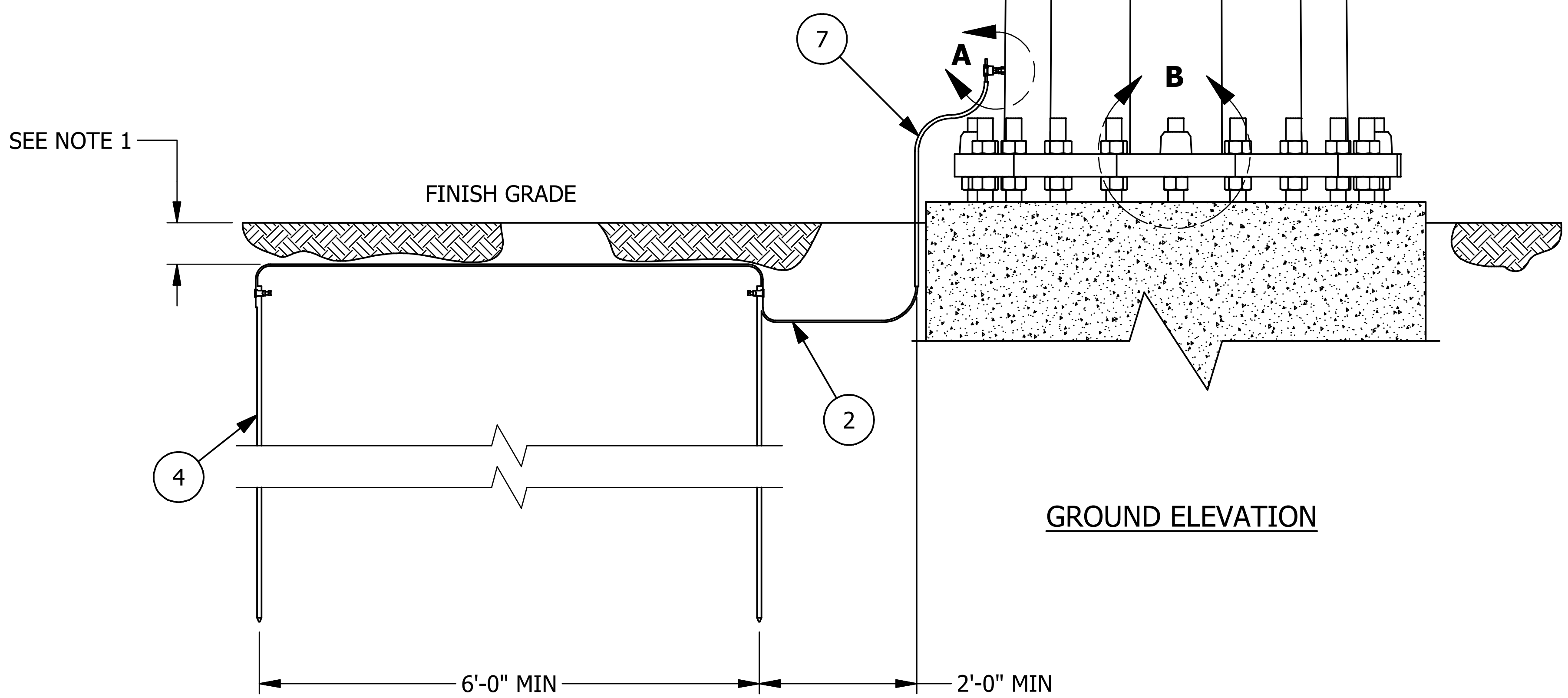
This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed East Mesa Solar Project, Imperial County.

Attachment E Transmission System Design Attachments

Attachment E.1 SDG&E Grounding Details

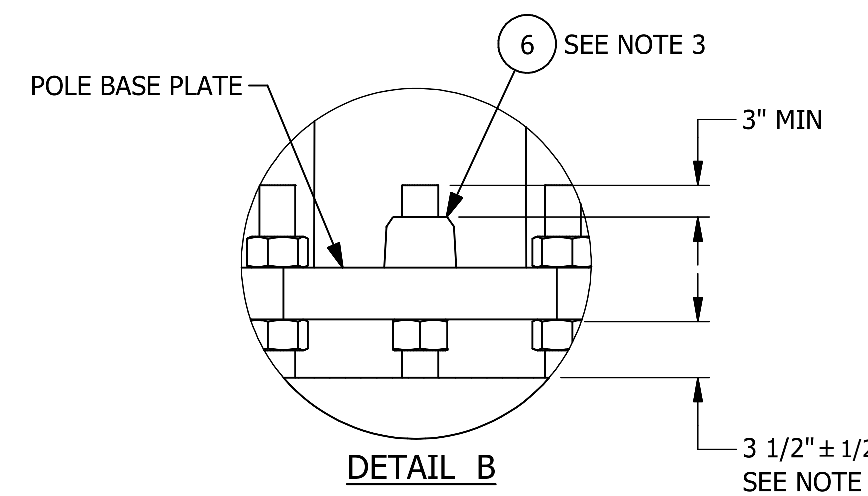


DETAIL A



GROUND ELEVATION

BILL OF MATERIAL				
ITEM	QTY	STOCK OR DWG NO	DESCRIPTION	FERC ACCT
1	1	S730466	TERMINAL, GROUND, SINGLE BOLT CLAMP, 1/2" COPPER ALLOY W/ NUT & WASHER	355
2	20'	S813056	WIRE, COPPERCLAD, 2AWG, SOLID, 40% CONDUCTIVITY, DEAD SOFT ANNEALED	355
4	2	S603074	ROD 5/8" X 8FT COPPERWELD GROUND	355
5	1	S505536	NUT, HEX, 1/2-13, STAINLESS STEEL	355
6	4	S203120	CAP, SAFETY HEX HEAVY 2.25" PIER FDN	356
7	15'	S252010	CONDUIT, 1/2" DIAMETER, 16MM, GRAY ANACO	357



DETAIL B

NOTES:

1. ROD AND WIRE DEPTH SHALL BE 6 INCHES MIN UNDER CONCRETE OR FINISHED GRADE, 18 INCHES FOR OPEN GROUND AND 4 FEET MIN IN AREAS SUBJECT TO PLOWING.
2. SET SCREWS SHALL TIGHTEN AGAINST GROUND ROD AND NOT AGAINST THE GROUND WIRE.
3. MINIMUM FOUR SAFETY CAPS TO BE INSTALLED AT 0°, 90°, 180° AND 270° FROM THE V-NOTCH.
4. INSTALL FLEX CONDUIT SNUG AGAINST GROUNDING LUG NOT EXCEEDING A 3.5 INCH BENDING RADIUS WHILE CONFORMING AROUND FOUNDATION.
5. VALUES ARE CALCULATED BASED ON 2.25 INCH DIAMETER ANCHOR BOLTS, CIVIL STRUCTURAL ENGINEERING SHALL BE NOTIFIED IF OTHER ANCHOR BOLT SIZE IS USED.

REV	CHANGE	DWN	CHKD	CHKD	APVD	APVD DATE	EFF DATE
B	-	-	-	-	-	-	-
A	REVISE TO 3D FORAMT, REV DETAIL B, ADDED NOTE 5	PEI/DV	SS	CFT	PG	10/19/23	10/20/23
-	ORIGINAL ISSUE (SUPERSEDES STD DWG #17135)	GLC	RER/JAE	ECJ	WGT	12/13/16	02/21/17

ELECTRIC TRANSMISSION ENGINEERING

SDGE

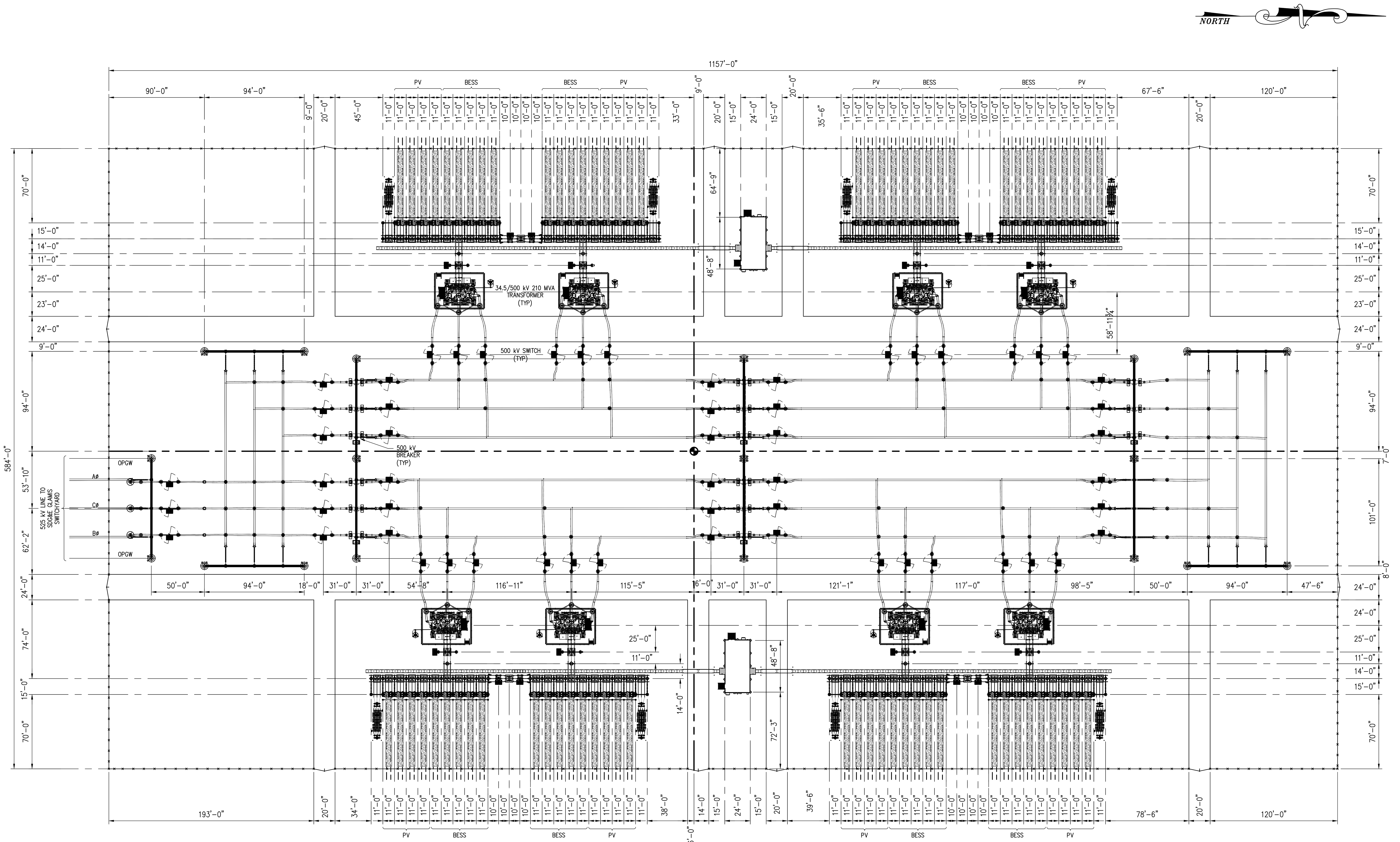
DRILLED PIER STEEL POLE PLACEMENT & GROUNDING DETAILS

SCALE: NOT TO SCALE

DRAWING NO: 21130

SHEET: 1 OF 1

Attachment E.2 One-line Diagram of Proposed Substation and Switchyard



LEGEND

- BASELINE MARKER
- BASELINE
- SUBSTATION FENCE
- MOD SWITCH OPERATOR
- MANUAL SWITCH OPERATOR
- STRUCTURE MOUNTED YARD LIGHTING
- A / P004-1: INDICATES ELEVATION NUMBER; INDICATES DRAWING ON WHICH ELEVATION APPEARS

STRUCTURE DESIGN CRITERIA

500 kV CLEARANCE (1800 kV BIL):

LIVE PARTS: MIN ø-G=144"
MIN ø-ø=195"

TO GRADE: 21'-6" (BUS)
42'-6" (DRIVEWAY)

34.5 kV CLEARANCE (200 kV BIL):

LIVE PARTS: MIN ø-G=13"
MIN ø-ø=18"

TO GRADE: 10'-0" (BUS)
22'-0" (DRIVEWAY)

ISSUED FOR REVIEW

I RATED
242 A @ 500 kV
3,514 A @ 34.5 kV

0 20FT 50FT 100FT
SCALE: 1"=50'-0"

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\111 PHYSICAL\PRK-D-P003-0_REV A.DWG LAST SAVED BY: icdelaney 7/29/2024 3:33 PM PLOTTED BY: Isaac C. Delaney 7/29/2024 5:15 PM Tab:PRK-D-P003-01

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BILLINGS, MONTANA

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A	ISSUED FOR 10% REVIEW	07/29/24	ICD	MAG

Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: 1"=50'-0"	PLT SCALE:	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
ULTIMATE ARRANGEMENT

DWG. NAME: PRK-D-P003-01 REVISION NO : A

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NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M1, 52M2 AND 52BT1 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T1 AND T2.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C11G AND CSC11 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C12G AND CSC12 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:26 AM Tab:PRK-D-S001-4

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DESIGNED	GROFF	07/24
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APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION SWITCHING DIAGRAM (SHEET 1)

DWG. NAME: PRK-D-S001-4 | REVISION NO : A

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NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M1, 52M2 AND 52BT1 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T1 AND T2.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C21G AND CSC21 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C22G AND CSC22 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:26 AM Tab:PRK-D-S001-5

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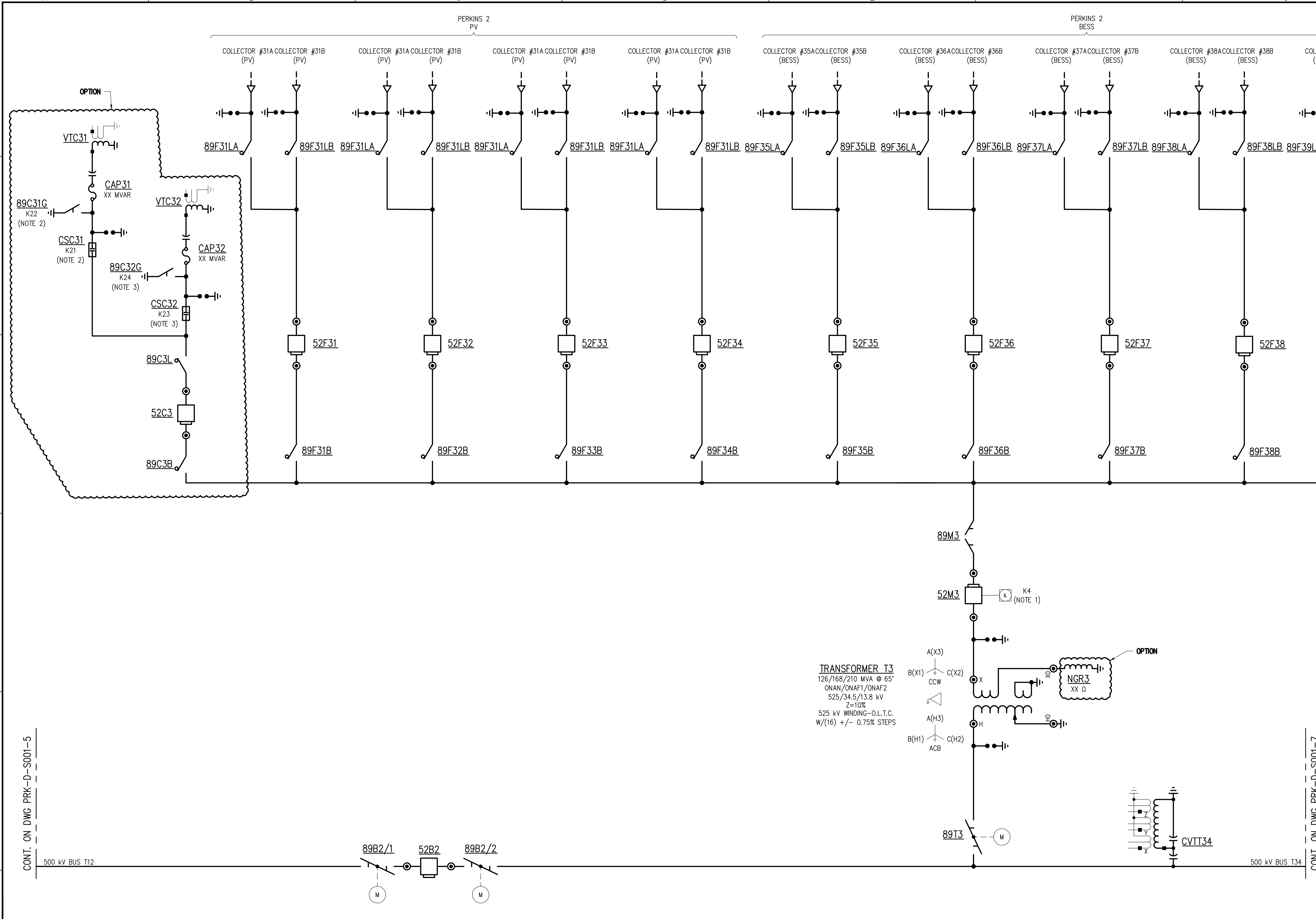
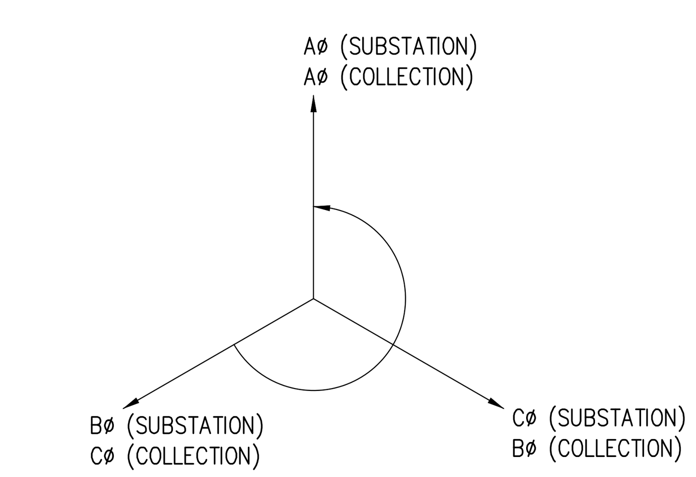
ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION SWITCHING DIAGRAM (SHEET 2)

DWG. NAME: PRK-D-S001-5 REVISION NO : A





VOLTAGE PHASORS

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NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M3, 52M4 AND 52BT2 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T3 AND T4.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C31G AND CSC31 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C32G AND CSC32 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:26 AM Tab:PRK-D-S001-6

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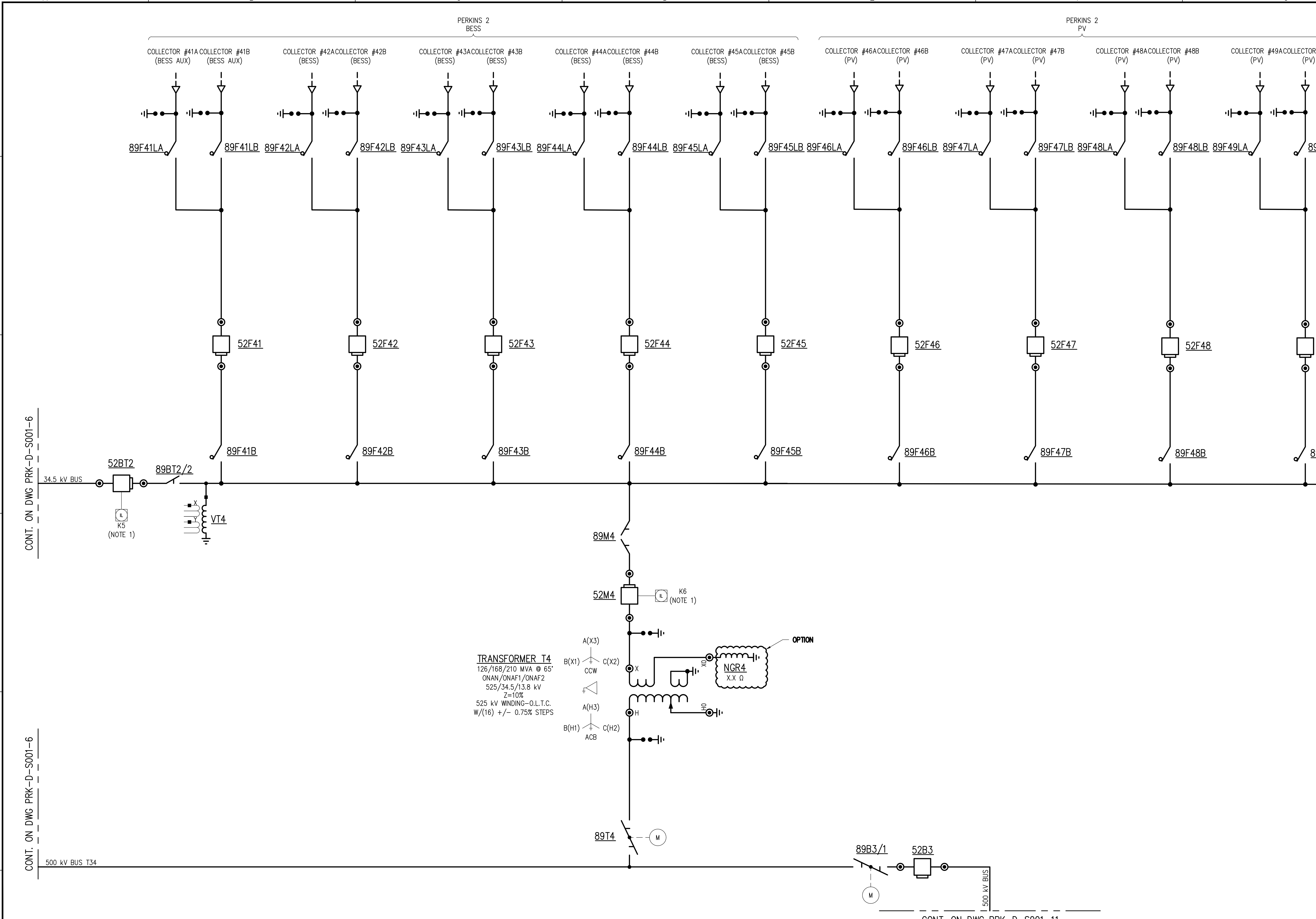
A	ISSUED FOR 10% REVIEW	07/29/24	ICD	MAG

Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION SWITCHING DIAGRAM (SHEET 3)

DWG. NAME: PRK-D-S001-6 REVISION NO : A



ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M3, 52M4 AND 52BT2 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T3 AND T4.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C41G AND CSC41 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C42G AND CSC42 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-7

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A	ISSUED FOR 10% REVIEW	07/29/24	ICD	MAG

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ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION SWITCHING DIAGRAM (SHEET 4)

DWG. NAME: PRK-D-S001-7 REVISION NO : A

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M5, 52M6 AND 52BT3 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T5 AND T6.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C51G AND CSC51 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C52G AND CSC52 TO PREVENT GROUNDING OF 34.5 kV BUS.

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DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION SWITCHING DIAGRAM (SHEET 5)

DWG. NAME: PRK-D-S001-8 REVISION NO : A

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M5, 52M6 AND 52BT3 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T5 AND T6.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C61G AND CSC61 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C62G AND CSC62 TO PREVENT GROUNDING OF 34.5 kV BUS.

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DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION SWITCHING DIAGRAM (SHEET 6)

DWG. NAME: PRK-D-S001-9 REVISION NO : A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M7, 52M8 AND 52BT4 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T7 AND T8.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C71G AND CSC71 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C72G AND CSC72 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-10

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DESIGNED	GROFF	07/24
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APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION SWITCHING DIAGRAM (SHEET 7)

DWG. NAME: PRK-D-S001-10

REVISION NO : A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M7, 52M8 AND 52BT4 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T7 AND T8.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C81G AND CSC81 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C82G AND CSC82 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:26 AM Tab:PRK-D-S001-11

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ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION SWITCHING DIAGRAM (SHEET 8)

DWG. NAME: PRK-D-S001-11 REVISION NO : A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M1, 52M2 AND 52BT1 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T1 AND T2.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C11G AND CSC11 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C12G AND CSC12 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:26 AM Tab:PRK-D-S001-12

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NO	REVISION	DATE	BY	APR

Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
METERING DIAGRAM (SHEET 1)

DWG. NAME: PRK-D-S001-12 REVISION NO : A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M1, 52M2 AND 52BT1 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T1 AND T2.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C21G AND CSC21 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C22G AND CSC22 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:26 AM Tab:PRK-D-S001-13

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
METERING DIAGRAM (SHEET 2)

DWG. NAME: PRK-D-S001-13 REVISION NO : A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M3, 52M4 AND 52BT2 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T3 AND T4.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C31G AND CSC31 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C32G AND CSC32 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-14

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BILLINGS, MONTANA

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
METERING DIAGRAM (SHEET 3)

DWG. NAME: PRK-D-S001-14 REVISION NO : A

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M3, 52M4 AND 52BT2 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T3 AND T4.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C41G AND CSC41 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C42G AND CSC42 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-15

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BILLINGS, MONTANA

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
METERING DIAGRAM (SHEET 4)

DWG. NAME: PRK-D-S001-15 REVISION NO : A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M5, 52M6 AND 52BT3 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T5 AND T6.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C51G AND CSC51 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C52G AND CSC52 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-16

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BILLINGS, MONTANA

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
METERING DIAGRAM (SHEET 5)

DWG. NAME: PRK-D-S001-16
REVISION NO : A

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M5, 52M6 AND 52BT3 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T5 AND T6.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C61G AND CSC61 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C62G AND CSC62 TO PREVENT GROUNDING OF 34.5 kV BUS.

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ENGINEERING RECORD		DATE
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CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
METERING DIAGRAM (SHEET 6)

DWG. NAME: PRK-D-S001-17 REVISION NO : A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M7, 52M8 AND 52BT4 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T7 AND T8.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C71G AND CSC71 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C72G AND CSC72 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:31 AM Tab:PRK-D-S001-18

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
METERING DIAGRAM (SHEET 7)

DWG. NAME: PRK-D-S001-18 REVISION NO : A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M7, 52M8 AND 52BT4 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T7 AND T8.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C81G AND CSC81 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C82G AND CSC82 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/18/2024 10:39 AM PLOTTED BY: Isaac C. Delaney 10/18/2024 10:42 AM Tab:PRK-D-S001-19

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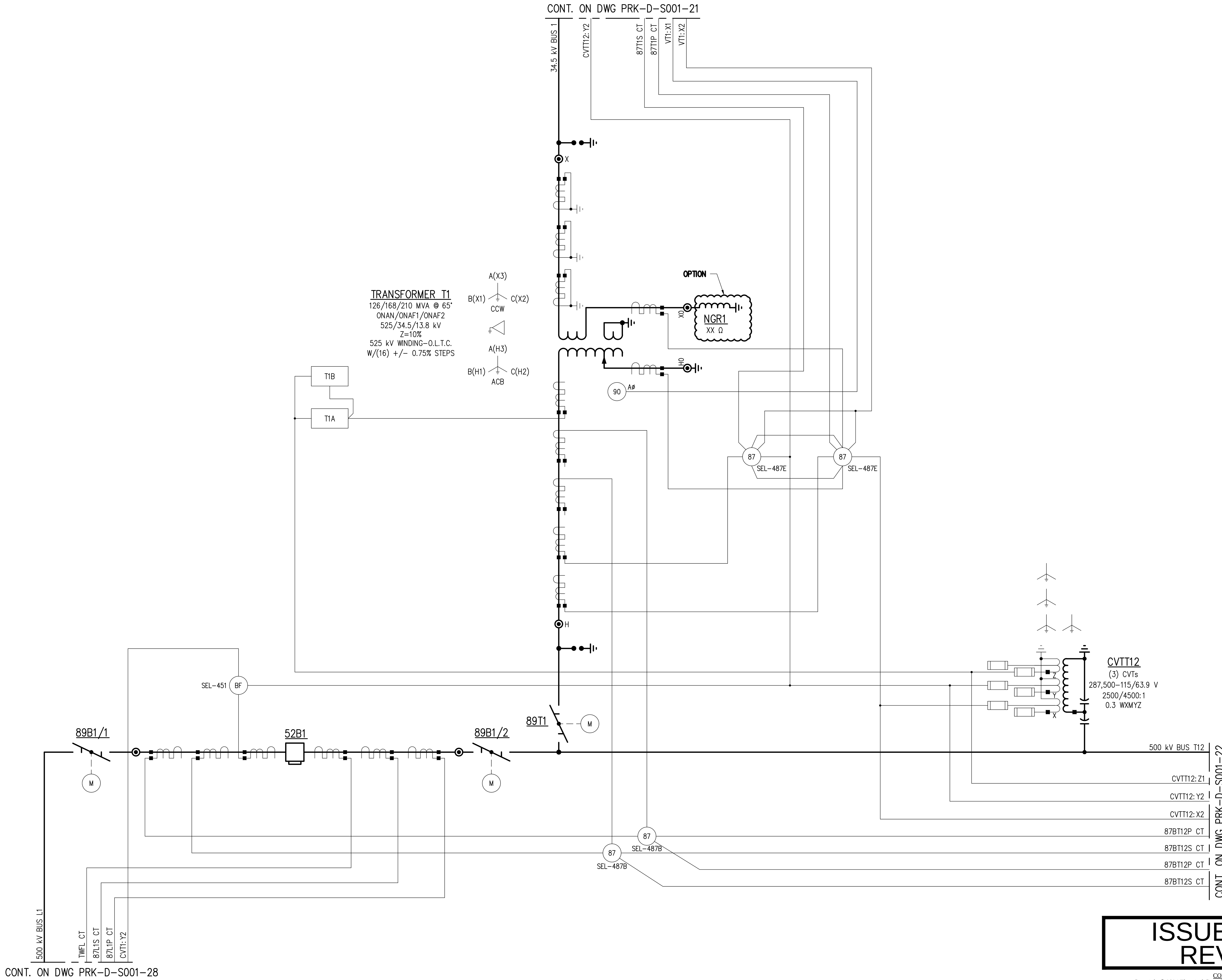
Intersect Power

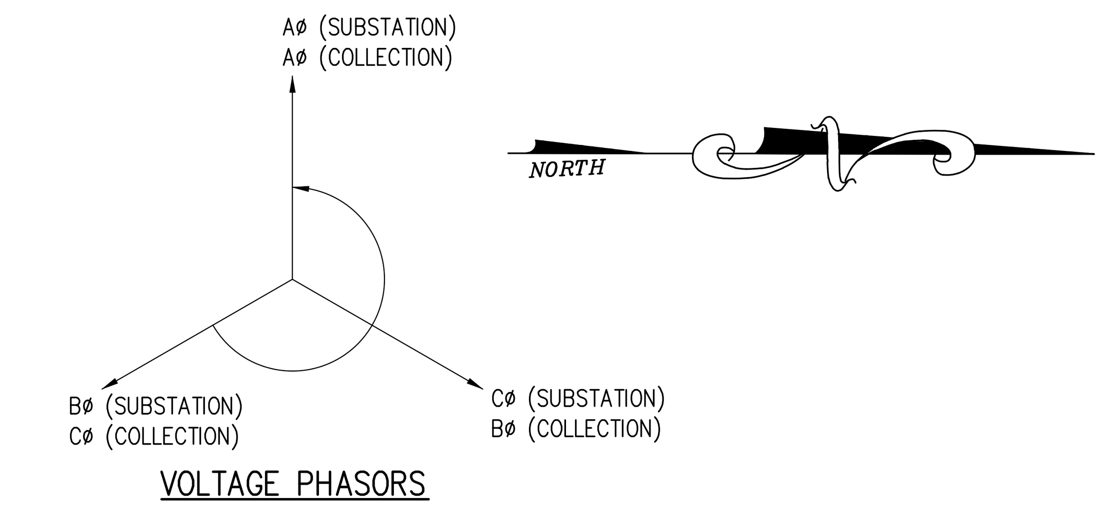
ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		

DWG SCALE: NONE PLT SCALE: 1:1

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
METERING DIAGRAM (SHEET 8)

DWG. NAME: PRK-D-S001-19 REVISION NO : A





NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M1, 52M2 AND 52BT1 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T1 AND T2.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C11G AND CSC11 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C12G AND CSC12 TO PREVENT GROUNDING OF 34.5 kV BUS.

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ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 1)

DWG. NAME: PRK-D-S001-20 REVISION NO : A

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NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M1, 52M2 AND 52BT1 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T1 AND T2.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C22G AND CSC22 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C12G AND CSC12 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-21

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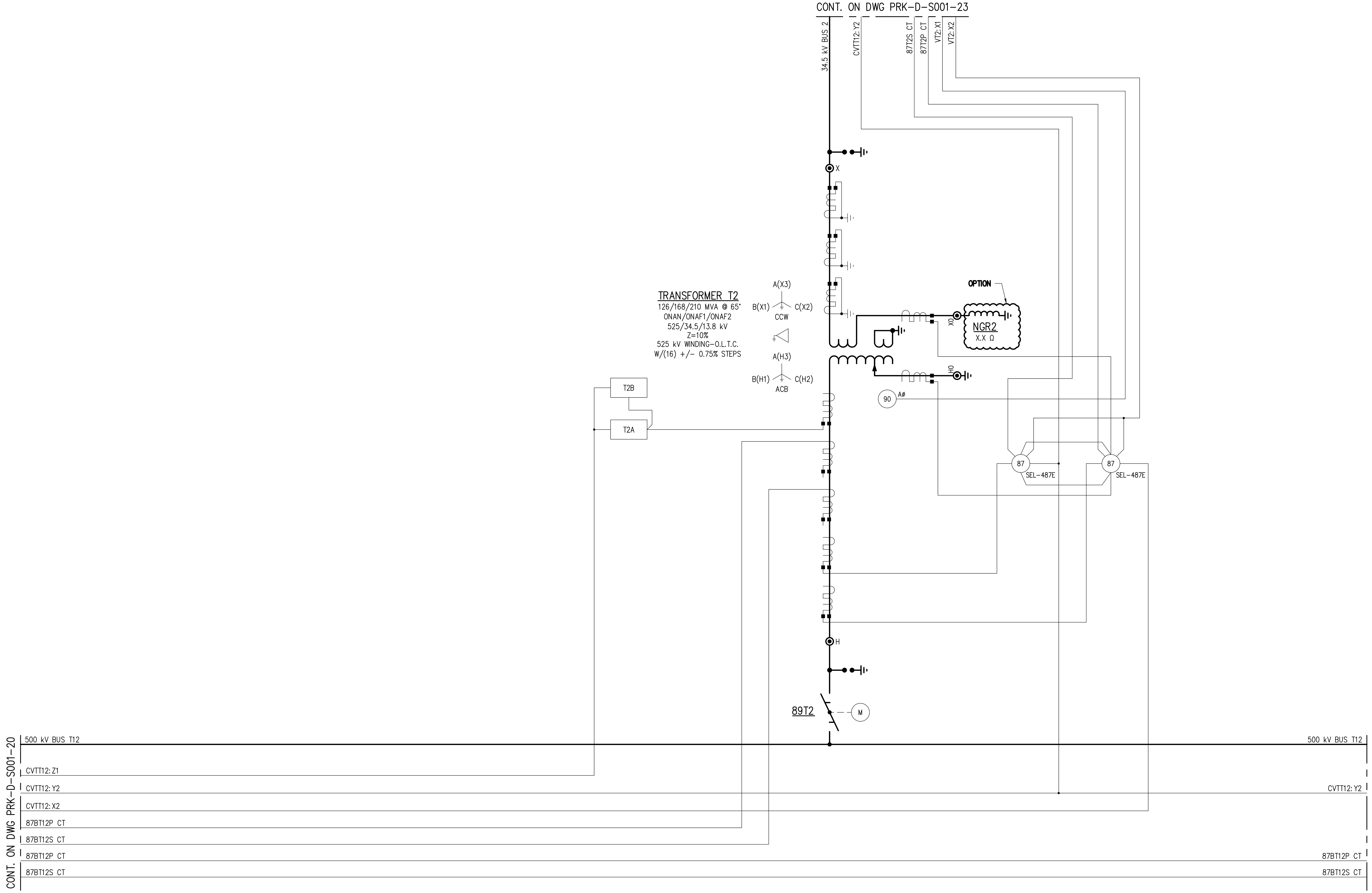
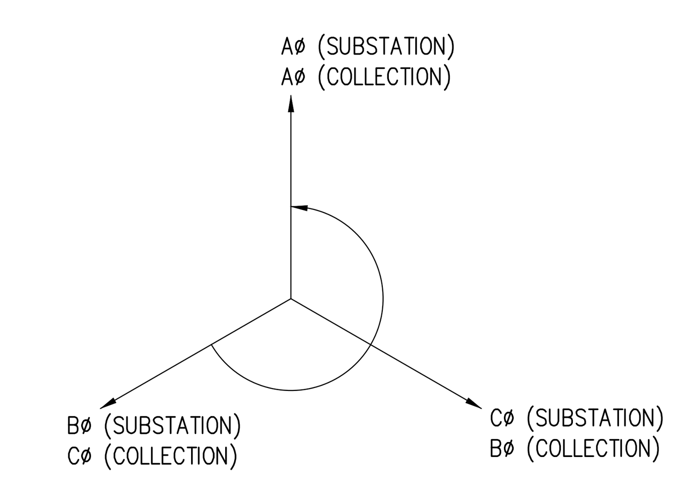
Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 2)

DWG. NAME: PRK-D-S001-21 REVISION NO : A





VOLTAGE PHASORS

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M1, 52M2 AND 52BT1 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T1 AND T2.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C21G AND CSC21 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C22G AND CSC22 TO PREVENT GROUNDING OF 34.5 kV BUS.

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 3)

DWG. NAME: PRK-D-S001-22 | REVISION NO : A

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NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M1, 52M2 AND 52BT1 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T1 AND T2.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C21G AND CSC21 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C22G AND CSC22 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-23

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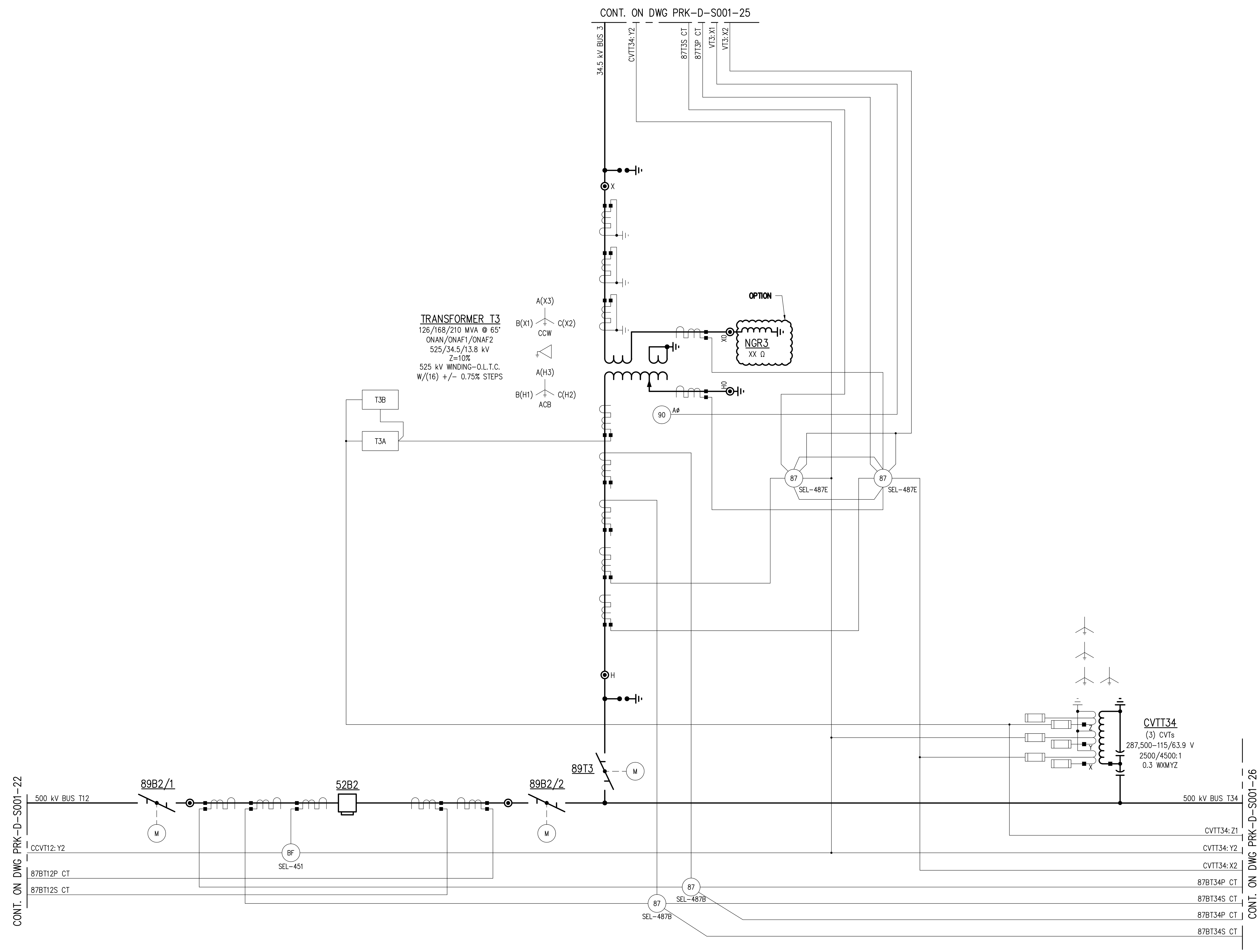
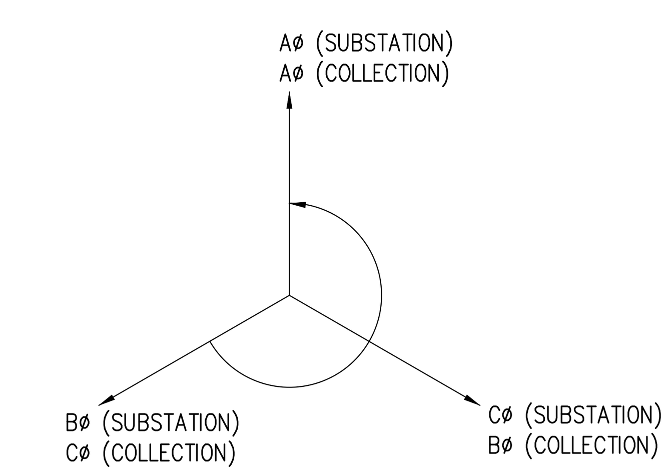
Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 4)

DWG. NAME: PRK-D-S001-23 | REVISION NO : A





VOLTAGE PHASORS

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M3, 52M4 AND 52BT2 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T3 AND T4.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C41G AND CSC41 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C42G AND CSC42 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-24

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 5)

DWG. NAME: PRK-D-S001-24 REVISION NO : A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M3, 52M4 AND 52BT2 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T3 AND T4.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C31G AND CSC31 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C32G AND CSC32 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-25

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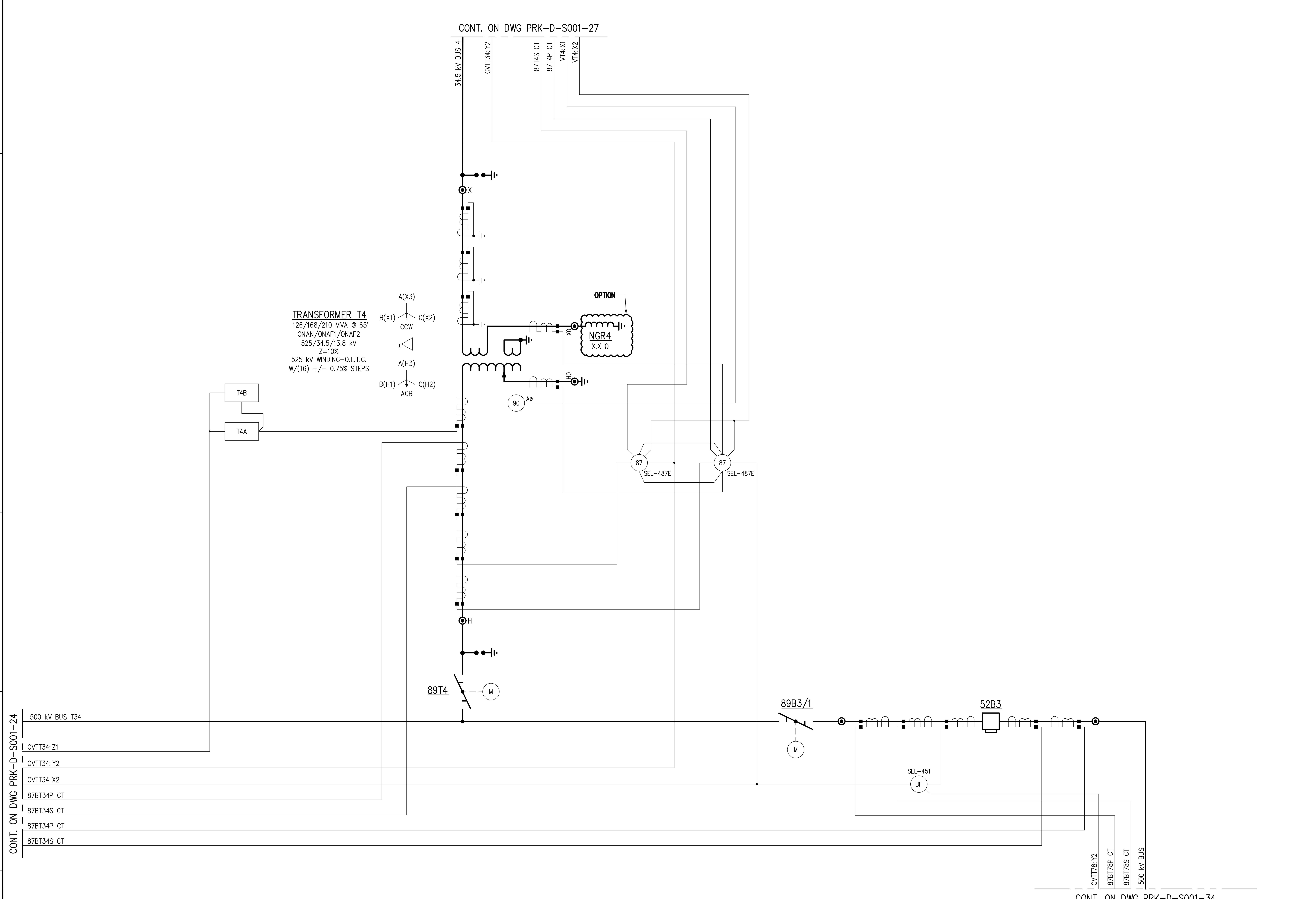
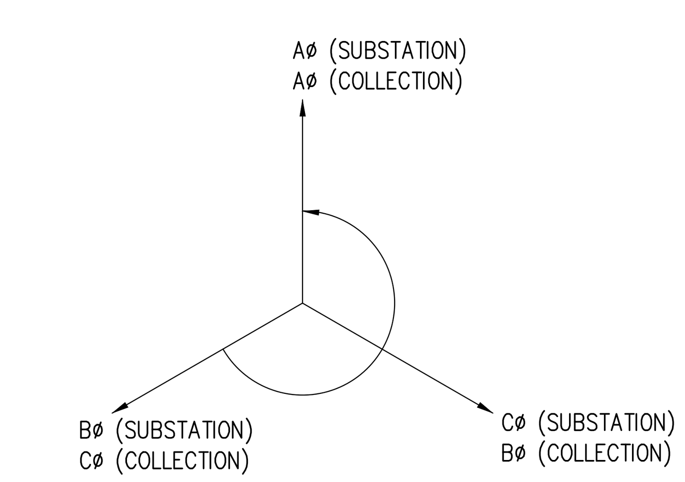
Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 6)

DWG. NAME: PRK-D-S001-25 REVISION NO : A





VOLTAGE PHASORS

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M3, 52M4 AND 52BT2 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T3 AND T4.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C41G AND CSC41 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C42G AND CSC42 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-26

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BILLINGS, MONTANA

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 7)

DWG. NAME: PRK-D-S001-26 REVISION NO : A

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M3, 52M4 AND 52BT2 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T3 AND T4.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C41G AND CSC41 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C42G AND CSC42 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-27

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 8)

DWG. NAME: PRK-D-S001-27 REVISION NO : A

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M5, 52M6 AND 52BT3 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T5 AND T6.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C51G AND CSC51 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C52G AND CSC52 TO PREVENT GROUNDING OF 34.5 kV BUS.

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 9)

DWG. NAME: PRK-D-S001-28 | REVISION NO : A

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NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M5, 52M6 AND 52BT3 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T5 AND T6.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C51G AND CSC51 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C52G AND CSC52 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-29

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 10)

DWG. NAME: PRK-D-S001-29 REVISION NO : A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M5, 52M6 AND 52BT3 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T5 AND T6.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C51G AND CSC51 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C52G AND CSC52 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:31 AM Tab:PRK-D-S001-30

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BILLINGS, MONTANA

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Intersect Power

ENGINEERING RECORD		DATE
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DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 11)

DWG. NAME: PRK-D-S001-30 REVISION NO : A

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M5, 52M6 AND 52BT3 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T5 AND T6.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C61G AND CSC61 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C62G AND CSC62 TO PREVENT GROUNDING OF 34.5 kV BUS.

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FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-31

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Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
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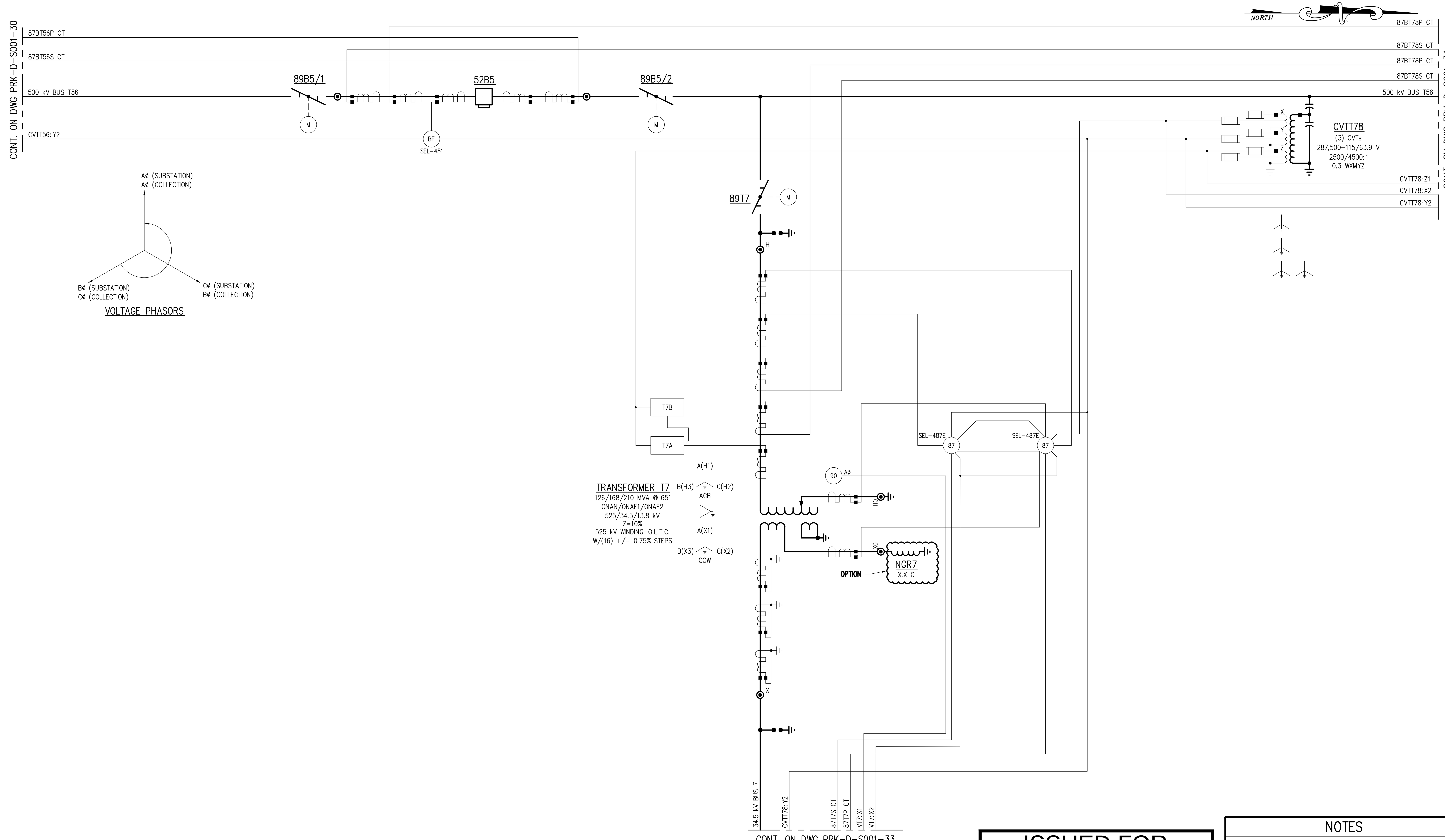
CHECKED		
APPROVED		

DWG SCALE: NONE | PLT SCALE: 1:1

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 12)

DWG. NAME: PRK-D-S001-31 | REVISION NO : A



ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M7, 52M8 AND 52BT4 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T7 AND T8.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C71G AND CSC71 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C72G AND CSC72 TO PREVENT GROUNDING OF 34.5 kV BUS.

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"Engineering with Distinction"
ECI ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

NO	REVISION	DATE	BY	APR
A	ISSUED FOR 10% REVIEW	07/29/24	ICD	MAG

Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 13)

DWG. NAME: PRK-D-S001-32 | REVISION NO : A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M7, 52M8 AND 52BT4 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T7 AND T8.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C71G AND CSC71 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C72G AND CSC72 TO PREVENT GROUNDING OF 34.5 kV BUS.

FILE LOCATION: N:\SHARED\01 ECI\INTERSECT POWER\02 PROJECTS\IP-010 PERKINS COLLECTOR\PERKINS COLLECTOR SUB\100 CADD\110 WORKING\112 SCHEMATIC\PRK-D-S001-4 THRU 35.DWG LAST SAVED BY: icdelaney 10/22/2024 4:07 PM PLOTTED BY: Isaac C. Delaney 10/23/2024 8:27 AM Tab:PRK-D-S001-33

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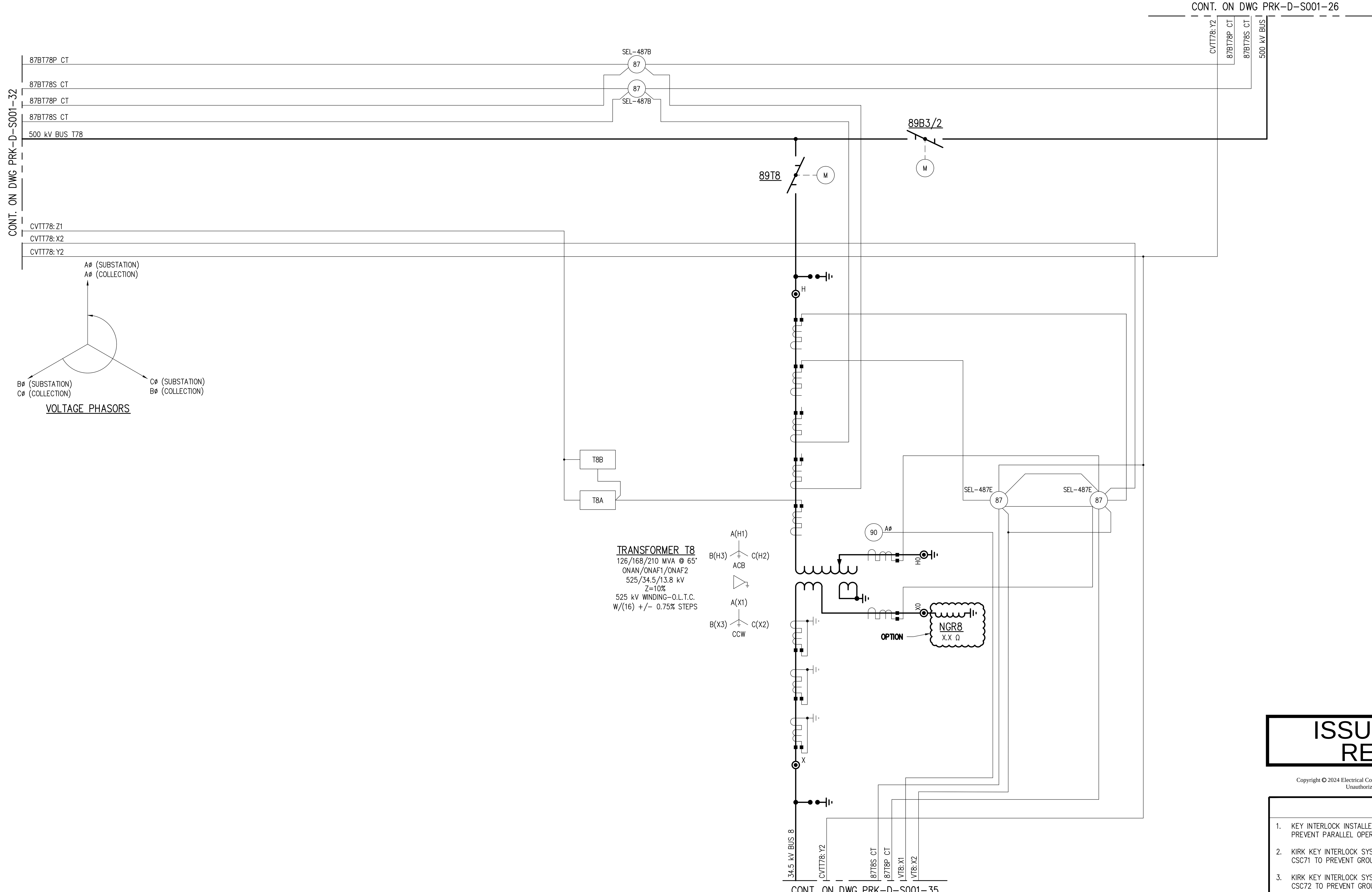
NO	REVISION	DATE	BY	APR
A	ISSUED FOR 10% REVIEW	07/29/24	ICD	MAG

Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 14)

DWG. NAME: PRK-D-S001-33 REVISION NO : A



NORTH

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M7, 52M8 AND 52BT4 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T7 AND T8.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C71G AND CSC71 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C72G AND CSC72 TO PREVENT GROUNDING OF 34.5 kV BUS.

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BILLINGS, MONTANA

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A	ISSUED FOR 10% REVIEW	07/29/24	ICD	MAG

Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 15)

DWG. NAME: PRK-D-S001-34 REVISION NO: A

ISSUED FOR REVIEW

NOTES

1. KEY INTERLOCK INSTALLED ON SWITCHES 52M7, 52M8 AND 52BT4 TO PREVENT PARALLEL OPERATION OF TRANSFORMERS T7 AND T8.
2. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C81G AND CSC81 TO PREVENT GROUNDING OF 34.5 kV BUS.
3. KIRK KEY INTERLOCK SYSTEM INSTALLED ON SWITCHES 89C82G AND CSC82 TO PREVENT GROUNDING OF 34.5 kV BUS.

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BILLINGS, MONTANA

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A	ISSUED FOR 10% REVIEW	07/29/24	ICD	MAG

Intersect Power

ENGINEERING RECORD		DATE
DRAWN	DELANEY	07/24
DESIGNED	GROFF	07/24
CHECKED		
APPROVED		
DWG SCALE: NONE	PLT SCALE: 1:1	

PERKINS PROJECT
34.5 – 500 kV SUBSTATION
SIMPLIFIED ONE LINE DIAGRAM (SHEET 16)

DWG. NAME: PRK-D-S001-35 | REVISION NO : A

Attachment E.3 Phase I and Phase II Studies and Supporting Documentation (Confidential)

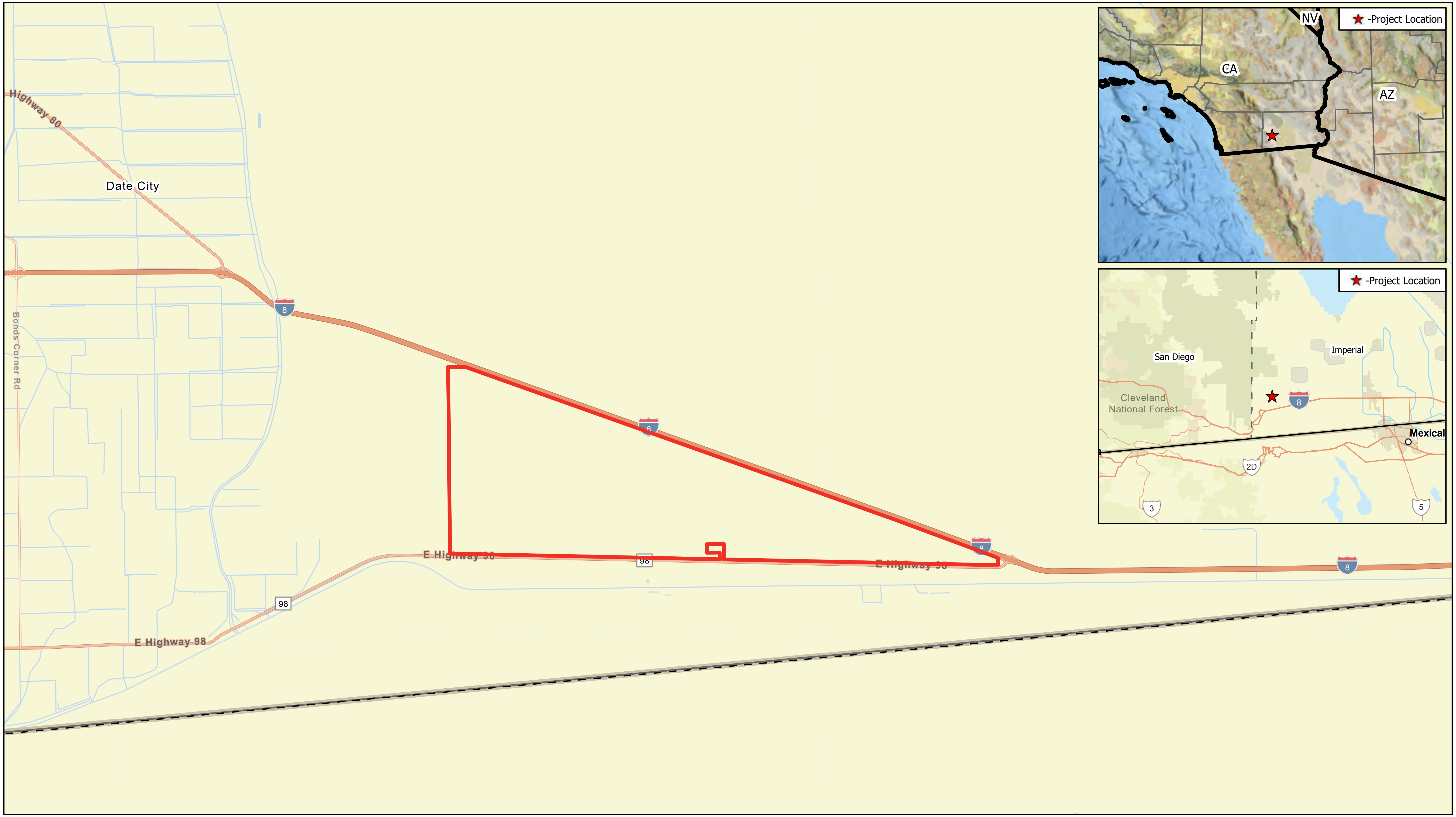
Attachment F Water Data Request Support Documents

Attachment F.1 Preliminary Drainage Plans

Exhibits

Appendices

Exhibits



Data Source(s): Westwood (2025); Esri WMS Basemap Imagery (Accessed 2025); USGS (2025); FEMA (2025); USDA (2025)

Westwood

Toll Free (888) 937-5150 westwoodps.com

Legend

Project Area

County Boundary

N

0 8,000 Feet

Perkins Solar Project

Imperial County, CA

Exhibit 1: Location Map

March 7, 2025

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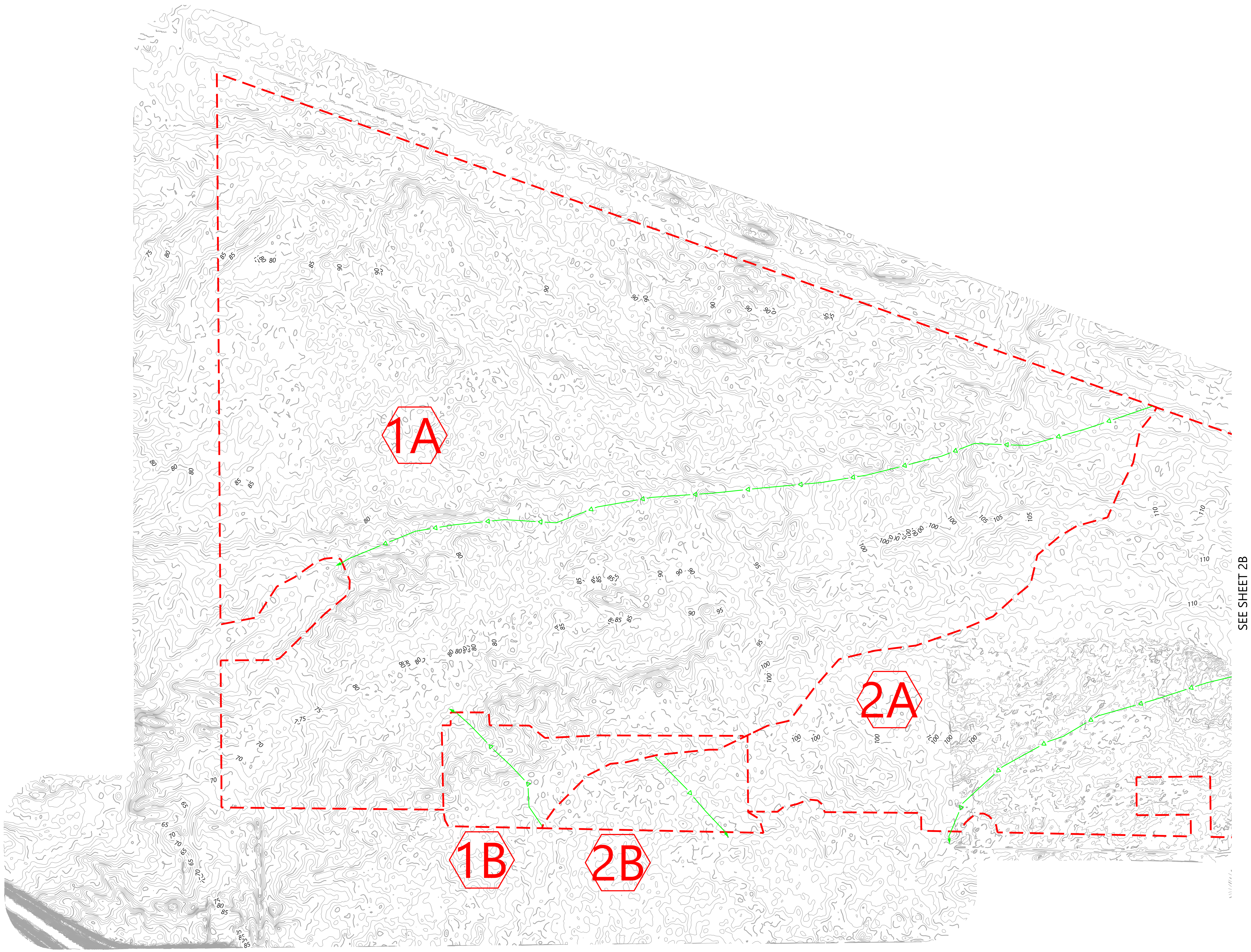
01-Location Map - Location Map | 3/7/2025 1:46 PM | JLEckstrom



LEGEND:

- PROJECT BOUNDARY
- EX. INDEX CONTOUR
- EX. INTERVAL CONTOUR
- EX. TREELINE
- EX. PAVED ROAD
- EX. GRAVEL ROAD
- EX. BUILDING
- EX. CULVERT
- EX. STREAM CHANNEL
- EX. WETLAND
- FEMA FLOOD ZONE
- EX. ONSITE DRAINAGE AREA BOUNDARY
- EX. TIME OF CONCENTRATION LINE
- DISCHARGE LOCATION
- 1 DRAINAGE AREA LABEL

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Fax (952) 937-5822
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Minnetonka, MN 55343
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Westwood Professional Services, Inc.

PREPARED FOR:

IP PERKINS, LLC

REVISIONS:

#	DATE	COMMENT

Perkins Solar Project

Imperial County, CA

Existing Drainage Map

NOT FOR CONSTRUCTION

DATE: 03/07/2025

SHEET: 2A

LEGEND:

- PROJECT BOUNDARY
- EX. INDEX CONTOUR
- EX. INTERVAL CONTOUR
- EX. TREELINE
- EX. PAVED ROAD
- EX. GRAVEL ROAD
- EX. BUILDING
- EX. CULVERT
- EX. STREAM CHANNEL
- EX. WETLAND
- FEMA FLOOD ZONE
- EX. ONSITE DRAINAGE AREA BOUNDARY
- EX. TIME OF CONCENTRATION LINE
- DISCHARGE LOCATION
- DRAINAGE AREA LABEL

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#	DATE	COMMENT
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Perkins Solar Project

Imperial County, CA

Existing Drainage Map

NOT FOR CONSTRUCTION

DATE: 03/07/2025

SHEET: 2B

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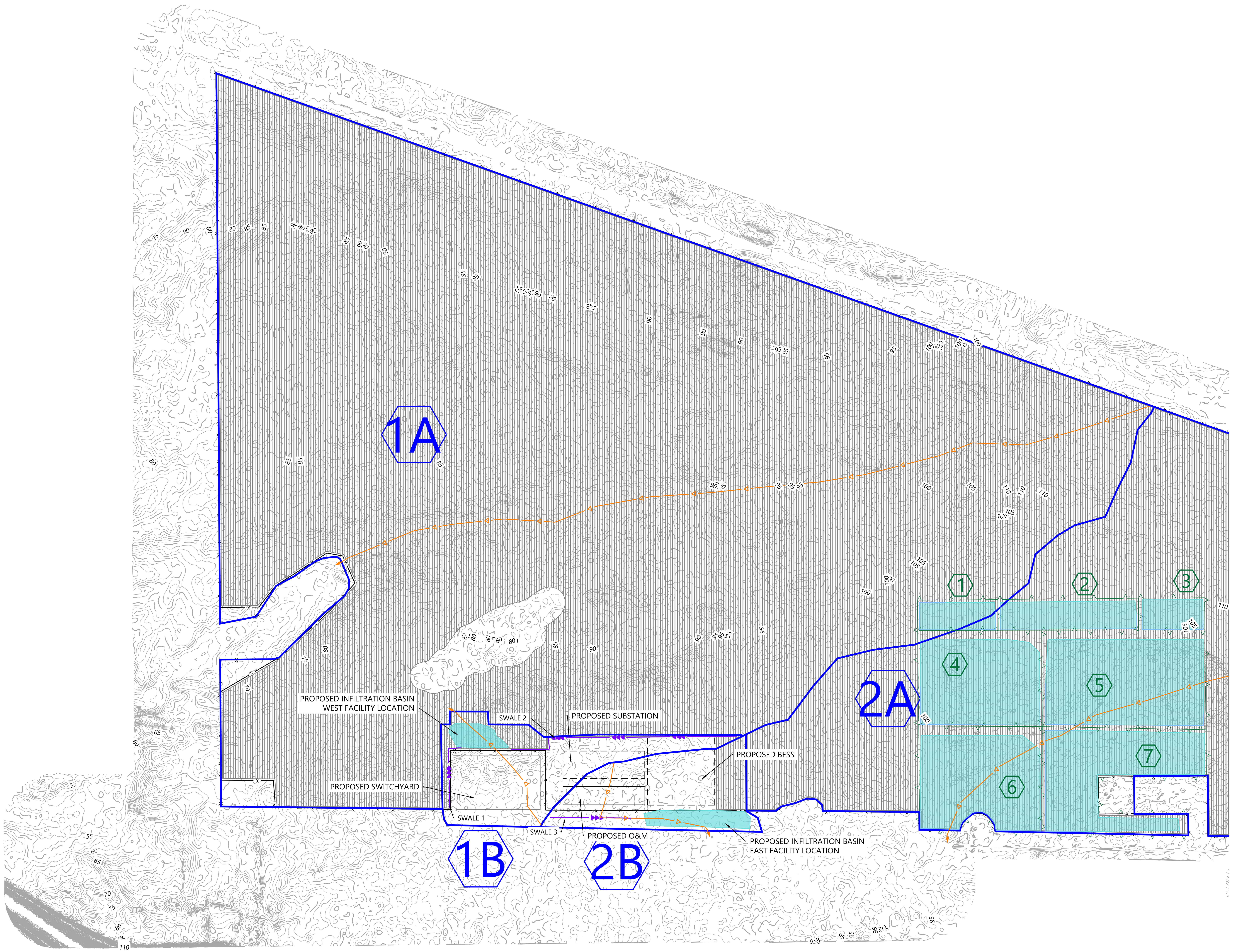

LEGEND:

- PROJECT BOUNDARY
- EX. INDEX CONTOUR
- EX. INTERVAL CONTOUR
- EX. TREELINE
- EX. PAVED ROAD
- EX. GRAVEL ROAD
- EX. BUILDING
- EX. CULVERT
- EX. STREAM CHANNEL
- EX. WETLAND
- FEMA FLOOD ZONE
- PROPOSED SOLAR ARRAY
- PROPOSED ACCESS ROAD
- PROPOSED SECURITY FENCE
- PROPOSED INDEX CONTOUR
- PROPOSED INTERVAL CONTOUR
- ARRAY INFILTRATION BASIN AREA
- PROPOSED STORAGE PONDING
- PROPOSED BERM
- PROPOSED SWALE
- PROPOSED ONSITE DRAINAGE AREA BOUNDARY
- PROPOSED TIME OF CONCENTRATION LINE
- DISCHARGE LOCATION
- ARRAY INFILTRATION BASIN AREA LABEL
- OVERALL DRAINAGE AREA LABEL

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REVISIONS:

#	DATE	COMMENT

0' 1000' 2000' 3000'

Perkins Solar Project

Imperial County, CA

Proposed Drainage Map

NOT FOR CONSTRUCTION

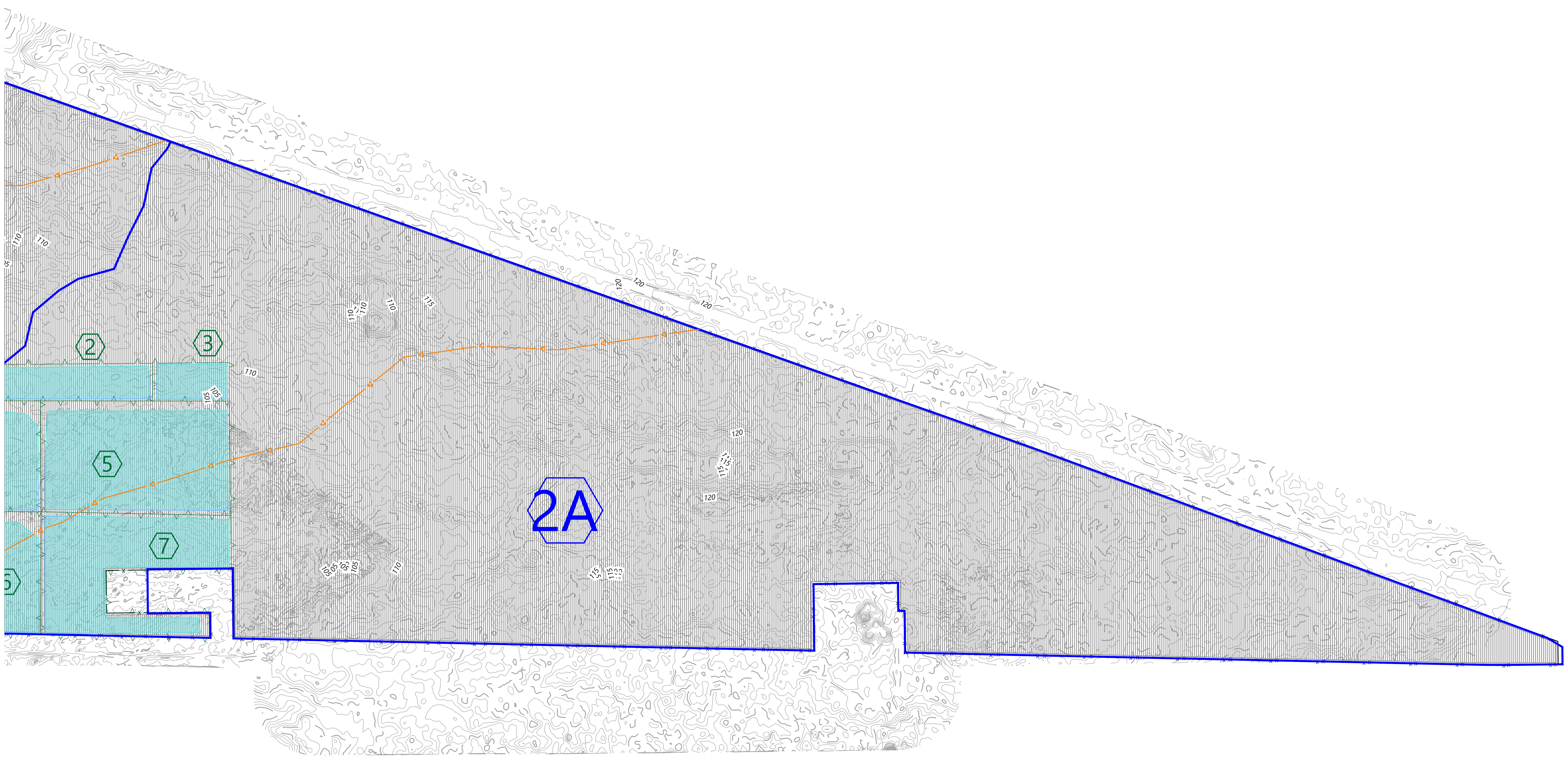
DATE: 03/07/2025

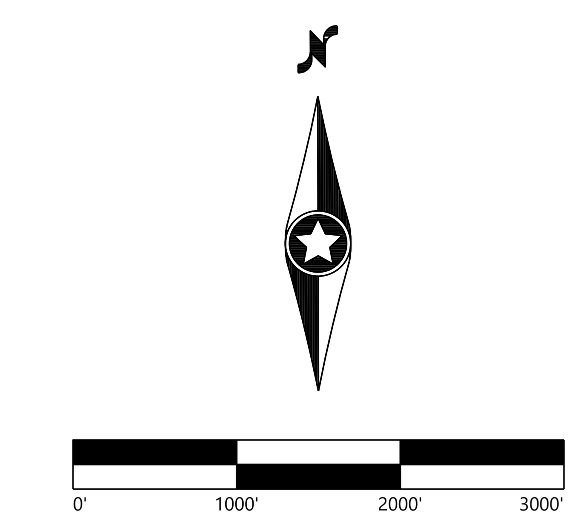
SHEET: 3A

LEGEND:

- PROJECT BOUNDARY
- EX. INDEX CONTOUR (900)
- EX. INTERVAL CONTOUR
- EX. TREELINE
- EX. PAVED ROAD
- EX. GRAVEL ROAD
- EX. BUILDING
- EX. CULVERT (STO)
- EX. STREAM CHANNEL
- EX. WETLAND
- FEMA FLOOD ZONE
- PROPOSED SOLAR ARRAY
- PROPOSED ACCESS ROAD
- PROPOSED SECURITY FENCE
- PROPOSED INDEX CONTOUR (900)
- PROPOSED INTERVAL CONTOUR
- ARRAY INFILTRATION BASIN AREA
- PROPOSED STORAGE PONDING
- PROPOSED BERM
- PROPOSED SWALE
- PROPOSED ONSITE DRAINAGE AREA BOUNDARY
- PROPOSED TIME OF CONCENTRATION LINE
- DISCHARGE LOCATION
- (1) ARRAY INFILTRATION BASIN AREA LABEL
- (1) OVERALL DRAINAGE AREA LABEL

SEE SHEET 3B





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-		
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-		
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-		

Perkins Solar Project

Imperial County, CA

Proposed Drainage Map

NOT FOR CONSTRUCTION

DATE: 03/07/2025

SHEET: 3B

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Appendix A

Atlas 14 Rainfall

NOAA Atlas 14, Volume 6, Version 2
Location name: Winterhaven, California, USA*
Latitude: 32.7286°, Longitude: -115.19°
Elevation: 92 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.080** (0.068-0.095)	**0.123** (0.104-0.147)	**0.185** (0.156-0.221)	**0.240** (0.201-0.290)	**0.324** (0.261-0.406)	**0.396** (0.312-0.507)	**0.476** (0.366-0.626)	**0.568** (0.424-0.769)	**0.708** (0.505-1.00)	**0.831** (0.572-1.22)
10-min	**0.115** (0.097-0.137)	**0.176** (0.149-0.210)	**0.265** (0.223-0.317)	**0.344** (0.288-0.416)	**0.464** (0.375-0.581)	**0.568** (0.448-0.727)	**0.683** (0.525-0.898)	**0.814** (0.607-1.10)	**1.02** (0.724-1.44)	**1.19** (0.820-1.75)
15-min	**0.139** (0.118-0.165)	**0.213** (0.180-0.254)	**0.320** (0.270-0.383)	**0.416** (0.348-0.503)	**0.562** (0.453-0.703)	**0.686** (0.541-0.879)	**0.826** (0.635-1.09)	**0.985** (0.735-1.33)	**1.23** (0.876-1.74)	**1.44** (0.991-2.12)
30-min	**0.191** (0.161-0.227)	**0.293** (0.248-0.349)	**0.440** (0.371-0.527)	**0.572** (0.478-0.691)	**0.772** (0.623-0.966)	**0.943** (0.744-1.21)	**1.14** (0.872-1.49)	**1.35** (1.01-1.83)	**1.69** (1.20-2.39)	**1.98** (1.36-2.91)
60-min	**0.266** (0.225-0.317)	**0.408** (0.346-0.487)	**0.614** (0.518-0.735)	**0.798** (0.668-0.965)	**1.08** (0.869-1.35)	**1.32** (1.04-1.69)	**1.58** (1.22-2.08)	**1.89** (1.41-2.56)	**2.36** (1.68-3.33)	**2.76** (1.90-4.06)
2-hr	**0.369** (0.313-0.440)	**0.549** (0.465-0.655)	**0.806** (0.680-0.965)	**1.03** (0.865-1.25)	**1.38** (1.11-1.72)	**1.66** (1.31-2.13)	**1.99** (1.53-2.61)	**2.35** (1.75-3.18)	**2.90** (2.07-4.11)	**3.39** (2.33-4.97)
3-hr	**0.421** (0.356-0.501)	**0.619** (0.523-0.738)	**0.900** (0.759-1.08)	**1.15** (0.961-1.39)	**1.52** (1.23-1.90)	**1.83** (1.45-2.35)	**2.18** (1.68-2.86)	**2.57** (1.92-3.48)	**3.16** (2.26-4.48)	**3.68** (2.53-5.40)
6-hr	**0.511** (0.433-0.609)	**0.744** (0.630-0.889)	**1.08** (0.907-1.29)	**1.37** (1.14-1.65)	**1.80** (1.45-2.25)	**2.16** (1.70-2.76)	**2.56** (1.97-3.36)	**3.01** (2.24-4.07)	**3.68** (2.62-5.21)	**4.26** (2.93-6.25)
12-hr	**0.586** (0.497-0.699)	**0.859** (0.727-1.03)	**1.25** (1.05-1.49)	**1.59** (1.33-1.92)	**2.10** (1.69-2.62)	**2.52** (1.99-3.23)	**2.99** (2.30-3.93)	**3.51** (2.62-4.76)	**4.29** (3.06-6.07)	**4.95** (3.41-7.27)
24-hr	**0.729** (0.644-0.841)	**1.08** (0.951-1.25)	**1.58** (1.39-1.83)	**2.02** (1.76-2.36)	**2.68** (2.27-3.22)	**3.23** (2.69-3.96)	**3.84** (3.12-4.82)	**4.52** (3.58-5.82)	**5.53** (4.22-7.40)	**6.40** (4.73-8.83)
2-day	**0.818** (0.723-0.944)	**1.22** (1.07-1.41)	**1.79** (1.57-2.07)	**2.29** (2.00-2.68)	**3.04** (2.58-3.66)	**3.68** (3.06-4.51)	**4.37** (3.55-5.48)	**5.14** (4.08-6.62)	**6.29** (4.80-8.41)	**7.27** (5.37-10.0)
3-day	**0.866** (0.766-1.00)	**1.29** (1.14-1.49)	**1.90** (1.67-2.20)	**2.44** (2.13-2.84)	**3.23** (2.74-3.89)	**3.90** (3.25-4.79)	**4.64** (3.77-5.82)	**5.45** (4.32-7.02)	**6.66** (5.08-8.91)	**7.69** (5.68-10.6)
4-day	**0.905** (0.800-1.04)	**1.35** (1.19-1.56)	**1.98** (1.75-2.30)	**2.54** (2.22-2.97)	**3.36** (2.85-4.05)	**4.06** (3.37-4.97)	**4.81** (3.91-6.03)	**5.65** (4.48-7.27)	**6.89** (5.26-9.21)	**7.94** (5.87-11.0)
7-day	**0.957** (0.845-1.10)	**1.42** (1.25-1.64)	**2.08** (1.83-2.41)	**2.65** (2.32-3.10)	**3.50** (2.97-4.21)	**4.20** (3.50-5.16)	**4.97** (4.04-6.23)	**5.81** (4.61-7.48)	**7.06** (5.38-9.43)	**8.10** (5.99-11.2)
10-day	**0.985** (0.871-1.14)	**1.46** (1.29-1.69)	**2.13** (1.88-2.47)	**2.72** (2.38-3.17)	**3.57** (3.03-4.30)	**4.28** (3.56-5.25)	**5.05** (4.10-6.33)	**5.89** (4.67-7.58)	**7.12** (5.44-9.52)	**8.16** (6.03-11.3)
20-day	**1.07** (0.946-1.24)	**1.60** (1.41-1.85)	**2.33** (2.05-2.70)	**2.96** (2.58-3.45)	**3.86** (3.27-4.64)	**4.60** (3.82-5.64)	**5.38** (4.38-6.75)	**6.24** (4.95-8.03)	**7.47** (5.70-9.99)	**8.48** (6.27-11.7)
30-day	**1.14** (1.01-1.32)	**1.72** (1.51-1.98)	**2.51** (2.21-2.91)	**3.18** (2.78-3.72)	**4.14** (3.51-4.99)	**4.92** (4.09-6.04)	**5.74** (4.67-7.20)	**6.62** (5.25-8.53)	**7.88** (6.01-10.5)	**8.90** (6.58-12.3)
45-day	**1.24** (1.10-1.44)	**1.89** (1.67-2.19)	**2.77** (2.44-3.21)	**3.51** (3.07-4.10)	**4.56** (3.87-5.49)	**5.40** (4.49-6.62)	**6.27** (5.10-7.87)	**7.20** (5.71-9.27)	**8.50** (6.49-11.4)	**9.55** (7.06-13.2)
60-day	**1.33** (1.18-1.54)	**2.05** (1.81-2.37)	**3.01** (2.65-3.49)	**3.82** (3.34-4.46)	**4.95** (4.20-5.96)	**5.84** (4.86-7.17)	**6.77** (5.51-8.49)	**7.74** (6.14-9.97)	**9.10** (6.94-12.2)	**10.2** (7.52-14.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

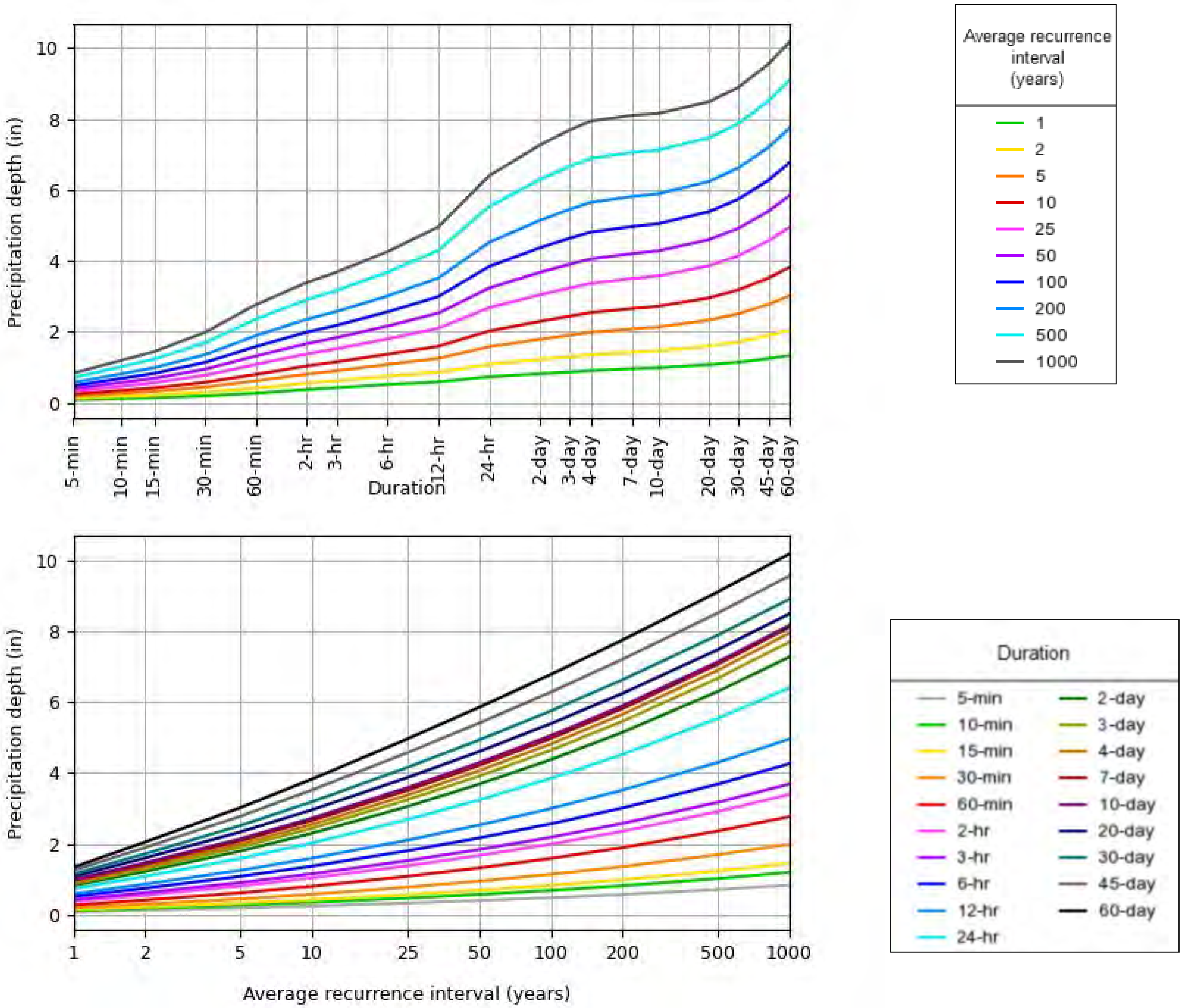
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 32.7286°, Longitude: -115.1900°



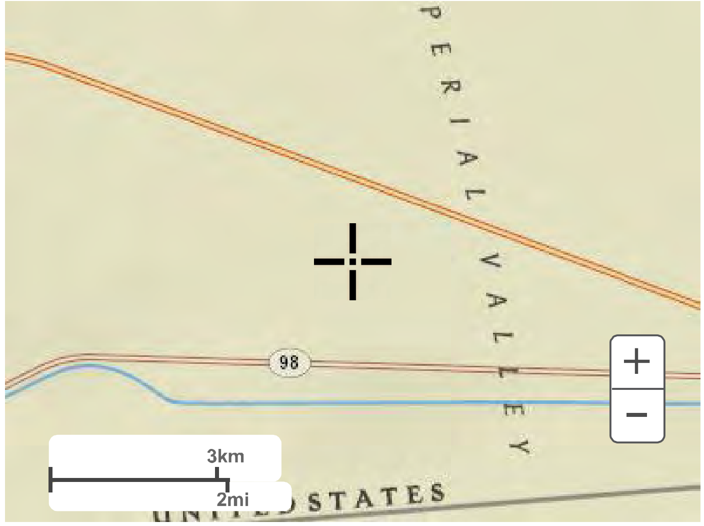
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Tue Aug 27 17:23:44 2024

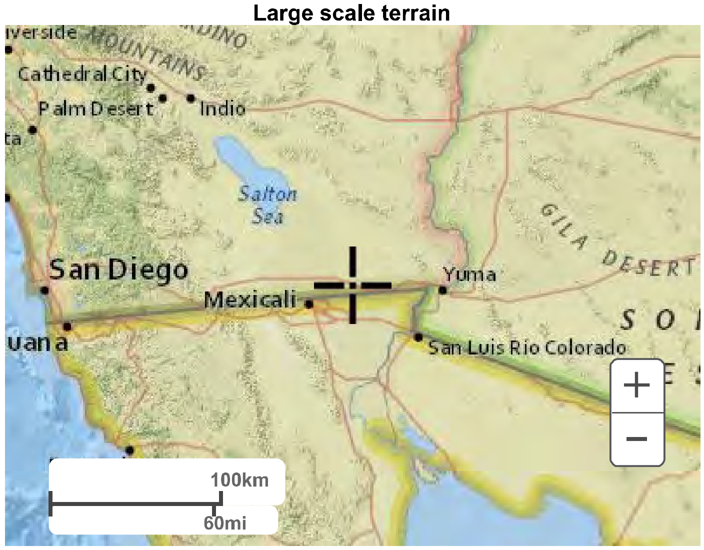
Back to Top

Maps & aerials

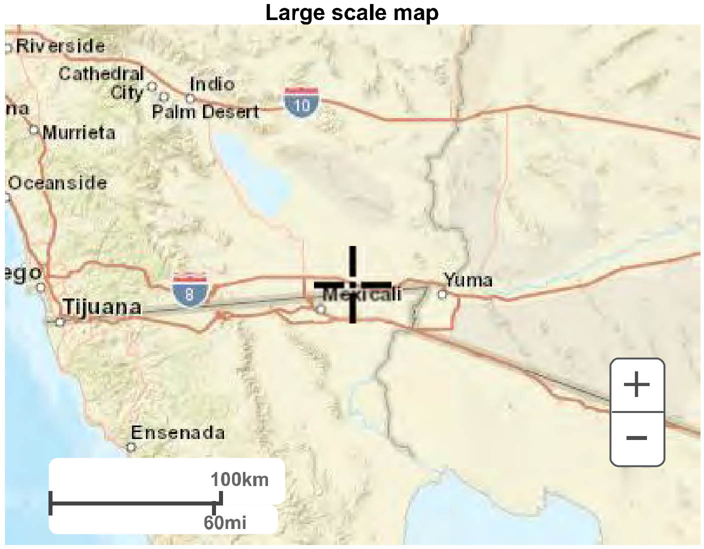
Small scale terrain



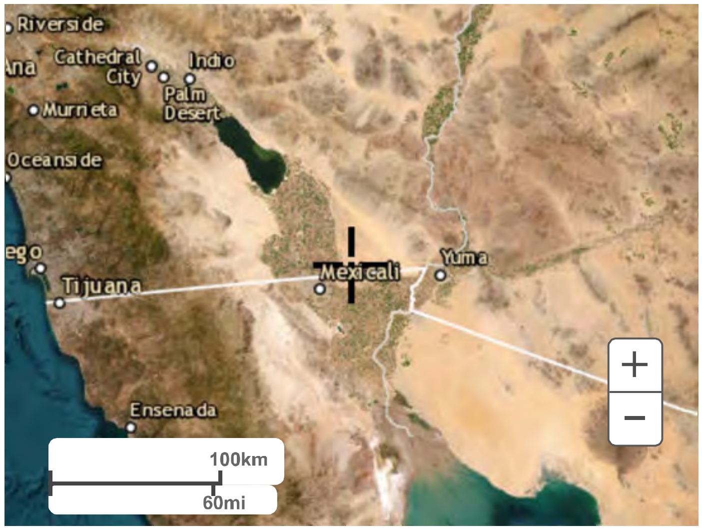
Large scale terrain



Large scale map



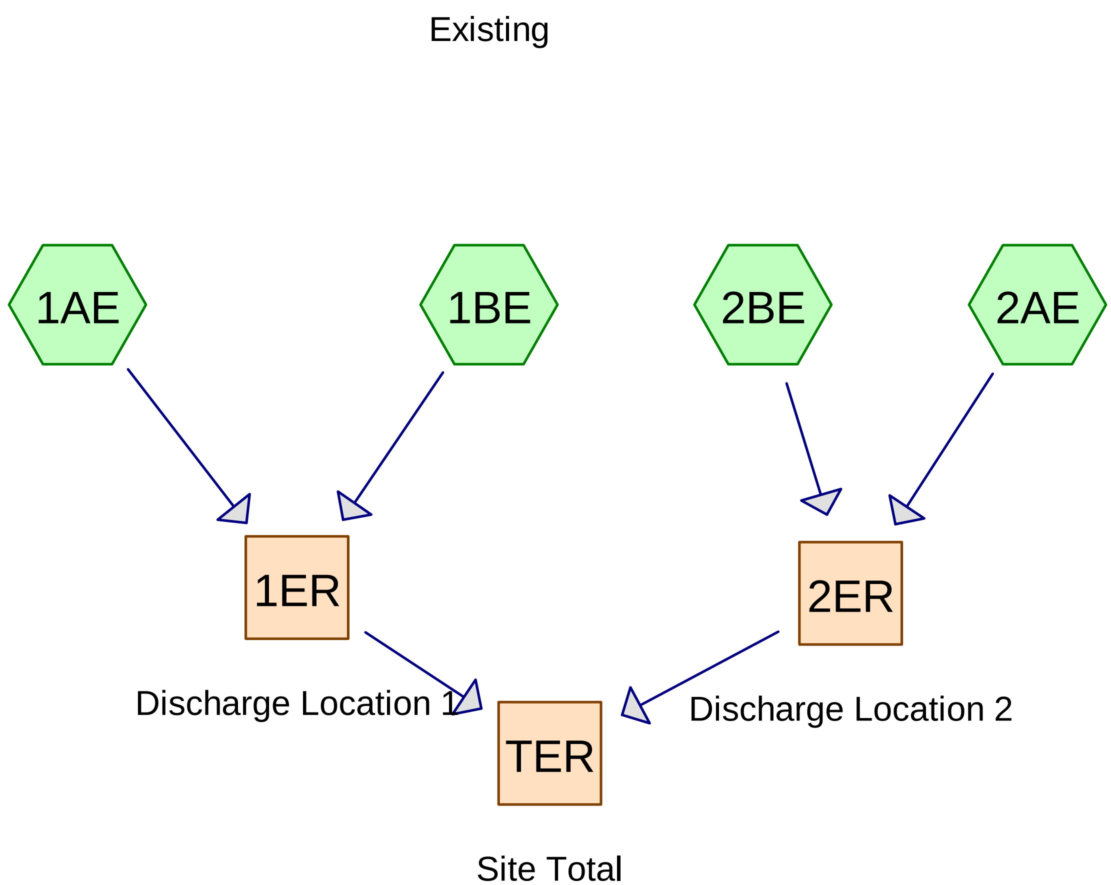
Large scale aerial

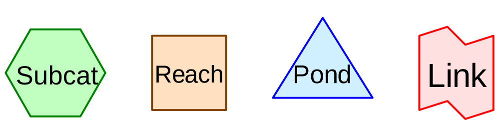

Riverside
Cathedral City
Indio
Palm Desert
Murrieta
Oceanside
Tijuana
Mexicali
Yuma
Ensenada
100km
60mi

Back to Top

Appendix B

Existing Model Results





Routing Diagram for 2025-03-07 Pre Post with Treatment
Prepared by Westwood Professional Services, Printed 3/7/2025

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	100-yr	CA-Perkins 6-hr S1	100-yr	Default	6.00	1	2.56	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6,088.600	63	Natural western desert, HSG A (1AE, 1BE, 2AE, 2BE)
32.100	85	Natural western desert, HSG C (1AE, 1BE, 2BE)
75.000	88	Natural western desert, HSG D (1AE, 1BE, 2AE)
6,195.700	**63**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
6,088.600	HSG A	1AE, 1BE, 2AE, 2BE
0.000	HSG B	
32.100	HSG C	1AE, 1BE, 2BE
75.000	HSG D	1AE, 1BE, 2AE
0.000	Other	
6,195.700		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
6,088.600	0.000	32.100	75.000	0.000	6,195.700	Natural western desert	1AE, 1BE, 2AE, 2BE
6,088.600	**0.000**	**32.100**	**75.000**	**0.000**	**6,195.700**	**TOTAL AREA**	

Summary for Subcatchment 1AE:

Runoff = 68.89 cfs @ 13.82 hrs, Volume= 71.638 af, Depth= 0.26"
Routed to Reach 1ER : Discharge Location 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 6-hr S1 100-yr Rainfall=2.56"

Area (ac)	CN	Description
3,215.200	63	Natural western desert, HSG A
9.600	85	Natural western desert, HSG C
26.200	88	Natural western desert, HSG D
3,251.000	63	Weighted Average
3,251.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
829.2	15,398	0.0030	0.31		**Lag/CN Method,**

Summary for Subcatchment 1BE:

Runoff = 17.92 cfs @ 5.66 hrs, Volume= 5.125 af, Depth= 0.48"
Routed to Reach 1ER : Discharge Location 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 6-hr S1 100-yr Rainfall=2.56"

Area (ac)	CN	Description
89.400	63	Natural western desert, HSG A
21.600	85	Natural western desert, HSG C
16.000	88	Natural western desert, HSG D
127.000	70	Weighted Average
127.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
170.0	2,673	0.0030	0.26		**Lag/CN Method,**

Summary for Subcatchment 2AE:

Runoff = 20.93 cfs @ 33.29 hrs, Volume= 58.404 af, Depth> 0.26"
Routed to Reach 2ER : Discharge Location 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 6-hr S1 100-yr Rainfall=2.56"

Area (ac)	CN	Description
2,678.800	63	Natural western desert, HSG A
32.800	88	Natural western desert, HSG D
2,711.600	63	Weighted Average
2,711.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2,305.7	27,825	0.0010	0.20		**Lag/CN Method,**

Summary for Subcatchment 2BE:

Runoff = 6.11 cfs @ 7.34 hrs, Volume= 2.338 af, Depth= 0.26"
Routed to Reach 2ER : Discharge Location 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 6-hr S1 100-yr Rainfall=2.56"

Area (ac)	CN	Description
105.200	63	Natural western desert, HSG A
0.900	85	Natural western desert, HSG C
106.100	63	Weighted Average
106.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
264.3	1,856	0.0010	0.12		**Lag/CN Method,**

Summary for Reach 1ER: Discharge Location 1

Inflow Area = 3,378.000 ac, 0.00% Impervious, Inflow Depth = 0.27" for 100-yr event
Inflow = 68.92 cfs @ 13.82 hrs, Volume= 76.762 af
Outflow = 68.92 cfs @ 13.82 hrs, Volume= 76.762 af, Atten= 0%, Lag= 0.0 min
Routed to Reach TER : Site Total

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Summary for Reach 2ER: Discharge Location 2

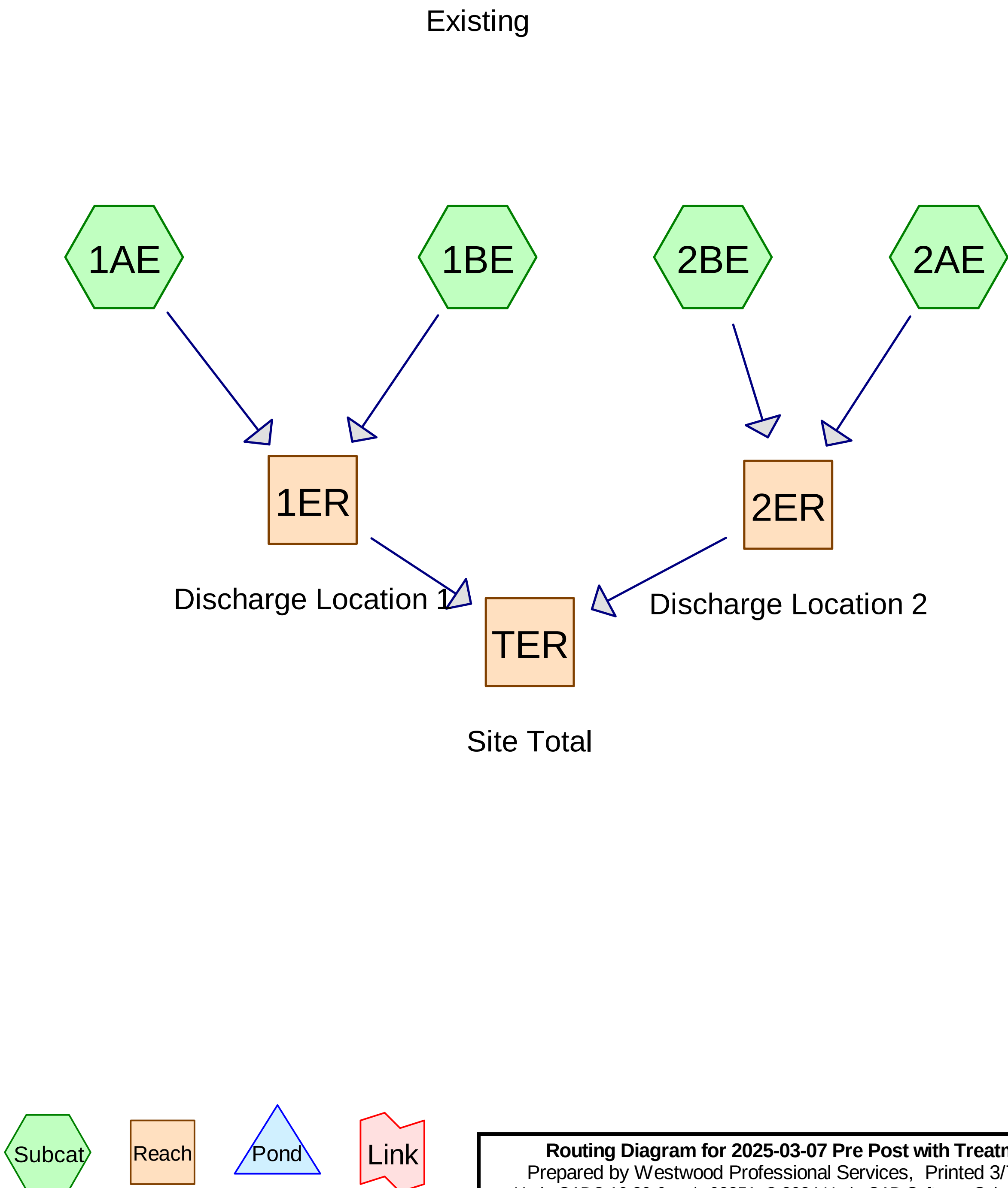
Inflow Area = 2,817.700 ac, 0.00% Impervious, Inflow Depth > 0.26" for 100-yr event
Inflow = 20.93 cfs @ 33.29 hrs, Volume= 60.742 af
Outflow = 20.93 cfs @ 33.29 hrs, Volume= 60.742 af, Atten= 0%, Lag= 0.0 min
Routed to Reach TER : Site Total

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Summary for Reach TER: Site Total

Inflow Area =	6,195.700 ac,	0.00% Impervious,	Inflow Depth > 0.27"	for 100-yr event	
Inflow =	73.69 cfs @	13.82 hrs,	Volume=	137.505 af	
Outflow =	73.69 cfs @	13.82 hrs,	Volume=	137.505 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs



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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	100-yr	CA-Perkins 24-hr S1	100-yr	Default	24.00	1	3.84	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6,088.600	63	Natural western desert, HSG A (1AE, 1BE, 2AE, 2BE)
32.100	85	Natural western desert, HSG C (1AE, 1BE, 2BE)
75.000	88	Natural western desert, HSG D (1AE, 1BE, 2AE)
6,195.700	**63**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
6,088.600	HSG A	1AE, 1BE, 2AE, 2BE
0.000	HSG B	
32.100	HSG C	1AE, 1BE, 2BE
75.000	HSG D	1AE, 1BE, 2AE
0.000	Other	
6,195.700		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
6,088.600	0.000	32.100	75.000	0.000	6,195.700	Natural western desert	1AE, 1BE, 2AE, 2BE
6,088.600	**0.000**	**32.100**	**75.000**	**0.000**	**6,195.700**	**TOTAL AREA**	

Summary for Subcatchment 1AE:

Runoff = 172.46 cfs @ 24.87 hrs, Volume= 225.415 af, Depth= 0.83"
Routed to Reach 1ER : Discharge Location 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

Area (ac)	CN	Description
3,215.200	63	Natural western desert, HSG A
9.600	85	Natural western desert, HSG C
26.200	88	Natural western desert, HSG D
3,251.000	63	Weighted Average
3,251.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
829.2	15,398	0.0030	0.31		**Lag/CN Method,**

Summary for Subcatchment 1BE:

Runoff = 32.46 cfs @ 14.36 hrs, Volume= 12.955 af, Depth= 1.22"
Routed to Reach 1ER : Discharge Location 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

Area (ac)	CN	Description
89.400	63	Natural western desert, HSG A
21.600	85	Natural western desert, HSG C
16.000	88	Natural western desert, HSG D
127.000	70	Weighted Average
127.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
170.0	2,673	0.0030	0.26		**Lag/CN Method,**

Summary for Subcatchment 2AE:

Runoff = 64.62 cfs @ 43.55 hrs, Volume= 178.576 af, Depth> 0.79"
Routed to Reach 2ER : Discharge Location 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

Area (ac)	CN	Description
2,678.800	63	Natural western desert, HSG A
32.800	88	Natural western desert, HSG D
2,711.600	63	Weighted Average
2,711.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2,305.7	27,825	0.0010	0.20		**Lag/CN Method,**

Summary for Subcatchment 2BE:

Runoff = 12.34 cfs @ 15.86 hrs, Volume= 7.357 af, Depth= 0.83"
Routed to Reach 2ER : Discharge Location 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

Area (ac)	CN	Description
105.200	63	Natural western desert, HSG A
0.900	85	Natural western desert, HSG C
106.100	63	Weighted Average
106.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
264.3	1,856	0.0010	0.12		**Lag/CN Method,**

Summary for Reach 1ER: Discharge Location 1

Inflow Area = 3,378.000 ac, 0.00% Impervious, Inflow Depth = 0.85" for 100-yr event
Inflow = 176.51 cfs @ 24.87 hrs, Volume= 238.370 af
Outflow = 176.51 cfs @ 24.87 hrs, Volume= 238.370 af, Atten= 0%, Lag= 0.0 min
Routed to Reach TER : Site Total

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Summary for Reach 2ER: Discharge Location 2

Inflow Area = 2,817.700 ac, 0.00% Impervious, Inflow Depth > 0.79" for 100-yr event
Inflow = 64.62 cfs @ 43.55 hrs, Volume= 185.933 af
Outflow = 64.62 cfs @ 43.55 hrs, Volume= 185.933 af, Atten= 0%, Lag= 0.0 min
Routed to Reach TER : Site Total

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

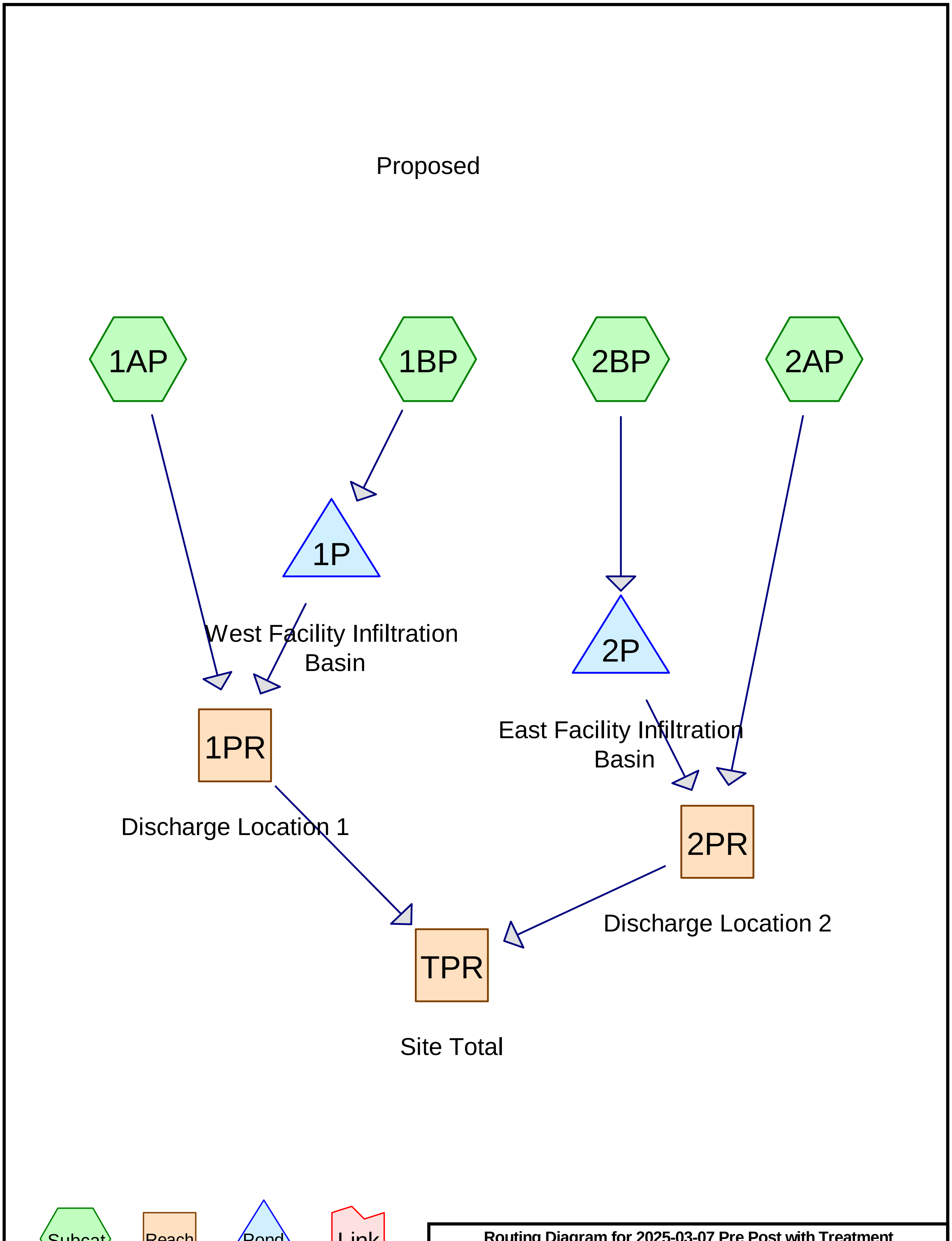
Summary for Reach TER: Site Total

Inflow Area = 6,195.700 ac, 0.00% Impervious, Inflow Depth > 0.82" for 100-yr event
Inflow = 193.02 cfs @ 24.88 hrs, Volume= 424.302 af
Outflow = 193.02 cfs @ 24.88 hrs, Volume= 424.302 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Appendix C

Proposed Model Results



Routing Diagram for 2025-03-07 Pre Post with Treatment
Prepared by Westwood Professional Services, Printed 3/7/2025
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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	100-yr	CA-Perkins 6-hr S1	100-yr	Default	6.00	1	2.56	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
218.200	98	Impervious (1AP, 1BP, 2AP, 2BP)
5,894.500	63	Natural western desert, HSG A (1AP, 1BP, 2AP, 2BP)
18.000	85	Natural western desert, HSG C (1AP, 1BP)
65.000	88	Natural western desert, HSG D (1AP, 1BP, 2AP)
6,195.700	**65**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
5,894.500	HSG A	1AP, 1BP, 2AP, 2BP
0.000	HSG B	
18.000	HSG C	1AP, 1BP
65.000	HSG D	1AP, 1BP, 2AP
218.200	Other	1AP, 1BP, 2AP, 2BP
6,195.700		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	218.200	218.200	Impervious	1AP, 1BP, 2AP, 2BP
5,894.500	0.000	18.000	65.000	0.000	5,977.500	Natural western desert	1AP, 1BP, 2AP, 2BP
5,894.500	**0.000**	**18.000**	**65.000**	**218.200**	**6,195.700**	**TOTAL AREA**	

Summary for Subcatchment 1AP:

Runoff = 77.71 cfs @ 13.47 hrs, Volume= 79.020 af, Depth= 0.29"
Routed to Reach 1PR : Discharge Location 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 6-hr S1 100-yr Rainfall=2.56"

	Area (ac)	CN	Description
	3,150.900	63	Natural western desert, HSG A
	9.400	85	Natural western desert, HSG C
	25.700	88	Natural western desert, HSG D
*	64.300	98	Impervious
*	0.200	98	Impervious
*	0.500	98	Impervious
	3,251.000	64	Weighted Average
	3,186.000		98.00% Pervious Area
	65.000		2.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
808.1	15,398	0.0030	0.32		**Lag/CN Method,**

Summary for Subcatchment 1BP:

Runoff = 48.82 cfs @ 4.80 hrs, Volume= 10.429 af, Depth= 0.99"
Routed to Pond 1P : West Facility Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 6-hr S1 100-yr Rainfall=2.56"

	Area (ac)	CN	Description
	57.900	63	Natural western desert, HSG A
	8.600	85	Natural western desert, HSG C
	7.200	88	Natural western desert, HSG D
*	53.300	98	Impervious
	127.000	81	Weighted Average
	73.700		58.03% Pervious Area
	53.300		41.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
123.4	2,673	0.0030	0.36		**Lag/CN Method,**

Summary for Subcatchment 2AP:

Runoff = 23.69 cfs @ 32.45 hrs, Volume= 64.617 af, Depth> 0.29"
Routed to Reach 2PR : Discharge Location 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 6-hr S1 100-yr Rainfall=2.56"

	Area (ac)	CN	Description
	2,625.200	63	Natural western desert, HSG A
	32.100	88	Natural western desert, HSG D
*	53.600	98	Impervious
*	0.700	98	Impervious
	2,711.600	64	Weighted Average
	2,657.300		98.00% Pervious Area
	54.300		2.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2,247.1	27,825	0.0010	0.21		**Lag/CN Method,**

Summary for Subcatchment 2BP:

Runoff = 19.81 cfs @ 6.66 hrs, Volume= 7.313 af, Depth= 0.83"
Routed to Pond 2P : East Facility Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 6-hr S1 100-yr Rainfall=2.56"

	Area (ac)	CN	Description
	60.500	63	Natural western desert, HSG A
*	45.600	98	Impervious
	106.100	78	Weighted Average
	60.500		57.02% Pervious Area
	45.600		42.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
260.5	3,047	0.0010	0.19		**Lag/CN Method,**

Summary for Reach 1PR: Discharge Location 1

Inflow Area = 3,378.000 ac, 3.50% Impervious, Inflow Depth = 0.28" for 100-yr event
Inflow = 77.71 cfs @ 13.47 hrs, Volume= 79.020 af
Outflow = 77.71 cfs @ 13.47 hrs, Volume= 79.020 af, Atten= 0%, Lag= 0.0 min
Routed to Reach TPR : Site Total

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Summary for Reach 2PR: Discharge Location 2

Inflow Area = 2,817.700 ac, 3.55% Impervious, Inflow Depth > 0.28" for 100-yr event
Inflow = 23.69 cfs @ 32.45 hrs, Volume= 64.617 af
Outflow = 23.69 cfs @ 32.45 hrs, Volume= 64.617 af, Atten= 0%, Lag= 0.0 min
Routed to Reach TPR : Site Total

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Summary for Reach TPR: Site Total

Inflow Area = 6,195.700 ac, 3.52% Impervious, Inflow Depth > 0.28" for 100-yr event
Inflow = 82.70 cfs @ 13.47 hrs, Volume= 143.636 af
Outflow = 82.70 cfs @ 13.47 hrs, Volume= 143.636 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: West Facility Infiltration Basin

Inflow Area = 127.000 ac, 41.97% Impervious, Inflow Depth = 0.99" for 100-yr event
Inflow = 48.82 cfs @ 4.80 hrs, Volume= 10.429 af
Outflow = 0.80 cfs @ 3.64 hrs, Volume= 5.330 af, Atten= 98%, Lag= 0.0 min
Discarded = 0.80 cfs @ 3.64 hrs, Volume= 5.330 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1PR : Discharge Location 1

Routing by Stor-Ind method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
Peak Elev= 88.15' @ 9.65 hrs Surf.Area= 6.731 ac Storage= 9.970 af

Plug-Flow detention time= 2,350.8 min calculated for 5.329 af (51% of inflow)
Center-of-Mass det. time= 2,294.6 min (2,621.9 - 327.3)

Volume	Invert	Avail.Storage	Storage Description
#1	86.00'	24.900 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
86.00	2.400	0.000	0.000
87.00	4.500	3.450	3.450
88.00	6.500	5.500	8.950
89.00	8.000	7.250	16.200
90.00	9.400	8.700	24.900

Device	Routing	Invert	Outlet Devices
#1	Primary	88.50'	**50.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	86.00'	**0.80 cfs Exfiltration at all elevations** Phase-In= 0.05'

Discarded OutFlow Max=0.80 cfs @ 3.64 hrs HW=86.08' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.80 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=86.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: East Facility Infiltration Basin

Inflow Area =	106.100 ac,	42.98% Impervious,	Inflow Depth = 0.83"	for 100-yr event	
Inflow =	19.81 cfs @	6.66 hrs,	Volume=	7.313 af	
Outflow =	0.80 cfs @	4.52 hrs,	Volume=	5.286 af,	Atten= 96%, Lag= 0.0 min
Discarded =	0.80 cfs @	4.52 hrs,	Volume=	5.286 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routed to Reach 2PR : Discharge Location 2

Routing by Stor-Ind method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
Peak Elev= 95.30' @ 13.69 hrs Surf.Area= 5.891 ac Storage= 6.568 af

Plug-Flow detention time= 2,242.2 min calculated for 5.285 af (72% of inflow)
Center-of-Mass det. time= 2,181.3 min (2,641.9 - 460.7)

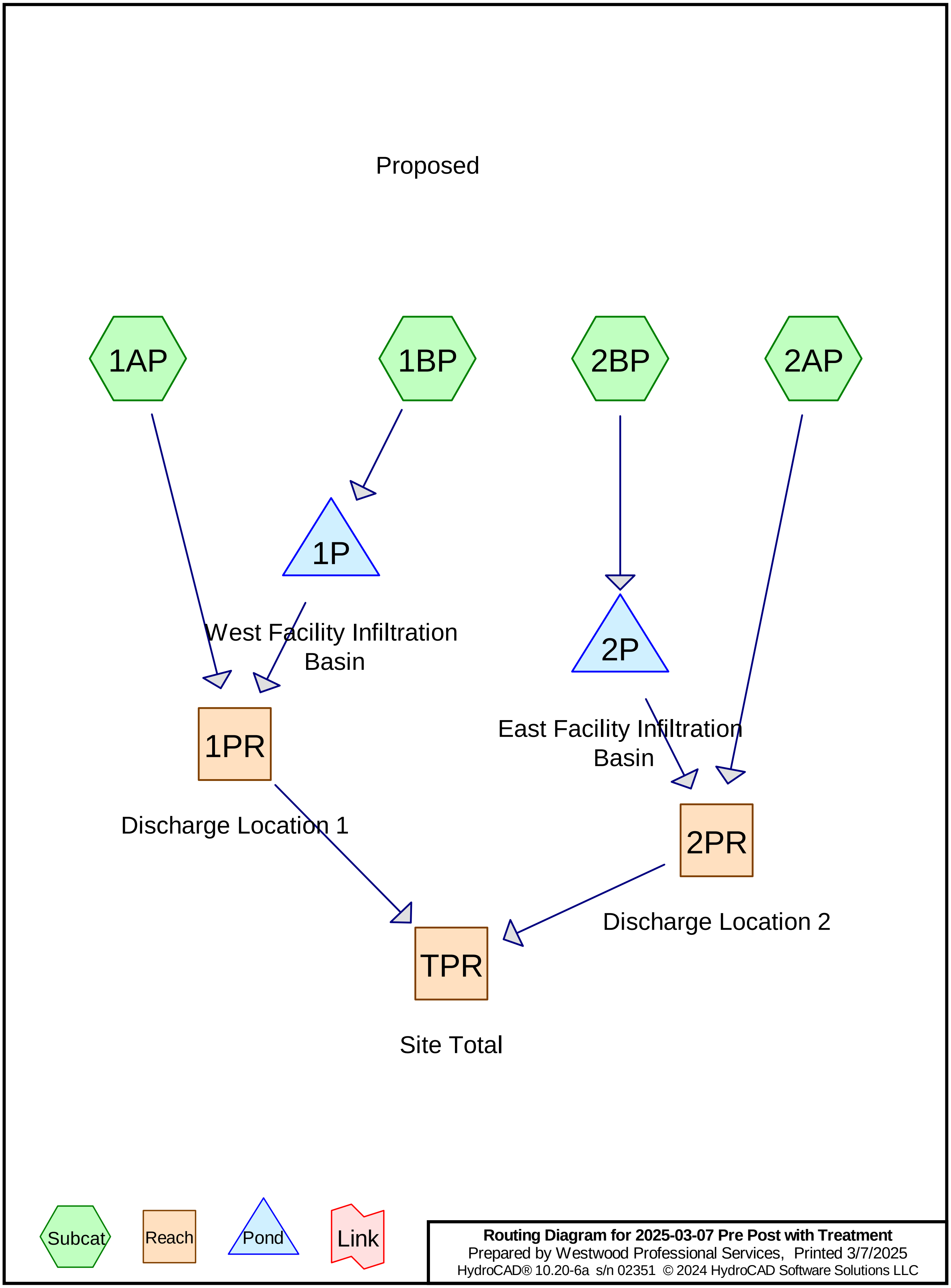
Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	20.150 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.00	1.500	0.000	0.000
94.00	1.700	1.600	1.600
95.00	5.000	3.350	4.950
96.00	8.000	6.500	11.450
97.00	9.400	8.700	20.150

Device	Routing	Invert	Outlet Devices
#1	Primary	96.50'	**20.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	93.00'	**0.80 cfs Exfiltration at all elevations** Phase-In= 0.05'

Discarded OutFlow Max=0.80 cfs @ 4.52 hrs HW=93.08' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.80 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)



Routing Diagram for 2025-03-07 Pre Post with Treatment
Prepared by Westwood Professional Services, Printed 3/7/2025
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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	100-yr	CA-Perkins 24-hr S1	100-yr	Default	24.00	1	3.84	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
218.200	98	Impervious (1AP, 1BP, 2AP, 2BP)
5,894.500	63	Natural western desert, HSG A (1AP, 1BP, 2AP, 2BP)
18.000	85	Natural western desert, HSG C (1AP, 1BP)
65.000	88	Natural western desert, HSG D (1AP, 1BP, 2AP)
6,195.700	**65**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
5,894.500	HSG A	1AP, 1BP, 2AP, 2BP
0.000	HSG B	
18.000	HSG C	1AP, 1BP
65.000	HSG D	1AP, 1BP, 2AP
218.200	Other	1AP, 1BP, 2AP, 2BP
6,195.700		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	218.200	218.200	Impervious	1AP, 1BP, 2AP, 2BP
5,894.500	0.000	18.000	65.000	0.000	5,977.500	Natural western desert	1AP, 1BP, 2AP, 2BP
5,894.500	**0.000**	**18.000**	**65.000**	**218.200**	**6,195.700**	**TOTAL AREA**	

Summary for Subcatchment 1AP:

Runoff = 185.55 cfs @ 24.24 hrs, Volume= 239.447 af, Depth= 0.88"
Routed to Reach 1PR : Discharge Location 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

	Area (ac)	CN	Description
	3,150.900	63	Natural western desert, HSG A
	9.400	85	Natural western desert, HSG C
	25.700	88	Natural western desert, HSG D
*	64.300	98	Impervious
*	0.200	98	Impervious
*	0.500	98	Impervious
	3,251.000	64	Weighted Average
	3,186.000		98.00% Pervious Area
	65.000		2.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
808.1	15,398	0.0030	0.32		**Lag/CN Method,**

Summary for Subcatchment 1BP:

Runoff = 72.24 cfs @ 13.58 hrs, Volume= 21.036 af, Depth= 1.99"
Routed to Pond 1P : West Facility Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

	Area (ac)	CN	Description
	57.900	63	Natural western desert, HSG A
	8.600	85	Natural western desert, HSG C
	7.200	88	Natural western desert, HSG D
*	53.300	98	Impervious
	127.000	81	Weighted Average
	73.700		58.03% Pervious Area
	53.300		41.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
123.4	2,673	0.0030	0.36		**Lag/CN Method,**

Summary for Subcatchment 2AP:

Runoff = 70.24 cfs @ 42.45 hrs, Volume= 190.921 af, Depth> 0.84"
Routed to Reach 2PR : Discharge Location 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

	Area (ac)	CN	Description
	2,625.200	63	Natural western desert, HSG A
	32.100	88	Natural western desert, HSG D
*	53.600	98	Impervious
*	0.700	98	Impervious
	2,711.600	64	Weighted Average
	2,657.300		98.00% Pervious Area
	54.300		2.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2,247.1	27,825	0.0010	0.21		**Lag/CN Method,**

Summary for Subcatchment 2BP:

Runoff = 30.18 cfs @ 15.35 hrs, Volume= 15.564 af, Depth= 1.76"
Routed to Pond 2P : East Facility Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

	Area (ac)	CN	Description
	60.500	63	Natural western desert, HSG A
*	45.600	98	Impervious
	106.100	78	Weighted Average
	60.500		57.02% Pervious Area
	45.600		42.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
260.5	3,047	0.0010	0.19		**Lag/CN Method,**

Summary for Reach 1PR: Discharge Location 1

Inflow Area = 3,378.000 ac, 3.50% Impervious, Inflow Depth = 0.88" for 100-yr event
Inflow = 190.62 cfs @ 24.24 hrs, Volume= 246.747 af
Outflow = 190.62 cfs @ 24.24 hrs, Volume= 246.747 af, Atten= 0%, Lag= 0.0 min
Routed to Reach TPR : Site Total

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Summary for Reach 2PR: Discharge Location 2

Inflow Area = 2,817.700 ac, 3.55% Impervious, Inflow Depth > 0.81" for 100-yr event
Inflow = 70.24 cfs @ 42.45 hrs, Volume= 190.921 af
Outflow = 70.24 cfs @ 42.45 hrs, Volume= 190.921 af, Atten= 0%, Lag= 0.0 min
Routed to Reach TPR : Site Total

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Summary for Reach TPR: Site Total

Inflow Area = 6,195.700 ac, 3.52% Impervious, Inflow Depth > 0.85" for 100-yr event
Inflow = 204.81 cfs @ 24.25 hrs, Volume= 437.668 af
Outflow = 204.81 cfs @ 24.25 hrs, Volume= 437.668 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: West Facility Infiltration Basin

Inflow Area = 127.000 ac, 41.97% Impervious, Inflow Depth = 1.99" for 100-yr event
Inflow = 72.24 cfs @ 13.58 hrs, Volume= 21.036 af
Outflow = 14.03 cfs @ 16.97 hrs, Volume= 12.168 af, Atten= 81%, Lag= 203.8 min
Discarded = 0.80 cfs @ 11.41 hrs, Volume= 4.868 af
Primary = 13.23 cfs @ 16.97 hrs, Volume= 7.300 af
Routed to Reach 1PR : Discharge Location 1

Routing by Stor-Ind method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
Peak Elev= 88.71' @ 16.97 hrs Surf.Area= 7.560 ac Storage= 13.918 af

Plug-Flow detention time= 1,043.8 min calculated for 12.168 af (58% of inflow)
Center-of-Mass det. time= 911.7 min (1,860.5 - 948.8)

Volume	Invert	Avail.Storage	Storage Description
#1	86.00'	24.900 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
86.00	2.400	0.000	0.000
87.00	4.500	3.450	3.450
88.00	6.500	5.500	8.950
89.00	8.000	7.250	16.200
90.00	9.400	8.700	24.900

Device	Routing	Invert	Outlet Devices
#1	Primary	88.50'	**50.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	86.00'	**0.80 cfs Exfiltration at all elevations** Phase-In= 0.05'

Discarded OutFlow Max=0.80 cfs @ 11.41 hrs HW=86.08' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.80 cfs)

Primary OutFlow Max=13.17 cfs @ 16.97 hrs HW=88.71' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 13.17 cfs @ 1.27 fps)

Summary for Pond 2P: East Facility Infiltration Basin

Inflow Area = 106.100 ac, 42.98% Impervious, Inflow Depth = 1.76" for 100-yr event
Inflow = 30.18 cfs @ 15.35 hrs, Volume= 15.564 af
Outflow = 0.80 cfs @ 12.83 hrs, Volume= 4.755 af, Atten= 97%, Lag= 0.0 min
Discarded = 0.80 cfs @ 12.83 hrs, Volume= 4.755 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 2PR : Discharge Location 2

Routing by Stor-Ind method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
Peak Elev= 96.35' @ 29.43 hrs Surf.Area= 8.485 ac Storage= 14.305 af

Plug-Flow detention time= 2,012.1 min calculated for 4.755 af (31% of inflow)
Center-of-Mass det. time= 1,797.8 min (2,882.8 - 1,085.0)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	20.150 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.00	1.500	0.000	0.000
94.00	1.700	1.600	1.600
95.00	5.000	3.350	4.950
96.00	8.000	6.500	11.450
97.00	9.400	8.700	20.150

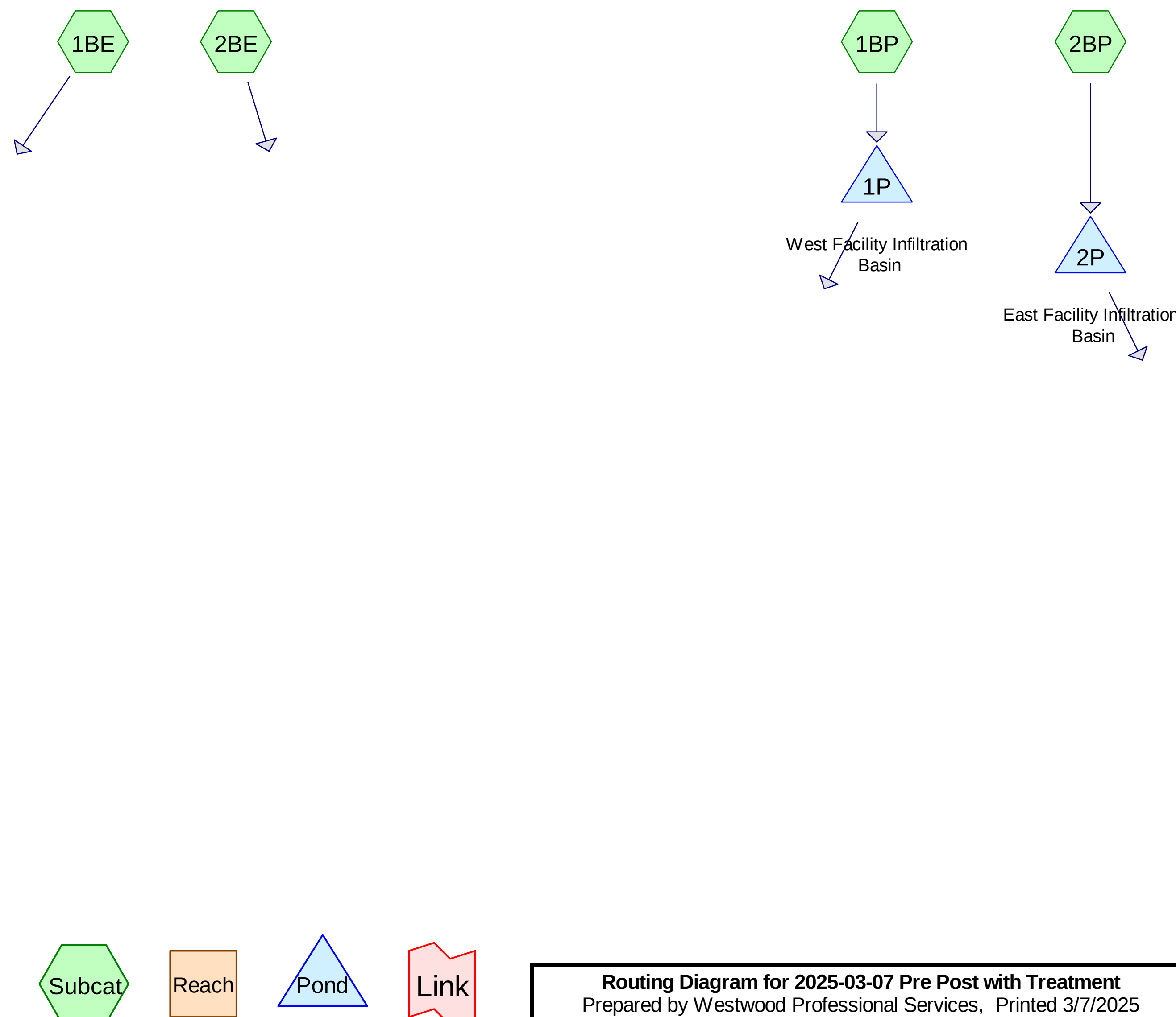
Device	Routing	Invert	Outlet Devices
#1	Primary	96.50'	**20.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	93.00'	**0.80 cfs Exfiltration at all elevations** Phase-In= 0.05'

Discarded OutFlow Max=0.80 cfs @ 12.83 hrs HW=93.08' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.80 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Appendix D

Permanent Basin Calculations



Routing Diagram for 2025-03-07 Pre Post with Treatment
Prepared by Westwood Professional Services, Printed 3/7/2025
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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
98.900	98	Impervious (1BP, 2BP)
313.000	63	Natural western desert, HSG A (1BE, 1BP, 2BE, 2BP)
31.100	85	Natural western desert, HSG C (1BE, 1BP, 2BE)
23.200	88	Natural western desert, HSG D (1BE, 1BP)
466.200	**73**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
313.000	HSG A	1BE, 1BP, 2BE, 2BP
0.000	HSG B	
31.100	HSG C	1BE, 1BP, 2BE
23.200	HSG D	1BE, 1BP
98.900	Other	1BP, 2BP
466.200		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	98.900	98.900	Impervious	1BP, 2BP
313.000	0.000	31.100	23.200	0.000	367.300	Natural western desert	1BE, 1BP, 2BE, 2BP
313.000	**0.000**	**31.100**	**23.200**	**98.900**	**466.200**	**TOTAL AREA**	

Summary for Subcatchment 1BE:

Runoff = 32.46 cfs @ 14.36 hrs, Volume= 12.955 af, Depth= 1.22"
Routed to Reach 1ER : Discharge Location 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

Area (ac)	CN	Description
89.400	63	Natural western desert, HSG A
21.600	85	Natural western desert, HSG C
16.000	88	Natural western desert, HSG D
127.000	70	Weighted Average
127.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
170.0	2,673	0.0030	0.26		**Lag/CN Method,**

Summary for Subcatchment 1BP:

Runoff = 72.24 cfs @ 13.58 hrs, Volume= 21.036 af, Depth= 1.99"
Routed to Pond 1P : West Facility Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

	Area (ac)	CN	Description
	57.900	63	Natural western desert, HSG A
	8.600	85	Natural western desert, HSG C
	7.200	88	Natural western desert, HSG D
*	53.300	98	Impervious
	127.000	81	Weighted Average
	73.700		58.03% Pervious Area
	53.300		41.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
123.4	2,673	0.0030	0.36		**Lag/CN Method,**

Summary for Subcatchment 2BE:

Runoff = 12.34 cfs @ 15.86 hrs, Volume= 7.357 af, Depth= 0.83"
Routed to Reach 2ER : Discharge Location 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

Area (ac)	CN	Description
105.200	63	Natural western desert, HSG A
0.900	85	Natural western desert, HSG C
106.100	63	Weighted Average
106.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
264.3	1,856	0.0010	0.12		**Lag/CN Method,**

Summary for Subcatchment 2BP:

Runoff = 30.18 cfs @ 15.35 hrs, Volume= 15.564 af, Depth= 1.76"
Routed to Pond 2P : East Facility Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr Rainfall=3.84"

	Area (ac)	CN	Description
	60.500	63	Natural western desert, HSG A
*	45.600	98	Impervious
	106.100	78	Weighted Average
	60.500		57.02% Pervious Area
	45.600		42.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
260.5	3,047	0.0010	0.19		**Lag/CN Method,**

Summary for Pond 1P: West Facility Infiltration Basin

Inflow Area = 127.000 ac, 41.97% Impervious, Inflow Depth = 1.99" for 100-yr event
Inflow = 72.24 cfs @ 13.58 hrs, Volume= 21.036 af
Outflow = 14.03 cfs @ 16.97 hrs, Volume= 12.168 af, Atten= 81%, Lag= 203.8 min
Discarded = 0.80 cfs @ 11.41 hrs, Volume= 4.868 af
Primary = 13.23 cfs @ 16.97 hrs, Volume= 7.300 af
Routed to Reach 1PR : Discharge Location 1

Routing by Stor-Ind method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
Peak Elev= 88.71' @ 16.97 hrs Surf.Area= 7.560 ac Storage= 13.918 af

Plug-Flow detention time= 1,043.8 min calculated for 12.168 af (58% of inflow)
Center-of-Mass det. time= 911.7 min (1,860.5 - 948.8)

Volume	Invert	Avail.Storage	Storage Description
#1	86.00'	24.900 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
86.00	2.400	0.000	0.000
87.00	4.500	3.450	3.450
88.00	6.500	5.500	8.950
89.00	8.000	7.250	16.200
90.00	9.400	8.700	24.900

Device	Routing	Invert	Outlet Devices
#1	Primary	88.50'	**50.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	86.00'	**0.80 cfs Exfiltration at all elevations** Phase-In= 0.05'

Discarded OutFlow Max=0.80 cfs @ 11.41 hrs HW=86.08' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.80 cfs)

Primary OutFlow Max=13.17 cfs @ 16.97 hrs HW=88.71' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 13.17 cfs @ 1.27 fps)

Stage-Discharge for Pond 1P: West Facility Infiltration Basin

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
86.00	0.00	0.00	0.00
86.05	0.80	**0.80**	0.00
86.10	0.80	**0.80**	0.00
86.15	0.80	0.80	0.00
86.20	0.80	0.80	0.00
86.25	0.80	0.80	0.00
86.30	0.80	0.80	0.00
86.35	0.80	0.80	0.00
86.40	0.80	0.80	0.00
86.45	0.80	0.80	0.00
86.50	0.80	0.80	0.00
86.55	0.80	0.80	0.00
86.60	0.80	0.80	0.00
86.65	0.80	0.80	0.00
86.70	0.80	0.80	0.00
86.75	0.80	0.80	0.00
86.80	0.80	0.80	0.00
86.85	0.80	0.80	0.00
86.90	0.80	0.80	0.00
86.95	0.80	0.80	0.00
87.00	0.80	0.80	0.00
87.05	0.80	0.80	0.00
87.10	0.80	0.80	0.00
87.15	0.80	0.80	0.00
87.20	0.80	0.80	0.00
87.25	0.80	0.80	0.00
87.30	0.80	0.80	0.00
87.35	0.80	0.80	0.00
87.40	0.80	0.80	0.00
87.45	0.80	0.80	0.00
87.50	0.80	0.80	0.00
87.55	0.80	0.80	0.00
87.60	0.80	0.80	0.00
87.65	0.80	0.80	0.00
87.70	0.80	0.80	0.00
87.75	0.80	0.80	0.00
87.80	0.80	0.80	0.00
87.85	0.80	0.80	0.00
87.90	0.80	0.80	0.00
87.95	0.80	0.80	0.00
88.00	0.80	0.80	0.00
88.05	0.80	0.80	0.00
88.10	0.80	0.80	0.00
88.15	0.80	0.80	0.00
88.20	0.80	0.80	0.00
88.25	0.80	0.80	0.00
88.30	0.80	0.80	0.00
88.35	0.80	0.80	0.00
88.40	0.80	0.80	0.00
88.45	0.80	0.80	0.00
88.50	0.80	0.80	0.00
88.55	2.37	0.80	1.57
88.60	5.23	0.80	4.43
88.65	8.93	0.80	8.13
88.70	13.32	0.80	12.52
88.75	18.49	0.80	17.69
88.80	24.30	0.80	23.50
88.85	30.72	0.80	29.92
88.90	37.74	0.80	36.94
88.95	45.48	0.80	44.68
89.00	53.83	0.80	53.03
89.05	62.80	0.80	62.00
89.10	72.37	0.80	71.57
89.15	82.94	0.80	82.14
89.20	94.21	0.80	93.41
89.25	106.18	0.80	105.38
89.30	118.86	0.80	118.06
89.35	130.30	0.80	129.50
89.40	142.11	0.80	141.31
89.45	154.28	0.80	153.48
89.50	166.80	0.80	166.00
89.55	179.40	0.80	178.60
89.60	192.31	0.80	191.51
89.65	205.52	0.80	204.72
89.70	219.01	0.80	218.21
89.75	232.79	0.80	231.99
89.80	246.85	0.80	246.05
89.85	261.18	0.80	260.38
89.90	275.78	0.80	274.98
89.95	290.64	0.80	289.84
90.00	**305.76**	0.80	**304.96**

Summary for Pond 2P: East Facility Infiltration Basin

Inflow Area = 106.100 ac, 42.98% Impervious, Inflow Depth = 1.76" for 100-yr event
Inflow = 30.18 cfs @ 15.35 hrs, Volume= 15.564 af
Outflow = 0.80 cfs @ 12.83 hrs, Volume= 4.755 af, Atten= 97%, Lag= 0.0 min
Discarded = 0.80 cfs @ 12.83 hrs, Volume= 4.755 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 2PR : Discharge Location 2

Routing by Stor-Ind method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
Peak Elev= 96.35' @ 29.43 hrs Surf.Area= 8.485 ac Storage= 14.305 af

Plug-Flow detention time= 2,012.1 min calculated for 4.755 af (31% of inflow)
Center-of-Mass det. time= 1,797.8 min (2,882.8 - 1,085.0)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	20.150 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.00	1.500	0.000	0.000
94.00	1.700	1.600	1.600
95.00	5.000	3.350	4.950
96.00	8.000	6.500	11.450
97.00	9.400	8.700	20.150

Device	Routing	Invert	Outlet Devices
#1	Primary	96.50'	**20.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	93.00'	**0.80 cfs Exfiltration at all elevations** Phase-In= 0.05'

Discarded OutFlow Max=0.80 cfs @ 12.83 hrs HW=93.08' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.80 cfs)

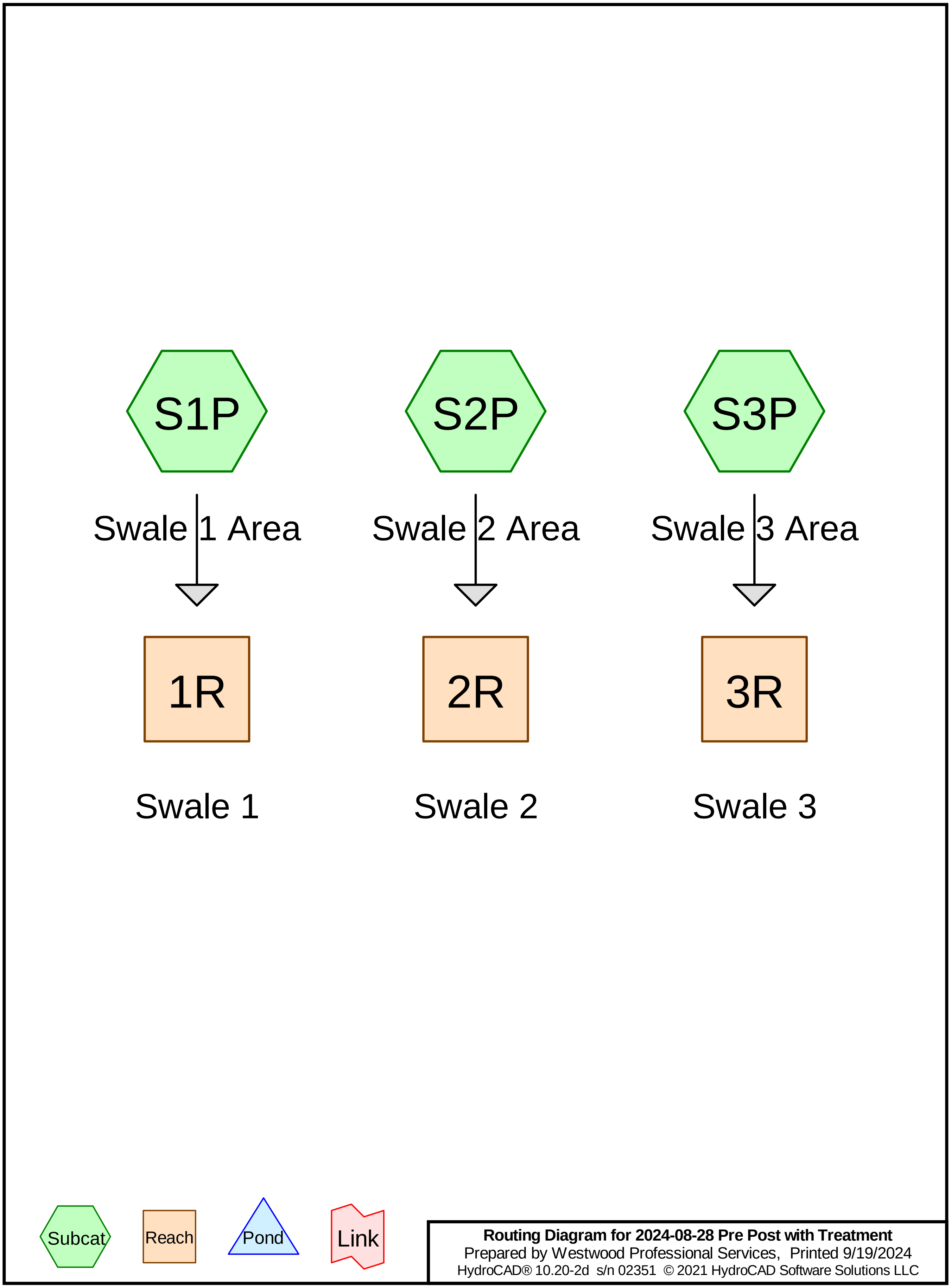
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Discharge for Pond 2P: East Facility Infiltration Basin

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
93.00	0.00	0.00	0.00
93.05	0.80	**0.80**	0.00
93.10	0.80	**0.80**	0.00
93.15	0.80	0.80	0.00
93.20	0.80	0.80	0.00
93.25	0.80	0.80	0.00
93.30	0.80	0.80	0.00
93.35	0.80	0.80	0.00
93.40	0.80	0.80	0.00
93.45	0.80	0.80	0.00
93.50	0.80	0.80	0.00
93.55	0.80	0.80	0.00
93.60	0.80	0.80	0.00
93.65	0.80	0.80	0.00
93.70	0.80	0.80	0.00
93.75	0.80	0.80	0.00
93.80	0.80	0.80	0.00
93.85	0.80	0.80	0.00
93.90	0.80	0.80	0.00
93.95	0.80	0.80	0.00
94.00	0.80	0.80	0.00
94.05	0.80	0.80	0.00
94.10	0.80	0.80	0.00
94.15	0.80	0.80	0.00
94.20	0.80	0.80	0.00
94.25	0.80	0.80	0.00
94.30	0.80	0.80	0.00
94.35	0.80	0.80	0.00
94.40	0.80	0.80	0.00
94.45	0.80	0.80	0.00
94.50	0.80	0.80	0.00
94.55	0.80	0.80	0.00
94.60	0.80	0.80	0.00
94.65	0.80	0.80	0.00
94.70	0.80	0.80	0.00
94.75	0.80	0.80	0.00
94.80	0.80	0.80	0.00
94.85	0.80	0.80	0.00
94.90	0.80	0.80	0.00
94.95	0.80	0.80	0.00
95.00	0.80	0.80	0.00
95.05	0.80	0.80	0.00
95.10	0.80	0.80	0.00
95.15	0.80	0.80	0.00
95.20	0.80	0.80	0.00
95.25	0.80	0.80	0.00
95.30	0.80	0.80	0.00
95.35	0.80	0.80	0.00
95.40	0.80	0.80	0.00
95.45	0.80	0.80	0.00
95.50	0.80	0.80	0.00
95.55	0.80	0.80	0.00
95.60	0.80	0.80	0.00
95.65	0.80	0.80	0.00
95.70	0.80	0.80	0.00
95.75	0.80	0.80	0.00
95.80	0.80	0.80	0.00
95.85	0.80	0.80	0.00
95.90	0.80	0.80	0.00
95.95	0.80	0.80	0.00
96.00	0.80	0.80	0.00
96.05	0.80	0.80	0.00
96.10	0.80	0.80	0.00
96.15	0.80	0.80	0.00
96.20	0.80	0.80	0.00
96.25	0.80	0.80	0.00
96.30	0.80	0.80	0.00
96.35	0.80	0.80	0.00
96.40	0.80	0.80	0.00
96.45	0.80	0.80	0.00
96.50	0.80	0.80	0.00
96.55	1.43	0.80	0.63
96.60	2.57	0.80	1.77
96.65	4.05	0.80	3.25
96.70	5.81	0.80	5.01
96.75	7.87	0.80	7.07
96.80	10.20	0.80	9.40
96.85	12.77	0.80	11.97
96.90	15.57	0.80	14.77
96.95	18.67	0.80	17.87
97.00	**22.01**	0.80	**21.21**

Appendix E

Swale Calculations


S1P
S2P
S3P
Swale 1 Area
Swale 2 Area
Swale 3 Area
1R
2R
3R
Swale 1
Swale 2
Swale 3
Subcat
Reach
Pond
Link
Routing Diagram for 2024-08-28 Pre Post with Treatment
Prepared by Westwood Professional Services, Printed 9/19/2024
HydroCAD® 10.20-2d s/n 02351 © 2021 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
47.400	63	Natural western desert, HSG A (S1P, S2P, S3P)
46.800	98	Paved parking, HSG D (S1P, S2P, S3P)
94.200	**80**	**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
47.400	0.000	0.000	0.000	0.000	47.400	Natural western desert	S1P, S2P, S3P
0.000	0.000	0.000	46.800	0.000	46.800	Paved parking	S1P, S2P, S3P
47.400	**0.000**	**0.000**	**46.800**	**0.000**	**94.200**	**TOTAL AREA**	

Time span=0.00-84.00 hrs, dt=0.01 hrs, 8401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1P: Swale 1 Area Runoff Area=9.800 ac 39.80% Impervious Runoff Depth=1.69"
Flow Length=1,814' Slope=0.0030 '/' Tc=102.3 min CN=77 Runoff=5.31 cfs 1.378 af

Subcatchment S2P: Swale 2 Area Runoff Area=47.800 ac 44.35% Impervious Runoff Depth=1.83"
Flow Length=2,887' Slope=0.0030 '/' Tc=139.7 min CN=79 Runoff=22.83 cfs 7.307 af

Subcatchment S3P: Swale 3 Area Runoff Area=36.600 ac 59.29% Impervious Runoff Depth=2.23"
Flow Length=1,869' Slope=0.0010 '/' Tc=145.4 min CN=84 Runoff=20.77 cfs 6.804 af

Reach 1R: Swale 1 Avg. Flow Depth=0.64' Max Vel=1.78 fps Inflow=5.31 cfs 1.378 af
n=0.033 L=1,322.0' S=0.0053 '/' Capacity=69.05 cfs Outflow=5.18 cfs 1.378 af

Reach 2R: Swale 2 Avg. Flow Depth=1.42' Max Vel=1.84 fps Inflow=22.83 cfs 7.307 af
n=0.033 L=4,382.0' S=0.0023 '/' Capacity=45.33 cfs Outflow=20.03 cfs 7.307 af

Reach 3R: Swale 3 Avg. Flow Depth=1.42' Max Vel=1.86 fps Inflow=20.77 cfs 6.804 af
n=0.033 L=1,736.0' S=0.0023 '/' Capacity=45.55 cfs Outflow=20.37 cfs 6.804 af

Total Runoff Area = 94.200 ac Runoff Volume = 15.489 af Average Runoff Depth = 1.97"
50.32% Pervious = 47.400 ac 49.68% Impervious = 46.800 ac

Summary for Subcatchment S1P: Swale 1 Area

Runoff = 5.31 cfs @ 13.31 hrs, Volume= 1.378 af, Depth= 1.69"
Routed to Reach 1R : Swale 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr 100-yr 24-hr Rainfall=3.84"

Area (ac)	CN	Description
5.900	63	Natural western desert, HSG A
3.900	98	Paved parking, HSG D
9.800	77	Weighted Average
5.900		60.20% Pervious Area
3.900		39.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
102.3	1,814	0.0030	0.30		**Lag/CN Method,**

Summary for Subcatchment S2P: Swale 2 Area

Runoff = 22.83 cfs @ 13.82 hrs, Volume= 7.307 af, Depth= 1.83"
Routed to Reach 2R : Swale 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr 100-yr 24-hr Rainfall=3.84"

Area (ac)	CN	Description
26.600	63	Natural western desert, HSG A
21.200	98	Paved parking, HSG D
47.800	79	Weighted Average
26.600		55.65% Pervious Area
21.200		44.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
139.7	2,887	0.0030	0.34		**Lag/CN Method,**

Summary for Subcatchment S3P: Swale 3 Area

Runoff = 20.77 cfs @ 13.89 hrs, Volume= 6.804 af, Depth= 2.23"
Routed to Reach 3R : Swale 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
CA-Perkins 24-hr S1 100-yr 100-yr 24-hr Rainfall=3.84"

Area (ac)	CN	Description
14.900	63	Natural western desert, HSG A
21.700	98	Paved parking, HSG D
36.600	84	Weighted Average
14.900		40.71% Pervious Area
21.700		59.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
145.4	1,869	0.0010	0.21		**Lag/CN Method,**

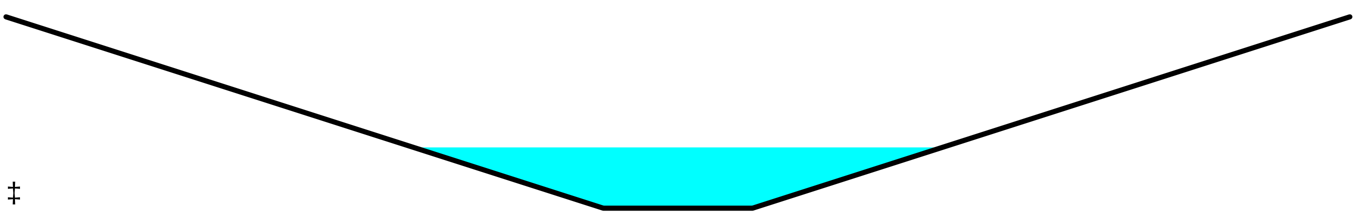
Summary for Reach 1R: Swale 1

Inflow Area = 9.800 ac, 39.80% Impervious, Inflow Depth = 1.69" for 100-yr 24-hr event
Inflow = 5.31 cfs @ 13.31 hrs, Volume= 1.378 af
Outflow = 5.18 cfs @ 13.75 hrs, Volume= 1.378 af, Atten= 3%, Lag= 26.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.78 fps, Min. Travel Time= 12.4 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 32.7 min

Peak Storage= 3,846 cf @ 13.54 hrs
Average Depth at Peak Storage= 0.64' , Surface Width= 7.11'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 69.05 cfs

2.00' x 2.00' deep channel, n= 0.033 Riprap, 1-inch
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 1,322.0' Slope= 0.0053 '/'
Inlet Invert= 95.00', Outlet Invert= 88.00'



‡

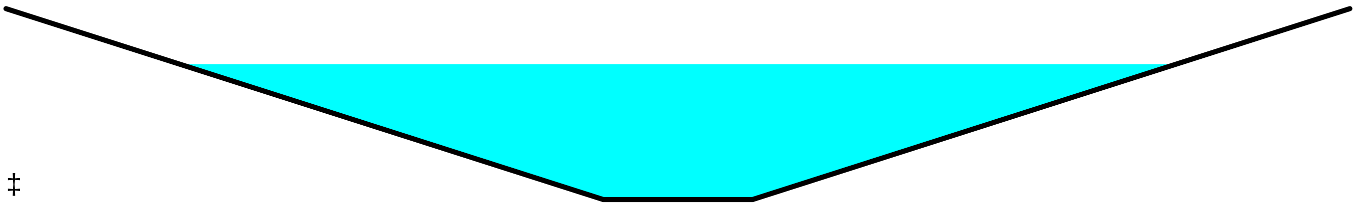
Summary for Reach 2R: Swale 2

Inflow Area = 47.800 ac, 44.35% Impervious, Inflow Depth = 1.83" for 100-yr 24-hr event
Inflow = 22.83 cfs @ 13.82 hrs, Volume= 7.307 af
Outflow = 20.03 cfs @ 15.05 hrs, Volume= 7.307 af, Atten= 12%, Lag= 73.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.84 fps, Min. Travel Time= 39.6 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 177.7 min

Peak Storage= 47,598 cf @ 14.39 hrs
Average Depth at Peak Storage= 1.42' , Surface Width= 13.33'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 45.33 cfs

2.00' x 2.00' deep channel, n= 0.033 Riprap, 1-inch
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 4,382.0' Slope= 0.0023 '/'
Inlet Invert= 100.00', Outlet Invert= 90.00'



‡

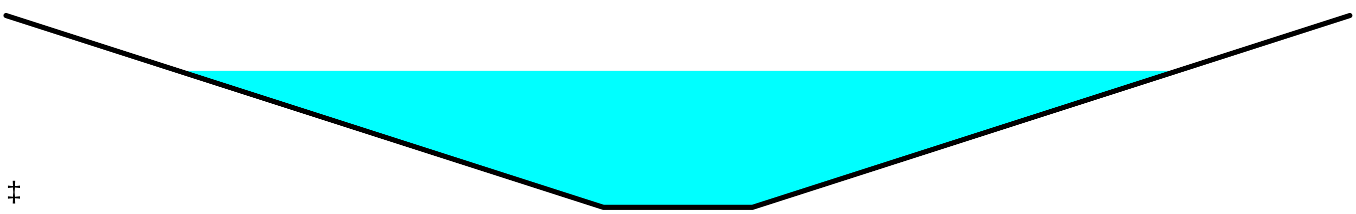
Summary for Reach 3R: Swale 3

Inflow Area = 36.600 ac, 59.29% Impervious, Inflow Depth = 2.23" for 100-yr 24-hr event
Inflow = 20.77 cfs @ 13.89 hrs, Volume= 6.804 af
Outflow = 20.37 cfs @ 14.37 hrs, Volume= 6.804 af, Atten= 2%, Lag= 28.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.86 fps, Min. Travel Time= 15.6 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 50.6 min

Peak Storage= 19,024 cf @ 14.11 hrs
Average Depth at Peak Storage= 1.42' , Surface Width= 13.39'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 45.55 cfs

2.00' x 2.00' deep channel, n= 0.033 Riprap, 1-inch
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 1,736.0' Slope= 0.0023 '/'
Inlet Invert= 100.00', Outlet Invert= 96.00'



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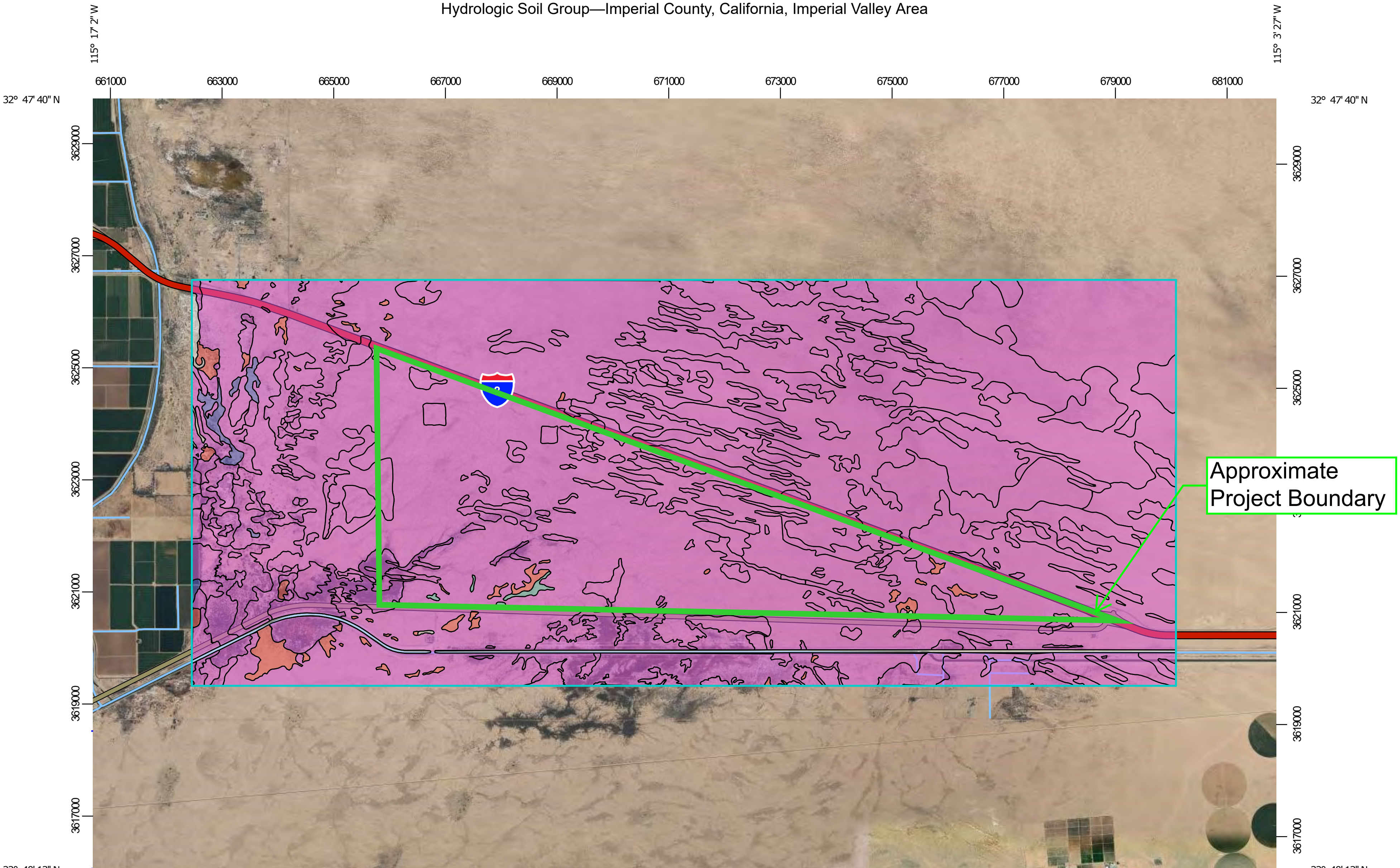
Appendix F

Web Soil Survey

Hydrologic Soil Group—Imperial County, California, Imperial Valley Area



Map Scale: 1:97,000 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 1000, 2000, 4000, 6000

Feet: 0, 4500, 9000, 18000, 27000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Imperial County, California, Imperial Valley Area
Survey Area Data: Version 15, Aug 30, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 17, 2021—May 22, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
100	Antho loamy fine sand	A	91.6	0.3%
103	Carsitas gravelly sand, 0 to 5 percent slopes	A	38.2	0.1%
108	Holtville loam	D	146.8	0.5%
110	Holtville silty clay, wet	D	22.8	0.1%
111	Holtville-Imperial silty clay loams	D	169.6	0.5%
122	Meloland very fine sandy loam, wet	D	40.8	0.1%
123	Meloland and Holtville loams, wet	D	18.6	0.1%
127	Niland loamy fine sand	C	37.0	0.1%
129	Pits		54.8	0.2%
130	Rositas sand, 0 to 2 percent slopes	A	88.1	0.3%
132	Rositas fine sand, 0 to 2 percent slopes	A	7,540.8	23.8%
133	Rositas fine sand, 2 to 9 percent slopes	A	1,281.8	4.0%
135	Rositas fine sand, wet, 0 to 2 percent slopes	A	2,035.4	6.4%
136	Rositas loamy fine sand, 0 to 2 percent slopes	A	17,875.7	56.4%
137	Rositas silt loam, 0 to 2 percent slopes	B	112.6	0.4%
139	Superstition loamy fine sand	A	1,857.7	5.9%
142	Vint loamy very fine sand, wet	A	30.4	0.1%
144	Vint and Indio very fine sandy loams, wet	B	10.4	0.0%
145	Water		229.6	0.7%
Totals for Area of Interest			**31,694.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix G

Curve Number Table

soil type and vegetative cover and condition is the hydrologic soil-cover complex. If a sub-basin contains more than one complex, a composite CN for the sub-basin must be determined using a weighted area approach. A more detailed description of hydrologic soil-cover complexes and Curve Number is available in NEH-630, Chapter 9 and Chapter 10 (USDA, 2004).

Table 4-1 through Table 4-3 are from NEH-630 (USDA, 2004) and provide guidance in selecting CN based on hydrologic complex. The CNs in the table assume the initial abstraction (I_a) is equal to 20% of the total runoff retention capacity of the watershed ($I_a = 0.2S$), which is the standard assumption put forth in NEH-630 (USDA, 2004). Any assumption other than $I_a = 0.2S$ would require determination of different CNs for the hydrologic soil complexes. When impervious areas are part of the basin, it must be determined if they are connected or unconnected to the drainage system and treated accordingly. Treatment of connected and unconnected impervious areas is discussed following Table 4-1. Also note that the CN for some urban cover types assumes a certain percent imperviousness and these areas should not be double-counted.

Table 4-1. Runoff Curve Numbers for Urban Areas[1]

Cover Description			**Curve Number by Hydrologic Soil Group**			
Cover Type	**Hydrologic Condition**	**Average % Impervious Area[2]**	**A**	**B**	**C**	**D**
Fully developed urban areas (vegetation established):						
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]	Poor (grass cover < 50%)		68	79	86	89
	Fair (grass cover 50 to 75%)		49	69	79	84
	Good (grass cover > 75%)		39	61	74	80
Impervious areas:						
Paved parking lots, roofs, driveways, etc. (excluding un-improved right-of-way)			98	98	98	98
Streets and roads:						
Paved; curbs and storm sewers (excluding un-improved right-of-way)			98	98	98	98
Paved; open ditches (including right-of-way)			83	89	92	93
Gravel (including right-of-way)			76	85	89	91
Dirt (including right-of-way)			72	82	87	89
Western desert urban areas:						
Natural desert landscaping (pervious areas only)[4]			63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-			96	96	96	96