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1 Executive Summary

IP Perkins, LLC, IP Perkins BAAH, LLC, and any related affiliates (collectively, "Applicant"), subsidiaries of Intersect Power, LLC, propose to construct, operate, maintain, and decommission a 1,150 megawatt (MW) solar photovoltaic (PV) facility and battery energy storage system (BESS) 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. The major Project components include the following:

- 1,150 megawatt (MW) solar photovoltaic (PV) facility
- Up to 1,150 MW, up to 4-hour duration battery energy storage system (BESS)
- An interconnection generation tie (gen-tie) line
- Project substation
- Operation and maintenance (O&M) yard and facility
- A high-voltage breaker-and-a-half switchyard (BAAH switchyard)
- Two 500 kilovolt (kV) loop-in transmission lines

The Project Application Area , defined as the Project site (which includes the PV facility, BESS, gen-tie, Project substation, and O&M facility), BAAH switchyard, and loop-in transmission line was selected taking into consideration the Project objectives (Section 1.1), environmental impacts, water, engineering constraints, site geology, waste and fuel constraints, and electric transmission constraints, among other factors. A detailed discussion of site selection is provided in Chapter 5: Alternatives. The main elements of the Project are further summarized in Section 1.2. Chapter 2: Project Description provides Project details and Chapter 3: Engineering, provides additional engineering and design detail for this Opt-In Application. Section 4.13: Visual Resources provides a visual depiction of the existing conditions and will provide visual simulations of the same areas following completion of construction of all Project components. Due to the size of the Project Application Area, over 6,000 acres, it is infeasible to capture the full Project site, BAAH switchyard, and loop-in transmission line in one full-page color photographic reproduction, so several simulations will be provided.

1.1 Project Objectives

The Project's primary goal is to contribute to the achievement of California's renewable energy goals and create a vital new point of interconnection for renewable energy in the Imperial Valley to connect to California's electric transmission infrastructure.

The Project's objectives are as follows:

- Design, construct, and operate the facility in a manner that respects the local community, its values, and its economy.
- Operate the facility in a manner that protects the safety of on-site staff and off-site members of the public.
- Generate sales tax revenues for Imperial County by establishing a point of sale in the County for the procurement of most major Project services and equipment.
- Create temporary and permanent living-wage, union jobs for local and regional residents.
- Generate affordable wholesale electric power to serve the ratepayers of the Imperial County region and the State of California.
- Contribute to addressing the climate crisis by generating renewable energy to displace climate-warming fossil fuel-based generation, and in so doing, helping to create a global climate that is hospitable to future generations and wild places.
- Contribute to meeting the State of California's renewable energy policy objectives as described by the interim targets in Senate Bill (SB) 1020 to require renewable energy and zero-carbon resources to supply 90 percent of all retail electricity sales by 2035 and 95 percent of all retail electricity sales by 2040.
- Assist the nation in meeting its Nationally Determined Contribution commitments under Article 4 of the Paris Climate Agreement to achieve a 50 to 52 percent reduction in United States (U.S.) greenhouse gas pollution from 2005 levels by 2030, and to achieve 100 percent carbon pollution-free production in the electricity sector by 2035.
- Minimize environmental impacts and land disturbance associated with solar energy development by siting the facility on relatively flat, contiguous lands with low quality habitat, high solar insolation in close proximity to existing roads and established utility corridors.
- Create a new point of interconnection in the Imperial Valley along California's backbone transmission infrastructure to facilitate this Project and future generators helping meet the state's renewable energy goals.
- Develop a project that is economically feasible and which can attract commercial financing.
- Deliver 1,150 MW of clean, renewable solar energy to California ratepayers.
- Install 1,150 MW of 2-hour and/or 4-hour energy storage capacity, which would generally be charged by the solar PV facility and dispatched in the late afternoon/ evening, once the sun goes down and solar production declines.

1.2 Project Overview

The Project location and main components of the Project are discussed in the following subsections. Figure 1.3-1 depicts the regional location and Project vicinity, Figure 1.3-2 provides an overview of layout option 1 of the Project site and components, and Figure 1.3-3 provides layout option 2 of the Project site, including alternate BESS and substation locations.

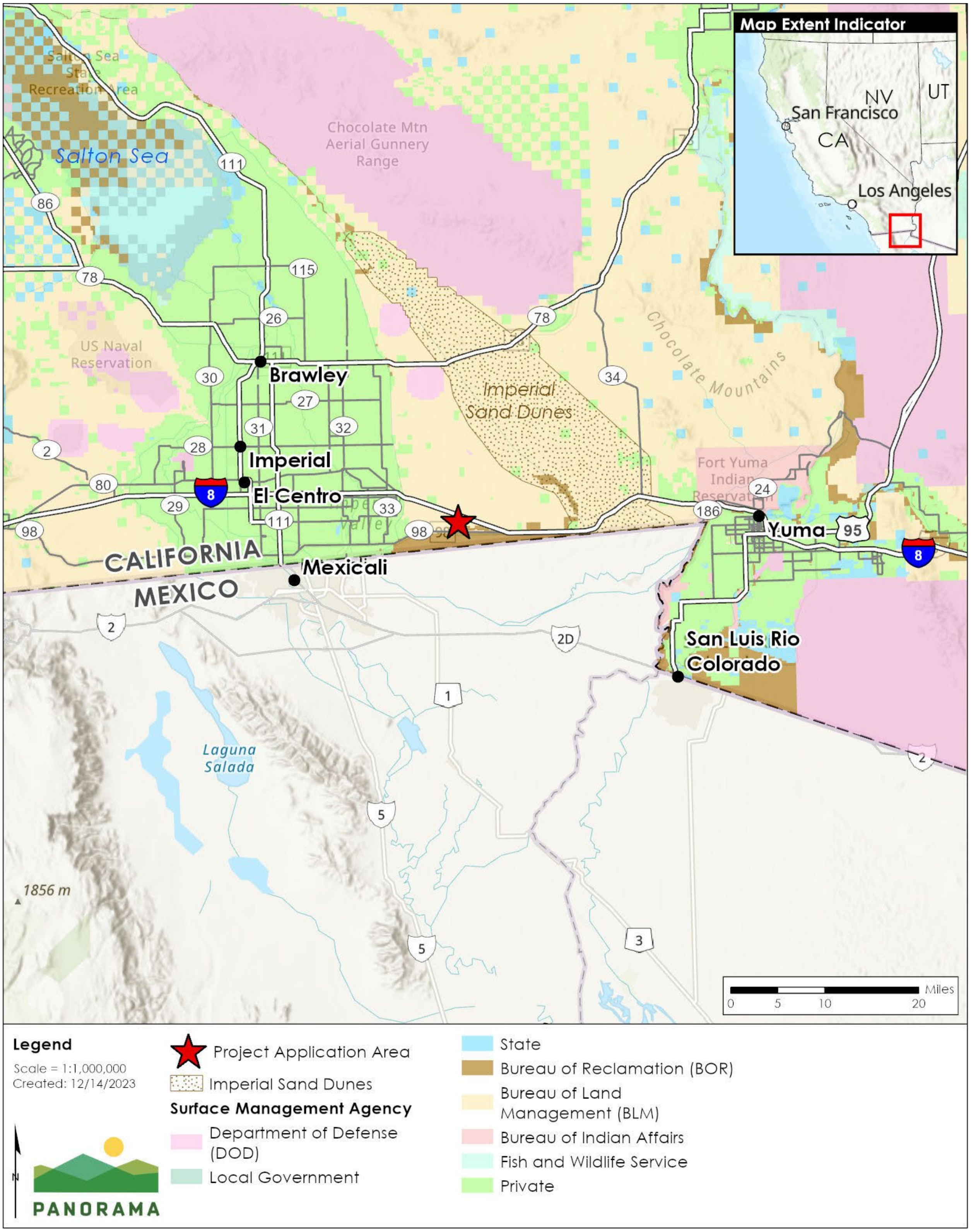
1.3 Project Location

The Project Application Area is in Imperial County, approximately 37 miles southeast of the Salton Sea. Imperial County is located in southern California, in the southwestern portion of the Colorado Desert. The Project Application Area is located approximately 1.2 miles north of the U.S.–Mexico border, 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 Application Area. The Imperial Sand Dunes, the largest mass of sand dunes in California, is located approximately 9 miles east of the Project Application Area.

The Project site and BAAH switchyard would be located on BLM- and BOR-administered public lands as well as private lands. The 500 kV loop-in transmission lines would be located on public lands administered by BLM and BOR and would connect the BAAH switchyard to the existing San Diego Gas and Electric Company (SDG&E) Southwest Power Link (SWPL) transmission line, 0.84 mile south of the Project site. The entirety of the Project Application Area on BLM-administered public land is a designated Development Focus Area (DFA) under the Desert Renewable Energy Conservation Plan (DRECP) and its associated Record of Decision (ROD).[1] The private land within the Project Application Area 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.

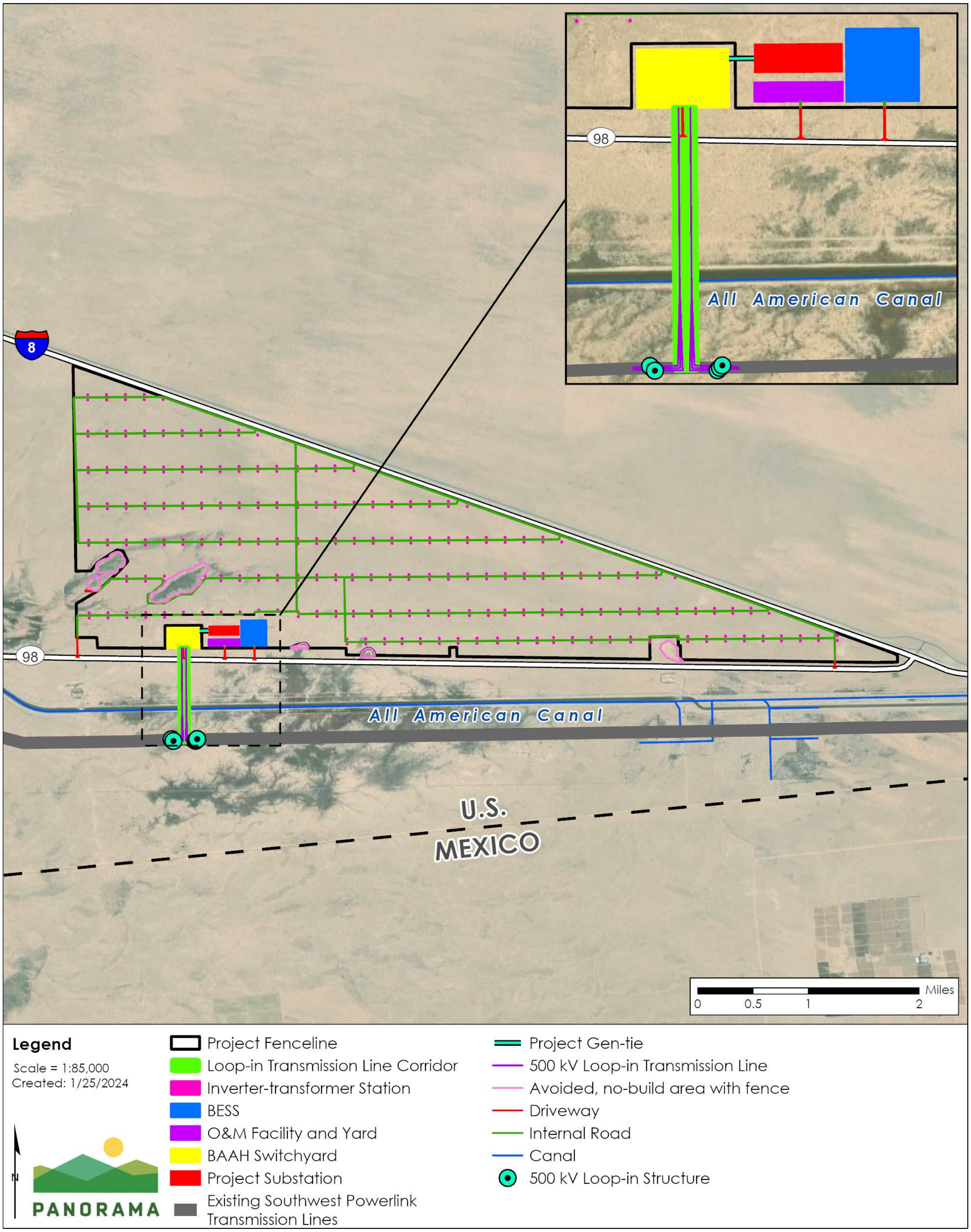
[1] The DRECP was developed to advance federal and State natural resource conservation goals and other state laws while facilitating a timely and streamlined permitting process for renewable energy projects (BLM 2015). Areas designated as DFAs are considered areas suitable for renewable energy development under the DRECP.

Figure 1.3-1 Regional Setting



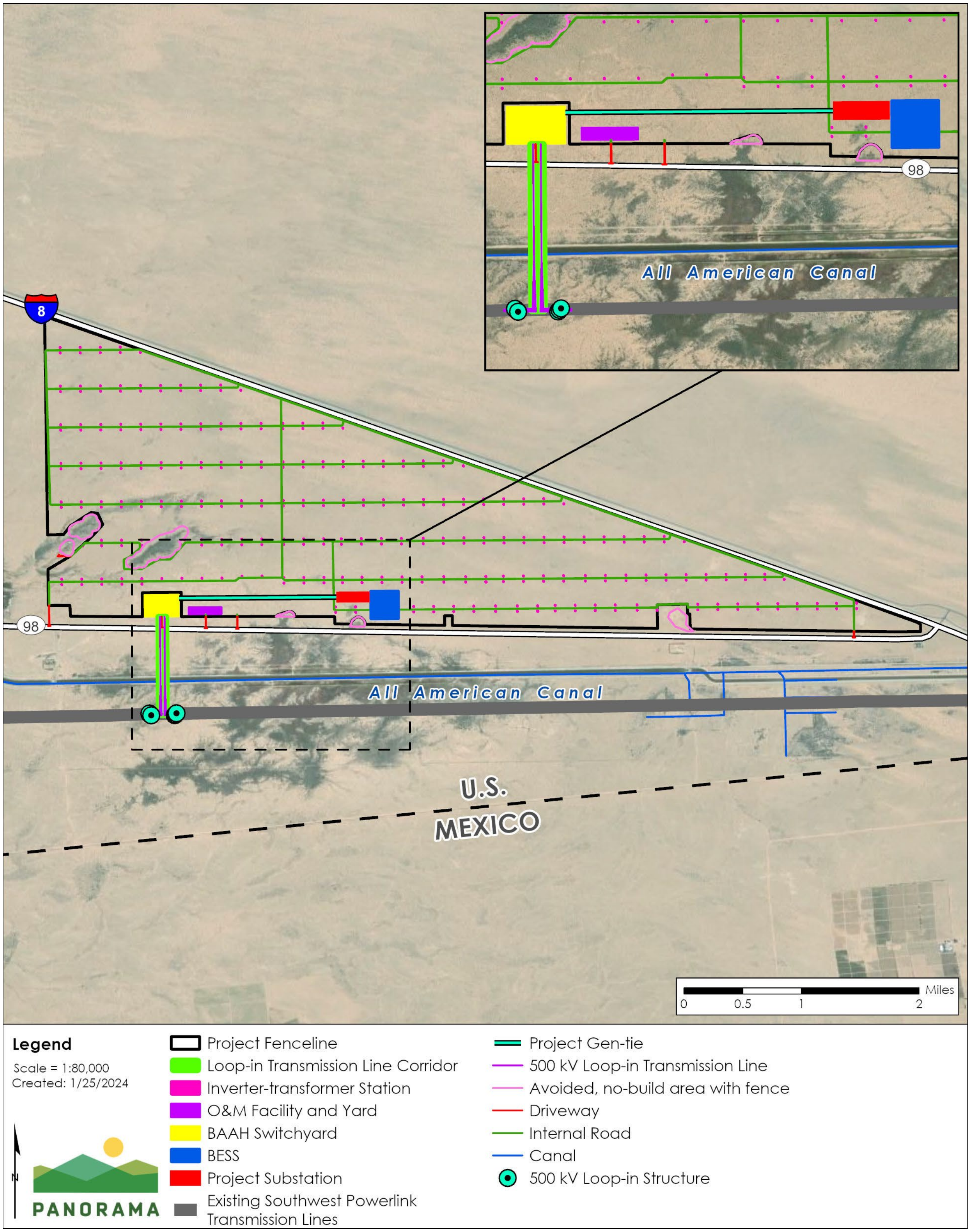
Source: (BLM 2022)(BLM 2012)

Figure 1.3-2 Project Application Area and Project Site Components Layout Option 1



Source: (Intersect Power 2023a)

Figure 1.3-3 Project Application Area and Project Components Layout Option 2



Source: (Intersect Power 2023a)

The Applicant coordinated with BLM to design the Project fenceline such that the Project preserves a portion of the BLM/368 energy utility corridor[2] that traverses the Project site. Refer to Figures 4.6-2, 4.6-3, and 4.6-4 in Section 4.6: Land Use, for a visual representation of the land use designations and corridors within, and adjacent to, the Project Application Area. The Project substation would obtain distribution power from Imperial Irrigation District's (IID) existing distribution system in the area. The IID distribution line would traverse the utility corridor just south of the Project Application Area and connect into the substation.

The Project site is bounded by Interstate 8 (I-8) to the north and State Route 98 (SR 98) to the south. The immediate area to the west of the Project site is vacant natural land with farmland located 2.5 miles west of the Project site. 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 south of the Project site, parallel with SR 98. The Project vicinity is shown in Figure 1.3-1. Existing conditions within the Project site and 500 kV loop-in transmission corridor are shown in Figures 4.13-2 through 4.13-5 of Section 4.13: Visual Resources.

The Project's legal description is provided in Appendix A. A parcel notification package was completed and provided in Appendix B and includes all APNs and owners' names and addresses for parcels within 500 feet of the 500 kV loop-in transmission lines and 1,000 feet of the Project site. Direct mailing addresses for owners and occupants of properties contiguous to the Project Application Area are also included in the parcel notification list.

1.4 Project Elements

Figure 1.3-2 shows the on-site Project components, BAAH switchyard, and 500 kV loop-in transmission line. The main Project elements are discussed in the following subsections.

1.4.1 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

[2] In 2009, the BLM designated approximately 5,000 miles of Section 368 corridors (known as the West-Wide Energy Corridors or WWECs) on public lands in an ROD that amended 92 BLM land use plans in 11 contiguous western states. The Project Application Area is located, in part, within energy corridor Number 115-238, designated in the 2009 ROD (BLM 2009). This area overlaps with a utility corridor previously designated by the BLM in the California Desert Conservation Area (CDCA) Plan, as Amended, called Utility Corridor K (BLM 1980). The Applicant worked with the BLM to determine the appropriate width of the retained Section 368 corridor that would allow for development of the Project while also facilitating ongoing function of the Section 368 corridor.

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. 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.

1.4.2 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.

1.4.3 Operation and Maintenance Facilities

The operation and maintenance (O&M) facilities would be designed for Project security, employee offices, and parts storage. The O&M facility would cover an area of approximately 10 acres and include the following components: two O&M 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 O&M office building would have a septic system and would be constructed on a concrete foundation. The water supply for the O&M facility is anticipated to be from an on-site groundwater well.

1.4.4 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 (see layout options 1 and 2 in Figure 1.3-2 and Figure 1.3-3).

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.

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.

1.4.5 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.

1.4.6 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.

1.4.7 500 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.

1.5 Project Schedule

Construction of the Project is anticipated to begin as early as January 2026 and extend to December 2027, for a duration of 24 months. Commercial operation of the Project is anticipated from December 2027 to December 2057. The Project would operate 7 days a week, 365 days a year, with a lifespan of up to approximately 50 years.

1.6 Project Ownership

1.6.1 Project Applicant, Owner, and Operator

The solar facility, BESS, Project substation, and gen-tie line would be constructed, owned, and operated by IP Perkins, LLC and Affiliates. IP Perkins BAAH, LLC would construct the BAAH switchyard, which, upon commissioning, would be owned and operated by SDG&E in coordination with IID. The two 500 kV loop-in transmission lines would be constructed by SDG&E and, upon commissioning, owned and operated by SDG&E in coordination with IID. IP Perkins, LLC, has a fully executed Engineering and Procurement (E&P) agreement with SDG&E and has filed for an interconnection position of 1,150 MW on SDG&E's SWPL line. IP Perkins, LLC is in the process of negotiating and, upon completion of interconnection studies, will execute an interconnection agreement with SDG&E to carry up to 1,150 MW of energy.

1.6.2 Persons Who Prepared the Opt-In Application

Appendix C contains a list of persons involved in the preparation of the Opt-In Application, including their roles and responsibilities.

2 Project Description

2.1 Introduction

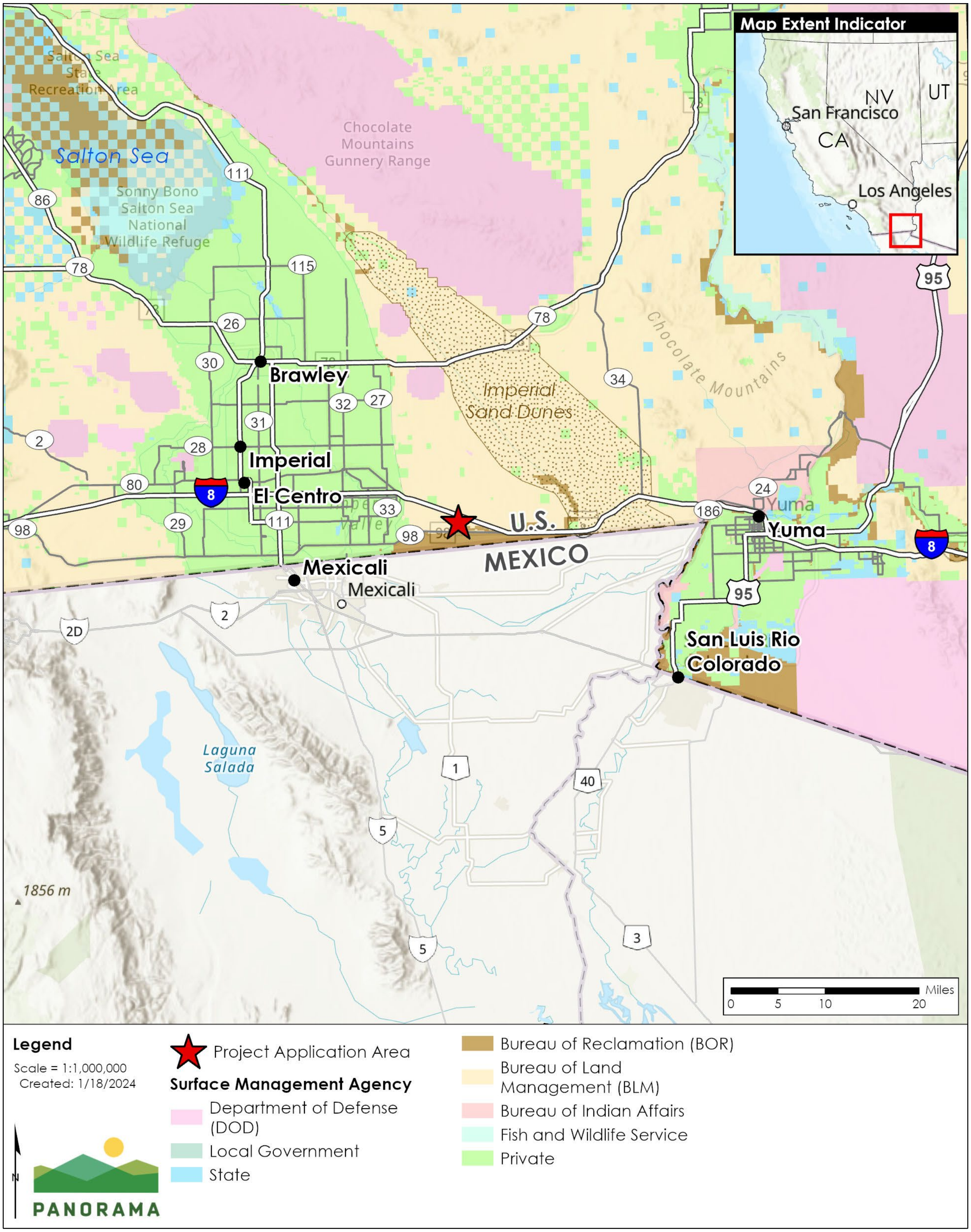
This section discusses the Perkins Renewable Energy Project (Project), including the Project components, location, and site selection, preliminary site investigations and design, and Project closure as well as efficiency and reliability of the Project. The information contained in this section and organization of information conforms with the requirements of the California Energy Commission (CEC) California Code of Regulations (CCR) Title 20, Appendix B.

2.1.1 Project Summary

IP Perkins, LLC, IP Perkins BAAH, LLC, and any related affiliates (collectively, "Applicant"), subsidiaries of Intersect Power, LLC, propose to construct, operate, maintain, and decommission a 1,150 megawatt (MW) solar photovoltaic (PV) facility and battery energy storage system (BESS) 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 (refer to Figure 2.1-1).

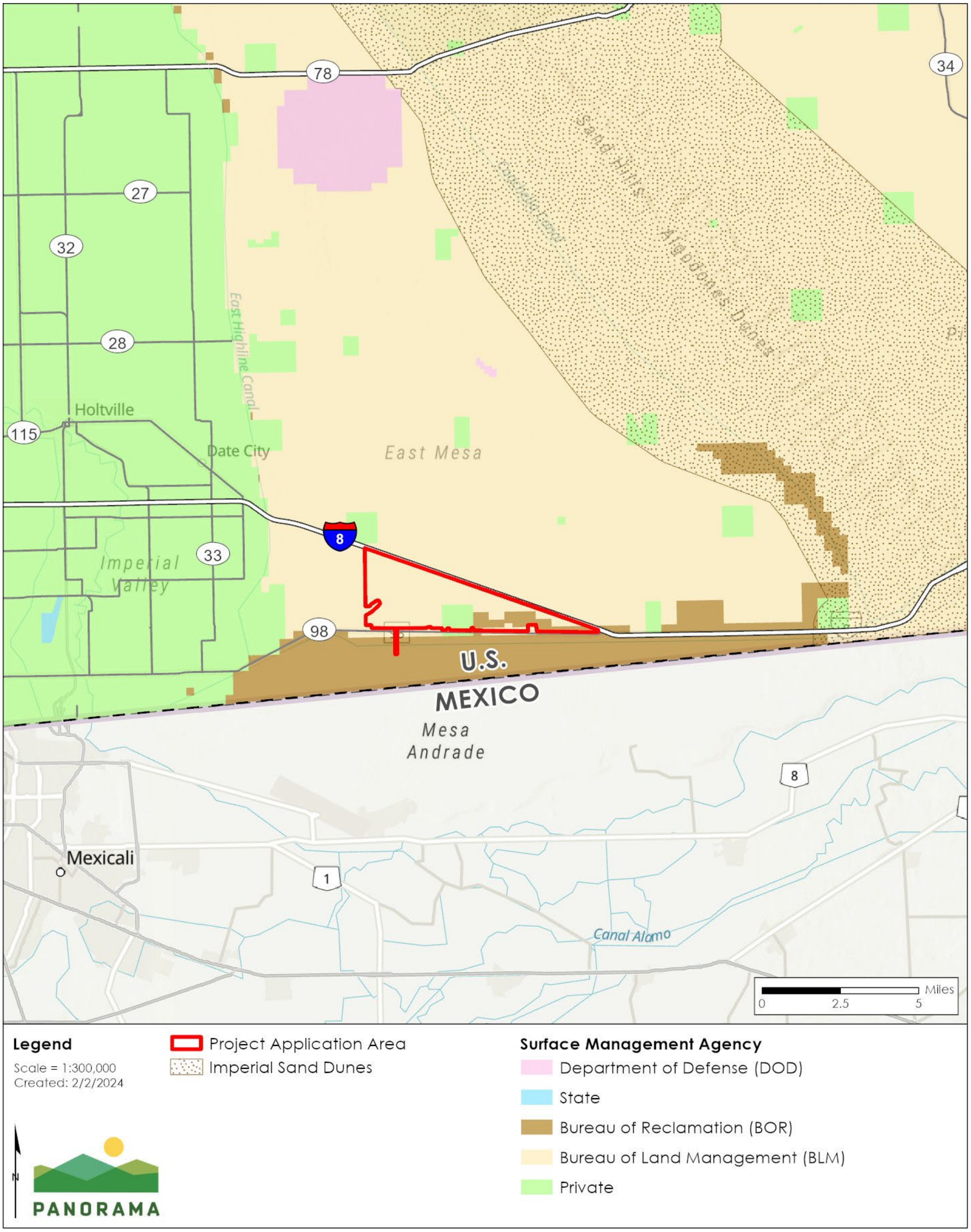
A fenced area referred to as the “Project site” would contain the solar plant, BESS, Project interconnection generation tie (gen-tie) line, Project substation, and operations and maintenance (O&M) yard and facility. The Project would also include a high-voltage breaker-and-a-half switchyard (BAAH switchyard) 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 to the south of the Project site. Together the Project site, the BAAH switchyard, and the 500 kV loop-in transmission corridors are referred to as the “Project Application Area” in these application materials (refer to Figure 2.1-2).

Figure 2.1-1 Regional Setting



Source: (Intersect Power 2023)(Bureau of Land Management (BLM) 2012)

Figure 2.1-2 Project Vicinity



Source: (Intersect Power 2023)(BLM 2022)(BLM 2012)

2.1.2 Project Objectives

The Applicant's objectives for the Project include the following:

- Design, construct, and operate the facility in a manner that respects the local community, its values, and its economy.
- Operate the facility in a manner that protects the safety of on-site staff and off-site members of the public.
- Generate sales tax revenues for Imperial County by establishing a point of sale in the County for the procurement of most major Project services and equipment.
- Create temporary and permanent living-wage, union jobs for local and regional residents.
- Generate affordable wholesale electric power to serve the ratepayers of the Imperial County region and the State of California.
- Contribute to addressing the climate crisis by generating renewable energy to displace climate-warming fossil fuel-based generation, and in so doing, helping to create a global climate that is hospitable to future generations and wild places.
- Contribute to meeting the State of California's renewable energy policy objectives as described by the interim targets in Senate Bill (SB) 1020 to require renewable energy and zero-carbon resources to supply 90 percent of all retail electricity sales by 2035 and 95 percent of all retail electricity sales by 2040.
- Assist the nation in meeting its Nationally Determined Contribution commitments under Article 4 of the Paris Climate Agreement to achieve a 50 to 52 percent reduction in United States (U.S.) greenhouse gas pollution from 2005 levels by 2030, and to achieve 100 percent carbon pollution-free production in the electricity sector by 2035.
- Minimize environmental impacts and land disturbance associated with solar energy development by siting the facility on relatively flat, contiguous lands with low quality habitat, high solar insolation in close proximity to existing roads and established utility corridors.
- Create a new point of interconnection in the Imperial Valley along California's backbone transmission infrastructure to facilitate this Project and future generators helping meet the state's renewable energy goals.
- Develop a project that is economically feasible and which can attract commercial financing.
- Deliver 1,150 MW of clean, renewable solar energy to California ratepayers.
- Install 1,150 MW of 2-hour and/or 4-hour energy storage capacity, which would generally be charged by the solar PV facility and dispatched in the late afternoon/ evening, once the sun goes down and solar production declines.

2.1.3 Applicant and Other Responsible Entities

The solar facility, BESS, Project substation, and gen-tie line would be constructed, owned, and operated by IP Perkins, LLC and Affiliates. IP Perkins BAAH, LLC would construct the BAAH switchyard, which, upon commissioning, would be owned and operated by SDG&E in coordination with IID. The two 500 kV loop-in transmission lines would be constructed by

SDG&E and, upon commissioning, owned and operated by SDG&E in coordination with IID. IP Perkins, LLC, has a fully executed Engineering and Procurement (E&P) agreement with SDG&E and has filed for an interconnection position of 1,150 MW on SDG&E's SWPL line. IP Perkins, LLC is in the process of negotiating and, upon completion of interconnection studies, will execute an interconnection agreement with SDG&E to carry up to 1,150 MW of energy.

2.2 Project Location

2.2.1 Regional Setting

The Project Application Area is in Imperial County, approximately 37 miles southeast of the Salton Sea. Imperial County is located in southern California, in the southwestern portion of the Colorado Desert. The Project Application Area is located approximately 1.2 miles north of the U.S.–Mexico border, 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 Application Area. The Imperial Sand Dunes, the largest mass of sand dunes in California, is located approximately 9 miles east of the Project Application Area.

2.2.2 Project Application Area and Vicinity

The Project site and BAAH switchyard would be located on BLM- and BOR-administered public lands as well as private lands. The 500 kV loop-in transmission lines would be located on public lands administered by BLM and BOR and would connect the BAAH switchyard to the SWPL transmission line, 0.84 mile south of the Project site. Table 2.2-1 lists the Project site acreages and Project Application Area acreages, listed by land management category. The entirety of the Project Application Area within BLM -administered public land is designated Development Focus Area (DFA) under the Desert Renewable Energy Conservation Plan (DRECP) and its associated Record of Decision (ROD).[1] The private land within the Project Application Area 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. The Applicant coordinated with BLM to design the Project fenceline such that the Project

[1] The DRECP was developed to advance federal and state natural resource conservation goals and other state laws while facilitating a timely and streamlined permit process for renewable energy projects (BLM 2015). Areas designated as DFAs are considered areas suitable for renewable energy development under the DRECP.

Table 2.2-1 Project Application Area and Project Site Acreages by Land Manager/ Administrator

Land manager/administrator	Project Application Area acreages	Project site acreages
Bureau of Land Management	4,763	4,708
Bureau of Reclamation	848	828
Private Land	515	515
Total	**6,126**	**6,051**

Note: Totals may not add due to rounding.

preserves a portion of the BLM/368 energy utility corridor[2] that traverses partially through the Project site. Refer to Figure 4.6-1, 4.6-2, and 4.6-3 in Section 4.6 Land Use, for a visual representation of the land use designations and corridors within and adjacent to the Project Application Area.

The Project site is bounded by Interstate 8 (I-8) to the north and State Route 98 (SR 98) to the south. The immediate area 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 Project vicinity is shown in Figure 2.1-2. Existing conditions within the Project site and 500 kV loop-in transmission corridor are shown in Figure 4.13-2 through 4.13-5 of Section 4.13 Visual Resources.

2.2.3 Legal Description, ROW and Leaseholds

The Project Application Area is located in unincorporated Imperial County in Township 16 South, Ranges 17E and 18E, San Bernardino Meridian. The Project legal description, including a map at a scale of 1:24,000 (1″ =2000′) and the identification of the location of the Project site, related facilities, and leaseholds by section, township, range, county, and assessor's parcel numbers (APNs), is provided in Appendix A.

[2] In 2009, the BLM designated approximately 5,000 miles of Section 368 corridors (known as the West-Wide Energy Corridors or WWECs) on public lands in an ROD that amended 92 BLM land use plans in 11 contiguous western states. The Project Application Area is located, in part, within energy corridor Number 115-238, designated in the 2009 ROD (BLM 2009). This area overlaps with a utility corridor previously designated by the BLM in the California Desert Conservation Area (CDCA) Plan, as Amended, called Utility Corridor K (BLM 1980). The Applicant worked with the BLM to determine the appropriate width of the retained Section 368 corridor that would allow for development of the Project while also facilitating ongoing function of the Section 368 corridor.

2.2.4 Parcel Notification

A parcel notification package was completed and provided in Appendix B which includes all APNs and owners' names and addresses for parcels within 500 feet of the 500 kV loop-in transmission lines and 1,000 feet of the Project site. Direct mailing addresses for owners and occupants of properties contiguous to the Project Application Area are included in the parcel notification list.

2.3 Generation Facility Description, Design, and Operation

2.3.1 Facility Design Considerations

Site Selection

The Project site was selected through review of available BLM-administered lands with DFA designations located adjacent to existing transmission infrastructure. The portions of the Project site on BLM-administered lands are located within a DFA, and a high voltage transmission line is located 0.8 mile from the Project site. Other factors that were considered include sensitive resources, solar insolation, slope, meteorological conditions, and hydrology. The private and BOR-managed lands included in the proposed Project also demonstrate these characteristics that make them suitable for solar development. Existing roads and highways including I-8 and SR 98, Imperial Irrigation District (IID) rights of way and infrastructure (e.g., distribution lines), and other utilities were also considered in the Project design/layout. The site investigations performed to verify the site conditions as part of the site selection and design process are described below. A detailed discussion of site selection is included in Section 5.1, Alternatives.

Engineering Evaluations

Solar Insolation and Slope

Insolation is a measure of solar radiation energy received on a given surface in a given time. It is commonly expressed as an average irradiance in watts per square meter (W/m^2) or kilowatt-hours per square meter per day ($kWh/m^2/day$). The region in which the Project site is located receives greater than 7 $kWh/m^2/day$ of solar radiation energy, giving it a higher degree of insolation than almost anywhere else in the United States (National Renewable Energy Laboratory 2018).

Solar PV projects require the land to be minimally sloped for development. The Project site slopes gradually from east to west, and the slope within the site ranges from 0 to 2.5 percent.

Sensitive Resources

Sensitive resources, including swales dominated by microphyll woodlands, are located adjacent and within the Project site. The original Project layout encompassed a larger area that has since been reduced to avoid the woodland areas. The approximately 52-acre woodland area that remains within the Project site boundaries near the solar PV would be avoided and left undisturbed by the Project design. Refer to Section 4.2: Biological Resources for additional information on the woodland areas.

Preliminary Geotechnical Evaluation

The Applicant is conducting a geotechnical evaluation to gather information on the physical properties of the soil and rock for incorporation into the design of the facility. Geotechnical testing and analysis would include survey work, geotechnical borings, soil sampling, use of ground-penetrating radar, and prototype pile testing along existing disturbed routes within the Project site. A preliminary Geotech report, covering a portion of the private lands included in the Project site, has been completed (see Section 4.4). Additional geotechnical investigations will be conducted on the BLM and BOR managed lands once the federal Right of Way (ROW) Grant for those lands is received.

As an input to Project design, the Applicant would conduct a comprehensive geotechnical and engineering geologic investigation that covers the entirety of the Project site. The resulting report would provide recommendations to address surface fault rupture potential; seismic groundshaking/seismic loading; seismically induced ground failure/instability, included but not limited to liquefaction; slope instability and failure, including but not limited to seismically induced slope failures and stability of cut and fill slopes; and site soil conditions, including but not limited to potential for expansive soils. The reports would be prepared by California state-licensed engineering and geologic staff (California Geotechnical Engineer/GE and Certified Engineering Geologist/CEG).

Hydrologic Modeling

A 2-D hydraulic study was conducted for the Project site in 2021. The study determined that the Project site has a generally low maximum floodplain inundation depth of 1 foot or less, with velocity of 1 foot per second (fps) or less. The Project site has a low flood risk, which is consistent with the hydrologic characteristics of the area given the dry and mostly flat topography of the Project site (WRMA Engineering 2021).

Measures Proposed to Improve Adverse Site Conditions

Potential risks from adverse site conditions to the solar facility would be addressed through engineering. Adverse site conditions could include ground shaking from seismic activity, arc hazards, or corrosive soils. Project construction would adhere to the requirements and specifications contained in the final geotechnical report and final design plans, which would be fully compliant with the seismic recommendations provided by a California-registered professional engineer in accordance with the California Building Code requirements. Grounding wires would be installed where needed along the gen-tie. A ground grid composed of copper wire would be installed at the substation. Depending upon the results of the geotechnical report, if cathodic protection is recommended due to the presence of corrosive soils, a sacrificial anode type cathodic protection system would be provided. Galvanized metal posts and epoxy-coated rebar may be utilized in lieu of cathodic protection if supported by soil conditions.

2.3.2 Solar Facility Description

Components

The solar facility includes the following components:

- Solar PV arrays
- Inverter-transformer stations and electrical collector lines
- BESS
- Operation and maintenance facilities
- Monitoring and telecommunication facilities
- Access roads
- Security fencing and lighting
- Septic system
- Emergency and auxiliary facilities, including a permanent back-up generator

The Project also includes the Project substation, BAAH switchyard, and two 500 kV loop-in lines, described within Section 2.4. Table 2.3-1 lists the approximate acreages associated with each Project component for the Project site.

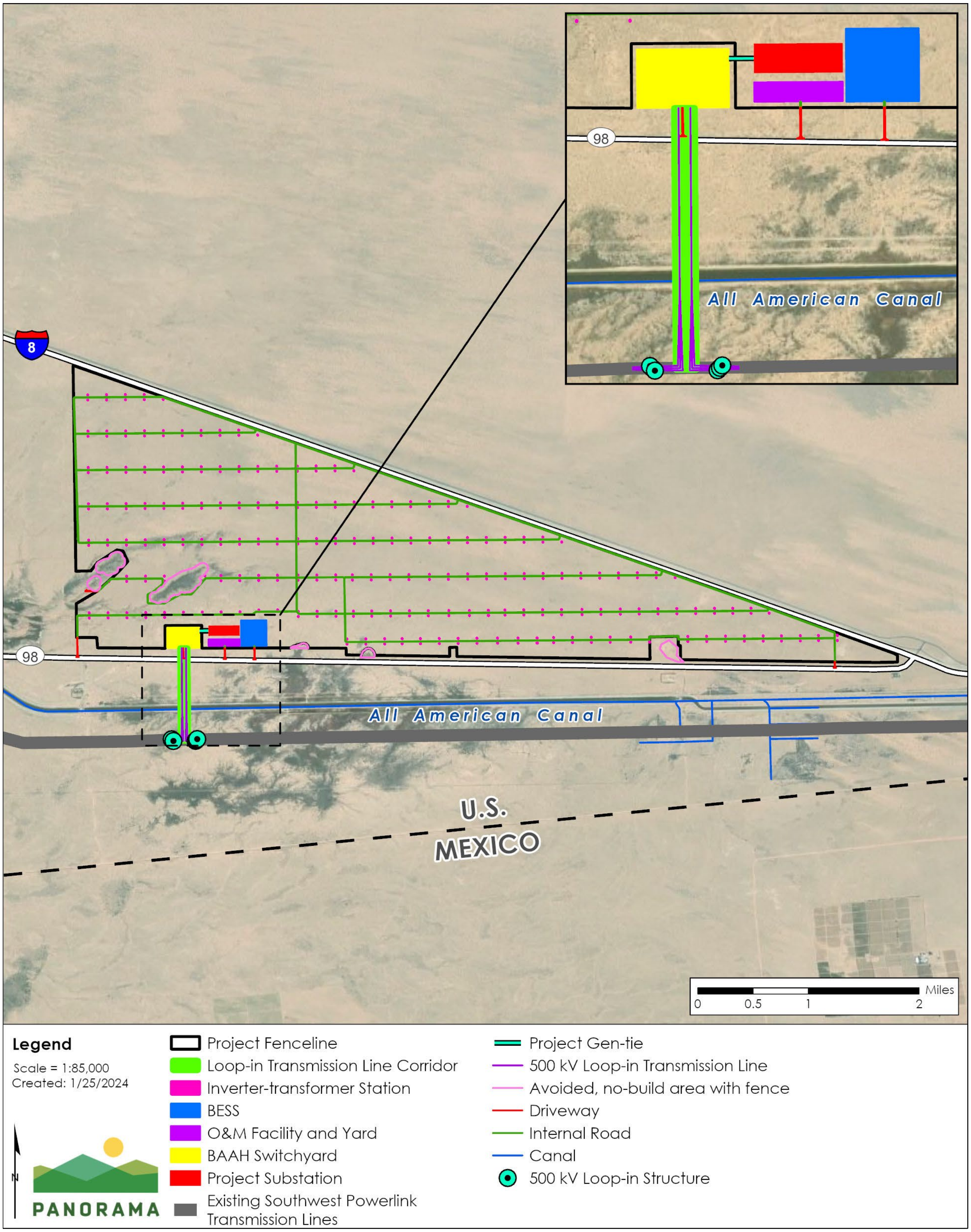
Project Site Layout

The Project site layout options, including the solar PV facility, BESS, substation, and transmission facilities are shown in Figure 2.3-1 and Figure 2.3-2. The Project would be outside the CalTrans ROW at I-8 and would be located north of the SR 98 ROW. New access roads and driveways would require an encroachment permit from CalTrans for connection to SR 98. The Project would also require an encroachment permit from IID for the crossing of the All-American Canal. Figures Section 4.14 Visual Resources will depict full-page color photographic reproduction depicting the visual appearance of the site prior to construction and a full-page color simulation of the Project site after construction.

Table 2.3-1 Estimated Development Area for the Solar Site Permanent Components

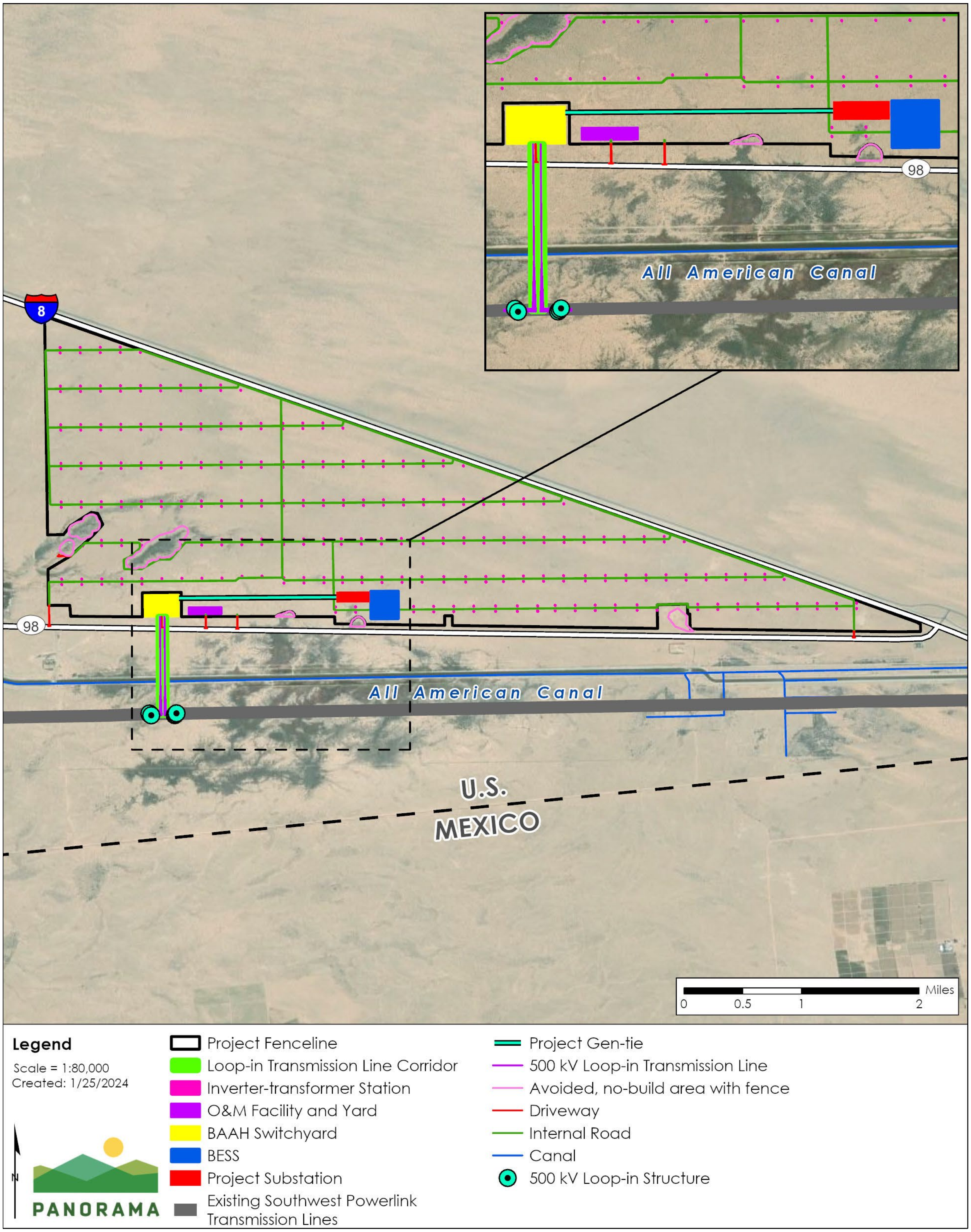
Project site component(s)	Approximate acreage
Fenced solar PV facility with arrays, inverters, transformers, and internal access roads	5,985
BESS	35
Operation and maintenance yard and facility	10
Temporary parking and laydown areas	≤25 acres

Figure 2.3-1 Project Layout Option 1



Source: (Intersect Power 2023a)

Figure 2.3-2 Project Layout Option 2



Source: (Intersect Power 2023a)

Solar Arrays

The solar facility would include approximately 3,100,000 solar panels; the precise panel count would depend on the technology ultimately selected at the time of procurement and efficiency of the technology at the time. 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 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.

Either mono-facial or bi-facial modules could 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 either be 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. Refer to Figure 2.3-3 for an elevation of an example solar PV technology that may be selected. Refer to Figure 2.3-4 for a visual representation of an example solar PV technology.

The PV panels would be manufactured at an off-site location and transported to the Project site. Panels would be arranged on the site in solar arrays. For single-axis tracking systems, the length of each row of panels would be approximately 350 feet along the north–south axis. For fixed-tilt systems, a row would consist of multiple tables four panels high by 10 panels wide (contingent on final design), each table being approximately 65 feet along the east–west axis, with 1-foot spacing between each table. Spacing between each row would be a minimum of 4 feet. Electricity would be generated directly from sunlight by the solar arrays and collected to the Project substation.

Structures supporting the PV panels would consist of steel piles (e.g., 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 typically would 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. 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.

Figure 2.3-3 Elevation of Solar PV Example Technology

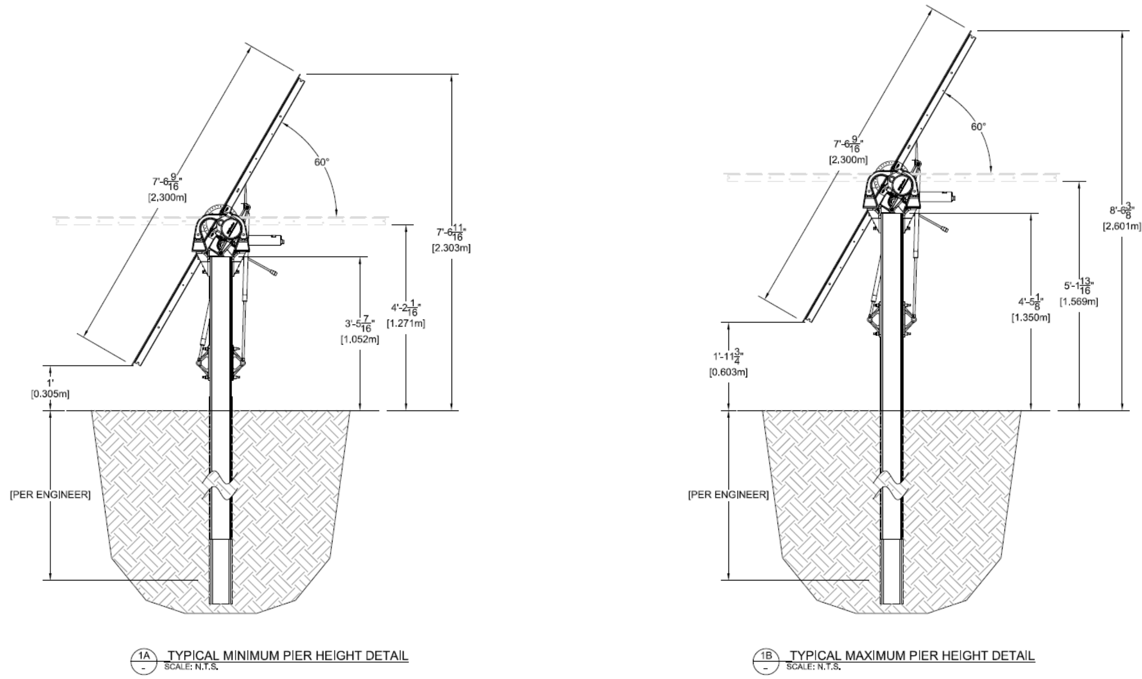


Figure 2.3-4 Visual Representation of Solar PV Example Technology

Inverters, Transformers, and Electrical Collection System

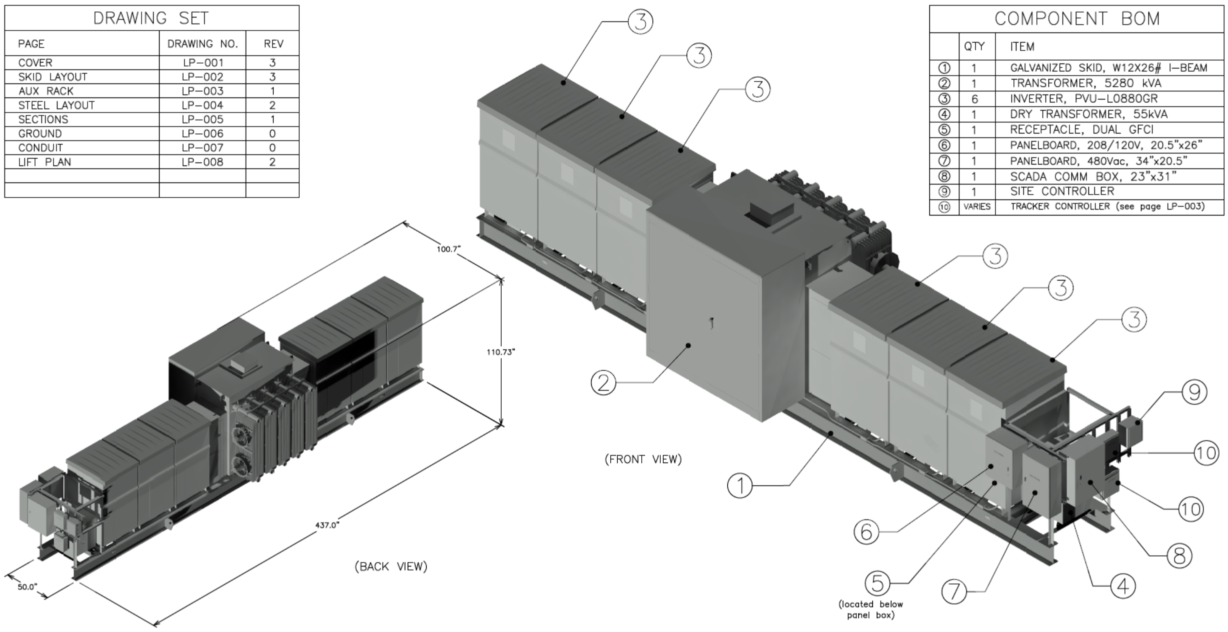
The Project would be designed and laid out primarily in sub-arrays of installed rows of panels, ranging in capacity from 4 to 7 MW. Non-conforming module blocks would be designed and sized as appropriate to accommodate the irregular shape of the Project site where necessary to avoid identified sensitive environmental resources.

Each 4 to 7 MW solar array would include a direct current (DC) to AC inverter and medium voltage transformer equipment area (i.e., inverter-transformer station) measuring 40 feet by 25 feet and approximately 10 feet tall, constructed on a concrete pad or steel skid and centrally located within the PV arrays (refer to Figure 2.3-5). The color of the inverter equipment would be light colored or neutral, depending on thermal requirements and availability from the manufacturer. Each inverter-transformer station would contain up to six inverters, a transformer, a battery enclosure, and a switchboard 8 to 11 feet high. The battery would provide an uninterruptible power supply as emergency back-up power for the inverter-transformer station. Each pad would have a security camera at the top of an approximately 20-foot-tall wood or metal pole. If required based on site meteorological conditions, an inverter shade structure would be installed at each pad. The shade structures, if needed, would consist of wood or metal supports and a durable outdoor material shade structure (metal, vinyl, or similar). The shade structure would extend up to 10 feet above the ground surface.

PV panels would be electrically connected into panel strings using wiring secured to the panel racking system. Cables would be installed to convey the DC electricity from the panels via combiner boxes or combiner harnesses with a trunk bus system located throughout the solar arrays to inverters to convert the DC to AC electricity. The output voltage of the inverters would be stepped up to the collection system voltage via transformers located near the inverters. The 34.5 kV collection cables would be either buried underground or installed overhead on wood poles. An underground 34.5 kV line would likely be buried in a trench 4 feet below grade but could go as deep as 6 feet and include horizontal drilling to avoid environmental resources and constraints. Thermal specifications require 10 feet of spacing between the medium voltage lines. In some locations closer to the step-up substation, more than 20 medium voltage AC lines may run in parallel.

In locations where the collection system crosses a road or pipeline overhead, wood poles spaced at intervals between 150 to 250 feet would be installed across the Project site. The typical height of the poles would be approximately 60 to 100 feet, with an embedment depth of 10 to 15 feet depending on the type of crossing, and diameters varying from 12 to 20 inches. Due to potential for operations and maintenance challenges, as well as for security purposes, the intent is to install the 34.5 kV collection lines underground; however, overhead installation could be used in the event sensitive resources need to be avoided.

Figure 2.3-5 Inverters, Transformers and Electrical Collection System



Battery Energy Storage System

The Project would include a BESS capable of storing 1,150 MW of electricity for up to 4 hours and would be housed in electrical enclosures and buried electrical conduit. The BESS would be located near one of the two optional sites shown in Figure 2.3-1 and Figure 2.3-2.

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, LFP (lithium iron phosphate), NMC (nickel manganese cobalt), or NCA (nickel cobalt aluminum) batteries. Color treatment of the BESS enclosures would be RAL 9016 Traffic White.

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) during the final design process and would be reviewed/approved by the local or State Fire Marshal.

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 relevant fire authorities.

Figure 2.3-6 Battery Energy Storage System Example Technology

Operation and Maintenance Facilities

Operation and maintenance facilities would be constructed on the Project site. The O&M facility would cover an area of approximately 10 acres and include the following components: two O&M 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 O&M office building will have a septic system and will be constructed on a concrete foundation. The coloring of the operation and maintenance building would be tan, grey, or another neutral color. Energy would be supplied to the operation and maintenance building from the existing IID distribution lines south of the Project site. Standard medium voltage 12kV electrical poles would be installed to support the connection. The O&M facilities are shown on the site plan in Appendix F and a typical O&M facility is shown in Figure 2.3-7.

Figure 2.3-7 Operation and Maintenance Facilities

Monitoring and Telecommunications Facilities

The Project would be designed with a comprehensive *supervisory control and data acquisition* (SCADA) system to allow remote monitoring of facility operation and/or remote control of critical components. The fiber optic or other cabling required for the monitoring system typically would be installed in buried conduit within the access roads or planned trenching, leading to a SCADA system cabinet at the Project substation or a series of appropriately located SCADA system cabinets constructed within the operation and maintenance building. External telecommunications connections to the SCADA system cabinets could be provided through wireless or hard-wired connections to locally available commercial service providers. The Project's SCADA system would interconnect to the fiber optic network at the BAAH switchyard (described in Section 2.4), and no additional disturbance associated with telecommunications is anticipated.

Permanent Meteorological Data Collection System

The Project would include a meteorological data collection system (met system), such as a Soil Climate Analysis Network (SCAN) station or other applicable technology, for the life of the Project. Each met station (up to three) would be approximately 10 feet tall and have multiple weather sensors: a pyranometer for measuring solar irradiance, a thermometer to measure air temperature, a barometric pressure sensor, and wind sensors to measure speed and direction. The 4-foot horizontal cross-arm of each met station would include the pyranometer mounted on the left-hand side and the two wind sensors installed on a vertical mast to the right. The temperature sensor would be mounted inside the solar shield behind the main mast. Each sensor would be connected by cable to a data logger inside the enclosure. The met stations are preassembled units that are brought on and positioned on the Project site.

Solar Facility Access Driveways and Roads

The Project's roadway system would include a perimeter road, access roads and driveways from SR 98, and internal roads. Up to five access roads and driveways from SR 98 would be constructed for access to the Project site. The access roads and driveways would be 24 feet wide (20 feet wide with a 2-foot shoulder on each side) and constructed to achieve facility maintenance requirements and Imperial County standards. The access roads and driveways would be surfaced with gravel, compacted soil, or another commercially available surface, depending upon site conditions and constraints. Shoulders would be of the same material albeit less compacted and would allow vehicles to pass one another.

A 20-foot-wide perimeter road (16 feet wide with 2-foot-wide shoulders on each side) would be built on the inside of the fence. A network of regularly spaced 20-foot-wide internal roads would be installed connecting to the perimeter road. Roads would be surfaced with compacted soil or another commercially available surface acceptable to regulatory agencies and would provide a fire buffer, accommodate Project operation and maintenance activities such as cleaning of solar panels, and facilitate on-site circulation for emergency vehicles. If aggregate or gravel is used for road surfaces, such as to reduce dust or for low water crossings, portions of road lengths may remain free of gravel in strategic locations in order to facilitate wildlife movement. In addition, wildlife passage culverts may be placed at key locations along Project roads to allow wildlife to avoid the road.

Site Security, Fencing, and Lighting

Controlled Access
Ingress/egress locations would be accessed via locked gates along the Project fenceline located at up to five points connecting to SR 98. The exact locations of the access points would be determined in coordination with CalTrans and based on resource survey results. The Project site would not be accessed from I-8.

Fencing
The Project site would be enclosed with fencing that meets National Electric and Safety Code (NESC) requirements for protective arrangements in electric supply stations. The boundary of the Project site would be secured by up to 6-foot-high chain-link perimeter fences topped with 1 foot of three-strand barbed wire or other fencing as dictated by BLM and/or North American Electric Reliability Corporation (NERC) specifications. The fence would typically be installed approximately 100 feet from the edge of the solar arrays.

Lighting
Motion sensitive, directional security lights would be installed to provide adequate illumination around the Project substation and BAAH switchyard areas, each inverter-transformer station, at gates, and along perimeter fencing. All lighting would be shielded and directed downward to minimize the potential for glare or spillover onto adjacent properties. Security lights would use motion sensor technology that would be triggered by movement at a human's height. Once activity has ceased, the motion sensors would be set to turn off lighting within 10 minutes.

All structures would be below the 200-foot height standard that triggers Federal Aviation Administration Part 77 Obstruction Evaluation Consultation, so no aviation lighting on power poles or other facilities is required.

Security Monitoring
Nighttime activities are anticipated to be minimal during Project operations and would be limited to occasional operational and maintenance activities at the Project substation, BAAH switchyard, and BESS as well as for panel repair required during de-energization. Additionally, off-site security personnel could be dispatched during nighttime hours or could be on site, depending on security risks, emergency maintenance requirements, and operating needs. Infrared security cameras, motion detectors, and/or other similar technology would be installed to allow for monitoring of the site through review of live footage 24 hours per day, 7 days per week. Such cameras or other equipment would be placed along the perimeter of the facility and/or at the inverters. Security cameras located at the inverters would be posted on poles approximately 20 feet high.

Water Supply Wells

Water supply for the Project would come from a combination of up to four new on-site groundwater wells and/or would be trucked in from off-site. The new on-site groundwater wells would be installed near I-8 in the northern portion of the Project site. Each proposed groundwater well for the site would include a robust well casing, a screened or perforated pipe for water flow, and a pump system, with the wellhead positioned at ground level for accessibility and a meter to track usage. Power for the well would either be generated by on-site generators or a temporary service line dropped by the local utility. The well's depth would be determined through a hydrogeological study, ensuring reliable access to groundwater. However, it is possible for the depth to vary based unforeseen subsurface conditions. Permission to drill the wells is sought as part of the opt-in application to the CEC in lieu of local permits.

Septic System

A septic system would be installed for restrooms to be used by O&M facility staff. If the septic system is not self-contained, an associated leach field would be required. The septic system and leach field would be permitted by the CEC in lieu of local permits and would not be located within 0.25 mile of any drinking water well. For a 750-gallon septic facility, the leach field would consist of two compartments, each 20 feet long, 2 feet high, and 4 feet wide, with 10 feet of separation between the compartments. The precise design of the septic system would be determined based on final Project design. The Applicant would engage a California state-licensed engineering or geologic staff to prepare a septic design study evaluating site suitability and constraints and providing recommendations for septic design consistent with applicable codes and standards and suitable to site conditions.

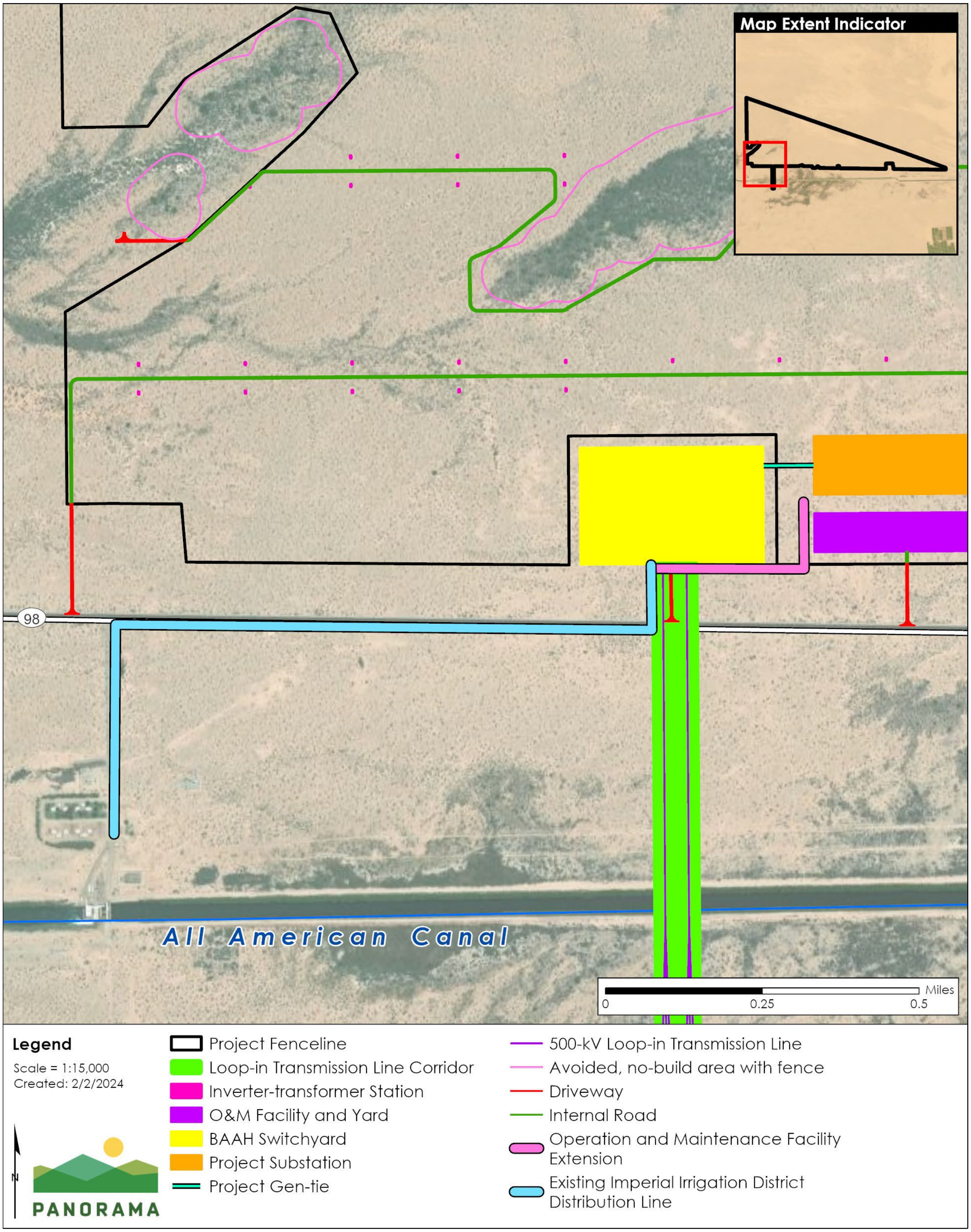
Emergency and Auxiliary Systems

A backup diesel generator would be used for the control room of the SCADA system and Project substation controls in the event of a power outage. Under normal operating conditions, the SCADA system and Project substation controls would rely on electricity supplied from an existing IID distribution line.

Distribution Line

The Project would tap into the existing IID 12 kV distribution line. Poles would be standard medium voltage poles and would run from the existing line which parallels SR 98 to the substation area. The IID distribution line would traverse the utility corridor just south of the Project site and connect into the substation, see Figure 2.3-8.

Figure 2.3-8 IID Distribution Line and Interconnection Route



Source: (Intersect Power 2023a)

2.3.3 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, substation, and BAAH foundations. Best management practices (BMPs), Project Design Features, and DRECP Conservation and Management Actions (CMAs) (refer to Appendix D.1 and D.2) 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 2.3-2). Where excavation is required, most construction activities, including excavation for the PV arrays, transformer pads, and O&M 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, loop-in transmission line structures, substation piers, and switchyard structures 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 Application Area 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 2.3-2 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

Note:

[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, BAAH switchyard, 500kV loop-in transmission lines, 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, once approved by the State Water Resources Control Board and a BLM hydrologist, 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).[3]

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 Application Area 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.

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.[4] 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.

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[3] 30 roundtrips assumes that all water supply would come from a(n) offsite source(s).

[4] 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.

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 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.

2.3.4 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 and up to 2 for each the BAAH switchyard and loop-in transmission line 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 would be prepared and would provide 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[5] 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

[5] 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 area 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).[6] Limited water would also be used for the operation and maintenance facility staff, including restrooms.

Groundwater usage would be monitored as described above.

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[6]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 Application Area, 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.

Operational 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 O&M 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, see Figure 2.3-8.

2.4 Transmission System and Lines Description, Design, and Operation

2.4.1 Transmission System Description

Components

The transmission system would include the following components:

- Project substation
- Project gen-tie lines
- BAAH switchyard
- 500 kV loop-in transmission lines

Table 2.4-1 lists the acreages associated with each Project component for the transmission system and lines.

Table 2.4-1 Estimated Development Area for the Transmission System Permanent Components

Proposed component	Approximate acreage
Project substation	20
Project gen-tie lines	≤5
BAAH switchyard	40
500 kV loop-in transmission lines [a]	≤35

Note:

[a] Construction would occur within the 500 kV loop-in transmission line corridors and would be limited to the area needed for the transmission structures, access roads, and tensioning sites.

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.

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 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, IID, 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 complete.

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 of 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. A spur road off the new access road would be constructed to access each of the 500 kV loop-in transmission line support structure sites.

Project Substation

One 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 substation or at an optional location on the private land parcels, see Figure 2.3-1 and Figure 2.3-2.

The internal arrangement of the Project substation would include the following:

- Power and auxiliary transformers with foundations
- Prefabricated control buildings to enclose the protection and control equipment, including relays and low voltage switchgear (each building is approximately 20 feet by 40 feet, and 10 to 20 feet high
- Metering stand
- Capacity bank(s)
- Circuit breakers and disconnect switches
- One microwave tower adjacent the control building comprising a monopole structure up to 100 feet in height mounted with an antenna up to 5 feet in diameter
- Dead-end structure(s) up to 199 feet in height to connect the BAAH switchyard to the loop-in transmission lines
- Control building(s)

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 Project substation equipment would either be galvanized steel (non-painted) or painted American National Standards Institute (ANSI) 61 gray. 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. A typical substation is shown in Figure 2.4-1 with a BESS and PV panels in the background. The substation is shown on the site plan in Appendix F.

Figure 2.4-1 Substation Example

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 to the BAAH switchyard. The utility switchyard would utilize high-voltage circuit breakers, switches, and series capacitor line compensation equipment in a BAAH configuration and would be designed and constructed in alignment with the interconnecting utility's standards.

Structural components in the switchyard area would include:

- One free-standing digital microwave antenna (radio tower) up to 199 feet tall to support SCADA communication between the switchyard and the off-site SDG&E Operations Center

- Series capacitor banks (sizing to be determined by utility requirements)
- Ten 500 kV steel A-frame dead-end poles up to 199 feet in height with foundations up to 20 feet deep or more
- Ten 500 kV steel H-frame dead-ends poles up to 199 feet in height with foundations up to 20 feet deep or more
- Busbar (a conducting bar that carries heavy currents to supply several electric circuits)
- Control Shelter(s) approximately 150 feet by 40 feet by 12 feet tall for SDG&E's substation control and protection equipment; MPAC building would be installed on a concrete foundation
- Switchyard battery enclosure area(s) approximately 40 feet by 20 feet by 12 feet tall
- Five 500 kV circuit breakers and air disconnect switches
- On-site stormwater retention pond (approximately 1,000 feet by 100 feet) for temporary runoff storage during rainfall events, if needed
- Chain-link or similar security fencing up to 8 feet tall and two separate access gates plus one personnel gate

The BAAH switchyard equipment would be either galvanized steel (non-painted) or painted ANSI 61 gray. The BAAH switchyard that connects to the 500 kV loop-in transmission lines would ultimately be owned and operated by SDG&E.

2.4.2 Transmission Line Design Considerations

Engineering constraints considered for the BAAH switchyard and 500 kV loop-in transmission line placement include the crossing of the All-American Canal and existing transmission lines in the area. The loop-in transmission line construction will follow the BOR *Engineering and O&M Guidelines for Crossings* for the All-American Canal. Consideration was also given to the existing radio tower located southwest of the Project site near the All-American Canal. The loop-in transmission lines were sited to avoid this radio tower. The loop-in transmission corridors were also sited to avoid existing riparian vegetation located around the All-American Canal in order to reduce vegetation disturbance and avoid impacts to biological resources. The loop-in transmission line corridors also avoid the BLM Area of Critical Environmental Concern located southwest of All-American Canal in this area.

2.4.3 Transmission Line Need and Capacity

Project Components

The Project site was selected based on a constraints analysis (see Section 2.3.1) and does not contain any existing high voltage infrastructure. In order for the Project to be feasible, transmission lines and a new breaker-and-a-half switchyard must be constructed to interconnect the Project in order for the energy generated by the project to be transmitted onto the state-wide electricity grid.

The Project substation is required for operation of the Project as it converts the 34.5 kV power generated from Project PV panels and transmitted via the Project collection system to the 500 kV power at the point of interconnection.

The 500 kV loop-in transmission lines, BAAH switchyard, gen-tie lines, and Project substation work together to facilitate transfer of electric power generated at the Project to the utility grid for consumption and offtake.

BAAH Switchyard and Loop-In transmission lines

The 500 kV loop-in transmission line interconnection was chosen to maximize the power transfer available to the Project and to allow for interconnection to the adjacent SWPL transmission line. Additionally, to interconnect to the SDG&E 500 kV transmission network, the existing SWPL 500 kV line requires construction of a new BAAH switchyard. The creation of the new BAAH switchyard is necessary to maintain the reliability, control, and operability of the SDG&E 500 kV transmission network. The BAAH switchyard also would facilitate future transmission and potential clean energy (solar and geothermal) buildout and interconnection in this area.

The proposed electric transmission facilities have been routed and planned such that the facilities represent the shortest-length option while minimizing impacts on biological resources. The proposed transmission facilities also minimize the cost to the project, material requirements, land use impacts, and design complexity.

System Impact Study

The Project will interconnect to SDG&E's transmission system within the California Independent System Operator (CAISO) system. CAISO identified four potential Affected Systems from the Queue Cluster (QC14) Phase I Interconnection Study: Salt River Project (SRP), Arizona Public Service (APS), El Centro Nacional de Control de Energía (CENACE), and Imperial Irrigation District (IID).

The Applicant contacted all four potential affected systems in August 2023. APS confirmed no impact. SRP has completed its initial study determining the Project's contribution to SRP's required system upgrades. The Applicant is engaged in discussions on next steps, which will ultimately include executing a funding agreement. CENACE and IID both indicated that they require Phase II Interconnection study results, which the Applicant has provided upon receipt in January 2024, to determine next steps. The Applicant is awaiting their feedback following review of the Phase II results.

The SWPL is co-owned by IID (in partnership with SDG&E), and the Applicant has submitted an interconnection filing with them separately, to be formally studied as an Affected System. The Applicant continues to be in close communication with IID regarding the Project.

The Project received its Phase II Interconnection Study results in January 2024 and Applicant is in the process of reviewing the results.

2.4.4 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 2.4-2.

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.

Table 2.4-2 Transmission System 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
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

Note:

[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.

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.

2.4.5 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 although they may be used for emergency maintenance or repair activities associated with the loop-in line.

Drones may be used to perform annual thermal and visual inspections of the gen-tie line, 500kV loop-in transmission lines, 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 and 500kV loop-in transmission 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.

SDG&E would operate and maintain the BAAH switchyard and loop-in transmission line using the same methods it currently uses to maintain the existing SWPL transmission line, including drone and helicopter use as described above for the gen-tie line. An average of up to two full-time workers would be involved in BAAH switchyard operations and an average of up to two full-time workers would be involved in operation of the 500 kV loop-in transmission line.

2.5 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, appurtenant facilities, and 500 kV loop-in transmission lines 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, BAAH switchyard, O&M 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
- Dismantling of 500 kV loop-in transmission lines
- Scarification of compacted areas
- Restoration of Project disturbance areas

The panels could be sold into a secondary PV panel market for recycling or reuse, including recycling up to 95 percent of the semiconductor material and reusing 90 percent of the glass. It is expected that a robust market for used PV panels will exist in the future because the panels can be used in various configurations and at various scales. Electricity demand is expected to continue to rise, and electricity prices are projected to continue their steady increase. Demand for solar energy is rapidly accelerating and is expected to grow for decades to come.

The module's component materials are free from toxic metals including mercury and lead, and the majority of the components of the solar installation are made of materials that can be readily recycled. If modules containing Cadmium Telluride (Cad-Tel) are ultimately used, they will be recycled in accordance with the manufacturer's recycling program. If the panels can no longer be used in a solar array, the silicon can be recovered, the aluminum resold, and the glass recycled. Other components of the solar installation, such as the tracker structures and mechanical assemblies, could be recycled as they are made from galvanized steel. Equipment such as drive controllers, inverters, transformers, and switchgear could be either reused or their components recycled. The equipment pads, which would be made from concrete, could be crushed and recycled. Underground conduit and wire could be removed by uncovering trenches and backfilling when done. The electrical wiring would be made from copper and/or aluminum and could be reused or recycled, as well. The BESS components, including batteries, would be shipped to a universal waste handler or authorized recycling facility as described in the decommissioning protocol provided by the batteries' original equipment manufacturer.

2.6 Efficiency

The annual net electrical energy produced for each mode of operation, including starts and shutdowns would be approximately 3,530,000 MWh. The number of hours the Project would be operated in each design condition each year would be the following:

- Solar: 4,200 operational hours, annually
- BESS:
  - Charge: 1,570 hours annually
  - Discharge: 1,460 hours annually

The single-axis trackers used for the Project would track the path of the sun throughout daytime hours (approximately 4,200 hours per year) from east to west without deviation (known as "true tracking") unless the tracker controllers specify a stow command for the tracker rows. Because the electrical configuration of the solar modules reduce the susceptibility of the PV panels to shading losses when shadows are along the length of the panel, this mode of tracking would typically lead to higher yields than the "back tracking" approach, sometimes utilized in other PV solar power generating facilities, whereby the modules deviate from a perpendicular angle with the sun's position in order to avoid shadows along the length of the panel from the adjacent tracker row.

Once the specific type of single-axis tracker is selected and high resolution on site meteorological measurements are taken, the specifics of the tracker operation can be better understood as it pertains to proportion of time spent in other tracking modes such as wind stow and diffuse light capture stow (both of which would result in the tracker rotating to an angle such that the panels are parallel to the ground). It is expected, however, that the proportion of time spent in these tracking modes would be minimal relative to the time spent in the default true tracking mode.

2.7 Reliability

The anticipated availability of the BAAH switchyard, loop-in transmission lines, the Project gen-tie line, and Project substation should approach 99 percent, with the exception of maintenance outages and planned outages. An annual availability factor of 99 percent is anticipated. A lifetime capacity factor of 20 percent to 40 percent is anticipated. See Section 3.4 for more details.

The types of solar power generating equipment that would be used for the Project have a proven track record of reliability based on multiple approved and existing power plants across America that rely on the same technology, which have already been permitted, financed, and installed.

2.8 Plans, Best Management Practices, Project Design Features, and Conservation and Management Actions

In conjunction with this AFC, the Applicant submitted a right-of-way (ROW) application to the BLM. The SF-299 application for the ROW grant was originally submitted on December 1, 2020, and revised applications have been subsequently submitted. The latest application, amended to incorporate the BOR and private lands, was submitted to the BLM in November 2023. The Applicant also submitted an application to the BOR for the 500kV transmission line crossing on April 21, 2023. This application was deemed complete by BOR on May 10, 2023. An amended application, incorporating BOR lands into the solar facility, was submitted to BOR on December 5, 2023. Since the original filings, the Applicant has continued coordination efforts with the BLM, BOR, Imperial County, IID, and other stakeholders, including the pre-application meeting held with the BLM, BOR, responsible agencies, and other stakeholders on August 30, 2023.

The Applicant has prepared multiple construction and operation plans as required by the BLM. The completed plans are included as appendices to this opt-in application, as called out in each of the resource sections. Some plans and technical studies, listed in Table 2.8-1, below, are currently in preparation and will be prepared to support Project permitting, construction, operation and maintenance, and decommissioning activities. These plans will be submitted as a supplement to the opt-in application when they are available.

The Applicant has drafted best management practices (BMPs) and project design features (PDFs) that would be included as part of the Project. The full text of the BMPs and PDFs are provided in Appendix D.1.

Consistent with the DRECP, CMAs would be applied to the Project in order to develop within the DFA. The full text of the DRECP CMAs is provided in Appendix D.2.

Table 2.8-1 Construction and Operation Plans Preparation and Timing

Mitigation plan	Timing of preparation
Fire Management and Prevention Plan	Prepared
Flight Operations Plan	First quarter, 2024
Fugitive Dust Control Plan	Prepared
Hazardous Materials Management & Oil Spill Response Plan	Prepared
Health, Safety and Noise Plan	Prepared
Operations and Maintenance Plan	Prepared
Bird and Bat Conservation Strategy	Prepared
Decommissioning & Revegetation Plan	Prepared
Nesting Bird Management Plan	Prepared
Raven Management Plan	Prepared
Restoration & Integrated Weed Management Plan	Prepared
Security and Emergency Preparedness Plan	Prepared
Wildlife Protection and Translocation Plan	Prepared
Cultural Resources Monitoring & Discovery Plan	Fourth quarter, 2024
Paleontological Resources Monitoring & Mitigation Plan	Fourth quarter, 2024
Tribal Participation Plan for Monitoring	Fourth quarter, 2024
Groundwater Monitoring, Reporting, and Mitigation Plan	2025
Surface Treatment Plan	2025
Night Lighting Plan	2025
Emergency Response Plan (per SB 38)	Prior to operations

2.9 Project Compliance with Laws, Ordinances, Regulations and Standards

The Project would comply with laws, ordinances, regulations, and standards (LORS), as indicated. Additional information on conformance to LORS applicable to the Project is provided in the associated resource analysis sections, Section 4.1 through Section 4.18 of this Opt-in Application.

2.10 Agencies and Agency Contacts

Appendix E provides a list of agencies and agency contacts as appropriate for the Project.

2.11 Permit and Permit Schedule

Appendix F provides a table with the appropriate permits and permit schedules for the Project. The Streambed Alteration Agreement application and Waste Discharge Requirement application are discussed in Section 4.2, Biological Resources, and included as appendices.

3 Engineering

3.1 Overview

3.1.1 Summary of Site Conditions

This section summarizes the Project site conditions based on information detailed in Section 4.4: Geologic Hazards and Resources, Section 4.11, Soils, and Section 4.15, Water Resources.

Numerous active faults are present in the region surrounding the Project Application Area, although the Project Application Area is not intersected by any active faults. Due to the faulting in the area, the Project Application Area should be considered likely to experience strong seismic groundshaking within the lifespan of the Project. Seismically-induced landslides and landslides in general are not considered a primary concern at the site due to low relief and generally subtle topography. Liquefaction has a potential to occur, pending additional data collection regarding the soils underlying the Project Applicant Area. The majority of the Project Application Area is classified as low potential for expansive soils to occur with a very small portion classified as moderate potential. Refer to Section 4.4: Geologic Hazards and Resources and Section 4.11: Soils for additional information regarding geological hazards and soils, respectively.

A Project-specific preliminary geotechnical engineering report has been completed on private lands included in the Project site to gather information on the physical properties of the soil and rock for incorporation into the design of the facility. A second preliminary geotechnical engineering report will be completed in Spring 2024 on public lands, upon BLM authorization. Additional geotechnical testing would be completed if the Project were approved for final engineering. Geotechnical testing and analysis includes survey work, geotechnical borings, soil sampling, use of ground-penetrating radar, and prototype pile testing along existing disturbed routes within the Project site. As discussed in Section 4.4: Geologic Hazards and Resources, Project construction would adhere to the specifications, procedures, and site conditions contained in the geotechnical report and final design plans, which would be fully compliant with the seismic recommendations provided by the California-registered professional engineer in accordance with California Building Code (CBC) requirements. Potentially unstable soils present at the Project site would be addressed during Project construction in compliance with CBC requirements such that Project components would not operate on unstable soils.

A 2-D hydraulic study was conducted for the Project site in 2021 and updated in 2024 (refer to Appendix G). The study determined that the Project site has a generally low maximum floodplain inundation depth of 1 foot or less, with velocity of 1 foot per second or less. The

Project site has a low flood risk, which is consistent with the hydrologic characteristics of the area given the dry and mostly flat topography of the Project site (WRMA Engineering 2021). Due to the low flood risk and small footprint, installation of individuals piles for the solar panels and overhead electrical lines would not substantially impede or redirect flood flows.

The Project site is in Imperial County, near the U.S. border with Mexico, where the climate is hot and arid, with long, dry summers, and cool winters, with some rain. Temperatures in summer can be extreme, with an average high of 107 degrees Fahrenheit in July and an average annual temperature of 74 degrees Fahrenheit. Section 4.15: Water Resources provides a detailed description of the meteorological and climate conditions of the Project site.

3.1.2 Site Improvement Measures

Potential risks from adverse site conditions to the Project solar site would be addressed through engineering. Adverse site conditions could include ground shaking from seismic activity, arc hazards, or corrosive soils. Project construction would adhere to the requirements and specifications contained in the geotechnical report and final design plans, which would be fully compliant with the seismic recommendations provided by a California-registered professional engineer in accordance with the CBC requirements. Grounding wires would be installed where needed along the Project gen-tie and 500 kV loop-in transmission lines. A ground grid composed of copper wire would be installed at the substation. Depending upon the results of the geotechnical report, if cathodic protection is recommended due to the presence of corrosive soils, a sacrificial anode type cathodic protection system would be provided. Galvanized metal posts and epoxy-coated rebar may be utilized in lieu of cathodic protection if supported by soil conditions.

3.2 Solar Facility Design

3.2.1 Solar Facility Description

Chapter 2: Project Description, Section 2.3.2: Solar Facility Description, provides a description of the solar power generating facility and associated infrastructure, including the BESS. Heat dissipation systems, cooling systems, atmospheric emission control systems, waste disposal systems, noise emission abatement systems, or geothermal resource conveyance, and re-injection lines are not applicable to the Project solar site or associated infrastructure.

Some components of the solar facility require thermal management for safety and functionality of the equipment. For example, each battery cabinet is anticipated to include an integrated thermal management system that provides active cooling and heating for the internal components. The thermal system would include radiators and pumps that circulate liquid coolant through the battery as well as an in-line heater that can warm the coolant. Shade structures may be needed for the inverter-transformer stations to minimize direct sun and extreme heat. The O&M building would also be expected to require air conditioning. No external heating, ventilation, air conditioning or thermal system would be required.

All transformers would have concrete oil containment. Oil containment would be designed to catch and hold oil from transformers in the event a leak develops or transformer failure. Containment would be designed to prevent transformer oil from entering soil or stormwater runoff.

Construction and operational wastes and proposed disposal are included in Chapter 2: Project Description, Section 2.3.3: Solar Facility Construction and Section 2.3.4: Solar Facility Operation and Maintenance. Noise generated by on-site equipment and facilities is discussed in Section 4.7: Noise.

3.2.2 Solar Facility Foundation Design

Solar panels would be installed directly on steel piles (i.e., cylindrical pipes, H-beams, helical screws, or similar) and would not have a foundation. Each solar array would include an inverter-transformer station constructed on a concrete pad or steel skid centrally located within the surrounding solar PV arrays.

For the BESS, battery packs would be installed on a level foundation base strong enough to support the weight of the equipment in accordance with the manufacturer's design requirements. Foundation types would include, but are not limited to, concrete pads or steel piles.

Foundation and structural design would take into consideration all seismic and soil conditions for the Project-specific location and Project-site-specific geotechnical characteristics.

3.3 Transmission System Design

3.3.1 Transmission System Description

Chapter 2: Project Description, Section 2.4.1: Transmission System Description provides a description of associated Project substation, Project gen-tie lines, BAAH switchyard, and 500 kV loop-in transmission lines.

3.3.2 Transmission System Foundation Design

Foundation designs for the Project substation, BAAH switchyard, and Project gen-tie and 500 kV loop-in transmission line dead-end structures would likely consist of drilled piers, concrete slabs, pedestals with footers, and/or directly embedded poles. Foundations for the substation and BAAH switchyard would likely be formed with plywood and reinforced with structural rebar depending upon the foundation type selected in final design. Loading and design assumptions for foundations would be consistent with industry standards and County, State, and federal design codes. Each of the dead-end structures within the fenced Project substation and BAAH switchyard would require foundations excavated to a depth of 20 feet or more.

3.3.3 Need and Junction Points

The Project would interconnect into and bisect the existing SDG&E SWPL 500 kV transmission network. To interconnect to the SDG&E 500 kV transmission network, new 500 kV loop-in transmission lines and a new BAAH switchyard would be constructed. The 500 kV loop-in transmission lines must be constructed to interconnect the Project to the utility grid to allow for transmission of the energy generated by the Project to the wholesale electrical grid. The 500 kV loop-in transmission line interconnection was chosen to maximize the power transfer available to the Project and to allow for interconnection to the adjacent SWPL 500 kV transmission line. The creation of the new BAAH switchyard is necessary to maintain the reliability, control, and operability of the SDG&E 500 kV transmission network. The BAAH switchyard and 500 kV loop-in transmission line engineering would be coordinated with SDG&E and meet all the California Public Utilities Commission (CPUC) requirements. The BAAH switchyard may also facilitate future transmission and clean energy development (solar and geothermal) and interconnection in this area.

3.3.4 Transmission Requirements

The Project site was selected based on a constraints analysis (refer to Chapter 2: Project Description for more information) and does not contain any existing high voltage infrastructure. In order for the Project to be feasible, 500 kV loop-in transmission lines and BAAH switchyard must be constructed to interconnect the Project to the utility grid to transfer energy generated by the Project to the wholesale electrical grid.

3.3.5 Transmission System Safety and Nuisance

Overview on Electric and Magnetic Fields

Electric and magnetic fields are separate phenomena and occur both naturally and from human activity. Naturally occurring electric and magnetic fields are caused by the weather and the Earth's geomagnetic field. The fields caused by human activity result from technological application of the electromagnetic spectrum for uses such as communications, appliances, and the generation, transmission, and local distribution of electricity. The frequency of a power line is determined by the rate at which electric and magnetic fields change their direction each second. For power lines in the United States, the frequency of change is 60 times per second and is defined as 60 Hertz (Hz) power.

Alternating current overhead and underground electric transmission lines produce electric and magnetic fields (i.e., *electromagnetic fields*, or EMFs). Electric and magnetic fields caused by power lines are determined based on the line design, line loading, distance from the line, and other factors. Electric fields from power lines are created whenever the lines are energized, with the strength of the field dependent directly on the voltage of the line generating the field. Electric field strength is typically described in terms of kilovolts per meter (kV/m). Electric field strength attenuates (reduces) rapidly as the distance from the source increases. Electric fields are reduced in many locations because they are effectively shielded by most objects or materials such as trees or houses. Unlike magnetic fields, which penetrate almost everything and are unaffected by buildings, trees, and other obstacles, electric fields are distorted by any object that is within the electric field, including the human body.

Magnetic fields from power lines are created whenever current flows through power lines at any voltage. The strength of the field is directly dependent on the current in the line. Magnetic field strength is typically measured in milligauss (mG) or microtesla (μT). Similar to electric fields, magnetic field strength attenuates rapidly with distance from the source. However, unlike electric fields, magnetic fields are not easily shielded by objects or materials.

The localized electric field near an energized conductor can be sufficiently concentrated to produce a small electric discharge, which can ionize air close to the conductors. This effect is referred to as *corona*, and it is associated with all energized electric power lines but is especially common with high-voltage power lines. If the intensity of the electric field at the surface exceeds the insulating strength of the surrounding air, a corona discharge occurs in the form of heat and energy dissipation. Corona can produce small amounts of sound, radio and television reception interference, heat, and chemical reactions of air components.

The electric field gradient is greatest at the surface of the conductor. Large-diameter conductors have lower electric field gradients at the conductor surface and, hence, lower corona than smaller conductors, everything else being equal. Also, irregularities (such as nicks and scrapes on the conductor surface) or sharp edges on suspension hardware concentrate the electric field at these locations and, thus, increase corona at these spots. Similarly, corona increases with humid and inclement weather, elevated air pollution, and smoke from wildfires, which can result in an audible hum and crackling noise under these conditions (Parmar 2011).

Safety hazards caused by transmission lines such as shock hazards, electric arcs, and ground faults are analyzed in Section 4.17: Worker Safety. Audible noise from the corona effect generated by transmission lines is addressed in Section 4.7: Noise.

Electric and Magnetic Field Estimates

EMF levels from the Project gen-tie line or 500 kV loop-in transmission line are anticipated to be similar to or less than those of the existing SDG&E SWPL 500 kV transmission line to which the Project would interconnect as the amount of power flowing through the Project gen-tie line and 500 kV loop-in transmission line would be less than the ratings of the existing 500 kV transmission line. EMF generated by equipment at the Project substation and BAAH switchyard would also be less than the proposed gen-tie line or 500 kV loop-in transmission line outside the substation and switchyard fences due to the distance from energized equipment. SDG&E would be expected to incorporate “no cost” or “low cost” magnetic field reduction steps as is required for facilities requiring certification under General Order 131-D. However, as noted by the CPUC, “low cost” mitigation is not necessary in undeveloped land except in the case of permanently occupied residences, schools, or hospitals located on those lands. There would be no permanently occupied residences, schools, or hospitals near the 500 kV loop-in transmission lines or any other Project infrastructure.

At the edge of the 175-foot-wide corridor for each of the 500 kV loop-in transmission lines at 1 meter above ground level, the electric field is estimated to be 5.83 kV/m. In the same location, the magnetic field is estimated to be 24.8 μT (248.2 mG) for one-phase and, for three-phase, 28.8 μT (288.0 mG).[1]

Corona losses are estimated to be 2.70 kW per phase per kilometer[2] or 8.46 kW for the 500 kV three-phase loop-in transmission lines. One study calculated radio interference induced by corona from a 500 kV three-phase transmission line at approximately 45 decibels above 1 microvolt per meter (dB[1μV/m][3]; henceforth referred to as dB) at approximately 88 feet (27 meters)[4] away from the outermost phase of a transmission line (Tejada-Martinez et al. 2019). Measured radio interference was generally similar to calculated values particularly for conductors strung on towers horizontally but was found to be closer to 50 dBuV/m for conductors strung on towers in a vertical manner. Two other studies of 500 kV transmission lines at the same distance from center phase calculated radio interference at approximately 30 dB to generally below 60 dB, except for when subconductors were spaced closely together, depending on the geometric parameters (e.g., conductor size, conductor spacing) (El Dein 2013; Phaiboon, Vivek, and Somkuarnpanit 2000). As discussed above, wet weather and other conditions (e.g., debris build up on conductors) can affect corona and therefore radio interference, with higher interference anticipated in wetter weather. The 500 kV transmission lines would be engineered and installed so as to avoid harmful interference with radio or other transmissions.

Conclusion

Construction and operation of the Project, including the interconnection of the facility with SDG&E's transmission system, are not expected to result in significant increases in electric field or magnetic field levels or in radio and television interference that could result in harmful interference. Accordingly, mitigation would not be required.

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[1] Calculated on the following assumptions: 3,000 amps of current the same as the existing SWPL, 3-1033.5 ACSR/AW conductor size (0.4149 inch steel core and 1.245 inch cable diameter), 120-foot-tall transmission structures, and 35 feet of clearance from conductor to ground.

[2] Calculated with the same assumptions as electric and magnetic fields. Additional assumptions were 23.8 C, 764.794 mm Hg, and 0.9 surface irregularity of the conductor.

[3] dB(1μV/m) is a unit of field strength.

[4] This distance approximately corresponds to where the edge of the 500 kV loop-in transmission line 175-foot-wide corridors.

3.4 Reliability and Availability

3.4.1 Fuel Availability

The Project would involve generation of power from solar energy and would not require large quantities of fuel for construction or operations. Equipment and vehicles used during construction and operations would operate on locally available diesel and gasoline. During operations, the Project would interconnect to the existing IID grid for electricity and emergency diesel generators would provide backup power for the control room and Project substation controls in the event of a grid outage. The backup generators would be tested periodically and would run on locally available diesel.

3.4.2 Facility Availability

Availability is the duration of time that the entire facility would be able to perform the intended task. It is calculated as a ratio expressed in percentage where the numerator is the number of hours when the system as a whole is either 1) ready to either charge or discharge (during idle/standby periods); 2) charging or discharging; or 3) actively exporting electrons directly to the point of interconnection (rather than first to the BESS), all divided by the total number of hours in the period in which the generator could be discharging or charging. For a solar generating facility, the total number of hours available would be daylight hours and/or hours that there could be charge in the BESS throughout the year.

Typically, both planned and unplanned outages are subtracted from the availability calculation numerator to calculate actual availability for a period. The availability calculation denominator can be the total amount of time in the day, week, month or, most commonly, year where availability is being calculated.

For further clarity, availability is not the same as a typical generating plant's capacity factor, which accounts for annual criteria such as the plant's actual energy megawatt hour (MWh) output (numerator) versus the plant's nameplate capability to produce MWh over a full year (denominator) and which is usually based on the general assumption that the relevant plant would always operate at baseload.

The BAAH switchyard, the Project gen-tie line, and Project substation would be designed to be available to operate at maximum possible output (based on meteorological conditions) at least 99 percent of the time, with the exception of maintenance outages and planned outages. An annual availability factor of 99 percent is anticipated for the solar facility, excluding the BESS. The BESS would be designed to be available to operate at its full load at least 98 percent of the time.

The solar facility would be anticipated to operate for between 4,200 hours per year (daylight hours). The solar facility is expected to have an annual and overall lifetime capacity factor between approximately 20 to up to 40 percent (U.S. Energy Information Administration 2023a; 2023b; 2023c). The BESS is anticipated to be designed for a 4-hour system, cycled up to 2 times per day, to not exceed 365 cycles per year, with an annual capacity factor of 16.7 percent to 33.3 percent. Overall, the solar facility's equipment is anticipated to have a useful life of 50 years. The BESS would be expected to have a design life of approximately 25 years.

3.4.3 Facility Reliability

The proposed solar power generating equipment has a proven track record of reliability based on multiple approved and existing power plants across North America that rely on the same technology and which have already been permitted, financed, and installed. The Project could use any commercially available battery technology that have undergone feasibility analysis in terms of energy density, cycle life, and cost-effectiveness. Certain facilities would have backup systems to increase reliability. Each inverter-transformer station would include an uninterruptible power supply as emergency back-up power in the form of a battery. A backup diesel generator would be used for the control room of the SCADA system and Project substation controls in the event of a power outage. Power capacity would be sized to ensure full capacity output up to 50 degrees Celsius and down to minus-20 degrees Celsius to withstand climactic extremes. Operation and maintenance procedures would be consistent with manufacturer and industry standard practices to maintain the useful life of the Project components.

3.5 Efficiency

The annual net electrical energy produced for each mode of operation, including starts and shutdowns, would be up to 3,530 GWh, or 3,530,000 MWh, assuming that the solar facility has a total of 4,200 operational hours annually. It is anticipated that the BESS would operate in charge mode approximately 1,570 hours each year and in discharge mode approximately 1,460 hours each year (assuming one cycle per day per year due to the constraint of a maximum of 365 cycles per year). The BESS would produce approximately 1,679 GWh, or 1,679,000 MWh, per year (considering one 4-hour discharge cycle per day per year).

3.6 Laws, Ordinances, Regulations, and Standards Compliance

Table 3.6-1 International and Federal Laws, Ordinances, Regulations, and Standards

LORS	Applicability	Compliance
International Committee on Electromagnetic Safety (ICES) Institute of Electrical and Electronics Engineers (IEEE) Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz 2019	Standard specifies exposure criteria and limits to protect against established adverse health effects in humans associated with exposure to electric, magnetic, and electromagnetic fields in the frequency range of 0 Hz to 300 GHz	The Project will adhere to these guidelines, as appropriate.

LORS	Applicability	Compliance
International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines on Limiting Exposure to Electromagnetic Fields (100 kHz to 300 GHz) 2020	Guidelines for the protection of humans exposed to radiofrequency electromagnetic fields (EMFs) in the range 100 kHz to 300 GHz.	The Project will adhere to these guidelines, as appropriate.
IEEE 693-2018, "IEEE Recommended Practices for Seismic Design of Substations"	Recommends seismic design and construction practices for substations.	The Project substation and BAAH switchyard will comply with this guidance, as appropriate.
IEEE 980-2021, "Guide for Containment and Control of Oil Spills in Substations"	Recommendations for preventing release of oil into the environment.	The Project substation and BAAH switchyard will comply with this guidance, as appropriate.
IEEE 644-2019, "Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines"	Standard procedure for measuring EMF from an electric line that is in service.	The Project will implement this standard procedure, as appropriate.
IEEE 80, "IEEE Guide for Safety in AC Substation Grounding"	Presents guidelines for assuring safety through proper grounding of AC substations.	The Project substation and BAAH switchyard will comply with this standard.
National Electrical Safety Code (NESC), Section 9	Identifies grounding methods for electrical supply and communications facilities.	The Project will adhere to these guidelines, as appropriate.
Title 14 CFR, Part 77, "Safe, Efficient Use, and Preservation of the Navigable Airspace"	Describes the criteria used to determine whether a "Notice of Proposed Construction or Alteration" (FAA Form 7450-1) is required for potential obstruction hazards.	The Project gen-tie and 500 kV loop-in transmission structures will comply with this standard, if relevant.
FAA Advisory Circular No. 70/7450-1M, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting of obstructions as identified by FAA Regulations Part 77.	The Project gen-tie and 500 kV loop-in transmission structures will comply with be below 200 feet so do not require lighting.

Note that there are no federal standards limiting residential or occupational exposure to electromagnetic fields from power lines.

Table 3.6-2 State Laws, Ordinances, Regulations, and Standards

LORS	Applicability	Compliance
CPUC General Order (GO) No. 52, CPUC	Applies to the construction and operation of power lines and communication lines that are subject to CPUC jurisdiction to prevent or mitigate inductive interference	The 500 kV loop-in transmission line will comply with this standard, as relevant.
CPUC Decision 06-01-042	CPUC policy to mitigate electric and magnetic field exposure for new utility transmission and substation projects	The BAAH switchyard and 500 kV loop-in transmission line will comply with this policy, as relevant.
CPUC GO No. 131-D	Applies to the planning and construction of facilities for the generation of electricity and certain electric transmission facilities under CPUC jurisdiction. Describes requirements for applications to include measures to reduce potential exposure to electric and magnetic fields generated by the facilities.	The 500 kV loop-in transmission line will comply with this standard, as relevant.
CPUC GO No. 95	Applies to construction of overhead electric lines under CPUC jurisdiction.	The 500 kV loop-in transmission line will comply with this standard, as relevant.
CPUC EMF Design Guidelines for Electrical Facilities 2006	Provides recommendations for standard no-cost and low-cost measures to reduce electric and magnetic fields.	The 500 kV loop-in transmission line will comply with this guidance, as relevant and feasible.

No local laws, ordinances, regulations, or standards for engineering are applicable to the Project.

3.7 References

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