

2. PROJECT DESCRIPTION

2.1. OVERVIEW OF THE VCIP

Consistent with the mission of Westlands Water District (District) to provide timely, reliable, and affordable water service to landowners and water users in western Fresno and Kings Counties, the Valley Clean Infrastructure Plan (VCIP) is intended to provide an overall plan to guide and facilitate the beneficial repurpose of drainage-impaired and other private and District-owned lands within the District’s boundaries, through proposals by Golden State Clean Energy (GSCE) and any other potential project proponents to develop clean energy generation, storage, transmission, and other ancillary and supportive energy uses in a manner that furthers the District’s mission.¹

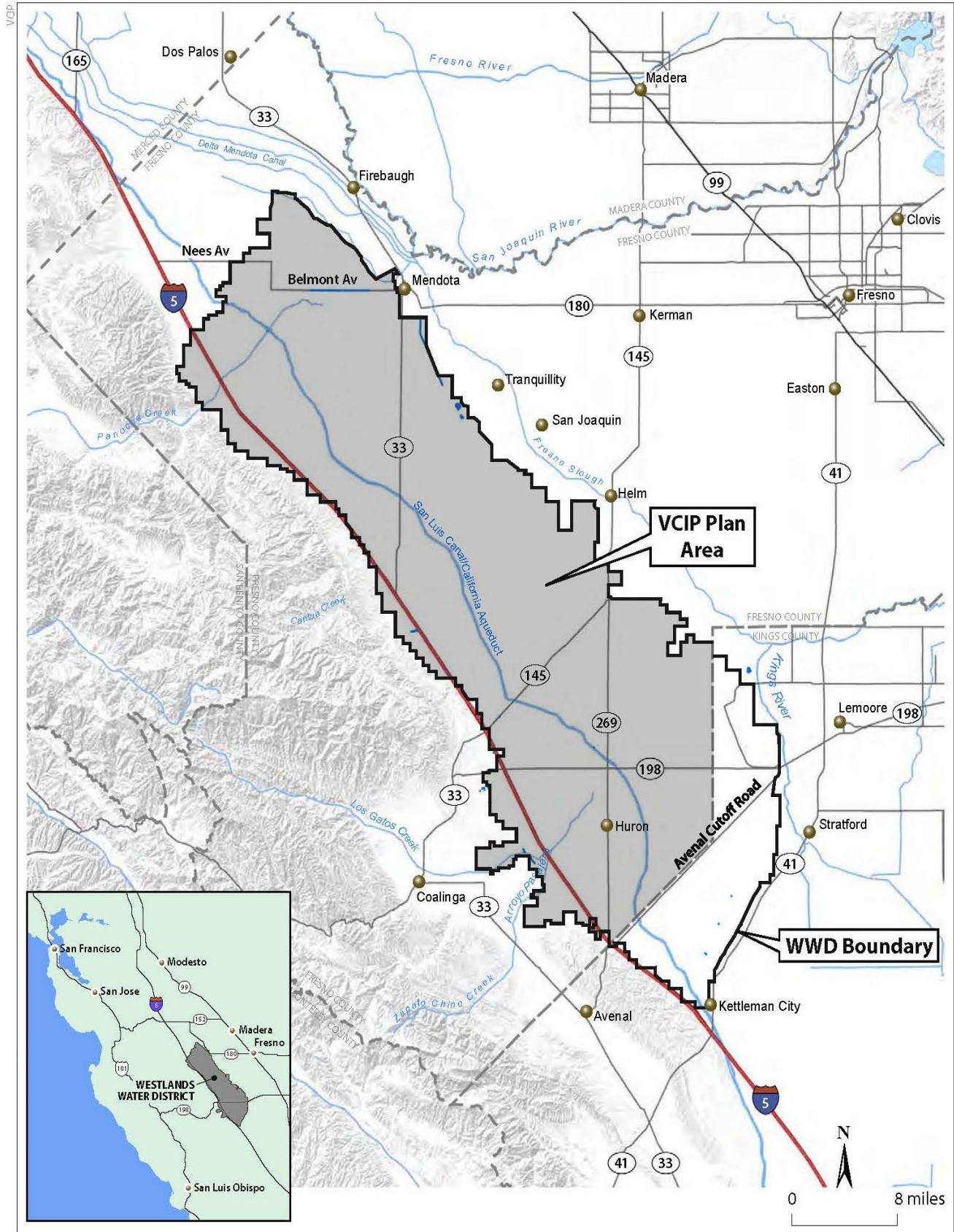
The VCIP is a regional non-regulatory master planning tool for the structure and major components of clean energy projects in the District’s service area, involving potential construction of transmission lines, generation tie lines, substations and related infrastructure for conveyance of clean energy, and the actual generation and storage of clean energy, subject to permits or land use entitlements issued by other public agencies with regulatory authority. For the District’s planning purposes, the VCIP and its potential clean energy projects are subject to CEQA review as the “whole” of the proposed “action” in relation to decisions the District may make in evaluating and approving its own policy decisions and transactions, and to inform future permitting and regulatory proceedings.

The VCIP is intended to achieve a number of water supply and energy-related objectives (see Section 2.2), and includes two main elements:

- 1) Energy Resource Plan – This element identifies specific areas within the Plan Area (see Figure 2.1-1) that have been identified for potential renewable energy development, including solar photovoltaic (PV) facilities with integrated energy storage systems (ESS), along with typical supporting facilities such as Operations and Maintenance (O&M) facilities and project substations. Separate ESS facilities located outside of solar projects and dedicated solely to energy storage are also included in the Plan.
- 2) Infrastructure Plan – This element consists of the transmission facilities and collection substations required for the collection of solar generation within the Plan Area, and for the delivery of renewable energy to electricity markets in California. The energy produced at the solar facilities would be transferred to generation tie-lines (gen-tie lines) for conveyance to one of five new collection substations to be distributed throughout the Plan Area. The collection substations would provide for interconnection to the state and federal power systems for delivery of the solar generation outside the VCIP.

Plan Area Definition

¹ Besides Golden State Clean Energy, the District is not aware of any other solar developers that intend to submit proposals pursuant to the proposed VCIP.
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Source: Westlands Water District, 2022

VCIP Plan Area
Figure 2.1-1

The Plan Area for the VCIP encompasses the entire Fresno County portion of the District’s service area. This area comprises a total of about 534,800 acres within the District’s approximately 614,700-acre overall service area. Solar and infrastructure development within the Kings County portion of the District’s service area is covered by the Westlands Solar Park Master Plan, which was adopted by the District’s Board of Directors on January 16, 2018. No additional lands within the Kings County service area have been identified for potential clean energy development as part of the proposed VCIP.

Development Focus Areas

Within the defined Plan Area, approximately 136,000 acres have been identified as “Development Focus Areas” (DFAs)(see Figure 2.1-2). These lands, which are suitable for clean energy development, include the following: (1) approximately 72,000 acres of District-owned land;² and (2) approximately 64,000 acres of privately-owned lands for which the landowners have expressed interest in clean energy facilities. The 136,000 gross acres in the DFAs would accommodate the planned generation capacity of up to 21,000 megawatts (MW) under the VCIP . (This is based on the current average development intensity for PV solar of about 6.5 gross acres per MW, which includes solar PV generation and energy storage facilities, substations, and other ancillary facilities).

2.2. PROJECT OBJECTIVES OF THE VCIP

The VCIP is intended to fulfill the following overall goals of the project proponents: (1) Westlands’ mission of water supply reliability/water service efficiency; and (2) state and GSCCE goals for renewable energy, in addition to objectives related to water supply, energy, climate change, and economic development. The specific project objectives of each of the project proponents are set forth below.

Westlands Water District

- Utilize the District’s location, topography, and excellent insolation (solar radiation energy) attributes to promote the siting of solar generation, storage, and transmission of renewable energy, in furtherance of federal, state, and local renewable energy and carbon reduction goals over approximately 35 years.
- Balance the promotion of long-term but temporary development of solar energy projects and associated storage and transmission facilities with the protection of environmental resources, which may include, among other things, protection of agricultural, biological, cultural, and water resources.
- Avoid or substantially reduce environmental impacts associated with solar development, construction, and operation through low-impact design, short construction timeline with minimal ground disturbance, low amounts of impervious surfaces, the continued use of existing habitat by present wildlife, co-location of energy and agricultural activities where practicable.

² The 72,000 acres of District-owned DFA lands include four solar/battery storage projects which were pending project-level approval when the NOP for this PEIR was issued on February 2, 2024. These projects include the Darden, Sonrisa, Heartland, and ICF Rosemary solar projects. Since these projects are within the VCIP DFAs, they are included in the plan-level analyses in this PEIR, and therefore they are not duplicated in the cumulative analyses in this PEIR. {00081324.1}

- Ensure financing of decommissioning and site reclamation at the end of the project life in order to restore the site to conditions suitable for agricultural use.
- Utilize existing facilities, roads, and other infrastructure to the extent feasible.
- Identify preferred transmission corridors to efficiently convey renewable energy from VCIP projects to the statewide electricity market and reduce dependence on, and environmental impacts such as wildfire risk associated with, long-distance transmission.
- Contribute to the solution of reduced water supply reliability by (i) providing productive long-term but temporary repurposing of those lands from irrigated agriculture and for renewable energy production, and (ii) ensuring irrigated agriculture on the repurposed lands can be restored following the decommissioning of the renewable energy projects, particularly with advancement of water conservation and irrigation technologies.
- Facilitate implementation of the Sustainable Groundwater Management Act (SGMA) by: (i) contributing to the conjunctive use of groundwater for irrigation, (ii) promoting drought resiliency, (iii) reducing the likelihood of undesirable results like subsidence, including in the vicinity of sections of the San Luis Canal/California Aqueduct, and (iv) implementing the VCIP pursuant to the Westside Subbasin Groundwater Sustainability Plan (GSP) in conjunction with other agricultural land repurposing management actions.
- Address the chronic shortage of CVP contract water deliveries by promoting repurposing of farmland and by facilitating the redirection of scarce surface water allocations to other productive agricultural land within the District.
- Provide utility-scale power generation on farmland that has been fallowed or removed from irrigated agriculture due to lack of a reliable surface water supply, which reduces pressure to develop renewable energy on prime agricultural land elsewhere. Promote expeditious and efficient repurposing of farmlands through a comprehensive planning process to address transmission capacity constraints on further incremental clean energy development in the District.
- Provide for development of utility-scale solar generation facilities on highly disturbed lands, which provide minimal habitat value for wildlife.
- Provide a low-impact alternative location for the siting of utility-scale renewable energy development that might otherwise occur on lands with high habitat value for protected wildlife species (such as the Mojave Desert).
- Contribute to overall reduction in greenhouse gas emissions by generating electricity that is not based on the combustion of fossil fuel.
- Positively contribute to the local economy through stimulation of economic activity such as creation of secondary multiplier employment and the purchase of materials and services.
- Provide community benefits through job creation and training programs for local residents, use of local businesses and vendors, financial contributions to community development projects and programs, and increased property tax and sales tax revenues.

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Golden State Clean Energy

- Help implement the state’s Global Warming Solutions Act of 2006 (AB 32), as supplemented in 2016 by SB 32, by facilitating the development of up to 21,000 MW of non-fossil fuel based sources of electricity that will replace existing fossil-based generation and thereby contribute to achieving the state’s goal of carbon neutrality by 2045.
- Provide new sources of energy storage that support the state in achieving its renewable energy and carbon neutrality targets, and provide transmission facilities for conveying the renewable energy to the state’s electrical load centers.
- Potentially provide the District with a direct source of renewable energy for operation of the District’s Groundwater Management Program wells, filtration booster pumps, and other District owned facilities.
- Provide for utility-scale energy generation on disturbed lands which provide minimal habitat value for wildlife.
- Provide the foundation for a renewables development program which will generate an average of 6,000 construction jobs for at least 10 years, in addition to approximately 800 permanent jobs and approximately 400 part-time jobs upon the VCIP buildout.
- Promote local hiring by establishing a job creation and training program for local residents.
- Positively contribute to the local economy through stimulation of economic activity such as creation of secondary multiplier employment and local procurement of equipment, goods and services.
- Provide community benefits through increased property tax revenues and increased sales tax receipts through local procurement and establishment of local points of sale for materials sourced from outside the area.

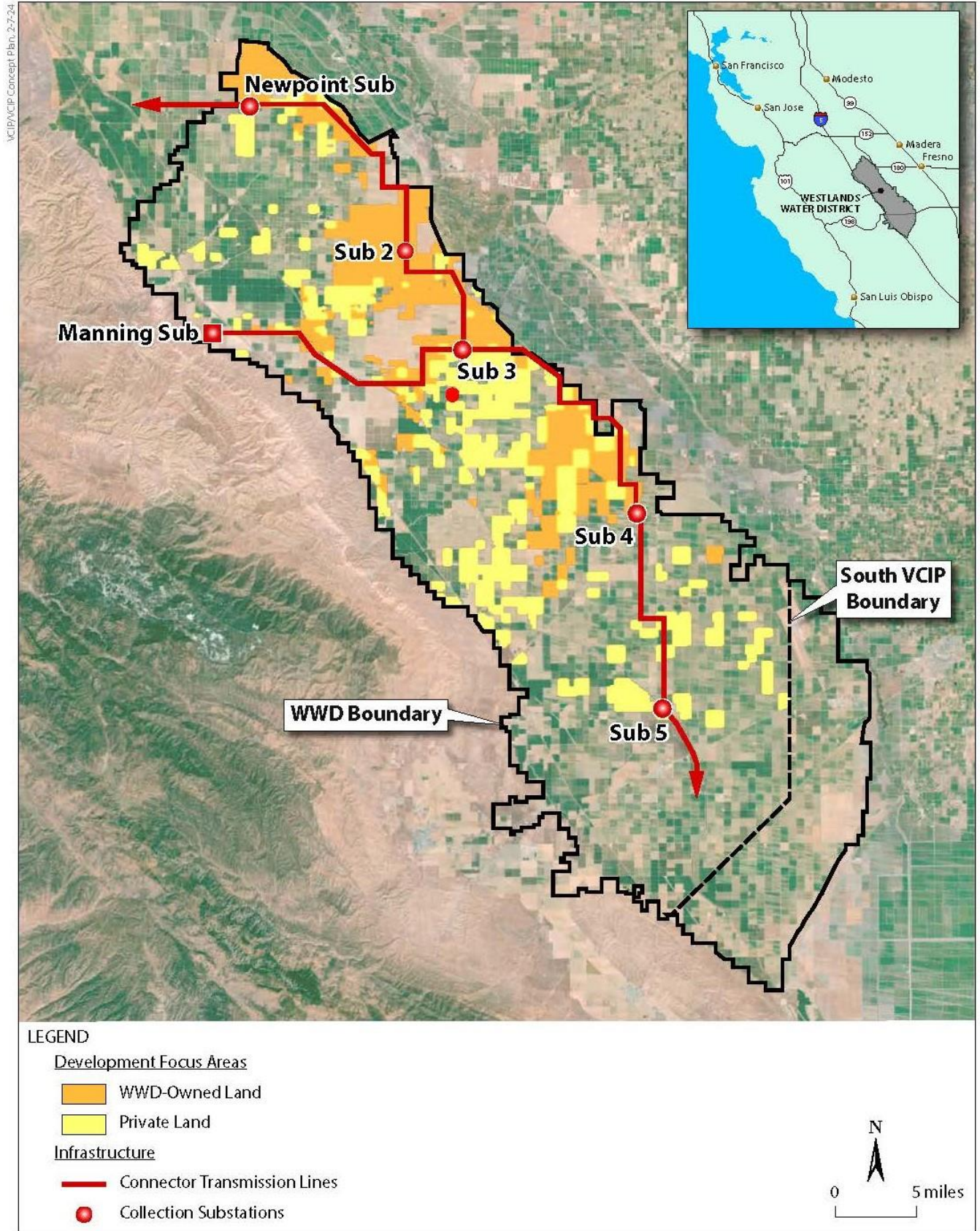
2.3. OVERVIEW OF THE VCIP COMPONENTS

The main components of the VCIP are summarized below. The conceptual plan for clean energy development and transmission infrastructure is shown in Figure 2.3-1. The various components of VCIP are described in greater detail Section 2.4.

2.3.1. Energy Resource Plan

The primary components of the Energy Resource Plan consist of clean energy development in the form of: (1) solar PV generating facilities; and (2) stand-alone energy storage facilities, as described in turn below.

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VCIP Concept Plan
Figure 2.3-1

1. Solar PV Generating Facilities

The individual solar PV facilities would range in size from 100 MW (on approximately 640 acres) to about 1,150 MW (on approximately 7,500 acres), with the latter representing the approximate maximum generation that can be accommodated by a double-circuit 230-kV gen-tie line. It is assumed that a typical solar PV facility would have a generating capacity of 250 MW and would occupy about 1,600 acres. This project size represents the approximate upper limit for project size that is manageable for construction contractors and for financing.

Upon completion, full buildout of the contemplated VCIP solar facilities would have a total generating capacity of 21,000 megawatts (MW), which would generate approximately 33,484,500 megawatt hours per year (MWh/yr), which is based on the 2023 average generation of 1,594.5 MWh/MW from the five largest solar operating solar facilities in Fresno County (CEC 2024f). This is equivalent to the average electrical consumption of 5,683,045 California homes in 2023 (at 5,892 kilowatt-hours per year [kWh/yr] per home) (US EIA 2024a).

It is assumed that each solar facility would include an on-site battery energy storage system (BESS) integrated into the project design with a maximum storage capacity equivalent to the facility's generation capacity. A typical facility could include up to 250 MW of storage. Currently, these facilities would likely utilize lithium-ion batteries but could include other technologies as described in Section 2.4.1.2.

It is noted that while incorporation of energy storage facilities as an integral component of solar generating facilities has become standard, it is also likely that the VCIP would include solar facilities with smaller energy storage capacities or may have no on-site energy storage. However, it is unlikely that the typical 250-MW solar facility would include more than 250 MW of energy storage facilities. For purposes of this PEIR, it is assumed that the typical 250-MW solar PV facility will include 250 MW of energy storage. Each solar facility would also include O&M facilities, and an on-site 230-kV substation, which would convey the solar generation to a gen-tie line (described subsequently).

2. Energy Storage Facilities

As an alternative to co-locating and integrating the BESS facilities with the solar PV facilities, the VCIP also contemplates up to 10,000 MW of stand-alone energy storage facilities (with a total storage capacity of up to 40,000 MW hours) which would operate independently of solar generation facilities, and which would occupy a total combined land area up to approximately 500 acres. These facilities would provide temporary storage for solar power generated at off-site solar facilities, and would dispatch the stored power to the electrical grid when needed. It is anticipated that each stand-alone energy storage facility would have up to 1,150 MW of storage with a capacity of 4 hours per MW, or a total capacity of 4,600 MW hours (MWh), although advances in battery technology would allow for longer duration of storage per MW. The locations of these stand-alone energy storage facilities have not been determined, but it is anticipated that they would be located near the VCIP collection substations described below in order minimize the length of gen-tie lines. Currently, a typical energy storage facility would likely utilize lithium-ion batteries, but other storage technologies could be employed, as discussed in Section 2.4.1.2.

It is noted that while the VCIP contemplates up to 10,000 MW of energy storage facilities, it is possible that the total overall energy storage capacity of stand-alone facilities ultimately installed in the Plan Area may be less, but is unlikely to be greater. It is also noted that the total planned capacity of energy storage facilities in the VCIP, located in both solar PV projects and in stand-alone projects, will not exceed a combined total of {00081324.1}

21,000 MW of energy storage. The proportion of energy storage systems that will be co-located with solar PV facilities versus energy storage located in stand-alone facilities will be determined by prevailing market conditions and cannot be determined at this time. For purposes of analysis in this PEIR, it is assumed that all energy storage will be co-located with solar PV facilities. Since the land coverage and quantitative data related to energy storage (e.g., traffic generation, air quality impacts, etc.) would be the same for stand-alone energy storage facilities and storage facilities co-located with solar PV projects regardless of location within the VCIP, the PEIR analysis would provide full coverage of the potential impacts of all energy storage facilities up to an overall planned capacity of 21,000 MW. The VCIP BESS facilities would be manufactured, installed, and maintained in accordance with all applicable fire codes and product standards. As described below, the BESS facilities would also be subject to testing pursuant to recent industry-standard test methods designed by UL Solutions (UL) to demonstrate compliance with all applicable fire safety and building code requirements for BESS systems.

2.3.2. Infrastructure Plan

The primary components of the proposed VCIP Infrastructure Plan consist of transmission and interconnection facilities, including: (1) Gen-Tie Lines; (2) Collection Substations; and (3) Connector Transmission Lines within the VCIP. These infrastructure facilities are described in turn below.

1. Gen-Tie Lines

Each solar PV generating facility and stand-alone energy storage facility would be served by a 230-kV generation-interconnection tie-line (gen-tie line) which would convey the generated power to one of five 500/230-kV collection substations within the VCIP. The gen-tie lines would branch out from each collection substation to serve the solar and energy storage facilities in the vicinity. The precise alignments of the gen-tie lines would depend on the size, location and timing of solar and energy storage projects as they are planned to come on-line. Since the pattern of the gen-tie network that is ultimately constructed can vary widely, the routing of individual gen-tie lines cannot be defined at a plan level under the VCIP. However, the general construction and operational nature of the gen-tie facilities can be characterized in sufficient detail to allow for their meaningful evaluation in the PEIR at a programmatic level.

2. Collection Substations

The Infrastructure Plan includes five collection substations which would be distributed from north to south along the backbone transmission corridor running through the eastern portion of the Plan Area (described below). These 500/230-kV substations would serve as collection points for power generated in the surrounding DFAs as received from the gen-tie network and would provide interconnection to the state and federal power systems. It is expected that each collection substation would accommodate approximately 4,000 MW of solar power generated at solar facilities occupying an average of about 26,000 acres around each substation. Each collection substation is anticipated to have a footprint of about 60 acres, to be located within a larger site of about 160 acres which would provide sufficient buffer area to accommodate the convergence of incoming gen-tie lines from the nearby solar generation and energy storage facilities.

It is noted that a new substation (Manning) is currently proposed within the VCIP Plan Area on the south side of W. Manning Avenue, approximately 2 miles west of I-5. The planned Manning Substation is currently in the CPUC approval process and is scheduled to be in service in June 2028. The Manning Substation is intended to add resilience to the larger electrical grid and will be constructed with or without the VCIP solar development.

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The CPUC approval process includes a CEQA-equivalent environmental review process which is independent of this PEIR. As such, the Manning Substation project is not part of the VCIP and is not covered in this PEIR except as a cumulative project. It is anticipated that up to 1,100 MW of VCIP solar generation, from 7,000 acres of solar facilities in the west-central portion of the Plan Area, would be conveyed to the state power grid through the Manning Substation.

3. Connector Transmission Lines within the VCIP

The five collection substations within the VCIP would be connected by a backbone transmission corridor running through the eastern portion of Plan Area in a northwest-southeast direction. This corridor would have a total length of approximately 59 miles and would collect VCIP-generated power and provide interconnection to the state and federal power systems.

It is anticipated that the VCIP connector transmission corridors would include up to two parallel 500-kV transmission lines within 1,000-foot wide corridors. The two parallel lines would require a combined right-of-way of approximately 450 feet, with the additional width included to provide equipment maneuvering space during construction as well as design flexibility at the engineering stage.

In addition, a central transmission corridor is planned to run east-west through the Plan Area to provide connection between the VCIP backbone corridor at Substation No. 3 and the new Manning Substation planned for the vicinity of W. Manning Avenue and Interstate 5. This connecting transmission corridor would be approximately 20 miles long and would provide an alternative path for energy exported from the VCIP to connect to the larger grid and provide redundancy and resilience to the system. As noted above, the Manning Substation is not part of the VCIP; however, the 20-mile connecting transmission line connecting the VCIP to the Manning Substation is part of the VCIP.

2.3.3. VCIP Development Timeline and Phasing

It is anticipated that the VCIP solar facilities and infrastructure would be completed within an 11-year development period, with construction planned to start in 2028 and with full buildout anticipated in 2038. The VCIP development is planned to progress incrementally from north to south, such that solar PV and energy storage projects and their associated gen-tie lines would be constructed in conjunction with the incremental completion of collection substations and collector transmission lines, as they are extended southward through the Plan Area. For example, the DFAs around the Newpoint Substation in the north would be developed first, followed in subsequent years by development of DFAs around Substation 2, and so forth. In the early years, the development pace is expected to reach 2,300 MW per year, which will diminish slightly over time and result in an average annual development pace of about 2,000 MW. It is important to note that given the length of time required to complete the initial infrastructure improvements (e.g., the Newpoint Substation will require two years to complete, beginning in 2028), the solar PV projects are not planned to begin construction until a year later (e.g., 2029). Therefore, the buildout of the proposed Energy Resource Plan would be expected to occur over 10 years (e.g., 2029 through 2038).

It is recognized that the location and timing of individual solar and energy storage projects within the VCIP will depend on market conditions and technical factors, including the scheduling of interconnection to the electrical grid and the construction of internal collection and external transmission delivery facilities, which may vary from the sequence described above. However, the timeline and phasing concept presented above represents the District's best efforts to identify the most reasonably foreseeable scenario for purposes of analysis in the PEIR.

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2.4. TRANSMISSION DELIVERY LINES OUTSIDE THE VCIP

The development of renewable energy projects under the VCIP will drive the need for new transmission development outside the Plan Area to deliver the VCIP renewable generation to load centers in northern and southern California. These transmission delivery corridors extend far beyond the District's boundaries and are not part of the proposed VCIP. Planning and approval of these outside transmission lines are under the jurisdiction of the state and federal energy regulatory agencies, and public utilities. No specific bulk transmission projects are currently planned by the state or federal energy agencies or others to convey VCIP solar generation to the load centers. In light of these facts, no attempt has been made to define specific new bulk transmission lines as part of the VCIP planning process.

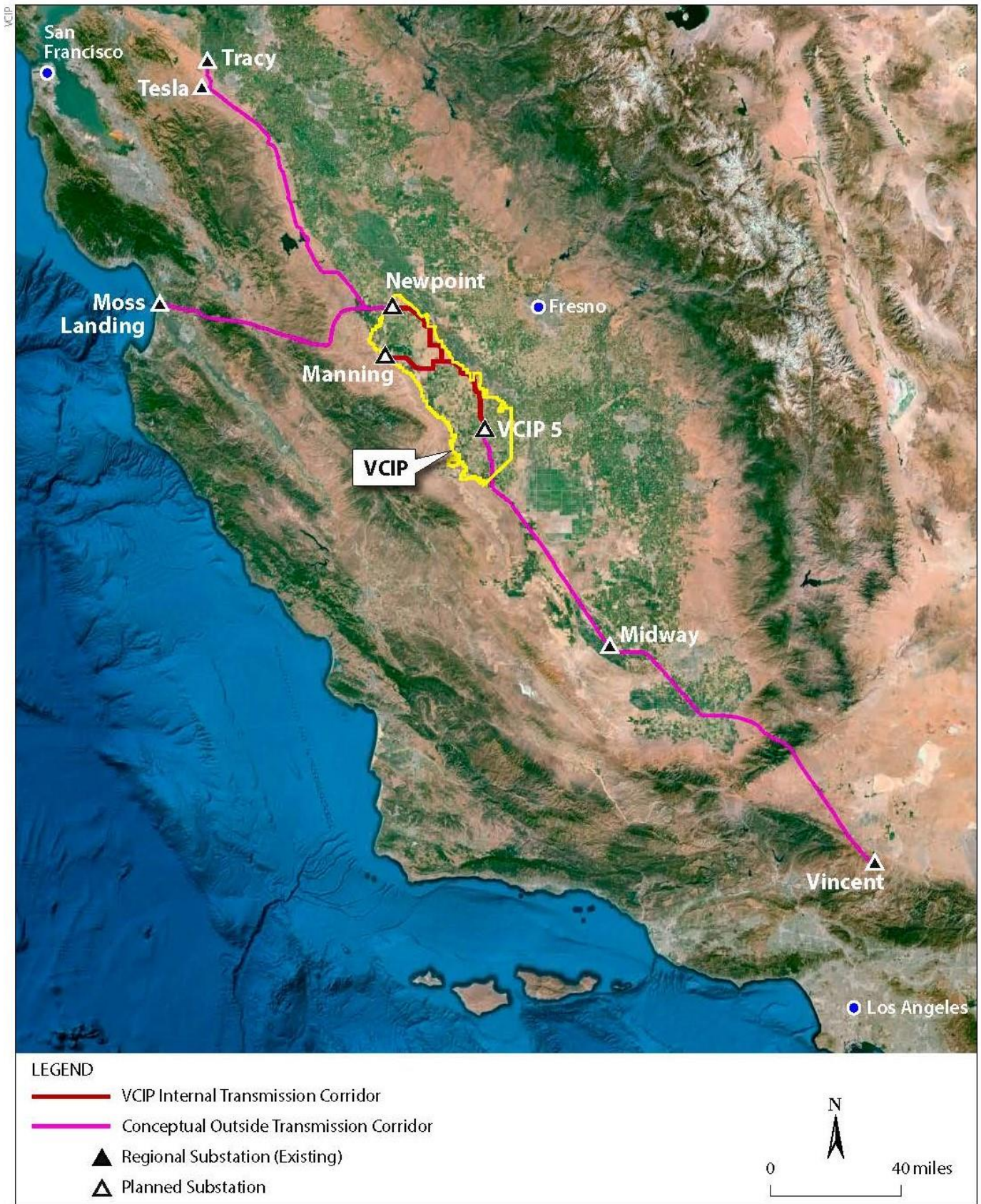
However, the PEIR includes a conceptual description of potential transmission routes outside the Plan Area to allow a general discussion of environmental impacts associated with transmission line development for informational purposes. Based on preliminary power flow studies, the amount of generation that would be delivered to the regional load centers was estimated, which allowed the development of a conceptual plan of transmission routing and capacities that would be required to deliver renewable generation from the VCIP to the load centers. Although no specific transmission routes or substation upgrades outside the Plan Area have been defined, it is assumed for conceptual planning purposes that the required new transmission lines would run adjacent to existing transmission corridors to major regional substations at the load centers. Specifically, it is assumed that these outside transmission corridors would extend north to the Tesla Substation and the Tracy Substation, west to the Moss Landing Substation, and south to the Midway Substation and the Vincent Substation (see Figure 2.4-1).

Since these transmission improvements would be integral to planning and programming of grid-level transmission state-wide, which will require coordinated efforts of Westlands Water District and potentially multiple state and federal agencies and utilities, it is speculative and premature to undertake specific route planning or design for such bulk transmission facilities. Thus the conceptual transmission routes identified in this PEIR have not been evaluated for the specific locations, constructability, desirability, cost, or likelihood of their successful permitting. They also have not been studied by transmission planning groups to identify their effects on other transmission systems.

For purposes of completeness under CEQA, the assumed transmission routes are evaluated in this PEIR to a level of detail commensurate with the conceptual level at which they have been identified and described. Based on the assumed corridors, it is possible to estimate the approximate linear miles and approximate acreages and the general nature of land disturbance associated with the outside transmission corridors. This high level of description of conceptual transmission corridors will allow a general evaluation of potential environmental impacts associated with transmission line development for informational purposes. The transmission corridors outside the Plan Area are further described in Section 2.5.2.4.

In summary, it is important to emphasize that the conceptual transmission routes assumed in this PEIR are not part of the VCIP and have no formal planning status with the state and federal electricity regulating agencies and utilities. As such, the high level of discussion of the outside transmission corridors in this PEIR is intended to provide an overview of potential impacts for informational purposes only, and is not intended to provide a first-tier environmental analysis under CEQA.

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Source: Google Earth 2024

Conceptual Transmission Corridors
Figure 2.4-1

2.5. DESCRIPTION OF THE VCIP COMPONENTS

The various components of the VCIP are described in detail below. Since the VCIP is a program-level master plan for clean energy facilities and infrastructure development, the construction-level details of future projects to be developed under the VCIP are unknown at this time. However, the solar, storage, and infrastructure elements contemplated under the Plan would have a high degree of uniformity from one project to another and would be similar in character to solar, storage, and infrastructure projects that have been developed in the region over the past 15 years (i.e., since 2010). Typical projects within each category (e.g., solar generation, energy storage, transmission, substations) are described to a sufficient level of detail to form the basis of a programmatic analysis of environmental impacts for purposes of CEQA. The typical projects contemplated for each Plan component are described in detail below.

2.5.1. Energy Resource Plan

The components of the Energy Resource Plan include: (1) solar generating facilities; and (2) stand-alone energy storage facilities, each of which is described in turn below.

2.5.1.1. SOLAR PV GENERATING FACILITIES

2.5.1.1.1. TYPICAL SOLAR PROJECT COMPONENTS

As discussed above, the typical solar generating facility under the VCIP would have a generating capacity of 250 MW on approximately 1,600 acres. The solar facilities would include the following components, each of which are described in greater detail below:

- Photovoltaic (PV) Modules and Trackers
- Power Conversion Stations (PCSs)
- Project Substation
- Telecommunications Facilities
- Meteorological Data Collection System
- Battery Energy Storage System (BESS)
- Operations and Maintenance (O&M) Facilities
- Site Access Roads
- Lighting
- Signage
- Perimeter Fencing

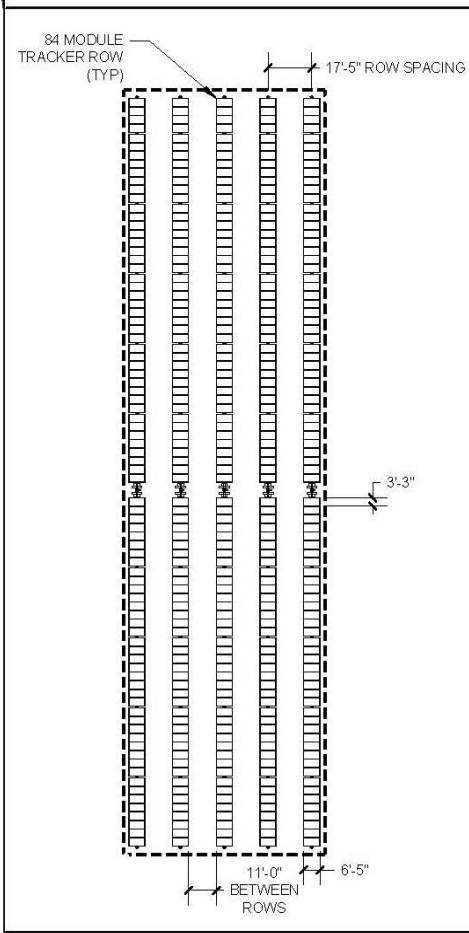
Photovoltaic (PV) Modules and Trackers

The typical solar project would utilize photovoltaic (PV) panels or modules to convert sunlight directly into electricity. The most commonly used photovoltaic modules are composed of mono-crystalline silicon solar cells arranged on panels/modules measuring up to 8 feet by 4 feet, and protected with tempered glass panes (see Figure 2.5-1). The PV cells are dark in color to maximize absorption and minimize reflectance of sunlight. {00081324.1}

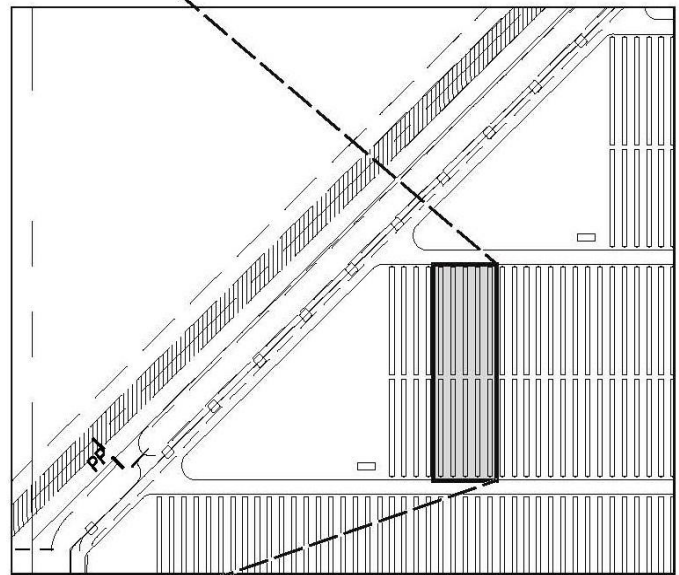
VCIP



Solar PV Modules on Horizontal Trackers



Solar Array



Plan Detail

Typical Solar Array Details
Figure 2.5-1

A less commonly used solar technology consists of thin-film modules, which typically utilize cadmium-telluride (CdTe) cells. While it is not expected that thin-film modules would be utilized within the VCIP, the PEIR includes a discussion of the potential impacts associated with thin-film modules (see Section 4.9. *Hazards and Hazardous Materials*).

The solar mounting systems that are most commonly employed consist of horizontal tracker systems which rotate the solar modules to follow the arc of the sun over the course of the day. Although there are other types of mounting systems, such as fixed-tilt systems, it is not expected that these would be utilized in the VCIP. (The overall impacts associated with fixed-tilt systems are almost indistinguishable from tracker systems, thus any differences in potential impacts would be negligible.) The PV panels and mounting systems would be supported by steel posts (cylindrical pipes, H-beams, or C-channels) which would be driven into the ground using truck-mounted vibratory drivers. The support posts would be installed at approximately 25 foot intervals to depths of 4 to 10 feet, with actual depths depending on localized soil conditions and load factors. The completed rows of solar modules would be spaced approximately 20 feet apart (on center), with the tracking pivot point approximately 5.5 feet above the ground surface. At maximum tilt, the solar modules would reach a height of up to 12 feet above ground level, depending on the module size and pivot height of the mounting system, while the lower module edge would be approximately 18 inches from the ground surface at its lowest point. When the modules are in their horizontal position (at noon or at rest), the rows of modules would be separated by approximately 12 feet of clear area.

Power Conversion Stations (PCSs)

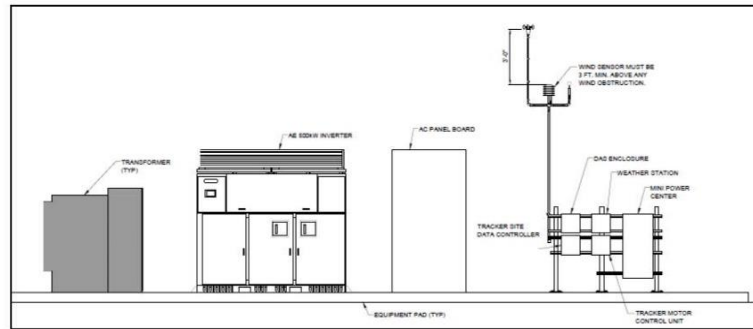
The electrical output from the PV modules would be collected as DC (direct current) by cables harnessed to the underside of the modules and collected in combiner boxes at each array and then delivered via above ground or underground cables to the Power Conversion Stations (PCSs) dispersed throughout the solar facility (see Figure 2.5-2). The PCSs would include inverters and transformers to convert the generated power to collection voltage. The inverters would convert the DC electrical output to AC, and the transformers would step up the inverter output voltage to intermediate collection voltage (e.g., 34.5-kV). The transformers would contain a vegetable-based oil as an insulating fluid (e.g., FR3). The converted power would be conveyed via buried cables to the project substation. Trenching for cables would occur in the project driveways and would be approximately 3 feet wide and 4 feet deep and would be backfilled with native material after cables are laid. The PCSs would be placed on equipment pads at predetermined locations where each PCS would be rated at approximately 4 MW of AC power. The typical 250 MW solar project would include approximately 70 PCSs, each on a concrete pad measuring approximately 30 by 6 feet, with a maximum height of 12 feet.

Project Substation

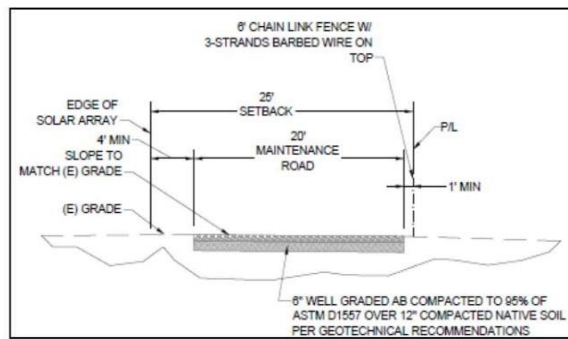
Output from the PCSs would be transferred via buried electrical conduits and cables to an on-site substation. The substation would occupy up to 3 acres adjacent to the project O&M yard and would collect consolidated solar generation from the PV collection system and step-up the intermediate collection voltage from 34.5-kV to 230-kV via high-voltage transformers. The stepped-up voltage would then be typically transferred to an adjacent switching station and conveyed via gen-tie line to the solar facility's point of interconnection at the nearest collection substation within the VCIP. The project substation would include transformers, breakers, switches, meters, relays, a control house, and other related equipment (see Figure 2.5-3). Interconnection equipment, including the control house, would be installed aboveground and underground within the footprint of the substation.

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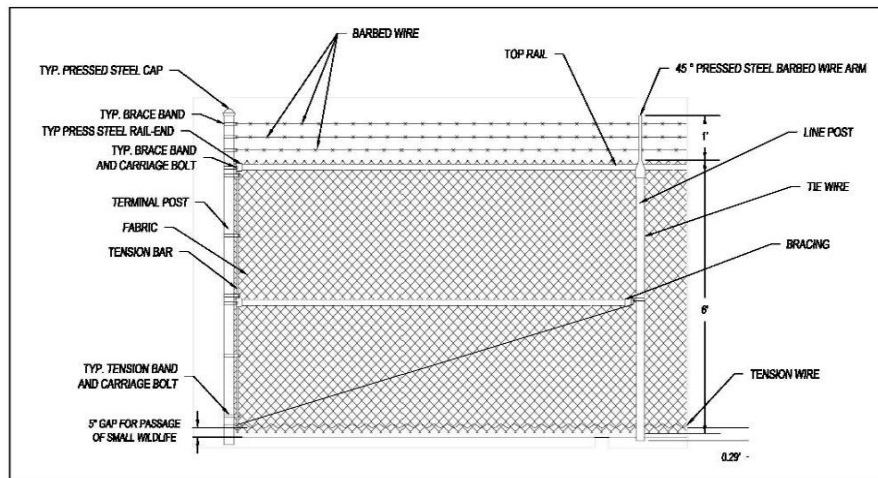
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Inverter/Transformer Pad



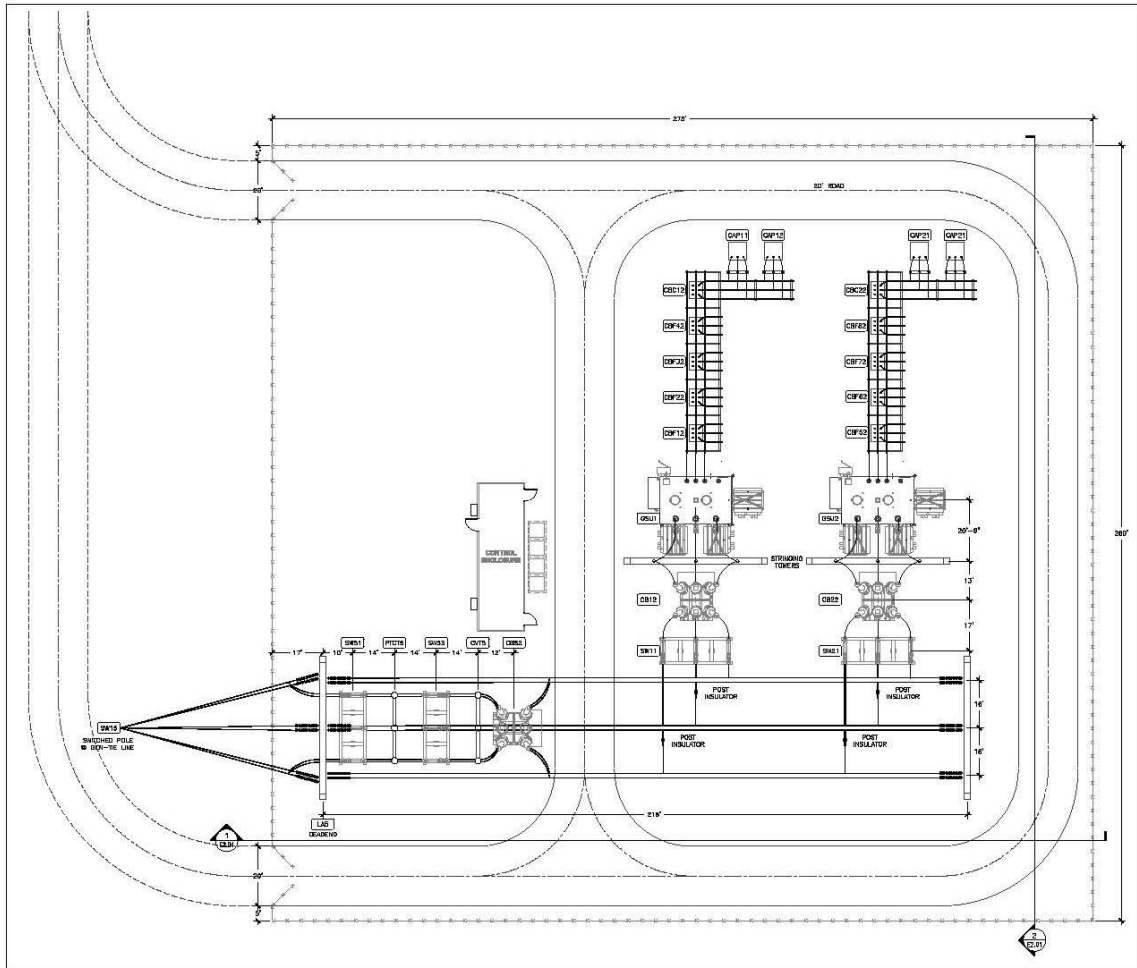
Internal Maintenance Road



Perimeter Fence

Typical Solar Facility Details
Figure 2.5-2

VCIP



230-kV Substation Plan

Typical 230-kV Project Substation
Figure 2.5-3

The transformers would contain mineral oil as an insulating fluid, and the substations would be designed to contain any accidental spill of transformer fluid. The tallest structural elements within the on-site substation would be dead-end structures up to 75 feet high. Each dead-end structure would require foundations excavated to a depth of 20 feet or more. The substation would be enclosed by an eight-foot chain-link fence topped with barbed wire and would comply with electrical codes. The substation would have access to communication systems in the area to comply with state, federal, and utility monitoring, control and dispatch requirements. Compliance would be accomplished by underground lines, aboveground lines, or wireless communication. Each project substation would be designed to be unstaffed, with automated features and remote-control capabilities.

Battery Energy Storage System (BESS)

The typical 250-MW solar project would include a 10- to 20-acre dedicated energy storage area adjacent to the on-site substation for the purpose of optimizing delivery of generated power to the electrical grid. The energy storage system would use one or more proven battery storage technologies such as lithium ion, sodium-sulfur, or vanadium-redox-flow batteries, and could potentially include flywheel banks housed in electrical enclosures. Emerging storage technologies which could be employed include sodium ion and zinc batteries. Currently, the most common energy storage technology is lithium-ion batteries. (For purposes of the PEIR analysis, it is assumed that lithium-ion battery storage would be utilized although other emerging technologies mentioned above could also be employed. The PEIR discussion will note differences in impacts associated with the different storage technologies, as appropriate.) The amount of battery storage included within solar PV projects can vary widely from as little as no BESS up to a storage capacity that is equivalent to the solar facility's generating capacity (i.e., 250 MW). For purposes of this PEIR, it is assumed that the typical 250 MW solar facility would include 250 MW of battery storage.

The battery facilities would consist of 250 prefabricated battery modules or containers, each with a storage capacity of about 4 MW hours, for a total storage capacity of about 1,000 MW hours. Generally, each on-site energy storage system would provide storage of generated power when grid demand is low and provide for delivery of stored power when grid demand is high. The battery storage units would typically consist of metal containers 40 feet long by 8 feet wide by 8.5 feet high. Each storage unit would be self-contained and would include battery racks, switchboards, integrated HVAC units, and inverters. Typical energy storage facilities are shown in Figure 2.5-4. The transformers for the battery units would be located outside the battery containers on dedicated equipment pads with each transformer set serving four battery containers. (In some energy storage systems, the inverters are co-located with transformers outside the containers.) Thus, the project battery storage systems would include a total of 250 battery containers and 63 transformers. The energy storage containers and transformers would be founded on concrete pads, or could utilize foundation systems consisting of concrete piles and steel beams. The areas between the containers would be surfaced with crushed aggregate. The enclosures would have appropriate fire suppression and safety systems in compliance with UL standard 9540, *Standards for the Installation of Stationary Energy Storage Systems*. The batteries and containers must also comply with UL 9540A fire test criteria which require battery fires to be contained within a single container. Each energy storage unit used on site would be designed in compliance with the UL 9450 safety standard (UL 2025) and the most up-to-date version of the California Fire Code section 1207 ("Electrical Energy Storage Systems" (ESS)), which has been adopted as part of the Fresno County Fire Code (i.e., Fresno County Code of Ordinances, section 15.10.010) to minimize risk of fire from stationary storage battery systems and contain fire in the event of such an incident (Fresno County 2024i). (For a detailed discussion of potential fire risks associated with BESS and a description of the fire standards and codes that address it, see Section 4.9. *Hazards and Hazardous Materials*, under Impact HAZ-2.)

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Typical Energy Storage Facility
Figure 2.5-4

In the unlikely event of battery fire, water for fire suppression would be obtained from an on-site water tank with storage capacity as specified by the Fresno County Fire Protection District (FCFPD), which would also specify minimum fire flows. Consistent with industry-standard practices, water would not be applied directly to any burning battery units but would be applied to nearby battery containers as needed to reduce heat buildup. For potential VCIP projects on lands currently owned by the District, water supply for the on-site storage tanks would be provided by the District from its existing underground water distribution system serving all lands within the District. For VCIP projects on privately-owned lands, water supplies would be provided from groundwater wells or surface water supplies from the landowner.

Telecommunications Facilities

The typical solar facility would include a Supervisory Control and Data Acquisition (SCADA) system to provide monitoring of facility operation and remote control of critical components. The PCSs would be connected by fiber optic or other cabling that would be installed in buried conduit leading to the project substation control house. The SCADA systems would be connected to local telecommunications service via overhead lines or buried lines. Telecommunications may also be transmitted wirelessly via a communications tower up to 125 feet high adjacent to the project substation. The SCADA servers would either be housed on-site in the project substation control house or O&M building or remotely in a cloud-based system.

Meteorological Data Collection System

The typical solar project would include one or more meteorological monitoring stations (“met” stations) to record key data such as insolation (incident solar radiation), air temperature, precipitation, wind direction and speed, and relative humidity. The met stations would collect meteorological data from up to 15 feet above the ground, or about 3 feet above the maximum height of nearby equipment to allow for accurate wind readings. The meteorological data would be transmitted to the facility SCADA system.

Operations and Maintenance Facilities

The typical solar project would include an operations yard, which would provide storage for operational equipment and materials, and provide parking and maneuvering areas for staff vehicles, delivery trucks, and service vehicles. The operations yard would occupy an area of up to 2 acres, and would include a pre-manufactured operations and maintenance (O&M) building with office space for operations and maintenance staff. The yard would also include one or more metal storage buildings or containers for storing spare modules and other materials. The parking area would include up to 10 spaces including one disabled access space.

Potable water would be delivered to each O&M facility by a commercial water delivery service. The typical 250 MW solar plus energy storage facility would include a water storage tank for potable water which would provide for drinking, hand washing, and toilet flushing at the O&M building.

Domestic wastewater disposal would be provided by a septic tank and leach field system located adjacent to each O&M building. The septic system would be designed and constructed in accordance with the Fresno County Local Agency Management Program for Onsite Wastewater Treatment Systems (OWTS). During construction, sanitary needs would be provided by portable chemical toilets which would be serviced as needed by a private contractor.

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Site Access and Internal Circulation

The typical solar project would gain vehicular access from project entrances located on the county road system or on state highways passing through the Plan Area. Permanent access through each project site would be provided primarily by internal driveways within the project's fence line which would run along the site perimeter and across the solar fields. The perimeter driveways and primary internal driveways would be surfaced with decomposed granite while minor driveways would consist of native compacted soil. All internal driveways would be 20 feet wide to allow passage and maneuvering of emergency and maintenance vehicles. The distance between parallel internal driveways would provide sufficient access throughout the project to provide access for emergency vehicles and personnel. The internal driveways would be designed and constructed to have a continually durable dust-free surface, in accordance with the Fresno County Improvement Standards, and would be permeable to allow percolation of rainfall into the underlying soil.

Exterior Lighting

Lighting for the typical solar facility would be designed to provide minimum illumination for safety and security while avoiding direct light spillover onto public roadways or adjacent properties. Low-level lighting would be installed at the entry gates, substation, PCSs, and O&M building. Lighting systems would be light-activated to automatically come on in the evening and shut off in the morning. Lighting within the solar fields would be confined to the PCSs, which would be activated only when needed by switch or motion sensors. There would be no lighting within the solar arrays, along any internal access driveways, or around the facility perimeter. Light fixtures would be hooded so as to be directed only on-site and away from other properties.

Signage

Project signage would typically consist of identification signs at the permanent project entrances, and safety signage at electrical equipment and at the substation. The signage would identify the project owner, operator, and emergency contacts and provide safety and security information. Additionally, small-scale signage would be posted at the main entry gates and intermittently along the fencing around the PV panels to indicate "No Trespassing" and "Private Property" for security and safety purposes. During the construction phase, temporary directional signage would be employed as needed. All signage would conform to the sign standards of the Fresno County Sign Code.

Perimeter Fencing

Prior to installation of solar arrays, the perimeter of each solar field would be securely fenced and gated to prevent unauthorized access. The perimeter fencing would consist of 6-foot chain-link galvanized metal topped with standard three-strand barbed wire. Fence posts would either be drilled and grouted or driven into the soil profile using truck mounted vibratory drivers. All fence posts would be capped to prevent the entrapment of small birds. Vehicle access gates would be installed at the project entrances and would remain locked when not in use.

To allow unimpeded passage of kit fox and other local wildlife through the typical solar project site, all security fencing would include a continuous 5-to-7-inch gap between the bottom of the fence and the ground surface. (For a more detailed discussion of this wildlife-friendly fencing, see Section 4.9. *Biological Resources*, under Impact BIO-12.)

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2.5.1.1.2. CONSTRUCTION OF SOLAR FACILITIES

Construction of the typical solar generation facility would involve four major construction phases, as follows:

- 1) Site preparation activities;
- 2) Installation of solar arrays, O&M and related facilities;
- 3) Installation of PCSs and construction of onsite substation; and
- 4) Installation of energy storage systems.

Construction of each typical 250-MW solar facility is expected to occur over an approximately one-year period. This includes 11 months of construction and one month of testing prior to energizing.

Site Preparation Activities

Pre-construction Activities

The site development process would begin with pre-construction activities such as surveying and staking for various project elements like internal driveways, PV array locations, electrical trenches, equipment pads, and support structures. The next step would be construction mobilization, which would include delivering initial equipment, supplies, and temporary construction trailers to the site.

Clearing and Grading

Prior to facility construction, the site would be cleared of vegetation, graded, and compacted. Site clearing and soil preparation would occur incrementally as needed, and would not proceed to a new area until that area is needed for the next construction phase. Vegetative cover would be retained as long as possible to minimize exposed soils and reduce potential for erosion and wind-blown dust.

Since the existing ground throughout the Plan Area is essentially level, with only agricultural furrows creating minor terrain roughness, solar development can typically be accommodated without mass grading. Grading would balance on-site, and no import or export of soils would be required. Ground preparation would include tilling and grading to smooth out existing agricultural furrows, followed by compaction with rollers. The existing topsoil would not be removed. Final grades would be designed to provide for positive drainage. Measures for erosion and sediment control would also be implemented, as described in “Stormwater Management and Erosion Control” below. Prior to installation of solar arrays, the perimeter of each array would be securely fenced and gated to prevent unauthorized access.

Construction Staging

The typical 250-MW solar project would include a central staging area for construction management and support, located on approximately 30 acres near a project entrance on a county road or state highway. The staging area would include construction offices, a first aid station, worker parking, equipment storage areas, cleaning and maintenance, and truck unloading area. Portable chemical toilets would provide for sanitary needs and bottled drinking water would be delivered to the site. The staging area would require a power source for temporary lighting, which would be supplied by existing local power distribution lines, with portable generators to provide backup emergency power supply. The staging area would be enclosed by {00081324.1}

security fencing. During construction, additional satellite staging areas may be located within the project site for temporary material storage and assembly.

Temporary Internal Driveways

Construction access through the project site would be provided by temporary all-weather driveways composed of native compacted soil and treated with dust palliative as needed. Temporary project entrances would include crushed stone and metal riffle plates for removing soil from the wheels of construction vehicles prior to exiting to avoid tracking mud and sediment onto county roads and state highways.

Workforce

During construction, the number of workers on each project site at any given time would fluctuate depending on the construction stage. Workforce numbers would be greatest during the middle of the construction period when all construction stages would overlap to some degree. During this overlapping period, the number of workers would reach a peak of up to approximately 640 workers at each typical VCIP project site during the busiest time of construction.

Typically, construction of solar facilities involves 10-hour working days from Monday through Thursday each week, for a total of 200 working days. The daily hours of construction would be staggered depending on the construction trade, with start times ranging from 5 to 7 AM, and with end of shift times ranging from 2:30 to 5:30 PM. Occasionally, workdays and hours may be extended to complete critical components or to make up for schedule delays caused by bad weather. During the hot summer months some workers (e.g., welders) would arrive earlier and leave around midday. For safety reasons, certain construction tasks, such as final electrical terminations, must be performed after dark when no energy is being produced.

Based on construction observation on other solar projects in the region, it is expected that 25 percent of workers would carpool to and from the typical solar project site. During the peak construction period at the typical project site, the construction workers would generate approximately 480 round trips per day (i.e., 640×0.75 [assuming 25 percent of workers would carpool]). Thus, the commuting construction workers on a 250-MW solar project would generate a total of 960 daily trips (in-bound and out-bound) during the peak construction period. Employee traffic generated during less intensive construction periods would be less (for additional detail see Section 4.16 *Transportation* and Appendix E of this PEIR).

In furtherance of the VCIP's project objective to provide community benefits through job creation and training programs for local residents, the construction workforce for the typical VCIP solar project would be largely drawn from the surrounding communities, with the possible exception of project management personnel. It is estimated that the average round-trip commute length for construction personnel would be approximately 95 miles. Construction workers would park at the on-site construction staging area.

Construction Deliveries

Construction materials, equipment and supplies would be delivered to the typical solar project site by truck. Construction would involve the use of numerous pieces of construction equipment and support vehicles at various stages of construction. This would include grading and excavation equipment such as graders, scrapers, dozers, compactors, trenchers, and backhoes, and general construction equipment like concrete mixers, cranes, hydraulic and vibratory pile drivers, forklifts, water trucks, ATVs, pick-up trucks, and generators. This equipment would be brought to the project site when needed and would remain on-site throughout the duration of the activities for which they are needed.

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It is estimated that the typical 250-MW solar project would receive an average of about 40 deliveries per day over the 200-day construction period. Deliveries of solar modules and support structures, electrical components, battery systems, concrete and aggregate would occur throughout the construction period. The equipment and material deliveries would originate in various locations in central California and would follow designated truck routes to travel to the project site. It is anticipated that most deliveries of solar modules, tracking systems, and major electrical components would originate from the Port of Oakland, although some could come from the Ports of LA, Long Beach, and Port Hueneme. It is anticipated that aggregate and concrete supplies would be obtained from the nearest sources, which would vary depending on location of the project site within the VCIP. All other construction deliveries are expected to originate from the Fresno area. Truck deliveries would normally occur during daylight hours, although some offloading and/or transporting would occur on weekends and during evening hours.

Impervious Surfaces and Revegetation

The coverage of the typical solar facility with impervious surfaces is minimal since the solar arrays are elevated above the ground and mounted on racks supported by narrow profile steel posts. Relatively small areas of impervious surfaces would be created by concrete pads and footings for the inverters/transformers, substation, the O&M building, the battery containers, and asphalt pavement for site entrances and parking area. The internal driveways would consist of compacted earth or would be surfaced with decomposed granite or other permeable surface material, and would include no asphalt pavement or other impervious materials. A typical solar project would retain over 90 percent of its surface area in vegetated cover, with about 9 percent covered by pervious internal driveways, and less than 1 percent covered by impervious surfaces.

At each solar facility, the exposed soils would be vegetated to prevent erosion and provide dust control. The exposed areas would be planted with an approved native seed mix that would contain only “low water use” plant species that would not require any irrigation, would discourage weed infestation, and would provide habitat value for native wildlife species. The seeding would be performed by a mechanical seed drill which would plant seeds in a continuous stream in furrows at a uniform rate and at controlled depth and then cover the planted seeds with soil. All planted vegetation would receive sufficient **rainfall** for germination and growth during the winter and spring of each year. The vegetation would senesce (die back) during the summer and fall but would remain in place to stabilize the soil. All planted vegetation would receive sufficient sunlight for photosynthesis. As shown in Figure 2.5-1 Typical Solar Arrays, the rows of solar arrays would be widely separated so that they do not cast shade on each other when the sun is low in the sky in the early morning and late afternoon. When the solar arrays are in the horizontal position (at noon), about 67 percent of the solar field is not covered by solar panels and receives direct sunlight. The areas shaded at noon receive direct sunlight at various times in the mornings and afternoons as the trackers rotate the solar panels to follow the sun across the sky.

If the solar operator elects to utilize grazing to manage on-site vegetation, then the typical solar project site may be revegetated with prescribed seed mix which could serve as forage for sheep grazing. (For purposes of the PEIR analysis, it is assumed that the typical solar project would not necessarily employ sheep grazing, in addition to mechanical means of vegetation control. The potential effects of sheep grazing are considered in the relevant analyses, such as water supply, to disclose potential impacts in cases where sheep grazing may be included in solar facility operations. However, sheep grazing is not assumed in other discussions such as project compatibility with Williamson Act contracts, in order to present the most conservative (i.e., environmentally protective) reasonably foreseeable environmental analysis for each resource area.

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Site Management during Construction

Construction Water Use

During construction, non-potable water would be used for dust control and soil conditioning during earthwork. Based on experience with similar projects, the water demand for preparation and construction of a typical 1,600-acre project site would average 0.15 acre-feet per acre (af/ac), resulting in a total consumption of 240 acre-feet of water during the 12-month construction period. As further described in the Water Supply Assessment included as Appendix F of this PEIR, it is anticipated that water for grading and construction would be obtained from existing agricultural wells on the site or in the vicinity.

Bottled water would be provided to the construction workers for consumption. Sanitary needs during construction would be provided by portable chemical toilets which would be serviced as needed by a private contractor.

Stormwater Management and Erosion Control

During grading and construction, soil stabilization and runoff control measures would be required to prevent erosion and sedimentation. The appropriate measures for conditions within the typical solar project site would be specified in the Storm Water Pollution Prevention Plan (SWPPP), as required for all projects over 1 acre in size by the State Water Resources Control Board. The SWPPP would specify Best Management Practices (BMPs) such as stormwater runoff control and hazardous waste management measures, and include monitoring and reporting procedures.

Typical measures would include diversion of runoff away from disturbed areas, protective measures for sensitive areas, mulching for soil stabilization, straw-bale barriers, and siltation or sediment ponds. Specific BMPs would be determined during the final engineering design stage for each project phase. The project SWPPP would be submitted to the State Water Resources Control Board prior to initiation of ground disturbing activities.

Construction Waste Recycling and Disposal

The waste generated during construction would primarily consist of non-hazardous waste materials such as packing containers and materials, waste lumber, wood pallets, scrap metal, glass, plastics, and paper. These waste materials would be segregated on-site for recycling or disposal at a Class III landfill in the region. Consistent with local regulations and the California Green Building Code, the solar project would be required to divert a minimum of 50 percent of construction waste from landfills.

Any waste classified as hazardous such as waste paint, waste solvents, waste oil, degreasing agents, oily rags, concrete curing compounds, adhesives, chemicals, and used batteries would be stored (in an approved storage facility/shed/structure). Hazardous waste generated during construction would be either recycled or disposed of at a Class I disposal facility, as required by state and local regulations.

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2.5.1.1.3. OPERATION OF SOLAR GENERATING FACILITIES

The typical solar generating facility would involve facility operation and monitoring, facility maintenance and management, and implementation of safety and security measures. These are described in turn below.

Facility Operation and Monitoring

Operational activities at a typical 250-MW solar facility would primarily involve monitoring and management of solar generation, which would occur during daylight hours year-round. The project owner would contract with an O&M contractor who would provide operations staff to be stationed at the project O&M facility. Operations staff would manage the facility via SCADA (“Supervisory Control and Data Acquisition”) systems. Operators would monitor and analyze the collected data to determine maintenance needs, respond to automated alerts from the monitoring systems (i.e., in the event of equipment failures or abnormalities), and communicate with customers and transmission facility operators.

Operations and Maintenance Personnel

Up to 5 permanent staff would be on the solar facility site at any given time to perform monitoring duties described above and to conduct visual inspections of equipment, internal roadways, and fencing, and perform maintenance or make repairs, as necessary. Additional workers could be on-site intermittently when equipment needs to be repaired or replaced. Panel washing cycles would involve up to 10 workers for up to 4 weeks per wash cycle, which is expected to occur up to 2 times per year in the summer. During the growing season when sheep may be grazing on site (if the facility operator elects to employ sheep grazing), up to 2 sheep herders could be required to manage the rotation of sheep flocks through the site. At facilities where mechanical mowing and trimming would be the sole means of vegetation management, a staff of 10 would be needed for a period of 4 weeks for each mowing cycle, which would occur twice per year in the winter and spring. It is anticipated that the typical 250-MW solar project would have 5 permanent operations staff and a maximum of 10 additional staff on any given day (the panel cleaning and mowing workers would not overlap). Thus, there would be a maximum of 15 personnel on-site on any given day. On projects that also include on-site ESS facilities, up to five additional permanent operating staff would be needed, bringing the total to maximum of 20 workers on-site at any given time. On average, the typical 250-MW solar and BESS facility would have about 15 workers on site per day.

Vegetation Management

Upon the completion of construction within a given area of a potential VCIP project, the exposed soil would be revegetated through seeding with slow-growing grasses, with the entire site completely or substantially revegetated upon completion of construction (see “Impervious Surfaces and Revegetation” above). Vegetative cover would be kept low (typically no taller than 6 inches) to prevent shading of solar panels and to minimize buildup of combustible fuel loads. The short vegetation cover would also allow passage of emergency vehicles, as well as access for maintenance and panel washing vehicles.

The project site vegetation would be kept low primarily by mechanical means (e.g., mowing, trimming, hoeing) where needed, but could also involve sheep grazing at the facility operator’s discretion. The net vegetated area potentially subject to grazing would be approximately 1,400 acres on a typical 1,600-acre site. The sheep grazing would be managed and controlled by temporary sheep enclosures (i.e., plastic fencing) which would be moved progressively through the project site. Grazing would occur from January until the end of the growing season in May, at which time the sheep would be removed.

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Weed and Pest Control

The typical VCIP solar project would include implementation of a Pest Management Plan (PMP), as required by Fresno County or other applicable approving agency. The PMP would be directed toward prevention and control of infestations by weeds, insects, disease, and vertebrate pests. The PMP would specify measures to prevent infestation of invasive weed species which would reduce the grazing value of the site, pose a fire hazard, and potentially spread to neighboring farmland. Weed control would consist of a combination of methods, including the use of weed-free seed mixes for site revegetation, and keeping vegetation low through mechanical methods such as mowing, trimming, and hoeing, and potentially sheep grazing at the facility operator's discretion. Herbicides would be used only selectively where needed using low-impact chemicals and practices that minimize impacts to protected biological species.

The PMP would specify measures to prevent infestation by rodents such as rats, ground squirrels, gophers, and voles which can cause damage to project structures and spread diseases. The primary objective would be to avoid rodent infestations through preventive measures such as vegetation management (described above) to avoid impacts to protected wildlife species. Natural or ecological control through predation by hawks would also provide incidental control of rodent populations. The use of eradication measures such as application of rodenticides would only be employed as a last resort.

Fire Safety

The typical solar/BESS project would include a number of design and operational measures for fire prevention and suppression. Design measures include incorporation of County design standards for minimum driveway widths, ground clearance, and accessibility to all areas of the project. Fire prevention measures would include vegetation management as described above to minimize the potential for grass fires. All electrical equipment (including inverters) not located within a larger structure would be designed specifically for outdoor installation, and all electrical equipment would be subject to product safety standards. Vehicles and equipment would be required to be parked or stored away from vegetated areas. All construction and operations personnel would be trained in fire prevention and suppression measures, including the safe shut-down of electrical equipment during emergency incidents. Portable carbon dioxide (CO₂) fire extinguishers would be mounted at the inverter/transformer pads throughout the project. Employees would be required to be familiar with the use of fire safety equipment, and smoking would be permitted only in designated areas.

The BESS within the solar facility would consist of a number of prefabricated electrical enclosures containing battery banks and associated switchboards, inverters, and transformers (see Figure 2.5-4). All battery containers would be installed on concrete foundations. The enclosures would have appropriate fire suppression and safety systems in compliance with UL standard 9540, *Standards for the Installation of Stationary Energy Storage Systems*. The batteries and containers would also have to comply with UL 9540A fire test criteria which require battery fires to be contained within a single container. Each energy storage unit used on site would be designed in compliance with the most up-to-date version of the California Fire Code section 1207 *Electrical Energy Storage Systems (ESS)*, which has been adopted as part of the Fresno County Fire Code to minimize risk of fire from stationary storage battery systems and contain fire in the event of such an incident. (For a detailed discussion of potential fire risk associated with BESS and a description of the fire standards and codes that address it, see Section 4.9. *Hazards and Hazardous Materials*, under Impact HAZ-2.) In the unlikely event of battery fire, water for fire suppression would be obtained from an on-site water tank with storage capacity as specified by the Fresno County Fire Protection District (FCFPD), which would also specify minimum fire flows. For potential VCIP projects on lands currently owned by the District, water supply for the on-site storage tanks would be provided by the District from its existing underground water

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distribution system serving all lands within the District. For VCIP projects on privately-owned lands, water supplies would be provided from groundwater wells or surface water supplies from the landowner.

Hazardous Materials and Hazardous Waste Management

The operation and maintenance of the typical solar facility would involve the use of small quantities of hazardous materials such as diesel fuel, gasoline, motor oil, mineral oil in transformers, various solvents and detergents, and lead acid-based batteries used for emergency backup, and lithium-ion batteries used in the ESS.

Hazardous materials and waste would be managed, used, handled, stored, and transported in accordance with applicable local and state regulations. All hazardous materials would be handled, stored, and disposed of in accordance with a Hazardous Material Business Plan (HMBP). Spill prevention and containment would adhere to the requirements set forth in the approved HMBP.

Security

The perimeter of the typical solar facility would be securely fenced and gated to prevent unauthorized access, as described under “Perimeter Fencing” above. The facility operator would contract with a private security company to provide security services during construction and operation. Electronic surveillance equipment such as infrared security cameras and motion detectors would be installed around the solar facility, with video feeds transmitted in real time to the off-site security contractor for monitoring. In the event the surveillance system detects a breach, a security representative would be dispatched to the site, as needed, and the County Sheriff’s office would be notified as appropriate. Experience on previous solar projects in the District indicates that the presence of on-site security staff during construction virtually eliminates the incidence of theft and vandalism at the sites. During project operations, the presence of on-site security staff during all off hours (evenings and weekends) likewise virtually eliminates the incidence of theft and vandalism at the facilities (Biller 2025).

Solar Module Cleaning

The PV modules would be washed periodically to remove dust to maintain efficient conversion of sunlight to electrical power. The cleaning interval would be determined by the rate at which electrical output degrades between cleanings. Periodic panel washing would occur during the dry summer months when there is an increased potential for deposition of windblown dust from nearby agricultural operations. It is anticipated that panel washing would be required up to two times per year, and would be accomplished using light utility vehicles with tow-behind water trailers. No chemical cleaners would be used for module washing. It is estimated that water demands from one complete cycle of panel washing would be approximately 2.5 acre-feet for each 250 MW project based on the usage rate reported for the 250-MW Aquamarine Solar Facility, which is part of the Westlands Solar Park in Kings County. Two panel cleaning cycles per year would use approximately 5.0 acre feet of water (AFY) to clean all panels associated with the typical 1,600-acre project site. As further described in the Water Supply Assessment included as Appendix F of this PEIR, a water requirement is well under the District’s maximum allowance of 5 AFY per 160 acres for M&I uses associated with solar projects. It is noted that panel cleaning at the Aquamarine Solar Facility was conducted twice in 2022, and only one time each year in 2023 and 2024. It is anticipated that only one panel washing cycle per year would be needed, except in very dry years, like 2022, when up to two panel cleaning cycles may be needed (Biller 2025).

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Overall Operational Water Demands

At the typical VCIP solar/BESS facility, general operational activities, such as washing or rinsing equipment, etc., are estimated to require 24,000 gallons (0.074 acre feet) of non-potable water annually. This is based on consumption rate of up to 2,000 gallons per month reported for the Aquamarine Solar Facility (Biller 2025).

Assuming the typical solar project employs sheep grazing for vegetation control, the sheep used for grazing would each require up to 3 gallons of water per day. Assuming a sheep grazing density of 0.5 sheep per acre over approximately 1,400 acres to be grazed, a total of 700 sheep would be employed. During a 5-month (151-day) grazing period (January through May), the total water requirement for sheep watering would be 317,100 gallons, or 0.97 AFY per project site.

As discussed above, the washing of solar modules on each typical 1,600-acre project site would use up to approximately 5.0 AFY, based on two washing cycles per year.

Based on the annual water consumption estimates provided above, the combined operational water use by a typical 250-MW facility for panel washing (5.0 AFY), sheep watering (0.97 AFY), and general operational uses (0.074 AFY) would total approximately 6.05 acre-feet of water annually over the 1,600-acre project site. This is equivalent to 0.004 acre-feet per acre, or 0.6 acre-feet per quarter-section (160 acres).

Operational water supplies would be obtained from various sources depending on land ownership. For potential solar facilities on lands leased (or with easements) from private landowners, operational water would be provided from the landowners' retained eligibility for surface and groundwater allocations, or would be obtained on the open market and wheeled through the District's water distribution system. For potential solar facilities on lands currently owned by the District (whether leased, transferred, or with easements from the District), the District would provide operational supplies through its existing system of lateral pipelines for conveyance of imported surface water.³ The District has established an annual allocation of water deliveries for PV solar projects which do not qualify for surface or groundwater allocations, as is the case with lands owned by the District. Solar PV facilities on District-owned lands are eligible to receive up to 5.0 acre-feet per quarter-section per year for operational uses. As noted above, the operational water usage rate at a typical 250-MW solar facility is estimated to be 0.67 acre-feet per quarter-section per year, which is well within the District's maximum annual allowance of 5.0 acre-feet per quarter-section.

Small quantities of potable water would be required at the solar facilities for domestic uses. Potable water would be delivered to the facility by a commercial water delivery service. The typical 250 MW solar plus energy storage facility would include a water storage tank for potable water which would provide for drinking, hand washing, and toilet flushing at the O&M building. The water tank would be refilled regularly at a rate of approximately 5,000 gallons (0.015 AF) per month (i.e., the capacity of a standard water tanker truck), for a total of approximately 0.18 AFY at each typical 250-MW project site and 16 AF per year for full VCIP implementation. (This compares with total non-potable operational water use of approximately 508 AFY for all VCIP facilities at full buildout. Given the small quantities of potable water that would be required and multiple water delivery services within the vicinity of the Plan Area, there are sufficient supplies to meet all potable water demands.

³ Because District-owned lands are no longer irrigated, these lands will be subject to the same restrictions and are ultimately treated the same for the purposes of this analysis – regardless of whether they leased by the District or transferred during potential implementation of the VCIP. As such, these lands are simply referred to as “District-owned lands” throughout this PEIR.

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2.5.1.1.4. DECOMMISSIONING AND SITE RECLAMATION

At the end of its useful life after approximately 35 years of operation, it is anticipated that the typical solar facility would be decommissioned, and the site would be reclaimed in accordance with an approved Reclamation Plan.

Decommissioning would begin with removal of the solar modules, which would be recycled or disposed of as e-waste. The racks and trackers would be disassembled, and the steel posts supporting the racks would be removed. Site infrastructure would be removed, including inverters, transformers, each site's substation, battery containers, as well as all electrical cables, concrete pads, fences, and other related equipment and material. The demolition debris and removed equipment may be cut or dismantled into pieces that can be safely lifted or carried by standard construction equipment. Project internal driveways would be restored to their pre-construction condition unless they are needed for subsequent land use, to be determined through subsequent planning and environmental review. Equipment and materials would be reused and/or recycled to the extent practicable. Upon complete removal of equipment and salvageable material, the site would be cleared of any remaining trash and debris.

Since these decommissioning activities would involve exposure and disturbance of soils, measures for erosion and sediment control would be implemented in accordance with a Storm Water Pollution Prevention Plan (SWPPP) which would be required for decommissioning. Water for dust suppression would also be required, with the overall volume and sources of water required expected to be similar to the volume used during construction.

After the last remnants of the solar facility are removed and hauled off-site, the land would be tilled to restore the topsoil to a density and consistency suitable for farming. Finally, the site would be reseeded with an appropriate weed-free seed mix to provide soil stability and moisture retention prior to the resumption of farming or grazing.

It is expected that the decommissioning of the typical solar facility would involve a similar or lower level of activity than the original project construction. Decommissioning may involve less equipment use and fewer haul truck trips, and the time required for decommissioning may be less than the duration of the original project construction.

2.5.1.2. STAND-ALONE ENERGY STORAGE FACILITIES

As an alternative to co-locating and integrating the potential BESS facilities with the potential solar facilities, the VCIP also contemplates stand-alone energy storage facilities (with a total storage capacity of up to 10,000 MW) which would operate independently of solar generation facilities, and which would occupy a total combined land area of about 500 acres. These facilities would provide storage for excess solar power generated at off-site solar facilities during low grid demand periods, and would dispatch the stored power to the electrical grid when needed. The battery storage units would be the same or similar to those included within solar facilities as described in Section 2.5.1.1 (See Figure 2.5-4 for illustration of a typical energy storage facility.) It is noted that while the VCIP contemplates up to 10,000 MW of stand-alone energy storage facilities, it is possible that the total overall energy storage capacity of stand-alone facilities that is ultimately installed in the Plan Area may be substantially less than this, but is unlikely to be greater.

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It is anticipated that the typical stand-alone energy storage facility would occupy up to 50 acres and provide up to 1,150 MW of storage, at 4 hours per MW, for a total storage capacity of 4,000 MW hours (MWh). The locations of these stand-alone energy storage facilities have not been determined, but it is anticipated that they would be dispersed throughout the Plan Area and located near the five VCIP collection substations described below. The energy storage systems would use one or more proven battery storage technologies such as lithium-ion, iron-flow, sodium-sulfur, or vanadium-redox-flow batteries, and could potentially include flywheel banks housed in electrical enclosures. Emerging storage technologies which could be employed include sodium-ion and zinc batteries. Currently, the most common energy storage technology is lithium-ion batteries. (For purposes of the PEIR analysis, it is assumed that lithium-ion battery storage would be utilized although other proven or emerging technologies mentioned above could also be employed. The PEIR discussion will note differences in impacts associated with the different storage technologies, as appropriate.) The battery storage units would consist of metal containers 40 feet long by 8 feet wide by 8.5 feet high. Each storage unit would be self-contained and would include battery racks, switchboards, integrated HVAC units, and inverters. Transformers would be located outside the battery storage containers, and each transformer would serve up to four containers. In some energy storage systems, the inverters are co-located with transformers outside the containers.

The prefabricated electrical enclosures containing battery banks and associated switchboards, inverters, and transformers would have appropriate fire suppression and safety systems built to code and in compliance with UL standards as described above. The final design would include containment features to prevent the escape of liquids or spills from the energy storage site. Each energy storage unit used on site would be designed in compliance with the California Fire Code, which has been adopted as the Fresno County Fire Code, which would minimize risk of fire from stationary storage battery systems and contain fire in the event of such an incident. (For a detailed discussion of fire risk associated with BESS and a description of the fire standards and codes that address it, see Section 4.9. *Hazards and Hazardous Materials*, under Impact HAZ-2.)

On-site support facilities for the typical energy storage facilities would include a substation, a SCADA system, access roads, security lighting and fencing. The energy storage containers and transformers would be founded on concrete pads, or could utilize foundation systems consisting of concrete piles and steel beams. The areas between the containers would be surfaced with crushed aggregate.

Construction of a typical 1,000 MW energy storage facility would be completed in about 12 months (200 workdays) and would involve 95 workers on average and 110 workers during peak construction periods. These workers would be drawn from the surrounding communities and would have an average roundtrip commute of about 95 miles. Construction would involve approximately 1,840 truck deliveries, including 2,000 for battery containers, transformers, substation equipment, and construction equipment, 4,400 for aggregate, and 400 for concrete. On average, the energy storage facility would receive about 34 truck deliveries per day over the 200-day construction period.

Water consumption rates during construction of stand-alone energy storage systems would be similar to that for solar/BESS facilities. At a demand rate of 0.15 AF per acre, the typical 50-acre energy storage site would require a total 7.5 acre-feet of water for dust suppression and soil conditioning during the 12-month construction period for each site.

Construction of the energy storage facilities would be subject to the same site management requirements as the solar generating facilities described in Section 2.5.1.1.2 above. This would include preparation and

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implementation of SWPPPs for storm water management and erosion control, management of waste disposal and recycling, and hazardous materials management.

Operation of the energy storage facilities would be similar to solar generating facilities as described in Section 2.5.1.1.3., except there would be no maintenance of solar arrays. The operation of a 1,000 MW energy storage project would be similarly managed by a SCADA system, with about 20 permanent staff to manage operations. Similar vegetation, pest control, and waste management requirements would apply, as would hazardous materials and fire safety protocols. Security measures would also be similar and would include electronic surveillance and off-site monitoring.

Water consumption rates during operation would be lower than solar facilities since there would be no need for panel washing or sheep grazing.⁴ Based on consumption rates at other energy storage facilities, the typical 50-acre energy storage project would require approximately 1,000 gallons (0.003 AF) of water per year (Fresno County 2023d).

Decommissioning of the energy storage facilities would involve many of the same steps as solar generating facilities, as described in Section 2.5.1.1.4 above. Decommissioning would involve complete removal of all project components, including battery containers, transformers, gravel, concrete, asphalt, and underground conduits, followed by restoration of the site to pre-project conditions, as required by a Reclamation Plan approved by Fresno County.

2.5.2. Infrastructure Plan

The components of the Infrastructure Plan include: (1) gen-tie lines; (2) collection substations; and (3) transmission lines within the VCIP. Each of these components is described in turn below.

2.5.2.1. GEN-TIE LINES

2.5.2.1.1. DESCRIPTION OF GEN-TIE LINES

The renewable power from the solar generating and energy storage facilities would be transferred to double-circuit 230-kV gen-tie lines which would convey the power to one of five collection substations located on the backbone transmission collection line within the VCIP. As noted previously, the gen-tie lines would branch out from each of the five collection substations to serve the solar and energy storage facilities in the vicinity. Each gen-tie line would have a transmission capacity of approximately 1,000 MW, so that four gen-tie lines would be needed to deliver power to each of the five collection substations, which would each have capacities of approximately 4,000 MW, on average. The gen-tie lines would extend from 10 to 50 miles from the nearest collection substation depending on the location of the solar or energy storage facility to be served. It is estimated that approximately 260 miles of gen-tie line would be needed to serve the VCIP solar and energy storage facilities. It is anticipated that the gen-tie lines would be constructed at a pace of about 26 miles per year, on average, over the 10-year buildout period.

⁴ Sheep grazing would not be feasible on the stand-alone BESS project sites because the energy storage containers would be founded on concrete pads and would not be vegetated like the areas beneath potential solar arrays. {00081324.1}

The tower structures of the gen-tie lines would consist of self-supporting tubular steel poles (TSPs or monopoles)(see Figure 2.5-5). (Although four-legged steel lattice towers have been traditionally utilized for transmission lines, monopoles are currently favored due to their reduced cost [which is now comparable to lattice towers], their unobtrusive visual profile, and because they are highly suitable for flat terrain with deep soils, as occurs throughout the Plan Area.) The tower-to-tower spans would be as short as 800 feet, and the monopoles would range in height from 100 to 180 feet depending on location and span distances between monopoles. It is estimated that the VCIP gen-tie lines would include a total of up to 2,000 monopoles (i.e., 7.7 towers per mile, which includes one extra pole per mile to account for double poles needed at turning and crossing points).

The monopoles would consist of two main types of structures. Heavier and stronger monopoles would be installed at both ends of each gen-tie line, and at overcrossings at county roads, state highways, and the Aqueduct, and also at turning and crossing points in the gen-tie alignments. These heavier monopoles would be bolted onto steel-reinforced concrete piers which would be cast in place in excavated holes in the ground. The concrete footings would be up to 35 feet deep and up to 8 feet in diameter. The remainder of the monopoles would consist of lighter poles which would not have concrete footings but would instead include a solid steel bottom section which would be imbedded directly into the ground to a depth of up to 25 feet. It is estimated that about one-third of the monopoles (666 poles) would consist of heavier structures founded on concrete footings, with the remaining two-thirds (1,334 poles) consisting of lighter-duty structures imbedded directly into the ground.

The monopoles would carry conductors (“wires” or “cables”), insulators, and ground wires for two electrical circuits. Each circuit would consist of three phases, which would be carried on separate conductor cables arranged in a horizontal pattern. The two circuits would be installed from arms extending from both sides of the poles. Conductors must meet minimum ground clearances (at the bottom of the conductor sag), typically 27 to 30 feet above the ground. To protect conductors from the hazard of direct lightning strikes, overhead ground wires (shield wires) or fiber optic ground wire would be installed on top of tower structures to transfer lightning currents into the ground.

2.5.2.1.2. CONSTRUCTION OF GEN-TIE LINES

This section describes the construction of 26 miles of double-circuit 230-kV gen-tie line, representing the annual average of gen-tie line anticipated to be constructed over the 10-year VCIP buildout period.

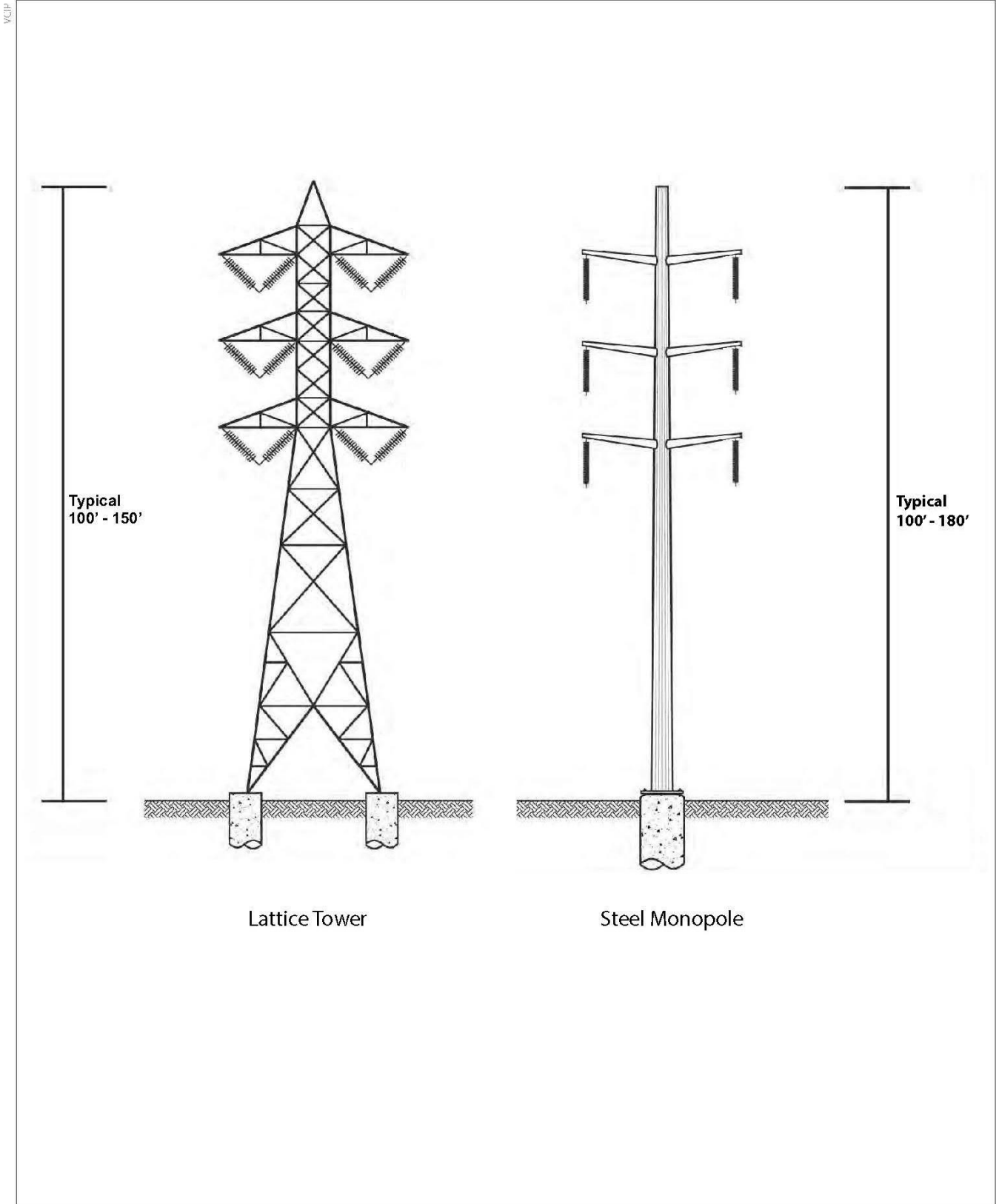
Construction Overview

It is estimated that the construction of the average 26-milelong gen-tie line to the nearest collection substation would be completed in approximately 6 months (100 working days). The construction of the gen-tie line would include the following general sequence of activities: right-of-way acquisition; surveying and pre-construction activities; preparation of the staging area; clearing of tower sites; tower installation; conductor installation; installing substation tie-ins; and site reclamation. Each of these activities is described below.

Right-of-way Acquisition

Although much of the gen-tie line rights-of-way would be on lands within the Development Focus Areas (i.e., lands owned by the District or participating private landowners), some gen-tie segments would need to be routed over privately-owned farmland outside the DFAs, and thus would require the acquisition of right-of-way (ROW) from the landowners.

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Typical 230-kV Transmission Towers
Figure 2.5-5

The ROWs would be in the form of easements, which would allow agricultural activities to continue within the right-of-way. The easement width for the gen-tie lines would range from 175 to 350 feet.

Surveying and Pre-Construction Activities

Construction survey work would consist of locating the centerline, tower locations, ROW boundaries, and temporary disturbance areas for pulling and tensioning activities, and temporary tower access roads. Once the centerline and disturbance areas have been surveyed and clearly marked in the field, preconstruction surveys for biological resources would be conducted. Geotechnical investigations would also be conducted to determine soil densities and strength for use in soils engineering and structural design.

Construction Access

Each tower site would require vehicular access during construction, and also during gen-tie line operation to allow access for inspection and maintenance. It is assumed that the gen-tie alignments would be designed to follow the existing county roads and farm roads, therefore few if any new access roads are anticipated to be needed.

Clearing Gen-Tie Right-of-Way

To reduce hazards associated with direct contact with trees and vegetation, minimum electrical safety clearances would be required as specified by national electrical safety standards. Within the gen-tie rights-of-way, it is anticipated that existing orchard trees and vineyards would need to be cleared from the tower installation sites and from planned pulling and tensioning sites.

At the tower sites, temporary clearance areas for construction of the monopoles would typically require a 90 foot by 90-foot area, or 8,100 square feet (0.2 acres) at each monopole site. Pulling and tensioning sites would be spaced about one mile apart along the gen-tie line (i.e., approximately 26 pulling and tensioning sites on along each gen-tie line). Each pulling and tensioning site would typically require an average of 4 acres for equipment maneuvering. Within gen-tie segments outside the DFAs, the landowners would be compensated for any loss or damage to crops as part of their easement agreements, and could replant the temporary clearance areas after completion of the gen-tie line. (Estimates of temporary and permanent land disturbance associated with gen-tie construction are contained in Table 2.5-1.)

Construction Staging Area

It is anticipated that one construction yard or staging area would be required for each gen-tie project to provide for storage of materials (e.g., conductor reels, structure hardware, etc.), construction equipment and vehicles, parking areas for crew vehicles, temporary construction offices, and portable sanitation facilities. The sections of the steel towers would be delivered directly to their pole locations and would not be stored at the staging area. It is anticipated that the typical staging for the gen-tie construction would require a 5-acre site.

Tower Installation

The first step in tower installation would be to prepare a cleared work area at the tower site to accommodate the construction of the tower footings, laydown areas for tower segments, work areas for the assembly of the tower structure, and sufficient area to allow necessary crane maneuvers for tower installation. As mentioned,

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a temporary cleared work area of up to 0.2 acres would be required for a typical monopole site. The sites would be cleared, graded, and compacted where necessary to accommodate heavy vehicles.

As noted, the monopoles would consist of two main types of structures. At turns in the gen-tie line and at road crossings, heavier and stronger monopoles would be bolted onto steel-reinforced concrete piers which would be cast in place in excavated holes in the ground. The concrete footings would be up to 35 feet deep and up to 8 feet in diameter. The remainder of the monopoles would consist of lighter poles which would not have concrete footings but would instead include a solid steel bottom section which would be imbedded directly into the ground to a depth of up to 25 feet. Approximately one-third of the monopoles would consist of heavier structures founded on concrete footings, with the remaining monopoles consisting of lighter-duty structures imbedded directly into the ground. The average 26-mile gen-tie line would include a total of 200 monopoles (at 7.7 per mile), including 66 large monopoles and 134 lighter duty poles.

For the larger monopoles, the holes for tower foundations would be bored or augured, and concrete poured in place over the pre-assembled reinforcing steel cages set into the holes. Depending on load requirements and soil characteristics, an average of 65 cubic yards (cy) of concrete is estimated to be required at each tower site to install footings or piers (based on a diameter of 8 feet and an assumed footing depth of 35 feet including 2 feet above ground). Once the concrete has cured, the towers would be bolted to the piers. Sections of pole would be hauled to each tower site and lifted into place with a crane and bolted together.

As mentioned, the lighter-duty monopoles would be imbedded directly into bored holes to a depth of up to 25 feet. The buried portions of these structures would consist of thicker steel to provide ballast and would be pre-treated to resist corrosion. These monopole foundations would require no concrete. The soil excavated from all of the foundation holes would be distributed over the adjacent lands and would not be exported from the tower sites.

Upon completion of construction activity, a permanent setback area would be kept clear around each tower structure for maintenance access and fire safety purposes. It is expected that the typical finished tower pad, including a permanent clearance area, would measure approximately 30 feet by 30 feet and occupy an area of up to 900 square feet (0.02 acres). Upon completion of each segment of gen-tie line, the areas disturbed during construction would be restored as appropriate to allow for resumption of cultivation of row, tree, and other crops, if applicable.

Conductor Installation

After the towers are completed, the conductors and ground wires would be installed. This would begin by stringing pilot lines from tower to tower. The pilot lines would guide the pulling of conductors and ground wires, which would be kept under tension to prevent contact with the ground and obstacles. The stringing of pilot lines would be performed by helicopter for all monopoles, and boom lifts or aerial man lifts would be used to complete the connections of the conductors to the monopoles.

Conductors and ground wires would be strung and tensioned using powered pulling equipment at one end and powered braking or tensioning equipment at the other end of a conductor segment. Pulling and tensioning sites would be spaced about one mile apart and would each temporarily occupy areas of about 4 acres. It is anticipated that these stringing equipment sites would mainly be located within the gen-tie easements. In locations where the gen-tie alignment changes course, the pulling and tensioning sites could extend beyond the gen-tie corridor at these angles or corners, but would not extend more than 800 feet from

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the easement. As with the monopoles, the precise locations and dimensions of the pulling and tensioning sites would be determined at the engineering design stage.

Helicopter services for stringing of the pilot lines would be obtained on a short-term contract basis from an aviation firm in the region. It is expected that the helicopter would depart and return to its home base daily and that temporary landing zones to serve the gen-tie projects would not be required.

The gen-tie lines will need to cross over existing physical features and infrastructure such as roads and highways, canals, and electrical distribution lines. To protect these underlying features during conductor stringing, guard structures would be installed to intercept any falling cables and prevent them from dropping below a specified height. Typical guard structures consist of standard wood poles, 60 to 80 feet high, connected by a similar wood cross member to form an “H-frame.” Typically, guard structures would be placed on either side of the protected feature, with protective netting strung from the cross members on one guard structure to the cross members on the opposite structure. Guard structures would be designed and installed in accordance with applicable safety requirements. At each crossing location, the guard structure would be removed once the overhead conductors have been secured to towers. Encroachment permits would be obtained from Fresno County and Caltrans for the public road and highway crossings, and encroachment permits for the power line crossings would be obtained from the PG&E. Encroachment permits would also be required for any crossings of the San Luis Canal/California Aqueduct, to be issued by the United States Bureau of Reclamation (USBR) or the California Department of Water Resources (DWR) as applicable.⁵ The encroachment permits would include conditions regarding safety measures and traffic control.

Site Management during Gen-Tie Construction

Dust Control

During construction, water trucks would be used for regular application of water to minimize dust generation. Gen-tie construction would include compliance with the fugitive dust measures specified in a Dust Control Plan approved by the San Joaquin Valley Air Pollution Control District (SJVAPCD).

Drainage and Erosion Control

Measures to prevent erosion during construction would be specified in the Storm Water Pollution Prevention Plan (SWPPP) required for each gen-tie project by the State Water Resources Control Board. The SWPPPs would specify Best Management Practices (BMPs) for erosion control and hazardous material containment to be implemented during construction. Drainage control features would be installed, as appropriate, to minimize stormwater runoff from construction areas.

Construction Waste

During construction, the waste generated would primarily consist of non-hazardous waste materials such as waste lumber, scrap metal, green waste, and common trash. These waste materials would be collected and

⁵ While outside the scope of this CEQA analysis, is anticipated that USBR would issue encroachment permits under NEPA Categorical Exclusion 516 DM 14.5(D)(10), which applies to the issuance of permits, licenses, easements, and crossing agreements which provide right-of-way over BOR lands where the action does not allow for or lead to a major public or private action.

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taken to the main construction staging yard where they would be segregated for recycling or disposal at the appropriate facilities.

Some quantities of hazardous waste would be generated during construction. These waste materials would include fuels, lubricants, and cleaning solvents, etc. Hazardous waste generated during construction would be either recycled or disposed of at a Class I disposal facility, as required.

Land Disturbance and Restoration

The construction of the gen-tie lines would result in temporary and permanent land disturbance at tower locations and in temporary land disturbance at work sites and staging areas. Table 2.5-1 on the next page contains estimates of land areas that would be permanently and temporarily disturbed. These estimates include the entire 260 miles of gen-tie line anticipated for the VCIP.

Upon completion of each segment of gen-tie line, the areas disturbed during construction would be restored as appropriate to allow for resumption of cultivation of row, tree, and other crops, if applicable.

Construction Workforce and Equipment

Workforce

The average 26-mile gen-tie line segment is expected to be constructed over a 6-month period (100 workdays) and have an average workforce of approximately 40 construction workers on any given day, with a peak of 50 workers on the busiest days. It is expected that most of the construction personnel would be drawn from the communities in the region, although some specialized workers may need to be brought in from outside the area and provided with per diems to pay for lodging in local hotels or other rental accommodations.

TABLE 2.5-1
VCIP GEN-TIE LINES – LAND DISTURBANCE ESTIMATES¹

Gen-Tie Project Feature	Quantity	Land Disturbance (Acres)		
		Total Disturbance Area	Temporarily Disturbed/ To be Restored	Permanently Disturbed
Tower Sites	2,000 ²	400 ³	360	40 ⁴
Pulling/Tensioning Sites	260 ⁵	1,040 ⁶	1,040	0
Staging/Material Storage Sites	26	104	104	0
Totals	--	1,544 ac.	1,504 ac.	40 ac.

Footnotes:

¹ Total length of gen-tie corridor within the VCIP is estimated to be 260 miles.

² Monopoles would be spaced about 800 feet apart; or 6.6 monopoles per mile, plus 1 extra pole per mile for turning points.

³ Temporary disturbance area at each monopole site = up to 0.2 acres (8,100 sf), i.e., temporary clear areas = up to 90 X 90 feet.

⁴ Permanent disturbance area at each monopole site = 0.02 acres (900 sf), i.e., permanent clear areas = 30 X 30 feet.

⁵ Pulling/Tensioning sites are one mile apart.

⁶ Pulling/Tensioning sites estimated to disturb an average of 4 acres each.

⁷ One staging site per 10 miles of corridor over 260 corridor miles. Each staging site is 4 acres.

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During the 100-day construction period, the work activities would be distributed along the gen-tie line, with various crews engaged in surveying, ROW clearing, pole foundation installation, tower assembly and erection, conductor installation, and reclamation. Although some ridesharing would occur, it is assumed that all construction workers would be solo commuters. Assuming that all 40 workers would commute solo, the peak daily traffic generated by construction personnel would be 40 AM trips and 40 PM trips.

Typically, gen-tie construction would take place in 10-hour shifts between the hours of 6 AM and 5 PM, Monday through Thursday, although work could take place outside these hours if needed. For example, crossings over public roadways may be scheduled during nighttime hours to minimize traffic disruption. For any work taking place after dark, night lighting would be required for safe working conditions, but the lights would be directed toward the work areas.

Construction Deliveries

Equipment and Materials

The construction of the average 26-mile gen-tie line is expected to use approximately 60 pieces of construction equipment and support vehicles at various stages of construction. This would include equipment such as graders, back-hoes, bobcats, auger trucks, concrete mixer and pump trucks, cranes, aerial lifts, forklifts, puller trucks, tensioner trucks, winch trucks, bucket trucks, water trucks, fuel trucks, skip loaders, tractor trailer trucks, pick-up trucks/crew cabs, compressors, and generators. Equipment deliveries would include approximately 24 flatbed deliveries of small equipment, plus 24 deliveries of large mobile equipment, and 15 pickup trucks and crew cabs. In total, there would be about 48 deliveries of construction equipment, plus 15 pickup trucks.

Deliveries of power poles, hardware, conductor spools, concrete, and equipment would occur throughout the construction period. Consistent with the VCIP's objective to provide community benefits, equipment and materials would be procured from existing local businesses and vendors and would originate from various locations in central California. These deliveries would utilize regional highways and local roads to reach the gen-tie corridor.

Concrete and Monopole Deliveries

Concrete would be delivered to pole sites by concrete mixer trucks for pouring of the tower footings. It is expected that concrete would be provided by the nearest supplier depending on location within the VCIP. It is estimated that an average of 65 cubic yards (cy) of concrete would be required at each of the 66 poles with concrete foundations, for a total of approximately 4,290 cy of concrete. Given a concrete mixer truck capacity of 10 cy, a total of 430 concrete deliveries would occur. Deliveries of monopole sections, conductors, insulators, and other hardware would involve a total of approximately 800 deliveries, based on 4 deliveries for each of the 200 towers. In total, the construction of an average 26-mile gen-tie line would involve approximately 1,278 deliveries of equipment, components and materials, or an average of 12.8 deliveries per day over the 100-day construction period.

2.5.2.1.3. OPERATION AND MAINTENANCE OF GEN-TIE LINES

After completion, the gen-tie line would be inspected, maintained, and repaired in accordance with the applicable regulatory requirements. Gen-tie components would be inspected at least once per year for corrosion, equipment misalignment, loose fittings, and mechanical problems. Vegetation, landscaping, and

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agricultural crops in the vicinity of the towers and conductors would be maintained at clearance distances as required by applicable regulations and safety standards.

2.5.2.1.4. DECOMMISSIONING AND RECLAMATION OF GEN-TIE LINES

At the end of the useful life of each solar generating facility and energy storage facility, the facility site would be decommissioned and reclaimed as described in Section 2.4.1.14. Each gen-tie line may serve several solar and/or energy storage facilities which may be decommissioned at different times depending on when they were constructed and remaining time on their power and energy sale agreements. Once all the facilities served by a gen-tie line have been decommissioned and the gen-tie line is de-energized, it would be decommissioned unless it is needed for another purpose as determined by the gen-tie owner and approved by the governing agency. Decommissioning would involve the dismantling and removal of conductors, insulators, and hardware from the right-of-way. Tower structures would be removed, and foundations removed down to at least 5 feet below the ground surface. Dismantled materials would be salvaged for reuse, or recycled, or hauled to an approved landfill site for disposal. The gen-tie corridor would then be reclaimed and restored to pre-project conditions, in accordance with an approved Reclamation Plan. The decommissioning activities would generally follow those described for the solar facilities in Section 2.4.1.1.4.

2.5.2.2. VCIP COLLECTION SUBSTATIONS

The Infrastructure Plan includes five large collection substations which would be evenly distributed from north to south along the backbone transmission corridor at approximately 15-mile intervals. These 500/230-kV substations would serve as collection points for power generated in the surrounding DFAs as received from the gen-tie network and would provide interconnection to the state and federal power systems. The substations would step-up the collection voltage from 230- to 500-kV for transfer to the electrical grid (see Figure 2.5-6).

It is expected that each collection substation would accommodate approximately 4,000 MW of solar generation. Each collection substation is anticipated to have a footprint of up to 60 acres, to be located within larger site of about 160 acres which would provide sufficient buffer area to accommodate the convergence of incoming gen-tie lines from the nearby solar generation and energy storage facilities.

Each collector substation would include several circuit positions, which would each include steel support structures, bussing, transformers, circuit breakers, disconnect switches and associated equipment, and a relay house and control house containing control and protective relaying equipment, and security systems. The station yards would be graded to maintain positive drainage, with stormwater basins constructed if needed to prevent runoff from leaving the station sites. The substation sites would include paved internal access roads, and unbuilt areas of the station yards would be covered with crushed-rock aggregate. The tallest structural elements within substations would be dead-end structures up to 140 feet high. Each dead-end structure would require foundations excavated to a depth of 20 feet or more. The substations would be enclosed by an 8-foot high concrete/masonry wall for security.

Construction of the collection substations would involve site clearing and grading of access road, installation of concrete foundations and steel support structures, installation of below- and above- ground electrical conduits and grounding conductors, and installation of control and relay houses.

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VCIP



Typical 500/230-kV Collector Substation
Figure 2.5-6

The construction of each collection substation would take about 24 months (400 workdays) and would involve 80 workers on average and 100 workers during peak construction periods. These workers would be drawn from the surrounding communities and would have an average roundtrip commute of about 95 miles. Construction of each collection substation would involve approximately 2,620 truck deliveries, including 140 for construction equipment, 480 for structures and electrical components, 400 for concrete, and 1,600 for aggregate. On average, each collection substation would receive about 6.6 truck deliveries per day over the 400-day construction period.

Water consumption rates during construction would be similar to solar facilities. At a demand rate of 0.15 AF per acre, the typical 60-acre collection substation site would require 9.0 acre-feet of water for dust suppression and soil conditioning.

Construction of the collection substations would be subject to the same site management requirements as the solar generating facilities described in Section 2.5.1.1.2 above. This would include preparation and implementation of SWPPPs for storm water management and erosion control, management of waste disposal and recycling, and hazardous materials management.

Operation of the collector substations would be similar to the operation of the project substations at the solar facilities as described in Section 2.5.1.1.3. The operation of the collector substations would be similarly managed remotely by SCADA systems, and no permanent staff would be required to manage the facility operations. Similar vegetation, pest control, and waste management requirements would apply, as would hazardous materials and fire safety protocols. Security measures would also be similar, consisting of electronic surveillance and off-site monitoring.

As there would be no permanent operations staff or other routine activities that would use water, water consumption during operation of the collection substations would be, at most, negligible.

At the end of the useful life of the nearby solar and energy storage facilities, when all of the facilities served by a collection substation have been decommissioned and the incoming gen-tie lines have been de-energized, the collection substations would not be decommissioned since they would continue to have usefulness in providing system redundancy and resilience for the state and federal power grid.

2.5.2.3. VCIP CONNECTOR TRANSMISSION LINES

2.5.2.3.1. DESCRIPTION OF THE VCIP CONNECTOR TRANSMISSION LINES

As described in Section 2.3.2., the five collection substations within the VCIP would be connected by a backbone transmission corridor running through the center of the VCIP in a northwest-southeast direction (see Figure 2.3-1). This corridor would be approximately 59 miles long and would include two parallel 500-kV transmission lines which would collect VCIP-generated power for conveyance to the state and federal power systems. The planned transmission alignment is described as follows. Commencing in the north from the planned Substation No. 1 (Newpoint) at N. Fairfax and W. Ashlan Avenues, the transmission corridor would extend east and southeast to a point 0.7 miles west of the City of Mendota boundary where it would turn south and continue to Substation No. 2 just west of SR-33 and north of W. American Avenue. From there the

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transmission corridor would generally follow the eastern Plan Area boundary, connecting to Substation No. 3 near the intersection of W. Floral Avenue and S. San Mateo Avenue, and then continuing southeastward to the Substation No. 4 near Five Points, and then southward along SR-145 to Substation No. 5 at SR-198.

The 59-mile long VCIP connecting transmission corridor is planned to include two parallel 500-kV transmission lines within 1,000-foot wide corridors. Each 500-kV transmission line requires a 200-foot right-of-way, and parallel rights-of-way are required to be 50 feet apart. Thus the two parallel lines would require a combined right-of-way of approximately 450 feet (200 + 50 + 200), with the additional corridor width included for planning purposes to allow for additional equipment maneuvering space during construction as well as design flexibility at the engineering stage.

In addition to the connecting transmission corridor, a central transmission corridor is planned to run east-west through the Plan Area to provide connection between the VCIP backbone corridor at Substation No. 3 and the new Manning Substation planned in the vicinity of W. Manning Avenue and Interstate 5. This single 500-kV transmission line would be approximately 20 miles long and would provide an alternative path for energy exported from the VCIP to connect to the larger grid and thus provide redundancy and resilience to the system. It is noted that the Manning Substation is currently in the CPUC approval process and is planned to be in service in June 2028. Thus, while the Manning Substation itself is not part of the VCIP, the 20-mile connecting transmission line connecting the VCIP to the Manning Substation is part of VCIP.

The tower structures of the transmission lines would consist of self-supporting tubular steel poles (TSPs or monopoles) (see Figure 2.5-7). These monopoles would be larger than those described for the gen-tie lines in Section 2.5.2.1.1. Although four-legged lattice steel towers have been traditionally utilized for transmission lines, monopoles are currently favored due to their reduced cost, which is now comparable to lattice towers, their unobtrusive visual profile, and because they are highly suitable for flat terrain with deep soils, as occurs throughout the Plan Area. However, lattice steel towers would be utilized for portions of the outside transmission corridors, described subsequently, specifically in mountainous terrain where soils are too shallow to support deep foundation piers. The tower-to-tower spans would average over 1,000 feet (about 5 towers per mile), and the monopoles would range in height from 140 to 190 feet depending on location and span distances between monopoles. It is estimated that the VCIP connector transmission lines would include up to 759 monopoles (59 miles X 2 lines; +20 miles X 1 line =138 line miles; X 5 poles/line mile = 690 poles; + 69 extra poles for turning and crossing points = 759 total monopoles). All of these heavier monopoles would be bolted onto steel-reinforced concrete piers which would be cast in place in excavated holes in the ground. The concrete footings would be up to 55 feet deep and up to 10 feet in diameter.

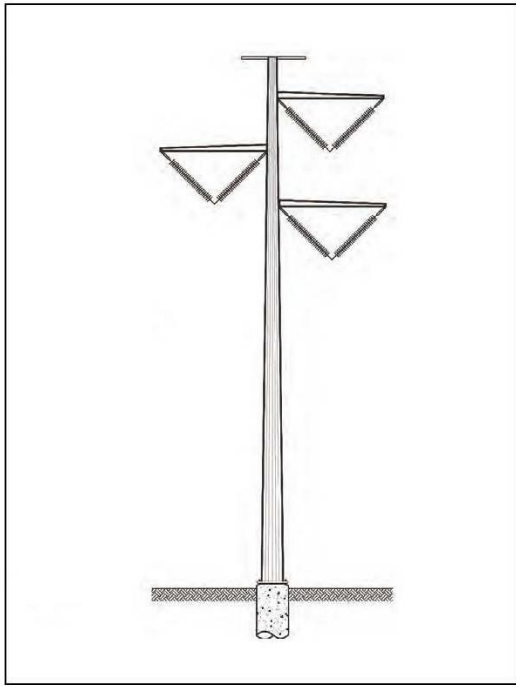
2.5.2.3.2. CONSTRUCTION OF THE VCIP CONNECTOR TRANSMISSION LINES

It is anticipated that the VCIP connector transmission lines will be constructed in 15-mile segments, which is the average distance between the five VCIP collection substations on the backbone transmission line. Construction of the transmission lines would be similar to the construction of the gen-tie lines described in Section 2.5.2.1.2.

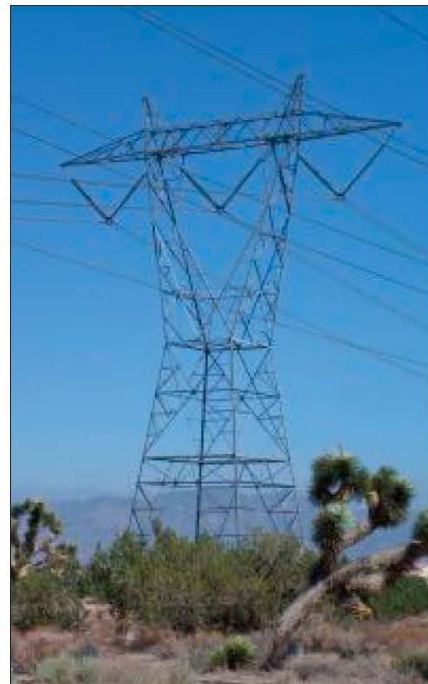
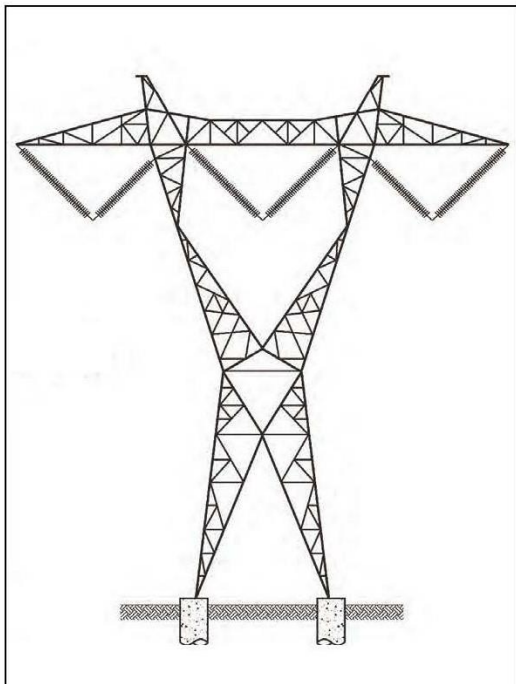
The construction practices and inputs described above for the gen-tie line are closely applicable to the construction of the transmission line segments. In the following discussion, the construction of the transmission lines will be described in terms of similarities and differences from the previously described construction of the gen-tie lines.

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VCIP



500-kV Single Circuit Monopole - Up to 190 feet



500-kV Single Circuit Lattice Steel - Up to 170 feet

Typical 500-kV Transmission Towers
Figure 2.5-7

In the description of gen-tie pre-construction activity in Section 2.5.2.1.2, the descriptions of right-of-way acquisition, surveying, and pre-construction activities, clearing the right-of-way, construction access, and staging areas, are all equally applicable to transmission line construction and are not repeated here. The only notable difference is that the ROW for a 500-kV transmission line would be 200 feet plus a 50-foot buffer from the adjacent ROW, as noted above. As mentioned in Section 2.3.2, transmission corridors for the VCIP are planned to be 1,000 feet wide, in order to provide additional width for equipment maneuvering during construction, and design flexibility at the engineering stage, and other factors.

Based on the total of 79 miles of approximate combined length for these transmission corridors, the approximate acreages of land disturbance associated with transmission construction were estimated, as shown in Table 2.5-2 on the next page. It is assumed that all tower construction sites and pulling sites would be accessible from adjacent county roads or farm roads, and that no new access roads would be required.

The VCIP connector transmission lines would be constructed in the same manner as described for gen-tie construction in Section 2.5.2.1.2., and site management would also involve control of stormwater, dust, solid waste, and hazardous materials as described. The construction of a typical 15-mile connector transmission line segment (consisting of up to 83 monopoles) would take about 6 months (100 workdays) and would involve 50 workers on average and 60 workers during peak construction periods. These workers would be drawn from the surrounding communities and would have an average roundtrip commute of about 95 miles. Construction would involve approximately 1,885 truck deliveries, including 60 for construction equipment, 580 for monopoles and electrical components, and 1,245 for concrete (83 poles at 150 cy concrete per pole / 10 cy per truck). On average, the typical 15-mile transmission segment would receive about 12.5 truck deliveries per day over the 100-day construction period.

Upon completion of each segment of transmission line, the areas disturbed during construction would be restored as appropriate to allow for resumption of cultivation of row and tree crops, if applicable.

**TABLE 2.5-2
VCIP CONNECTOR TRANSMISSION LINES – LAND DISTURBANCE ESTIMATES¹**

Transmission Line Feature	Quantity	Land Disturbance (Acres)		
		Total Disturbance Area	Temporarily Disturbed/ To be Restored	Permanently Disturbed
Tower Sites	759 ²	759 ³	684	76 ⁴
Pulling/Tensioning Sites	69 ⁵	276 ⁶	276	0
Staging/Material Storage Sites	8 ⁷	40	40	0
Totals	--	1,076 ac.	1,000 ac.	76 ac.

Footnotes:

- ¹ Total length of transmission line (59 miles X 2 lines) + (20 miles X 1 line) = 138 line miles.
- ² Approx. 5 monopoles per line mile = 690 monopoles + 69 extra poles at turning and crossing points = 759 total monopoles.
- ³ Temporary disturbance area at each monopole site = up to 1.0 acre, i.e., temporary clear areas = up to 210 X 210 feet.
- ⁴ Permanent disturbance area at each monopole site = 0.1 acre, i.e., permanent clear areas = 65 X 65 feet.
- ⁵ Pulling/Tensioning sites are two miles apart. (138 line miles / 1 site per 2 miles = 69 sites)
- ⁶ Pulling/Tensioning sites estimated to disturb an average of 4 acres at each site.
- ⁷ One staging site per 10 miles of corridor over 79 corridor miles. Each staging site is 5 acres.

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2.5.2.3.3. OPERATION AND MAINTENANCE OF TRANSMISSION LINES

After completion, the transmission lines would be inspected, maintained, and repaired in accordance with the applicable regulatory requirements. Transmission components would be inspected at least once per year for corrosion, equipment misalignment, loose fittings, and mechanical problems. Vegetation, landscaping, and agricultural crops in the vicinity of the towers and conductors would be maintained at clearance distances as required by applicable regulations and safety standards.

2.5.2.3.4. POST-VCIP REUSE OF VCIP TRANSMISSION LINES

After decommissioning of the solar and energy storage facilities in the VCIP, it is not anticipated that the backbone transmission line would be decommissioned. Instead, the governing agency would likely make a determination that the backbone transmission line would still be needed to provide redundancy and resilience to the overall electrical grid, even without functioning as a collection line for VCIP renewable generation. The retention of the transmission corridor would be important for managing congestion on the bulk transmission system and providing alternative transmission routing in the event of system outages. .

2.6. TRANSMISSION CORRIDORS OUTSIDE THE VCIP

The transmission corridors for delivery of solar generation from potential VCIP projects to urban electricity markets in northern and southern California have been identified at a conceptual level in this PEIR to allow a general discussion of environmental impacts associated with transmission line development for informational purposes. These transmission delivery corridors extend far beyond the District's boundaries and are not part of the proposed VCIP. Planning and approval of these outside transmission lines are under the jurisdiction of the state and federal energy regulatory agencies, and public utilities. No specific bulk transmission projects are currently planned by others to convey VCIP solar generation to the load centers, and no attempt has been made to define specific new bulk transmission lines as part of the VCIP planning process.

However, for informational purposes, the PEIR includes a conceptual description of potential transmission routes outside the Plan Area. Based on preliminary power flow studies, assumptions were made regarding the routing and capacities of these outside transmission delivery lines. Since no specific transmission routes or substation upgrades outside the Plan Area have been defined, the specific locations of outside transmission lines are not known at this time. However, it is reasonable to assume that the required new transmission lines would run adjacent to existing transmission corridors to major regional substations at the load centers. Since these transmission improvements would be integral to planning and programming of grid-level transmission state-wide, which is the responsibility of multiple state agencies and utilities, it is beyond the authority of the District or any local government to undertake specific route planning or design for such transmission facilities. Thus, the conceptual transmission routes identified in this PEIR have not been evaluated for the specific locations, constructability, desirability, cost, or likelihood of their successful permitting. They also have not been studied by transmission planning groups to identify reliability concerns or effects on other transmission systems.

For informational purposes, the conceptual bulk transmission routes are described and evaluated in this PEIR to a level of detail commensurate with the conceptual level at which they have been identified in this Project Description. Based on the assumed corridors, it is possible to estimate the approximate linear miles and approximate acreages and general nature of land disturbance associated with the outside transmission

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corridors. This high level of description of conceptual transmission corridors will allow a very general overview of potential environmental impacts associated with the outside transmission lines that could be expected.

The bulk transmission lines which are assumed to deliver renewable energy from the VCIP to outside regional substations at the load centers are shown in Figure 2.4-1 and listed below, along with the linear miles of transmission between the applicable VCIP collection substations and the destination substations.

Northern California

- One 500-kV line from the planned VCIP Substation 1 (Newpoint) to the existing Tracy Substation (~102 line miles).
- Two 500-kV lines from Newpoint Substation to connect with existing Los Banos-Gates Line No. 3 (~13.5 miles; ~27 line miles)
- One 500-kV line from the planned VCIP Substation 1 (Newpoint) to the existing Tesla Substation (~95 line miles).
- One 500-kV line from the planned VCIP Substation 1 (Newpoint) to the existing Moss Landing Substation (~76 line miles).

Southern California

- One 500-kV line from the VCIP Substation 5 to the existing Midway Substation (~72 miles).
- One 500-kV line from the VCIP Substation 5 to the existing Vincent Substation (~177 line miles).

In corridors with one transmission line, the required right-of-way would be 200 feet wide. The corridors with two parallel 500-kV lines would require a combined right-of-way of 450 feet (200 + 50 + 200). In both cases, a wider corridor of 1,000 feet is assumed for planning purposes.

The general characteristics of the outside transmission corridors would be similar to those described for the VCIP connector transmission corridors in Section 2.4.2.3.1. Assuming for purposes of description that the outside transmission lines would be constructed in 15-mile segments (consisting of 83 towers per segment), each segment would take about 6 months (100 workdays) and would involve 50 workers on average and 60 workers during peak construction periods. These workers would be drawn from the surrounding communities and would have an average roundtrip commute of about 95 miles. Construction would involve approximately 1,885 truck deliveries, including 60 for construction equipment, 580 for towers and electrical components, and 1,245 for concrete. On average, the typical 15-mile transmission segment would receive about 18.9 truck deliveries per day over the 100-day construction period.

Based on the total of 348 miles of approximate combined length for these assumed corridors, the approximate acreages of land disturbance associated with the transmission corridors were estimated, as shown in Table 2.6-1.

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TABLE 2.6-1
TRANSMISSION DELIVERY LINES OUTSIDE VCIP PLAN AREA – LAND DISTURBANCE ESTIMATES¹

Transmission Line Feature	Quantity	Land Disturbance (Acres)		
		Total Disturbance Area	Temporarily Disturbed/ To be Restored	Permanently Disturbed
Tower Sites	3,020 ²	3,020 ³	2,718	302 ⁴
Pulling/Tensioning Sites	275 ⁵	1,100 ⁶	1,100	0
Staging/Material Storage Sites	35 ⁷	175	175	0
Totals	--	4,295 ac.	3,993 ac.	302 ac.

Footnotes:

¹ Total length of outside transmission line is approximately 549 line miles.

² Towers at 5 towers per line mile. (549 line miles X 5 towers per mile = 2,745 towers; + 10% extra towers for turns and crossings = 275 towers; Total = 3,020 tower sites.)

³ Temporary disturbance area at each tower site = up to 1.0 acre, i.e., temporary clear areas = up to 210 X 210 feet.

⁴ Permanent disturbance area at each tower site = 0.1 acre, i.e., permanent clear areas = 65 X 65 feet.

⁵ Pulling/Tensioning sites are two miles apart. (549 line miles / one site per two line miles = 275 sites)

⁶ Pulling/Tensioning sites estimated to disturb an average of 4 acres at each site.

⁷ One staging site per 10 miles of corridor over 348 corridor miles. Each staging site is 5 acres. (Note: In several instances the two transmission lines will share a corridor resulting in fewer corridor miles than transmission line miles indicated above.)

The land disturbance estimates in Table 2.6-1 apply to monopoles and steel lattice transmission towers, both of which are expected to be used for the outside transmission lines. On the level ground characteristic of the floors of the San Joaquin and Antelope Valleys, monopoles would be used since the deep soils could accommodate the deep foundation piers required. In the hilly and mountainous terrain of the Tehachapi Range, San Gabriel Mountains, and Coast Ranges, soil cover would be thin and unsuitable for monopoles. Approximately one-half of all the tower sites would be located in the rolling and steep terrain in these ranges. In these areas, lattice steel towers would be used since they can be supported by shallower footings for each of their four legs. The land disturbance estimates in Table 2.6-1 assume that the temporary and permanent disturbance areas associated with steel lattice towers would be similar to those for monopoles. In steep terrain, shorter span lengths may be required which would increase the total number of towers and associated disturbance areas. However, a review of the existing transmission lines through these hilly areas indicated that most spans are at least 1,000 feet, with a few as short as 800 feet.

The construction of the transmission lines through hilly terrain would utilize existing tower access roads serving the existing adjacent transmission lines, so ground disturbance associated with construction of new access roads would be minimal. Also, in most segments where the transmission corridors would pass through hilly terrain, the vegetation is composed of grassland with dispersed trees, indicating that few if any clearance areas between towers would be needed to provide minimum vertical distance between conductor sags and ground vegetation. However, some tree cutting and trimming would be required at some tower sites.

In summary, the construction practices for the outside transmission lines would be similar to those described for the VCIP connector transmission corridors in Section 2.5.2.3.2. The main difference would be the need to construct new towers and to string conductors through areas of rolling terrain, which would also involve the use of steel lattice towers instead of monopoles. This would extend the overall duration of construction

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(perhaps doubling the construction time through the hilly terrain) and may require the addition of specialized personnel. However, the estimates of overall ground disturbance shown in Table 2.6-1 would apply, as would the above estimates of construction deliveries and total number of construction workers.

Operation and maintenance activities associated with the outside transmission lines would be similar to those described for the VCIP connector transmission corridors in Section 2.5.2.3.3. The main differences would be greater need for tree trimming in forested areas, as well as generally heightened fire prevention practices and awareness.

With respect to decommissioning, it is expected that the outside transmission lines would not be decommissioned but would instead continue to provide bulk transmission capacity as well as redundancy and resilience for the state's electrical grid.

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