2 PROJECT DESCRIPTION

2.1 INTRODUCTION

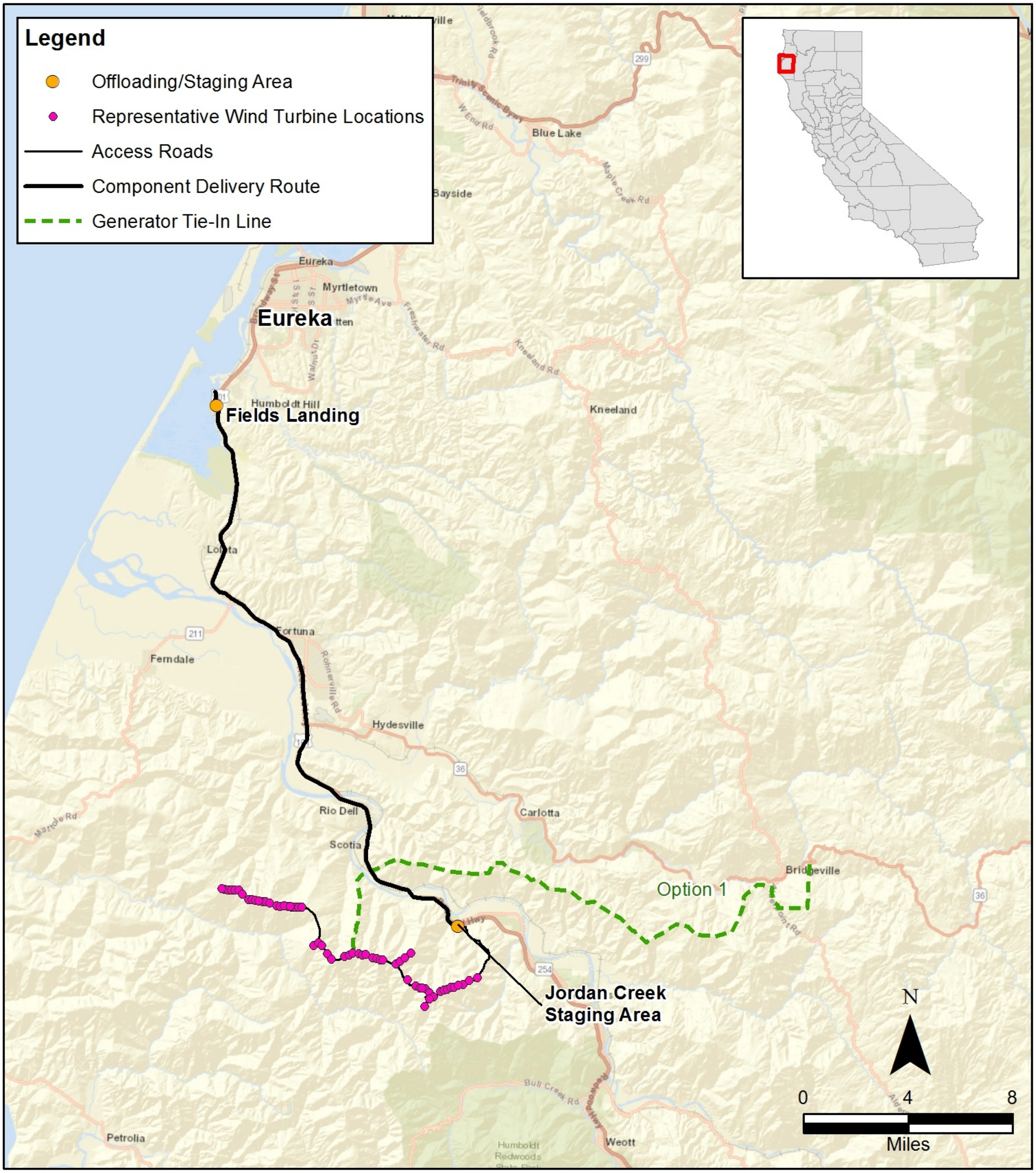
This environmental impact report (EIR) chapter describes the technical, economic, and environmental characteristics of the Humboldt Wind Energy Project (proposed project or project). The required content of an EIR project description is discussed in the California Environmental Quality Act Guidelines, in Title 14, Section 15124 of the California Code of Regulations. Section 15124 states that "The description of the project shall contain the following information, but should not supply extensive detail beyond that needed for evaluation and review of the environmental impact." The contents of a project description shall include:

- the precise location and boundaries of the proposed project, preferably on a detailed topographic map, along with the general location of the project on a regional map;
- a statement of the objectives sought by the proposed project, including the underlying purpose of the project, designed to assist the lead agency in the formulation of alternatives and preparation of findings or a statement of overriding considerations, if necessary;
- a general description of the project's technical, economic, and environmental characteristics, considering the principal engineering proposals, if any, and supporting public service facilities; and
- a statement briefly describing the intended uses of the EIR, including (to the extent the information is known to the lead agency) a list of:
    - the agencies that are expected to use the EIR in their decision making;
    - permits and other approvals required to implement the project; and
    - related environmental review and consultation requirements required by federal, state, or local laws, regulations, or policies.

2.2 PROPOSED PROJECT

2.2.1 PROJECT LOCATION

Humboldt Wind, LLC (project applicant or applicant) proposes to construct and operate the Humboldt Wind Energy Project, a wind energy generation facility in Humboldt County, California. The project site is about 20 miles south of Eureka (Figure 2-1), roughly 12 miles southeast of the city of Fortuna and 22 miles north of the community of Garberville, and is bisected by U.S. Highway 101 (U.S. 101). The town of Scotia is adjacent to the northern edge of the project site.



Source: Data compiled by Stantec in 2018

Figure 2-1. Regional Location

2.2.2 PROJECT OBJECTIVES

California's energy demand and supply sources are continually evolving as a result of state mandates to address climate change. Senate Bill (SB) 350, signed into law in 2015, requires a statewide portfolio standard to ensure that renewable resources account for 50 percent of California's electrical load by 2030. The recently enacted SB 100 moves up the deadline for reaching the 50 percent milestone to 2026, stepping to 60 percent by 2030. The law also states that renewable energy resources and zero-carbon resources are to supply 100 percent of retail sales of electricity by 2045. Many utility providers are assessing their energy portfolios and seeking ways to achieve these mandates through a combination of purchase or funding of renewable energy projects, existing power-purchase agreements, and banked renewable energy credits.

The project applicant has identified the following objectives for the project:

- Contribute to a diversified statewide energy portfolio that will reduce exposure to price volatility associated with electricity and natural gas, while assisting the state in meeting the renewable-energy requirements established in SB 350 and SB 100, including assisting in directly achieving the state's Renewable Portfolio Standard of 100 percent zero carbon energy by 2045.
- Develop a wind project that is feasible to finance, construct, and operate.
- Develop a wind energy project that can meet the criteria to achieve the maximum federal tax credit requiring placement into operation by December 30, 2020, which is intended to decrease the cost of renewable energy generation and delivery, promote the diversity of energy supply, and decrease the dependence of the United States on foreign energy supplies.
- Promote sustainable energy and utilization of alternative energy systems throughout the county in compliance with the Open Space and Conservation Element of the *Humboldt County General Plan*.
- Develop a wind energy facility as near as possible to existing transmission infrastructure.
- Develop a wind energy facility in Humboldt County that supports the economy by creating short- and long-term employment opportunities and increasing tax revenue.
- Displace emissions of approximately 372,000 metric tons per year of carbon dioxide (a greenhouse gas) that would otherwise be required to generate the same amount of electricity as this 155-megawatt (MW) project.

2.2.3 PROJECT COMPONENTS

PROJECT OVERVIEW

The proposed project consists of a maximum of 60 wind turbine generators (WTGs) and associated infrastructure with a nameplate generating capacity (theoretical maximum energy generation) of up to 155 MW. Figure 2-2 depicts the project site boundaries. The project site represents an approximately 2,218-acre area study corridor within which the WTGs and associated infrastructure would be placed. Within that study corridor, a representative project footprint was developed that conservatively includes approximately 900 acres of temporary or permanent impacts; the actual project footprint is likely to be less but would be located within the study corridor. The study area was defined based on a 1,000-foot-wide corridor centered on the representative locations of WTGs; a 200-foot-wide corridor centered on project roadways, the electrical collection line, and the generation transmission line (gen-tie); and a 500-foot-wide buffer around proposed staging areas, temporary impact areas, and the project substation. The exact footprint of individual WTGs within the project site would be determined during final engineering design, but would generally be placed along Monument and Bear River ridges.[1,2] Turbine heights could reach up to 600 feet tall, with a rotor diameter of 492 feet.

A variety of factors influence the amount of energy in wind, including the volume of air, density, and wind speed. The function of a wind turbine generator is to transform the wind's kinetic energy into electricity. The amount of energy extracted from the wind is directly proportional to the swept surface area of the rotor blade.[3] Thus, the turbine model and design affect the number of WTGs required to achieve the desired power output, and it is possible that fewer than 60 WTGs could be constructed while still achieving the desired generating capacity. The environmental impact analysis in this DEIR is based on a maximum number of WTGs that may be placed within the boundaries of the study corridor. The assumptions developed for this analysis support a conservative approach to project planning and environmental review, as they represent the maximum level and footprint of potential development.

In addition to the WTGs and transformers, the project includes ancillary facilities such as temporary staging areas, access roads, 34.5-kilovolt (kV) collection lines (referred to in this EIR as the "collection system"), an operations and maintenance (O&M) facility, a substation, a modified utility switchyard, and a 115 kV gen-tie along Shively Ridge.

A segment of the gen-tie would cross the Eel River; this segment would be constructed underground. The project's point of interconnection with the Pacific Gas and Electric Company (PG&E) transmission grid would be PG&E's Bridgeville Substation (Figure 2-2). PG&E is a public utility that sells energy in the California utility market, which is operated by the California Independent System Operator.[4]

The project would include the following components, which are discussed in detail in the remainder of this chapter:

- up to 60 WTGs (capable of generating 2–5 MW of electricity each) erected on tubular steel towers set on concrete foundations, as well as the associated WTG pads, temporary staging areas, and transformers;
- temporary construction access roads and permanent service roads, as well as temporary improvements to public roads at two locations along U.S. 101 to facilitate the delivery of WTGs from the Fields Landing Drive delivery site to the staging yard at Jordan Creek;
- an up to 25-mile, 115 kV gen-tie, including an underground crossing of the Eel River, following Shively Ridge and ultimately connecting to the existing PG&E transmission system at the Bridgeville Substation;

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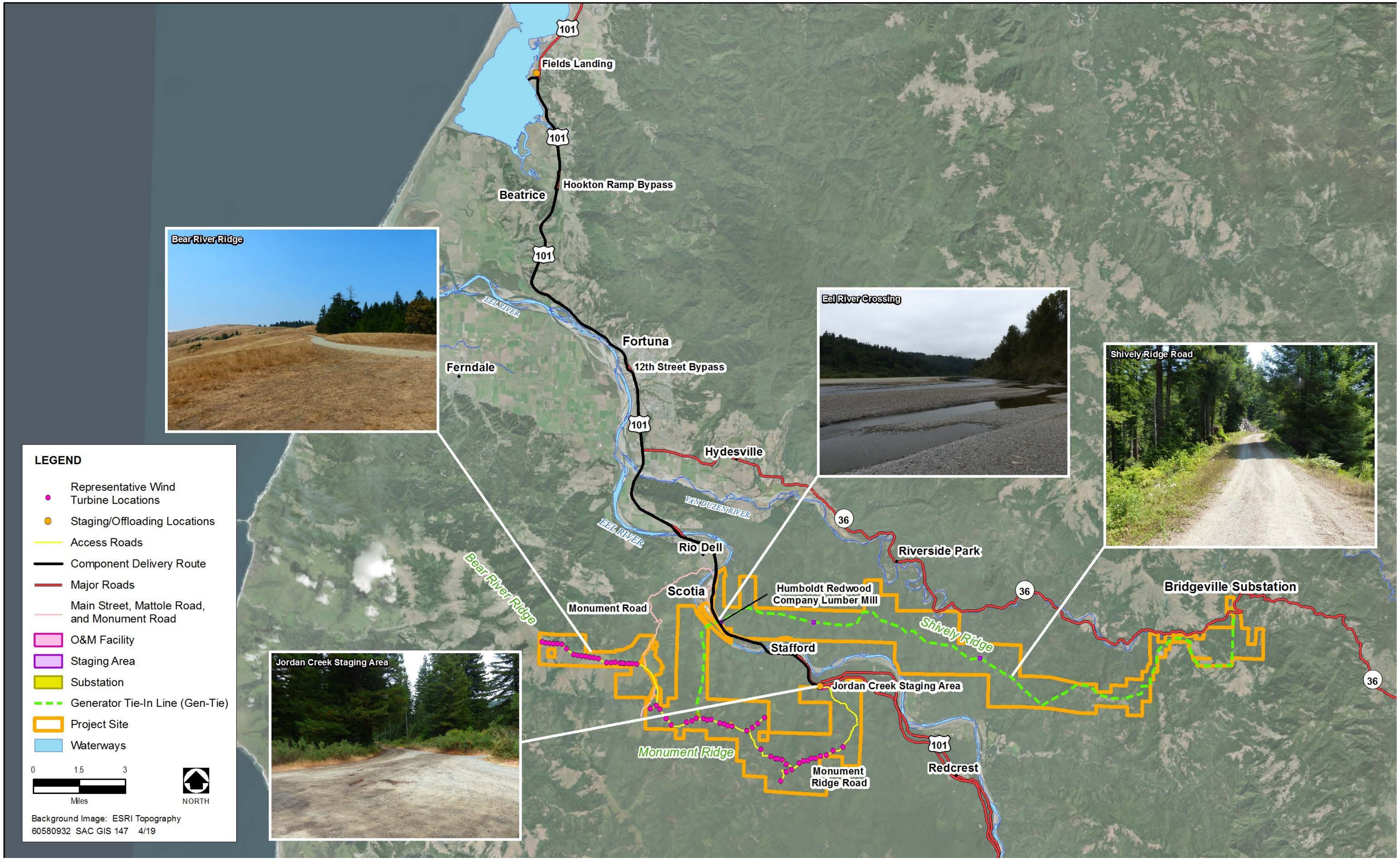
1 Long-term monitoring by ground-based equipment—meteorological towers, sonic detectors, and remote sensing units—has occurred at the project site since 2017 to identify the areas best suited for wind energy generation.

2 Project geotechnical work conducted at the WTG pad would involve soil borings to a depth of approximately 50 feet to ensure that sufficient soil strength and bearing capacity exist at the site to provide a stable foundation for the WTG.

3 The swept area refers to the area of the circle created by the blades as they sweep through the air. The amount of energy extracted from the wind is directly proportional to the swept surface area. Large WTGs leverage economies of scale with an increased blade diameter.

4 The California Independent System Operator is a nonprofit independent system operator serving California. It oversees the operation of California's bulk electric power system, transmission lines, and electricity market generated and transmitted by its member utilities.



Source: Data compiled by AECOM in 2018

Figure 2-2. Project Site Boundaries and Surrounding Land

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- a project substation located on-site;
- an underground electrical collection system linking WTGs to each other and to the project substation;
- an underground communication system (fiber optic cable) adjacent to the collection system;
- a Supervisory Control and Data Acquisition (SCADA) system between each WTG and the substation and between the project substation and the Bridgeville Substation to monitor and control project output and the transmission of energy into the system;
- an up to 5-acre O&M facility, including an operations building, a parking area, and an outdoor storage area with perimeter fencing;
- a 10-acre temporary staging area and a construction trailer and parking area located within the O&M facility;
- a component offloading location at Fields Landing;
- two temporary bypasses off U.S. 101 (Hookton Overpass and 12th Street Bypass) for transporting oversize loads;
- up to six permanent meteorological towers;
- three 5-acre, temporary staging areas distributed throughout the project site, one of which would include one temporary cement batch plant on Monument Ridge; and
- up to 17 miles of new 24-foot access roads.

Table 2-1 lists each component and its function and the disturbance areas for temporary and permanent conditions.

Wind Turbine Generators

A wind turbine generator consists of the tower, nacelle, hub, blades/rotor, controller, central SCADA system for communication, transformer, Federal Aviation Administration (FAA) lighting where required, and lightning protection system (Figure 2-3). Maximum WTG height, as measured at the highest point of the rotor blade rotation, would be up to 182 meters (600 feet) from the base of the WTG. Ground clearance for the rotor blades at their lowest point of rotation would be 23 meters (76 feet).

The nameplate generating capacity of the WTGs would range between 2 and 5 MW. The WTGs would have a horizontal-axis design in a light grey color with a nonreflective finish, consistent with FAA requirements. The various WTG components are summarized below.

- **Tower.** The tower consists of a tubular steel monopole, typically built in three or more sections, that extends from the top of a concrete foundation at ground level to the connection with the nacelle. The tower would support the nacelle, hub, and three-blade rotor and would include internal access ladders to allow WTG maintenance. The tower would have a total maximum height of up to 114 meters (440 feet) to the hub of the rotor blades and would be situated on a concrete foundation measuring 18–21 meters (60–70 feet) in diameter.

Table 2-1 Project Components and Associated Disturbance Areas

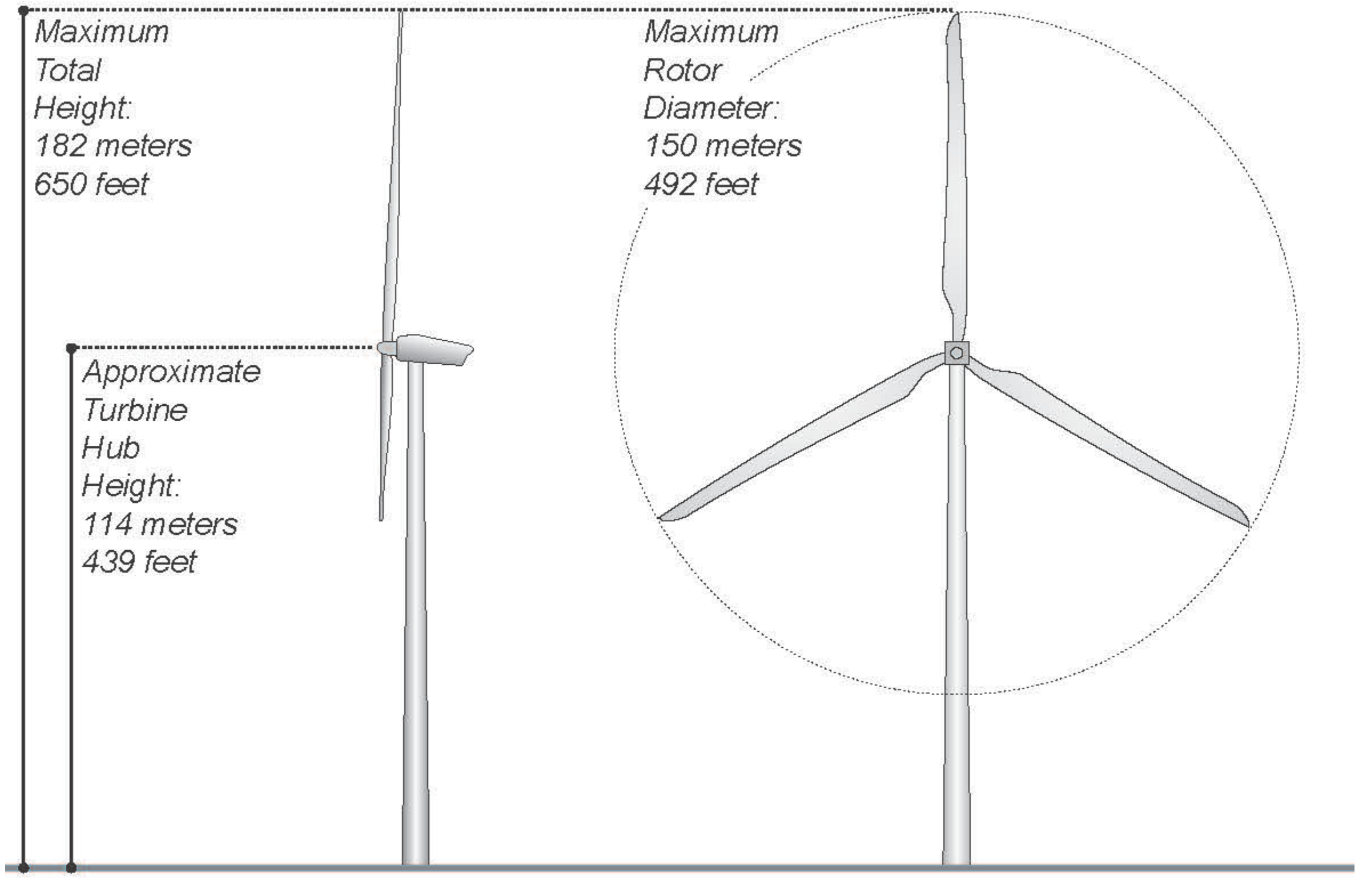
Component	Quantity	Typical Disturbance Area	
		Temporary	Permanent
Wind turbine generators and pads[a]	Maximum of 60	Approximately 4 acres per wind turbine generator	0.3 acre per wind turbine generator
Collection system and gen-tie[b]	Maximum length of 25 miles	30-foot width	*Collection system:* Buried in a 12- to 24-inch-wide trench (filled) *Gen-tie:* Constructed on H-frame structures, with each pole creating a 3-foot-diameter patch of surface disturbance; gen-tie would include a underground crossing of the Eel River
Project substation	1	3 acres	3 acres
PG&E Bridgeville switchyard modification	1	Up to 3 acres	Up to 3 acres
Access roads	Up to 17 miles of new roads	*Turbine string roads:* 24-foot-wide gravel surface with 50-foot width for crane access and 200-foot width for grading and matching slopes	*Turbine string roads:* 24-foot-wide gravel surface with a 1-foot shoulder on both sides and nominally up to an additional 12 feet on either side where required for stormwater management control, for a total potential width of 48 feet *Project access roads:* 24-foot-wide gravel surface and 200-foot width for grading and matching slopes, for a total potential width of 224 feet
O&M facility	1	5 acres	3–5 acres total, including a 5,000- to 6,000-square-foot building
Temporary staging area located at the O&M facility (Jordan Creek)	1	5 acres (in addition to O&M facility)	NA
Temporary staging areas	2	5 acres each	NA
Temporary cement batch plant (Monument Ridge)	1	3–5 acres	NA
Meteorological towers	12 (six of which may become permanent)	1.5 acres per tower	5,400 square feet

Notes: gen-tie = generation transmission line; NA = not applicable; O&M = operations and maintenance; PG&E = Pacific Gas and Electric Company

[a] Includes temporary staging areas.

[b] Portions of the collection system would be constructed within access roads. Note that acreage includes co-located underground fiber optic communications cable.

Source: Data compiled by Stantec in 2018



Source: Data compiled by AECOM in 2018

Figure 2-3. Typical Wind Turbine Generator

- **Nacelle.** The nacelle is an aerodynamic, welded-steel and fiberglass structure atop the tower that contains the inner mechanical workings of the WTG, including the power-generating components. Among those components are the main drive shaft/generator and the gearbox; electrical components/cabinets; and, depending on the confirmed WTG size and make, the power transformer, which steps up the WTG voltage to the voltage of the collection lines. The nacelle also contains the blade pitch control, which controls the angle of the blades; a cooling system; and the yaw drive, which controls the position of the WTG relative to the wind.

- **Hub.** The hub, the fixture for attaching the blades to the main drive shaft, is usually made from a large iron casting. It is placed on the front of the nacelle, covered by a composite nose-cone structure to streamline airflow and protect the equipment. The hub also contains the mechanisms that allow the blades to pitch in response to wind, temperature, and air density conditions.

- **Blades/Rotor.** The WTGs would have three blades bolted to the hub; the blades and hub are collectively called the rotor. The rotors would be up to 150 meters (492 feet) in diameter. The blades are long, tapered, small-chord airfoils that resemble airplane wings. They vary in thickness (thinnest at the tip and thickest where they attach to the hub) and use aerodynamic lift, similar to an airplane wing, to provide the driving force for spinning the rotor. At the 12 o’clock position, the tip of the blade would be 600 feet in height.

- **Controller/Communications.** The controller is a microprocessor that automatically regulates operation of the WTG, including startup, shutdown, pitch control, yaw control, and safety monitoring. Information would be communicated from the controller to the central O&M facility via fiber optic cables. A central SCADA system, potentially located off-site, would monitor data input from the controller to facilitate centralized operation and maintenance. If a control parameter deviates from its normal operating range, the controller would automatically shut down the WTG and notify the operating technician(s) of the fault.

- **Transformer.** A step-up transformer would be either contained within the WTG or mounted on a pad next to the WTG base. Transformers boost the voltage of the WTG (500–1,000 volts) to the collection voltage of 34.5 kV because the low-voltage power generated by the WTG is not suitable for power transmission. Electricity from the transformer would be transmitted via the collection system to the project substation.

- **FAA Lighting.** Lighting may be installed on the exterior of the nacelles in compliance with FAA rules. Specific requirements for the project, based on WTG heights and site-specific aviation conditions, would be developed in conjunction with the FAA, and WTG lighting would be consistent with all FAA requirements.[5]

- **Lightning Protection.** A lightning protection system would be installed on each WTG and connected to an underground grounding arrangement to allow lightning to flow safely to the ground. In addition, all equipment, cables, and structures would be connected to a metallic, project-wide grounding network.

WIND TURBINE GENERATOR PAD

Each WTG would be supported by a rectangular pad measuring about 350 feet by 350 feet, leveled to a 2 percent slope or less (Figure 2-4). A portion of the WTG pad would remain graded as a permanent soil-compacted crane pad to provide a stable foundation for the crane during placement of the WTG components. The WTG foundations would be buried to a depth of 10 feet below grade with a pedestal extending approximately 1 foot above the ground. The foundation would be 60–70 feet in diameter, depending on the WTG model selected.

Once construction is completed, a permanent gravel ring 25 feet in diameter would be established around the base of the foundation to form the permanent WTG pad. The gravel would provide a stable surface for maintenance vehicles and would minimize erosion and runoff as typically required by a project-specific storm water pollution prevention plan (SWPPP).[6] After construction of the WTG, all temporary impact areas would be stabilized in accordance with the SWPPP and a site-specific restoration plan.

SUPERVISORY CONTROL AND DATA ACQUISITION SYSTEM

Each WTG contains electronic devices that continuously monitor turbine performance. A SCADA system installed in the generation area would collect operational and performance data from each WTG and the project as a whole and would allow for remote turbine operation. The WTGs have a braking system built within the controls to slow down the turbine blades if the WTGs' operational characteristics deviate from set limits. O&M personnel would address all operational deviations and bring the equipment back into service in a safe and timely manner.

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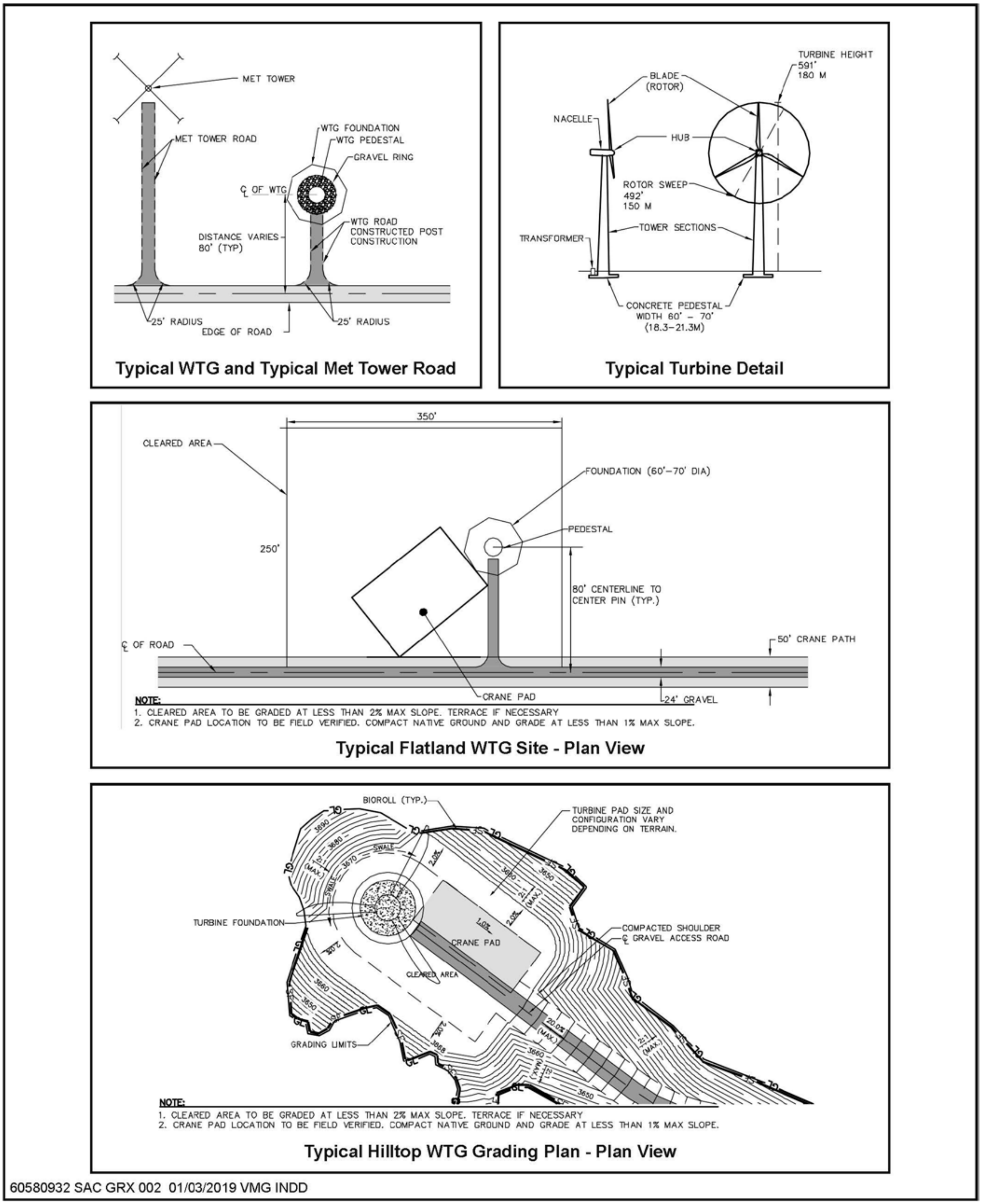
[5] Depending on the outcome of the FAA Part 77 notification procedure, tower lighting could be steady red, blinking red, or blinking white per FAA guidelines.

[6] The WTG pad dimensions presented here have been sized to accommodate the range of WTGs being considered for the project and environmental control measures typically required during construction and operation of similar wind energy projects.



Source: Data compiled by Stantec in 2018

Figure 2-4. Typical Wind Turbine Generator Layout and Pad

ACCESS ROADS

Primary access to the proposed WTG pads would be provided by an existing logging road called Demonstration Forest Road Right, located at the Pepperwood off-ramp from U.S. 101. Demonstration Forest Road Right is a graded dirt road approximately 12 feet wide that leads from the staging area at Jordan Creek and travels upslope, generally following the natural grade of the hillside (Figure 2-5). The project would require improving Demonstration Forest Road Right to accommodate heavy trucks that would haul large components to the ridge. Proposed improvements consist of a graded and graveled surface roughly 24 feet wide, with an additional compacted shoulder measuring 10–20 feet wide on each side to support crane travel. In areas with steep slopes, the total width of the disturbance area along access roads could be up to 200 feet.

Source: Photograph by AECOM in 2018

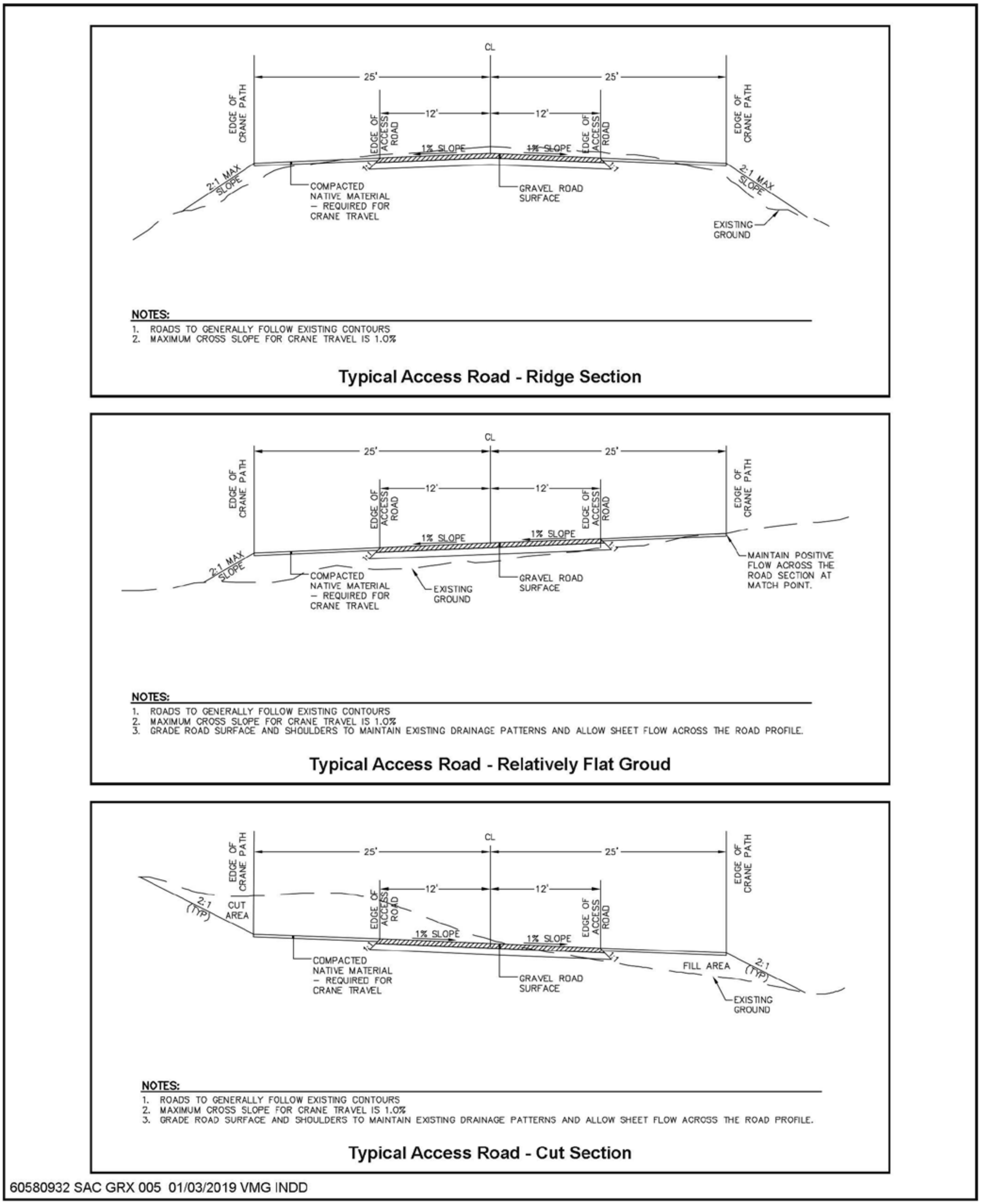
Figure 2-5. Demonstration Forest Road Right

Where existing logging roads proposed for component transport cross existing drainages, road improvements would be implemented to accommodate the large-size transport vehicle while also upgrading the crossing in a manner that would stormproof the crossing to reduce sedimentation associated with past road construction practices. Modifications would depend on the purpose of the road and type of crossing, but would generally include grading the side channel to reduce the slope angle, armoring the bank and bottom using geotextile fabric and riprap, and upsizing culverts designed to support the weight of the haul trucks (Figure 2-6).

Spur roads would be constructed only where necessary to reach a WTG pad that is not currently served by a logging road. New roads would be designed with an alignment that would avoid drainage crossings when practical. All crossings must be designed to intersect drainages at a 90-degree angle to minimize bank disturbance. At low-water crossings, the bank and channel bottom would be armored and the finished road surface would be at an elevation that would allow the water to flow over the surface (Figure 2-6).

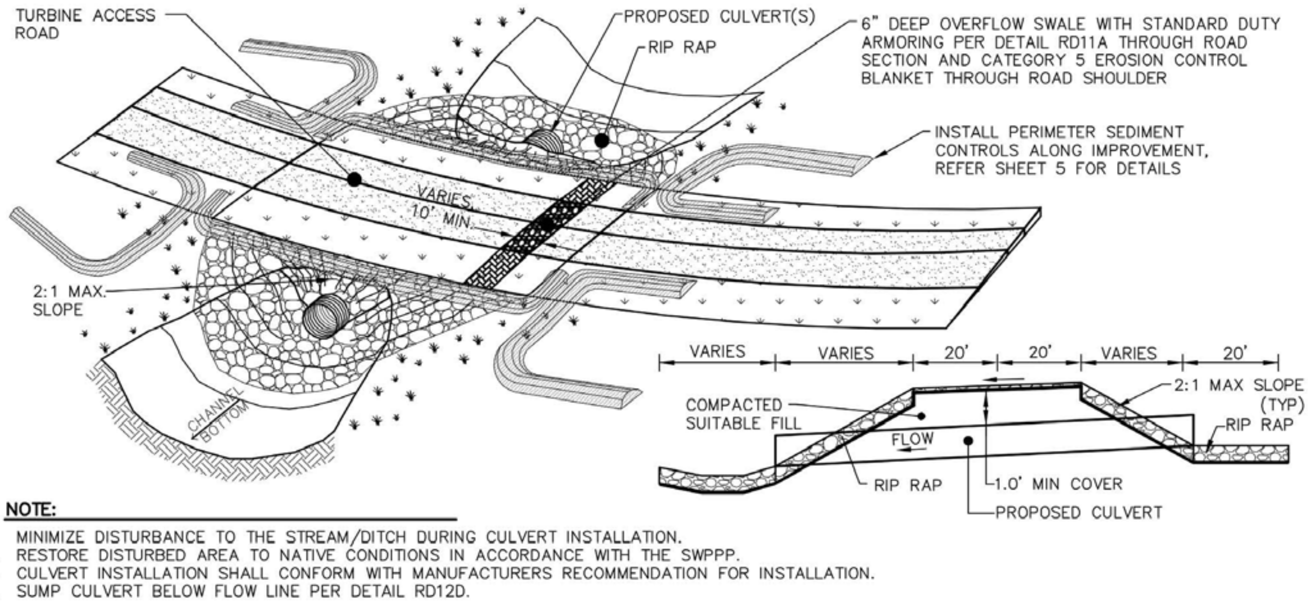
After project components have been delivered to the site and construction equipment has been removed, permanent access roads would be reduced to 24 feet wide with a 1-foot shoulder on each side (Figure 2-7). However, in areas where cuts and fills of a certain volume are required to construct the road, permanent disturbance may be as wide as 60 feet to accommodate stormwater controls and drainage management features such as rolling dips or water bars to capture sediment while permitting water to flow downstream. During O&M, service vehicles and equipment would continue to use project access roads. Permanent access roads would be maintained by periodic grading and compacting to minimize naturally occurring erosion.[7]

[7] Road construction and maintenance practices are dictated by the habitat conservation plan, the California Forest Practice Rules, water quality permits issued by the North Coast Regional Water Quality Control Board, and streambed alteration permits issued by the California Department of Fish and Wildlife.



Source: Westwood, adapted by AECOM in 2019

Figure 2-6. Typical Access Road Cross Sections



Source: Data compiled by AECOM in 2019

Figure 2-7. Typical Road Crossing at Drainage

2.2.4 ELECTRICAL INTERCONNECTION

COLLECTION SYSTEM

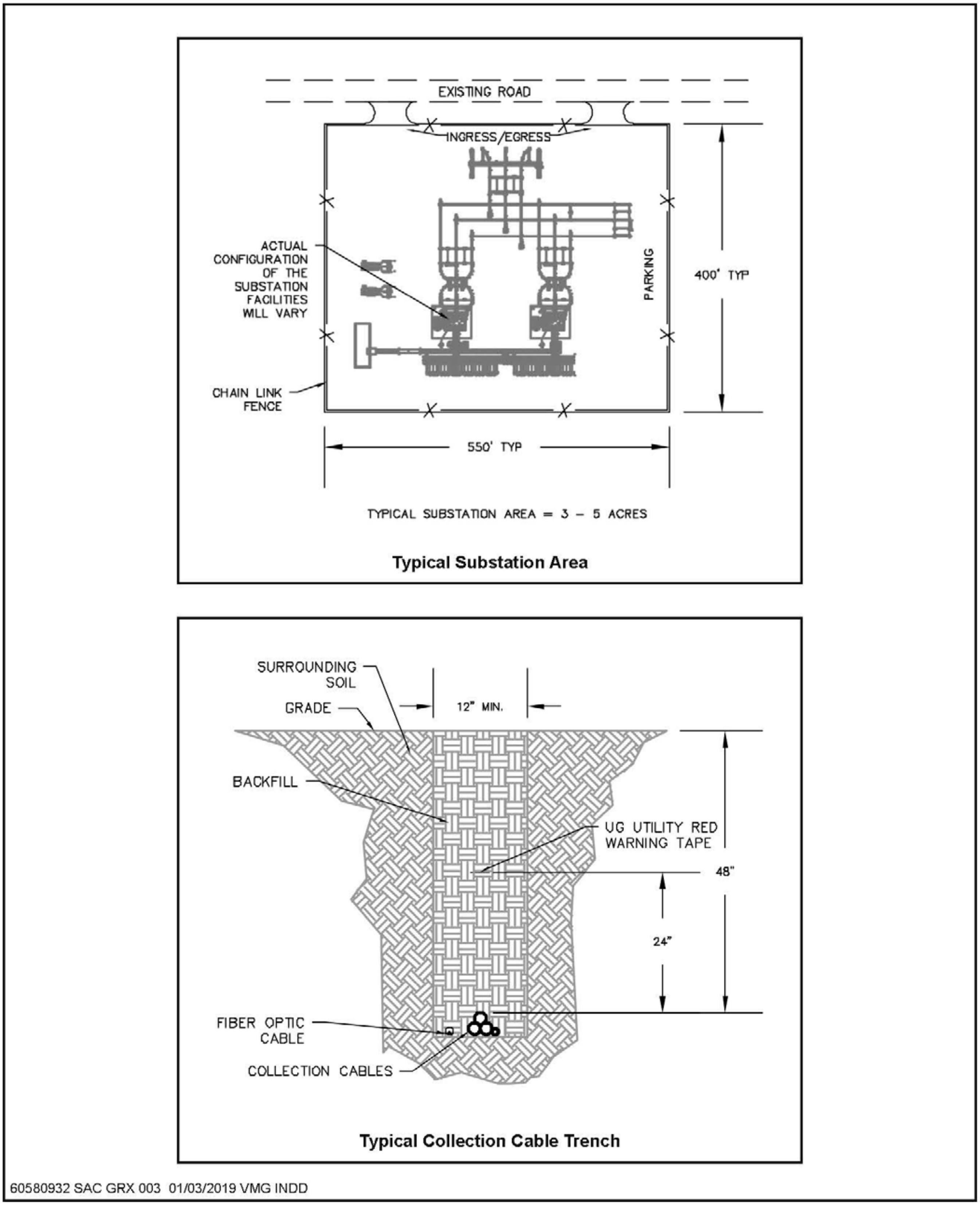
The collection system would consist of 34.5 kV lines located underground on dedicated paths or within project roads. Collection lines would be buried in trenches and would terminate at individual WTGs, where they would connect to junction boxes, or at the project substation. Each trench would contain power cables, a ground wire, a fiber optic communication cable for the SCADA system to transmit data from the WTG controllers to the substation and O&M facility, and markers to alert anyone digging in the area. The project applicant anticipates that the underground collection system would be placed within a cable trench measuring 4 feet deep and 12–24 inches wide (Figure 2-8).

PROJECT SUBSTATION

The main power transformer within the project substation would increase the voltage of the electricity from the 34.5 kV collection system to 115 kV for transmission to the Bridgeville Substation. The final permanent footprint of the substation and switching station site would be approximately 5 acres and would consist of a graveled area, a perimeter fence, and a parking area for maintenance vehicles. Figure 2-8 depicts a typical substation site plan similar to that proposed as part of the project.

GEN-TIE

The project would connect to the transmission system at the PG&E Bridgeville Substation via an approximately 25-mile overhead transmission line or gen-tie (Figure 2-9). The overhead, 115 kV transmission interconnect lines would be constructed on wooden H-frames, wood poles, or metal monopole structures similar to those shown in



Source: Westwood, adapted by AECOM in 2019

Figure 2-8. On-site Substation and Collection Cable Trench

Source: Westwood, adapted by AECOM in 2019

Figure 2-9. Gen-Tie Interconnection with the Pacific Gas and Electric Company Bridgeville Substation

Figure 2-10,which would be placed within a 100-foot-wide transmission corridor. The structure holes would be drilled using an auger, creating a hole approximately 3 feet in diameter and 10 feet deep. If H-frame structures are used, guy wires would be placed on each structure. Turning structures may require more than one guy wire. Aboveground pole heights would range from 60 feet to 65 feet. Primarily existing roads would be used to maintain the system; however, small spur roads would be constructed between existing roads and the transmission right-of-way to facilitate construction and maintenance.

Source: Stock photo 2018

Figure 2-10. Typical H-frame Transmission Pole

All energized project components, including the entire gen-tie and all power lines, would be constructed in accordance with the current suggested practices of the Avian Power Line Interaction Committee (APLIC 2006, 2012) to protect birds from electrocution and collisions.

2.2.5 Bridgeville Substation Upgrades

The gen-tie would terminate at PG&E's Bridgeville Substation (Figure 2-9 and Figure 2-11). The Bridgeville Substation, part of PG&E's existing 115 kV transmission system, is located between the Cottonwood Substation to the east and the Humboldt Substation to the west. Bridgeville is currently configured as a 115/12 kV substation that connects local distribution lines to PG&E's 115 kV transmission system.

Source: Photograph by AECOM in 2018

Figure 2-11. PG&E Bridgeville Substation

As part of the project, PG&E would expand the Bridgeville Substation to allow the project to connect to the 115 kV side of the substation. To do so, PG&E would extend the existing gravel pad to the north and east, add two new circuit breakers to the existing 115 kV bus, upgrade relays to accept the project's power, install a 115 kV breaker to electrically isolate the project from the Bridgeville Substation, and install a telecommunications link between the project substation and Bridgeville (Figure 2-9).

Two new intermediate transmission structures may be needed to connect the gen-tie to the 115 kV bus. In addition, the lines entering and exiting the Bridgeville Substation may require modifications to interconnect the project with the PG&E transmission grid. During construction, PG&E may need to construct a temporary transmission line, known as a "shoefly," to maintain electrical service while project-related work is conducted at Bridgeville.

Source: Photograph by Stantec in 2018

Figure 2-12. Typical Operations and Maintenance Building

Source: Photograph by AECOM in 2018

Figure 2-13. Temporary Meteorological Tower

OPERATIONS AND MAINTENANCE FACILITY

An O&M facility is proposed for placement on up to 5 acres of land with a building footprint of 5,000–6,000 square feet (Figure 2-12). The facility would include a main building with offices, a SCADA system (if on-site), control room, spare parts storage, restroom, shop area, outdoor parking facilities, temporary staging area, a turnaround area for large vehicles, outdoor lighting (shielded and downcast), and gated access with partial or full-perimeter security fence.

The O&M facility would include a water storage tank, which would be supplied with potable water obtained from a new well drilled within the footprint of the O&M facility.[8] Wastewater generated at the O&M facility would be treated by an appropriately sized septic system that would be installed.

METEOROLOGICAL TOWERS

Sonic Detection and Ranging units have been deployed on the project site since April 2017. Meteorological towers (METs) and/or Light Detection and Ranging units would be installed on-site to allow project planners to assess the project's viability and determine the optimum WTG layout, and to ensure optimal operation of the installed WTGs. METs would be 80–120 meters (262–394 feet) tall and would comply with FAA lighting regulations (Figure 2-13).

Up to 12 METs would be constructed within the project footprint. Up to six of these METs would remain on-site permanently after the completion of WTG optimization testing. These permanent METs would likely be freestanding tubular steel poles that would match the hub height of the final WTGs selected. To minimize impacts on birds, all permanent METs associated with the project would be freestanding structures without guy wires.

8 The groundwater well would provide sufficient pressure and duration to supply 1 acre-foot per year for 15 full-time employees plus fire flow requirements, conservatively assumed to be 2,000 gallons per minute for 2 hours or 240,000 gallons.

2.3 CONSTRUCTION AND PHASING

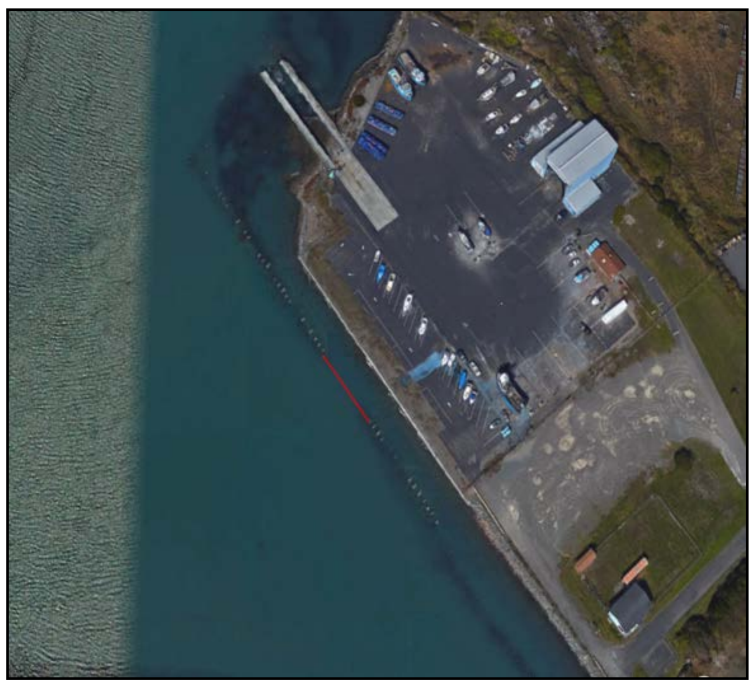
Construction would begin in fall 2019 and would last 12–18 months. The sequence of construction activities would generally be as follows: tree clearing, site preparation/grading, access road construction, construction of WTG foundations, WTG installation, installation of the collection system, substation construction, gen-tie installation, switchyard installation, final testing and WTG commissioning, installation of O&M facilities, and cleanup and restoration.

Approximately 3 million cubic feet of earth would be excavated on-site to construct the proposed project.[9] All grading would remain balanced within the project site, so no export of soil is anticipated. Grading would be conducted according to the requirements of an approved grading plan prepared to meet the grading, excavation, erosion, and sedimentation control regulations of the Humboldt County (County) Code. Construction contractors would incorporate structural and treatment controls in disturbed areas and at active roads and staging areas to address soil erosion and sedimentation. During the winter months, all construction activities would follow the program for wet weather identified in the Humboldt Redwood Company (HRC) Habitat Conservation Plan.

Water used for construction of project facilities, dust control, soils compaction, and concrete manufacture would consist of treated wastewater effluent (recycled water) from the Scotia Community Services District and HRC in the town of Scotia, located about 5 miles northwest of the project site. Treated effluent would be delivered to the project site via water truck.

2.3.1 COMPONENT SHIPPING AND STAGING

WTG components consisting of blades, nacelles, tower sections, transformers, and other large parts would be stacked on shipping frames and barged to Humboldt Bay for offloading at Fields Landing (Figure 2-14). Barges would enter Humboldt Bay connected to a tugboat by a 2,200-foot-plus towline, which would be spooled and shortened before entering the approach jetty.



Source: Photograph by Central Oceans USA in 2018

Figure 2-14. Fields Landing

Transportation by sea would take place when weather conditions and the sea state are acceptable, based on predetermined conditions established by the port captain, who must consider limits on load size, the risk of unfavorable sea conditions, and waves breaking across the bar. The port captain would use a vessel tracking weather service to determine an

9 Data compiled by Stantec, January 2, 2019.

acceptable “sea state” for departure and inform the marine surveyor and tug master of the day’s conditions on each day before departure.

The size of a barge entering the harbor is limited by the width of the jetty entrance into the harbor and water depth in the harbor during low tide. Barges must be slim enough to pass through the harbor entrance without touching the jetty, and must have enough draft or be positioned in deep enough water during the unloading process to avoid touching the harbor bottom.[10]

The largest barge capable of meeting these constraints while transporting the project components for unloading and storage at Fields Landing has dimensions of 340 feet by 86 feet by 20 feet, which would draft approximately 2 feet, 6 inches at empty weight (light draft). The maximum weight this size barge can handle is approximately 7,000 gross tonnage or 14 million pounds. At that weight, the barge would draft approximately 15 feet (Central Oceans USA 2019).

The pier field (last of the edge of former dock pilings) is 50 feet from the stable terminal wall. Water depth at this point is 2.5 feet at mean low tide (8–10 feet at high tide). Approximately 60 feet from the terminal wall, water depth drops to more than 10 feet at low tide. Loaded barges would be positioned by tug to a predetermined location based on the specific load weight draft and daily tides. Using steel ropes extending to the shore, the barge would tie up to heavy concrete blocks. In the barge channel, a Series S-50 or S-70 model spud barge with cleats, potable spud wells, and spud/morning legs would be used to provide a mooring to prevent the barge from drifting toward the shore (Figure 2-15).[11] Four spud legs would be used for mooring.

Source: Photograph by Central Oceans USA in 2018

Figure 2-15. Typical Series S-50 Spud Barge

A crane would be placed on the shore at Fields Landing. The crane would be capable of lifting 160,000 pounds (slightly heavier than the largest piece) 65 feet high at 115 feet of reach.[12] This reach would be sufficient to allow the crane to offload components from the front of the barge to the center of the barge while moored off-shore.

After offloading half of the cargo on the barge, the crane would be rotated to allow it to access the remaining cargo.

[10] Draft is the depth of the bottom of the barge below the surface of the water.

[11] Spud-leg is a method of anchorage better known for securing floating work platforms to their watery bed to prevent general movement and drifting from their work area.

[12] Reach is measured from the center of the crane to end of the hook.

Once offloaded from the barge, components would be either directly loaded onto transport vehicles or temporarily stored at existing storage yards within the Fields Landing complex: a paved yard adjacent to the offloading location and a compacted gravel storage yard immediately south of the western terminus of South Bay Depot Road. Both yards may be used for short-term storage of components (Figure 2-16).

Offloading of barges at Fields Landing is scheduled to occur over a 30-day period. Barges would be offloaded between 7 a.m. and 10 p.m.

Access to and egress from Fields Landing for trucks with WTG components would be via South Bay Depot Road. Additional turning radii may be required to accommodate trucks departing the storage yard(s) with blades and other large components.

2.3.2 COMPONENT TRANSPORT TO THE PROJECT SITE

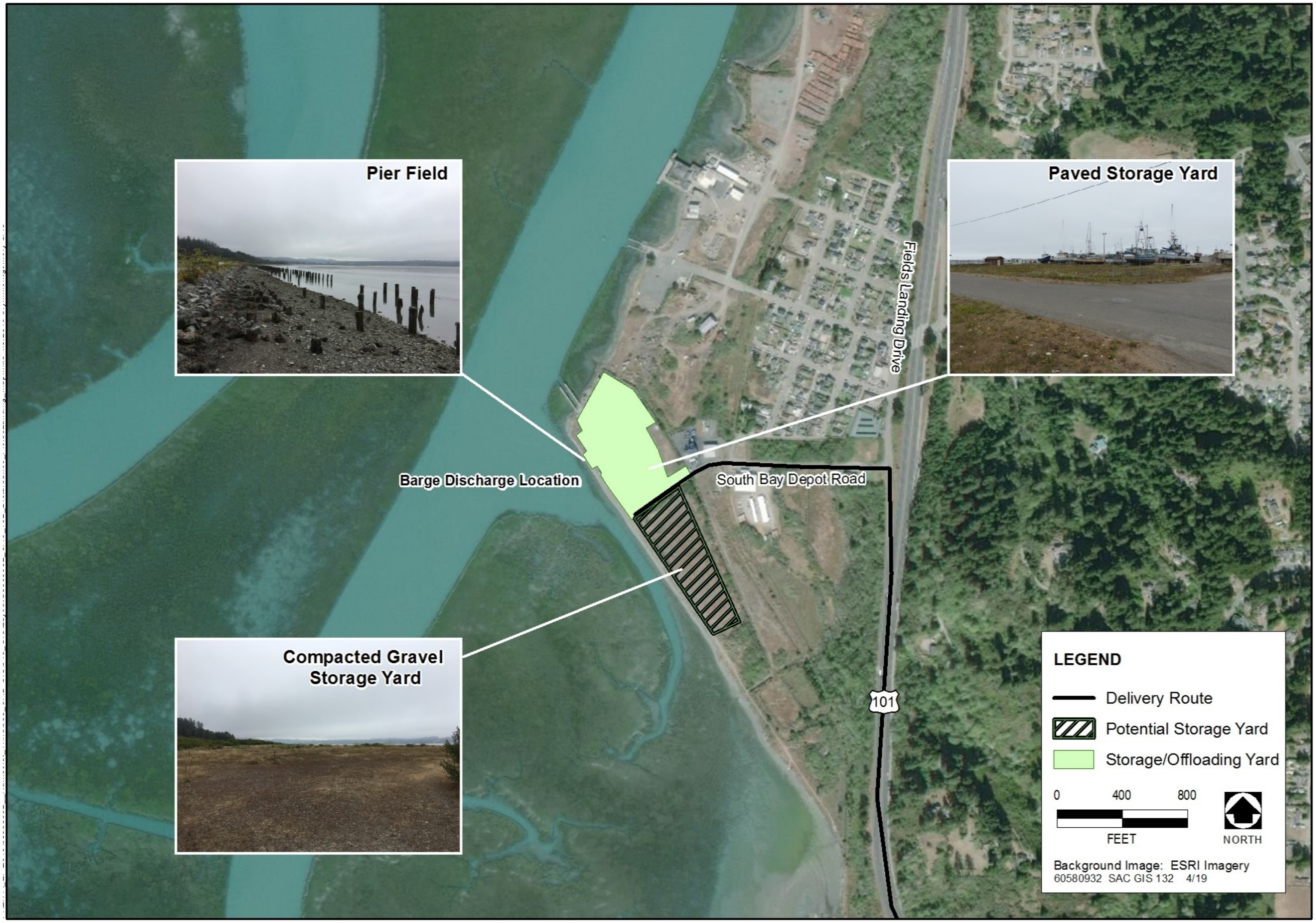
Components would be transported overland to the project site on heavy trucks, which would use U.S. 101 before reaching the temporary staging area at the Jordan Creek off-ramp (Figure 2-17). Truck trailers may be larger than average to carry oversized loads. If required, pilot vehicles would accompany the trucks. Upon reaching the temporary staging area, the equipment would be either offloaded and temporarily stored or hauled directly to the worksite and assembled or installed. Transport of heavy components may require localized clearing or pruning of vegetation, temporary relocation of obstacles such as fences and overhead power lines, and/or placement of temporary mats and fill material to support the loaded vehicle weight.

For each WTG, up to 15 separate loads of equipment and materials would be delivered to the pad. Nine to 12 of these loads would be oversized permitted loads (Figure 2-18). Towers would be generally delivered and constructed in three, four, or five sections, depending on the WTG selected. Each WTG blade, nacelle, and rotor and set of down-tower components (e.g., controllers, ladders and platforms, and WTG switchgear) would be delivered separately.

Trucks loaded with WTG parts would exit the Fields Landing storage yard(s) and travel eastbound on South Bay Depot Road, then would turn right (south) onto Fields Landing Drive. Trucks would merge onto southbound U.S. 101 and travel southbound to the Jordan Creek off-ramp (Figure 2-17). This turn would require repositioning one communications pole a short distance to the north, increasing the right-hand turn radius, and possibly repositioning the stop sign and other road signs a short distance to the south given the need for wide right-hand turns.

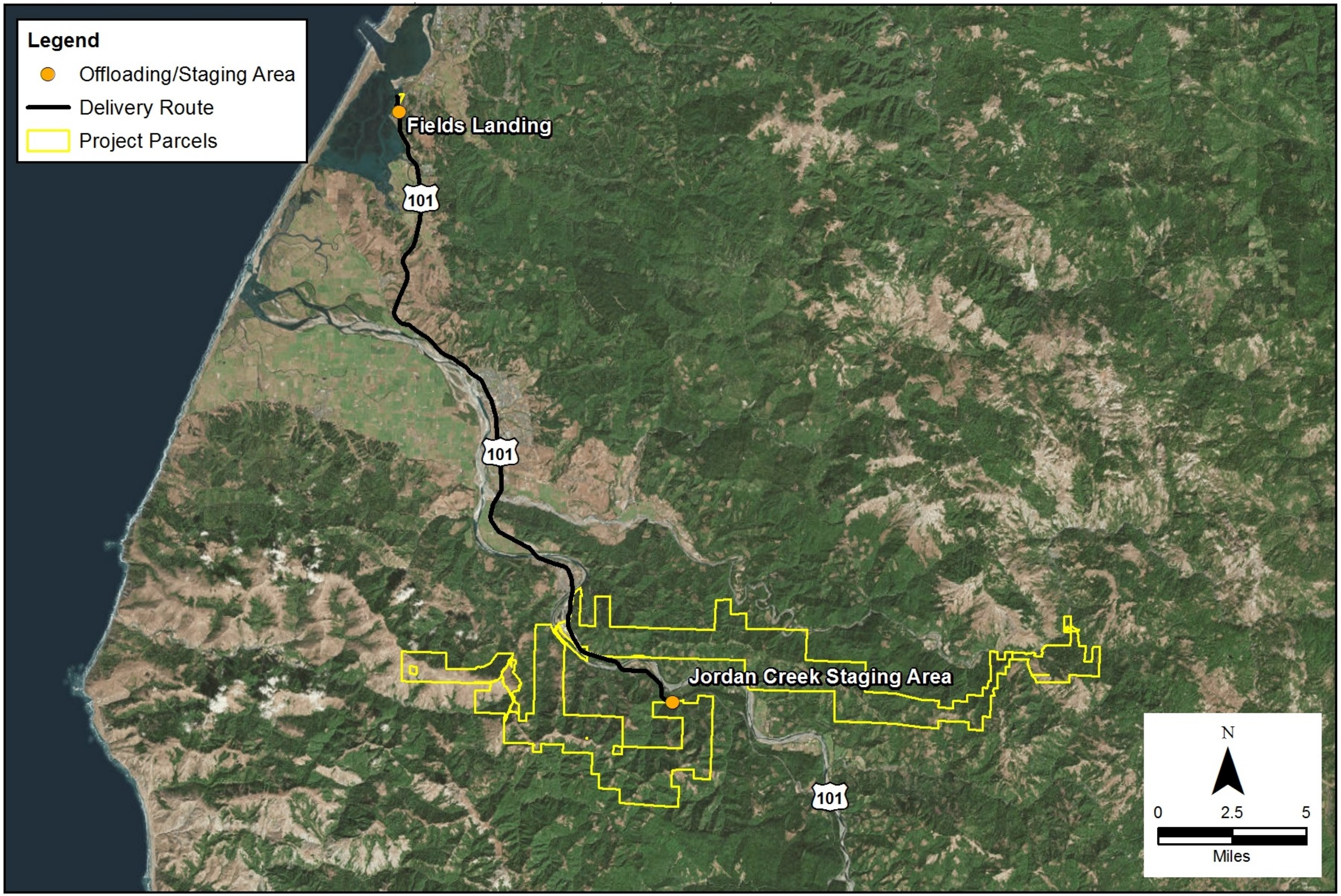
Most project components could be transported directly to the project laydown yard at Jordan Creek without requiring any improvements to the U.S. 101 corridor. However, depending on final WTG selection and the transportation plan, the base tower section may exceed the allowable height of two overpasses: Hookton Road and 12th Street. The following temporary detours and physical improvements are proposed for these locations:

- **Hookton Road—**A temporary off-ramp from U.S. 101 would be constructed to allow trucks carrying base tower sections to exit onto Visitor Center Access Road (Figure 2-19). The temporary bypass would be constructed by placing a culvert, geotextile fabric, and gravel to create a 21-foot-wide link between U.S. 101 and the frontage road where the elevations of the two routes are roughly equivalent. Trucks would proceed southbound on Visitor Center Access Road before reentering U.S. 101 on the Eel River Drive on-ramp.



Source: Stantec 2018; photographs by AECOM 2018

Figure 2-16. Fields Landing Barge Offloading and Temporary Storage



Source: Stantec 2018

Figure 2-17. Project Component Transportation Haul Route

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The temporary off-ramp would disturb 1.35 acres of right-of-way. All improvements would be removed following WTG delivery, which is expected to last up to 6 months. The sites would be restored to pre-installation conditions.

Source: Photograph by Vestas Americas in 2017

Figure 2-18. Clearance for Blade Tip Swing-out

- **12th Street Overpass—**A temporary off-ramp would be constructed between U.S. 101 and the northern terminus of Dinsmore Drive (Figure 2-20). Trucks would proceed south on Dinsmore Drive before reentering U.S. 101 using the existing on-ramp located at the junction of Dinsmore Drive and Riverwalk Drive.

  The bypass would be constructed in a similar fashion to that at Hookton Road. The temporary ramp would disturb approximately 0.131 acre of right-of-way.

Additional detours off U.S. 101 are planned that would not require physical improvements other than trimming vegetation to provide truck clearance:

- **Loleta Drive—**Trucks would exit southbound at Loleta Drive, go around the underpass, and reenter the highway using the southbound on-ramp.

- **Finch Creek Bridge**—Trucks carrying heavy loads, such as nacelles and base tower sections, would exit U.S. 101 using the southbound off-ramp at Singley Road. Vegetation may be cleared at the base of the Singley Road off-ramp. Trucks would then proceed south on Singley Road before reentering U.S. 101 at the Fernbridge Drive on-ramp.

- **Palmer Boulevard Bridge**—Trucks carrying heavy loads, such as nacelles and base tower sections, would exit U.S. 101 using the southbound off-ramp at Palmer Boulevard. The trucks would then proceed to the southbound on-ramp and reenter the highway.

All transportation activities would be timed to minimize traffic disruptions consistent with applicable permits administered by the California Department of Transportation (Caltrans) and the County. Delivery of project components would be coordinated through both the Caltrans and County encroachment permit processes. These processes would be used to determine the final trailer configuration, clearance requirements, emergency service access, lane closures (if required), California Highway Patrol escort (as required), and transportation times.

2.3.3 ACCESS ROADS

Access to the proposed WTG pads and ancillary project components would be provided by the existing network of logging roads except where the existing road cannot accommodate trucks hauling oversize loads. The first step in the construction of access roads would be tree clearing as required, rough grading, and leveling. Base rock would be trucked in, spread, and compacted to create a road base. Capping rock would then be spread over the.

Source: data compiled by AECOM in 2019

Figure 2-19. Hookton Road Off-Ramp Detour

Source: data compiled by AECOM in 2019

Figure 2-20. 12th Street Ramp Detour Modifications and Disturbance Area

road base and roll-compacted to finished grade. The grading equipment would make a final pass on permanent maintenance roads to level the road surfaces, and more capping rock would be spread and compacted where needed. Some segments of currently paved roads (e.g., Shively Road) may require realignment to provide access for the gen-tie. Realigned segments would be improved with gravel during construction. Paved portions would be repaved once construction activities are completed. All newly constructed roads would remain in place for the life of the project.

2.3.4 TURBINE FOUNDATION

Each WTG would have a concrete-and-steel-reinforced foundation with a WTG-mounting pedestal. Foundation construction would include the following stages (with not all stages required at all WTG locations): vegetation removal; grading; excavation; assembly of rebar and bolt cage; concrete casting and finishing for the foundation base; form installation for the pedestal, pedestal pouring, and finishing; removal of the forms; backfilling and compaction; and restoration of the foundation site area.

The exact type of foundation would not be determined until more detailed engineering and geotechnical work is conducted during the construction planning stage. However, for the purpose of the environmental analysis, this EIR assumes a foundation size resulting in the maximum disturbed area.

Constructing the foundations for the WTGs would involve making a roughly circular excavation approximately 25 feet in diameter and 10 feet deep. In some locations, large boulders may require the use of explosives. In such cases, boreholes about 3 inches in diameter would be drilled to a depth of 2 feet below the foundation depth. Packets of explosives about the size of soda cans (each containing about 2 pounds of explosive material) would be lowered into the boreholes (one packet per foot of depth) and the remaining space would be filled with sand. Rock in the excavation area would be first fractured by delayed detonation blasting in interior and perimeter boreholes. Most of the energy released by the detonation would be consumed in fracturing rock within a conical zone a maximum of twice the depth of the foundation (i.e., 20 feet). The fractured rock would subsequently be removed from the excavation area.

Two sections of concentric steel conduit forms would be lowered into the excavation. Concrete slurry would be pumped between the outside of the larger diameter conduit and the perimeter of the excavation. Spoils from the excavation would fill the inside of the smaller diameter conduit. A bolt structure would be lowered into the area between the two conduits and concreted into place. The WTG tower would be connected to the protruding bolts

Depending on foundation specifications, each foundation could require 580 cubic yards of 5,000- to 6,150-pounds-per-square-inch test concrete and 20 cubic yards of 2,000-pounds-per-square-inch slurry mix, which would require up to 60 truckloads of concrete per WTG from the on-site temporary cement batch plants.

2.3.5 COLLECTION SYSTEM INSTALLATION

Communications fiber optic cables and grounding cables would be installed concurrently with the 34.5 kV collection lines in the same trenches. Electric cables would be laid in the trenches and surrounded with a cushion of clean fill and inspected, and the trenches would be backfilled and compacted. After inspection and testing, the 34.5 kV collection lines would be connected to the WTG switchgear at the base of the WTGs at one end and at the substation’s low-voltage breakers at the other end.

2.3.6 PROJECT SUBSTATION CONSTRUCTION

Construction of the project substation would involve several stages of work: grading the substation area; installing a grounding mat; constructing several foundations for the transformer, power circuit breakers, and structures; erecting and placing the steel work and all outdoor equipment; and completing electrical work for all required terminations. The entire substation would be enclosed by a chain-link security fence. After construction, an inspection and commissioning test plan would be executed before the substation is energized.

2.3.7 GEN-TIE INTERCONNECTION

Construction of the gen-tie would involve using standard industry procedures including surveying, materials hauling, structure assembly and erection, wire grounding, conductor stringing, cleanup, and restoration. All transmission lines and structures would be designed to minimize perching by raptors and other birds, following industry standards outlined by the Avian Power Line Interaction Committee (APLIC and USFWS 2005).

Erecting structures and stringing conductors would occur sequentially along the corridor for the transmission interconnect lines. Existing public and private roads and roads constructed or improved for the project would be used to transport materials and equipment from staging areas to ingress points along the transmission interconnect line, using the shortest distance feasible. In some cases, a helicopter may be used to string the transmission line and install the power poles.

The gen-tie would cross under the bed of the Eel River, using a horizontal directional drilling technique. A 2-acre staging yard would be established in an upland area on the west side of the river. A similar staging area would be established on the east side of the river, between the HRC log yard and the eastern bank of the river. The horizontal directional drilling would begin on the west side of the river and the length of the bore would be increased by adding a section of pipe behind a drill bit. Once the bore is complete, the drill bit would be extracted and either metal or plastic casing would be positioned to stabilize the bore.

Once the casing has been established, the 115 kV wire would be positioned on self-supporting transition structures before being pulled through the casing. On the east side of the river, another transition structure would be used between the casing and the first aerial structure. The sending and receiving areas would be reclaimed after construction.

2.3.8 MODIFICATION OF PG&E BRIDGEVILLE SUBSTATION

PG&E would expand and modify the existing switchyard at the PG&E Bridgeville Substation as part of the project. Modifications to the Bridgeville Substation would include upgrading equipment and relocating power poles within the substation to accommodate the project’s gen-tie, as outlined in Section 2.2.5, “Bridgeville Substation Upgrades.”

2.3.9 TURBINE INSTALLATION

Once adequate WTG pad sites and roads have been prepared, the turbine components would be transported to each WTG pad from the temporary staging area(s) for assembly at the pad site. After installation of the WTG switchgear on the foundation, the tower would be erected in sections using a crane. Tower construction would be followed by hoisting and installing the nacelle; assembling, hoisting, and installing the rotor; connecting internal cables; and inspecting and testing the electrical system.

2.3.10 FINAL TESTING AND TURBINE COMMISSIONING

Before being commissioned, all project facilities, systems, controls, and safety equipment would be calibrated and tested to ensure their compliance with required specifications and proper working order. Each WTG would be commissioned individually, in sequence, after each unit has reached mechanical completion. All systems would be tested before energization; then, following a strict predetermined sequence, backfeed power would be admitted to the down-tower switchgear and routed to all systems within the unit. After all necessary checks have been completed, the nacelle would yaw to the wind and the blades would be pitched so that the rotor would start turning. Once the rotor is turning, the WTG would be tested by feeding energy from the generator to the controller, synchronizing the controller with the grid, and generating power for a short period of time. After this initial test, each WTG would go through predetermined run tests for up to 72 hours. Commissioning for the whole plant would be achieved when this process is completed for the last WTG.

2.3.11 CLEANUP AND RESTORATION

After construction, all temporary impact areas would be restored to their preconstruction state as appropriate for the project site, in accordance with County requirements or permits and authorizations issued by other regulatory agencies. All construction debris and waste would be stored outside of any jurisdictional drainage and in locations that would avoid unnecessary movement of the material. When removed, material would be disposed of at an appropriate location by a local, licensed disposal company.

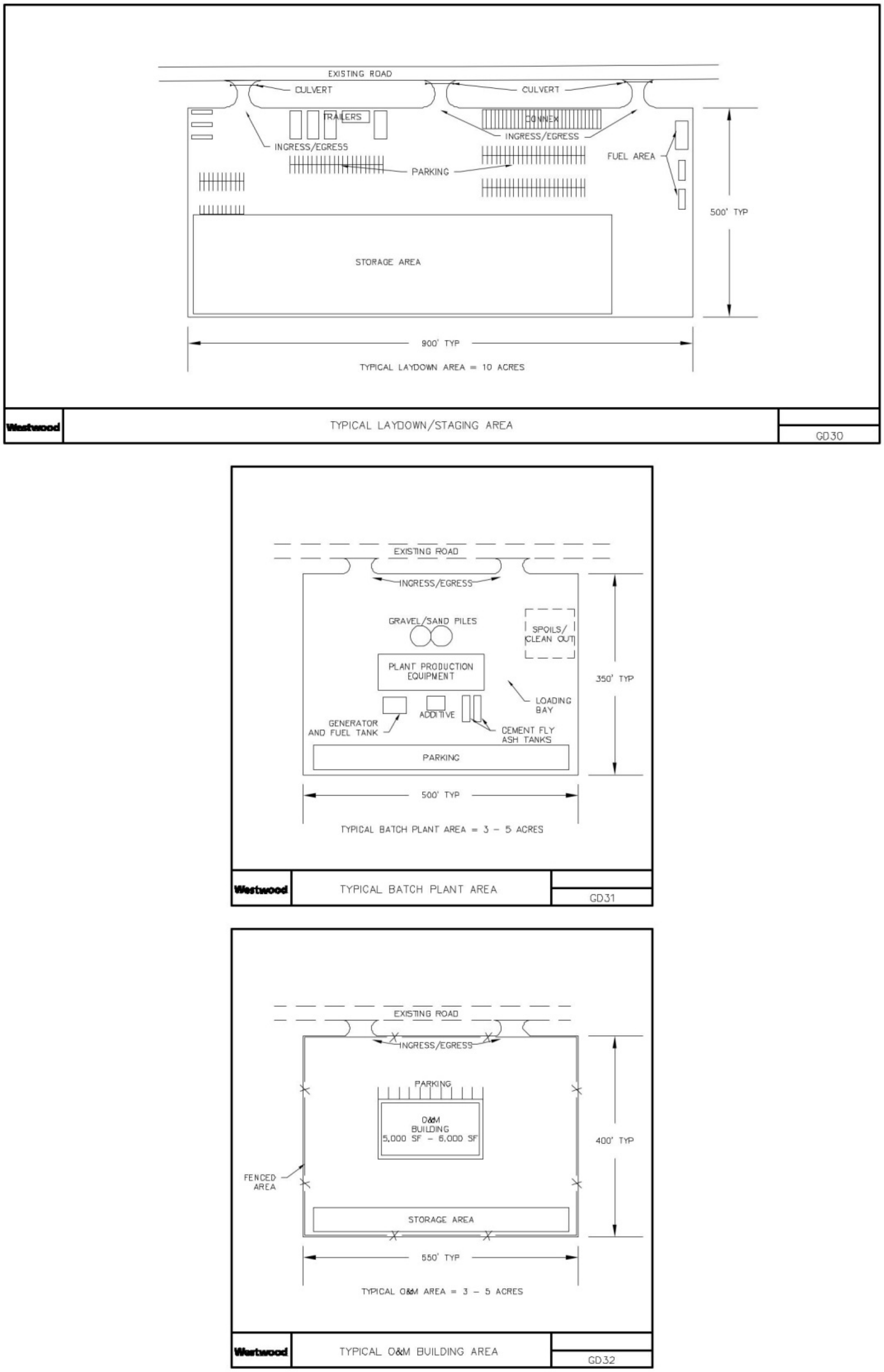
2.3.12 CONSTRUCTION AND EQUIPMENT AREAS

The temporary construction staging area, trailer area, and parking area, all located at Jordan Creek, would consist of an approximately 10-acre (5-acre O&M facility plus 5-acre temporary staging area) compacted gravel pad on a cleared and graded footprint (Figure 2-21). During construction, this area would be used to store large equipment and materials, refuel equipment, and collect and temporarily store construction waste. It would also be used for parking, construction office space, and temporary (portable) sanitary facilities. Construction vehicles would be refueled by a vendor-supplied fuel truck that would make daily or weekly deliveries to approved storage tanks. After construction, this area would become part of the project's O&M facility (Figure 2-21).

In addition to the 10-acre area that would become part of the project's O&M facility, the project would require up to two temporary staging areas, each up to 5 acres, to stage construction equipment and construction contractor trailers, and for offloading and temporary storage of project equipment and materials (Figure 2-2). The temporary staging areas would be cleared of vegetation, compacted to support construction equipment, and potentially graveled, depending on soil conditions.

2.3.13 BATCH PLANT

One temporary cement batch plant would be set up along Monument Ridge at the project substation to supply cement for the WTG and transformer foundations (Figure 2-22). The cement batch plant would typically operate during construction hours (sunrise to sunset), but may operate outside of those times if inclement weather were to delay construction. Up to 11,000 cubic yards of concrete would be required to construct the WTG tower and substation foundations. Depending on weather conditions, concrete typically needs to be poured within 90 minutes of being mixed with water. Delivery time to pour locations from existing concrete suppliers near the



Source: Data compiled by Stantec in 2018

Figure 2-21. Typical Site Plan for Staging Area and Batch Plant

generation area, or from potential off-site staging areas, may exceed 90 minutes. Therefore, a temporary concrete batch plant may need to be constructed in the generation area so that concrete can be poured within 90 minutes of mixing it.

The temporary concrete batch plant would be located on approximately 5 acres. Vegetation would be cleared, the ground leveled, and appropriate erosion control devices such as earth berm, silt fences, and straw bales would be installed around the area to contain water runoff. Diversion ditches would be installed as necessary to prevent stormwater from running onto the site from surrounding areas.

Source: Stock photo

Figure 2-22. Typical Mobile Batch Plant

The batch plant would require a stand-alone generator approximately 250 kilowatts in size. The generator would draw fuel from an approximately 500-gallon aboveground storage tank with secondary storage for spill prevention. The batch plant is estimated to consume 10,000–15,000 gallons of water per day. A minimum 10,000-gallon water tank would be required on-site and would be replenished as needed.

Stockpiles of sand and aggregate would be stored at the batch plant in a manner that would minimize exposure to wind. Cement would be discharged via screw conveyor directly into an elevated storage silo without outdoor storage. Construction managers and crew members would use good housekeeping practices to keep the plant, storage, and stockpiles clean and to minimize the buildup of fine materials. Cement trucks would be cleaned and washed at the batch plant. Cement residue would be washed from the cement delivery trucks into an aboveground settling pond. Cement residue would be collected from the settling pond and trucked off-site for disposal, as needed.

After completion of construction activities, the temporary batch plant area would be recontoured, stockpiled topsoil would be replaced, and the area would be reseeded with a designated mixture prescribed by a restoration plan. All waste and debris from batch plant operations would be hauled off-site and disposed of at appropriate locations. Recyclable items would be staged and disposed of separately, and hazardous materials would be handled in accordance with all laws and regulations.

2.3.14 CONSTRUCTION TRAFFIC

Over the entire construction period, approximately 9,670 heavy truck trips would be needed for delivering the WTG parts and related material to the project site (Table 2-2). These trucks could weigh up to 110 tons and could be up to 90 feet long. Because of the large size and low maneuverability of the vehicles, brief temporary road closures may be required while larger parts are being transported.

Dump trucks, concrete trucks, water trucks, cranes, and other construction and trade vehicles would also travel to the site. In total, the project would generate 29,250 trips over the course of construction. After construction, operation and maintenance activity of the project would require approximately three round trips per day using pickups or other light-duty trucks.

Table 2-2 Heavy Truck Trips

Component	Heavy Truck Trips by Component*	Total Heavy Truck Trips
Turbines (60)	4	240
Rock	33	2,000
Water	91	5,470
Cement	1	73
Sand	31	1,890
Total		9,673

Note: * Numbers may not sum due to rounding.
Source: Data provided by Humboldt Wind LLC in 2018

Although the large trucks carrying WTG parts would be required to travel via a specific route (as described above), other construction traffic would travel to the Jordan Creek staging area via the most efficient paths. In general, construction traffic would travel to the generation area from U.S. 101. All construction traffic would be routed to the Jordan Creek staging area. The construction traffic management plan, which would be prepared as a condition of the project, would prohibit the use of Monument Road from Rio Dell or Bear River Ridge Road/Mattole Road through Ferndale. The plan would identify haul routes, construction worker traffic patterns, and detour routes for implementation during transportation of heavy project components. See Section 3.12, “Transportation and Traffic,” for more information.

2.3.15 HAZARDOUS MATERIALS

The use of hazardous materials is required during construction and operation of wind energy generation projects. Table 2-3 summarizes the materials typically used for such projects, with details about their use and typical quantities.

Table 2-3 Typical Hazardous Materials Associated with Wind Energy Projects

<table>
<tr><th>Hazardous Material</th><th>Uses</th><th>Typical Quantities</th></tr>
<tr><td>Fuel: Diesel fuel[a]</td><td>Powers most construction and transportation equipment during the construction and decommissioning phases. Powers emergency generator during the operational phase.</td><td>The project estimate is more than 5,000 gallons to be stored in aboveground tanks during construction at any one time. An unknown amount would be used during decommissioning.[b]</td></tr>
<tr><td>Fuel: Gasoline[c]</td><td>Used for some construction equipment, transportation vehicles, and during operations.</td><td>Because few construction and transportation vehicles use gasoline, on-site storage is not likely to occur during any project phase.</td></tr>
<tr><td>Fuel: Propane[d]</td><td>Most probable fuel for ambient heating of the control building.</td><td>Typically 500–1,000 gallons stored in an aboveground storage vessel for use to heat the O&M building.</td></tr>
<tr><td rowspan="3">Lubricating oils/ grease/hydraulic fluids/gear oils</td><td>Lubricating oil is present in some wind turbine generator components and in the diesel engine of the emergency power generator.</td><td>55 gallons or less, stored and maintained on-site in portable containers during construction and decommissioning.</td></tr>
<tr><td>Maintenance of fluid levels in construction and transportation equipment.</td><td rowspan="3">55 gallons or less, stored in portable containers on-site during the operational phase.</td></tr>
<tr><td>Hydraulic fluid is used in the rotor driveshaft braking system and other controls.</td></tr>
<tr><td>Lubricating oils/grease/hydraulic fluids/gear oils</td><td>Gear oils and/or grease are used in the drivetrain transmission and yaw motor gears.</td></tr>
</table>

Table 2-3 Typical Hazardous Materials Associated with Wind Energy Projects

Hazardous Material	Uses	Typical Quantities
Glycol-based antifreeze	Present in some wind turbine generator components for cooling (e.g., 5–10 gallons per turbine are present in the recirculating cooling system for the transmission).	Limited quantities (10–20 gallons of concentrate) stored on-site during construction and decommissioning.
	Present in the cooling system of the diesel engine for the emergency power generator.	Limited quantities (1–10 gallons of concentrate) stored on-site during the operational phase.
Lead-acid storage batteries and electrolyte solution	Present in construction and transportation equipment.	Limited quantities of electrolyte solution (less than 20 gallons) for maintenance of construction and transportation equipment during construction and decommissioning.
	Backup power source for control equipment, tower lighting, and signal transmitters.	
Other batteries (e.g., nickel-cadmium batteries)	Present in some control equipment and signal-transmitting equipment.	No maintenance of such batteries is expected to take place on-site.
Cleaning solvents	Organic solvents (most likely petroleum-based but not listed under the Resource Conservation and Recovery Act) used for equipment cleaning and maintenance.	Limited quantities (less than 55 gallons) on-site during construction and decommissioning to maintain construction and transportation equipment.
	Where feasible, water-based cleaning and degreasing solvents may be used.	Limited quantities (less than 55 gallons) on-site during operations.
Paints and coatings[e]	Used for corrosion control on all exterior surfaces of wind turbine generator towers.	Limited quantities for touch-up painting during construction (less than 50 gallons) and for maintenance during operations (less than 20 gallons).
Dielectric fluids[f]	Present in electrical transformers, bushings, and other electric power management devices as an electrical insulator.	Turbine transformers may contain more than 500 gallons of dielectric fluid. Substation transformers each contain approximately 10,000 gallons of mineral oil.
Explosives	May be necessary for excavation of tower foundations in bedrock.	Limited quantities equal to only the amount necessary to complete the task.
	May be necessary for construction of access and/or on-site roads or for grade alterations.	On-site storage expected to occur for only limited periods of time as needed by specific excavation and construction activities.
Herbicides	May be used to control vegetation around facilities for fire safety.	If deemed necessary, herbicides would likely be brought to the site and applied by a licensed applicator.

Notes: O&M = operations and maintenance

[a] It is assumed that commercial vendors would replenish diesel fuel stored on-site as necessary.

[b] This value represents the total on-site storage capacity, not the total amount of fuel consumed (see footnote a, above). On-site fuel storage during the construction and decommissioning phases would likely be in aboveground storage tanks with a capacity of 500–1,500 gallons. Tanks may be of double-wall construction or may be placed within temporary, lined earthen berms for spill containment and control. At the end of the construction and decommissioning phases, any excess fuel, as well as the storage tanks, would be removed from the site, and any surface contamination resulting from fuel handling operations would be remediated.

[c] Gasoline is expected to be used exclusively by on-road vehicles (primarily automobiles and pickup trucks).

[d] Delivered and replenished as necessary by a commercial vendor.

[e] It is presumed that all wind turbine generator components, nacelles, and support towers would be painted at their respective points of manufacture. Consequently, no wholesale painting would occur on-site; only limited amounts would be used for touch-up purposes during the construction and maintenance phases. It is further assumed that the coatings applied by the manufacturer during fabrication would be sufficiently durable to last throughout the equipment's operational period and that no wholesale repainting would occur.

[f] It is assumed that transformers, bushings, and other electrical devices that rely on dielectric fluids would have those fluids added during fabrication. However, very large transformers may be shipped empty and have their dielectric fluids added (by the manufacturer's representative) after installation. New transformers, bushings, and electrical devices are expected to contain mineral oil-based or synthetic dielectric fluids that are free of polychlorinated biphenyls. Some equipment may instead contain gaseous dielectric agents (e.g., sulfur hexafluoride) rather than liquid dielectric fluids.

Source: Adapted by AECOM in 2019 from "typical" windfarm equipment lists provided by Stantec

The project applicant would develop and implement a fire protection plan before construction and operation. The fire protection plan would include emergency response and evacuation procedures that would include immediate notification of local fire agencies. Staff would be equipped with incipient fire suppression equipment (i.e., designed for fighting initial-stage fires), radio and cellular access, and pertinent telephone numbers for reporting a fire. See Section 3.9, “Hazards and Hazardous Materials,” for more information.

2.3.16 WATER SUPPLY AND USAGE

Most of the project’s water use would occur during the construction phase for dust suppression, backfill compaction, and cement mixing. These activities are expected to require 62 acre-feet of water over the duration of construction. This water demand would be met by the use of treated wastewater sourced from the nearby Scotia Community Services District’s wastewater treatment and cogeneration facilities and from HRC discharges into the “Log Pond” located in the town of Scotia. Potable water required at the O&M building would be provided by a groundwater well.

2.3.17 CONSTRUCTION SCHEDULE, PERSONNEL, AND EQUIPMENT

Project construction is anticipated to require 12–18 months. Table 2-4 lists the heavy equipment that would be used during construction activities. Table 2-5 lists typical equipment specifications and runtimes.

Table 2-4 Construction Workforce and Equipment Required for a Typical 155-Megawatt Wind Energy Project

Construction Activity	Workforce	Typical Equipment Used
Office staff/management	10	Pickup trucks and small vehicles
Foundations	30	Dozer, grader, excavator or drill rig, crane, concrete pump trucks, concrete trucks, pickup trucks with trailers, all-terrain forklifts, water trucks, dump trucks, compactors, generators, welders
Roads	24	Dozer, grader, front-end loaders, compactor, roller, pickup trucks, water trucks, dump trucks, compactors, scrapers
Turbine component unloading crew (pad site)	15	Cranes, all-terrain forklifts, pickup trucks with trailers
Wind turbine generator erecting	40	Cranes, pickup trucks with trailers
Environmental	8	Pickup and flatbed trucks
Substation	20	Cranes, forklifts, pickup trucks, water trucks, concrete pump trucks, concrete trucks, dump trucks, compactors, generators, welders, scrapers
Collection system	30	Trencher, grader, forklift, small cranes
Directional boring	8	Boring machine, pickup trucks
Gen-tie	53	Cranes, excavator, drill rig, pickup trucks
Laborers	30	Pickup trucks
Owner representatives	7	Pickup trucks
Turbine supplier	25	Pickup trucks
Total Number of Workers	**300**	**NA**

Note: gen-tie = generation transmission line; NA = not applicable

Source: Data compiled by Stantec in 2018

Table 2-5 Typical Construction Equipment

Equipment Type by Project Phase	Number of Pieces	Equipment Engine Size (horsepower)	Fuel Type	Daily Operation of All Units (hours/day)	Total Working Days/Unit (days)
Access Roads and Pads					
Grader	2	175	Diesel	8	140
Bulldozer	1	255	Diesel	8	140
Excavator	2	163	Diesel	8	140
Loader	2	200	Diesel	8	140
Compactor	3	172	Diesel	4	140
Smooth drum compactor	3	172	Diesel	4	100
Off-road dump truck	5	400	Diesel	6	140
Belly dump trailers on tractors	3	98	Diesel	6	140
Truck-mounted hydraulic jackhammer	10	123	Diesel	8	45
Small roller	4	81	Diesel	4	20
Telescopic forklift	2	100	Diesel	8	45
Large rubber-tired roller	3	175	Diesel	6	45
Backhoe	3	98	Diesel	8	140
Masticator	1	163	Diesel	6	100
Foundations					
Cranes (40- to 60-ton)	2	226	Diesel	4	60
Large excavator	5	163	Diesel	8	60
Bulldozer	1	255	Diesel	8	60
Track hoe	10	208	Diesel	6	60
Grader	2	175	Diesel	6	60
Off-road dump truck	5	400	Diesel	6	60
Compactor	3	172	Diesel	4	60
Smooth drum compactor	3	172	Diesel	4	60
Large rubber tire roller	2	175	Diesel	4	60
Belly dump trailers on tractors	3	98	Diesel	6	60
Truck-mounted hydraulic jackhammer	10	123	Diesel	4	45
Loader	2	200	Diesel	8	55
Small roller	3	81	Diesel	4	45
Telescopic forklift	3	100	Diesel	2	60
Remote dual drum compactor	2	172	Diesel	2	50
Vibrating roller	2	81	Diesel	4	60
Small compaction machine	4	85	Diesel	2	60
Jumping jack	4	78	Diesel	2	60
Bridgeville Substation Upgrades					
Vertical drill rig	2	206	Diesel	8	80
Cranes (multiple)	1	226	Diesel	4	80
Telescopic forklift	1	100	Diesel	8	80
Loader	1	200	Diesel	6	80
Backhoe	1	98	Diesel	8	80
Trencher	2	81	Diesel	6	80

Table 2-5 Typical Construction Equipment

Equipment Type by Project Phase	Number of Pieces	Equipment Engine Size (horsepower)	Fuel Type	Daily Operation of All Units (hours/day)	Total Working Days/Unit (days)
Transmission Line Construction					
Vertical drill rig	3	206	Diesel	6	200
Excavator	1	163	Diesel	8	200
Bulldozer	1	255	Diesel	6	200
Off-road dump truck	5	400	Diesel	6	200
Compactor	2	172	Diesel	4	200
Smooth drum vibrating compactor	2	172	Diesel	4	200
Remote dual drum compactor	2	172	Diesel	4	200
Large rubber tire roller	2	175	Diesel	4	200
Belly dump trailers on tractors	2	98	Diesel	6	200
Backhoe	1	98	Diesel	6	200
Man lift	3	63	Diesel	6	200
Cranes (multiple)	2	226	Diesel	8	200
Helicopter	1	847	Diesel	8	200
Rotating boom derrick	5	175	Diesel	8	200
Project Substation Construction					
Cranes (multiple)	1	226	Diesel	4	84
Backhoe	2	98	Diesel	8	84
Large trencher machine	2	81	Diesel	6	84
Padding machine	2	81	Diesel	6	84
Small compaction machine	3	20	Diesel	4	84
Man lift	2	63	Diesel	6	84
Jumping jack	3	78	Diesel	4	84
Vibrating roller	1	81	Diesel	4	84
Turbine Assembly/Erection					
Cranes (multiple)	1	226	Diesel	6	65
Cranes (40- to 60-ton)	3	226	Diesel	6	65
Telescopic forklift	3	100	Diesel	8	65
Man lift	5	63	Diesel	8	65
Source: Data compiled by Stantec in 2018					

2.4 OPERATIONS AND MAINTENANCE ACTIVITIES

Upon completion of construction, the project applicant would ensure that the facility is operated and maintained properly. Up to 15 O&M staff members would service the facility, implement standard operating procedures, and operate the SCADA system.

2.4.1 OPERATIONS AND MAINTENANCE PLAN

The project applicant would develop an O&M protocol to be implemented throughout the life of the project. The protocol would specify routine WTG maintenance and operation that would typically adhere to the maintenance requirements prescribed by the WTG manufacturer. O&M personnel would conduct maintenance activities for each WTG required by the routine schedule provided by the WTG supplier, or as required to keep the equipment in excellent operation.

Some amount of unscheduled maintenance and repair is also expected to be necessary. These activities would be performed in accordance with the requirements of equipment specifications and good industry practice. The O&M plan would also include descriptions of major unscheduled maintenance and response activities.

Scheduled Wind Turbine Maintenance

The O&M plan would include the scheduled minor and major maintenance and inspection activities anticipated during the calendar year. Various inspections would be performed on a daily, weekly, or monthly basis. The results of these inspections would be logged and used to plan future maintenance activities. Visual inspections inside the rotor head, nacelle, and tower bottom would be done on a regular schedule. Information collected in these inspections may be used to plan future maintenance activities.

Regularly scheduled preventive maintenance activities would also be performed on a daily, weekly, or monthly basis. The O&M plan would include a list of scheduled preventive maintenance activities. Routine maintenance may include but would not be limited to replacing lubricating fluids; checking parts for wear and replacement as required; and recording data from data-recording chips in all pertinent equipment, including anemometers. Personnel would also regularly inspect and maintain access roads, crane and WTG pads, erosion control systems, transmission lines, the substation, and perimeter fencing areas to ensure minimal degradation. During project operation, equipment required for maintenance could be staged in the O&M storage yard.

Unscheduled Wind Turbine Maintenance

WTG maintenance and internal inspection activities are normally performed on a scheduled basis. However, should any problems occur, unscheduled maintenance would be required to maintain the operating efficiency of the wind energy facility.

A WTG experiencing mechanical difficulties that could result in safety or environmental risks or damage to the equipment would be taken offline until repairs could be completed. Otherwise, repairs would be planned for the first convenient opportunity.

Roadway Maintenance

Upon completion of construction, access roads would be returned to HRC and used for access to timberland. Roadway maintenance would be performed as needed according to the HRC road management plan. Minor amounts of surface dragging, blading, or grading would be required to remove vehicle ruts that may develop from maintenance traffic or after periods of heavy rainfall. Culverts, drains, or other water management devices would need to be inspected before the wet season and after large storms and kept clear to allow effective drainage.

The HRC road management plan is part of the overall HRC management plan. It describes the construction standards and management, inspections, maintenance, road monitoring, and reporting periods for roads on company property. All roads are inventoried according to an established protocol. HRC uses this database inventory for prioritizing sediment control treatments when storm-proofing roads. Roads are constructed, reconstructed, and removed using specifications and best management practices (BMPs) described in the plan.

The wet-weather season maintenance includes patch or spot rocking, clearing any ditches where runoff is draining poorly, and repairing and maintaining water bars.

Typical measures for ensuring proper site maintenance include identifying access and evacuation routes at the project site; clearing dry, flammable vegetative growth, thereby limiting vegetation fuel sources; and designing firebreaks (by, at minimum, adhering to the established setback distances). The project would implement all relevant safety measures into the operation and maintenance of the project to ensure the safety of employees, visitors, and residents near the project site.

2.4.2 PUBLIC ACCESS AND SAFETY

PUBLIC ACCESS

Public access across most of the project site would be restricted. Limited access would be provided to those users authorized to access the property, such as grazing permittees or employees of communications companies with transmission facilities, at the discretion of the underlying landowner. Authorized users would also have access during the construction period but would be subject to safety measures negotiated by the project applicant and the landowner.

FENCING

The on-site substation would be fenced with a chain-link fence to prevent public and wildlife access to high-voltage equipment. Safety signs would be posted in conformance with applicable federal and state regulations around all towers (where necessary), transformers, and other high-voltage facilities and along roads.

LIGHTING REQUIREMENTS

FAA regulations require lighting on structures more than 200 feet tall. Through its Notice of Proposed Construction or Alteration (Form 7460.1), the FAA would conduct a review of the project before construction begins (Title 14, Part 77 of the Code of Federal Regulations). The WTGs proposed under all generation options would be more than 200 feet tall and therefore would require appropriate obstruction lighting. However, the FAA may determine that the absence of marking and/or lighting would not threaten aviation. Recommendations for marking and lighting structures vary depending on terrain, local weather patterns, geographic location, and, in the case of windfarms, the cumulative number of towers and overall site layout. As a result of its review process, the FAA might recommend installing tower markings or aviation safety lighting on all or only a portion of the WTG towers.

Lighting would be placed on one or more WTGs in a manner compliant with the FAA Obstruction Marking and Lighting Advisory Circular (AC70/7460-1K). The probable lighting setup is anticipated to consist of two medium-intensity flashing white lights operating during the day and twilight and two flashing red beacons operating at night. The intensity of the lights would be based on a level of ambient light, with illumination less than 2 foot-candles being normal for nighttime and illumination of more than 5 foot-candles being the standard for daytime. The lights would likely not be mounted on every WTG, but would be located on several strategically selected turbines to mark the extent of the WTGs adequately. The minimum number of required lights would be used to minimize attractants for birds during night migrations.

WILDFIRE PLANNING AND DESIGN

The project would be constructed and would operate in compliance with federal and state laws related to the generation and distribution of energy. Measures that would be incorporated into the project design and activities specified in the O&M plan to address fire safety are listed below.

- **Vegetation Management:** The project would comply with North American Electric Reliability Corporation Standard FAC-003 on Transmission Vegetation Management, by practicing a defense-in-depth strategy to manage vegetation located on transmission rights-of-way. The management plan would:
  - specify procedures for documenting the maintenance strategies, processes, and specifications used to manage vegetation;
  - require timely notification of the appropriate control center regarding vegetation conditions that could cause a flash-over;
  - require corrective actions to ensure that flashover distances would not be violated;
  - require annual inspections of vegetation conditions; and
  - require completion of the annual work needed to prevent flash-over.
- **Remote Monitoring**: Remote monitoring of WTG operations through the SCADA system provides a tool for the operator to assess the health of the power system including the WTGs, substation, and gen-tie equipment. Turbine speeds can be regulated through SCADA to ensure consistent power delivery and prevent overloading of system components. Operators can use SCADA to remotely shut down one or more WTGs or completely disconnect from the grid in the event of an emergency.

2.5 PROJECT DECOMMISSIONING AND RESTORATION

The project is assumed to have a life span of up to 30 years. Decommissioning would require a separate discretionary permit and would require removal of the WTGs, cables, and other infrastructure support facilities. Any underground utility improvements would be abandoned in place. Restoration of disturbed lands would occur in accordance with regulations and/or the landowner’s contractual commitments. Alternatively, new technology may become available for repowering the WTGs to foster more efficient operation.

Upon decommissioning of the facility, the WTGs would be removed from the project site, and the materials would be reused or sold for scrap. Decommissioning activities are anticipated to be similar to construction-related activities. Therefore, all management plans, BMPs, and stipulations developed for the construction phase of the project would be applied to the decommissioning phase. At a minimum, a decommissioning plan would be developed and implemented. The decommissioning plan would require removal of all above-grade structures and facilities from the project site. In addition, a minor stormwater management plan would be prepared in accordance with County requirements, outlining plans for decompaction, recontouring, hydroseeding, and if necessary, installation of BMPs to prevent significant impacts on water quality.

After facilities have been removed and the project site is returned to preconstruction and operation condition, the project applicant would implement a restoration plan in accordance with County requirements, similar to the plan used during construction. Topsoil from all decommissioning activities would be salvaged and reapplied during final reclamation. All areas of disturbed soil would be reclaimed using weed-free native shrubs, grasses, and forbs. The vegetation cover, composition, and diversity would be restored to values commensurate with the area's ecological setting, consistent with measures identified in the permits.

If the project applicant decides to repower the project, the applicant would be required to apply for all required environmental and permit/entitlement reviews and new landowner agreements to extend the operational period. The project applicant would be financially responsible for restoring the land to its preconstruction condition after project operations and would be conditioned to prepare a decommissioning and restoration plan at the time of decommissioning. These responsibilities are tied to the project through the conditions of project approval and would be transferred to any future owners of the project. The approval of a decommissioning plan would be subject to further environmental review, to be conducted when such a plan is submitted for consideration by County decision makers.

2.6 ANTICIPATED PERMITS AND APPROVALS

Table 2-6 lists the federal, state, and County permits that may be required for the project.

Table 2-6 Anticipated Permits and Approvals

Jurisdiction	Regulation	Regulatory Agency/ Regulator	Permit/Authorization/Submittal
Federal	National Historic Preservation Act Section 106 Cultural Compliance	SHPO	Consultation under Section 106 of the NHPA, resulting in SHPO concurrence as non-eligible, SHPO concurrence with the implementation plan, and SHPO concurrence with avoidance
	Clean Water Act Section 404	USACE	Nationwide permits
	Federal Endangered Species Act	USFWS (terrestrial species), NMFS (anadromous and marine fish, marine mammals, and sea turtles)	Biological opinion and incidental take permit under Section 7 of the Endangered Species Act
State	California Endangered Species Act	CDFW	Fish and Game Code Section 2081 incidental take permit
	California Fish and Game Code Section 1602	CDFW	Notification of lake or streambed alteration to CDFW resulting in lake or streambed alteration agreement
	Clean Water Act Section 401	North Coast RWQCB	Water quality certification
	CPUC General Order 131-D	California Public Utilities Commission	Authorization to upgrade PG&E Bridgeville Substation
	CPUC Section 851	California Public Utilities Commission	Section 851 permit, if required
	California Coastal Act	California Coastal Commission	Coastal development permit
	Clean Water Act Section 402	North Coast RWQCB	National Pollutant Discharge Elimination System construction general permit and corresponding storm water pollution prevention plan
	California Environmental Quality Act	Humboldt County	EIR
	California Streets and Highways Code	Caltrans	Encroachment permit
		Caltrans	Haul permit
		Caltrans	Height variance
	Forest Practice Act	CAL FIRE	Harvest document
	California Code of Regulations Article 2800	State Lands Commission	Surface and submerged lands lease for directional drilling under the Eel River
County	Humboldt County Code	Humboldt County	Conditional use permit
	Humboldt County Code	Humboldt County	Streamside encroachment special permit
	Humboldt County Code	Humboldt County	Building and grading permits
	California Coastal Act	Humboldt County	Coastal development permit
	Humboldt County Code	Humboldt County	Encroachment permit
	Humboldt County Code	Humboldt County	Transportation permit
	Humboldt County Code	Humboldt County	Permit to construct and operate septic system
	Humboldt County Code	Humboldt County	Water well construction permit
Other	Humboldt National Wildlife Refuge Eel River Unit	USFWS	Encroachment permit or functional equivalent
	City of Fortuna Code	City of Fortuna	Transportation permits
	City of Fortuna Code	City of Fortuna	Encroachment permits

Notes: AE = Agriculture Exclusive zoning; CAL FIRE = California Department of Forestry and Fire Protection; Caltrans = California Department of Transportation; CDFW = California Department of Fish and Wildlife; County = Humboldt County; CPUC = California Public Utilities Commission; EIR = environmental impact report; NHPA = National Historic Preservation Act; NMFS = National Marine Fisheries Service; O&M = operations and maintenance; PG&E = Pacific Gas and Electric Company; RWQCB = Regional Water Quality Control Board; SHPO = State Historic Preservation Officer; TPZ = Timber Production Zone zoning; U.S. 101 = U.S. Highway 101; USACE = U.S. Army Corps of Engineers; USFWS = U.S. Fish and Wildlife Service
Source: Data compiled by Stantec in 2018